Cyber Quest

Windows 10 and MS Office 2019

7



Name .....

Class ..... Section ..... Roll No .....

School .....

Address .....

Phone .....

Preface

Computer is the biggest innovation of mankind and has become one of the basic necessities of human life. Computer learning has been accepted as an integral part of the school curriculum.

Kips, with its vast experience in school computer education has designed the Computer Series, **Cyber Quest**. It is based on Windows 10 and Office 2019. It incorporates tool-based learning and a number of activity-based software, like Paint 3D, eduActiv8, Scratch, etc.

Cyber Quest is one of the most comprehensive series for classes I to VIII, which is free from rote learning. The books follow the latest NEP for imparting computer knowledge. All concepts are explained using the principle of Law of Association **(LOA)**.

Cyber Quest features the latest technology in the field of computers, like MS Office 2019, PHP, Krita, Artificial Intelligence, Robotics, etc. **Coding** has been introduced from class I onwards.

Suggestions for any improvement in the content are welcome so that they may be incorporated in the subsequent editions.

Kips Content Development Team

Acknowledgements

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All suggested use of the internet should be under adult supervision.

WORK DETAILS

S.No.	Chapter Name	Date	Teacher's Signature

Kips

My Performance

Date	Test/ Exam	Marks / Grades Obtained			Highest Marks/Grade in the class	Teacher's Remarks	Parent's Signature
		Theory	Practical	Total			

IT PERSONALITIES



N R Narayana Murthy: He is the co-founder of **Infosys**. He was the chief mentor of the company and has now taken up the title of **Chairman Emeritus**.



Azim Premji: He is the chairman of the **Wipro Limited**, which is one of the global leaders in the software industry.



Sabeer Bhatia: He is an Indian-American businessman and one of the co-founders of **Hotmail.com**. He is a prime example of success story of an Indian at the Silicon Valley.



Sundar Pichai: He is the **CEO** of **Alphabet Inc.** and its subsidiary Google LLC. Under him, Google has developed many AI-based products and services.



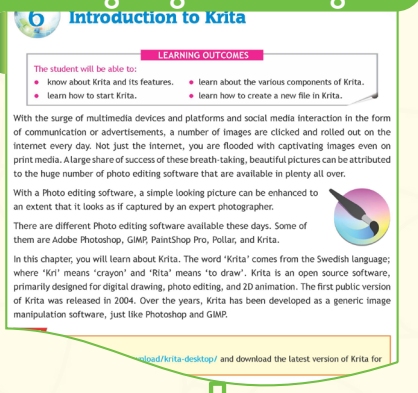
Shiv Nadar: He is the founder and chairman of **HCL** and the **Shiv Nadar Foundation**. He founded HCL in the mid-1970s which is a hugely successful IT enterprise.



Vinod Dham: He is famously known as the **'Father of the Pentium Chip'** for his contribution in making Intel's Pentium microprocessor.

Key Features

Cutting Edge Technologies


Introduction to Krita

LEARNING OUTCOMES

The student will be able to:

- know about Krita and its features.
- learn how to start Krita.
- learn about the various components of Krita.
- learn how to create a new file in Krita.

With the surge of multimedia devices and platforms and social media interaction in the form of communication or advertisements, a number of images are clicked and rolled out on the internet every day. Not just the internet, you are flooded with captivating images even on print media. A large share of success of these breath-taking, beautiful pictures can be attributed to the huge number of photo editing software that are available in plenty all over.

With a Photo editing software, a simple looking picture can be enhanced to an extent that it looks as if captured by an expert photographer.

There are different Photo editing software available these days. Some of them are Adobe Photoshop, GIMP, PaintShop Pro, Pollar, and Krita.

In this chapter, you will learn about Krita. The word 'Krita' comes from the Swedish language; where 'Kri' means 'crayon' and 'Rita' means 'to draw'. Krita is an open source software, primarily designed for digital drawing, photo editing, and 2D animation. The first public version of Krita was released in 2004. Over the years, Krita has been developed as a generic image manipulation software, just like Photoshop and GIMP.

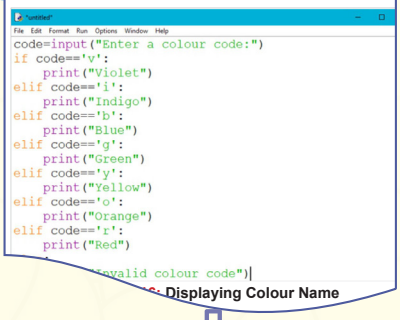
...nload/krita-desktop/ and download the latest version of Krita for

Chapters on cutting edge technologies to intrigue young minds

With self and peer assessment rubrics to encourage collaboration and creativity

Coding

Program 15: Create a program in Python t... corresponding colour code.


Untitled*

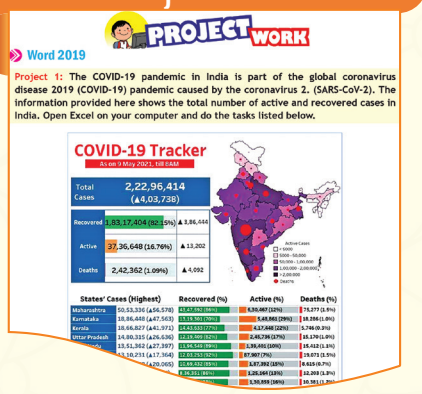
File Edit Format Run Options Window Help

```
code=input("Enter a colour code:")
if code=='v':
    print("Violet")
elif code=='i':
    print("Indigo")
elif code=='b':
    print("Blue")
elif code=='g':
    print("Green")
elif code=='y':
    print("Yellow")
elif code=='o':
    print("Orange")
elif code=='r':
    print("Red")
...valid colour code")
```

...Displaying Colour Name

Using the latest and age-appropriate software in all grades

Project Work


PROJECT WORK

Word 2019

Project 1: The COVID-19 pandemic in India is part of the global coronavirus disease 2019 (COVID-19) pandemic caused by the coronavirus 2. (SARS-CoV-2). The information provided here shows the total number of active and recovered cases in India. Open Excel on your computer and do the tasks listed below.

COVID-19 Tracker

As on 9 May 2021, 1:08 AM

Total Cases	2,22,96,414 (▲4,03,738)	
Recovered	1,83,17,404 (82.19%)	▲3,86,444
Active	37,36,648 (16.76%)	▲13,202
Deaths	2,42,362 (1.09%)	▲4,092

States' Cases (Highest)	Recovered (%)	Active (%)	Deaths (%)
Maharashtra	50,53,336 (▲56,578)	41,47,592 (18%)	4,30,867 (12%)	75,277 (1.5%)
Karnataka	18,86,440 (▲47,563)	13,93,707 (74%)	5,68,881 (29%)	18,396 (1.0%)
Kerala	18,66,827 (▲41,971)	14,43,653 (77%)	4,17,648 (22%)	5,746 (0.3%)
Uttar Pradesh	14,90,315 (▲29,636)	12,51,700 (72%)	2,48,739 (17%)	10,176 (1.0%)
...	13,51,362 (▲27,397)	11,98,545 (89%)	1,39,495 (10%)	13,322 (1.1%)
...	13,10,211 (▲17,364)	12,03,253 (92%)	87,907 (7%)	19,071 (1.5%)
...	... (▲70,065)	14,83,132 (35%)	4,97,382 (35%)	8,619 (0.7%)
...	36,351 (▲91%)	3,29,564 (33%)	32,203 (3.3%)	
...		1,30,559 (16%)	10,583 (1.3%)	

Artificial Intelligence


FUN with AI

Arduino Microcontroller Programming

Arduino is an open-source platform, used for building electronics projects. It consists of a programmable circuit board – a microcontroller and an IDE. The IDE runs on your computer, and is used to write and upload the computer code to the physical board. The Arduino IDE uses a simplified version of C++, making it easier to learn to program.

Arduino is the most simple and affordable, small-scale computer with a microprocessor that focuses on interaction with the outside world. Most of the computers you are familiar with are controlled almost exclusively through the keyboard and mouse, touchscreen, or trackpad. An Arduino allows you to take information from the outside world with sensors that measure temperature, light and sound levels, or even the vibrations underneath your feet and convert these measurements into motion, sound, light, and more.

The Arduino was originally developed for the students without a background in electronics and programming to create interactive objects that can scan the environments. Since the original Arduino was released in 2005, it is estimated that over 1 million have been sold. Designers, educators, engineers, hobbyists, and students have built all kinds of projects that sense and respond to the world with Adruino.

Arduino Hardware

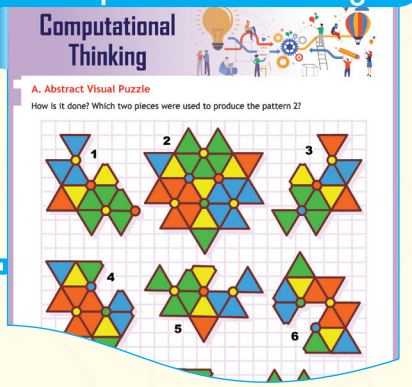
There are many versions of the Arduino, and each is designed for a specific function. The ...shows a few of the Arduino boards.

...pen Source Hardware ...the machines, ...hose

To help students become familiar with the world of AI

Includes activities to develop the critical and logical skills in a fun way

Computational Thinking


Computational Thinking

A. Abstract Visual Puzzle

How is it done? Which two pieces were used to produce the pattern 2?

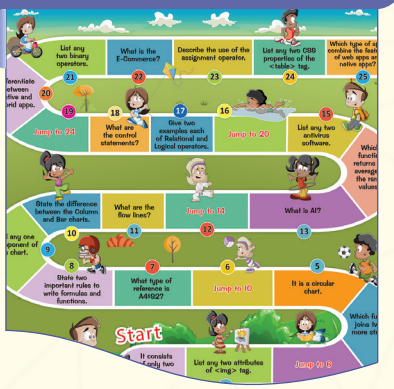
1 2 3 4 5 6

Highlights the latest NEP key points with the icons below

- Healthy Living
- Computational Thinking (Coding)
- Artificial Intelligence
- Board Games
- Cyber Ethics
- Life Skills & Values
- Art Integration
- Cross-Curricular Activities

For revision and engaging the students

Board Games



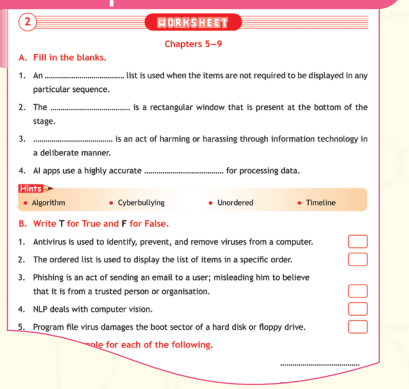
Activity Section



Includes Lab Sessions, topics for Group Discussion, Online Links for more information, etc.

To assess the progress of the students

Test Papers and Worksheets



Cyber Ethics



To make the children aware about the precautions and etiquette to be followed while using the internet

Healthy Living



To help the students imbibe good eating habits and focus on their fitness

Additional Digital Resources Include

- **CYL** – Consolidate Your Learning
- **QPG** – Question Paper Generator
- **ICL** – Interactive Classroom Learning
- **AR** – Augmented Reality App
- Lesson Plans
- Answer Keys

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Chapter 1

Number System

LEARNING OUTCOMES

The student will be able to:

- know about different number systems.
- perform computer arithmetic.

In early days when there were no means of counting, people used to count with the help of fingers, stones, pebbles, sticks, etc. These methods were not adequate and had many limitations. To overcome these limitations, many number systems were introduced with the passage of time, like:

- Decimal number system
- Binary number system
- Octal number system
- Hexadecimal number system

A number system is a set of values used to represent different quantities.

Decimal Number System

The need for counting paved the way to introduce the decimal number system in which digits 0,1,2,3...9 are used to form any number. Most of the arithmetic operations are performed with the decimal numbers.

Decimal number system consists of ten digits, i.e., 0 to 9 with the base 10. Each number can be used individually or they can be grouped to form a numeric value, for example, 82, –256, 52.87, etc. The value of each digit in a number depends upon the following:

- The face value of the digit
- The base of the number system
- The position of the digit in the number

Each position represents a specific power of base (10). The right most digit of a number is called the **Least Significant Digit** whereas the left-most digit is called the **Most Significant Digit**. For example, the number 547 can be represented in the following way:



Example

5 4 7

7 * 10^0	units	=	7
4 * 10^1	tens	=	40
5 * 10^2	hundreds	=	500
			547

The positional value of each digit increases ten folds as you move from right to left. In the example given, 5, 4, and 7 are the **face values** and their **place values** are hundreds, tens, and units, respectively. The place value depends on the position of the digit in the number.

Now, let us discuss the various types of number systems that are used in a computer.

Binary Number System

The binary number system consists of only two digits, i.e., zero and one (0 and 1). Since this system uses two digits, it has the base 2. All digital computers use this number system and convert the input data from the decimal format into its binary equivalent.

Importance of Binary Code

A computer understands only the binary codes. Therefore, the data that is entered into a computer is converted into its binary equivalent. It further converts the binary results into their decimal equivalents for the output.

Conversion of Decimal to Binary Number System

The equivalence between binary and decimal numbers can be understood with the help of the given examples. To convert a decimal number into binary number, follow the given rules:

- Divide the given decimal number with the base 2.
- Write down the remainder, divide the quotient again by 2.
- Repeat step 2 till the quotient becomes zero.



Example

Example 1:

2	25	
2	12	1 → Least Significant Digit
2	6	0
2	3	0
2	1	1
	0	1 → Most Significant Digit

Thus, $(25)_{10} = (11001)_2$

The base of number is given as subscript.

Example 2:

2	321	
2	160	1 → Least Significant Digit
2	80	0
2	40	0
2	20	0
2	10	0
2	5	0
2	2	1
2	1	0
	0	1 → Most Significant Digit

Thus, $(321)_{10} = (101000001)_2$

Remainders, that are obtained in each step are written in reverse order, i.e., the least significant digit is placed at the top and most significant digit at the bottom, to form the binary equivalent of the decimal number.

Conversion of Binary to Decimal Number System

To convert a binary number into decimal number, follow the given steps:

- Multiply each binary number with its positional value, which is in terms of powers of 2, starting from the extreme right digit.
- Increase the power, one-by-one, keeping the base fixed as 2.
- Sum up all the products to get the decimal number.


Example

Example 1:

$(1010)_2$

0×2^0 – Units = 0

1×2^1 – Tens = 2

0×2^2 – Hundreds = 0

1×2^3 – Thousands = 8

Thus, $(1010)_2 = (10)_{10}$

Example 2:

$(1\ 0\ 0\ 1)_2$

$1 \times 2^0 = 1$

$0 \times 2^1 = 0$

$0 \times 2^2 = 0$

$1 \times 2^3 = 8$

Thus, $(1001)_2 = (9)_{10}$

Example 3:

$(110001001)_2 = 1 \times 2^8 + 1 \times 2^7 + 0 \times 2^6 + 0 \times 2^5 + 0 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 0 \times 2^1 + 1 \times 2^0$

$= 256+128+0+0+0+8+0+0+1$

$= 393$

Thus, $(110001001)_2 = (393)_{10}$

Fact File



Aryabhata was India's greatest mathematician and astronomer. He introduced the concept of 0 (zero) without which modern computer technology would have been non-existent.

Lets Know More

Base or Radix of a Number System

The base of a number system is the number of digits used in it. For example, the decimal number system uses 10 digits, so its base is 10.

Octal Number System

The Octal number system (Oct) consists of 8 digits: 0 to 7 with the base 8. The concept of octal number system came from the Native Americans as they used to count numbers by using the space between their fingers rather than using their fingers.

Conversion of Octal to Decimal Number System

The procedure of 'octal to decimal' conversion is similar to 'binary to decimal' conversion, the only difference is the change of base. So, if you want to convert any octal number to decimal number, you have to

Fact File



Gottfried Leibniz, a German mathematician is credited with the invention of the modern Binary number system.

start multiplying the digits of the number from the right-hand side with the increasing power of 8, starting from 0. After multiplication, sum up all the products.


Example

Example 1:

$(345)_8$

$(3 \times 8^2) + (4 \times 8^1) + (5 \times 8^0)$

$192 + 32 + 5$

Thus, $(345)_8 = (229)_{10}$

Example 2:

$(317)_8$

$(3 \times 8^2) + (1 \times 8^1) + (7 \times 8^0)$

$192 + 8 + 7$

Thus, $(317)_8 = (207)_{10}$

Hexadecimal Number System

This number system consists of 16 digits: 0—9 and the letters A—F, where A—F represents digits 10 to 15 with the base 16. This number system is also known as Hex, where Hex=6 and Decimal=10, so it is called the Hexadecimal.

Hex	Decimal Value
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7

Hex	Decimal Value
8	8
9	9
A	10
B	11
C	12
D	13
E	14
F	15

Conversion of Hexadecimal to Decimal Number System

The procedure of converting hexadecimal to decimal is similar to the methods shown above, the only difference is the change of base. To convert hexadecimal number to decimal, multiply the number with base 16.


Example

Example 1:

$(3B)_{16}$

$(3 \times 16^1) + (11 \times 16^0)$

$48 + 11$

Thus, $(3B)_{16} = (59)_{10}$

Example 2:

$(4D2)_{16}$

$(4 \times 16^2) + (D \times 16^1) + (2 \times 16^0)$

$1024 + 208 + 2$

Thus, $(4D2)_{16} = (1234)_{10}$

Computer Arithmetic

As a computer understands only the binary code, the data input by the user is converted into binary code for processing. This processing may involve various kinds of arithmetic operations, such as addition, subtraction, multiplication, division, etc., on binary numbers.

Binary Addition

The technique used to add binary numbers is very easy and simple. This is performed in the same way as you perform addition with decimal numbers. The following table illustrates the addition of two binary digits:

Know the Fact

4 bits = 1 nibble

2 nibbles = 8 bits

8 bits = 1 byte

Binary Addition

a	b	a + b = c
0	0	0 + 0 = 0
0	1	0 + 1 = 1
1	0	1 + 0 = 1
1	1	1 + 1 = 0 and carry 1



Tip

While adding 1 + 1, the output will be 10, where 0 is written under the same column and carry over 1 is shifted to the next position.



Example

Example 1:

Compute $(1000)_2 + (111)_2$

```
  1 0 0 0
+ 0 1 1 1
---------
  1 1 1 1
```

Example 2:

Compute $(11111)_2 + (1011)_2$

```
  1 1 1 1   ← Carry over
  1 1 1 1 1
+ 0 1 0 1 1
-----------
1 0 1 0 1 0
```

Lets Know More

Most computer operations use the byte, or a multiple of the byte (16, 24, 32, 64 bits, etc). Hexadecimal makes it easier to write these large binary numbers.

Binary Subtraction

The rules given in the table must be followed to perform binary subtraction:

Binary Subtraction

a	b	a – b = c
0	0	0 – 0 = 0
1	0	1 – 0 = 1
1	1	1 – 1 = 0
0	1	0 – 1 = 1



NOTE

The number is borrowed from the left digit when 1 is subtracted from 0 (10 – 1 = 1).



Example

Example 1:

Compute $(1111)_2 - (1010)_2$

```
  1 1 1 1
– 1 0 1 0
---------
  0 1 0 1
```

Example 2:

Compute $(1100)_2 - (11)_2$

```
          Borrowed 1      Again Borrowed 1
                  10
          Balance 0   Balance 1   Number is now
    1       1           0           0          10
–   0       0           1           1          –1
-------------------------------------------------
    1       0           0           1          1
```

Quick Quiz

Which number system has '8' as its base?

RECAP

- The decimal number system consists of ten digits, i.e., 0 to 9 with the base 10.
- The right-most digit of a binary number is called the least significant digit whereas the left-most digit is called the most significant digit.
- The binary number system consists of two digits, i.e., 0 and 1 and has the base 2.
- The octal number system consists of 8 digits and has the base 8.
- The hexadecimal number system consists of 16 digits and has the base 16.

Brain developer

A. Fill in the blanks.

1. The base of a binary number system is ..... .
2. The base of a ..... number system is 10.
3. The octal number system consists of ..... digits.
4. In Binary addition, 1 + 0 equals to ..... .
5. The ..... number system is understood by the computer system.
6. ..... uses 16 symbols to represent numbers.

Hints

- Binary
- Hexadecimal
- Decimal
- 2
- 8
- 1

B. Write T for True and F for False.

1. You cannot perform arithmetical operations on binary numbers. ☐
2. The decimal number system consists of 10 digits, i.e., 0 to 9. ☐
3. The number is borrowed when 1 is subtracted from 0. ☐
4. The place value depends on the position of the digit in the number. ☐
5. The numbers used in octal number system are 1 to 7. ☐
6. To convert hexadecimal to decimal, you multiply the number with an increasing power of 8. ☐

C. Select the correct option.

1. A computer understands only ..... codes.

   a. English b. French c. Binary

2. You raise the power one-by-one when converting a binary to decimal, keeping the base fixed as ..... .

   a. 2 b. 8 c. 10

3. In the Hexadecimal number system, the letters A-F represent digits ..... .

   a. 10-16 b. 10-15 c. 9-15

4. In Binary addition, 1 + 0 equals to ..... .

   a. 0 b. 1 c. 2

5. To convert a Decimal number into binary number, divide the number by ..... .

   a. 2 b. 8 c. 10

D. Answer the following questions.

1. What is a number system? Name the different types of number systems.

   .....

   .....

2. What are the rules to convert a decimal number to a binary number?

   .....

   .....

3. What is the base of the octal number system? Which digits are used in it?

   .....

   .....

   .....

4. What is the importance of the binary number system?

   .....

   .....

   .....

ACTIVITY SECTION



MY ACTIVITY

Learning While Playing

A. Convert the following decimal numbers into binary numbers.

a. 68	b. 987	c. 657

B. Convert the following binary numbers into decimal numbers.

a. 1011	b. 100110	c. 10101

C. Perform binary addition on the following.

a. 10101 + 00111	b. 11001101 + 1000101101	c. 1101 + 1001

D. Find the difference between the following binary numbers.

a. 10011 – 01010	b. 11001001 – 01100110	c. 111 – 001

GROUP DISCUSSION

For Concept Clarity



Discuss the following topic:

- **Decimal Number System vs Binary Number System**

PROJECT WORK

Using Creativity



Make a presentation on the **Number System**. Set a beautiful background. Apply formatting and animation effects to it.

ONLINE LINKS

Looking For More



Visit the following links:

- https://www.youtube.com/watch?v=TWm9phoTILw
- https://www.youtube.com/watch?v=b7pOcU1xMks



Chapter 2

Formulas and Functions

LEARNING OUTCOMES

The student will be able to:

- use basic and compound formulas.
- learn about different cell references.
- use different functions.
- know about formula errors.

One of the important attributes of Excel is its ability to perform calculations using either formula or function. In this chapter, you will learn the basics of formulas and functions and how they can be used in different scenarios.

Formulas are the user-defined instructions to perform calculations, whereas, functions are the pre-defined or in-built formulas that come with Excel.

Working with Formulas

Formulas are used to perform calculations involving addition, subtraction, division, and multiplication, etc. A formula establishes a relationship between two or more cells. It is an expression that can include cell addresses, numbers, arithmetic operators, and parenthesis. Using it, you can perform simple as well as complex calculations.

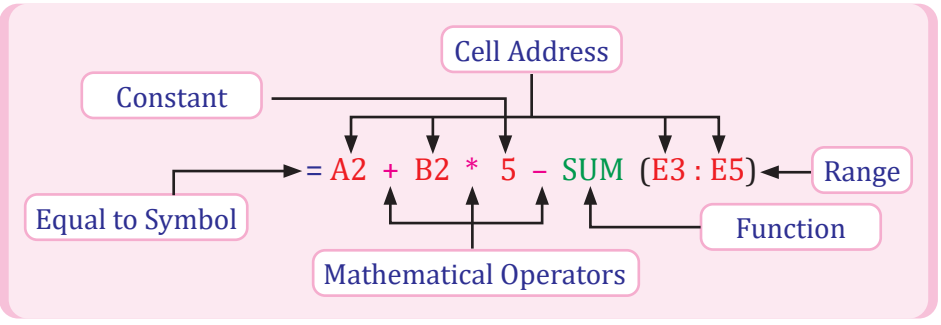
A formula must begin with an equal to (=) symbol, followed by cell references and operators. It may contain a few or all the below-mentioned elements.

References: A cell or range of cells that you want to include in your calculation

Operators: Symbols (+,-,*,^,%,$,#, etc.) that specify the operation to be performed

Constants: Numbers or text values that do not change

Functions: Predefined formulas in Excel



Elements of Formulas in Excel

Using a Basic Formula

A basic formula involves only one type of operator in it. Let us use it to calculate the sum of the numbers in **B4**, **B5**, ... **B9** and display the result in **B11**.

Follow the steps given:

- Click on the cell **B11** (where you want to display the result) and type = sign.
- Click on the cell **B4**. A dashed border called marquee will appear around it. Its address will appear in the cell **B11** and **Formula bar**. This method of clicking on the cell to add its reference to a formula is called **Pointing**. The Status bar will display the status of the **Point**.
- Now, type the + symbol in cell B11.
- Repeat the above steps till **B9** or type: **=B4+B5+B6+B7+B8+B9** in **B11**. Observe the different colour borders that appear around these cells.
- Press the **Enter** key. Cell **B11** will display the total of all the values from **B4** to **B9**.

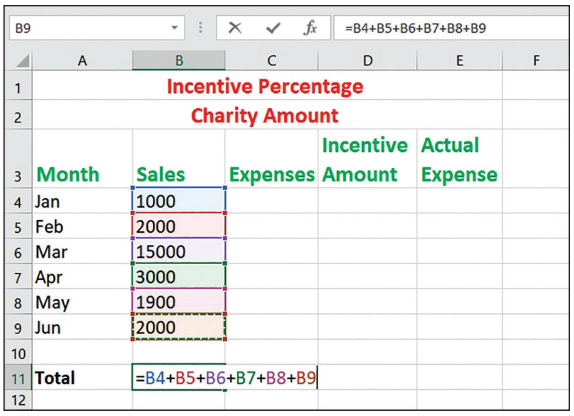


Figure 2.1: Using a Basic Formula

Using Compound Formula

Compound formula is used when more than one operator is required to perform calculation. Let us use it to calculate the Simple Interest by using the formula 'P * R * T/100'. Enter the data as shown in Figure 2.2. Follow the given steps:

- Click on the cell **B6** and type '='.
- Click on the cell **B2**. The cell address of **B2** appears in the cell **B6**.
- Again, type the symbol '*' and click on the cell **B3**.
- Type the symbol '*' in **B6** and click on the cell **B4**. Now, type the symbol '/' followed by 100 in cell **B6** and press the Enter key. The cell **B6** displays the calculated Simple Interest.
- Note that the result appears in the cell, but the actual formula is visible on the Formula bar.

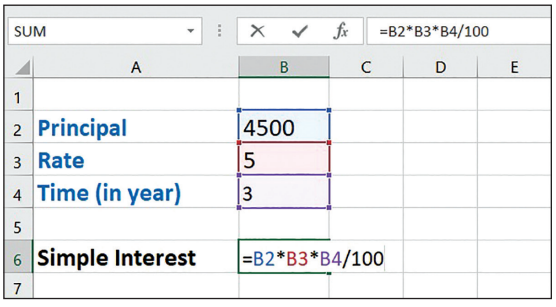


Figure 2.2: Using Compound Formula

Using a Range in a Formula

You can assign multiple cells to a formula by creating a range. By using range you can save a lot of time. For example, if you want to calculate the sum of the multiple columns or rows, it is always better to define a range.

Know the Fact

A range spans a group of cells adjacent to each other on a worksheet. The range can be used in formulas.

- Type the data as shown in Figure 2.3. Click on the cell **B11** and type the formula **=SUM(B4:B9)**. Here, SUM is a built-in function of Excel that helps in adding up the numbers.



B4 =Sum(B4:B9)

	A	B	C	D	E	F
1		Incentive Percentage				
2		Charity Amount				
3	Month	Sales	Expenses	Incentive Amount	Actual Expense	
4	Jan	1000				
5	Feb	2000				
6	Mar	15000				
7	Apr	3000				
8	May	1900				
9	Jun	2000				
10						
11	Total	=Sum(B4:B9)				
12						

Figure 2.3: Using Range in Formula

- Press the **Enter** key. The sum value will be displayed in the cell **B11**.
- Similarly, you can calculate the sum in cell **C11** by using the above-mentioned steps.

Quick View

To enter or modify a formula in a cell, you can also press **F2** after selecting the cell. Any change that you make in the data will be reflected in the result.

Using Formula on Text

You can also perform addition on character and string data type. Except for addition, other operations, like subtraction, multiplication, division, etc., are not allowed on the string data type. The ampersand symbol (&) is used to perform addition. Addition of two or more text values is called **Concatenation**. Let us understand this with the help of an example:

- Enter any string type value in cells **A1** and **B1**, say **Kips** in **A1** and **India** in **B1**.
- Enter the following formula: ="Kips"&"India" or =A1&B1 in cell **C1** and press the Enter key.
- It will display **KipsIndia** in cell **C1**.



C1 =A1&B1

	A	B	C	D
1	Kips	India	KipsIndia	
2				

Figure 2.4: Using Formula on Text

Quick View

To copy a formula from the above cell, press **Ctrl + '** (apostrophe).

NOTE

In the Formula bar, type the text within double quotes in order to create a text value. If you want to leave a blank space after each word, then leave a space before closing the double inverted commas.

For example: ="I "&"Love "&"Computers"

I Love Computers

Types of Cell References

The cell address in a formula is known as the **cell reference**. With the help of references, you can find the values or data in a worksheet that you want to use in the formula. There are three types of cell references.

Relative Reference

When you create a formula, references to a cell or ranges are usually based on the position relative to the cell. When you copy the formula to the other cells, the reference cell automatically gets changed. For example, if the formula in **A3** is **=A1+A2** and you copy the formula from **A3** to **B3**, Excel automatically changes the reference to match the location of the cells, i.e., **=B1+B2**. Let us learn it practically.

- Select the cell **B11**, in which formula **=SUM(B4:B9)** is written. Click on the **Copy** button present in the **Clipboard** group on the **Home** tab.
- Now, select **C11** and click on the **Paste** button.
- Observe that the cell reference in **C11** changes automatically from **B4:B9** to **C4:C9**.

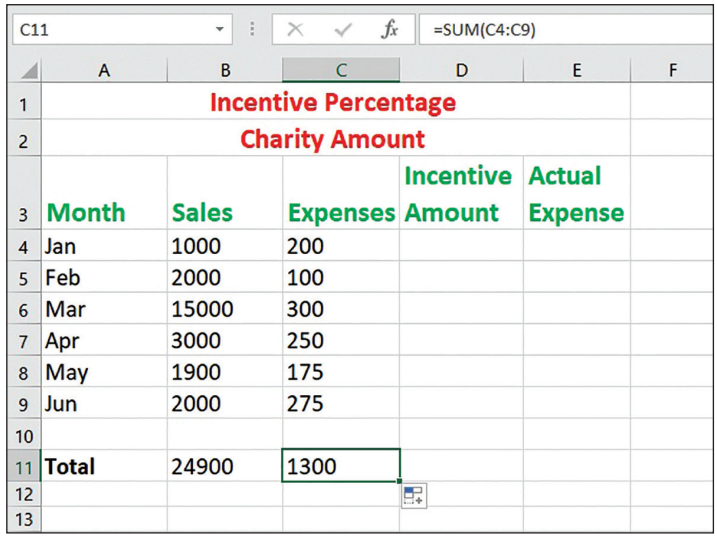


Figure 2.5: Using Relative Reference

NOTE

You can also calculate the sum of the range by using the **Auto Fill** handle '+'. Select the cell **B11** and using the **Auto Fill** handle drag it to **C11**. The sum of the range **C4:C9** will be reflected in the cell **C11**.

Absolute Reference

Absolute reference is used when you do not want to change the address of the cell while copying the formula to the other cell. To use absolute reference in a formula, you need to add dollar ($) sign before the column and row number.

For example, =$A$1+$A$2

Let us calculate the incentive amount at the rate of 10% on monthly sales.

- Type **10%** in cell **D1**.
- Now, click on the cell **D4**.
- Type **=B4*$D$1** and press the **Enter** key.

Let's Know More

The easiest way to define names for cells is to click on the **Name Box** at the left end of the Formula Bar. Type a name for the range and press the **Enter** key.

- The cell **D4** displays the value **100**. The first cell address **B4** has no dollar sign, so it is relative reference and the second cell address is fully absolute. Therefore, when the data of the cell is copied, the first cell reference changes accordingly in the new location, but the second one remains the same, i.e., **$D$1**.
- Now, copy the formula by dragging the mouse pointer to the rest of the cells.

Mixed Reference

Quick View

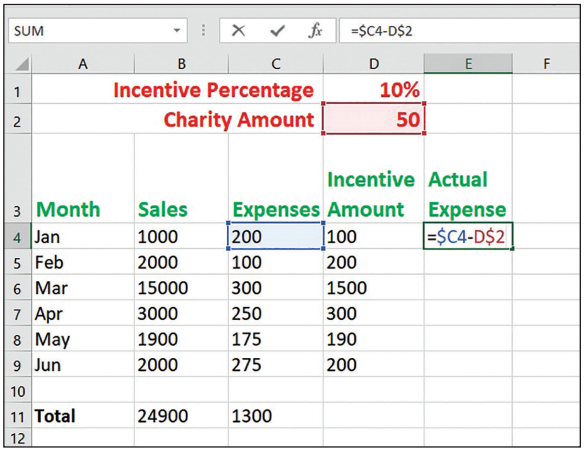
To get the total of adjacent cells, press **Alt + = (Equal)** key combination, instead of clicking on the AutoSum Σ button.

It is a combination of Relative and Absolute reference. In this type of reference, either the row or column has to remain fixed. **$A1 + A$2** is an example of Mixed Reference. Let us use the mixed reference to calculate the Actual Expense.

- Type **50** in cell **D2**. Click on the cell **E4**.
- Type=**$C4–D$2**. Press the **Enter** key.
- You can further calculate the Actual Expenses for the other cells by dragging the mouse pointer to the desired range when it changes to the cross (+) symbol.

Let's Know More

If you want to calculate the sum of multiple cells that are not in a range, separate each cell address by a comma.
E.g. **=SUM (C4, C6, D8)**



	A	B	C	D	E	F
1			Incentive Percentage	10%		
2			Charity Amount	50		
3	Month	Sales	Expenses	Incentive Amount	Actual Expense	
4	Jan	1000	200	100	=$C4-D$2	
5	Feb	2000	100	200		
6	Mar	15000	300	1500		
7	Apr	3000	250	300		
8	May	1900	175	190		
9	Jun	2000	275	200		
10						
11	Total	24900	1300			
12						

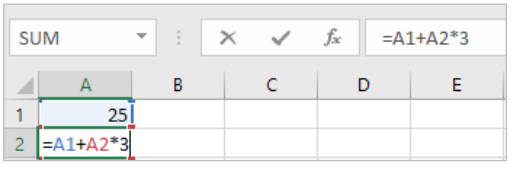
Figure 2.6: Using Mixed Reference

Know the Fact

The common functions, like Sum, Average, Count Numbers, Max, Min, can be used by using the dropdown arrow of **AutoSum** button. To use the other functions, click on the **More Functions** option.

Circular Reference

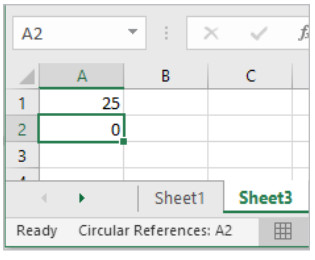
A circular reference occurs when a formula in a cell refers to its own cell value directly or indirectly.



	A	B	C	D	E
1	25				
2	=A1+A2*3				

Figure 2.7: Using Circular Reference

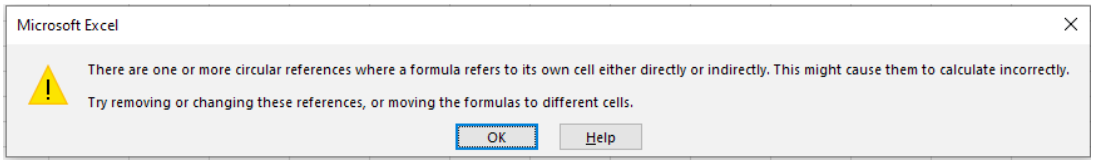
For example, if you enter the formula **=A1+A2*3** in cell **A2**, you are making the formula refer to its own cell value, which is not possible. A warning, as shown in the figure given below, will be displayed in such a case. As soon as you click on the **OK** button



Let's Discuss

Relative vs **Absolute Cell** reference.

of the warning dialog box, 0 will be returned in the cell containing formula. The Status bar will also notify you that circular reference is found in the workbook and the address of that cell will be displayed on it.



Cell Reference of Another Worksheet

You can use the cell reference of one worksheet in another worksheet. This can be done in two ways.

Using Copy and Paste Options

- Click on the **New sheet** button ⊕ present to the right of the **Sheet1** tab at the bottom of the screen. A new worksheet with the name **Sheet2** will be added. Now, enter the data as shown in Figure 2.8.
- Click on the **Sheet1** tab. Now, click on cell **B11** where the 'SUM' function is used.
- Copy the formula using the **Ctrl+C** key.
- Click on the **Sheet2** tab. Click on the cell **B11**. Now, paste the formula by pressing the keys **Ctrl+V**. The cell will display the result of the formula, i.e., the summation of the cell values.

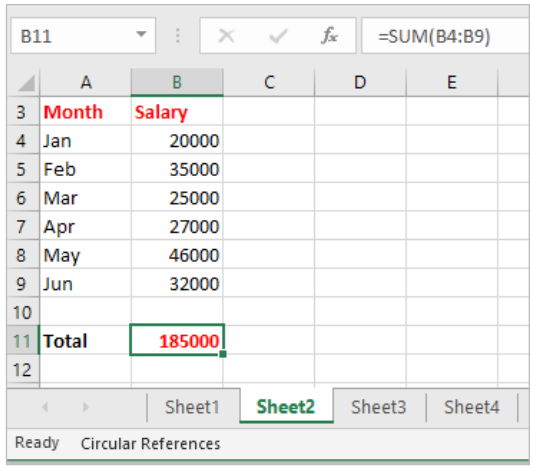


Figure 2.8: Using Copy and Paste Options

Using Sheet Reference

In this method, you use a sheet number, exclamation mark, and cell address to refer to a cell of a particular worksheet.

For example, by writing **Sheet1!D4**, you are referring to the cell **D4** of **Sheet1**. Now, try to use this method to calculate the total salary.

- Click on the cell **C4** of **Sheet2**.
- Type **=B4+Sheet1!D4** in it and press **Enter**. This will add the 'Incentive Amount' present in the cell **D4** of **Sheet1** with the 'Salary' present in cell **B4** of **Sheet2**.

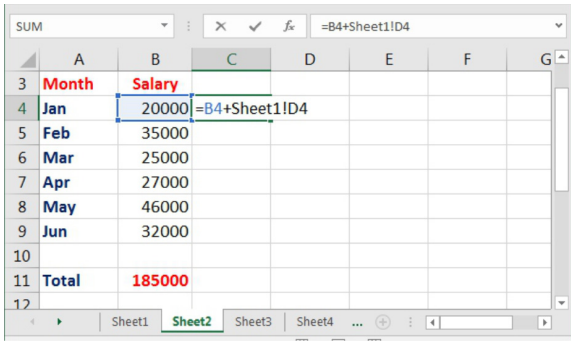


Figure 2.9: Using Sheet Reference

- You can further calculate the total salary for the other cells by dragging the mouse pointer to the rest of the cells when it changes to the cross symbol.

Renaming a Worksheet

By default, the worksheets in a workbook are named as Sheet1, Sheet2, and so on. You can rename a worksheet in order to make it more relevant for the users or readers. Usually, a worksheet is named based on the type of data it is holding. For example, if a worksheet contains daily attendance, you can name it as 'Attendance'. Let us do it practically.

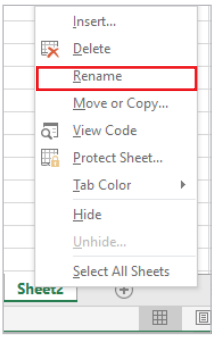


Figure 2.10: Renaming a Sheet Tab

- Right-click on the 'Sheet2' tab the worksheet.
- A shortcut menu will appear. Click on the **Rename** option.
- The Sheet tab gets highlighted. Assign a new name for the sheet by typing on it, say, 'KIPS' and press **Enter**.
- Note that the name of Sheet2 gets changed to 'KIPS'.

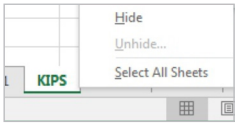


Figure 2.11: Renamed Sheet Tab

Changing Colour of a Sheet Tab

- Right-click on any Sheet tab and select the **Tab Color** option from the shortcut menu.
- Select any colour from the displayed choices and observe the change.

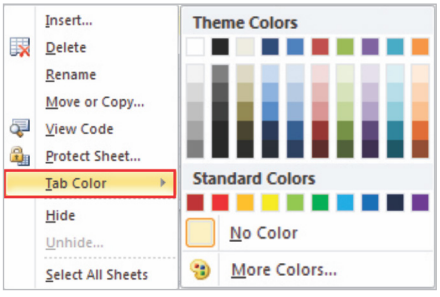


Figure 2.12: Changing Sheet Tab Colour

Functions

Functions are the pre-designed formulas in Excel to perform both simple and complex calculations. Functions save time and eliminate the chance of writing wrong formulas. They accept **Arguments** and return **Values**.

Arguments contain the information that you want to calculate. They are the input values to functions. The values are given within parenthesis. Arguments can be numbers, text, etc., and are enclosed within parenthesis.

Functions begin with the equal to (=) sign followed by the function name and then the list of arguments separated by commas within the parenthesis.

For example, **=Function name(argument1, argument2...)**

Rules to Enter a Function

- All Excel functions must begin with '=' sign.
- Function name must be a valid Excel name. For example, SUM, AVERAGE.

- Function name must be followed by an opening and closing parenthesis.
- Arguments are enclosed in the parenthesis. For example, =SUM (A1:A5).
- Function names are not case-sensitive.

Common Functions

AutoSum

The **AutoSum** option, besides being the common and the fastest way to find out the total of the given numbers in a range, can also be used to carry out different functions, like Average, Count, Max, Min, etc. You can find this option at two places.

- In the **Editing** group on the **Home** tab
- In the **Function Library** group on the **Formula** tab

Let us use this feature to calculate the total marks obtained by 'Anuj'.

- Click on the cell **E6** where you want to calculate the total marks.
- Click on the **AutoSum** option present in the **Editing** group on the **Home** tab.
- A dashed border appears around **C6** through **D6** and Excel automatically enters the formula (that uses the **SUM** function) in cell **E6**. Now, press **Enter**. Cell **E6** will display the result.

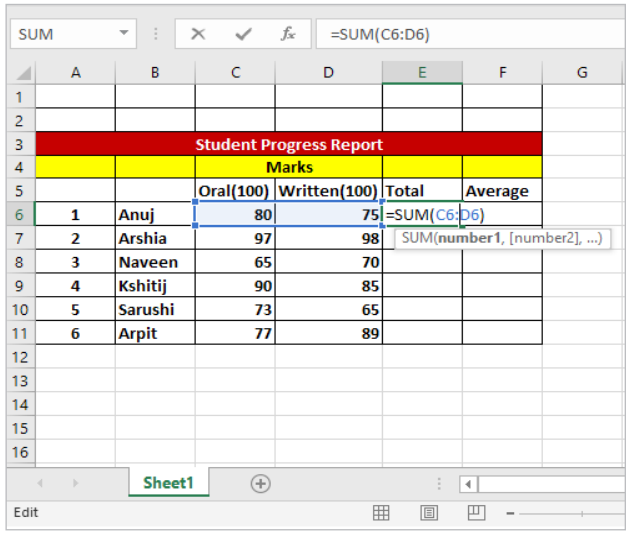


Figure 2.13: Using Sum Function

AVERAGE()

The AVERAGE function returns the average of the range values. The arguments can be a range of cells, simply numbers, or numbers along with cell reference(s). Using the worksheet shown in Figure 2.13, let us calculate the average of marks obtained by 'Anuj'.

- Click on the cell where you want to display the average of values, let us say **F6**.
- Type the equal to sign (=) followed by the name of the function, i.e, **AVERAGE**.
- Put the opening parenthesis symbol '('. Select the cells C6 through D6 to define the range of the cells.
- Put the closing parenthesis symbol ')' and press the **Enter** key. Cell **F6** will display the average of marks obtained by 'Anuj'.

MAX()

The MAX function is used to find the largest value in the given range.

- Click on cell **F4** and type **=MAX(B4:E4)** and press the **Enter** key.
- The maximum value in the range **B4:E4** will be displayed in the cell **F4**.

Similarly, **Min()** and **Count()** function can be applied to a range of cells.

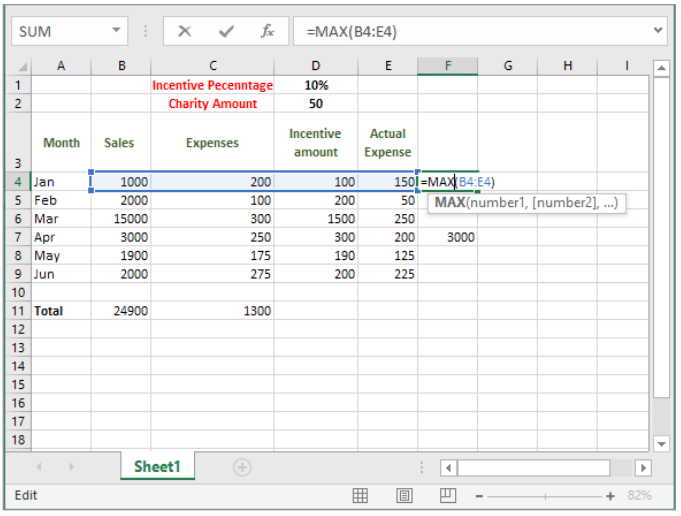
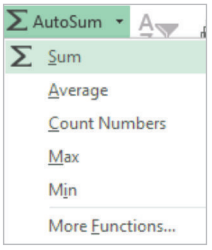


Figure 2.14: Using Max Function

Tips

- You can also carry out the above functions using the **AutoSum** feature. To do so, select the cell wherein you want to display the output of the functions. Click on the drop-down arrow of the **AutoSum** option and choose the desired function from the displayed list.
- Another amazing way to perform quick calculation is by using the **Quick Analysis Tool**. It helps you to implement functions, such as Sum, Average, Count, etc.



S.No.	Functions	Purpose
1.	SUM(range)	Gives the sum of a range
2.	AVERAGE(range)	Finds the average of a range
3.	ODD(number)	Returns the number rounded up to the nearest odd integer
4.	INT(number)	Rounds a number to the nearest integer
5.	PRODUCT(range)	Multiplies the values in a range of cells
6.	ROUND(number, num_digit)	Rounds a number to the specified digits
7.	EXP(number)	Returns natural logarithm raised to the power of a number
8.	SQRT(number)	Returns the square root of a number
9.	POWER(number, power)	Returns the result of a number raised to some power
10.	MOD(number, divisor)	Returns the remainder after a number is divided by the divisor
11.	TODAY()	Displays the current date in the selected cell

Function Library

There are many functions defined in Excel and it is beyond the capacity of a person to remember the name and functionality of each one of them. To overcome it, Excel has clubbed all the functions in the **Function Library** group of the **Formulas** tab. Here, the worksheet functions are categorised by their functionality, like **Math & Trig**, **Text**, **Date & Time**, etc. You can click a category to browse its functions.

Let us discuss the two common functions in the **Math & Trig** category: **LCM** and **GCD**.

LCM()

The **LCM** function returns the least common multiple of the integers. The least common multiple is the smallest positive integer that is a multiple of all the numbers provided as arguments. To use this function, follow the given steps:

- Open a new worksheet.
- Enter three integers in cells **A1**, **A2**, and **A3**.
- Now, select cell **A4** where the LCM of these numbers will be displayed.
- Click on the **Math & Trig** drop-down button in the **Function Library** group on the **Formulas** tab and choose **LCM** from the displayed list of options.

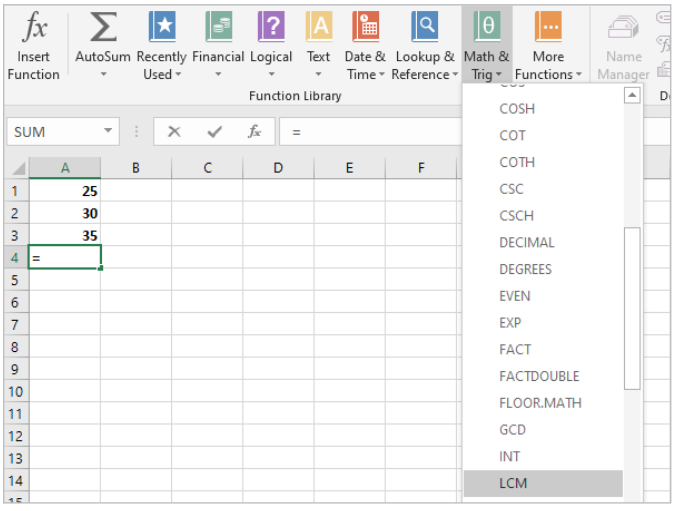


Figure 2.15: Using the Math & Trig Category

- The **Function Arguments** dialog box appears. Type the cell addresses in the respective text boxes, i.e., A1, A2, A3 in the **Number1**, **Number2**, and **Number3** text boxes, respectively. Note that the result of the formula appears near the bottom of the dialog box.

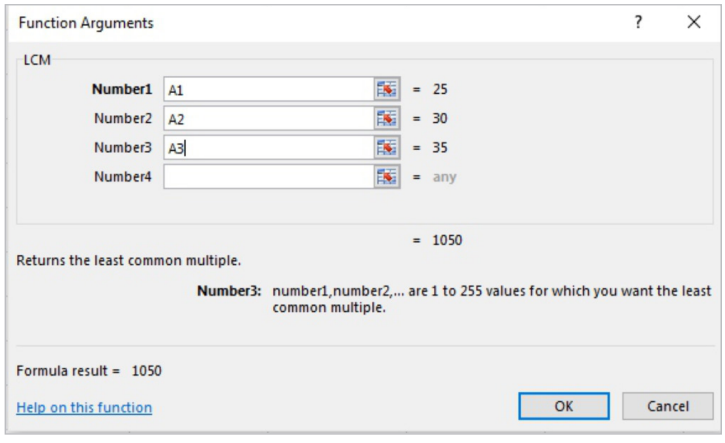


Figure 2.16: Calculating LCM of Three Numbers

- Click on **OK**. The output will appear in the cell **A4**.

GCD()

The **GCD** function calculates the greatest common divisor or highest common factor of two or more integers. The greatest common divisor is the largest positive integer that divides the numbers without a remainder. Let us calculate the GCD of the three numbers.

- Enter three integers in cells **A1**, **A2**, and **A3**.
- Now, select cell **A4** where the GCD of these numbers will be displayed.
- Click on the **Math & Trig** drop-down button in the **Function Library** group on the **Formulas** tab and choose **GCD** from the displayed list of options.
- The **Function Arguments** dialog box appears. Type **A1**, **A2**, and **A3** in Number1, Number2, and Number3 text boxes, respectively. Observe that the result of the formula appears near the bottom of the dialog box.
- Click on **OK**. The output will appear in the cell A4.

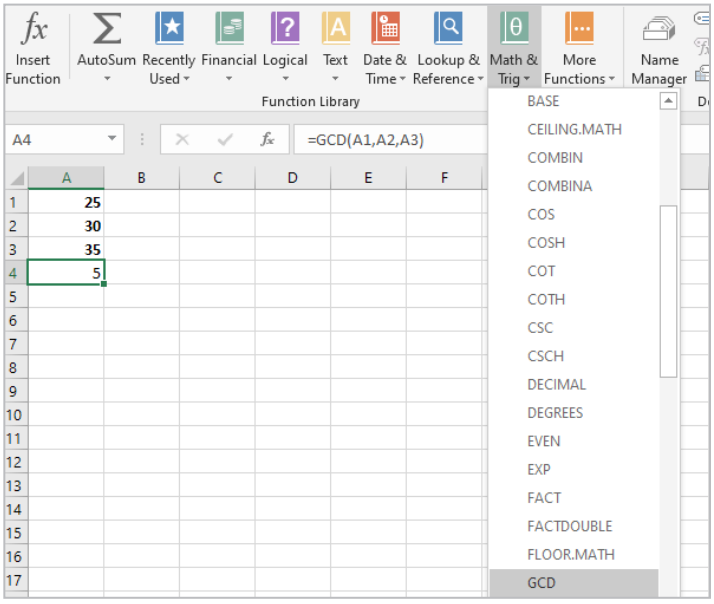


Figure 2.17: Calculating GCD of Three Numbers

The Insert Function

The **Insert** Function is one of the options in the **Function Library** group that helps you in creating a formula. Let us explore this option.

- Click on the cell in which you want to enter a formula.
- Click the **Insert Function** button  present on the **Formulas** tab. Or

  Click on the **Insert Function** button  present on the Formula bar.
- Either of these will launch the **Insert Function** dialog box and an equal to sign (=) will be placed in the cell.

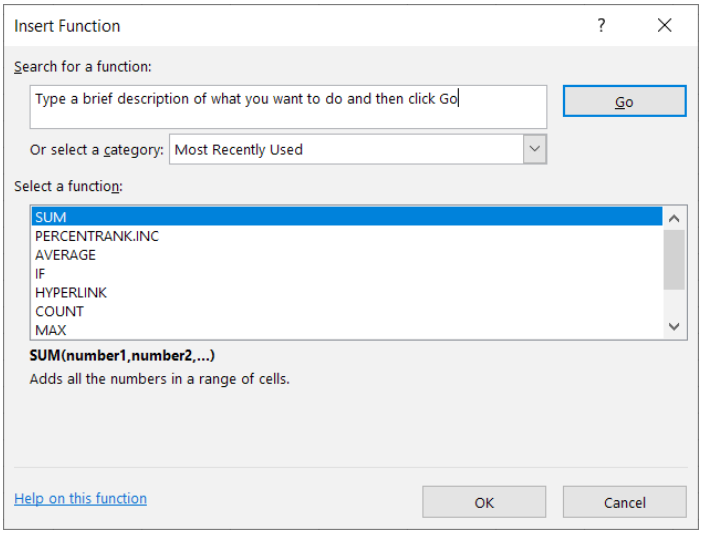


Figure 2.18: Insert Function Dialog Box

- In the **Insert Function** dialog box, you can search for a function by typing a brief description of what you want to do in the **Search for a function** text box, in case you do not remember the name of the function.

  For example, “add numbers” returns the Sum function.

- In the **Or select a category** text box, you can select the category of the function, like Math & Trig for GCD function. If you are not familiar with the categories, you can select ‘All’, which will display an alphabetic list of all the functions in the **Select a function** list box.

- Select the desired function from the displayed list and then click OK.

- This will open the **Function Arguments** dialog box, wherein you will enter the cell references or values and then click **OK** to get the result of the selected function.

Other Important Functions

Excel provides some more important functions that are exclusively available in the 2019 version. Some of them are discussed here:

CONCAT()

The **CONCAT()** function is used to join two or more than two strings together. This function falls under the category of the String function. In the earlier version CONCATENATE() function was used to join strings together. Let us now use the CONCAT() function and join the three strings together. Insert the text 'Microsoft' in cell A1, 'Office' in B1, and '2019' in cell C1. Type the formula =CONCAT(A1,B1,C1) in cell D1 and press the **Enter** Key.

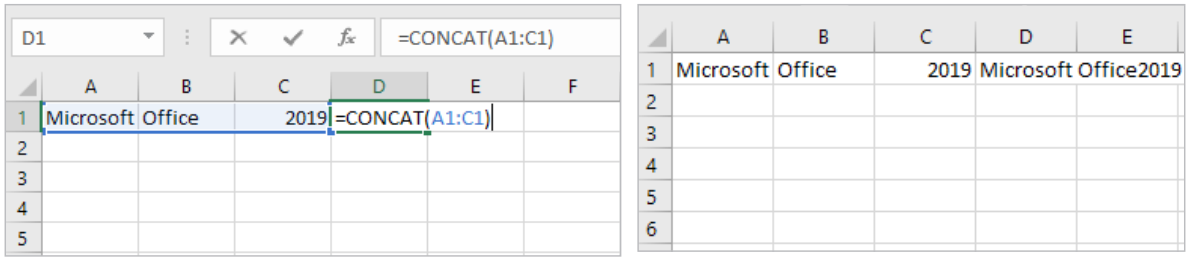


Figure 2.19: CONCAT() Function

TEXTJOIN()

The **TEXTJOIN()** function is similar to the CONCAT() function but it provides greater functionality. This function lets you join the text specified in a range of cells. Using TEXTJOIN() function, you can add words and a delimiter you specify between each text value that will be combined. In the following example, a hyphen has been added to a string as a delimiter.

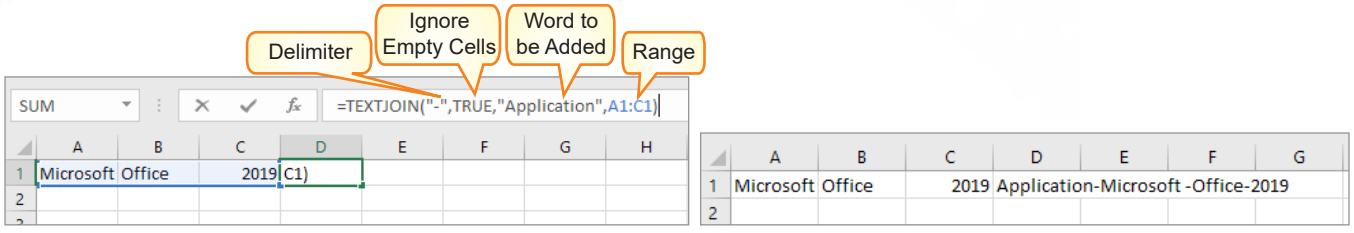


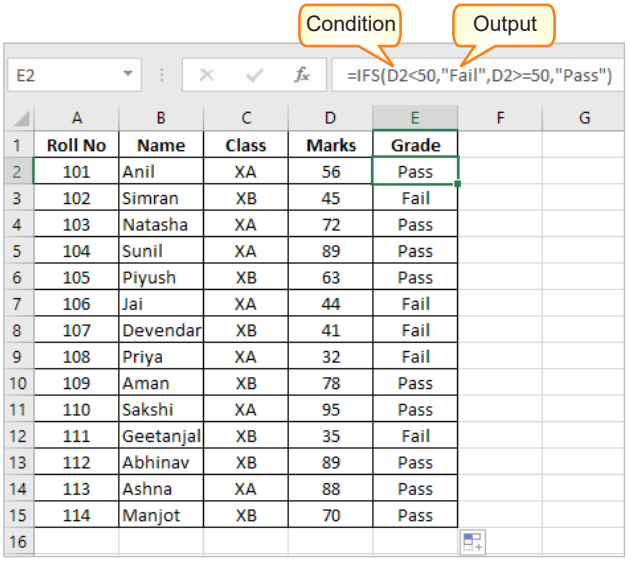
Figure 2.20: TEXTJOIN() Function

NOTE

The **Ignore empty cells** command is used to check if the empty cells in a specified range should be ignored or not. It can hold either True or False value. You can add blanks between words by using an empty string " " as a delimiter.

IFS()

The **IFS()** function is used to evaluate multiple conditions. Using the IFS() function multiple criteria can be specified in an Excel formula. In the example, the Grade of the student is displayed as "Pass" or "Fail", depending on the criteria Marks>50 or Marks<50, respectively.



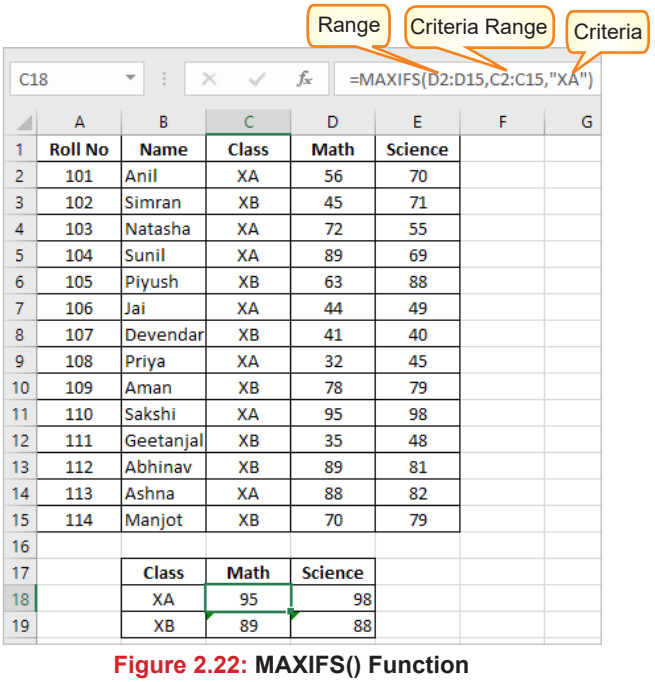
Roll No	Name	Class	Marks	Grade
101	Anil	XA	56	Pass
102	Simran	XB	45	Fail
103	Natasha	XA	72	Pass
104	Sunil	XA	89	Pass
105	Piyush	XB	63	Pass
106	Jai	XA	44	Fail
107	Devendar	XB	41	Fail
108	Priya	XA	32	Fail
109	Aman	XB	78	Pass
110	Sakshi	XA	95	Pass
111	Geetanjal	XB	35	Fail
112	Abhinav	XB	89	Pass
113	Ashna	XA	88	Pass
114	Manjot	XB	70	Pass

Figure 2.21: IFS() Function

MAXIFS() and MINIFS()

The Max() Excel function returns the largest numeric value that meets the criteria in a range of values. MAXIFS can be used with the criteria based on dates, numbers, text, and other conditions. Let us now use the MAXIFS() function for the datasheet given here. Using MAXIFS() function let us calculate the highest marks scored by students based on the class they are studying. In a similar manner, you can use MINIFS() function to find out the minimum values within a range based on a criteria.





Roll No	Name	Class	Math	Science
101	Anil	XA	56	70
102	Simran	XB	45	71
103	Natasha	XA	72	55
104	Sunil	XA	89	69
105	Piyush	XB	63	88
106	Jai	XA	44	49
107	Devendar	XB	41	40
108	Priya	XA	32	45
109	Aman	XB	78	79
110	Sakshi	XA	95	98
111	Geetanjal	XB	35	48
112	Abhinav	XB	89	81
113	Ashna	XA	88	82
114	Manjot	XB	70	79

Class	Math	Science
XA	95	98
XB	89	88

Figure 2.22: MAXIFS() Function

Formula Errors

In the Microsoft Excel, if any formula is entered incorrectly, then Excel displays an error message rather than the proper value. It also assists you in identifying and fixing the problem. Some of the common errors along with their possible reasons are listed as below:

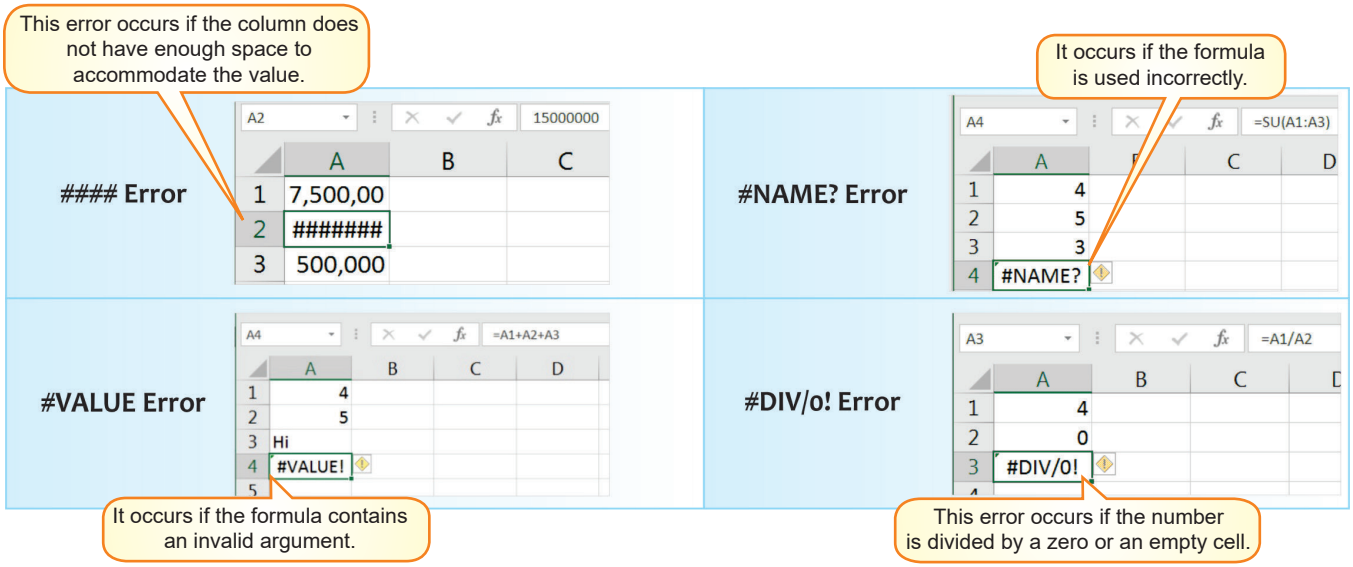


Figure 2.23: Some Common Errors in Excel Sheet

RECAP

- Formulas are used to perform calculations involving addition, subtraction, division, and multiplication. It is an expression that can include cell addresses, numbers, arithmetic operators, and parenthesis.
- The cell address in the formula is known as cell reference. There are three types of cell references: Relative, Absolute, and Mixed.
- Circular reference occurs when a formula in a cell, refers to its own cell, directly or indirectly.
- You can assign multiple cells to a formula by creating a reference or range.
- Functions are pre-designed formulas in Excel to perform both simple and complex calculations.
- The Insert Function is one of the options in the Function Library group, which helps us in creating a formula.
- In Microsoft Excel, if any formula is entered incorrectly, then Excel displays an error message instead of the value and assists you in identifying and fixing the problem.

A. Fill in the blanks.

1. A formula always begins with an ..... sign.
2. The cell address in a formula is also called ..... .
3. The cell address in a formula that does not change on copying, is considered as ..... .
4. ..... are input to functions, which accept values as number or text.
5. A function must be followed by opening and closing ..... .
6. The ..... character is used for concatenation of strings.

Hints

- &
- Absolute Reference
- Cell Reference
- Equal to (=)
- Parenthesis
- Arguments

B. Write T for True and F for False.

1. The Insert function helps in creating a formula. ☐
2. In Absolute Referencing, '$' sign is used before the cell co-ordinates. ☐
3. A range can be used in a formula. ☐
4. The Sum function is used to find sum of values. ☐
5. The error # VALUE occurs if the number is divided by a zero. ☐
6. In mixed referencing, the relative position of rows and columns changes when you copy a formula. ☐

C. Application-based questions.

1. A sports teacher has measured the height of the students in a class. Saumya has been given the assignment to find the maximum and minimum height from the collected data. Suggest the function that she should use to accomplish the task.

.....

2. Ms Priya and her friends got a raise of 10% in their salaries. Find the total amount if their present salary is ₹ 15,000. Calculate the salary by using the formula.

.....

D. Select the correct option.

1. Which function is used to add words and delimiters to a string?

   a. Textjoin() b. Concat() c. Maxifs()

2. Which key combination is used to get the sum of the values of the adjacent cells?

   a. Shift + S b. Ctrl + ' c. Alt + =

3. Which function finds the largest number in a range?

   a. Average() b. Count() c. Max()

4. Which function returns the remainder after a number is divided by the divisor?

   a. Mod b. Power c. Sum

5. Which of the given cell references can be used in a relative reference?

   a. $D6 b. A3 c. A$1

E. Answer the following questions.

1. What is a formula? Give an example.

.....

.....

.....

2. What is cell reference? Mention its types.

.....

.....

.....

3. What do you know about absolute reference? Explain with the help of an example.

.....

.....

.....

4. What do you mean by function? Name two Math & Trig functions.

.....

.....

.....

5. Differentiate between the Concat() function and Textjoin() function.

.....

.....

.....

ACTIVITY SECTION



LAB SESSION

Perfection Through Practice

A. Visit the computer lab and follow the given steps to understand how to use absolute reference.

- Open Microsoft Excel. Type the contents in Excel worksheet as given in the figure.
- Save the worksheet using the **Save** option. Now, click on the cell E4 and type the formula **=C4*D4** to calculate the Price of the item and press the **Enter** key.
- Hold the fill handle of the cell and drag to fill the copy the same formula to all the cells upto E13.

	A	B	C	D	E	F
1	Product Details					
2				GST	12.50%	
3	S. No.	Product	Quantity	Price per unit	Price	Price with GST
4	1	Mouse	25	250	6250	781.25
5	2	Keyboard	25	500	12500	1562.5
6	3	Microphone	25	350	8750	1093.75
7	4	Speakers	20	800	16000	2000
8	5	Webcam	25	550	13750	1718.75
9	6	NIC	25	250	6250	781.25
10	7	Modem	5	5500	27500	3437.5
11	8	Router	2	8000	16000	2000
12	9	RJ-45 Connector	25	20	500	62.5
13	10	Wi-Fi Router	3	1750	5250	656.25

- Now, to calculate the price of the item with GST, type the formula **=E4*$E$2** in the cell F4 and press **Enter**.
- Drag the fill handle to fill the same formula in all the cells.
- Save the file once again and close the application.

B. Follow the given steps to use the Concat() and TextJoin() functions in Excel.

- Type the contents in Excel worksheet as given in the figure.
- Save the worksheet using the **Save** option.
- Now, in the cell C3, type the formula **=CONCAT(A3,B3)** and press **Enter**.
- Drag the fill handle upto the cell C11 to fill the same formula.
- Now, in the cell E3, type the formula **=TEXTJOIN("@",FALSE,C3,D3)**.
- Drag the fill handle upto the cell E11 to copy the formula to the other cells also.
- Save the worksheet once again and close the application.

	A	B	C	D	E
1	Personal Details				
2	First Name	Last Name	Full Name	Company Name	Email Id
3	Rajan	Madaan	Rajan Madaan	kips.in	Rajan Madaan @kips.in
4	Aman	Bakshi	Aman Bakshi	kips.in	Aman Bakshi@kips.in
5	Jagdeep	Singh	Jagdeep Singh	kips.in	Jagdeep Singh@kips.in
6	Pranav	Wardhan	Pranav Wardhan	kips.in	Pranav Wardhan@kips.in
7	Seema	Agarwal	Seema Agarwal	kips.in	Seema Agarwal@kips.in
8	Charu	Gupta	Charu Gupta	kips.in	Charu Gupta@kips.in
9	Shikhar	Kundra	ShikharKundra	kips.in	ShikharKundra@kips.in
10	Chhavi	Agarwal	Chhavi Agarwal	kips.in	Chhavi Agarwal@kips.in
11	Shilpi	Saxena	Shilpi Saxena	kips.in	Shilpi Saxena@kips.in

GROUP DISCUSSION

For Concept Clarity



Discuss the following topics:

- **Functions and Formulas**
- **Types of Cell References**

PROJECT WORK

Using Creativity



- Create a worksheet to maintain your **Monthly Expenses on Stationery**.
- To calculate, it must have the following headings: S.No., Commodity, Price, Quantity.
- Find the total for each heading by using the formulas learnt in this chapter.

ONLINE LINK

Looking For More



To know more about the Formulas and Functions in Excel 2019:

https://support.microsoft.com/en-us/office/excel-functions-alphabetical-b3944572-255d-4efb-bb96-c6d90033e188

Chapter 3

Advanced Features of Excel

LEARNING OUTCOMES

The student will be able to:

- know about Excel charts.
- create and format charts.
- use combo charts and sparklines.
- apply sorting and filtering.
- group worksheets.
- perform data consolidation.

Microsoft Excel 2019 is the most recent and widely used spreadsheet software. You can use this software to keep data in tabular form. Excel offers a variety of tools using that you can analyse the data, sort the data to keep it organised, apply filters to work on specific data, group worksheets to enter or edit common data, consolidate data to combine it from multiple worksheets to a single worksheet, and so on. Let us learn the use of charts, and later will learn some more features of Excel, such as sorting, filtering, grouping, and data consolidation.

Charts

A chart is an effective way to display data in a pictorial form. Charts make it easier to draw comparison, analyse the growth, relationship, and trends among the values in a range. They provide more accurate analysis of information. A chart is updated automatically when the data is changed.

Components of a Chart

Following are the various components of a chart:

1. **Chart Area:** The chart area includes all objects and elements in a chart.
2. **Category Axis:** Category axis or X-axis is the horizontal axis of a chart.

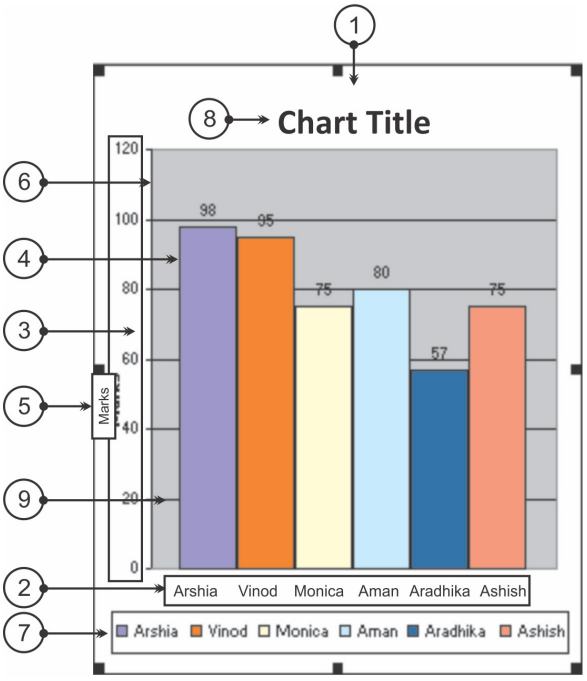


Figure 3.1: Components of a Chart

3. **Value Axis:** Value axis or Y-axis is the vertical axis used to plot the values.
4. **Data Series:** A data series is a related set of data values.
5. **Axis Titles:** These are the headings given to X-axis and Y-axis. The titles help in understanding what is being depicted on the axes.
6. **Plot Area:** The Plot area is a window within the chart area. It contains the actual chart and includes the plotted data, data series, category axis, and value axis.

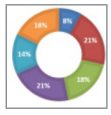
7. **Legend:** It depicts the colours, patterns, and symbols assigned to a data series. It helps in reading the chart accurately. By default, legends appear at the bottom of the chart. You can place them anywhere as per your choice.

8. **Chart Title:** It describes the purpose and contents of the chart.

9. **Gridlines:** These can either be horizontal or vertical lines depending on the selected chart type. They extend across the Plot area of the chart. Gridlines make it easier to read and understand the values.

Commonly used Chart Types

Different types of charts are available in Excel. Following are the most commonly used charts:

 Column Chart	**Column:** A column chart displays data in the form of vertical bars. It is used to show changes in the data over a period of time or comparisons among the different data items. In a column chart, categories are represented on the horizontal axis and values along the vertical axis.
 Bar Chart	**Bar:** This chart displays data in the form of long rectangular bars, that are placed horizontally in the Chart area. A bar chart illustrates the comparisons among the individual items. In this type of chart, categories are represented on the vertical axis and values are represented on the horizontal axis.
 Line Chart	**Line:** This chart is in the form of lines. It is very similar to plotting a graph on a graph paper with its values on the X-axis and Y-axis. A line chart uses connecting dots to display trends in data over a period of time.
 Pie Chart	**Pie:** It is a circular chart, which is divided into sectors where each sector shows the relative size of each value. It always shows only one data series and is useful when you want to emphasise on a significant element.
 Doughnut	**Doughnut:** This chart shows the relationship of part to a whole. It displays data in the form of rings where each ring represents a data series added into the chart. Unlike a pie chart, the doughnut chart represents more than one data series.

Creating a Chart

It is quite simple to create a chart in Excel. Follow these steps to create the chart:

- Create a new worksheet with the data as shown in Figure 3.2.
- Select the range (A2:B7) including column headings and row labels to be displayed in the chart.
- Click on the **Insert** tab. In the **Charts** group, select the **Column** drop-down menu.

	A	B
1		
2	**Name**	**Marks**
3	Ankita	86
4	Rajan	78
5	Ridhima	95
6	Anika	89
7	Vijay	98

Figure 3.2: Selecting Range for a Chart

- Click on **Clustered Column** in the drop-down list. The chart gets displayed in the centre of the worksheet.

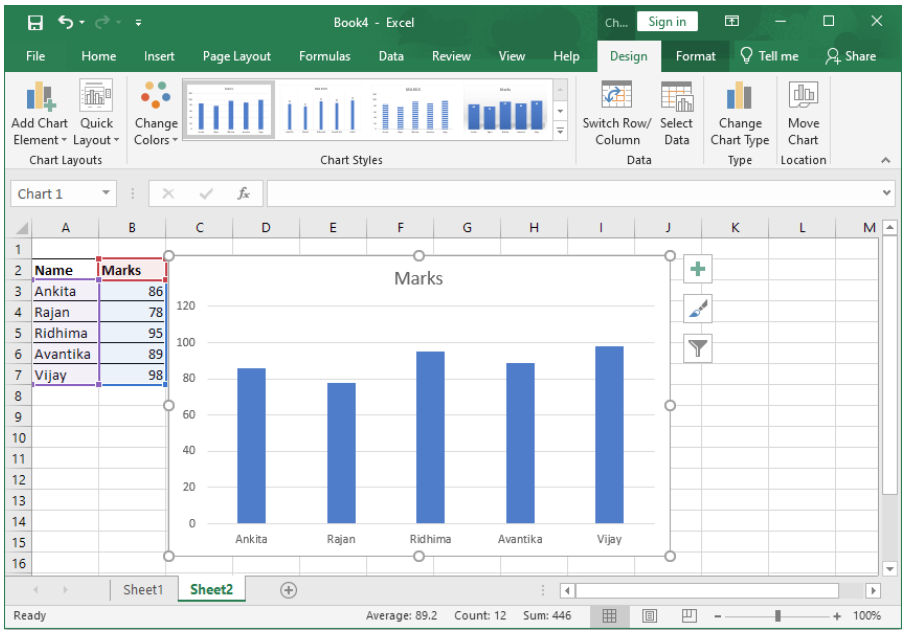


Figure 3.3: Creating a Chart

- The two tabs named as **Design** and **Format** appear under the **Chart Tools** category on the Ribbon. These tabs have options for editing and formatting the chart.
- Click on the **Design** tab. In the **Chart Styles** group, click on the **More** button to view all the available styles.
- Place the mouse pointer on each style to preview its effect. Click on the desired style that you want to use and observe the change. All the titles, data labels, legend details mentioned in the selected data range will be displayed in the chart.
- To change the data range of your chart, right-click on the chart and click on the **Select Data** option from the shortcut menu. The **Select Data Source** dialog box appears. Click on **OK** after making the desired changes.

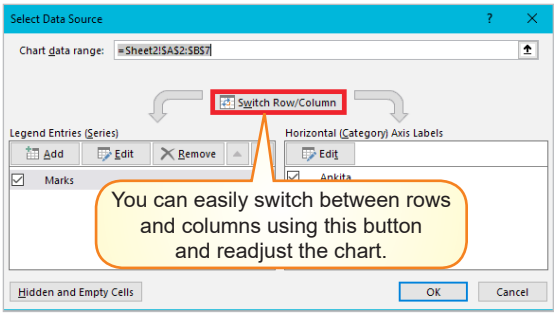


Figure 3.4: Select Data Source Dialog Box

Adding Chart Elements

You can add or remove Axis Titles, Data Series, Chart Title, Legend, Gridlines, and other components of the chart, whenever required. Let us add some of the chart elements.

Chart Title

To add a chart title, follow these steps:

- Click on the **Add Chart Element** option in the **Chart Layouts** group on the **Design** tab.

- A list of options appears. Click on the **Chart Title** option and select either the **Above Chart** or **Centered Overlay** option.
- The **Chart Title** text box appears. Type the text in it. After typing the title, click outside the chart.

Axis Titles

To add the axis titles, follow these steps:

- Select the **Axis Titles** option from the **Add Chart Element** drop-down list.
- Select the **Primary Horizontal** option to add title for an X-axis.
- The **Axis Title** box appears at the bottom. Type the text in it and then click outside the chart.

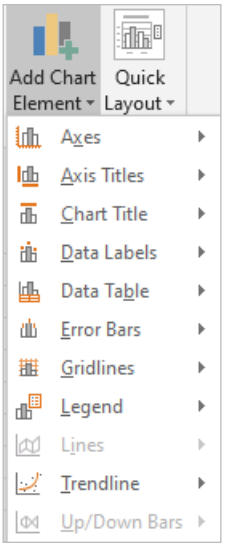


Figure 3.5: Various Chart Elements

Likewise, you can add Y-axis by selecting the **Primary Vertical** option.

Tips

- You can add more chart elements, such as Legend, Gridlines, Data Table, Data Labels by using the **Add Chart Elements** drop-down list.
- You can also add, remove, or change chart elements by clicking on the **Chart Elements** button + , which appears in the upper-right corner of the chart.

Formatting a Chart

Formatting improves the appearance of a chart. You can format a chart by changing text, font, line colour, width, border style, legends, data series, and so on. You can also change the numbers on the value axis, hide or show gridlines, etc.

Changing Backgrounds, Colours, and Patterns

To modify a chart by changing its colour, pattern, and background, follow the given steps:

- Right-click on the Plot area and select the **Format Plot Area** option. The **Format Plot Area** task pane will appear on the right-side.
- Click on the **Fill** tab and select the **Solid fill** option.
- Select the **Color** option and choose the desired colour from the **Fill Color** palette. Observe the change in the colour of the Plot area.
- Click on the **Border** tab. Select the **Solid line** option and increase the width. Observe the change.

Quick View

To create a chart instantly, select the data that you want to present in the chart and then press the **F11** function key. It will create a chart in a new sheet named as 'Chart1'.



Quick Quiz

What is the difference between the Chart area and Plot area?



Let's Know More

To change the chart type and its subtype, select the **Design** tab > **Change Chart Type** option in the **Type** group. Choose the chart from 'Change Chart Type' dialog box.

NOTE

Similarly, you can change the background of the Chart area by right-clicking on the Chart area and selecting the **Format Chart Area** option.

Formatting the Legend

You can format text, background, boundary, and colour of a legend by following the given steps:

- Right-click on the **Legend** boundary and select the **Format Legend** option or simply double-click on the Legend.
- The **Format Legend Entry** task pane appears on the right-side.
- Select the **Fill & Line** icon and then select the **Border** option. Click on the **Dash type** drop-down arrow and select any style.
- Specify the **Width** by clicking on the spin arrows.
- Select the desired colour by clicking on the **Color** drop-down menu.
- To position the legend on the chart, select the **Legend Options** icon and select the **Top** button from the displayed list.
- Click on the **Close** button. The legend will be placed at the top of the chart.

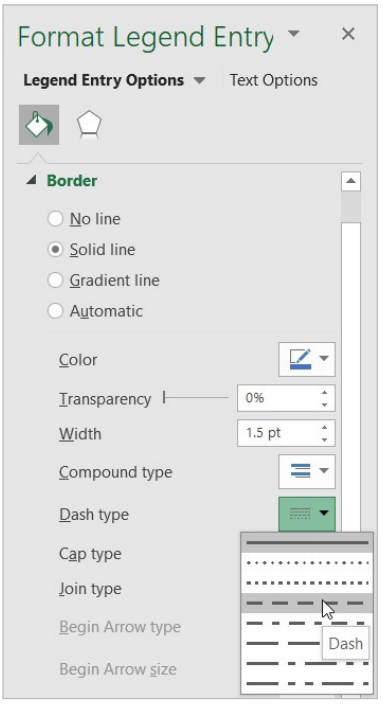


Figure 3.6: Format Legend Entry Pane

Changing the Scale of Value Axis

A chart consists of two axes— horizontal axis (X-axis) and vertical axis (Y-axis). Most chart types have two axes. By default, Excel automatically determines the values on the vertical axis. To change these values, follow the given steps:

- Point the mouse at Y-axis. Right-click on it and select the **Format Axis** option from the shortcut menu.
- The **Format Axis** task pane appears on the right-side. Here, select the **Axis Options** icon if it is not selected, by default. Click on the **Minimum** text box and enter 20 in it.
- Enter 200 in the **Maximum** text box. Click on the **Close** button and observe the change.
- Similarly, you can change the scale for X-axis.

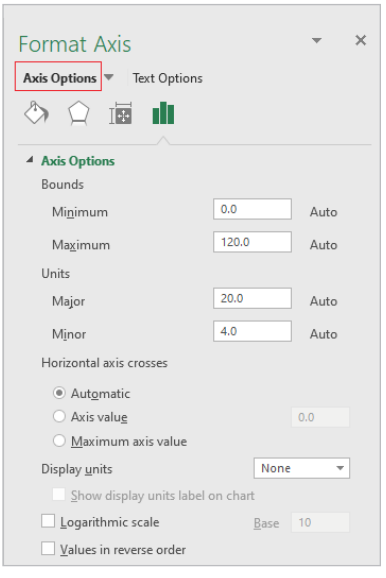


Figure 3.7: Format Axis Pane

Tips

To insert a **data label**, right-click on the Data Series and choose **Add Data Labels** or click on the **Chart Elements** button and select the **Data Labels** option from the displayed list.

Formatting Data Series

You can format data series by changing the bar colours, lines, slices, and shifting its position. To do so, follow the given steps:

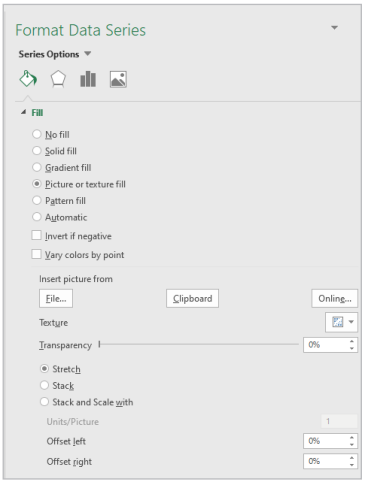


Figure 3.8: Format Data Series Pane

- Right-click on the data series. Select the **Format Data Series** option from the shortcut menu.
- The **Format Data Series** task pane will appear on the right-side.
- Click on **Fill & Line**. Change the border type and its width by selecting the **Dash type** and **Width** options, respectively.
- Click on the **Fill** option and choose the **Picture or Texture fill** option.
- Click on the **Texture** drop-down button and select any texture from the displayed choices.
- Click on the **Effects** icon and select the **Shadow** option. Select the desired format from the **Presets** drop-down menu.
- Click on the **Close** button to close the task pane, once completed.

Practice Time

Visit the lab and start Excel on your computer to complete the given tasks.

- Create a column chart or bar chart to analyse the weekly sale of a month with the following fields: {Week 1, Week 2, Week 3, Week 4}
- Add different chart elements, like chart title, axis titles, legend, and data series.
- Also, change the background colour of the Plot area and position of legend in the chart.

Combo Chart

A combo chart is a combination of two or more chart types in a single chart. Using this feature, you can plot two or more set of values to show multiple types of data. To create a combo chart, follow these steps:

- Enter the data as shown in Figure 3.9 and select it.
- Go to the **Insert** tab and select the **Insert Combo Chart** option in the **Charts** group.

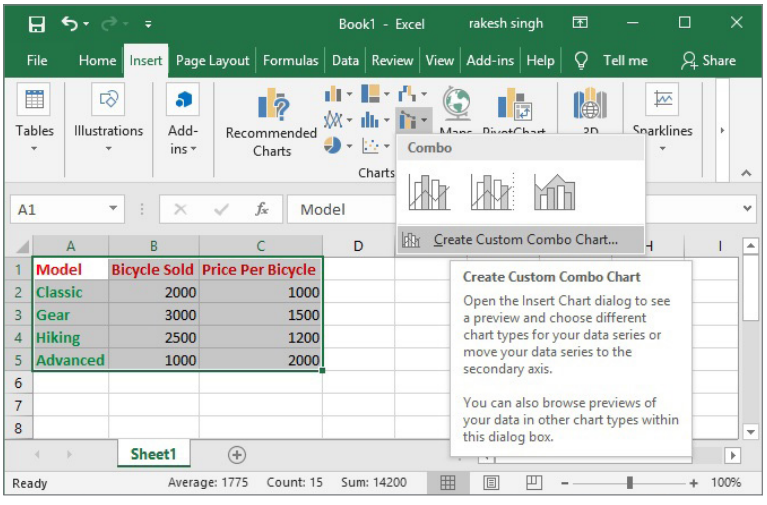


Figure 3.9: Sample Data

- A drop-down list of charts appears. Select the **Create Custom Combo Chart** option. The **Insert Chart** dialog box appears as shown in Figure 3.10.
- Select **Clustered Column** as the chart type for Bicycle Sold and **Line** for the Price Per Bicycle column.
- Click on the **Secondary Axis** check box beside the Price Per Bicycle.
- Now, click on **OK** to insert the chart. A combo chart will be added to the same worksheet.
- Give appropriate titles to the chart and the axes by clicking on the **Chart Elements** button.

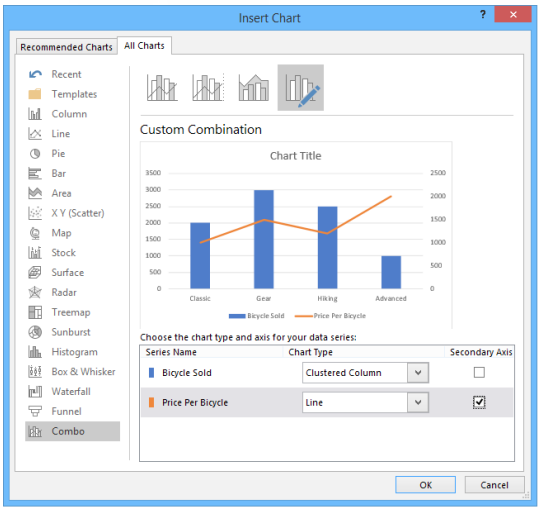


Figure 3.10: Insert Chart Dialog Box

Sparklines

Sparklines are mini charts that fit into a single worksheet cell to provide a visual representation of the data. These can be used to analyse the trends in your data. There are three types of sparklines—Line, Column, and Win/Loss.

- **Line** represents the relative value of the selected worksheet data.
- **Column** where the selected worksheet data is represented by tiny columns.
- **Win/Loss** where the selected worksheet data appears as a win/loss chart. Wins are represented by blue squares that appear above red squares.

Follow the given steps to add sparklines to your data.

- Select the data without selecting the column headings. For example, select the range **A2:C5**.
- Go to the **Insert** tab, select the **Line** option from the **Sparklines** group.

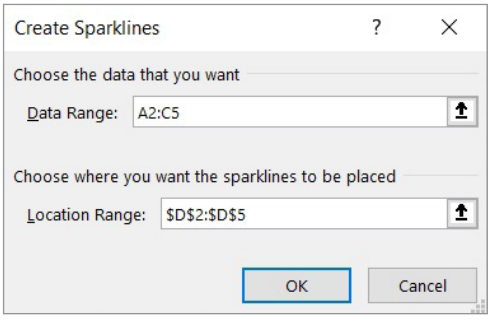


Figure 3.11: Create Sparklines Dialog Box

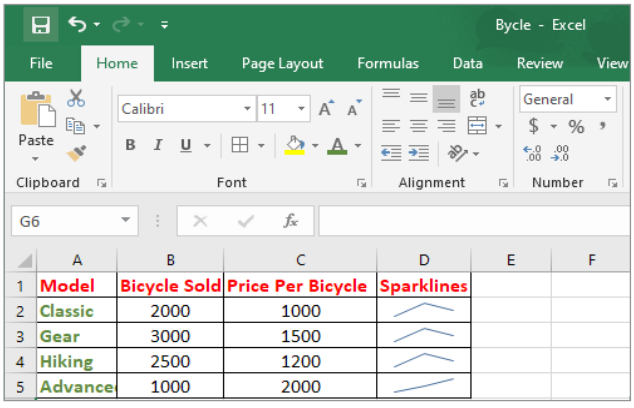


Figure 3.12: Created Sparklines

- The **Create Sparklines** dialog box appears as shown in Figure 3.12. The **Data Range** text box has a range value, **A2:C5**, as you have already selected the range in the worksheet.
- Specify **$D$2:$D$5** in the **Location Range** text box.

- Click on **OK**. Excel will create Sparklines for the specified data.
- You can make changes in the style by selecting any style from the **Style** group and colour of the sparklines from the **Sparkline** color drop-down menu on the **Design** tab.

Let's Know More

In Excel, **Recommended Charts** button, recommends the most suitable charts for your data.

Excel 2016

In Excel 2016, you can add, delete, and format the chart and its elements in the same way as you do in Excel 2019.

Sorting Data



The **Sort** feature of Excel helps you arrange the data either in an ascending or descending order. In a worksheet, data can be sorted in rows on the basis of text, numbers, or dates. Once the data has been organised, it becomes easy to work with it.

Follow these steps to sort the given data:

- Open any worksheet and select the cell range that you want to sort.
- Click on any cell, say **B2**. Now, select the **Sort** option in the **Sort & Filter** group on the **Data** tab. The **Sort** dialog box appears and the entire database gets selected.
- Click on the **Sort by** drop-down arrow and select the field on the basis of which you want to sort the data. For example, select the **Name** field.
- Select the **Values** option from the **Sort On** drop-down list. Select the sorting **order** from the Order drop-down list. If **Sort by** contains the alphanumeric data then **A to Z** option gets selected, automatically. In case, **Sort by** contains numeric data then the **Smallest to Largest** option gets selected.

Let's Know More

To edit the contents of more than one sheet at a time, hold down the **Ctrl** key while clicking the tabs of the sheets that you want to edit and then modify the data.



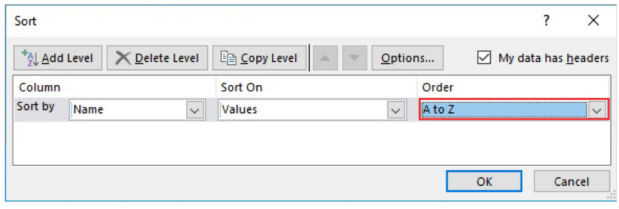


Figure 3.13: The Sort Dialog Box

- Select the **My data has headers** checkbox to exclude the first row, containing the column headings for sorting. Otherwise, uncheck the checkbox to include the first row headings in sorting.

Let's Know More

To delete the grouped sheets, right-click on any grouped Sheet tab and click on the **Delete** option from the shortcut menu.

- Click on **OK**. The data will be sorted in the descending order according to the Name field.

In Excel, you can also sort more than one column. For example, after sorting by **Name**, you want to arrange the list by **Roll No**.

To sort by more than one column, follow the given steps:

- Click on the **Add Level** button in the **Sort** dialog box. A new level gets added below the first level.
- Select the column name as **Roll No** in the **Then by** drop-down list and order of sorting as **Largest to Smallest** in the **Order** drop-down list in the new level. Click on **OK**. The data will be sorted in the descending order according to the Name field.

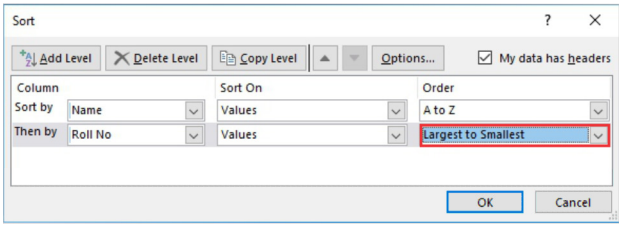


Figure 3.14: Adding Levels

Filtering Data

The **Filter** feature of Excel helps you display only those records that meet the specified criteria and hide the rest of the records.

- Select any cell within the database range, say **D1**. Click on the **Filter** option in the **Sort & Filter** group on the **Data** tab.
- Small arrows will be added next to the column headers. These arrows are used to specify conditions to filter the data.
- Click on the arrow next to the **Hindi** column header in cell **D1**. Uncheck the **Select All** check box to deselect all the check boxes. Now, select the check boxes of the values **82** and **98** from the drop-down list. Click on **OK**.
- You will notice that the list gets filtered and displays only those records that meet the specified criteria, i.e., records related to marks **82** and **98** in Hindi.

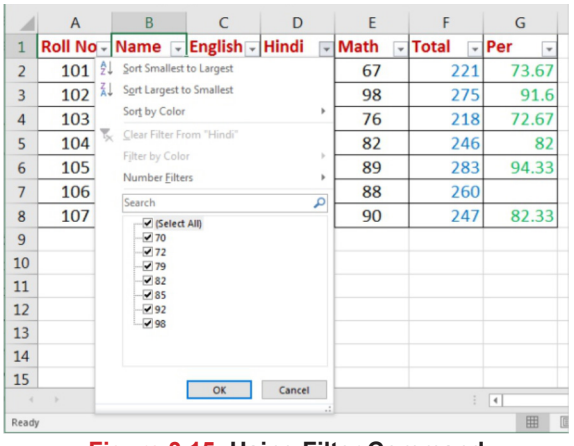


Figure 3.15: Using Filter Command

NOTE

To clear all the filters from the worksheet, click on the **Clear** button Clear present in the **Sort & Filter** group on the **Data** tab. If you have modified the data and want to filter the new data, click on the **Reapply** button .

Practice Time

Visit the lab and start Excel on your computer to complete the given tasks.

- Enter records of your 50 friends in the spreadsheet with the following fields:
  {Roll Number, Name, Class, City, Marks}
- Sort the data in ascending order according to 'Names' and 'City' columns.
- Add sparklines after the 'Marks' field.
- Apply filter to view records of the students who belongs to Delhi.

Grouping Worksheets

Grouping of worksheets facilitates the editing of multiple worksheets at the same time. You can enter common data, formatting effects, and formulas in the grouped sheets. Follow these steps to group multiple worksheets:

- Create a new workbook. Add two more sheets in the workbook. Select the **Sheet1** tab.
- Press and hold the **Shift** key and click on the **Sheet3** tab.
- Release the **Shift** key. All the three worksheet tabs have become white and the word '[Group]' appears on the Title bar. It indicates that Sheet1, Sheet2 and Sheet3 are grouped together. Currently **Sheet1** is active. Enter the data in the sheet.
- Format the heading by making it bold and increasing its font size to 18. Apply border around the heading 'FIRST QUARTER SALES'.
- Select row 3, increase the font size to 14 and give bold effect. Similarly, select **Column A** and apply the same formatting effects.
- To ungroup the worksheets, click on any **Sheet** tab other than the grouped ones or right-click on any grouped Sheet tab and select the **Ungroup Sheets** option.

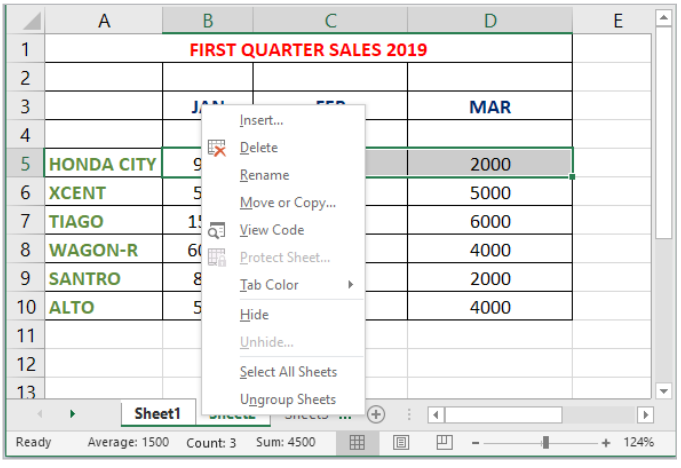


Figure 3.16: Entering Data in Grouped Worksheets

All the three sheets will display the common data with the formatting effects.

NOTE

If you have entered data in Sheet1 before grouping the worksheets, that data will not be reflected in the other sheets.

Consolidating Data

Consolidating data means combining the data of multiple worksheets into a single worksheet. You can combine the data of various ranges either in the same sheet or in different sheets.

Follow these steps to consolidate the data:

- Suppose, you have data in **Sheet1** and **Sheet2** as shown. To consolidate the data of these sheets, it is essential to group them together.
- After grouping and entering the common data in three worksheets, click on the **Sheet3** tab, change the heading and select the cell B5.

	A	B	C	D	E
1	FIRST QUARTER SALES				
2					
3		JAN	FEB	MAR	
4					
5	HONDA CITY	450	800	900	
6	XCENT	200	800	600	
7	TIAGO	1000	1200	700	
8	WAGON-R	4000	4500	6000	
9	SANTRO	500	600	800	
10	ALTO	100	120	200	
11					
12					
13					

Sheet1 | Ready | 124%

Figure 3.17: Data Entered in Sheet1

- Select the **Data** tab > **Consolidate** option in the **Data Tools** group. The **Consolidate** dialog box appears.
- To calculate the total car sales of the First Quarter, select the **Sum** function from the list box, if it is not selected.
- Click on the **Reference:** Text box. Click on the **Sheet1** tab and select the cell range from B5:D10.

	A	B	C	D	E	F
1	FIRST QUARTER SALES					
2						
3		JAN	FEB	MAR		
4						
5	HONDA CITY	900	1600	2000		
6	XCENT	500	800	5000		
7	TIAGO	1500	1000	6000		
8	WAGON-R	6000	6000	4000		
9	SANTRO	800	800	2000		
10	ALTO	500	200	4000		
11						
12						
13						

Sheet1 | Sheet2 | Sheet3 | Ready | 124%

Figure 3.18: Data Entered in Sheet2

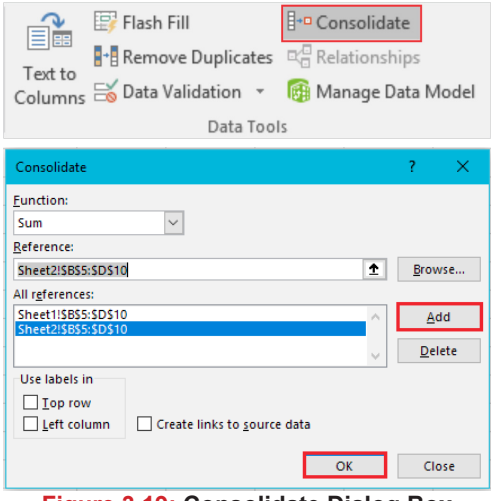
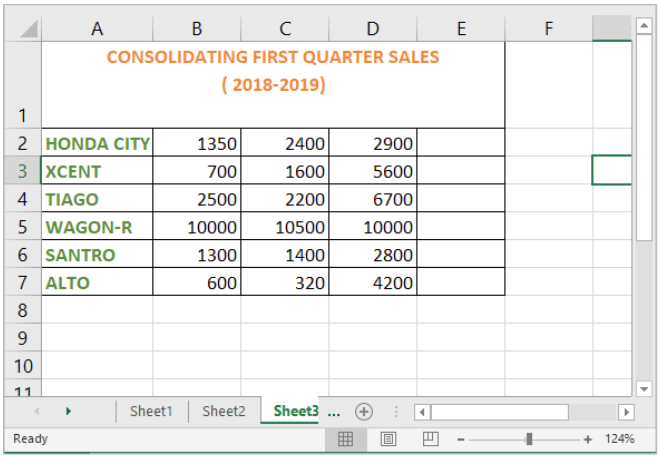


Figure 3.19: Consolidate Dialog Box

- Click on the **Add** button. The cell reference will be added in **All references** text box.
- Click on the **Reference** text box once again.
- Now, click on the **Sheet2** tab. Select the cell range B5:D10.
- Click on the **Add** button. Now, click on the **OK** button in the **Consolidate** dialog box.
- The **Sheet3** will display the consolidated data of the first quarter sales of each car.



CONSOLIDATING FIRST QUARTER SALES
(2018-2019)

HONDA CITY	1350	2400	2900	
XCENT	700	1600	5600	
TIAGO	2500	2200	6700	
WAGON-R	10000	10500	10000	
SANTRO	1300	1400	2800	
ALTO	600	320	4200	

Figure 3.20: Consolidated Data

Excel 2016

In the same way, you can group the sheets and consolidate the data in Excel 2016.

RECAP

- Charts make it easier to draw comparison and analyse the growth, relationship, and trends among the values in a range.
- In Excel, all the charts are available in the Charts group on the Insert tab.
- A combo chart is a combination of two or more chart types in a single chart.
- Sparklines are mini charts that fit into a single worksheet cell to provide a visual representation of the data.
- The Sort feature of Excel helps you arrange the data either in an ascending or descending order.
- The Filter feature of Excel helps you display only those records that meet the specified criteria and hide the rest of the records.
- Grouping of worksheets facilitates the editing of the multiple worksheets at the same time.
- Data consolidate is performed to combine the data of multiple worksheets into a single worksheet.

Brain developer

A. Fill in the blanks.

1. A ..... is an effective way to display data in a pictorial form.
2. ..... is a related set of data values.
3. ..... is used to identify the colours, patterns, or symbols assigned to data series.
4. A ..... chart uses horizontal bars to display data.
5. ..... is the vertical axis that is used to plot the values.

6. The purpose of grouping worksheets is to enter common ....., and ..... effects.

Hints

- Bar
- Data
- Chart
- Data Series
- Value Axis
- Formatting
- Legend

B. Write T for True and F for False.

1. A chart is updated automatically when the data is changed. ☐
2. You cannot modify the chart by changing its colours and patterns. ☐
3. The Y-axis is also known as the horizontal axis. ☐
4. You can sort the data using only one field. ☐
5. You can change the pattern of the data series using the Fill option. ☐
6. By applying filter, you can view a specific data and hide the rest of the records. ☐

C. Application-based questions.

1. Ritu is a student of class VII. Her geography teacher has asked her to prepare a chart on the population of four metro cities of India. Suggest the chart type that will suit her project.

   .....

   .....

2. Tripti has created a chart. She wants to improve its appearance by changing the background colour of the Plot area. Which option will you suggest her?

   .....

   .....

D. Select the correct option.

1. The titles given to the X-axis and Y-axis are known as ..... .

   a. Data Series b. Axis Titles c. Legend

2. Which chart type displays data in the form of a circle?

   a. Line b. Pie c. Bar

3. Which feature allows you to arrange the data according to a particular field either in an ascending or descending order?

   a. Sort b. Filter c. Arrange Data

4. Which key is used to group multiple worksheets?

   a. Shift b. Ctrl c. Enter

5. The mini charts that fit into a single worksheet cell to provide a visual representation of the data are known as ..... .

a. Thumbnail Charts b. Combo Charts c. Sparklines

E. Answer the following questions.

1. What is a chart?

.....

.....

.....

2. Distinguish between the column chart and bar chart.

.....

.....

.....

3. What is the difference between the chart area and plot area?

.....

.....

.....

4. What is the utility of grouping the worksheets of a workbook?

.....

.....

.....

5. What is data consolidation?

.....

.....

.....

6. Describe the use of sparklines. Also, list different types of sparklines.

.....

.....

.....

ACTIVITY SECTION

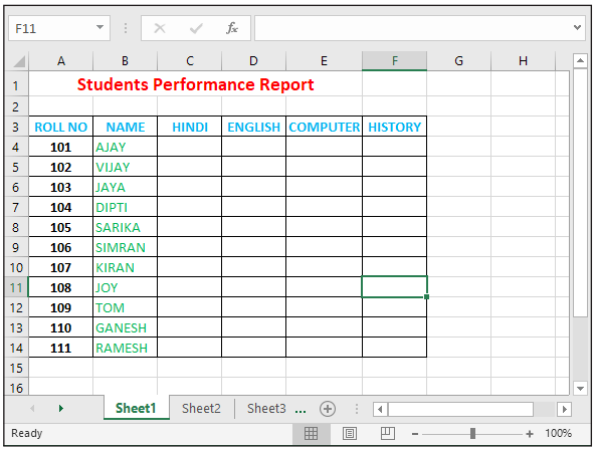


LAB SESSION

Perfection Through Practice

Visit the lab and follow the given steps to group the different worksheets and consolidate data.

- Open a new workbook. Add two more sheets in it. Select **Sheet3** tab. Sheet3 is now active.
- Press and hold the **Shift** key and click on the Sheet1 tab. Release the Shift key. Now, all the three sheets are grouped.
- Enter the common data in the grouped worksheets as given in Figure 1.
- Format the heading. Increase the font size to 16, make it bold and apply border to it.
- Select the range **A4:B14** and apply bold effect to it.
- Right-click on any grouped Sheet tab and choose the **Ungroup Sheets** option from the shortcut menu.
- Click on the **Sheet1** tab and enter the data as shown in Figure 2.
- Click on the **Sheet2** tab and enter the data as shown in Figure 3.
- Click on the **Sheet3** tab and select cell **C4**. Click on the **Data** tab > **Consolidate** option. Select **Sum** function from the list. Click on the **Collapse** button in the **Reference** text box.
- Click on the **Sheet1** tab and select the range **C4:F14**. Now, click on the **Add** button in the **Consolidate** dialog box. The cell reference will be added in **All references** list box.
- Select the **Collapse** button of **Reference** text box again. Click on the **Sheet2** tab. Select the cell range **C4:F14**. Click on the **Add** button and then click on **OK** in the **Consolidate** dialog box.



	A	B	C	D	E	F
1	Students Performance Report					
2						
3	ROLL NO	NAME	HINDI	ENGLISH	COMPUTER	HISTORY
4	101	AJAY				
5	102	VIJAY				
6	103	JAYA				
7	104	DIPTI				
8	105	SARIKA				
9	106	SIMRAN				
10	107	KIRAN				
11	108	JOY				
12	109	TOM				
13	110	GANESH				
14	111	RAMESH				

Figure 1

	A	B	C	D	E	F
1	Students Performance Report					
2						
3	ROLL NO	NAME	HINDI	ENGLISH	COMPUTER	HISTORY
4	101	AJAY	58	78	89	45
5	102	VIJAY	78	67	78	56
6	103	JAYA	76	56	78	54
7	104	DIPTI	78	45	56	34
8	105	SARIKA	98	56	76	65
9	106	SIMRAN	67	76	87	54
10	107	KIRAN	86	76	87	65
11	108	JOY	65	34	87	45
12	109	TOM	54	56	66	58
13	110	GANESH	75	67	54	76
14	111	REMESH	86	54	78	65

Figure 2

	A	B	C	D	E	F
1	Students Performance Report					
2						
3	ROLL NO	NAME	HINDI	ENGLISH	COMPUTER	HISTORY
4	101	AJAY	60	55	90	65
5	102	VIJAY	43	67	82	87
6	103	JAYA	45	67	85	65
7	104	DIPTI	74	89	67	76
8	105	SARIKA	73	77	75	89
9	106	SIMRAN	80	67	90	67
10	107	KIRAN	89	64	78	78
11	108	JOY	56	87	78	56
12	109	TOM	67	74	89	65
13	110	GANESH	77	72	90	87
14	111	REMESH	76	45	53	98

Figure 3

- You will get the total marks of all the students in each subject on the Sheet3.
- Now, let us insert a column chart. For this, click on **Insert > Insert Column** and select a chart type.
- Double-click on the Chart title and type the title: 'Students Performance Report'.
- Format the chart as per your requirement. Save the file using the **Ctrl + S** key combination.

GROUP DISCUSSION

For Concept Clarity



Discuss the following topic:

- **Data Consolidation vs Grouping Worksheets**

PROJECT WORK

Using Creativity



Shruti is a dance teacher. She teaches various forms of dance in her class, like Classical, Hip Hop, Contemporary, Salsa, etc. She has created a worksheet in Microsoft Excel, maintaining the details of the students' fee for various forms of dances. She wants to analyse the data with the help of a chart.

- Create a suitable chart with proper formatting effects for the given data.
- Also, collect the information on above-mentioned dance forms and create an interesting presentation on it.

Dance Class		
Dance Form	**No. of Students**	**Fee Per Student**
Classical	25	500
Hip Hop	15	1000
Contemporary	20	1500
Salsa	40	2000

ONLINE LINKS

Looking For More



Visit the following links:

- https://www.youtube.com/watch?v=Ep5q1cUhQas
- https://www.youtube.com/watch?v=_Wu7jYTr1Pk

Chapter 4

More on Python

LEARNING OUTCOMES

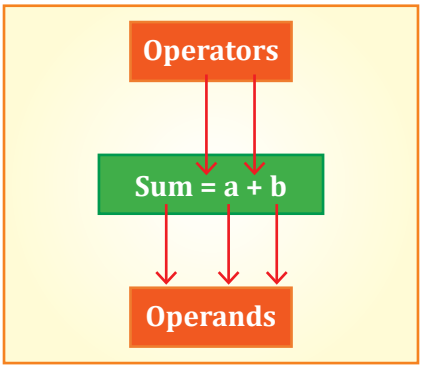
The student will be able to:

- use operators and understand their precedence.
- understand the types of control statements.
- use conditional statements.

You have learnt how to declare and initialise variables. Now, you will learn how to use operators to perform arithmetic and logical operations in programming.

Operators

Operators are symbols that perform arithmetic and logical operations on the operands and provide a meaningful result. An operator needs one or more operands to perform any operations. The valid combination of both operands and operators makes an **expression** that returns a computed result.



Types of Operators

Following are the different types of operators that can be used while programming:

Arithmetic Operators

The arithmetic operators are used to perform basic mathematical calculations, i.e., Addition (+), Subtraction (–), Multiplication (*), Division (/), etc.

The arithmetic operators can be further classified as: **Unary** and **Binary** operators.

Unary Operators: These operators operate on only one operand, for example, a= +100 (the value assigned to 'a' is +100), b= –100 (the value assigned to 'b' is –100).

Program 1:

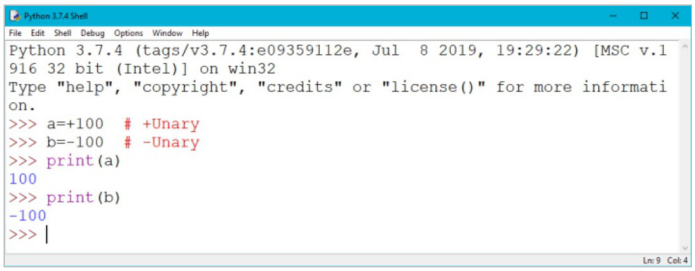


Figure 4.1: Using Unary Operators

Binary Operators: These operators operate on two operands, for example, a+b. Here, '+' is a binary operator working on 'a' and 'b'. Binary operators can further be classified as:

Operator	Symbol	Usage	Example
Addition	+	To obtain the sum of the values	• Value of 13+3.5 is 16.5
Subtraction	–	To subtract the values	• Value of 45 – 35 is 10
Multiplication	*	To find the product of the data	• Value of 6.2*6 is 37.2
Division	/	To divide the numbers and give an output in the decimal form	• Value of 5/2 is 2.5 • Value of –5/2 is –2.5 • Value of 10.0/3 is 3.333
Floor Division	//	To divide the numbers and give an output in the integer form	• Value of 5//2 is 2 • Value of –5//2 is –3
Remainder	%	To find the remainder when one value is divided by the other	• Value of 3%2 is 1 • Value of 10%6 is 4 • Value of 6%10 is 6
Exponential	**	To calculate the power of numbers	• Value of 2**3 is 8

Program 2:

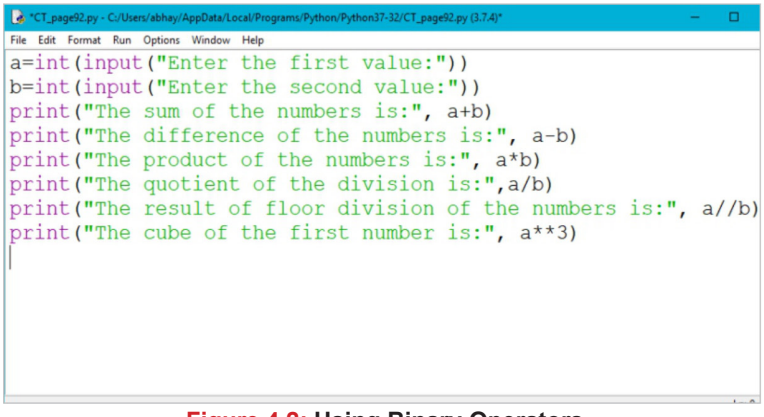
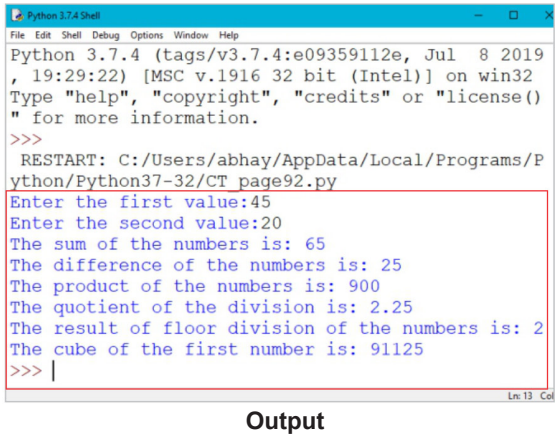
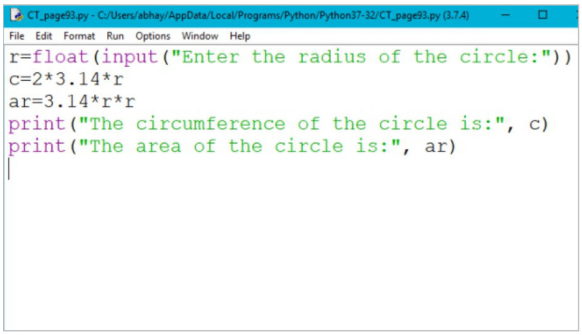


Figure 4.2: Using Binary Operators



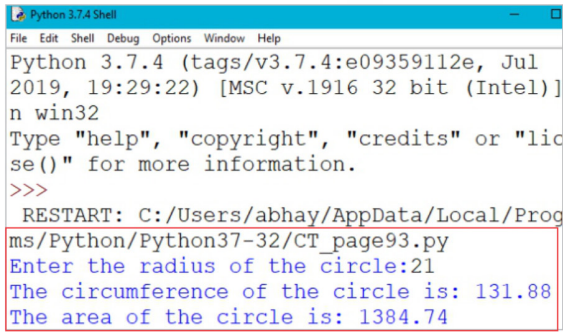
Output

Program 3: Write a program to find the area and circumference of a circle whose radius is entered by the user.



```
r=float(input("Enter the radius of the circle:"))
c=2*3.14*r
ar=3.14*r*r
print("The circumference of the circle is:", c)
print("The area of the circle is:", ar)
```

Figure 4.3: Area and Circumference of a Circle



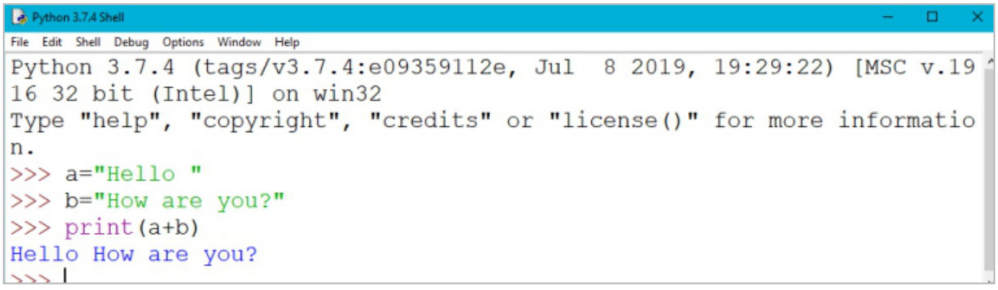
```
Python 3.7.4 (tags/v3.7.4:e09359112e, Jul
2019, 19:29:22) [MSC v.1916 32 bit (Intel)]
n win32
Type "help", "copyright", "credits" or "lic
se()" for more information.
>>>
 RESTART: C:/Users/abhay/AppData/Local/Prog
ms/Python/Python37-32/CT_page93.py
Enter the radius of the circle:21
The circumference of the circle is: 131.88
The area of the circle is: 1384.74
```

Output

String Operators

While working with the string values. Python allows only two types of operators on the string data types. You can either join two strings or replicate a string multiple times. For these two operations, you use '+' and '*' operators on strings, respectively. The '+' operator is termed as the **concatenation operator** when you use it with the strings. It is used to concatenate or join two or more strings.

Program 4:

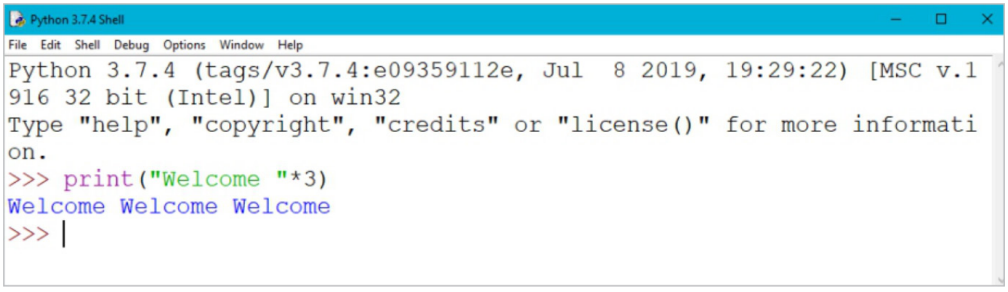


```
Python 3.7.4 (tags/v3.7.4:e09359112e, Jul  8 2019, 19:29:22) [MSC v.19
16 32 bit (Intel)] on win32
Type "help", "copyright", "credits" or "license()" for more informatio
n.
>>> a="Hello "
>>> b="How are you?"
>>> print(a+b)
Hello How are you?
>>>
```

Figure 4.4: Using Concatenation Operator

The '*' operator is used to replicate a given string specified times. It is also known as the **replication operator**.

Program 5:



```
Python 3.7.4 (tags/v3.7.4:e09359112e, Jul  8 2019, 19:29:22) [MSC v.1
916 32 bit (Intel)] on win32
Type "help", "copyright", "credits" or "license()" for more informati
on.
>>> print("Welcome "*3)
Welcome Welcome Welcome
>>>
```

Figure 4.5: String Replication

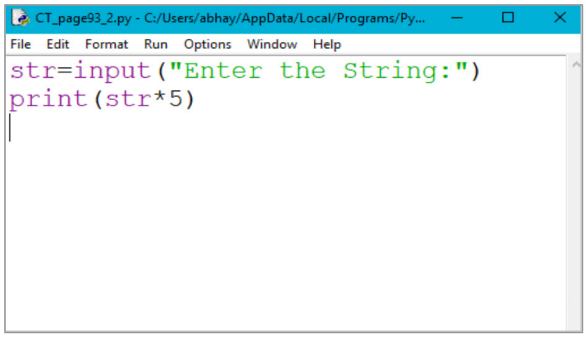
Here, the '*' operator is used to print the string, 'Welcome' three times as you can see in the output above.

Practice Time

Predict the output of the following statements:

S.No.	Statement	Output
1.	print(52*7)	
2.	print("52*7")	
3.	print("52*7 =", 52*7)	
4.	print("52"*7)	

Program 6: Write a program to print the string entered by the user five times.



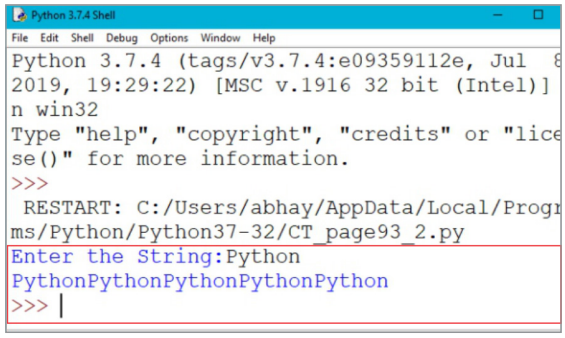


Figure 4.6: Printing a String — Output

Assignment Operator

The Assignment operator (=) is used to assign a value to a variable. It assigns the value on its right side to the variable written on the left of it. You have used this operator previously in the programs.

Program 7:

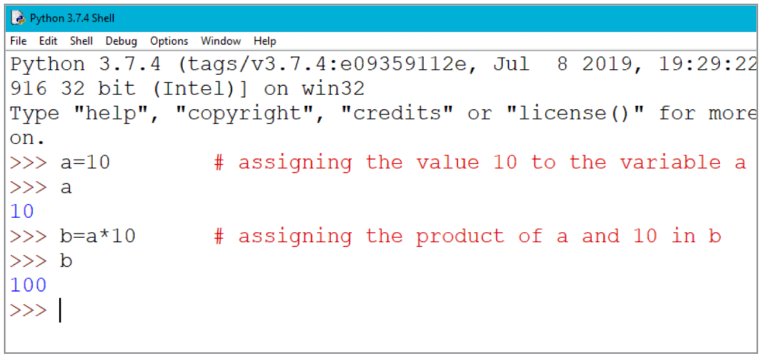


Figure 4.7: Using Assignment Operator

In the above example, you have assigned the value 10 to the variable 'a' and then the product of 'a' and 10 is assigned to the variable 'b'.

Relational Operators

The Relational operators are used to show the relationship between the operands. These operators compare the values of the variables and determine the result in a boolean expression, which is either '**True**' or '**False**'. Python provides different types of relational operators, as shown in the table given below:

Operator	Format	Expression a=12, b=4	Result
Less than	<	a<b	False
Less than or equal to	<=	a<=b	False
Equal to	= =	a= =b	False
Greater than	>	a>b	True
Greater than or equal to	>=	a>=b	True
Not equal to	!=	a!=b	True

Let us understand these operators with the help of a program in Python.

Program 8:

```
>>> a=100
>>> b=200
>>> c=100
>>> a<b          # Use of less than operator
True
>>> a<=c         # Use of less than or equal to operator
True
>>> a==b         # Use of equal to operator
False
>>> a==c
True
>>> a>b          # Use of greater than operator
False
>>> b>=a         # Use of greater than or equal to operator
True
>>> a!=b         # Use of not equal to operator
True
>>>
```

Figure 4.8: Using Relational Operators

Logical/Boolean Operators

The Logical or Boolean operators evaluate to one of the two states, either **True** or **False**. You use these operators in Python to compare two or more expressions. There are mainly three types of Boolean operators, i.e., **AND**, **OR**, and **NOT**.

Operator	Example (if a=5 and b=10)	Output	Explanation
AND	a= = 5 AND b>=10	(a= = 5) > True (b>=10) > True	So, the result of the expression is True.

OR	a<5 OR b!=10	(a<5) > False (b!=10) > False	So, the result of the expression is False.
NOT	NOT (a!=5)	(a!=5) > False	So, the result of the expression is True.

Operator Precedence

An expression in Python may have more than one operator involved in it. When more than one operator is to be evaluated in an expression, the Python interpreter decides at run time which operator should be evaluated first. This decision is based on the precedence and associativity of the operators.

Precedence: Precedence is the priority order of an operator according to which it is evaluated. Each operator has a precedence associated with it. This precedence is used to determine the order of evaluation of an expression involving more than one operator. There are different levels of precedence from high to low. An operator belonging to a higher level is evaluated first.

Associativity: If two operators have the same precedence (priority), then they are either evaluated from "Left to Right" or from "Right to Left" based on their level. It is termed as associativity, which tells the direction of the execution of the operators ("Left to Right" or "Right to Left") when the operators in an expression have the same precedence.

Operator	Description
( )	Parenthesis
**	Exponentiation
+ a, –a	+ Unary , – Unary
*, /, //, %	Multiplication, Division, Floor Division, Modulus (Remainder)
+, –	Binary addition and subtraction
< , <=, >, >=, = =, !=	Relational operators
NOT AND OR	Boolean/Logical operators

Operator Precedence

Higher precedence operators are operated before the lower precedence operators. When an expression contains operators, which have the same precedence (like * and /), then whichever operator comes first is evaluated first.

For example: Evaluate the following expressions:

12 + 3 * 4 - 6 / 2	(12 + 3) * 4 – 6 / 2	12 + 3 * (4 – 6) / 2
Solution	**Solution**	**Solution**
= 12 + 12 – 6 / 2	= 15 * 4 – 6 / 2	= 12 + 3 * (–2) / 2
= 12 + 12 – 3.0	= 60 – 6 / 2	= 12 + (–6)/ 2
= 24 – 3.0	= 60 – 3.0	= 12 – 3.0
= 21.0	= 57.0	= 9.0

Algorithm and Flowchart

In your day-to-day life, you come across various situations where you have to take decisions and act accordingly. Algorithms and flowcharts help you to solve these complex problems into simple steps.



Example

Let us take a simple real-life example. It is rainy season and you want to go out and play with your friends. Before you move out to play, you want to be sure that the weather will remain clear throughout the day or not. In this case, first you will check:

Condition	Plan of Action
If the weather is clear	Then you will go out and call your friends to play.
If it is raining	You will sit at home and enjoy watching television or probably read a story book.

Algorithm

An algorithm is a well-defined step-by-step procedure to solve a problem. It helps us to understand the problem and its solution in a better way.

Algorithm: To apply for a driving license

1. Input your age.
2. Check your age. If your age is greater than 18, then you can apply for the driving license.
3. If it is less than 18, then you are not eligible to apply for a driving license.

Flowchart

It is a pictorial representation of the flow of steps to solve a problem. Let us draw a flowchart for the above-mentioned example.

Flowchart: To check whether you can apply for a driving license or not

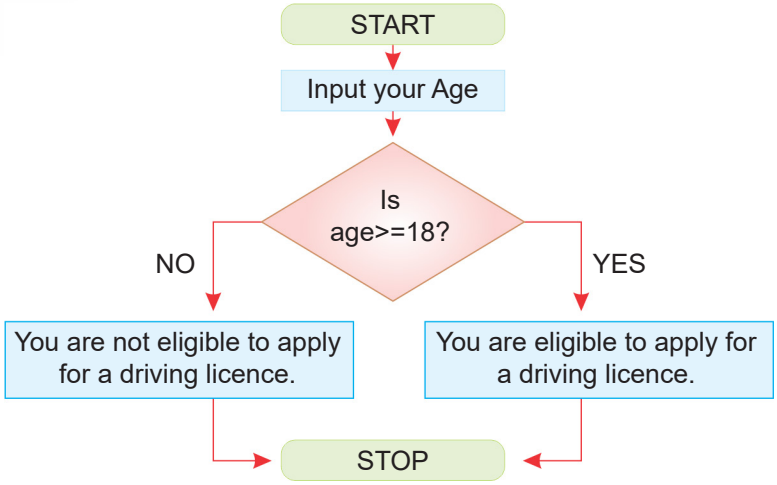


Figure 4.9: Flowchart

Control Statements

In a computer program, statements are generally executed in a sequential manner, where one statement is followed by the other, with no possibility of branching off to another action. However, at times, the user may need to change this order of execution by repeating or skipping the execution of a few statements, subject to a given condition. In such a situation, the flow of execution is altered by the use of **Control Statements**.

Types of Control Structures

Following are the different types of control structures that govern the flow of execution in programs:

Sequential

In Sequential construct, the statements in a program are executed in a sequential manner, where one statement is followed by the other, with no possibility of branching off to another action.

Program 9: A program to calculate the area of a rectangle; first, enter the length and breadth of the rectangle, then calculate its area and print the result.

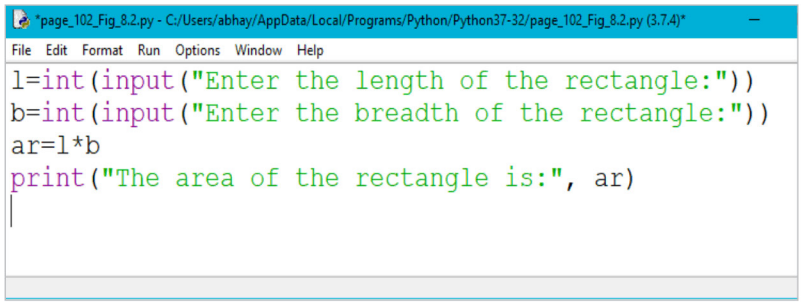
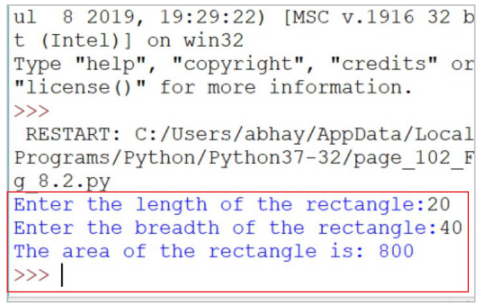


Figure 4.10: Calculating Area of Rectangle



Output

Conditional

In programming languages, conditional statements (also known as decision-making statements) cause the program control to transfer to a specific location depending on the outcome of the conditional expression. Every decision involves a choice between the two alternatives '**Yes**' and '**No**'. If a conditional statement is true, then one set of statements is executed, otherwise, the other set of statements is executed.



Example

Let us take another example. You need to have a valid driving license for driving any vehicle. To apply for a driving license, your age should be greater than or equal to 18.

Condition	Plan of Action
If your age is greater than or equal to 18	Then you are eligible to apply for a driving license.
If your age is less than 18	Then you are not eligible to apply for a driving license.

Iterative

These statements also known as **looping** statements, enable the execution of a set of statements to be repeated till the condition is true. As soon as the condition becomes false, the control comes out of the loop and the repetition stops.

In this chapter, you will be studying conditional statements in detail.

Conditional Statements

Before you start writing programs based on conditions, it is important to understand how conditional programming works. In conditional programming, the most important element is the **condition** on which the decision is based. The conditional statements check the condition and execute the statements accordingly. The conditional statements can be represented in many forms:

The if Statement

The **if** statement is used when you have to evaluate only one condition. It performs a course of action if the condition evaluates to **true**, otherwise it skips the statements.

For example, your parents allow you to go out for playing only if you complete your homework.

Syntax:

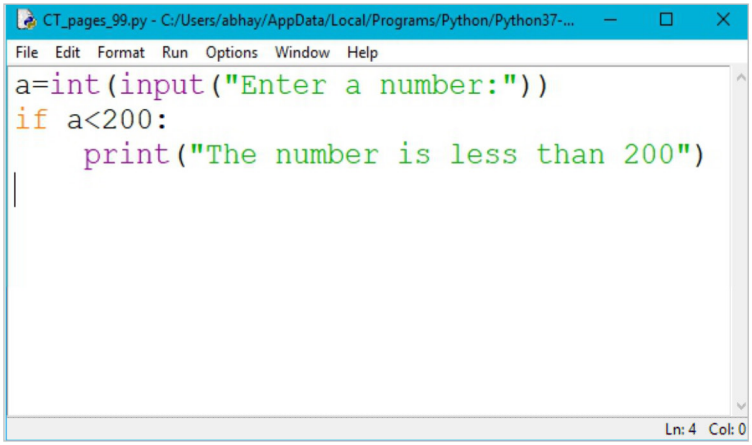
```
if <condition>:
    Statement 1
    Statement 2
    ..............
```



Remember, that after the **if** condition there is a **colon** and the condition body starts with an indentation of the **tab** space. It is mandatory in Python to indent the statements in the condition body, else it will display an error.

Let us understand this through a Python program:

Program 10:



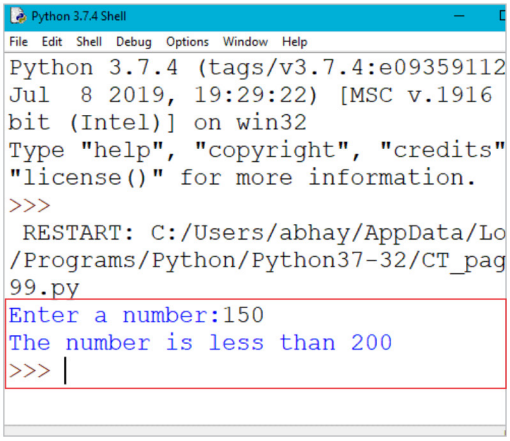


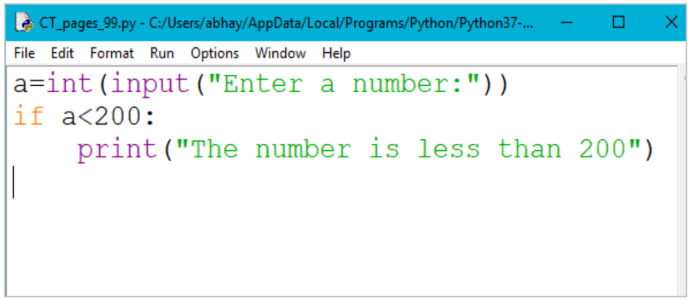
Figure 4.11: Use of if Statement — Output

So, in the above example, if you enter a number less than 200, it shows you the output "The number is less than 200".

But, what will happen, if you enter a number greater than 200? No output will be displayed because you have not given any statement or instruction to be followed if the given condition is **false**.

This is demonstrated in the following example:

Program 11:



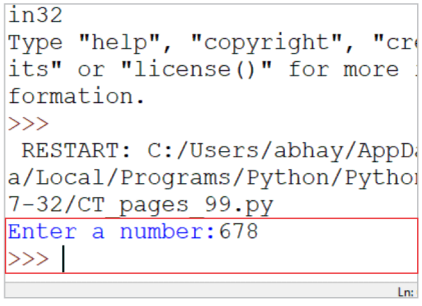


Figure 4.12: Use of if Statement — Output

Here, nothing is displayed when you enter a number greater than 200.

The if...else Statement

The **if... else** control structure is used when either of the two different actions is to be performed depending upon the result of the conditional expression. It contains two blocks of

statements. If the conditional expression evaluates to **true**, the statements in the 'if' block get executed, and if the result is **false**, then the statements in the 'else' block get executed.

For example, you can go out to play **if** it does not rain **else** you have to play indoor games.

Syntax:

```
if <condition>:

    Statements set 1

else:

    Statements set 2
```



Program 12:

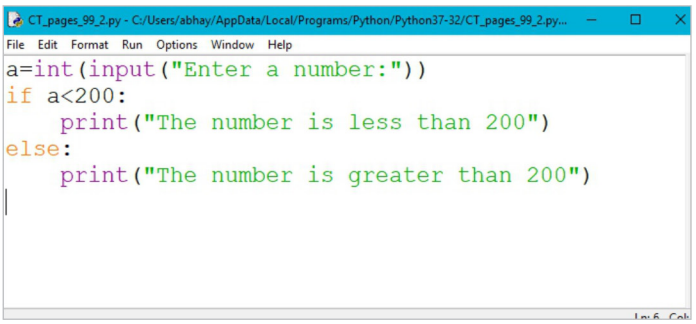
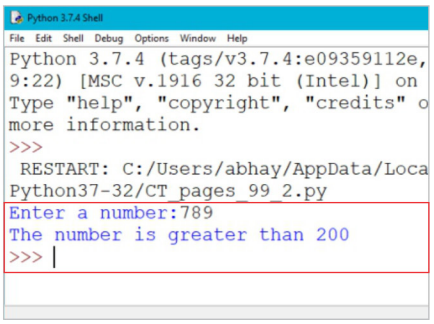


Figure 4.13: **Use of if-else Statement**



Output

In this example, when you enter a number less than 200, the first part, i.e., the 'if' part is executed and you get the output, “The number is less than 200”.

When you enter a number greater than 200, in this case, the statement following the 'else' part gets executed and displays the output, “The number is greater than 200”.

Practice Time

1. Create a program to input name of the month. Based on this input, the program should display the number of a days in a month, i.e., January 31 days , February 28 days, etc.
2. Create a program to input the runs scored by a batsman in a match. Based on the scored runs by the batsman, the program should display a message whether a batsman has scored a century or not.

The if...elif...else Statements

Sometimes, you need to work with multiple conditions. In this case, only using if-else construct does not serve the purpose. The if...elif...else statements provide a compact way to perform multiple tests on a condition.

For example, when you visit a bank, you go to the counter according to the service you want to avail. If you want to deposit cash, you go to counter 1, if you want to enquire about the cheque, you go to counter 2, if you have to enquire for a savings plan, you go to counter 3, and so on.

Syntax:

```
if <condition1>:
    statement set 1
elif <condition 2>:
    statement set 2
elif <condition 3>:
    statement set 3
else:
    statement set 4
```



Program 13: Create a program in Python to enter a number and check if the number is a positive or negative.

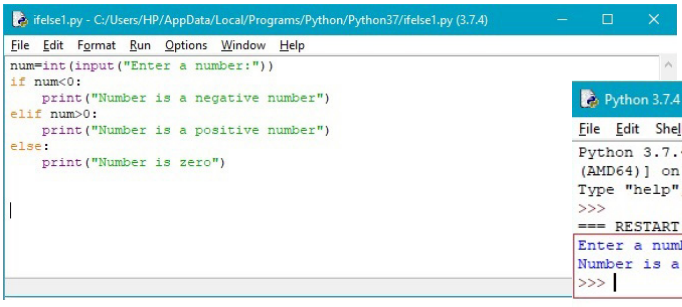
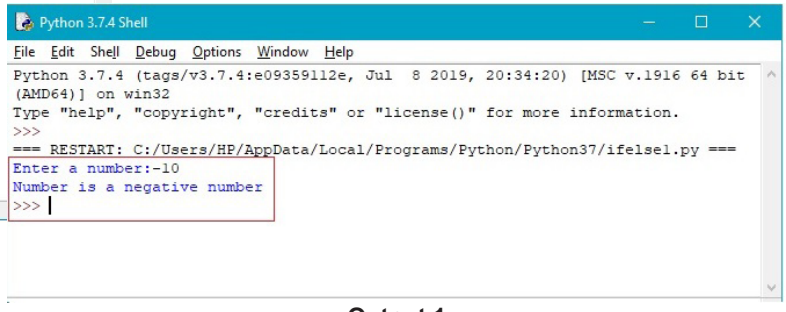
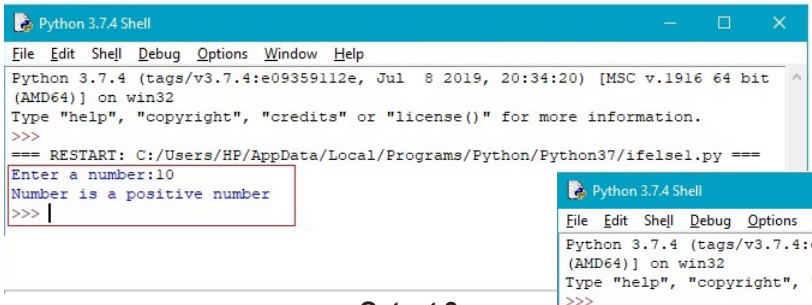


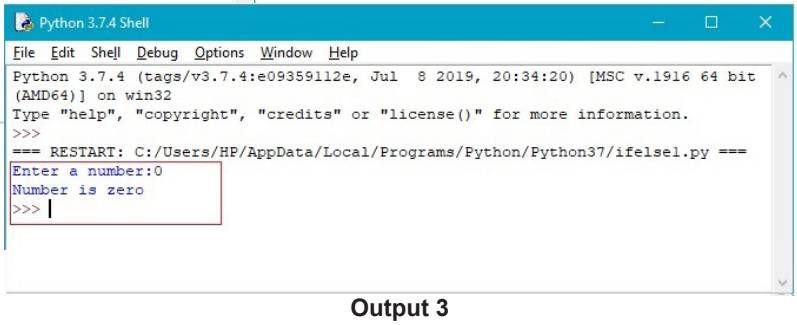
Figure 4.14: Use of if-elif-else Statement



Output 1

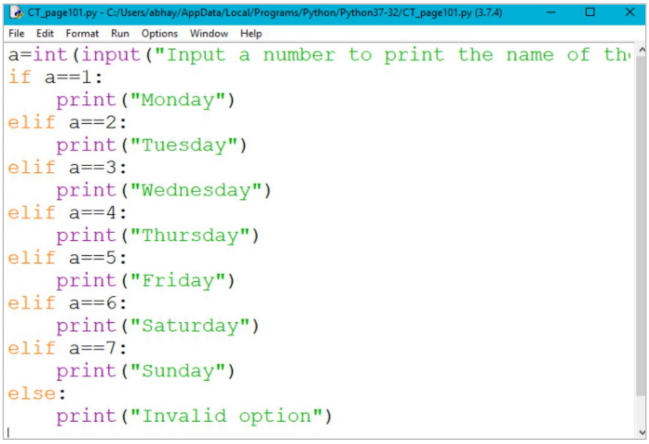


Output 2



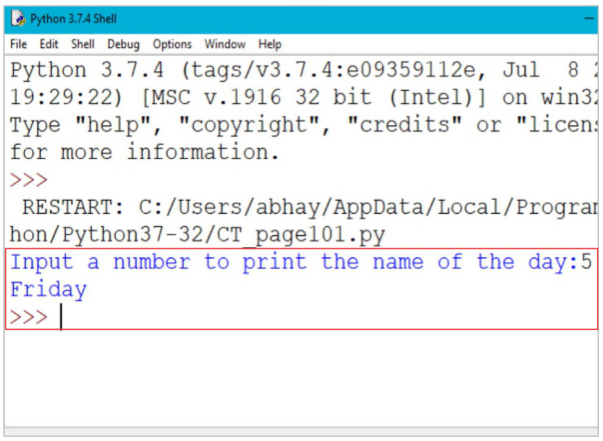
Output 3

Program 14: Write a program to display the name of the day according to the number given by the user.



```
a=int(input("Input a number to print the name of th
if a==1:
    print("Monday")
elif a==2:
    print("Tuesday")
elif a==3:
    print("Wednesday")
elif a==4:
    print("Thursday")
elif a==5:
    print("Friday")
elif a==6:
    print("Saturday")
elif a==7:
    print("Sunday")
else:
    print("Invalid option")
```

Figure 4.15: Use of if-elif-else Statement



```
Python 3.7.4 (tags/v3.7.4:e09359112e, Jul  8
19:29:22) [MSC v.1916 32 bit (Intel)] on win3
Type "help", "copyright", "credits" or "licens
for more information.
>>>
 RESTART: C:/Users/abhay/AppData/Local/Prograr
hon/Python37-32/CT_page101.py
Input a number to print the name of the day:5
Friday
>>>
```

Output

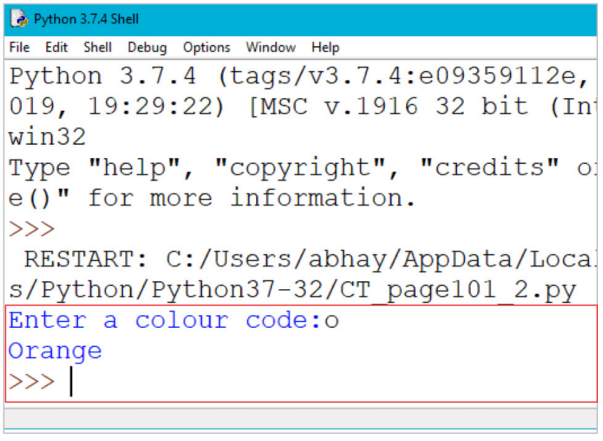
Hence, from the above example, it is clear that you can add multiple conditions in a program using conditional constructs.

Program 15: Create a program in Python to display the name of a colour on the basis of the corresponding colour code.



```
code=input("Enter a colour code:")
if code=='v':
    print("Violet")
elif code=='i':
    print("Indigo")
elif code=='b':
    print("Blue")
elif code=='g':
    print("Green")
elif code=='y':
    print("Yellow")
elif code=='o':
    print("Orange")
elif code=='r':
    print("Red")
else:
    print("Invalid colour code")
```

Figure 4.16: Displaying Colour Name



```
Python 3.7.4 (tags/v3.7.4:e09359112e,
019, 19:29:22) [MSC v.1916 32 bit (In
win32
Type "help", "copyright", "credits" o
e()" for more information.
>>>
 RESTART: C:/Users/abhay/AppData/Loca
s/Python/Python37-32/CT_page101_2.py
Enter a colour code:o
Orange
>>>
```

Output

Practice Time

ABC company is offering discounts on purchase of various electronic goods. At the payment counter, the operator is required to input the item code to get the details of the discount on the purchased items.

ITEM	CODE	DISCOUNT
Refrigerator	100	10%
Smart TV	101	15%
Micro Wave Oven	102	5%
Laptop	104	12%

Create a program which will display the total discount availed by a user based on item purchased.

RECAP

- Operators are symbols that perform arithmetic and logical operations on operands and provide a meaningful result.
- Arithmetic operators are used to perform mathematical operations.
- The concatenation operator is used to join two strings and is represented by a '+' sign.
- The Assignment operator (=) is used to assign the value of an expression to a variable.
- The Relational operators are used to compare two or more expressions.
- The logical operators are used to compare two or more expressions.
- The order in which the operators are evaluated is called the precedence of operators.
- An algorithm is a well-defined step-by-step procedure to solve a program.
- A flowchart is a pictorial representation of the flow of steps to solve a problem.
- In programming languages, the conditional statements cause the program control to transfer to a specific location depending on the outcome of the conditional expression.
- The if statement is used when you need to evaluate only one condition.
- The if...else control structure is used when either of the two different actions are to be performed depending upon the result of the conditional expression.
- The if...elif...else statements provide a compact way to perform multiple tests on a condition.

Brain developer

A. Fill in the blanks.

1. The order in which the operators are evaluated is called the ..... of operators.
2. The valid combination of both the operands and operators makes an ....., which returns a computed result.
3. The ..... operator is used to concatenate or join two or more strings.
4. In Python, the flow of execution is altered by the use of the ..... statements.
5. The ..... control structure is used when either of the two different actions is to be performed depending upon the result of the conditional expression.

6. In Python, the conditional statement is terminated with a ..... symbol.

Hints

- '+'
- If-else
- Precedence
- Colon
- Control
- Expression

B. Write T for True and F for False.

1. An operator does not need any operand to perform any operations. ☐
2. Unary operators can be used on more than three operands. ☐
3. Exponential operator is used to calculate the power of numbers. ☐
4. Higher precedence operators are operated before the lower precedence operators. ☐
5. The 'if-elif-else' statement is used when you need to evaluate only one condition. ☐
6. Iterative statements execute a set of statements repeatedly till the condition is true. ☐

C. Application-based questions.

1. Sumit is converting a decimal number to binary number. He needs to calculate the remainder in each step. Which operator do you suggest him to use for this task?

   .....

2. Arif's father is a businessman. He wants to determine whether he made a profit or loss based on the revenue figures. Suggest an appropriate conditional construct that he can use to solve the problem.

   .....

D. Select the correct option.

1. The values on which the operators work are known as ..... .

   a. Operands b. Data c. Numbers

2. // (floor division) is same as / (division).

   a. True b. False c. None of these

3. In which construct are the statements in a program executed in a sequential manner followed by one after the other with no possibility of branching off to another action.

   a. Conditional b. Sequential c. Iterative

4. Which statement among the following enables the execution of a statement to repeat till the condition is true?

   a. Conditional b. Sequential c. Iterative

5. Which block of statements will be executed first, if the conditional expression evaluates to false in the 'if...else' construct?

a. else b. if c. Both a and b

E. Answer the following questions.

1. Define operators. Also, list different types of operators.

.....

.....

.....

2. What is the difference between ' / ' and '//' operator?

.....

.....

.....

3. What is the use of the '*' operator in a string manipulation?

.....

.....

.....

4. Distinguish between logical and relational operators.

.....

.....

.....

5. List the different types of control structures.

.....

.....

.....

6. Describe the use of conditional statements. Write the syntax of any one.

.....

.....

.....

ACTIVITY SECTION



MY ACTIVITY

Learning While Playing

A. Write the output of the following code segments.

1.
```
a=10
b=20
print(a>10 and b<40)
```

2.
```
a=10
b=20
print(a+b)
print('a+b')
```

3.
```
a=100
if a>99:
  print(a,'is a three digit number')
else:
  print(a,'is a two digit number')
```

4.
```
a=4
if a%2==0:
  print(a,'is even number')
else:
  print(a,'is odd number')
```

B. Rewrite the programs after correcting the errors in the space provided.

1.
```
n=6
If N%2 = 0:
Print "n, is divisible by 2"
```

2.
```
a=10, b= 20
Sum = a + b
Print(Sum of numbers is +sum))
```

3.
```
num1=50
Num2=60
If Num1 < Num2
Print num1 is smaller than Num2
Else
Print Num2 , is greater than Num1
```

LAB SESSION

Perfection Through Practice



Write the code for the following programs in the Script mode.

1. Using the String Replication operator, print your name ten times.
2. Input two numbers and design a program that can perform the following functions:
   - Add the numbers
   - Subtract the numbers
   - Find the remainder when one number is divided by the other
   - Find the quotient when a normal division is performed
   - Find the quotient when an integer division is performed
   - Multiply the numbers
3. Input the name, age, and basic salary of an employee. Calculate the total salary of an employee by adding 10% DA and 10% HRA to the basic salary.
4. Create a program in Python to find if a year is a leap year or not. A year is a leap year, if it is divisible by 4.
5. Write a program to display "Valid Voter" if the following condition is true: Age of the person should be >=18.

GROUP DISCUSSION

For Concept Clarity



Discuss the following topics:

- **Different Types of Operators**
- **Different Types of Conditional Statements**

PROJECT WORK

Using Creativity



Input the name, age, and basic salary of an employee. Calculate the total salary of the employee as per the given conditions.

Age	HRA	DA
Age < 40	HRA 5%	DA 10%
Age between 40 to 50	HRA 7%	DA 12%

ONLINE LINK

Looking For More



Visit the following link:

- https://www.programiz.com/python-programming/operators

Chapter 5

Layers in Krita

LEARNING OUTCOMES

The student will be able to:

- learn about layers in Krita.
- add objects using layers.

In the previous grade, you learnt about various selection and editing tools in Krita. Now, let us understand another important concept in Krita, i.e., layers.

Layers

Layers are like a stack in which the objects are placed one over the other or **side-by-side**. An image consists of multiple layers and each layer can hold a single or multiple objects. These objects can be edited individually.

To access a particular object, you need to first access its layer. All the layers of an image are shown in the **Layers** panel as shown in Figure 5.1.

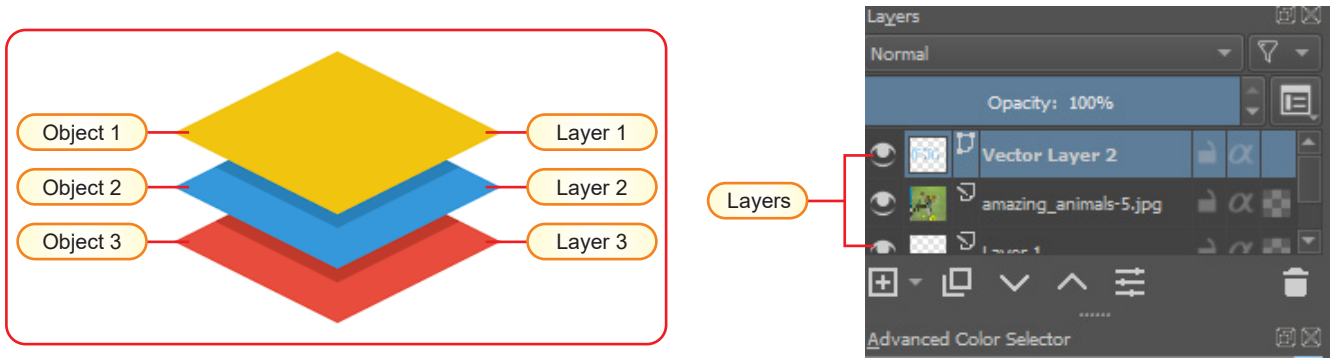


Figure 5.1: Layers Panel

Adding Objects as Layers

To add objects as layer, follow these steps:

- Click on the **Layers** menu.
- Then, click on the **Import/Export** option.
- Select the **Import Layer** option.
- This will show the **Import Image** dialog box as shown in Figure 5.2.

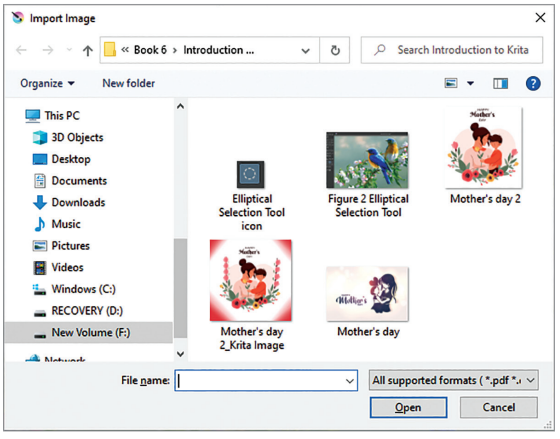


Figure 5.2: Import Image Dialog Box

- Select the image or object that you want to insert in the workspace.
- Once the image is inserted in the workspace, the **Layers** panel will now show an unnamed layer as shown in Figure 5.3.
- You can always change the name of the layer in the **Layers** panel and give it a name of your choice.

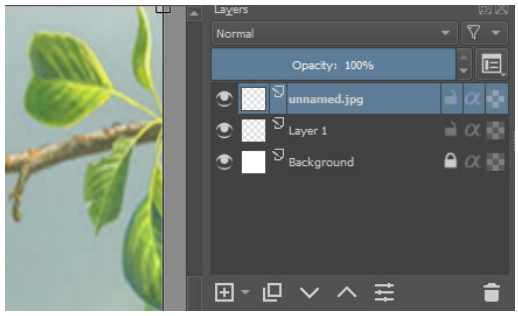


Figure 5.3: **Adding Layers to the Layers Panel**

Showing and Hiding Layers

While working with an image with the different layers, you have the option to **Hide/Show** different layers. This helps you to focus on the elements or objects of an individual layer at a time by hiding all the other layers.

- To hide or show layers, click on the **Eye** icon shown before the layer name in the **Layers** panel.

Renaming a Layer

A layer can be renamed by you as per your need. You can rename a layer using the following steps:

- Double click on the layer you want to rename in the **Layers** panel.
- Type the new name and press the **Enter** key.

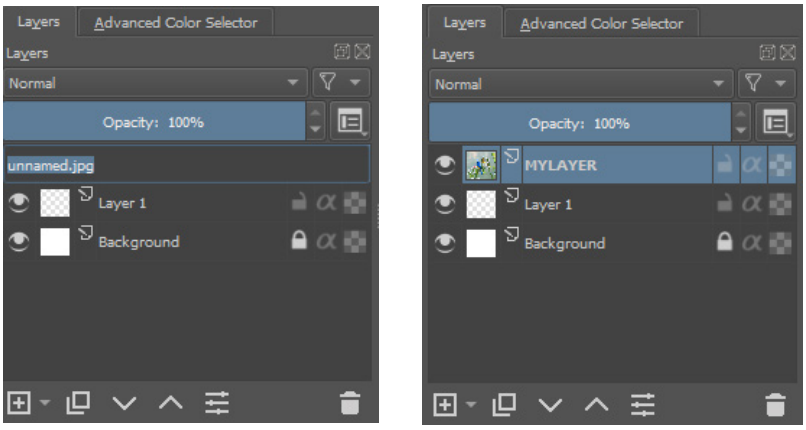


Figure 5.4: **Renaming Layers**

Deleting a Layer

In case you do not wish to work on a particular layer or had added a layer that you do not want now, then you can remove that layer by simply deleting it from the Layers panel.

- You can delete a layer by selecting the layer in the **Layers** panel and then by pressing the **Delete** key from the keyboard. Or

  Right click on the layer you want to delete. From the Context menu, select the **Remove Layer** option.

Working with Multiple Layers

Now, that you have understood the concept of layers, let us create a project where you will work with the multiple layers.

- Create a new file by clicking on the **File > New** option.
- The **Create new** dialog box is displayed. Click on the **Create** button to create a new file.
- To add an image, click on the **Layers** menu and then click on the **Import/Export** option. Select the **Import Layer** option. This will show the **Import Image** dialog box as shown in Figure 5.5.
- Select the image object you want to insert in the workspace.

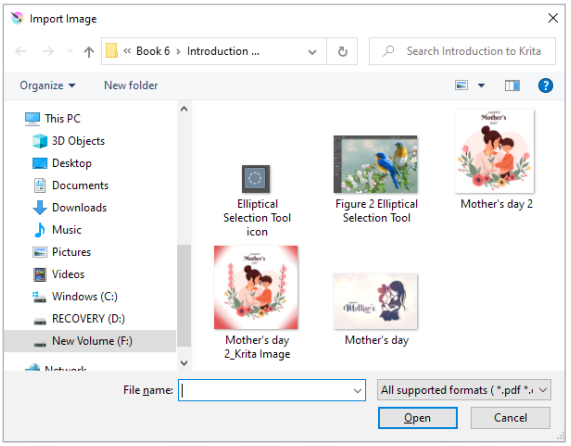


Figure 5.5: Import Image Dialog Box

- From the Toolbox, select the **Transform a layer** or **Selection** tool . Using the mouse, drag around the border of the image to cover the workspace area.
- Observe that the new image is added as a layer in the **Layers** panel.

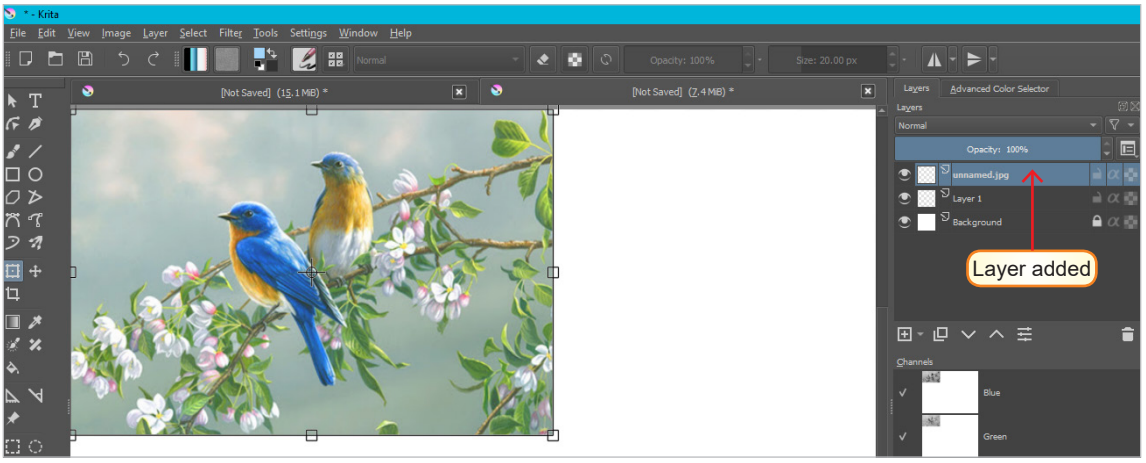


Figure 5.6: Adding the Image as a Layer

- Now, select the **Text** tool and place it on the image. Drag the borders to increase the size of the text box.
- The **Edit Text** dialog box will be displayed. Add the text in the box and click on the **Save** button. You can change the font style and size, etc., using the formatting options available in the **Edit Text** dialog box.
- After making the changes to the text, click on the **Close** button to quit the **Edit Text** dialog box.

- The text is now added to the image. Observe that a new layer is also added to the **Layers** panel.

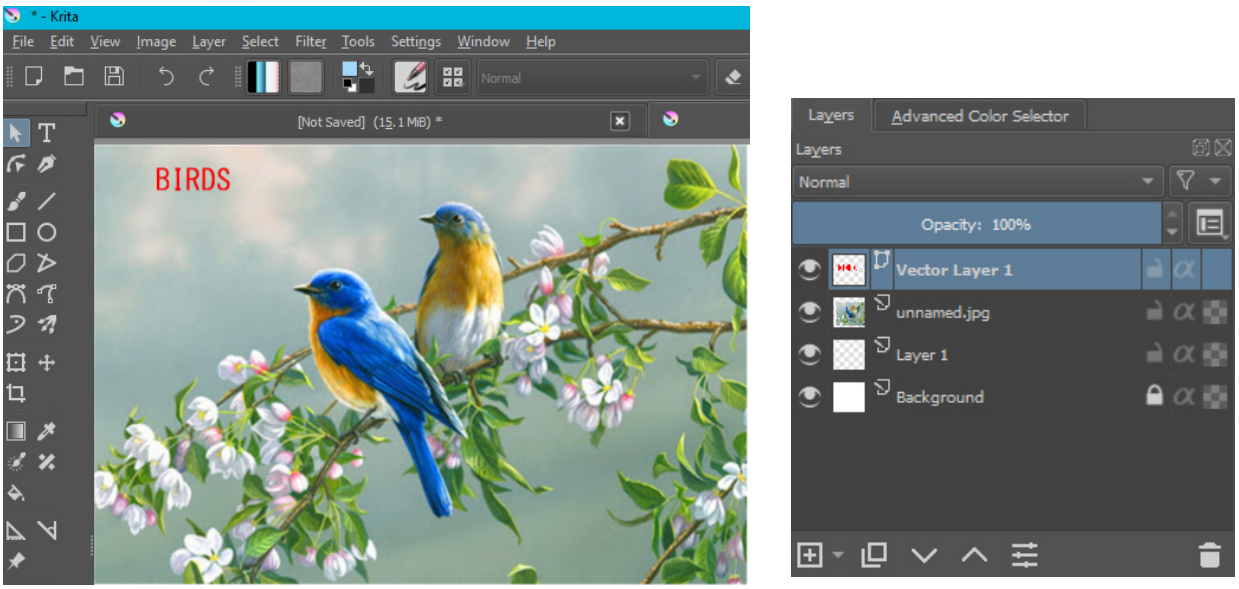


Figure 5.7: Working with Multiple Layers

RECAP

- Layers are like a stack in which the objects are placed one over the other or side-by-side.
- An image consists of multiple layers and each layer can hold a single or multiple objects.
- To access a particular object, you need to first access its layer.
- Hiding or showing a layer helps you to focus on the elements or objects of an individual layer at a time by hiding all the other layers.
- A layer can be renamed by you as per your need.
- In case you do not wish to work on a particular layer or had added a layer that you do not want now, then you can remove that layer by simply deleting it from the Layers panel.

A. Fill in the blanks.

1. ..... are like a stack in which the objects are placed one over the other or side-by-side.
2. You can use the ..... tool to add text in the image.

3. When an image is inserted in the workspace, the Layers panel shows an ..... layer.
4. To add an image, click on the Layers menu and then click on the ..... option.
5. To delete a layer, right click on the layer and select the ..... option from the context menu.

Hints

- Unnamed
- Text
- Remove Layer
- Import/Export
- Layers

B. Write T for True and F for False.

1. Krita supports working with multiple layers. ☐
2. You can rename a layer as per your need. ☐
3. Once a layer is added in the Layers panel you cannot delete it. ☐
4. To access a particular object, you need to first access its layer. ☐
5. You can change the font style and size, etc., of the text using the formatting options available in the Edit Text dialog box. ☐

C. Application-based questions.

1. Sakshi is editing her pictures using Krita. She has added multiple objects in a single layer. After finishing, she realised that she does not want to use the layer with multiple objects. Suggest what Sakshi can do to get rid of the same layer.

   .....

   .....

2. Aman wants to add multiple pictures in his file as different layers. Suggest the steps that Aman need to follow while adding images as layers.

   .....

   .....

D. Answer the following questions.

1. Explain the concept of layers.

   .....

   .....

   .....

2. Write down the steps to hide/show layers in Krita.

.....

.....

.....

3. How can you delete the layers in Krita?

.....

.....

.....

4. Explain the use of Text tool in Krita.

.....

.....

.....

ACTIVITY SECTION



LAB SESSION

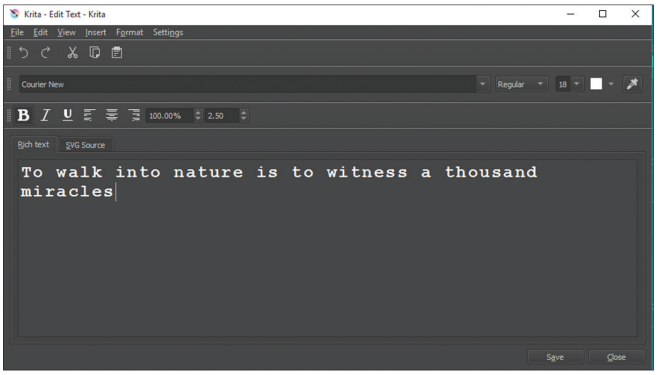
Perfection for Practice

Use the Krita Text tool to create the following project.

- Use the **Import Layer** option in the **Layers** menu to add an image in the Krita document.
- Select the SVG Text tool from the Toolbox.
- Place the SVG Text tool on the image.
- The Edit Text dialog box will open.
- Add some text and make appropriate changes, like colour, font, and size, using the different text tools.
- You can change the orientation of the text by using the handle.



- Save the changes by clicking on the **Save** button.



GROUP DISCUSSION

For Concept Clarity



Discuss the following topic:

- **Utility of Working with Multiple Layers**

PROJECT WORK

Using Creativity



Create a poster in Krita emphasising on the "Importance of Hygiene" using multiple layers. Use your imagination and skills to make the poster interesting and presentable.

ONLINE LINK

Looking For More



To know more about using layers in Krita, visit the website:

- https://docs.krita.org/en/user_manual/getting_started/basic_concepts.html?highlight=layers#layers-and-compositing



1 WORKSHEET

Chapters 1—5

A. Fill in the blanks.

1. The ..... number system consists of 8 digits.
2. ..... means arranging the data either in an ascending or descending order.
3. ..... section is used to manage all the layers used in the animation.
4. The ..... reference occurs when a formula in a cell refers to its own cell value directly or indirectly.
5. The ..... function is used to join two or more than two strings together.

Hints

- CONCAT()
- Layers
- Sorting
- Octal
- Circular

B. Write T for True and F for False.

1. In binary addition, 1 + 1 equals to 0. ☐
2. To enter or modify a formula in a cell, you can also press the F2 key. ☐
3. The relational operators are used to show the relationship between the operands. ☐
4. The print() function only prints numbers. ☐
5. An expression in Python may have more than one operator involved in it. ☐

C. Identify the types of charts and name them in the given space.


.....


.....


.....


.....

D. Match the following.

1.	Accepts the value from the user	a.	int(Integer)
2.	Useful for testing code	b.	+
3.	Stores integer values	c.	**
4.	Exponentiation	d.	Interactive mode
5.	Concatenates two strings	e.	input()

1 TEST PAPER

Chapters 1—5

Name: ..... **Date:** .....

A. Select the correct option.

1. Which of the following number systems consists of 16 digits?
   a. Octal b. Hexadecimal c. Decimal
2. Which of the following charts uses connecting dots to display trends in data over a period of time?
   a. Bar Chart b. Column Chart c. Line Chart
3. The ..... of an operator determines the order in which the operators should be evaluated.
   a. Associativity b. Precedence c. Expression
4. Which function returns the remainder after a number is divided by the divisor?
   a. MOD ( ) b. POWER ( ) c. SUM ( )
5. The ..... statement is used when you have to evaluate only one condition.
   a. if-else b. else c. if-elif-else

B. Answer in one word.

1. Name the number system that is used by all digital computers. .....
2. Which function key is used to insert a chart instantly in a worksheet? .....
3. It is used to assign a value to a variable. .....
4. What is the base of octal number system? .....

C. Answer the following questions.

1. What do you understand by hexadecimal number system?

   .....

   .....

2. What is filtering?

   .....

   .....

3. What is the difference between '=' and '==' operators?

   .....

   .....

Teacher's Signature: .....

Chapter 6

Animation using Krita

LEARNING OUTCOMES

The student will be able to:

- switch to Animation workspace.
- identify and use the Animation workspace controls.
- create animation in Krita.

Krita is a free and open source painting and animation program. It provides a versatile and easy way to create an animation that consists of images, sounds, and videos with various effects. Krita animation is extremely useful for developing highly interactive animations. They can be scaled to any size without compromising the quality. It can be extremely useful for developing highly interactive websites, online advertisements, computer games, and content for various other devices. You have already learnt the use of different tools and layers in Krita. In this chapter, you will learn how to create an animation.

Switching to Animation Workspace

In Krita, to access the animation features, the easiest way is to change your workspace to **Animation**. This will make the animation dockers (panels) appear on the workspace. To add the animation dockers, click on the **Choose Workspace** button  . This will display the Workspaces panel. Here, select the **Animation** option. You will see the animation dockers and stage on your workspace as shown in Figure 6.1. Before creating the animation, let us first know about the components of the Animation workspace.

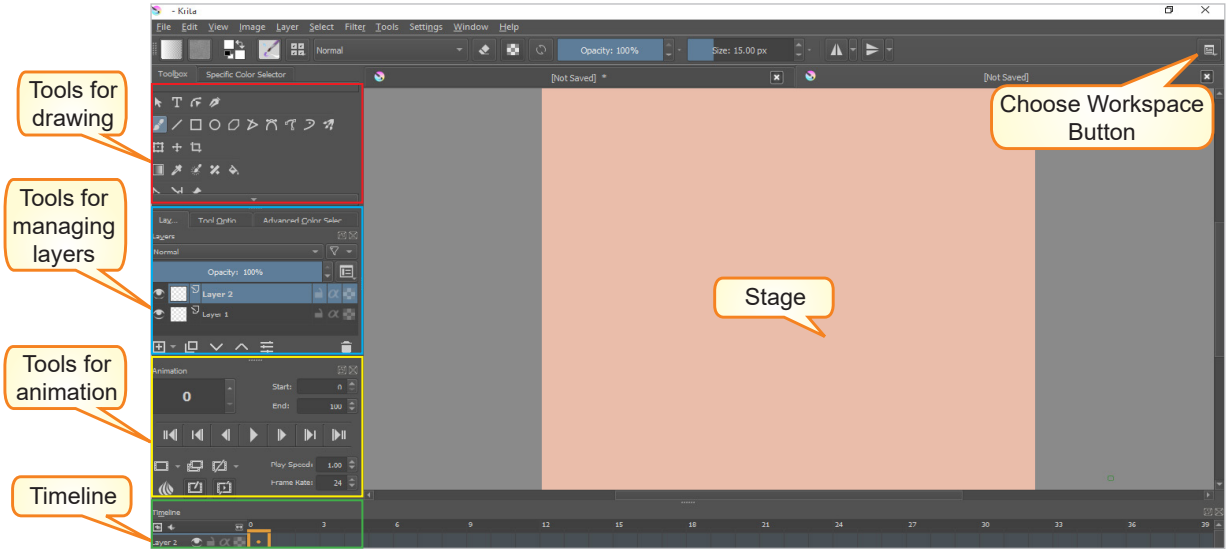


Figure 6.1: Krita Animation Workspace

The Workspace

The workspace is the arrangement of the various Krita elements, such as Tools Panel (containing different dockers), Stage, Timeline, and so on.

Stage

The stage is a drawing board where you can create graphics, animation, and make modifications too. It is a large space present in the center of the workspace.

Tools Panels

The tools panel consists of the various tools to draw, paint, and modify the objects in the workspace. It is divided into three parts—Toolbox, Layers, and Animation.

Toolbox: This docker has the different tools that are used for drawing, painting, and selecting the objects.

Layers: This docker is used to manage all the layers used in the animation.

Animation: This docker consists of the controls that are used for presenting the animation.

Timeline

The timeline is a rectangular window, which is present at the bottom of the stage. It is the area where one controls the sequencing and timing of the graphics and the other elements of animation. The major components of the timeline are **Layers, Frames,** and **Playhead**.

Frames

Animation in Krita is created with the help of frames. Each frame is defined as the little rectangular cell that appears on the timeline. Every fifth frame displays a number that you can find on the top of the timeline.

Keyframes

Keyframes are special types of frames, where you define some changes to an object's properties for an animation, like position, colour, shapes, etc.

Layers

Layers are like transparent sheets stacked on top of one another; each containing a different image that appears on the stage. You can draw and edit the objects on one layer without affecting the objects on another layer.

Creating Animation

Let us create the first animation in Krita: **A jumping man on the road**. For this, follow the steps given on the next page.

Creating a New Document

You will need two layers to make a jumping man on the road: one for the road and another for the man. So, create a new document with two layers. To do so, follow these steps:

- Click on **File > New**. The **Create new document** dialog box appears.
- In the **Create new document** dialog box, add the required values as given below.

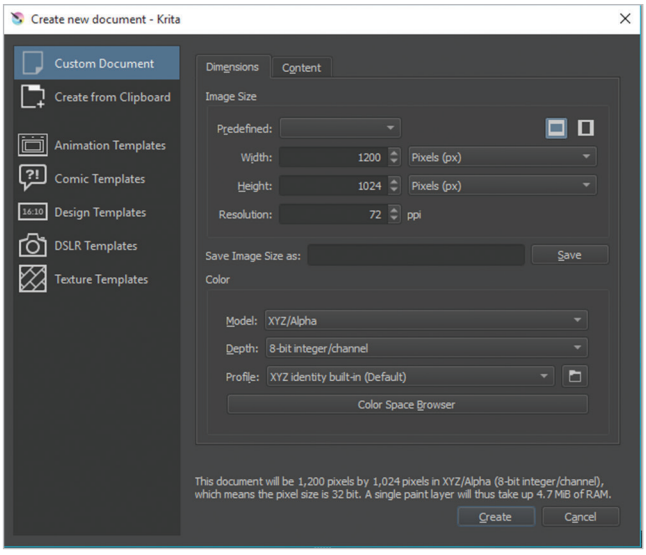


Figure 6.2: Creating a Custom Document—Dimensions Tab

Width	1200 Pixels(px)
Height	1024 Pixels(px)
Resolution	74 ppi

- Now, click on the **Content** tab and update the values as given below.

Layers	2
Background Color	Select any colour of your choice
Background Opacity	100%
Background	As canvas color

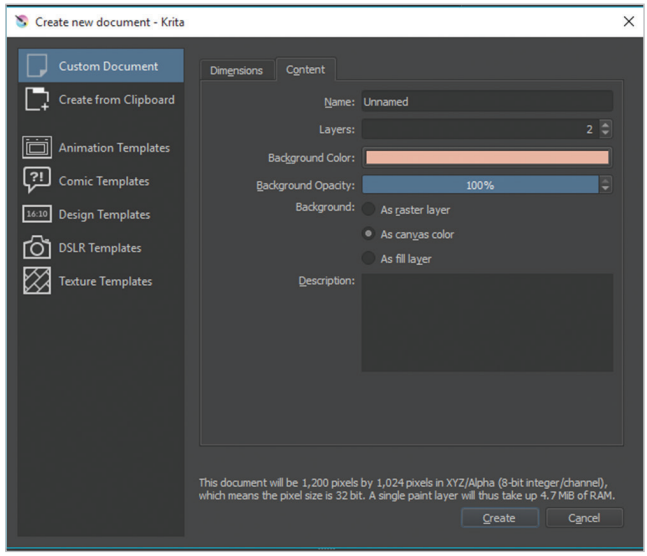


Figure 6.3: Creating a Custom Document—Content Tab

- After updating all the required values click on the **Create** button. This will create a New Krita document as shown in Figure 6.4.

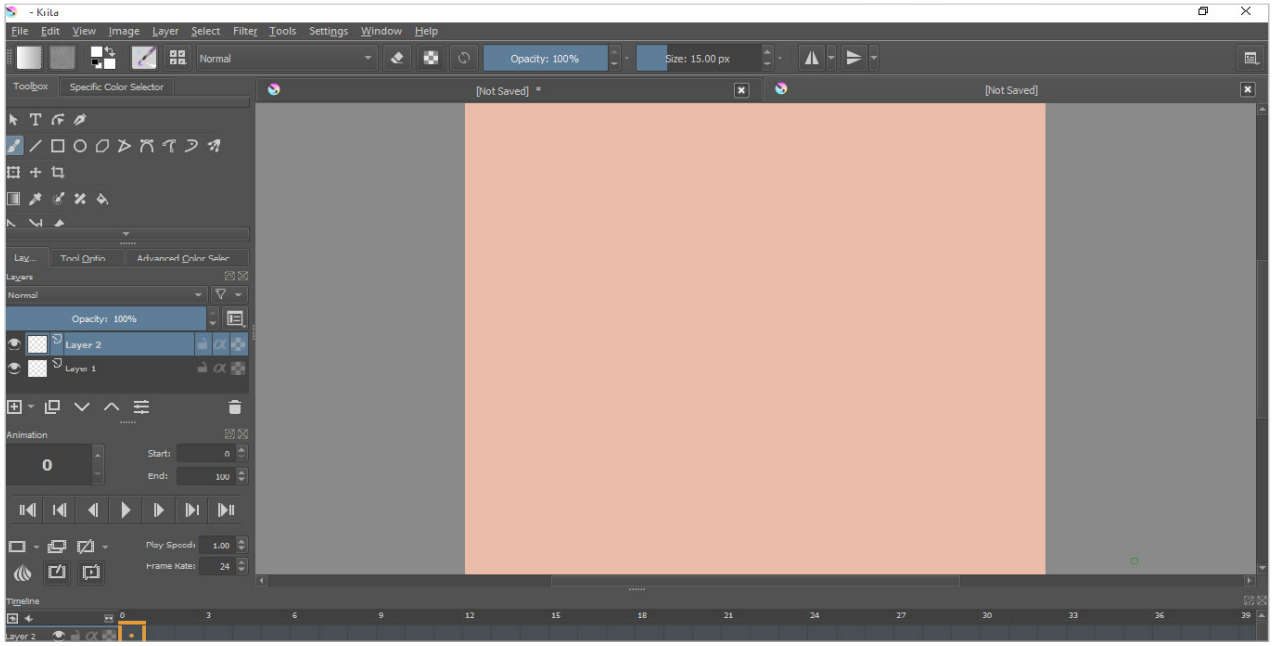


Figure 6.4: Created a New Krita Document

Renaming Layers

For better understanding, rename the layers first. Rename Layer1 as Road and rename Layer2 as Man. You can rename a layer using the following steps:

- Double-click on the layer you want to rename in the **Layers** panel.
- Type the new name and press the **Enter** key.

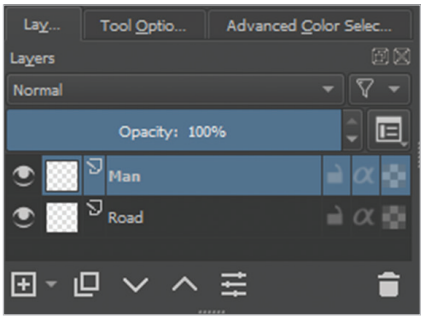


Figure 6.5: Renaming Layers

Adding Animation

To add animation, follow the given steps:

- Before you start drawing on the Road layer. Make sure you hide the other layer(s). For example, to hide the Man layer simply click on the icon.
- Now, select the layer in which you want to draw an object.
- Select any drawing tool from the Toolbox and draw an image that looks similar to the one given below in the work area.
- Click on the Road layer and draw a horizontal line using the **Line** tool.
- Now, the next thing to do is add another frame in the timeline. To add a blank frame in the timeline, click on the **Add blank frame** button .
- Repeat the previous step and add new frames at three (0,6,12) points as shown in Figure 6.6.

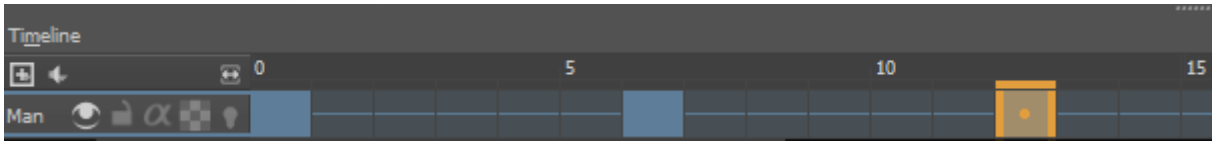
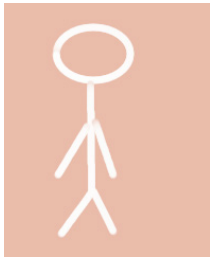
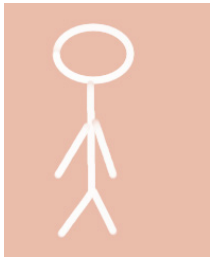


Figure 6.6: Adding Frames

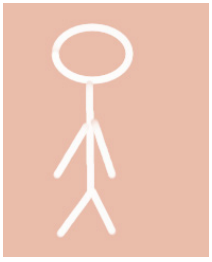
- Click on each new frame and draw the images with the drawing tools.



Frame 0



Frame 6



Frame 12

- Now, make both the layers visible and add the following information in the **Animation** panel as shown.
- To view the animation, click on the **Play** button  .

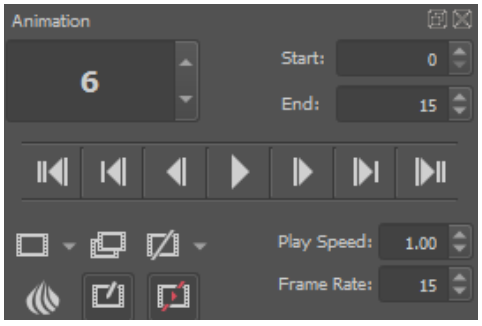
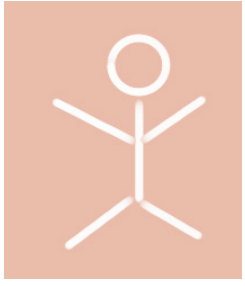


Figure 6.7: Animation Panel

Properties of Animation Panel

Start	First frame of the animation.
End	Last frame of the animation.
Play Speed	The speed at which the animation will be played in the preview mode.
Frame Rate	The speed at which the animation will be played when embedded with the other apps.



RECAP

- Krita is a free and open source painting and animation program.
- Click on the Animation workspace from the Workspaces panel to add the animation controls.
- Timeline controls the sequencing and timing of the graphics and the other elements of animation.
- Keyframes are special types of frames, where you define some changes to an object's properties for an animation.
- Layers are like transparent sheets stacked on top of one another. You can draw and edit the objects on one layer without affecting the objects on another layer.

A. Fill in the blanks.

1. You can add animation controls to the workspace by selecting the ..... option from the Workspaces panel.
2. A ..... is special frames that enables you define some changes to an object's properties.
3. You can add new blank frames in the ..... .
4. All the layers are available in the ..... panel.
5. To run the animation, you can click on the ..... button.

Hints

- Play
- Animation
- Keyframe
- Timeline
- Layers

B. Write T for True and F for False.

1. You can only create drawings with Krita. ☐
2. Krita is used for creating 3D animation. ☐
3. The stage is an area where you can create animation. ☐
4. Krita is a free and open source painting and animation program. ☐
5. The panel that contains drawing tools is called Toolbox. ☐

C. Answer in one word.

1. It sets the speed at which animation plays in the preview mode. .....
2. It sets the speed at which animation plays in other apps. .....
3. Name the tool that is used for adding blank frames. .....
4. Name the panel that holds all the layers of the animation. .....

D. Application-based questions.

1. Anand wants to rename layers in his Krita animation project. He is not sure about the location of the Layers panel. Help him find it.

.....

2. Ashna has created an animation in Krita. While playing it, she realised that the speed of the animation is slow, she wants to increase the speed of the animation. Suggest the animation property that she can use to do so.

.....

D. Answer the following questions.

1. How do you switch to the Animation workspace in Krita?

.....

.....

.....

2. Differentiate between a frame and a keyframe.

.....

.....

.....

.....

3. What is the significance of timeline in Krita?

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4. What are layers used for?

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5. Write down the steps to rename a layer.

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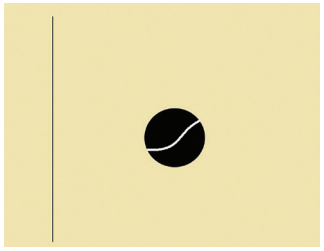
ACTIVITY SECTION

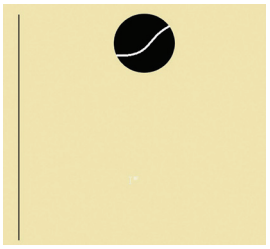


LAB SESSION

Perfection Through Practice

Create a bouncing ball animation in Krita by following the given steps.





- Create a workspace with two layers, name the first layer as ball and the second layer ground.
- Before you start drawing on the ground layer ensure that you hide the other layer.
- Hide the ball layer by simply clicking on the **Eye** icon.
- Now, once the ground layer is selected. Select the Line Tool from the toolbox and draw a vertical line that looks similar to the one given in the work area.
- Now, hide the ground layer by clicking on the **Eye** icon.
- Add another frame into the timeline. To add a blank frame in the timeline, click on the button.
- Click on the **Eye** icon of the ball layer to activate it and use the Ellipse tool to draw a ball in the newly created frame.
- Repeat steps 5 and 6 for frames 0 to 25. Draw the ball in each frame on a different location.
- In the Animation panel, set the Play Speed to 0.50 and Frame rate to 10.
- Run the animation and view the effect.

GROUP DISCUSSION

For Concept Clarity



Discuss the use of: **Frames, Keyframes, and Timeline**.

PROJECT WORK

Using Creativity



Make a chart on the various tools of Krita animation under the title, **Understanding the Krita Environment**.

ONLINE LINKS

Looking For More



Visit the following links:

- https://opensource.com/life/16/10/animation-krita
- https://www.youtube.com/watch?v=48pwrr4gPOA

Chapter 7

More on HTML5

LEARNING OUTCOMES

The student will be able to:

- work with different types of lists.
- create tables and insert images in web pages.

In the previous class, you were introduced to the basic formatting tags that were used for designing web pages in HTML. You have also learnt about the usage of CSS to spruce up the appearance of elements.

In this class, you will learn some more tags to embed the objects, like lists, tables, and images in a web page to make it look more appealing and professional.

Lists

Whether it is the minutes of a meeting, a list of items, or the table of contents of a document, you will find the use of a list in all.

A list is the most efficient way of presenting information in a precise manner. It helps in making important points standout more clearly, there by grabbing a visitor's attention. HTML supports different elements to create a list for displaying items in a specific order. It can be defined in different styles. The types of list that HTML provides are:

- Unordered List
- Ordered List
- Description List

Unordered List

An unordered list is used when the items are not required to be displayed in any particular sequence. The list begins and ends with <ul> and tags, respectively. It indents each item in the list and adds a bullet against each of them. It is also known as the **Bulleted** list. For example, a list of stationery items:

- Pen
- Pencil
- Clipboard
- Eraser
- Stencil
- Colours

Let's Know More

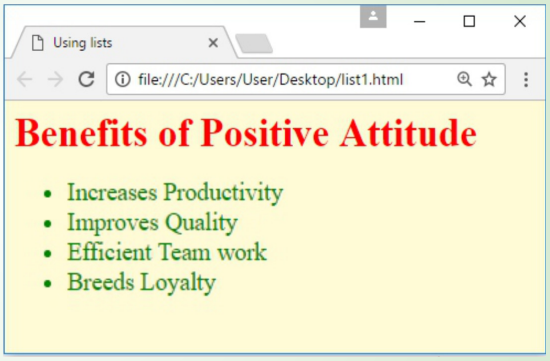
You can also style lists with colours to make them more noticeable. **For example:** <style> ol {background: Peachpuff; padding: 20px;} li{background: silver; padding: 5px;} </style>

The <li> tag is used to display the list of items in an unordered list and ordered list.

Let us have a look at the following example:

```
<html>
<head>
<title>Using lists</title><style type="text/css">
body{background-color:RGB(255,251,214)}
h1{color:red}
li{color:green}
</style>
</head><body>
<h1> Benefits of Positive
Attitude </h1><ul>
<li> Increases Productivity
<li> Improves Quality
<li> Efficient Team work
<li> Breeds Loyalty</ul></body></html>
```





Let's Know More

The **<menu>** tag is used to create a menu list. **<menu>** denotes the start of the menu and **</menu>** denotes the end of the menu.

Ordered List

An ordered list is used to display the list of items in a specific order. An ordered list indents and gives a number to each item in the list, that is why it is also known as the **Numbered** list. The list begins and ends with <ol> and tags, respectively. Ordered lists are mostly used in situations where the order of the items is significant or where it is required to keep a count on the number of items. For example, in a recipe, if the steps are not demonstrated orderly, the end result would not be as desired.

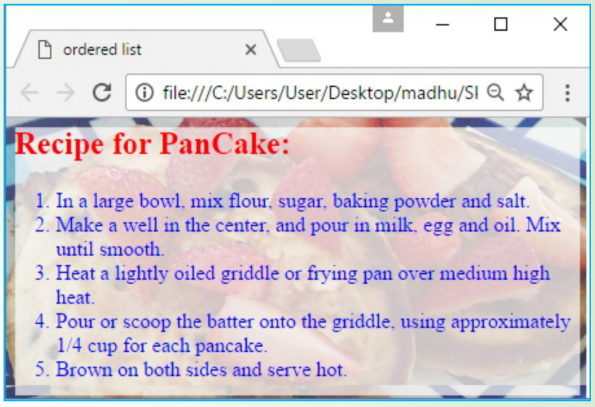


```
<html>
<head>
<title>ordered list</title>
<style type="text/css">
body{background-repeat:norepeat;
backgroundimage: url(pancake.jpg);
```

Let's Discuss

Unordered List vs Ordered List

```
color:Blue;font-size:20px}
h1{color:Red}
</style>
</head>
<body>
<h1> Recipe for PanCake:
</h1>
<ol>
<li> In a large bowl, mix flour, sugar, baking powder, and salt.
<li> Make a well in the center, and pour in milk, egg and oil. Mix until smooth.
<li> Heat a lightly oiled griddle or frying pan over medium high heat.
<li> Pour or scoop the batter onto the griddle, using approximately 1/4 cup for each pancake.
<li> Brown on both sides and serve hot.
</ol>
</body>
</html>
```



Attributes of <ol> Tag

Following are the different attributes of the <ol> tag:

Start Attribute

An ordered list automatically starts with number 1, but you can also start the list with a different number with the help of the Start attribute.

For example, if you write Start = 101, the ordered list numbering will start from 101.

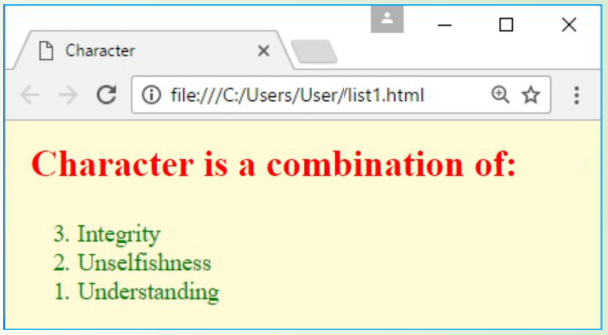
Reversed Attribute

This attribute specifies that the list order should be in the descending order.

For eample, <ol start=101 reversed>

```
<html>
<head>
<title>Character</title>
<style type="text/css">
body{background-color:RGB(255,251,214)}
h1{color:red}
```

```
li{color:green}
</style>
</head>
<body>
<h1> Character is a combination of: </h1>
<ol start=3 reversed>
<li> Integrity
<li> Unselfishness
<li> Understanding</ol>
</body>
</html>
```



Type Attribute

This attribute specifies the type of numbering or bullet used to mark items in the list. By default, its value is '1' for an ordered list and 'disc' for an unordered list.

Syntax:

For Unordered list: <ul type = "value">

where, value = disc|square|circle

For Ordered list: <ol type = "value">

where, value = A|a|I|i|1

Type Attribute Values for Unordered List

Bullet Style	Result	Description
Disc	●	A filled circle (default)
Circle	○	A non-filled circle
Square	■	A filled square

Type Attribute Values for Ordered List

Number Style	Result	Description
<ol type = "A">	A, B, C	Uppercase letters
<ol type = "a">	a, b, c	Lowercase letters
<ol type = "I">	I, II, III	Uppercase roman numbers
<ol type = "i">	i, ii, iii	Lowercase roman numbers
<ol type = "1">	1, 2, 3	Sequence of numbers (default)

List Properties

List-Style-Type

This property specifies the bullet style that will be used as the type of list item marker.

Syntax: list-style-type:value

where, values for the unordered list is: none|disc|circle|square (disc is the default value) and values for ordered list is: decimal|decimal-leading-zero|lower-roman|upper-roman| lower-alpha|upper-alpha (decimal is the default value)

List-Style-Image

With this property, you can specify an image as the list item marker.

Syntax: list-style-image:value

where, value=url("path of the image")|none

List-Style-Position

You can specify the position of the list-item markers with the help of this property, i.e., to make them appear inside or outside the content flow.

Syntax: list-style-position:value

where, value = inside|outside

List-Style

This is the shorthand property where all the list properties can be specified in one declaration.

Syntax: list-style:value

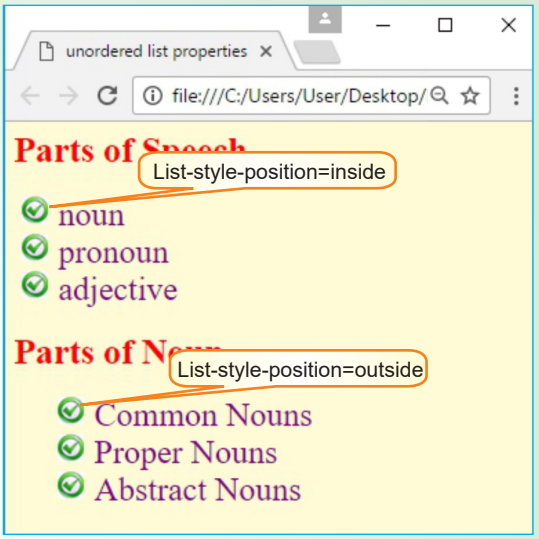
where, value = value for list-style-type|value for list-style-position|value for list-style-image

NOTE

If one of the values is missing in the above shorthand property, then the default value for the missing property will be inserted, if any.

```
<html>
<head>
<title>unordered list properties</title>
<style type="text/css">
body{background-color:RGB(255,251,214)}
```

```
ul{list-style-image:url("check.jpg")}
li{font-size:30px;color:purple;text-align:top}
h1{color:red}
</style>
</head>
<body>
<h1>Parts of Speech</h1>
<ul style=list-style-position:outside>
<li>noun
<li>pronoun
<li>adjective
</ul>
<h1>Parts of Noun</h1>
<ul style=list-style-position:inside>
<li>Common Nouns
<li>Proper Nouns
<li>Abstract Nouns
</ul>
</body>
</html>
```

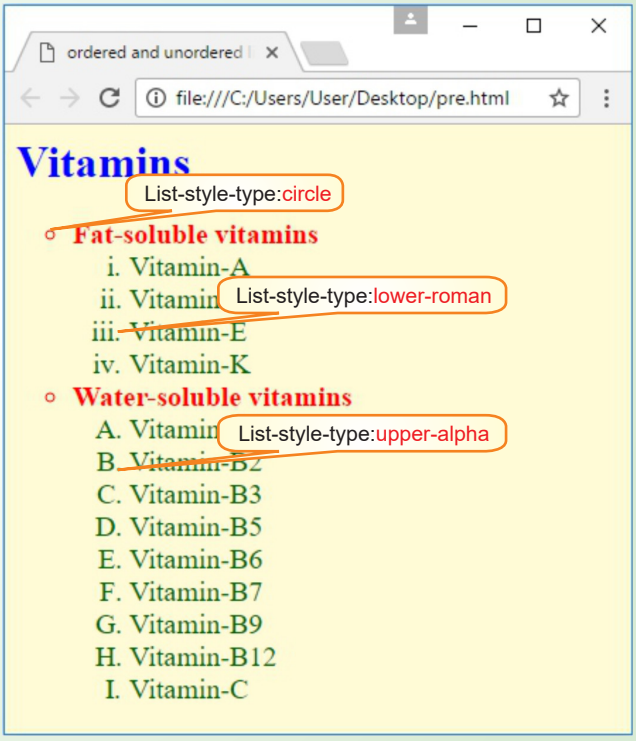


Nested List

A nested list is a list inside any other list. An ordered and unordered list can be nested within each other to form a multi-level list. To create a nested list, add a new list within the list, as given below:

```
<html>
<head>
<title>ordered and unordered lists</title>
<style type="text/css">
body{background-color:RGB(255,251,214)}
ol{list-style-type:lower-roman}
ul{list-style-type:circle}
```

```
li{font-size:20px}
h1{color:blue}</style></head><body>
<h1> Vitamins</h1>
<ul><li style=color:red>
<b>Fat-soluble vitamins</b>
<ol><li style=color:darkgreen>Vitamin-A
<li style=color:darkgreen>Vitamin-D
<li style=color:darkgreen>Vitamin-E
<li style=color:darkgreen>Vitamin-K
</ol><li style=color:red>
<b>Water-soluble vitamins</b>
<ol style=list-style-type:upper-alpha>
<li style=color:darkgreen>Vitamin-B1
<li style=color:darkgreen>Vitamin-B2
<li style=color:darkgreen>Vitamin-B3
<li style=color:darkgreen>Vitamin-B5
<li style=color:darkgreen>Vitamin-B6
<li style=color:darkgreen>Vitamin-B7
<li style=color:darkgreen>Vitamin-B9
<li style=color:darkgreen>Vitamin-B12
<li style=color:darkgreen>Vitamin-C
</ol></ul>
</body></html>
```



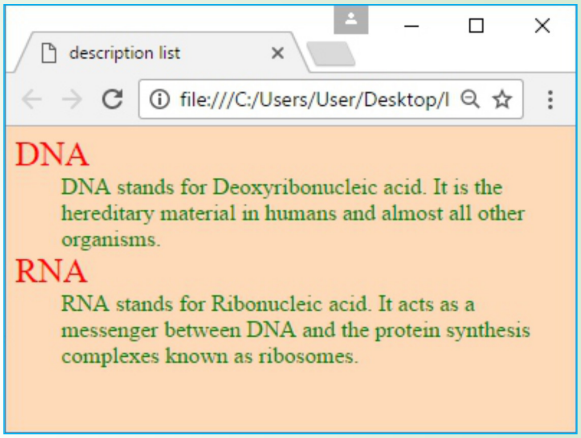
Definition List

A definition list, also called a description list consists of a term followed by its definition. It is used to present a glossary, list of terms, or other name/value lists. It starts and ends with <dl> and </dl> tag, respectively. The <dl> tag is used in conjunction with <dt> and <dd> tags where:

- The <dt> tag helps in defining the terms or names.
- The <dd> tag helps in describing each term or name.

```
<html>
<head>
<title>description list</title>
<style type="text/css">
body{background-color:peachpuff}
```

```
dt{text-transform:uppercase;color:red;fontsize:
30px}
dd{color:green;font-size:20px}
</style>
</head>
<body>
<dl>
<dt>dna</dt>
<dd>DNA stands for Deoxyribonucleic acid.
It is the hereditary material in humans and
almost all other organisms.</dd>
<dt>rna</dt>
<dd>RNA stands for Ribonucleic acid. It acts as a messenger between DNA and the
protein synthesis complexes known as ribosomes.</dd>
</dl>
</body></html>
```

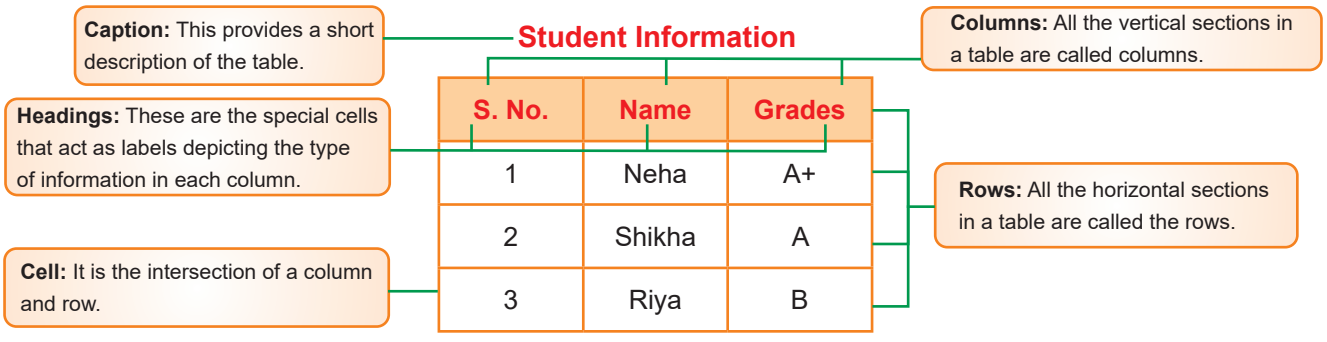


Tables

Tables are extremely popular on the web because they are flexible and an attractive way of presenting information in the form of rows and columns.

- Tables help in presenting the information or data in a comprehensive manner.
- Tables can be used for comparative analysis of data.
- Information displayed in tables is easier to read and quicker to evaluate.

Let us have a look at the various terms to define a table:



Creating a Table in HTML

To create a table in HTML, the <table> tag is used. Each table begins with a <table> tag and ends with </table> tag.

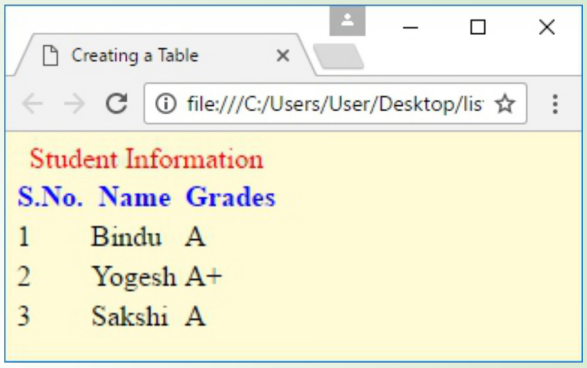
Each row in a table begins with the table row <tr> tag and ends with the </tr> tag. The rows must always be inside the <table> tag.

The columns contain cells; each of which begins with the table data <td> tag and ends with the </td> tag. The <td> tag must always be present inside the row tag <tr>.

To specify a column heading, you use the <th> tag that also ends with the </th> tag. It makes the text bold. The <caption> tag is used to specify the title for the table.

Let us create a table in HTML using these tags:

```
<html>
<head>
<title>
Creating a Table
</title>
<style type="text/css">
body{background-color:rgb(255,251,214)}
th{color:blue}
</style>
</head>
<body >
<table>
<caption style= color:red> Student Information
</caption>
<tr>
<th>S.No.</th><th>Name</th><th>Grades</th>
</tr><tr>
<td>1</td>
<td>Bindu</td><td>A</td>
</tr><tr><td>2</td> <td>Yogesh</td><td>A+</td>
</tr><tr><td>3</td> <td>Sakshi</td><td>A</td>
</tr></table>
</body></html>
```



NOTE

The above table does not give the real appearance of a table, except that the data is depicted in rows and columns. To enhance its appearance, let us discuss the various table properties.

Table Properties

The following properties can be used while creating a table to enhance its appearance and make it attractive.

Border

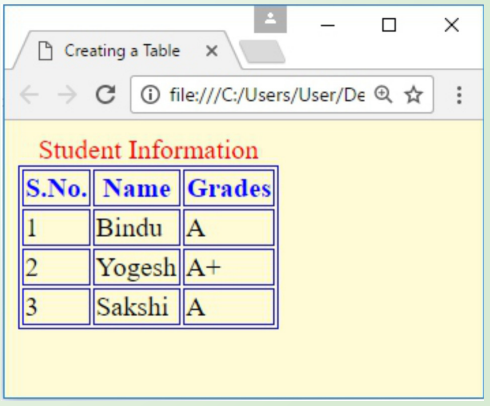
This property helps in specifying the border width, border style, and border-colour of the table and its cells.

Syntax: border:value

where, value = value for border-width|value for border-style|value for border-color

Let us apply this property using the following example:

```
<html>
<head>
<title>Creating a Table</title>
<style type="text/css">
body{background-color:rgb(255,251,214)} table,th,td{border:1px solid blue}
th{color:blue}
</style>
</head>
<body >
<table>
<caption style=color:red>Student Information</caption>
<tr>
<th>S.No.</th><th>Name</th><th>Grades</th>
</tr><tr><td>1</td> <td>Bindu</td><td>A</td>
</tr><tr>
<td>2</td> <td>Yogesh</td><td>A+</td>
</tr><tr>
<td>3</td><td>Sakshi</td><td>A</td>
</tr>
</table>
</body></html>
```



Horizontal and Vertical Alignments

The text-align and vertical-align properties are used to align the text in a table horizontally and vertically, respectively. These properties are used with the <th> or <td> tag.

By default, the horizontal alignment for the contents of <th> is center-aligned and for <td> is left-aligned. The default value of vertical-alignment is set to **middle** alignment.

Syntax: text-align: value; ← Horizontal Alignment

where, value = left|center|right

vertical-align: value; ← Vertical Alignment

where, value = top|middle|bottom

Hover

This property, if enabled, highlights the table cell, row, or column with the specified colour when you hover your mouse over it. It is used with the <tr>, <th>, or <td> tag.

Syntax: tr:hover{background-color: cyan}

Table-Layout

This property is used to set the layout for a table. It is used with the <table> tag.

Syntax: table-layout: value

where, value=auto|fixed|initial

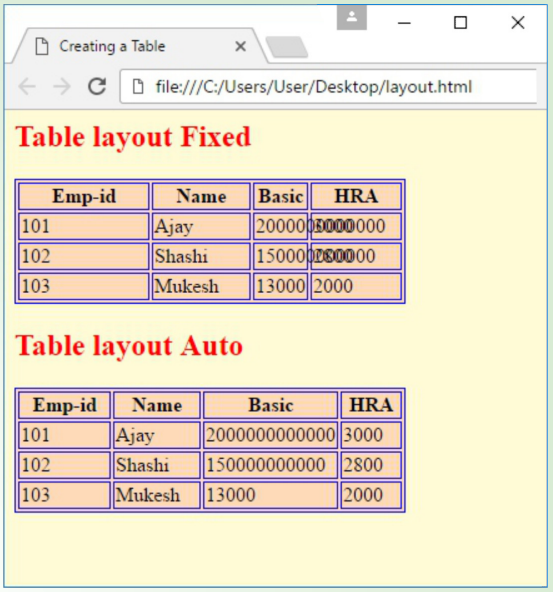
Auto: In this, the column width is set equal to the maximum width of the contents in the column.

Fixed: The column width depends on the table's width and the width of the columns, not on the contents of the cells.

Initial: The default value is used for the column width.

```
<html>
<head>
<title>Creating a Table</title>
<style type="text/css"> body{background-color:RGB(255,251,214)}
table,td,th{border:1px solid blue}table{width:50%}
th{text-align:center} td{vertical-align:middle} tr:hover{background-color:cyan}
table{table-layout:fixed;backgroundcolor:peachpuff}
```

```
h2{color:red}
</style></head>
<body ><table>
<h2> Table layout Fixed </h2>
<tr><th width=40%>Emp-id</th><th
width=30%>Name</th><th width=17%>Basic</th><th
width=28%>HRA</th>
</tr><tr>
<td>101</td> <td>
Ajay</td><td>2000000000000</td><td> 3000</td>
</tr><tr><td>
102</td><td>Shashi</td><td>150000000000</td><td>2800</td>
</tr><tr><td>103</td><td>Mukesh</td> <td>13000</td><td>2000</td>
</tr></table><table style=table-layout:auto>
<h2> Table layout Auto </h2><tr><th width=40%>Emp-id</th><th width=30%>Name</
th><th
width=10%>Basic</th><th width=28%>HRA</th>
</tr><tr><td>101</td> <td> Ajay</td><td>2000000000000</td><td> 3000</td>
</tr><tr><td>102</td><td>Shashi</td><td>150000000000</td><td>2800</td>
</tr><tr><td>103</td><td>Mukesh</td> <td>13000</td><td>2000</td>
</tr></table>
</body></html>
```



Border-Spacing

This property is used to specify the distance between the borders of the adjacent cells.

Syntax: border-spacing: value

where, value = horizontal spacing in px/cm vertical|spacing in px/cm

Example: border-spacing:10px—horizontal and vertical spacing set to 10px

border-spacing:10px 20px—horizontal and vertical spacing set to 10px and 20px, respectively.

NOTE

If only one value is specified, it gets applied to both the horizontal as well as vertical spacing.

Border-Collapse

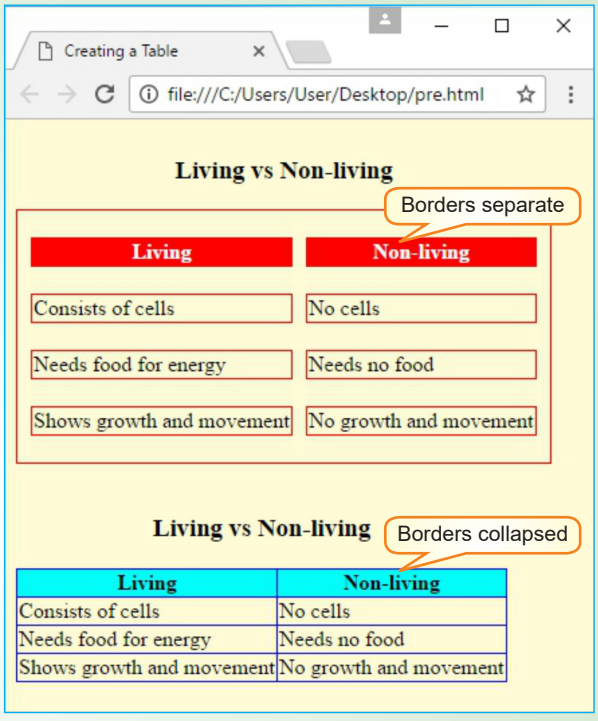
With this property, one can specify whether the table borders are to be collapsed into a single border or detached (as usual).

Syntax: border-collapse:value

where, value = separate|collapse

Example: border-collapse:collapse

```
<html>
<head>
<title>Creating a Table</title>
<style type="text/css">
body{background-color:RGB(255,251,214)}
table,td,th{border:1px solid red}
table{border-collapse:separate;
border-spacing:10px 20px}
</style></head>
<body><table>
<caption><h3> Living vs Non-living
</h3></caption>
<tr><th style=background-
color:Red;color:white>
Living</th><th style=backgroundcolor:
Red;color:white>Non-living</th>
</tr><tr>
<td>Consists of cells</td> <td>No cells</td>
</tr><tr>
<td>Needs food for energy</td> <td>Needs no food</td>
</tr><tr>
```



```
<td>Shows growth and movement</td> <td>No growth and movement</td>
</tr></table><br>
<table style=border-width:1px;border-style:solid;border-color:blue;border-
collapse:collapse>
<caption><h3> Living vs Non-living </h3></caption>
<tr><th style=border-color:blue;background-color:cyan>Living</th><th
style=border-color:blue;backgroundcolor: cyan>Non-living</th>
</tr><tr>
<td style=border-color:blue>Consists of cells</td>
<td style=border-color:blue>No cells</td>
</tr><tr>
<td style=border-color:blue>Needs food for energy</td>
<td style=border-color:blue>Needs no food</td>
</tr><tr><td style= border-color:blue>Shows growth and movement</td>
<td style=border-color:blue>No growth and movement</td>
</tr></table></body></html>
```

Definition of the 2nd table starts here

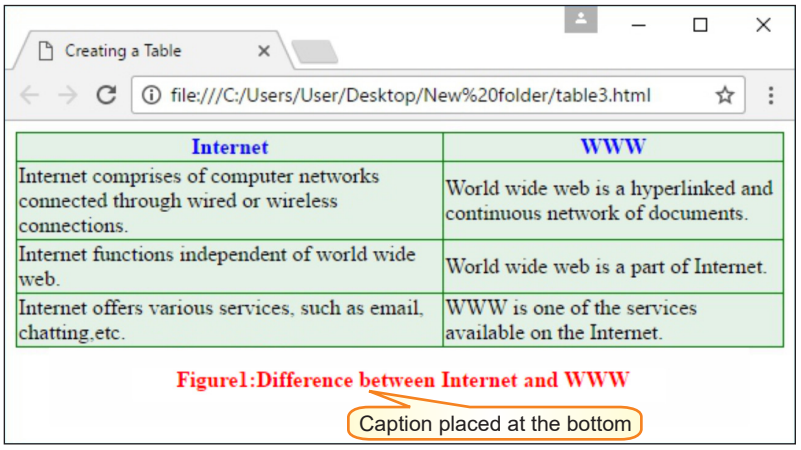
Caption-Side

It specifies the placement of a table caption.

Syntax: caption-side:value

where, value = top(default)|bottom

Example: caption-side:bottom



Empty Cells

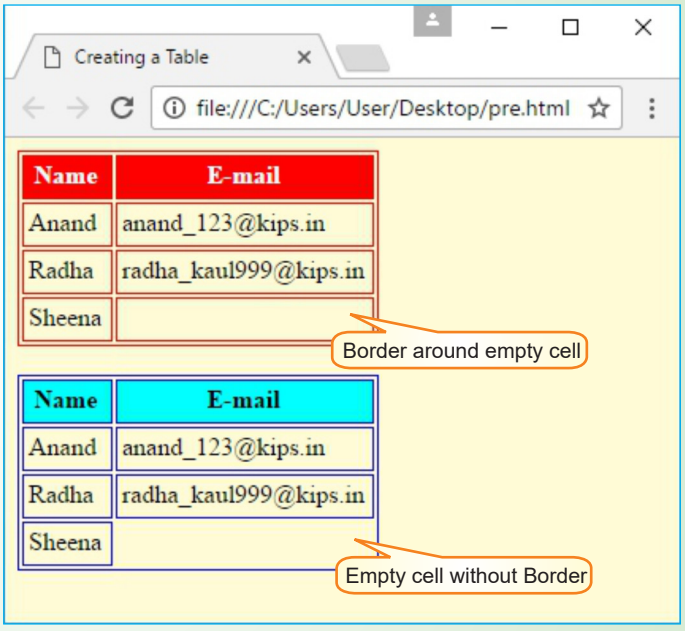
This property helps in specifying whether or not the border and background are to be placed around the empty cells in a table.

Syntax: empty-cells:value

where, value = show(default)\hide

Example: empty-cells:hide

```
<html>
<head>
<title>Creating a Table</title>
<style type="text/css"> body{background-color:RGB(255,251,214)}
table,td,th{border:1px solid red}table{border-collapse:separate;empty-cells:show}
th,tr,td{padding:3px 5px 5px 3px}</style></head><body ><table>
<tr><th style=background-color:red;color:white>Name</th><th style=background-
color:red;color:white>Email</
th></tr><tr><td>Anand</td> <td>anand_123@kips.in</td>
</tr><tr><td>Radha</td> <td>radha_kaul999@kips.in</td>
</tr><tr><td>Sheena</td>
<td></td>
</tr></table><br><table
style=empty-cells:hide;
bordercolor:blue>
<tr><th style=bordercolor:
blue;backgroundcolor:
cyan>Name</th><th
style=bordercolor:
blue;backgroundcolor:
cyan>E-mail</th>
</tr><tr><td style=bordercolor:blue>Anand</td><td
style=bordercolor:blue>anand_123@kips.in</td>
</tr><tr><td style=border-color:blue>Radha</td>
<td style=border-color:blue>radha_kaul999@kips.in</td>
</tr><tr><td style=border-color:blue>Sheena</td> <td style=border-color:blue></
td>
</tr></table></body></html>
```



Height and Width

Using these properties, you can set the height and width of the table.

Syntax: height:value

width:value

where, value = length in px/cm/%

Example: height:100px

Width: 25%

Let's Know More

You can make a cell span more than one column by using the colspan attribute.
For example:
<td colspan="2">
Similarly, a cell in a table can span more than one row with the help of the rowspan attribute.
For example:
<td rowpan="2">

Padding



This property helps in specifying the space between the border and content in a table.

Syntax: padding:value

where, value = top padding | right padding | left padding | bottom padding in px/cm/%

Example: padding:2px 3px 3px 2px—top(2px), right(3px), left(3px), bottom(2px)

padding:2px 3px 3px--------- top(2px),right and left(3px), bottom(3px)

padding:2px 3px---------- top and bottom(2px), right and left(3px)

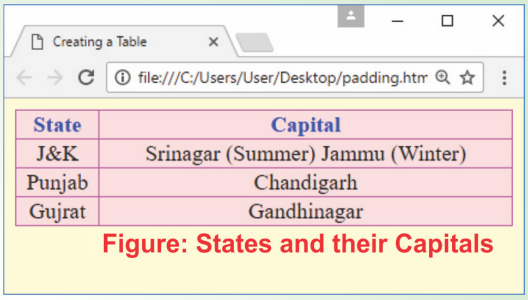
padding:2px---------- all four paddings of 2px each

Let's Know More

You can display different elements inside a table. For example, you can include a paragraph, list, table, and simple text inside a table.



```
<html>
<head>
<title>Creating a Table</
title>
<style type="text/css">
body{backgroundcolor:
RGB(255,251,214)}
caption{caption-side:bottom}
table,td,th{border:1px solid magenta}
table{border-collapse:collapse;padding:5px;width:100%;height:
30%;textalign: center;background-color:RGB(250,223,223)}
th{color:blue}
</style></head>
```



State	Capital
J&K	Srinagar (Summer) Jammu (Winter)
Punjab	Chandigarh
Gujrat	Gandhinagar

Figure: States and their Capitals

Quick Quiz

Name any two properties of a table.

```
<body><table>
<caption style=color:red> <b>Figure: States and their Capitals</b> </caption>
<tr><th>State</th><th>Capital </th>
</tr><tr><td>J&K</td> <td>Srinagar (Summer)
Jammu (Winter)</td></tr>
<tr><td>Punjab</td> <td>Chandigarh</td>
</tr><tr><td>Gujrat</td> <td>Gandhinagar</td>
</tr></table></body></html>
```

Images

Besides text, you can display graphics, drawings, paintings, charts, maps, or photographs on a web page. These elements make the web page more informative and appealing. Images can be used as a navigational tool to help the users browse through the internet. Web browsers support various graphic formats. The widely used formats are GIF, PNG, and JPEG formats.

There are two ways to insert images: **Inline** and **External**. The inline image is displayed when the web page is opened and inserted within a line of text whereas the external images are not displayed automatically with the other content on the web page. Instead, they are referenced externally and viewed separately by clicking on a link. To insert an inline image, the <img> tag is used whereas, to insert an external image, the anchor tag <a> is used that establishes a link to the image.

The <img> Tag

The <img> tag is used to add images in an HTML web page. It is an empty tag and requires different attributes to be specified with it. These attributes for the <img> tag tell the browser how to place the image on the page so that the text can flow properly around it.

Attributes of the <img> Tag

Src Attribute

To add and define the source of an image on a web page, the src attribute is used.

Syntax: <img src="Name or path of the image file">

While specifying the image file, one should be well aware of its name and location, i.e., where the file exists. Let us understand it with the help of the following examples:

Example 1: If the image file, let us say “pic1.jpg”, lies in the same folder, where the referring HTML file is located, then you can refer the image file by simply writing its name.

<img src= “pic1.jpg”>

Example 2: If the image file "pic1.jpg" lies in a directory other than the one in which the HTML file is placed, then you can refer to the image by specifying the full path of the file:

```
<img src="C:\Users\MyImages\Pictures\pic1.jpg">
```

Example 3: If the image file “pic1.jpg” is not saved in your computer rather is located in the images folder of the web server of Google, then you need to give the full path of the file:

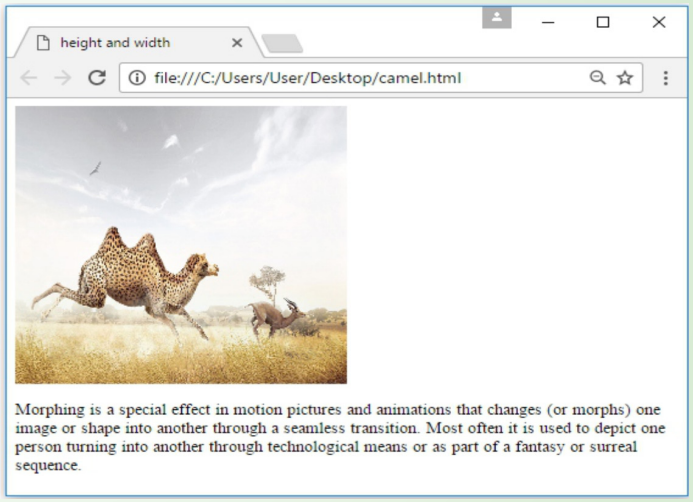
```
<img src=http://www.google.com/images/pic1.jpg>
```

Height and Width Attributes

The height attribute specifies height (in pixels) for an image either in the form of an integer or a percentage value.

The width attribute specifies width (in pixels) for an image either in the form of an integer or a percentage value.

```
<html>
<head>
<title> height and width </title> </head>
<body>
<img src= “camel.jpg”
style= height: 70% ; width: 50%> <p>
Morphing is a special effect in
motion pictures and animations
that changes (or morphs) one image
or shape into another through a
seamless transition. Most often it
is used to depict one person turning
into another through technological
means or as part of a fantasy or
surreal sequence. </p>
</body>
</html>
```



Alt Attribute

Sometimes, a browser on the user's computer does not display images due to some reasons (may be because of slow connection or error in the src attribute). In that case, you can display the text to provide a description about the image.

The Alt attribute lets you specify the text as an alternate to the image. The only purpose of the Alt attribute is to provide a description of the contents of an image file. It is generally used in case the user is having a text-based browser on his computer such as Lynx. It also proves to

be useful when the user is a blind surfer for whom the browser is programmed to read aloud the alternate text instead of displaying the image. In many cases, people have the image display disabled on their browsers or use settings that do not support the automatic loading of the images. In such cases as well, the Alt attribute is used.

NOTE

The value for the Alt attribute is a text string of up to 1024 characters, enclosed in quotation marks if you include spaces or other punctuation.

Aligning Image

To align an image to the right or left of a text, use the CSS property, float.

Example : <img src= " imag1.jpg " style = float:right; width:50px; height:50px> Image will appear to the right of the text.

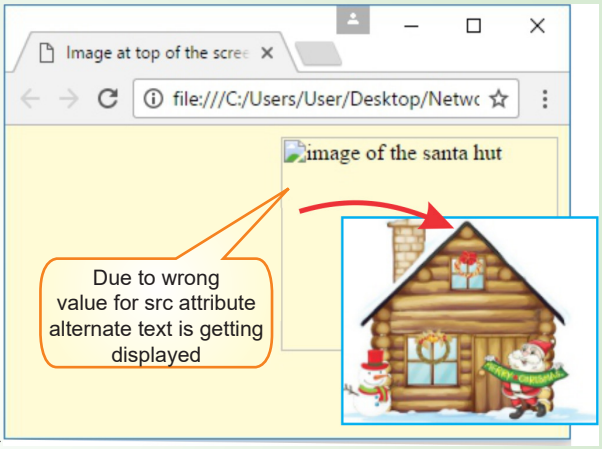
Tip To align an image to top, bottom, or middle, use the CSS property **vertical-align**.

NOTE

In the previous version of HTML, the align attribute was used to align the images to left or right.

```
<html>
<head>
<title> Image at top of the screen </title>
<style type="text/css">
body{background-color:RGB(255,251,214)}
</style></head>
<body>
<p><img src= "Santa Workshop.gif"
alt= "image of the santa hut"
style = float:right;width:200px;height:150px>
</p>
</body>
</html>
```

Santa Workshop.jpg **Correct Source Value**



Images in a Table Cells

You can also insert an image in a table cell. Let us understand it with the help of an example:

```
<html>
<head>
<title>Creating a Table</title>
```

```
<style type="text/css">
body{background-color:RGB(255,251,214)}
table,td,th{border:1px solid green;}
table{border-collapse:separate;}
td{text-align:center;}
</style>
</head>
<body >
<center><table>
<caption><h1>Facilities in a school</h1></caption>
<tr><td><img src="playground.jpg" style=width:100%><h3>Big Playground</h3></td>
<td><img src="library.jpg" style=width:100%><h3>A Library</h3></td>
</tr><tr><td colspan=2><img src="school.jpg" style=width:100%><h3>A School</
h3></td>
</tr><tr>
<td><img src="complab.jpg" style=width:100%><h3>A Computer Lab</h3></td>
<td><img src="music.jpg" style=width:100%><h3>A Music Room</h3></td>
</tr>
</table></center>
</body></html>
```



RECAP

- A list is the most efficient way of presenting information in a precise manner and helps in making important points standout more clearly.
- An unordered list is used when the items are not to be displayed in any particular sequence.
- The <li> tag is used to display the list of items contained in any of the two list types, i.e., unordered list and ordered list.
- An ordered list is used to display the list of items in a specific order.
- The Reversed attribute of the <ol> tag is used to specify the list order in the descending order.

- A nested list is a list inside any other list.
- A description list consists of a term followed by its definition and is used to present a glossary, list of terms, or other name/value lists.
- The <table> tag is used to create a table. Inside the <table> tag, you need to include the <tr> and <td> tags to create rows and columns, respectively.
- The <th> tag is used to specify a column heading in a table and the <caption> tag is used to specify the title for the table. These two tags also used within the <table> tag.
- The <img> tag with the src attribute is used to insert an image in a web page.

Brain developer

A. Fill in the blanks.

1. A ..... is the most efficient way of presenting information in a precise manner.
2. An ..... list indents each item in the list and adds a bullet against each item.
3. The ..... property is used to specify the distance between the borders of the adjacent cells in a table.
4. The ..... attribute of the <ol> tag puts the list in the descending order.
5. Images can be added to the HTML document with the help of the ..... tag.

Hints

- <img>
- List
- Unordered
- Border-spacing
- Reversed

B. Write T for True and F for False.

1. An ordered list automatically starts with the number 0. ☐
2. The Alt attribute lets you specify the text as an alternate to the image. ☐
3. The <tr> tag is always used inside the row tag <td>. ☐
4. The tag <dt> is used to define the terms or names. ☐
5. The 'list-style-type' property specifies the type of 'list-item' marker that will be used as a bullet. ☐

C. Application-based questions.

1. Manas has created a table and he wants that the table borders should be collapsed into a single border. Which property should he use?

   .....

   .....

2. Asmita has added few images on her web page but she wants to keep some provision for the visually impaired people or users using text-based browsers so that they get the description for the images. Which attribute should she use to accomplish the task?

   .....

   .....

D. Select the correct option.

1. Unordered list is also known as the ..... list.

   a. Bulleted b. Numbered c. Multilevel

2. By default, the ordered list starts with ..... .

   a. A b. 1 c. a

3. With the ..... property, you can specify the position of the list-item markers.

   a. List-style-position b. List-style-place c. List-position

4. In description list, the ..... tag helps in describing each term or name.

   a. <dl> b. <dd> c. <dn>

5. The ..... property helps in specifying the placement of a table caption.

   a. Caption-style b. Caption-place c. Caption-side

E. Answer the following questions.

1. Differentiate between the <ul> and <ol> tags.

   .....

   .....

   .....

2. Define the definition list.

.....

.....

.....

3. Describe the tags that are used to create a table.

.....

.....

.....

4. How are images added in an HTML document?

.....

.....

.....

5. Describe any two attributes of the <img> tag.

.....

.....

.....

6. Write the use of the Type attribute with an unordered list.

.....

.....

.....

7. State the use of any two properties that you use to enhance the appearance of a table.

.....

.....

.....

ACTIVITY SECTION



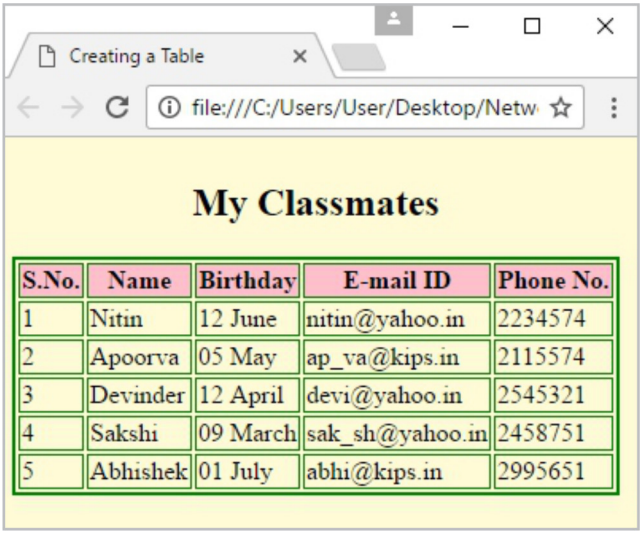


LAB SESSION

Perfection Through Practice

Visit the lab and follow the given steps to include a table in a web page.

- Create a web page to display the details of your classmates in a tabular format.
- Set the background colour of the web page to yellow and the top margin of the web page to 75.
- Set the Table border size to 3 pixels and border colour to 'Green'.
- The table height should be 250 pixels and width should be 500 pixels.
- Create five columns in the table named as **S.No**, **Name**, **Birthday**, **E-mail ID**, and **Phone No.** The caption of the table should be **My Classmates**. Apply heading style 1 to it.
- Create five rows in the table and enter the records of your five classmates.



My Classmates

S.No.	Name	Birthday	E-mail ID	Phone No.
1	Nitin	12 June	nitin@yahoo.in	2234574
2	Apoorva	05 May	ap_va@kips.in	2115574
3	Devinder	12 April	devi@yahoo.in	2545321
4	Sakshi	09 March	sak_sh@yahoo.in	2458751
5	Abhishek	01 July	abhi@kips.in	2995651

- Set the background colour and border colour of the heading row to 'Pink' and 'Green', respectively.
- Set CellPadding of the table to 5.

GROUP DISCUSSION

For Concept Clarity



Discuss the following topic:

- **Different Properties of the <ul>, <ol>, <table>, and <Img> Tags**

PROJECT WORK

Using Creativity



Ask the students to create a web page; displaying their personal profile, portraying their aim in life, hobbies, and strengths that make them unique. Use the required HTML tags to beautify your web page including lists and tables.

ONLINE LINKS

Looking For More



Visit the following sites:

- www.html-5-tutorial.com/ul-ol-tags.htm
- https://www.html-5-tutorial.com/image-element.htm

Chapter 8

Introduction to App Development

LEARNING OUTCOMES

The student will be able to:

- describe the types of apps and their uses.
- download and install apps.
- design and develop an app.

Nowadays, everyone uses smartphones for their day-to-day activities. Therefore, mobile apps have become the primary medium of digital interaction. In this chapter, you will learn about such, apps in detail. You will even be able to develop your own app at the end of this chapter.

Apps

An application is a software designed to do a specific job. The word "app" is an abbreviation for application. An app enables you to do something specific, like paint, draw, read maps, and barcodes, take photographs, play games, watch and edit videos, and a host of other activities, but within the technical limitations of your device.

An app works in pretty much the same way as the software does on a desktop or laptop. But, computing power and memory of a smartphone is generally less than a standalone computer, so the capabilities of the app are limited than a similar software running on a PC. Most desktops do not have touchscreens capabilities, while all mobile devices have touchscreens. This changes the way the user interacts with the device. Instead of a keyboard and mouse, the user taps on the display, which works both as an input device as well as output device.

Apps are designed to work on different operating systems used by the various devices. An Android app is developed to work on phones, tablets, or the other gadgets that run on Android OS, whereas iPhone apps can be used on iPhones that use iOS. For better running of the apps, the internet connection's speed must be fast so that the app can be downloaded easily from the **Google Play Store** on Android phone or through **App Store** on iOS.



Types of Apps

Apps can be broadly classified as Desktop apps, Web apps, or Mobile apps.

Desktop Apps

These apps can be used on a desktop or laptop. Generally, they do not need web access and run independently on a computer. To run a desktop app, it must first be installed on the desktop or laptop. The installed app is represented either by an icon on the computer screen or item on the Start menu. Examples of desktop applications are Word Processors, Spreadsheet, Paint, and Notepad.

Web Apps

These apps require an internet connection. They are usually browser-based and stored on a remote server. Users can access them like any other web page. Web applications require minimum device memory as the application lies on the remote server. These applications can be utilised from any device through the internet. For example, Google Maps, Instant messenger, etc.

Mobile Apps

These apps run on a smartphone or tablet. Mobile apps have responsive web designs to adapt to the much smaller screen sizes and orientations of mobile devices. These apps are usually small in size as mobile devices have limited memory. Some mobile apps may come preloaded on cell phones or tablets.

Keeping in view the device independence feature, software companies nowadays make diverse versions of the applications to be used as Desktop apps, Web apps, or Mobile apps.

Look at the examples given below:

Software	Desktop App	Web App	Mobile App
Photo Editing	**Adobe Photoshop** is a photo editing software, which must be installed on a desktop or laptop. **Pixlr** is a free photo editing tool for desktop.	**Pixlr** also provides photo editing software as a web application available at: https://pixlr.com /web **Sumo Paint** is another web-based photo editing application at: https://www.sumopaint.com/paint/	**Adobe Photoshop Express** and **Mobile Pixlr** are photo editing apps for mobile devices, which can be downloaded from either the **Google Play Store** or **App Store**.
Facebook	**Facebook Messenger** has its own desktop app, which can be downloaded from the Microsoft Store and Mac App Store. People can use it on your computer to send messages and make video calls.	**Facebook** is a popular web application used for social networking.	**Facebook** is available as a separate app, which can be downloaded from the Google **Play Store**, and **App Store**.

Office Suites	**MS Office** is a very good example of desktop-based Office applications. This includes Word processing, Spreadsheet, Presentation, and other applications.	**Microsoft 365** is a web-based version of Microsoft's Office suite. **Google Docs** is the part of G Suite, which allow users to view and edit documents in real-time through a web browser.	**Microsoft Office Mobile** mobile app combines Word, Excel, and PowerPoint with exclusive features. This app is useful to get documentation, spreadsheet, or presentation related work done on a mobile phone. G Suite applications can also be used on a mobile phone.
Games	Games like Solitaire and Minesweeper are available on all Windows-based computers. Other games too can be downloaded for use on the desktops and laptops.	There are many Flash games available online that you can play for free or by paying a small fee. **Power Cricket Challenge, Online Snooker,** and **Fortnite** are examples of web-based games.	Like web-based games, there are many games that are available on Play Store or App Store that you can download and play for free or by paying a small fee.
Media Players	Media player apps enable the users to play music or videos on their computers. **VLC Player** and **Windows Media Player** are some of the examples of the freely available Media Players.	Many sites offer their services and allow you to play music, videos, listen to the radio, and even watch TV while online.	**VLC, Media Player**, and **MX Player** are examples of apps that can be easily run on mobile phones and downloaded from the Play Store or App Store.
Maps	Google maps can be downloaded on the desktop computer. However, this app will only function when the internet access is available.	The browser based Google maps can be accessed by typing maps.google.com in the address bar of the browser.	The **Google maps** app is available in the **Google Play Store**.

Classification of Mobile Apps

Mobile apps can be further classified as Native Apps or Hybrid Apps.

Native Apps

Mobile apps are usually developed for a specific operating system and device. This is because each device may have different specifications, like GPS, dual SIMs or cameras, memory, Bluetooth, Wireless Fidelity (WiFi), or Near-Field Communication (NFC). Apps that are developed keeping the device specifications in mind are known as **Native Apps**. Most Native Apps come pre-installed on the new phone, and can also be downloaded from the **Play Store** or **App Store** and further installed on the device. Some Native Apps can run on the device without the use of the internet, but others may need the internet facility for full functionality. These apps have certain limitations. They are designed for a particular platform and expensive to develop and maintain.

Hybrid Apps

Hybrid Apps have the features of both Web Apps and Native Apps. These apps can be downloaded from the **Play Store** or **App Store** and installed on the device. These apps require the device to be connected with the internet. Hybrid apps can be stored partly on the local device and partly on the remote server. Some hybrid apps can be operated offline also by using cached pages, however, they have limited functionality offline.

For example, the most popular gaming app, Candy Crush is a hybrid app that can be played on a mobile phone as well as the web.

Let's Know More



Candy Crush
In this game the players complete levels by swapping coloured pieces of candy on a game board.



Uses of Common Apps

Apps have become so prevalent today that a suitable one can be found for almost any job. Whether it is for learning, entertainment, social interactions, or even banking, and e-commerce; there is an app for every purpose.

Quick Quiz

Differentiate between Native and Hybrid apps.

Educational Apps

With the rapid increase of mobile technology, learning with apps has become fun. There is a rapid spread of education to the remotest corners of the world. Today, students in the far-flung villages can easily access high quality educational resources.



There are apps for all levels of learning. Apps not only help the students to learn new concepts, but also show you what is being taught in the classrooms. Students of all age groups can access a treasure chest of information on any topic.

Educational apps are equally useful for both students and teachers. The teachers are able to distribute study material quickly, conduct tests, and grade the students efficiently by using apps, like **Google Classroom**.

Parents too make use of the educational apps to interact more closely with the teachers and thus monitor the progress of their children.

Know the Fact

DigiLocker
It is a mobile app, which is supported by the Ministry of Electronics and IT (MeitY), under its Digital India initiative. DigiLocker offers a Cloud account for each Aadhaar holder to access his/her authentic documents/certificates. It also offers 1 GB of storage space for each user to access the scanned copies of the legacy documents.

In keeping with this trend, many online study resources like **Khan Academy**, **Kips Interactive Books** as well as online study platforms, like **EdX** and **Coursera** are now available via apps.

Social Networking



Social media plays a significant role in communication. The social media apps let you post images, videos, and other updates to your profile, which can be shared with anyone. You can connect with anyone across the globe easily via such apps.

There are several types of social networking apps available today. Some of the most popular ones are as follows:

WhatsApp



With over 2 billion active users, WhatsApp is one of the most popular instant messaging app, worldwide. Although initially it started as a text messaging app, WhatsApp has rapidly grown and now offers high quality voice as well as video calling. It has a simple interface and many useful features that make it a very popular app.

Facebook



Facebook, with nearly 2.7 billion active users, continues to lead the social networking sites. It allows all the registered users to create their profile, post comments, exchange information, share links, photographs, chat, play games, etc. While initially, it was PC based, Facebook is now available as a pre-installed app on most of the mobile phones and tablets.

Twitter

Twitter is a social networking app where people communicate in short messages called tweets. Tweeting is sending short messages to anyone who follows you on Twitter, with the expectation that your messages are useful and interesting to someone in your audience.



Messages sent with this app were initially restricted to 140 characters. However, with the advent of smartphones, the users began to find this as an unnecessary hindrance, therefore, Twitter has now doubled this limit, i.e., the users now get 280 characters per tweet.

Other Social Networking Apps

Instagram is another app that is used for social networking. This app specialises in sharing of photographs by the users.

LinkedIn is a networking app that specialises in the sharing of business and professional information.

Reddit is a social news aggregation app. Registered users can upload news, stories, or links, and the other users can rate these stories by voting them up or down. The stories with the most up-votes are moved to the top of the category.



Entertainment Apps

If you have a smartphone, you can find a lot of entertainment apps on it. While many of these apps are free to use, some charge a fee for their premium services.



Hotstar App

If you wish to watch a movie, catch up on your favourite TV serial, or watch some sports, you can install and use **Hotstar**.


Gaana App

Are you a music lover? If yes! Then, **Gaana**, **Hungama Music**, and several other apps bring your favourite tunes right on your phones. Other apps are also available that allow a user to record and edit one's own music.

Do you fancy watching the latest blockbuster at your favourite multiplex? The **BookMyShow** app allows you to check timings, read reviews, and obtain tickets for plays, concerts, sports, and many other events.



BookMyShow App

If you are a game lover, you can enjoy many gaming apps. These apps have a huge fan base from all the age groups. There are various categories in these apps, like Sports, Strategy games, Action games, Racing games, Fighting games, etc.

Banking and Finance Apps

Almost all the banks have their own apps today. These apps allow quick and easy access to most of their services and products. One can check the balance in his account, open fixed deposits (FDs), pay utility bills, transfer money to another account, order a chequebook or Demand Draft, and many other activities through these apps.



HDFC Banking App SBI Banking App
Banking Apps

With the Indian Government encouraging the use of cashless transactions, digital wallet apps, like Paytm, Pockets from ICICI bank, Yono from SBI, and many more similar apps allow the users to make quick and easy monetary transactions.



Digital Wallet Apps

Moneycontrol

For the latest information on the Global and Indian stock markets, **Moneycontrol** app proves to be beneficial. It covers the Bombay Stock Exchange (BSE), National Stock Exchange (NSE) and also mutual funds, commodity, and currency markets. Using their Portfolio tracker, one can keep in touch with the swings of the market and take appropriate and timely decisions.


Moneycontrol

E-commerce

Buying or selling of goods or services, using electronic means, is known as **E-commerce**. The rapid increase in the use of mobile technology and the desire of people to get things done quickly has prompted the e-commerce companies to opt for mobile apps to supplement their business. This segment has become so important that some e-commerce companies have started giving preference to the app-based solutions and are discontinuing their e-commerce websites. Some of the most popular e-commerce apps that provide facility to shop online are **Flipkart**, **Amazon**, **Snapdeal**, and **Shopclues**.

Downloading and Installing an App

The following steps will help you download and install an app on your mobile phone or tablet:

- Tap on the **Play Store** icon on the screen of your device.
- Type the name of the app in the Search bar that you wish to download. If you do not know the specific name, type a general description of the job that the app does. For example, "educational apps".

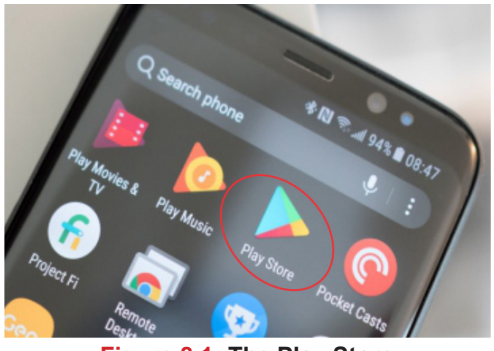


Figure 8.1: The Play Store Icon on Mobile Phone

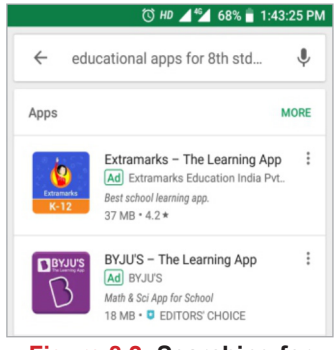


Figure 8.2: Searching for an App

- It will display the relevant list of apps. Now, select the most suitable one by tapping on the name of the app.
- Additional information about this app will be displayed including whether any fee needs to be paid. Check out the reviews and comments of the previous users. If it meets your requirements, tap the **INSTALL** button to install the app on your device.

- The app will request you for permission to access specific information from your phone. Confirm your consent, and the app will be downloaded and installed on your phone. The app is now ready to use.

Developing Your Own App

Looking at the different apps available at Play Store is an amazing experience, but it may give you the impression that it is very difficult to make your own app, but it is not so. There are several sites that allow you to make your own app in a very short span of time.

Let us use the **MIT App Inventor** to develop an app. It is an open-source web application originally provided by Google, and now maintained by the Massachusetts Institute of Technology (MIT). It is an easy and innovative platform to introduce programming and app creation to beginners.

To develop an app using app inventor, follow these steps:

- Open a browser, and type the following URL in the Address bar: www.appinventor.mit.edu
- Click on the **Create Apps!** button in the top-left corner.
- Sign in with your google account.

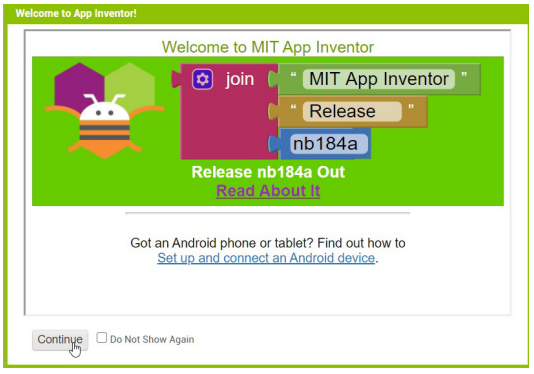


Figure 8.3: Welcome Screen

- After successfully signing in, accept the **Terms of Service** policy.
- The welcome screen appears. Click on **Continue**.
- You will get a new window, giving you options to go through the tutorials etc., or start a new project.

Starting a Project

- You can choose **Start a Blank Project** in the previous window or click on the **Start new project** button to start with a new project.
- Assign a new name in the **Project name** field and click on **OK**.

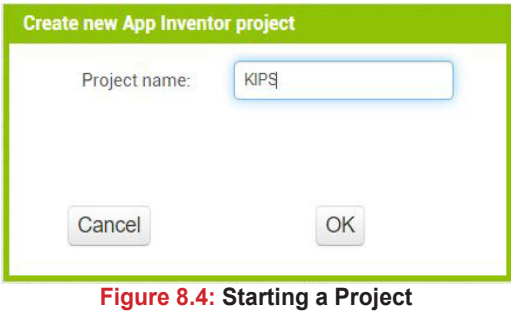


Figure 8.4: Starting a Project

Let's Know More

Flipkart is a popular e-commerce company headquartered in Bengaluru. It was started in 2007 by Sachin Bansal and Binny Bansal. There are over 100 million registered users of Flipkart in India.



Let's Know More

Bharat Interface for Money (BHIM) is an android application that enables fast, secure, and reliable cashless payments through your mobile phone. The app is directly linked to the user's bank account.



Quick Quiz

Name any two entertainment apps.

Designing an App

When you start a project, you get the **Designer** window, by default. The **Designer** window is used to design an interface of an application. Notice, the **Designer** button at the top-right corner appears dull green. This indicates that the window is active. The Designer window has four panes as listed below:

- **Palette:** This pane contains the components necessary for a graphical user interface design. It contains options such as User Interface, Layout, Media, Drawing and Animation, and so on.
- **Viewer:** This pane displays the appearance of the application.
- **Components:** This pane lists the components placed on the app screen. It shows a hierarchical view of the components.
- **Properties:** This pane shows various properties of the selected component. These properties are used to change the settings of the selected component.

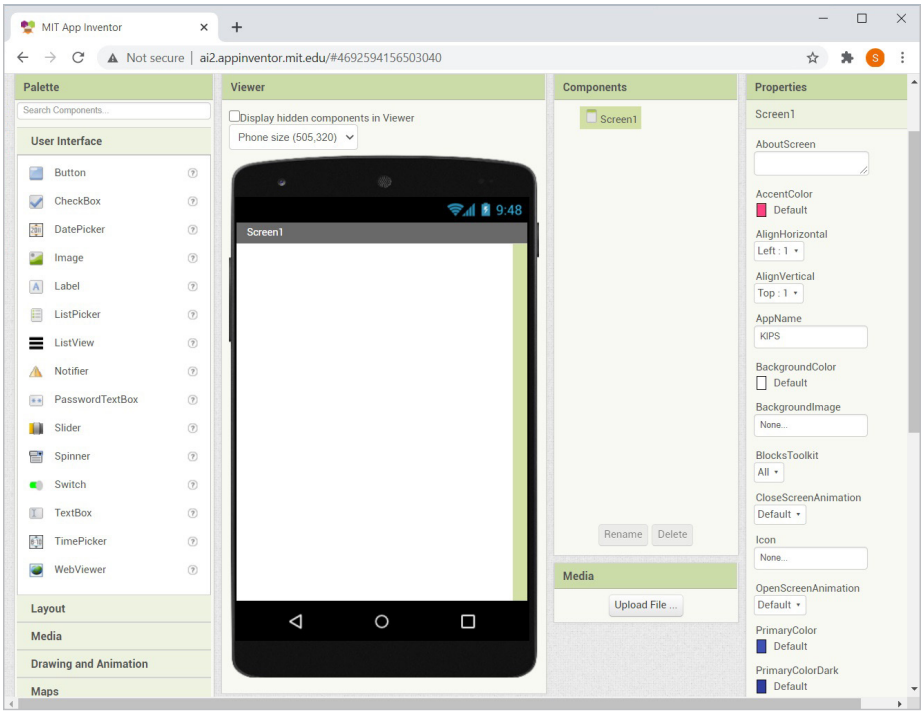


Figure 8.5: **Designer Window**

Let us design an interface for **Bouncing a Ball**. For this, you need a ball and a canvas.

- Click on the **Drawing and Animation** tab in the left pane and drag and drop the **Canvas** on Screen1. Set Canvas **Height** and **Width** properties as: **Fill parent** in the Properties pane.
- Now, select **Ball** from the same pane, drag and drop it on the centre of the Canvas. Set some of the properties of the ball, for example, set **PaintColor: Orange, Speed:7**, and **Radius:30**.

- Click on the **Media** tab and drag and drop the **TextToSpeech** control on Screen1. The **TextToSpeech** control reads the given text aloud. It is an invisible component and cannot be seen on the screen like the ball.

Coding an App

Coding in MIT App Inventor is very similar to Scratch. To code your components, click on the **Blocks** button located in the top-right corner. You will switch into the coding window. Here, you can add your code.

For example, to change the background colour of your canvas, and hear the given text (**"Bouncing Ball"**) on initialisation of Screen1, add the following blocks:

- Click on **Screen1** in the left pane and add the **Initialize** event by dragging it on the **Viewer** area. The code inside this block will be executed when you start your app.
- Now, click on **TextToSpeech1** control in the left pane, and add the **Speak message** block. This reads the given message. To add a message, click on **Text in the Built-in category** and add a **Text string**  block. Add the text **"Bouncing Ball"** in the string.
- Now, click on **Canvas1** in the left pane, and select the **BackgroundColor** block to change the background colour. To set a colour, click on **Colors** and add a color block.

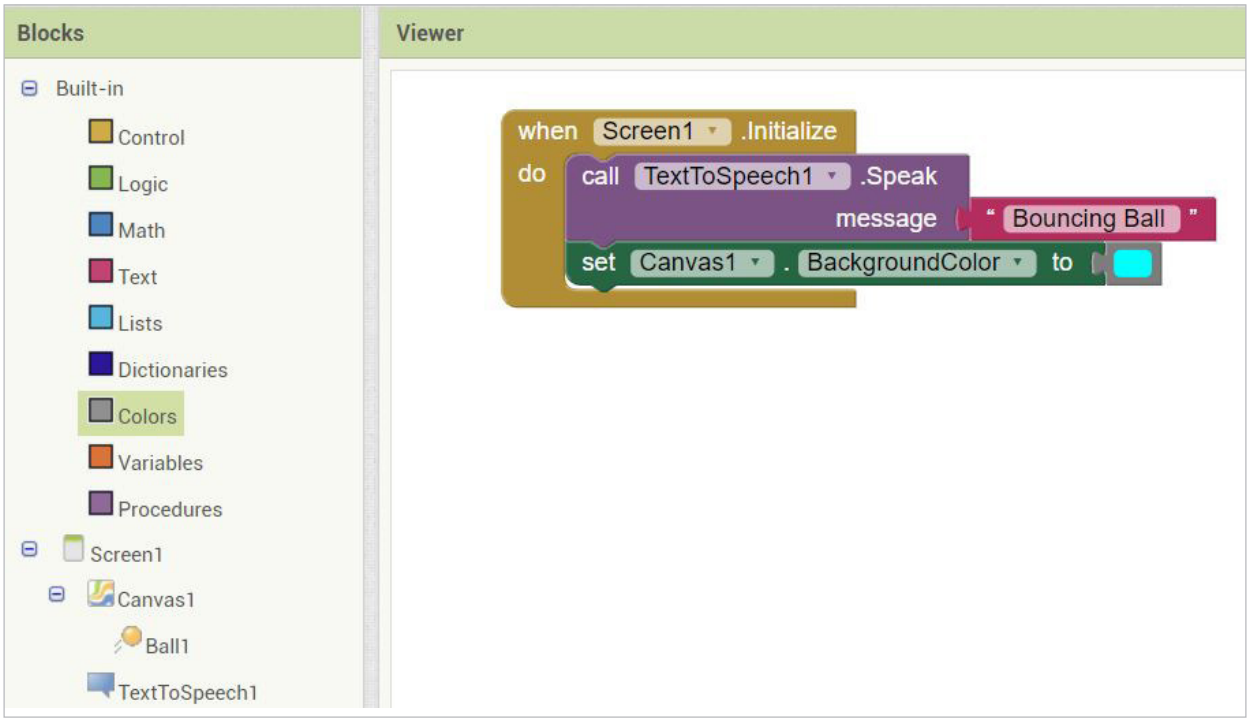


Figure 8.6: Adding the Code

Now, to bounce the ball, click on **Ball1** in left pane and add the following blocks:

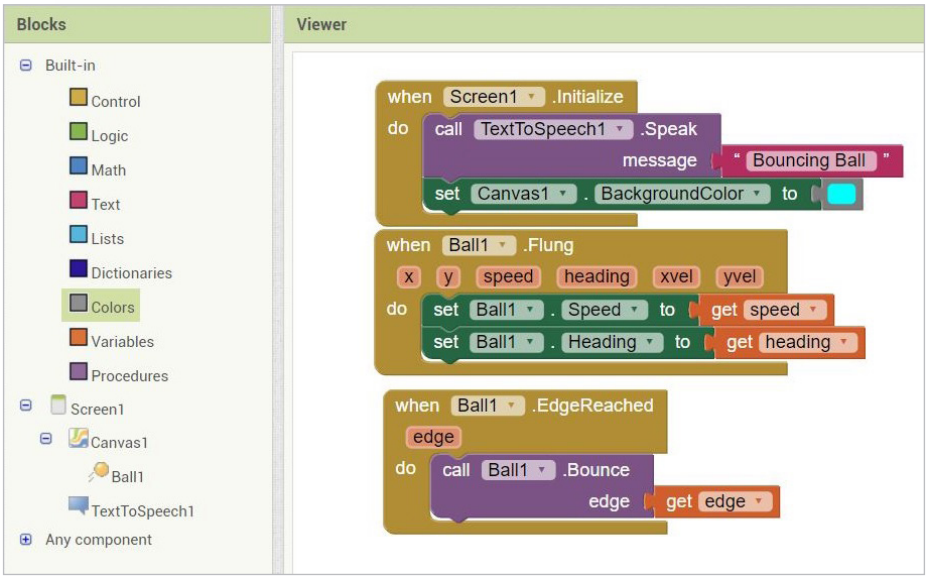


Figure 8.7: Adding the Code for Bouncing the Ball

Tip

To add the **get speed** block, bring the pointer to the **speed** parameter and select the **get speed** block. In the same way, add the **get heading** and **get edge** blocks by clicking on the corresponding parameters.

Running the App

When the design and code of your app is final, you need to test the app. You can set up live testing while you build apps, using any of the following options:

- With an Android device and Wi-Fi Connection
- With a Chromebook
- Using the Emulator
- With an Android device and USB Cable

Testing the App using an Emulator

Let us learn how to test an app using the Emulator.

- To download the emulator, in the Address bar, type the following URL: http://appinventor.mit.edu/explore/ai2/windows
- Click on the **Download the installer** link. You will get the setup file. After downloading the file, install the application in your computer system.
- Once the installation is complete, click on **Connect > Emulator**.
- App Inventor will start connecting to the Emulator, and you will get a virtual mobile screen on your computer. The companion app will start to test your app.

Let's Know More

Several Integrated Development Environment (IDEs) are available that greatly simplify the process of an Android App Development. The **Android Studio** from Google is one such example, while **Eclipse** is another.

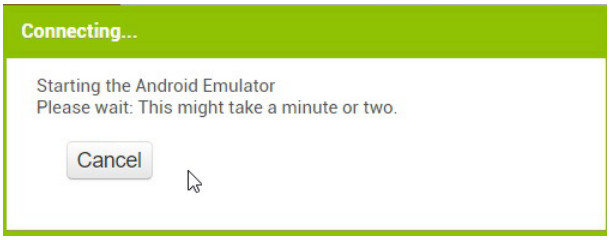


Figure 8.8: Establishing a Connection

- When Screen1 is initialised, you will hear the audio of "**Bouncing Ball**", the colour of the canvas becomes sky blue, and the ball bounces.

Let's Know More

Many IDEs come with their emulators to preview the working of your app, but the final testing of the app should be done on different mobile devices.

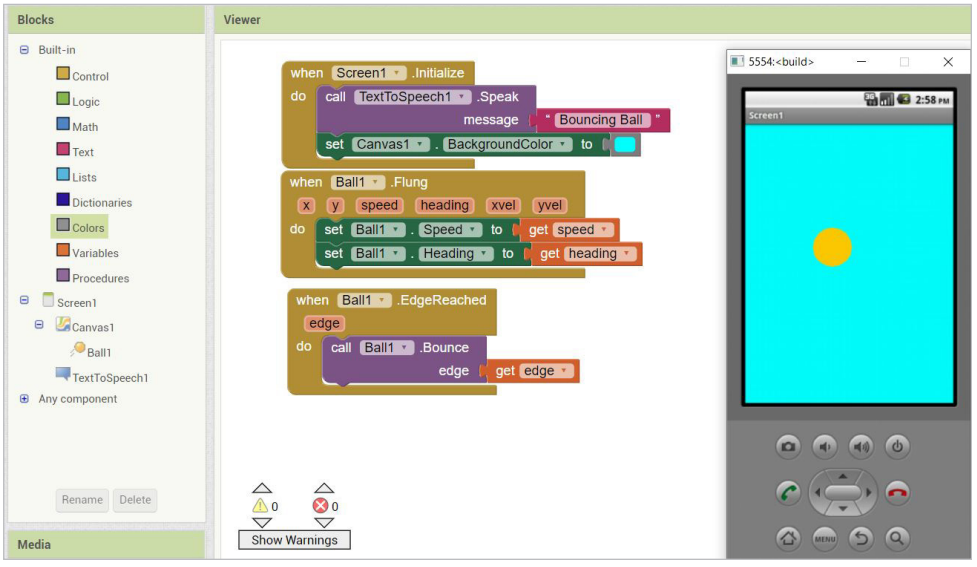


Figure 8.9: Testing the App

In the same way, you can also create apps using other sites, like Appy Pie, which is another web-based app maker. Appy Pie provides ready-made templates to add pages, forms, social media links, login pages for a wide range of applications for designing your app quickly. Visit the lab and follow the instructions given in the lab session to create an app using Appy Pie.

RECAP

- The word app is an abbreviation for application. The software designed to do a specific job is known as an application.
- Apps are broadly classified into three categories: Desktop apps, Web apps, and Mobile apps.
- Mobile apps are usually developed for a specific operating system and device.
- Hybrid apps combine the features of Web apps and Native apps.
- Buying or selling of goods or services using the electronic means is known as e-commerce.
- Coding in MIT App Inventor is very similar to Scratch.

A. Fill in the blanks.

1. ..... combine features of both Web apps and Native apps.
2. The abbreviation of the word 'application' is ..... .
3. Before installing an app on your device, the manufacturer of the app will ask for certain ..... .
4. The Facebook app is an example of a ..... app.
5. ..... apps do not need web access and run independently on a computer.
6. You can pay utility bills using a ..... app.

Hints

- App
- Permissions
- Hybrid Apps
- Desktop
- Banking
- Social Networking

B. Write T for True and F for False.

1. Google Maps is an e-commerce website. ☐
2. Desktop apps do not need web access and run independently on a computer. ☐
3. Hungama music app brings your favourite tunes right to your device. ☐
4. Mobile apps are usually smaller in size as mobile devices have limited memory. ☐
5. Usually, native apps come pre-installed on the new phone. ☐

C. Application-based questions.

1. Sneha and her parents are planning to go for a movie. She wants to book the tickets online. Which app can she use to do the same?

   .....

   .....

2. Mannat had a school trip last month where she clicked various photographs. Now, she wants to share these photographs with her friends. Which app should she use?

   .....

   .....

D. Select the correct option.

1. ..... is a social news aggregation app.

   a. Reddit b. Netflix c. Hotstar

2. ..... is an app that lets you build your own apps.

   a. MIT App Inventor b. Reddit c. Facebook

3. ..... is one of the most popular instant messaging app, worldwide.

   a. Twitter b. Candy Crush c. WhatsApp

4. Hotstar is an ..... app.

   a. Education b. Entertainment c. Social Networking

5. Buying or selling goods or services using electronic means is known as ..... .

   a. Money Control b. Finance c. E-Commerce

E. Answer the following questions.

1. How can you broadly categorise the apps? Explain any one category of the apps.

   .....

   .....

   .....

2. State the use of Web apps.

   .....

   .....

   .....

3. What is the difference between Hybrid apps and Native apps?

   .....

   .....

   .....

4. Distinguish between a Desktop app and Mobile app.

   .....

   .....

   .....

ACTIVITY SECTION



LAB SESSION

Perfection Through Practice

Create a Mobile app 'Go Goa' for mobile phones, which will provide information about the tourist destination 'Goa'.

- Open the site https://www.appypie.com/. The home page of the Appy Pie app builder site opens. Click on the **Get Started** button.
- Enter the App name (e.g., GO GOA) and click on the **Next** button. Now, choose the **Location & Places** category from the list of displayed options. Click on **Next**.
- Choose colour scheme for your app from the various enlisted options. Let us say, **DEEP OCEAN**. Click on the **Next** button.
- On the next page, select the type of device your app will use.
- Now, Sign up with Gmail account and then select any design from the displayed list, including fonts, colours, and sizes of various components of pages that you have designed.
- Click on the **Save & Continue** tab when you are done.
- You will be directed to the page where your app will be tested. After testing, you will be asked to scan a QR code displayed on the web page.
- Using the QR code scanner app and your mobile phone camera, scan the QR code. You will get a link to download the **Test Lab** app. The same link you will receive in your registered mail account inbox.
- Click on the link and install **Test Lab** on your mobile phone.
- Sign in to the app by entering the registered email id.
- Now, select your app and click on the **Test App** option to test your application.



GROUP DISCUSSION

For Concept Clarity



Conduct a group discussion on the topic: "Various types of Apps".

ONLINE LINKS

Looking For More



Visit the following sites:

- https://en.wikipedia.org/wiki/Mobile_app_development
- https://developer.android.com/training/basics/firstapp/

Chapter 9

Cyber Threats and Security

LEARNING OUTCOMES

The student will be able to:

- know about the different cybercrimes and their harmful effects.
- learn about various cyber security measures.

Computer and the internet have become inseparable parts of your life in multiple spheres these days. The booming technologies of the modern age have made your life much easier and more connected across the globe via the interconnected networks. Nowadays, you can connect to the internet using many devices, such as computers, smartphones, tablets, and so on. These gadgets are used for storing personal information, online banking, online shopping, booking tickets, playing games, and connecting with friends over social media.

Although networks of today have simplified the communication process and provided great opportunities in almost all spheres, there are various types of challenges and threats associated with their use. These threats are known as cybercrimes.

Cybercrime

A cybercrime is any illegal activity done through the internet, for example, identity theft; where somebody steals your email id or password and uses it to send fake emails to people containing false information about a product or winning a lottery, etc.



There are credit card account thefts, internet frauds like, ordering goods in your name, extracting mobile phone contacts, etc., forgery, i.e., imitating documents and currency, harassing others and mischief mongering, by sending threatening messages, all of which come under the jurisdiction of the Indian Penal Code (IPC).

Cybercrimes can be divided into three main categories:

- Crimes against an individual person
- Crimes against property
- Crimes against an organisation/society

Cybercrimes Against an Individual Person

The offences that cause or attempt harm or threat to an individual come in this category. These crimes can be committed in many forms.

E-mail Spoofing

Spoofing means hoax or misleading. In it, the receiver of a message is fooled into believing that the message received by him is from a trusted source, which actually is not so. The message is bogus. When a user clicks on the link that is falsely provided by the sender, the malware or virus enters into the system of the user.



Cyberstalking

When an attacker harasses a victim through emails, social media, chat rooms, blogs, instant messaging, etc., it is called **cyberstalking**. A stalker can be an online stranger or a person known to the targeted person. In cyberstalking the person can:

- harrass and humiliate the victim by posting false information about him.
- monitor or view a victim's online activites.
- damage the victim's computer by sending viruses.



Cyberbullying

It is an act of harming or harassing through information technology in a deliberate manner. This includes insulting remarks and threatening messages sent by email, spreading rumours about the person either by emails or social networking sites, posting embarrassing photos and videos to hurt the person, making derogatory remarks against gender, race, religion, or nationality.

Let's Know More

Any malicious program on a computer or mobile device, such as virus, worm, Trojan, horse, Spyware, etc., are collectively called **malware**.

Let's Know More

Defamation is defined as a communication that intends to harm or damage the reputation of a person, business, product, government, religion, or nation.

Know the Fact

Keylogger programs are used to check the user's keystrokes and get important information, such as passwords.

Let's Know More

Social Engineering refers to psychologically manipulating people into performing actions or divulging confidential information.

Cybercrimes Against Property

In real-life, you hear of stealing or robbing of some one's property. In the cyber world also, criminals look for an opportunity to steal or rob through the internet. They can steal a person's bank details and withdraw money from his account, misuse the credit card of a person, spoil the system of an organisation through malicious software to gain access to it.

Identity Theft

It refers to the act of stealing and misusing someone's personal information. It is a major issue for people who use the internet for online shopping, cash transactions, and banking services. The stolen information generally includes a person's name, date of birth, account number, credit/debit card number, ATM pin, etc. This information is then misused to obtain genuine documents, new credit cards to make purchases, withdraw money, get passports, and driving licences in the victim's name. Hackers steal the information either through hacking the network that a person is connected to or placing software, unknowingly, on a person's computer.

Phishing

It is an act of sending an email to a user; misleading him to believe that it is from a trusted person or organisation. The user is asked to visit a website in which he is asked to update or validate his personal details, such as the username, password, and credit card details. In this way the operators of the fake website commit crimes in your name after stealing your identity.

Pharming

In this type of attack, a piece of malicious code is installed on a computer or server. It misdirects the users to fraudulent websites without their knowledge in order to obtain personal information, such as passwords, or account numbers.



Cybercrimes Against Organisation or Society

It is a planned and politically motivated attack to cause large-scale disorder in computer networks. This category can cause panic amongst the civilians. In this category, criminals hack government websites, military websites, or circulate propaganda.

Virus

A computer virus is a program or a set of programs that disrupts the normal functioning of a computer. A virus infects or destroys data. Like a biological virus, it enters into the host (computer) without the permission or knowledge of the host. The full form of **Virus**

is **V**ital **I**nformation **R**esources **U**nder **S**eize. The essential resources of a computer, like memory, processing speed, data, and programs are hampered when a virus enters the system. Virus programs are self-replicating programs, which continuously expand their reach by infecting more and more computer files, resulting in the loss of speed and destruction of data. Creating a computer virus and spreading it is a cybercrime. Almost all the viruses are attached to an executable file, which means that if a virus exists on a computer, it will not infect the computer unless you run or open the malicious program.

Know the Fact

MyDoom is considered to be the most expensive virus in the world and in cyber security history. It caused an estimated financial damage of $38.5 billion.

Types of Viruses

There are different types of viruses but broadly they can be classified into the following categories:

Let's Know More

Clickjacking is a malicious technique of tricking a web user into clicking on something different from what the user perceives he is clicking on.

Boot Sector Virus



This type of virus damages the boot sector of a hard disk or floppy drive. A disk or hard drive comprises smaller sections known as sectors. The first sector is called the boot sector. It holds the master boot record, which is responsible for reading and loading the operating system. The boot sector virus becomes active at the time of booting the machine and destroys the data on the hard disk.

Know the Fact

Vishing is the criminal practice of using social influence over the telephone system to gain access to sensitive information, such as credit card details from the public. The term is a combination of "Voice" and phishing.

For example: Disk killer, Stoned, etc.

Program File Virus

This type of virus infects the executable files or programs, such as those with extension, like .com, .exe, .ovl, .drv, .sys, etc. It gets loaded in the memory during the execution. The virus remains active in the memory and infects files and other programs on the disk with the intention of causing permanent damage or making them unreadable.

For example: Sunday, Cascade, etc.

Multipartite Virus



A multipartite virus is a hybrid of a boot sector and program file virus that spreads in multiple ways. The virus gets entry into the computer system through

Let's Know More

Bots are one of the most sophisticated types of crime-ware applications that perform a wide variety of automated tasks on behalf of the cyber criminals.

some infected media and then resides inside the computer memory. After that, it moves into the hard drive, infects the boot sector, and starts spreading in the system by infecting the executable files.

For example: Invader, Flip, Tequila, etc.

Polymorphic Virus

As the name suggests (poly-many, morph-forms), this type of virus exhibits itself in different forms every time it infects a file and changes its binary pattern to avoid detection by an antivirus program.

For example: Elkern, Marburg, Satan bug, etc.

Network Virus

Network viruses rapidly spread through a Local Network Area (LAN), and sometimes throughout the internet. Generally, network viruses multiply through shared resources, i.e., shared drives and folders. When the virus infects a computer, it searches through the network to attack its new potential prey. When the virus finishes infecting that computer, it moves on to the next and the cycle repeats itself. The most dangerous network viruses are **Nimda** and **SQL Slammer**.



Macro Virus

A macro virus is associated with the application software, like Word, Excel, PowerPoint. When opening the infected document, the macro virus gets loaded into the main memory and destroys the data stored on the hard disk. These viruses cause a sequence of actions that get performed automatically when the application starts. Once a macro virus gets active on your computer, every document you produce will become infected.

For example: Melissa.A, Relax, bablas, etc.

Cybervandalism

It is the creation of malicious programs to perform harmful tasks, like to physically harm a computer or any of its parts, putting malware on a computer that erases the hard drive data, or steals sensitive information. It also involves editing the online content in a malicious manner so as to defame a website or disrupt businesses.

Hacking

Hacking refers to an illegal entry into a computer system or network. Hackers write or use ready-made computer programs to attack the target computer. Some hackers do it just for

enjoyment while the others hack for personal monetary gains by stealing credit card information and transferring money from the various bank accounts to their own or stealing sensitive information and extorting money from some corporate giants.

Know the Fact

Cyberespionage is the act or practice of obtaining secrets from individuals, competitors, rivals, groups, governments, and enemies also for military, political, or economic advantage.

Cybersquatting

It refers to the act of using the goodwill of a trademark belonging to someone else and getting benefit out of it.

Forgery

It is an act of imitating or making a false copy of a document like Birth Certificate, Driving Licence, Currency notes, Cheque Book, Passport, Postage/Revenue Stamps, Mark Sheets, etc., with an intent to check an individual or organisation. Special software, scanners, and other devices are used to recreate these documents and proceed with the intended scam.



Cyberextortion

It is a crime in which the victim is attacked first and then forced to pay money to stop further attacks. Cyber extortion may be done by blocking the system resource of the victim by some Ransomware or Denial of Service (DoS) attack. Hacked emails are used to commit this crime. These bogus emails force the user to click on some links that may lead to the installation of malware.

Let's Know More

A con man is the one who exploits characteristics of the human psyche such as greed, honesty and dishonesty, vanity, compassion, credulity, and irresponsibility. He is the one who tries to get something of value for nothing or far less valuable.

Cyberterrorism

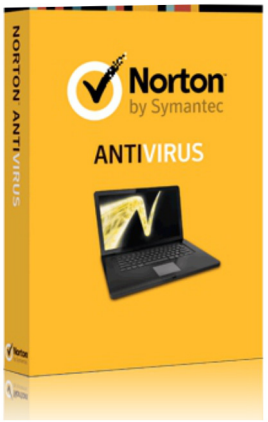
It is used to conduct terrorism through the use of computers and the internet in order to cause fear and panic. It causes large-scale disruption of computers, telecommunication networks, or information systems, so as to compel a government or its people to fulfil some social, religious, or political objectives. Attacks on military installations, power plants, air traffic controls, banks, etc., are some examples of cyberterrorism.

Cyber Security



Cyber security is a collection of technologies, processes, and practices designed to protect networks, computers, programs, and data from attack, damage, or unauthorised access.

Antivirus



Antivirus is a computer program that is designed to identify, prevent, and remove viruses from a computer. It performs the following tasks on a computer:

- It scans the computer files to look for known viruses from the virus dictionary.
- It identifies suspicious behaviour of any computer program, which might indicate infection.
- It scans incoming emails, which might contain viruses in the attachment.

Some popular antivirus software, in use nowadays, are as follows:

McAfee, AVG Antivirus, Quick Heal, Microsoft Security Essentials, Symantec Norton Antivirus.

Features of Antivirus Software

By using antivirus software, you can perform any of the following scans:

- **Full System Scans:** These types of scans are needed when you install antivirus software for the first time or have recently updated your antivirus software. This ensures that there are no hidden viruses present in your system.
- **Custom Scan:** It helps you to scan your system as per your requirements.
- **Virus Definitions:** The antivirus software depends on the virus definitions to identify malware. That is the reason you get regular updates on the new virus definitions.

Action Taken by Antivirus

Antivirus software performs following actions whenever a virus is found. These are:

- **Repair it:** The identified virus gets removed from the infected file. This is the best option usually.
- **Delete it:** The infected file gets deleted along with the virus. This option is used if the virus cannot be separated from the data file.
- **Quarantine it:** When the antivirus program is not sure whether the file is infected or not, it separates out the file so that the virus does not spread. It is called quarantining.



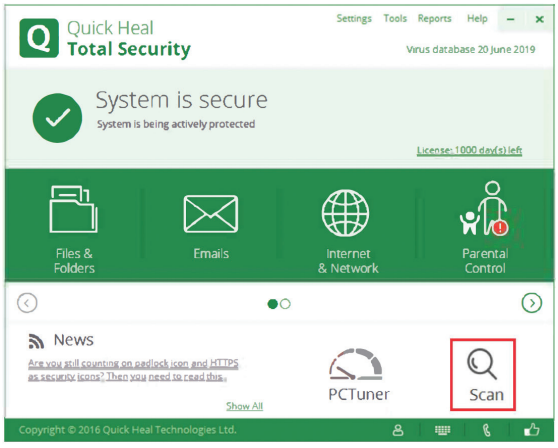
Scanning and Cleaning Virus

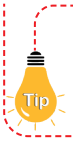
Let us learn how to scan the system using an antivirus. You can use the Quick Heal software

or use any other antivirus software, like Norton Antivirus, AVG, McAfee, etc., which is already loaded on your system.

To scan a computer, follow these steps:

- Click on **Start** and select the name of the antivirus software installed on your computer.
- The main window appears. Click on the **Scan** option. Select an option of your choice.
  - To scan any particular file or folder, select the **Custom Scan** option.
  - To scan the whole computer, select the **Full System Scan** option.
- If viruses are found, the antivirus will inform the same to the user and either delete the virus or quarantine it (isolate it so that it cannot affect the system).
- When the scan process gets over, the message, 'Scan Finished', is displayed on the screen.





You can **Pause**, **Resume**, or **Stop** the scan at any time.

Firewall

A firewall is a security system that protects your computer by preventing unauthorised users from gaining access to it through the network or internet. It can either be hardware or software or a combination of both. It is implemented on the gateway of a network and follows a specific set of rules defined by the user or network administrator. Based on these rules, it controls the incoming and outgoing network traffic.

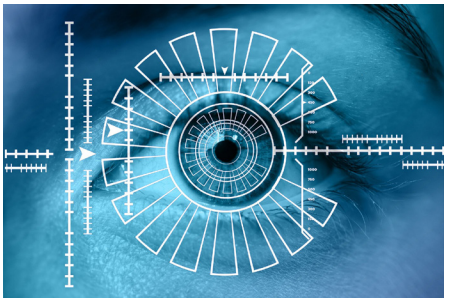


Encryption Software

While transmitting data over a network, you may lose data privacy. You can protect your data from any unauthorised access by using the **encryption** technique. **Encryption** is the process of converting your electronic data into a form that cannot be easily understood by anyone. Encryption software is used to produce the encrypted text called 'Cipher text'. To read an encrypted message, it has to be decrypted with the same software on the receiver's side. This process is called **Decryption**. The software applications, such as GnuPg or GPG can be used to encrypt data files and emails.

Biometrics

It is the safest method to give authorisation rights to an individual. In Biometrics, a person is verified by means of his/her unique biological or physical characteristics. It identifies a person by retinal scan, fingerprints, voice recognition, etc. These characteristics of a person are saved in a database. When a person tries to access the system, the new data put by him is matched with the saved data. If verified by the unique identifier the person is allowed to access the system.



Passwords

A password is a sequence of characters, numbers, and special symbols that a user is supposed to enter to gain access to the computer. It guarantees that the system is accessed only by the authorised users. To protect data and important information, strong passwords should be used.



Backups

In computer terminology, backup is the process of making duplicate copies of data, which can be used to restore the original data in case of any loss of it. These additional copies are called backups, which can also be used to restore the files that have been deleted accidentally or corrupted by the virus.



Cookies

A cookie is a text message given to a web browser by a web server. The web browser savers this user-specific data in a text file. This file is called a cookie, which is later used by the browser to prepare customised web pages. A user is not required to fill the stored information everytime he purchases goods online.

Cookies are otherwise safe documents, which can be deleted anytime. But they can produce harmful consequences if read by an unauthorised person. Hackers can use cookies to gain access to the user's sensitive information, which can be misused to commit further crimes. It is advised to delete the cookies periodically so as to avoid any kind of privacy threat, especially when working on public computers.

RECAP

- A cybercrime is any illegal activity done through the internet.
- Cybercrimes can be divided into three main categories: Crimes against an individual person, property, and organisation/society.
- In email spoofing a receiver of a message is fooled into believing that the message received by him is from a trusted source, which actually is not so.
- Cyberbullying is an act of harming or harassing through information technology in a deliberate manner, like threatening messages by email, posting of embarrassing photos and videos on social networking sites, etc.
- Identity theft is an act of stealing and misusing someone's personal information.
- A computer virus is a program or set of programs that disrupts the normal functioning of a computer.
- Cyber security is a collection of technologies, processes, and practices designed to protect networks, computers, programs, and data from attack, damage, or unauthorised access.
- An antivirus is a computer program that is designed to identify, prevent, and remove viruses from a computer.

Brain developer

A. Fill in the blanks.

1. A ..... can be an online stranger or a person known to the targeted person.
2. ..... is an act of harming or harassing through information technology in a deliberate manner.
3. A ..... is a program or set of programs that disrupts the normal functioning of a computer.
4. ..... is a security system that protects your computer by preventing the unauthorised users from gaining access to it through the network or internet.
5. In ....., a person is identified by retinal scan, fingerprints, voice recognition, etc.

Hints

- Cyberbullying
- Biometrics
- Stalker
- Virus
- Firewall

B. Write T for True and F for False.

1. A cookie is a text message given to a web browser by a web server. ☐
2. To protect data and important information, strong passwords should be used. ☐
3. The decryption software is used to produce the encrypted text. ☐
4. The program file virus damages the boot sector of a hard disk or floppy drive. ☐
5. Identity theft refers to the act of stealing and misusing someone's personal information. ☐

C. Application-based questions.

1. Arnav's computer hangs frequently as it has virus in it. Which software will you suggest him to install in order to solve this problem?

   .....

2. Sumit's computer is not working properly. The executable files and programs with extensions, like .com, .exe, .drv, .sys, etc. on his PC have got infected. Which type of virus has entered into his computer?

   .....

D. Select the correct option.

1. What is the full form of VIRUS?

   a. Vital Information Resources Under Seize

   b. Various Information Resources Under Sezie

   c. Vital Information Resources Under Size

2. Which of the following is a combination of boot sector and program file virus?

   a. Boot Sector Virus b. Multipartite Virus c. Polymorphic Virus

3. A ..... virus is associated with the application software, like Word, Excel, and PowerPoint.

   a. Network b. Program File c. Macro

4. ..... is a computer program that is designed to identify, prevent, and remove viruses from a computer?

   a. Antivirus b. Decryption c. Firewall

5. What do you call the process that converts the electronic data into a form that cannot be easily understood by anyone?

a. Decryption b. Encryption c. Translation

E. Answer the following questions.

1. What is cybercrime? Give an example.

.....

.....

.....

2. What is difference between cyberstalking and cyberbullying?

.....

.....

.....

3. What is phishing?

.....

.....

.....

4. What is cyberextortion?

.....

.....

.....

5. Mention any two ways in which you can protect your system.

.....

.....

.....

6. Define the term 'forgery'.

.....

.....

.....

ACTIVITY SECTION



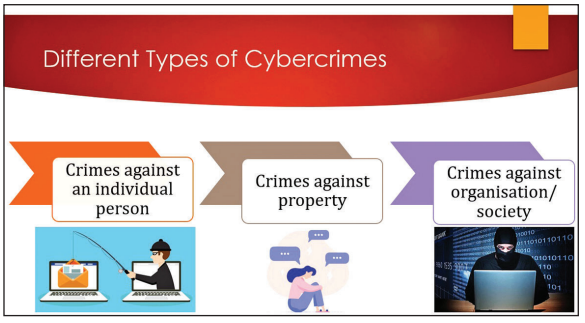
LAB SESSION

Perfection Through Practice

Create a PowerPoint presentation on Cybercrime by following the given instructions.

- Start with a new blank presentation in Microsoft PowerPoint.
- Choose a layout using the **Design** tab as per your choice.
- Insert appropriate pictures using the **Pictures > Online Pictures** option on the **Insert** tab.
- Include atleast 10 or more slides to make your presentation informative.
- Use animation and transitions effects in your presentation.
- Once completed, save your presentation with a suitable name.





GROUP DISCUSSION

For Concept Clarity



Conduct a group discussion on the topic: **Cyber Security**.

PROJECT WORK

Using Creativity



- Make a presentation on **Different Types of Virus and their Harmful Effects**.
- Search and access the information about virus with the help of the internet.

ONLINE LINKS

Looking For More



Visit the following sites:

- http://www.itgovernance.co.uk/what-is-cybersecurity.aspx
- http://en.wikipedia.org/wiki/Computer_virus

Chapter 10

Introduction to Artificial Intelligence

LEARNING OUTCOMES

The student will be able to:

- know about Artificial Intelligence.
- describe applications of AI in different fields.
- know about the various fields related to AI.

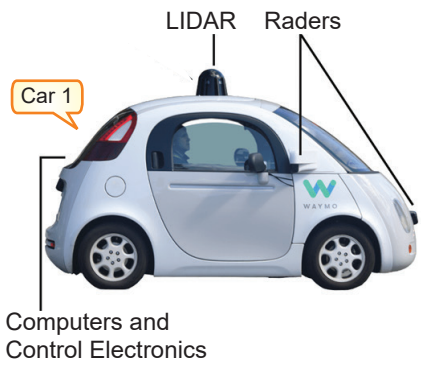
When it comes to performing tasks that require a lot of repetition and complex calculations, machines perform better than humans. The ability to store and retain information, and perform complex calculations in a computer is far better than a human. Computers score high in perfection and diligence, but when it comes to accumulating information and taking decisions based on the collected information, for an individual or a group, computers lag far behind. Humans take decisions based on their past experiences or implement logic to solve a problem in hand. This ability to take independent decisions separates them from machines.

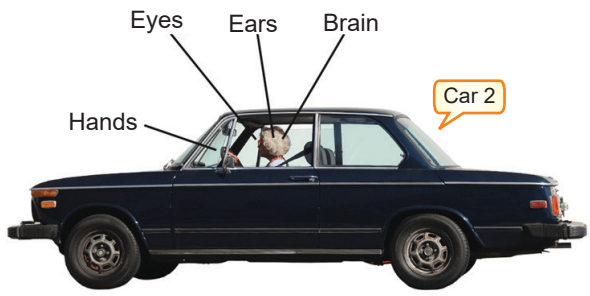
In the quest for a better future, man has always dwelled on the idea of making machines that can take decisions just like human beings. After a lot of research and trials, humans are finally close to making machines that can take any decisions just like them.

In this chapter, you will learn more about Artificial Intelligence also known as AI. It is the technology of the present and future and is here to help you in your day-to-day life. AI will aid mankind in simplifying decision-making, which will further help in taking quick logical decisions with accuracy.

Artificial Intelligence (AI)

AI or Artificial Intelligence is the ability of a machine to perceive its environment and take decisions in order to achieve a definite goal. The field of AI is based on the idea of replicating human intelligence. An increase in the processing power and storage capacity of the computers over the years has laid down the foundation of AI as a technology, that is meant to be adapted in the present and in the future.





Look at the picture given above. What differences do you see in both the cars, other than the shape of the cars? Observe that Car 2 is driven by a human; all the decisions related to speed, gear shift, acceleration, etc., are taken by the person driving the car. The person driving the car perceives the environment with the help of eyes and his ears, stores the information that he has perceived in the brain, processes the information stored in the brain, and controls the car with his hands and feet.

Now, notice that there is no driver in Car 1. This car is driven by AI; various cameras and sensors mounted on the car; help it in scanning the surrounding environment. The information collected by the cameras and sensors is stored in the car's storage unit, which is processed by the computer's CPU, and the CPU along with the other electronic devices help in controlling the motion of the car.

This is not the only scenario where AI is used today. It is now widely used in various other fields too, like agriculture, education, medicine, etc. Let us now discuss the application of AI in different fields and how it helps you in taking better decisions and obtaining better results.

Applications of AI

AI is used in various places. Here, you will study about some of them.



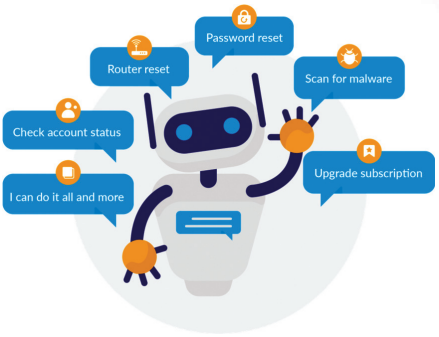
Agriculture: In agriculture, factors like irrigation, weather, use of pesticides, and availability of labours play a significant role in the turnover of crops. The AI techniques, like machine learning and computer vision can help in harvesting crops and pest identification. The AI related apps can help the farmers in planning the agricultural cycle according to the recent climatic changes that have been happening. It helps in seeding and harvesting of crops at a suitable time. AI can help farmers in managing the health of their crops which will have a lasting impact on the final output of the crop.



Health Care: AI is also widely being used in health care facilities. It helps doctors in diagnosing complex disorders; in recent times, AI has successfully been used in diagnosing diseases, like cancer, diabetes, and cardiovascular diseases. Such is the advantage of this trend in the upcoming years that companies, like Google, Microsoft, IBM, and Intel are investing huge amount of money in AI and its application in the field of health care.

Artificial Creativity: Creativity is the ability to use imagination and turn it into something that is closer to reality. For centuries, man has known to be creative in his endeavours, and

creativity is known to be practiced by man in all his inventions. But, of late, there is a slight shift in the trend as machines are now using AI to create music, paint, and write content, like AI is being used to write effective content for advertisement.

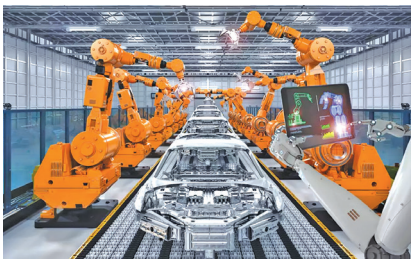


Customer Support: Most of the companies that are involved in customer support services are now using AI to solve customer queries. Various companies have developed chatbots, based on Natural Language Processing, which are providing customer support by resolving customer product related queries.

Space Exploration: Space is vast and the scope of exploration is wide. As the space is a vast entity, so the exploration and mapping of different zones and the identification of different expo planets is a time-consuming task that also requires utmost accuracy. Various prominent space agencies in the world are using AI technologies for the identification of the expo planets.



Manufacturing Industry: With the increased purchasing power and global market, the demand for different products is increasing day-by-day. To meet the growing demand, manufacturing industries are investing heavily in automating their system and AI is playing a significant role in converting the traditional manufacturing system into the automated system.



Hazardous Exploration: AI technology can be used for hazardous exploration. Organisations involved in disaster management are developing robotic technologies that can be used in search and rescue operations that involve taking a huge risk. Thus, AI integrated with robotics can play a huge role in saving the precious human life.

Benefits of AI

24×7 Availability: Various service providers need to keep in touch with the customers throughout the week. Providing such extensive kind of support from humans requires working in shifts. AI-based chatbots solve customer support-based queries 24×7. To take an example, Google assistance can book a table for you at your favourite restaurant, bank chatbots can answer your queries related to opening a savings account and the other bank related functions and queries.

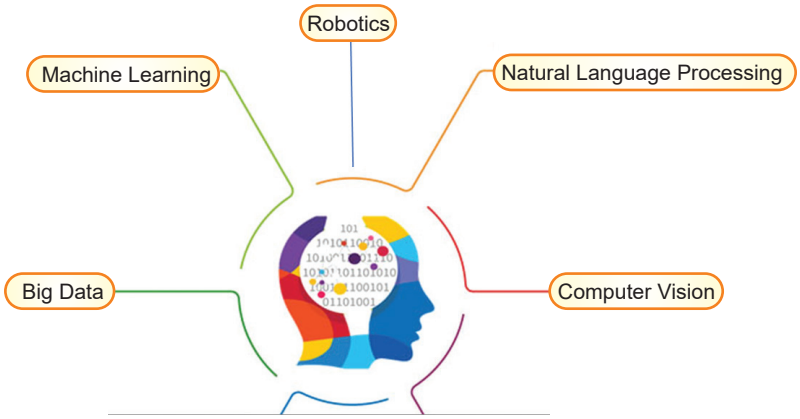
Saves Time: AI-based apps can process any amount of complex data and yet produce accurate results within no time. Processing a huge amount of data by humans requires more time and human resources; when a machine does this, it saves a lot of time and also requires lesser resources.

Accuracy: AI-based apps produce accurate results; as they use a highly accurate algorithm for processing data.

Friendly: The ultimate aim of AI is to help humans in taking complex decisions. In future, AI will be used to provide emotional and physical support to people around the world. At present, AI is capable of understanding human language with the help of a concept called Natural Language Processing or NLP. Alexa, Google Assistance, and Siri are a few of its examples.

Various Fields of AI

The scope of AI in the future is vast. The technology is still in its initial stage and expected to grow at a fast pace. The possibilities of AI in present times and the near future is huge and it is soon becoming a popular raging trend in various other fields too, just like mobile and internet technologies. Let us now discuss the various fields related to AI.



Machine Learning: Machine learning is a field that deals with building technology that can be used to program machines in a manner that the machines can learn independently. Once a machine is programmed, with the help of a substantial algorithm, it can quickly learn about the other scenarios and provide new solutions to solve a problem.



Big Data: With the internet becoming a new marketplace, and companies selling their products online, customers leave a huge trail of data when they are online. For example, when a customer buys something from an e-commerce site, the information related to the purchase, such as the category of products, its price, brand, colour, size, and other details are stored in the database of the e-commerce website. This trail of information is then used by the e-commerce website to understand the customer's purchase patterns and also helps the customers with the recommendations of products that fit their requirement. It is here that AI plays an important role in extracting the data and processing the huge amount of data to make the marketing process easier for the companies as well as buying process easier for customers.

Natural Language Processing (NLP): Communication is a two-way system where the speaker and listener should use one common language that is understood by both. In the past,

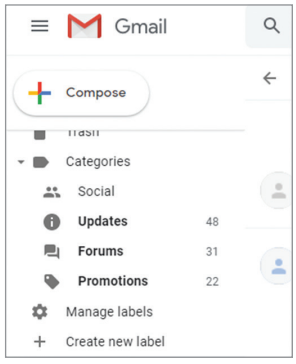
programmers have developed the text-based languages, such as machine language and higher-level programming languages to facilitate the communication between man and machines. With the advent of the AI technologies, programmers have developed a voice-based communication system where a user can give voice commands to a machine. The machine can easily interpret these commands with the help of NLP. Alexa, Google Assistant, Apple Siri are some AI-based applications that use NLP for communication.

Computer Vision: Computer vision is a field that deals with the idea of computers replicating human vision. This technology is used to extract visual information from images and videos. It is widely used in creating new security systems, face recognition, self-driven vehicles, and other such devices.

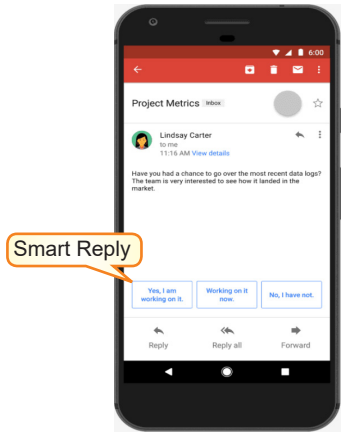
Robotics: AI plays a huge role in automating industrial processes. Industries, like automobiles and manufacturing, are automating their assembly lines in order to meet huge demand. These industries struggle to deliver products on time. Therefore, automating their production process is inevitable and the induction of robots in their workforce is a necessity. The integration of AI and robotics is helping these industries in tuning their assembly lines, thereby increasing the production rate. AI and robotics are used in industrial process like welding, material handling, painting, assembling, packing, etc.

Artificial Intelligence in Your Day-to-Day Life

AI is a trending technology and just like the other popular technologies, like television and internet, its popularity is increasing day-by-day. There are various AI technologies that people are currently using in their everyday life, but are little aware of. Following is the list of AI tools that are regularly used by many of us.



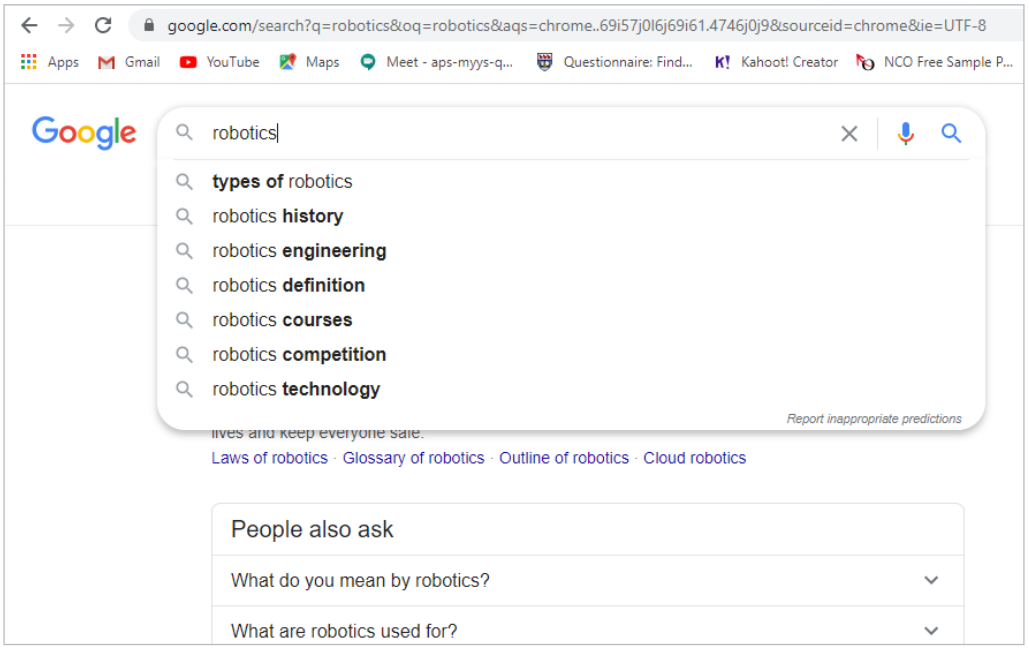
Gmail: Gmail uses AI to filter your mails into different categories, like Personal, Primary, Social, Promotion, Forums, Spam, etc. AI working in the background scans the mails received in your account and transfers an email into the correct folder category.



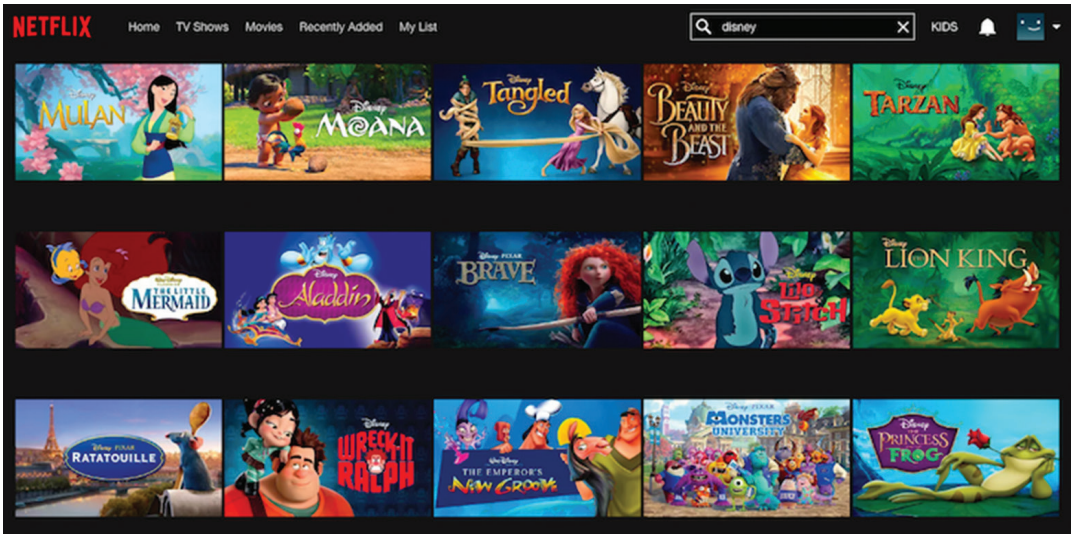
Smart Replies in Gmail: Smart reply is the latest feature launched by Gmail. Using AI, Gmail can read your email text and can give suggestions for a quick reply. To write an instant reply, the user simply has to click on the text suggestions displayed at the bottom of the email text.

Google Search: Google is widely used for searching information on the internet. While entering the text in the search box, you must have observed that you get to see some search related suggestions.

Google search engine makes use of AI for suggesting relevant search topics.



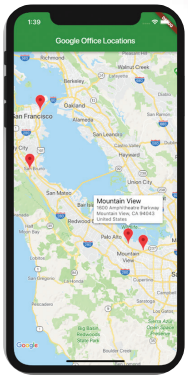
Recommendations: Most of the streaming apps, like Netflix and YouTube make use of the AI to recommend shows and movies based on different genres based on the viewer's choice. Various music apps, like Spotify play music based on the user's listening habits. E-commerce apps, like Amazon and Flipkart also use AI for product recommendations.



Alexa: Alexa is one device that is gaining immense popularity among the users and is becoming a household gadget. It makes use of NLP to interpret voice commands and converts them into text commands and routes the interpreted command to the cloud service.



Navigation: Apps like Google Maps make use of AI to update a commuter about traffic congestion in a particular area and about the estimated time to reach a particular destination. AI has a process for doing this. While you are travelling in your car, AI calculates the average speed of your car, the distance between your current location and destination. To update you about traffic congestion it takes note of the number of active mobile connections in an area where jam is expected and relays the information on your mobile app.



RECAP

- This ability to take independent decisions separates machines from humans.
- The field of AI is based on the idea of replicating human intelligence.
- AI-based chatbots can solve customer support-based queries 24 × 7.
- AI-based apps can process complex data and yet they can produce accurate result within no time.
- AI-based apps use a highly accurate algorithm for processing the data.
- AI is capable of understanding human language with the help of a concept called Natural Language Processing.
- Machine learning is a field, which deals with building technology that can be used to program machines in a manner that the machines can learn independently.
- Computer Vision is a field that deals with the idea of computers replicating human vision.

Brain developer

A. Fill in the blanks.

1. ..... make use of AI to update a commuter about traffic congestions in a particular area and about the estimated time to reach a particular destination.
2. AI is capable of understanding human language with the help of a concept called ..... .
3. ..... is a field that deals with the idea of computers replicating human vision.
4. AI-based apps use a highly accurate ..... for processing data.

Hints

- Natural Language Processing
- Google Maps
- Chatbots
- Algorithm
- Computer Vision

B. Write T for True and F for False.

1. In Gmail, AI is only used for scanning an email for viruses. ☐
2. Alexa is a device that makes use of NLP to interpret voice commands. ☐
3. Like humans, AI cannot take independent decisions. ☐
4. Computer Vision is a field that deals with the processing of language. ☐
5. Google Maps make use of AI to update about traffic congestion. ☐

C. Answer the following questions.

1. Write any two applications of AI in everyday life.

.....

.....

.....

2. What is machine learning?

.....

.....

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3. What is NLP? Name a few popular apps that make use of NLP.

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4. Explain the use of AI in Google search.

.....

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.....

5. What is computer vision?

.....

.....

.....

ACTIVITY SECTION



MY ACTIVITY

Learning While Playing

Look at the pictures given below and select the fields where AI can be used. Write the name of the fields in the box given next to the picture.











LAB SESSION

Perfection Through Practice

Application of AI Domains in Different Subjects

AI is ready to play a significant role in education. Some AI tools related to different subjects are given below. A teacher can use these tools to create curiosity among students.

Subject: Science

Chapter Name: Animals and their Features

AI Integration: Artificial Intelligence (NLP) & English

Materials Required: Smartboard/projector, laptop/desktop, internet connection, earphones/ headphones/ microphones.

AI Element: NLP

Description: Mystery Animal is an AI experiment developed by Google on an open-sourced platform, which is based on the Natural Language Processing domain. In this game, the computer pretends to be an animal and the player needs to guess the animal by asking 20 Yes/No questions.

The player asks the machine questions with the help of earphones/headphones/microphone to which the machine will respond either in Yes or No and according to the answers the player needs to modify his/her questions to guess the animal.
Link: https://mysteryanimal.withgoogle.com/

Subject: Maths
Chapter Name: Symmetry
AI Integration: Understanding the concept of Symmetry using AI Experiential Applications
Materials Required: Laptop/desktop with internet connection, chalk, and board, pen and paper.
AI Element: Machine Learning/Autodraw
Description: Autodraw.com is an AI enabled tool which is based on the domain of Computer Vision in which the machine identifies the pattern of your drawing and accordingly maps it with the most similar image. This tool shows various options trying to predict what the user is trying to draw.
Link: Autodraw.com

Subject: Physics
Chapter Name: Sound
AI Integration: Frequency, Amplitude & Velocity integrated with the infinite Drum Machine experiment
Materials Required: Laptop/desktop with internet connection, chalk, and board.
AI Element: Infinite Drum Machine/Machine Learning
Description: An infinite drum machine is an AI experiment developed by Google for people to understand how unsupervised-learning works. In this machine, thousands of sounds found in our surroundings have been randomly fed for the machine to make sense out of them. The sounds are not labelled in any way nor does the machine have any other information about that sound. All that it knows is the sound clip itself. Using one of the unsupervised learning algorithms, the machine analyses the data fed to it and tries to cluster similar sounds together. These clusters are then visible with the help of colours on the user's screen. All the dots appearing on the screen are sound clips, and they have been clustered together on the basis of their sound properties like amplitude, frequency and pitch with the help of which the machine is able to understand the similarity amongst different clips.
Link: https://experiments.withgoogle.com/ai/drum-machine/view/

GROUP DISCUSSION

For Concept Clarity



Discuss the following topics:

- **How AI is Transforming the World**
- **Different Fields of AI Applications**

PROJECT WORK

Using Creativity



Create a PowerPoint presentation on **Artificial Intelligence**. Also, add a slide in the presentation to show how AI can play an important role in your school.

2 WORKSHEET

Chapters 6—10

A. Fill in the blanks.

1. An ..... list is used when the items are not required to be displayed in any particular sequence.
2. The ..... is a rectangular window that is present at the bottom of the stage.
3. ..... is an act of harming or harassing through information technology in a deliberate manner.
4. AI apps use a highly accurate ..... for processing data.

Hints

- Algorithm
- Cyberbullying
- Unordered
- Timeline

B. Write T for True and F for False.

1. Antivirus is used to identify, prevent, and remove viruses from a computer. ☐
2. The ordered list is used to display the list of items in a specific order. ☐
3. NLP deals with computer vision. ☐
4. Program file virus damages the boot sector of a hard disk or floppy drive. ☐
5. Phishing is an act of sending an email to a user; misleading him to believe that it is from a trusted person or organisation. ☐

C. Give an example for each of the following.

1. NLP .....
2. Boot Virus .....
3. Type Attribute .....
4. Navigation App .....
5. Cybercrime against an Individual .....

2 TEST PAPER

Chapters 6—10

Name: ..... **Date:** .....

A. Select the correct option.

1. ..... is the act of using the goodwill of a trademark belonging to someone else and getting benefit out of it.

   a. Cybersquatting b. Cyberstalking c. Cyberbullying

2. ..... is the process of making duplicate copies of data, which can be used to restore the original data in case of any loss of it.

   a. Custom Scan b. Backup c. Passwords

3. An ..... list is used when the items are not to be displayed in any particular sequence.

   a. Ordered b. Unordered c. Description

4. The reversed attribute of ..... tag specifies that the list order should be in the descending order.

   a. b. c.

B. Answer the following questions.

1. Which tag do you use to insert images in your web page? Give an example.

   .....

   .....

2. What do you mean by encryption?

   .....

   .....

3. Define NLP.

   .....

   .....

4. Mention any two fields of AI.

   .....

   .....

Teacher's Signature: .....



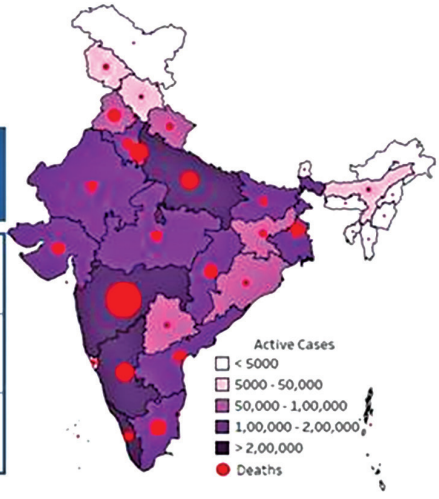
Excel 2019

Project 1: The COVID-19 pandemic in India is a part of the global coronavirus disease 2019 (COVID-19) pandemic caused by the coronavirus 2 (SARS-CoV-2). The information provided here shows the total number of active and recovered cases in India. Open Excel on your computer and do the tasks listed below.

COVID-19 Tracker

As on 9 May 2021, till 8AM

Total Cases	2,22,96,414 (▲4,03,738)	
Recovered	1,83,17,404 (82.15%)	▲ 3,86,444
Active	37,36,648 (16.76%)	▲ 13,202
Deaths	2,42,362 (1.09%)	▲ 4,092



States' Cases (Highest)	Recovered (%)	Active (%)	Deaths (%)
Maharashtra	50,53,336 (▲56,578)	43,47,592 (86%)	6,30,467 (12%)	75,277 (1.5%)
Karnataka	18,86,448 (▲47,563)	13,19,301 (70%)	5,48,861 (29%)	18,286 (1.0%)
Kerala	18,66,827 (▲41,971)	14,43,633 (77%)	4,17,448 (22%)	5,746 (0.3%)
Uttar Pradesh	14,80,315 (▲26,636)	12,19,409 (82%)	2,45,736 (17%)	15,170 (1.0%)
Tamil Nadu	13,51,362 (▲27,397)	11,96,549 (89%)	1,39,401 (10%)	15,412 (1.1%)
Delhi	13,10,231 (▲17,364)	12,03,253 (92%)	87,907 (7%)	19,071 (1.5%)
Andhra Pradesh	12,65,439 (▲20,065)	10,69,432 (85%)	1,87,392 (15%)	8,615 (0.7%)
West Bengal	9,73,718 (▲19,436)	8,36,351 (86%)	1,25,164 (13%)	12,203 (1.3%)
Chhattisgarh	8,42,356 (▲12,239)	7,01,116 (83%)	1,30,859 (16%)	10,381 (1.2%)
Rajasthan	7,38,786 (▲17,987)	5,33,973 (72%)	1,99,307 (27%)	5,506 (0.7%)
Gujarat	6,69,928 (▲11,892)	5,18,234 (77%)	1,43,421 (21%)	8,273 (1.2%)
Madhya Pradesh	6,60,712 (▲11,598)	5,51,892 (84%)	1,02,486 (16%)	6,334 (1.0%)
Haryana	6,02,349 (▲14,667)	4,80,786 (80%)	1,16,109 (19%)	5,454 (0.9%)
Bihar	5,80,217 (▲12,948)	4,64,025 (80%)	1,12,977 (19%)	3,215 (0.6%)
Odisha	5,24,207 (▲11,807)	4,39,322 (84%)	82,724 (16%)	2,161 (0.4%)
Telangana	4,92,385 (▲5,186)	4,21,219 (86%)	68,462 (14%)	2,704 (0.5%)
Punjab	4,33,689 (▲9,042)	3,51,426 (81%)	71,948 (17%)	10,315 (2.4%)
Assam	2,89,069 (▲5,756)	2,49,295 (86%)	38,146 (13%)	1,628 (0.6%)
Jharkhand	2,82,174 (▲6,112)	2,17,223 (77%)	61,195 (22%)	3,756 (1.3%)
Uttarakhand	2,38,383 (▲8,390)	1,63,661 (69%)	71,174 (30%)	3,548 (1.5%)

- Enter the data in your spreadsheet for the columns: States, Total Cases, Recovered Cases, and Active Cases.
- Create an appropriate chart to represent the data in pictorial form.
- Include different chart elements, like Chart title, Axis titles, Legend, and Data series.

- Change the background colour of the Plot area and position of Legend in the chart.
- Add the title 'Covid-19 Tracker' to your chart.
- Add a new column 'Sparklines' next to the 'Active Cases' column and insert sparklines for active cases.

Project 2: The data below depicts waterbird population records in Delhi for the years 2018-20. Consider the following data and complete the following tasks in Excel.



➤Asian Waterbird Census to be conducted at seven wetlands in Delhi-NCR from January 2 to 18, 2021

➤The census aims to record the conditions of wetlands and waterbird population

WETLANDS TO BE COVERED:

1. Sanjay Lake
2. Yamuna River
3. Najafgarh Jheel
4. Surajpur wetland (Noida)
5. Dhanauri wetland (Dankaur)
6. Okhla Bird Sanctuary
7. National Zoological Park



Waterbird population recorded in the last three years:

	AWC 2018		AWC 2019		AWC 2020	
	Species diversity	Population	Species diversity	Population	Species diversity	Population
Surajpur wetland:						
	35 species	1,920	42 species	3,034	39 species	2,092
Yamuna river:						
	32 species	594	30 species	1,267	28 species	1,051
Najafgarh Jheel:						
	40 Species	3,091	31 Species	1,679	54 Species	9,453
Okhla Bird Sanctuary:						
	63 species	11,622	63 species	12,212	62 species	8,776

- Insert 'Asian Waterbird Census' the data into three different sheets with names: AWC 2018, AWC 2019, and AWC 2020.
- Apply common formatting by grouping sheets. After applying formatting, ungroup all the sheets.
- Consolidate the data from all the three sheets into a new sheet to calculate the total species and population.

Python

Project 1: Write a program to accept the cost price to display the road tax to be paid according to the following criteria.

Cost Price (₹)	Up Road Tax
Above ₹20 Lakhs	9%
From ₹10 Lakhs to ₹ 20 Lakhs	8%
From ₹6 Lakhs to ₹ 10 Lakhs	6%
Up to 6 Lakhs	3%



Project 2: Write a program to accept any city from the user and display a monument of that city.

Monument	City
India Gate	Delhi
Taj Mahal	Agra
Jal Mahal	Jaipur
Ellora Caves	Aurangabad
Victoria Memorial	Kolkata
Buland Darwaja	Fatehpur Sikri
Vivekananda Rock Memorial	Kanyakumari
Indian Army Memorial	Manipur
Mumbai	Gateway of India



Project 3: Write a program to accept the percentage from the user and display grade according to the following criteria.



Unit	Grades
Below 25	D
25 to 45	C
45 to 50	B
50 to 60	B+
60 to 80	A
Above 80	A+

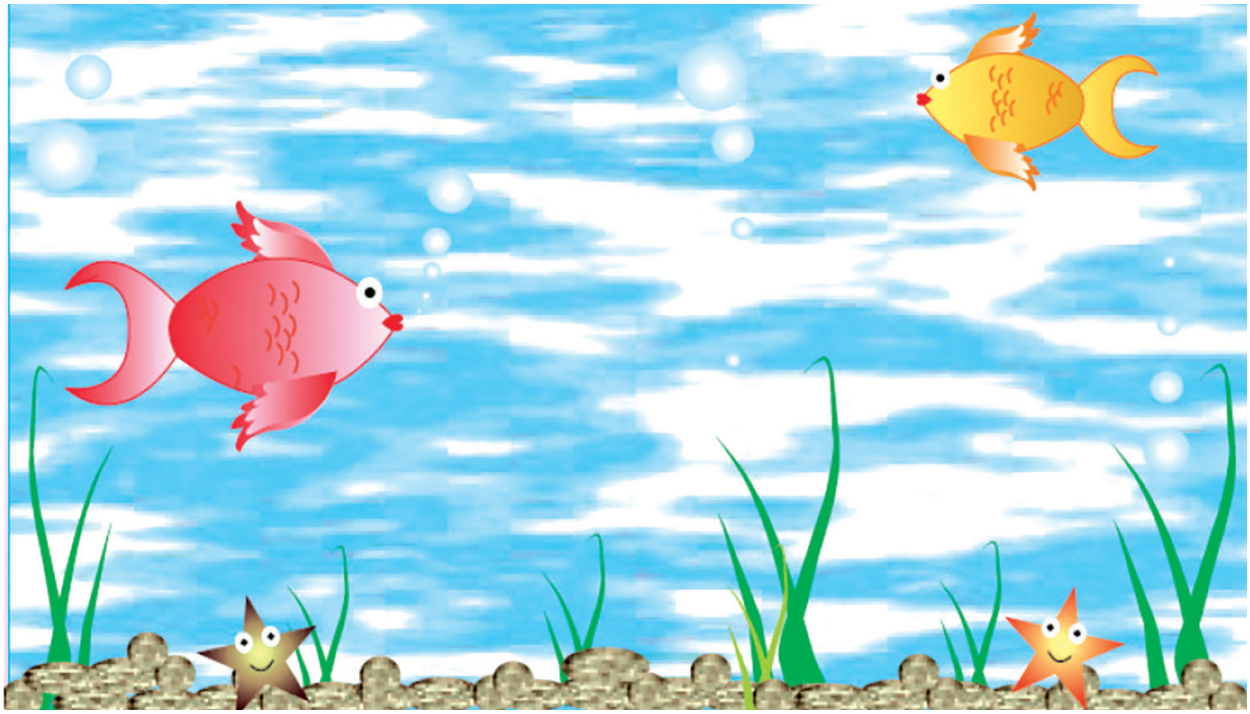
Project 4: Write a program to accept the number of days from the user and calculate the charge for the library according to the following criteria.

Days	Charges (₹)
First 5 days	₹ 4/day
6 to 10 days	₹8/day
10 to 15 days	₹10/day
After 15 days	₹15/day



Krita

Project 1: Create an animation using two layers. Create a sea scene in one layer and fish in the other layer. Animate the fish to move from one end to another.

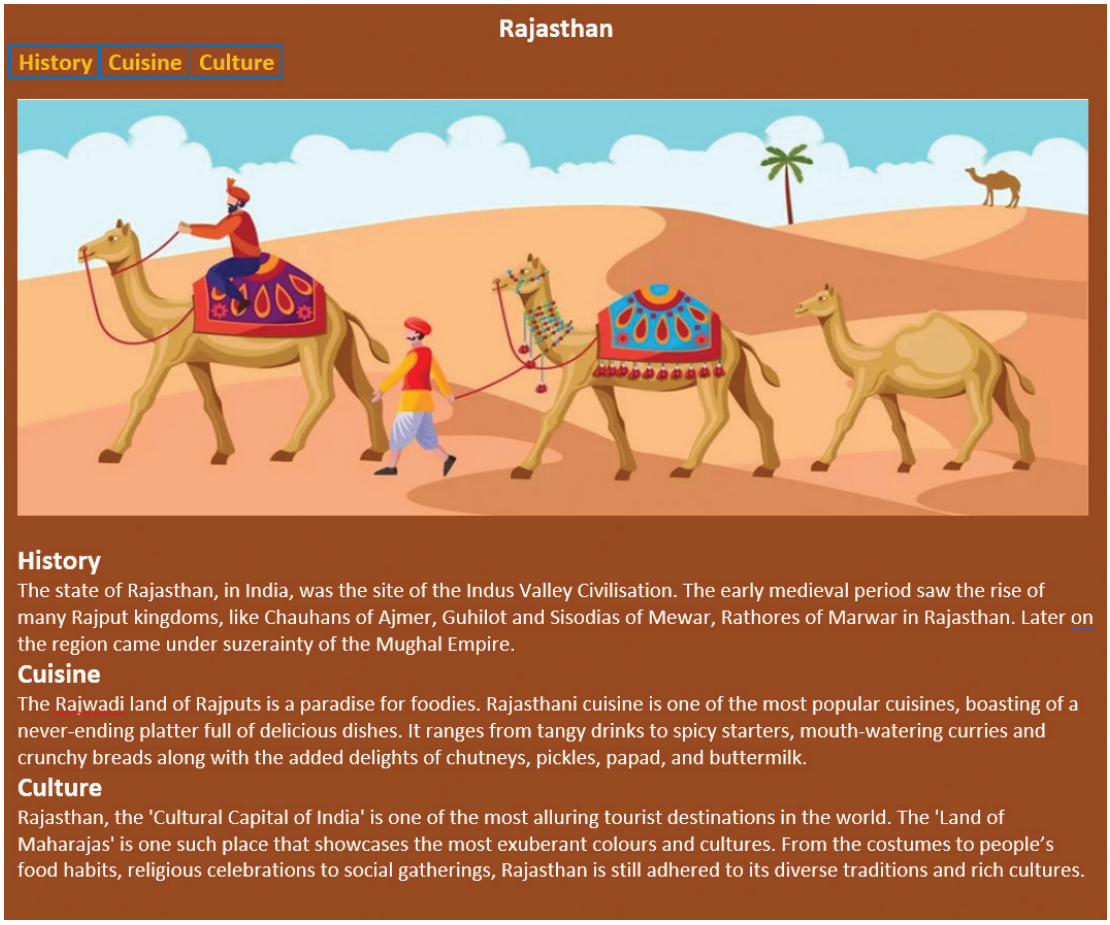


Project 2: Create the following scene using different layers in Krita and add animation to move the boat.



HTML

Project 1: Create a web page to provide information about Rajasthan's history, cuisine, and culture.



Include the following on your web page to make it more appealing and attractive:

- Give a meaningful title to the web page.
- Set the background-color: orange and font-type: Calibri for the web page.
- Give an appropriate heading in the center of the web page.
- Create a table in the top-left corner as shown on the web page. Set the table, table-border as blue and table text as orange.
- Insert an image that represents Rajasthan. You can include the image as per your choice.
- Include definition list to add the terms: History, Cuisine, and Culture. Use the following style for the definition list:

```
text-transform:Titlecase; color:white; font-size:30px}
```

- Give description under the corresponding terms to describe Rajasthan's History, Cuisine, and Culture. Use the following style for the description:

```
dd{color:white;font-size:25px}
```

After creating the web page, grade yourself by drawing and colouing a star for each check point. Also, ask your friend to do the same.

My Name: ..... **Friend's Name:**.....

Check Points		Self Assessment	Friend's Assessment
1.	Have you added a title to the web page?		
2.	Have you customised the background colour and font type?		
3.	Have you included the image in your web page?		
4.	Have you included the table in your web page as given?		
5.	Have you inserted data definition lists?		
6.	Have you created a style for data definition and description lists?		
	Total ★		

Date: ..... **Teacher's Signature:** .....

Project 2: Create a web page to depict the "Festivals of India". Including elements and attributes that you have learnt in your HTML chapters.

Festivals of India

People & Lifestyle	State	My India My Pride	Contact

India is a land of festivals and culture. In India, more festivals are celebrated as compared to the whole world.

Some of these festivals welcome the seasons, harvest, rains, and even full moon while the others celebrate religious occasions, like the birthdays of Gods, or advent of local New Years.

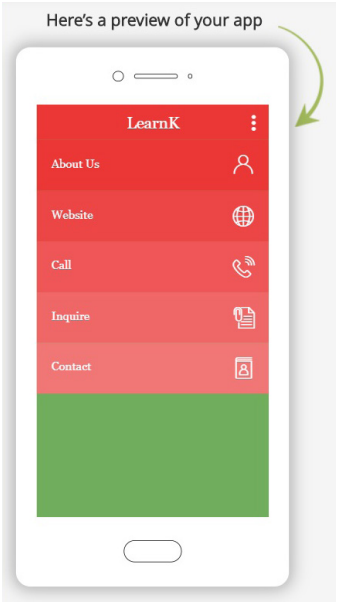
Most of the festivals in India are celebrated in the whole country but some have different names in the different parts of the country.



App Development

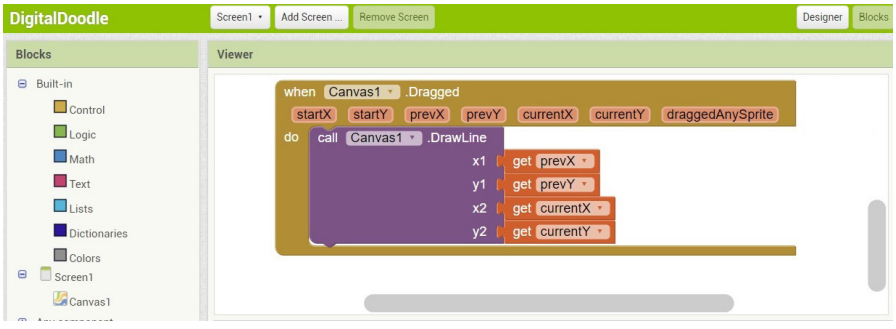
Project 1: Create an educational app using Appy Pie.

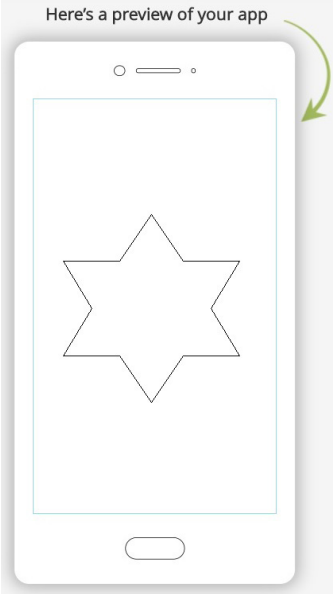
- Visit the site and start with a free app.
- Enter the name of your app.
- Choose the required category.
- Select the device to test your app.
- Choose design, font, colours, app layout, and the other elements as per your requirement.
- Save your settings and wait for the QR Code.
- Scan the QR code using any QR code scanner app on your mobile phone.
- You will get a link to download the Test Lab app.
- Download it and test your application.



Project 2: Create an app on Digital Doodle using the MIT App Inventor.

- Start with a new project, name it Digital Doodle.
- Add a Canvas on Screen1, set its width and height properties as 'Fill parent'.
- In the Blocks view, click on Canvas1 and add the given code to it.
- Run your app using the connected device and drag your finger around the screen to draw a doodle.







Reach the Finish Line!

List any two binary operators.

What is the E-Commerce?

21

22

Differentiate between Native and Hybrid apps.

20

19

18

17

Jump to 24

What are the control statements?

What is AI?

Tell any two components of a chart.

What are the flow lines?

State the difference between the Column and Bar charts.

10

11

9

8

7

State two rules to write formulas and functions.

What type of reference is A4$S2?

Start

It is a circular chart.

1

Take a dice and two counters to play the game.

Rules to play games:

- Roll the dice and move your counter.
- Answer the question correctly to move forward.
- If your answer is wrong, go back to your previous position.

Finish

Skip your turn

23

List any two CSS properties of the <table> tag.

24

Define the web apps and native apps.

25

16

Jump to 20

15

List any two antivirus software.

Which function returns the average of the range values?

14

Jump to 14

12

Give two examples of relational operators.

13

6

Describe the use of the assignment operator.

5

Number system which consists of only two digits.

Which function joins two or more strings?

4

List any two attributes of <img> tag.

2

Jump to 6

3

Arduino Microcontroller Programming

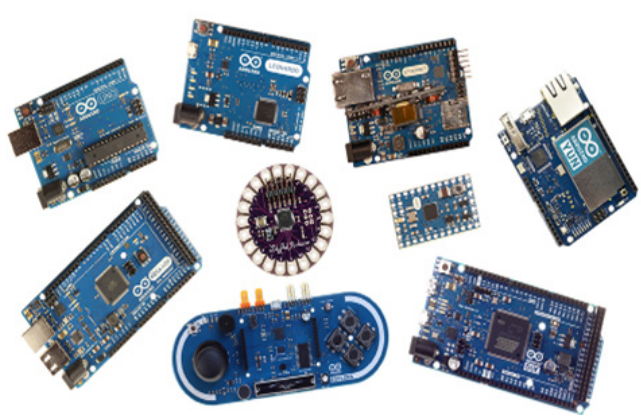
Arduino is an open-source platform, used for building electronics projects. It consists of a programmable circuit board — a microcontroller and an IDE. The IDE runs on your computer, and is used to write and upload the computer code to the physical board. The Arduino IDE uses a simplified version of C++, making it easier to learn to program.

Arduino is the most simple and affordable, small-scale computer with a microprocessor that focuses on interaction with the outside world. Most of the computers you are familiar with are controlled almost exclusively through the keyboard and mouse, touchscreen, or trackpad. An Arduino allows you to take information from the outside world with sensors that measure temperature, light and sound levels, or even the vibrations underneath your feet and convert these measurements into motion, sound, light, and more.

The Arduino was originally developed for the students without a background in electronics and programming to create interactive objects that can scan the environments. Since the original Arduino was released in 2005, it is estimated that over 1 million have been sold. Designers, educators, engineers, hobbyists, and students have built all kinds of projects that sense and respond to the world with Adruino.

Arduino Hardware

There are many versions of the Arduino, and each is designed for a specific function. The figure shows a few of the Arduino boards.

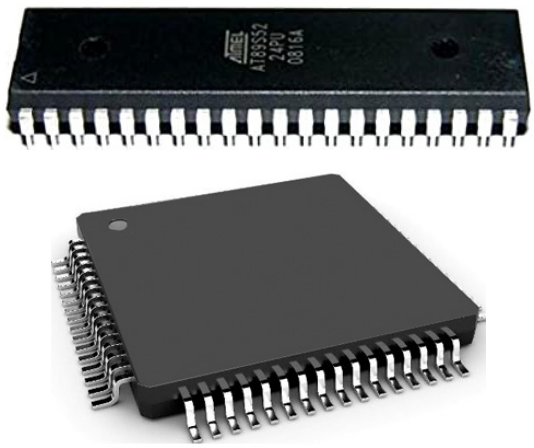


Arduino Boards

Arduino is an Open Source Hardware (OSHW), which consists of all the machines, devices, or other electronic parts whose designs are available for general public. Anyone can modify these open source hardware devices. An Arduino board consists of a microcontroller with ports and the other electronic components.

A microcontroller is a small computer on a single metal-oxide-semiconductor (MOS) integrated circuit (IC) chip with one or more CPU along with a limited amount of memory, which can be programmed. You can tell your board what to do by sending a set of instructions to the

microcontroller on the board. Once a program is stored into the memory of a microcontroller, it executes the instructions just like a computer. The microcontrollers can be programmed for input/output operations. You can also use various sensors to scan the environment around you. For example, sensors can be used to read the temperature inside your room or calculate the distance between two objects.



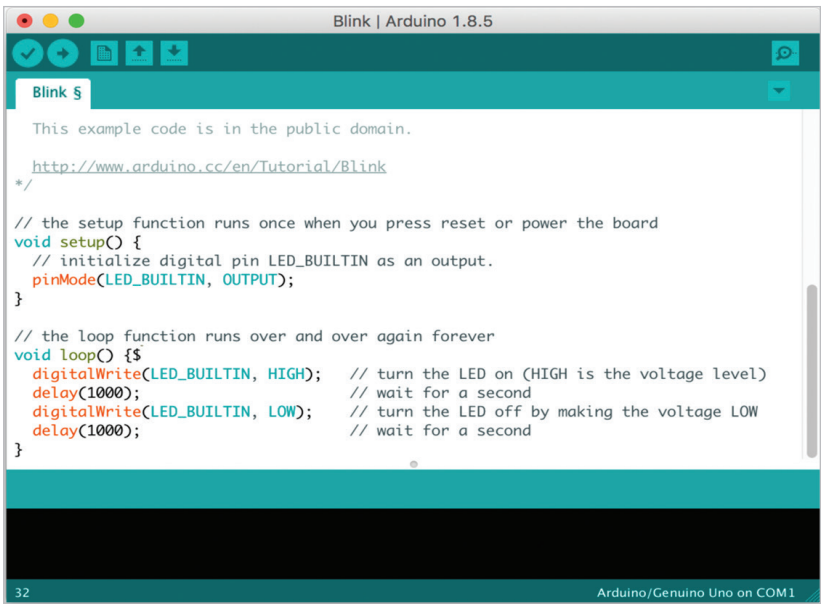
Microcontroller

The following is list of Microcontroller boards that are available online:

- Atmel 8-bit
- ATmega328
- ATmega2560
- ATmega8
- ATmega1280

Arduino IDLE

To program a microcontroller, you need to have an (Integrated Development Environment (IDE). IDE is an application used by the programmers to write instructions for a microcontroller. These instructions can be written in any programming language that Arduino supports. The Arduino IDE is a cross-platform application that can run on any type of operating system, i.e., Windows, Mac, and Linux. The Arduino IDE supports C, Java, Python, and C++ programming languages. It has a huge library of in-built functions that can be used for various input/output operations.



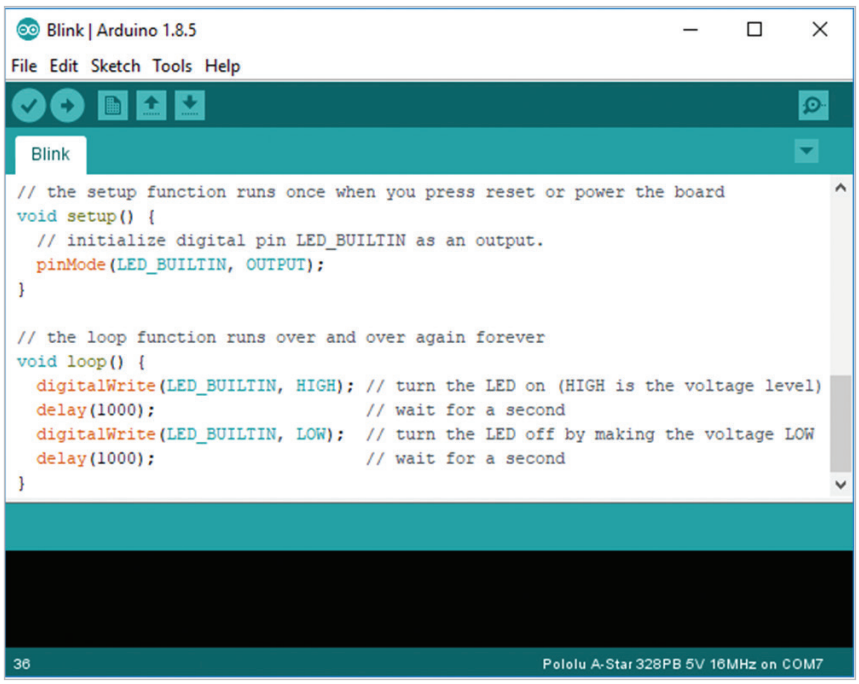
Arduino IDE

NOTE

You can download the latest version of Arduino from:
https://www.arduino.cc/en/main/software

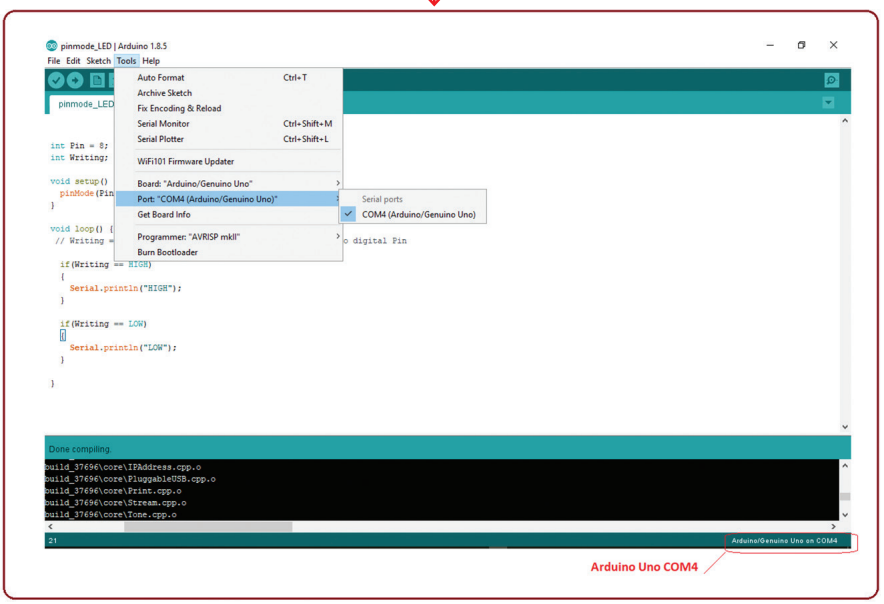
Steps to Create a Project in Arduino Board

- Write the code in the Arduino IDE.

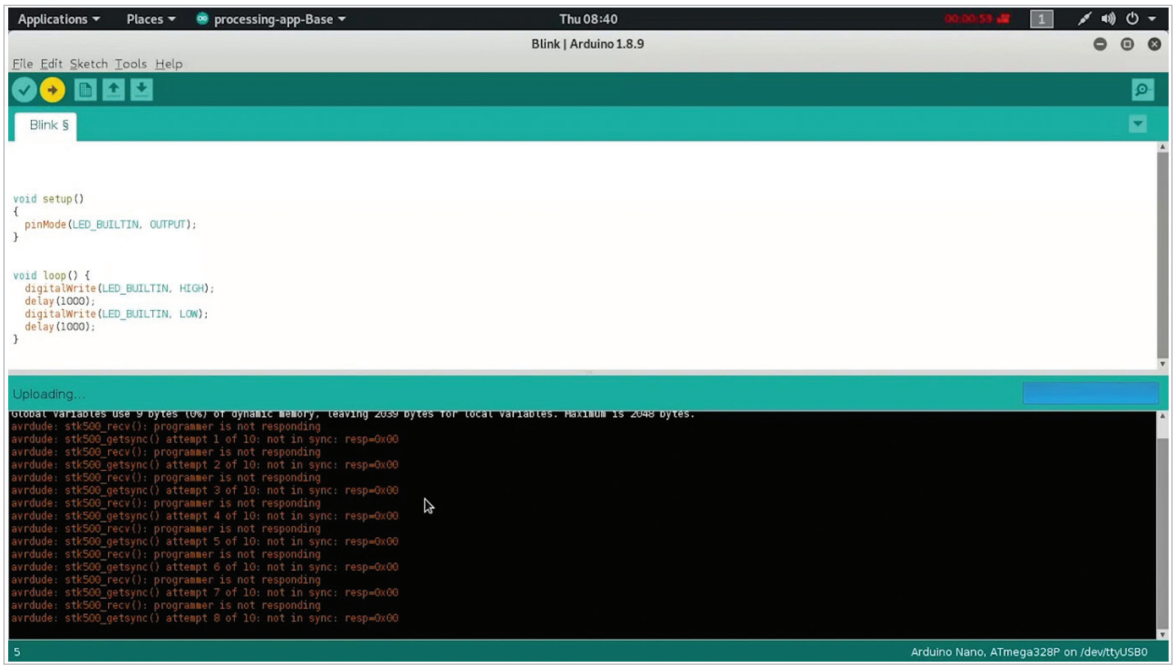


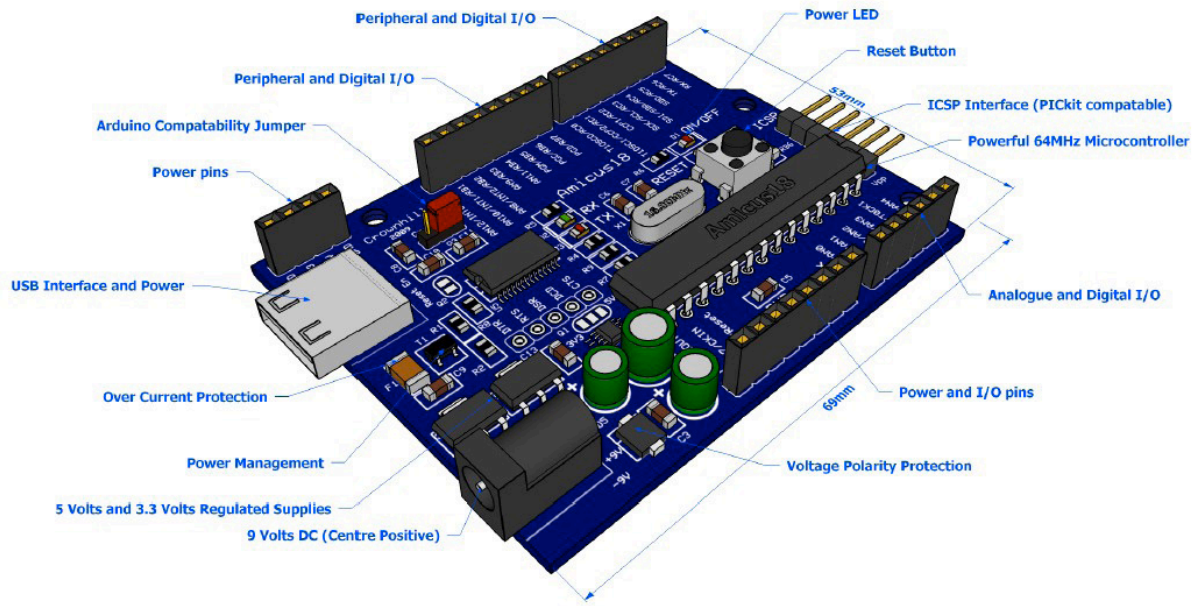
- Connect the Arduino Board with your computer.





- Compile and upload your code on the Arduino Board Microcontroller.



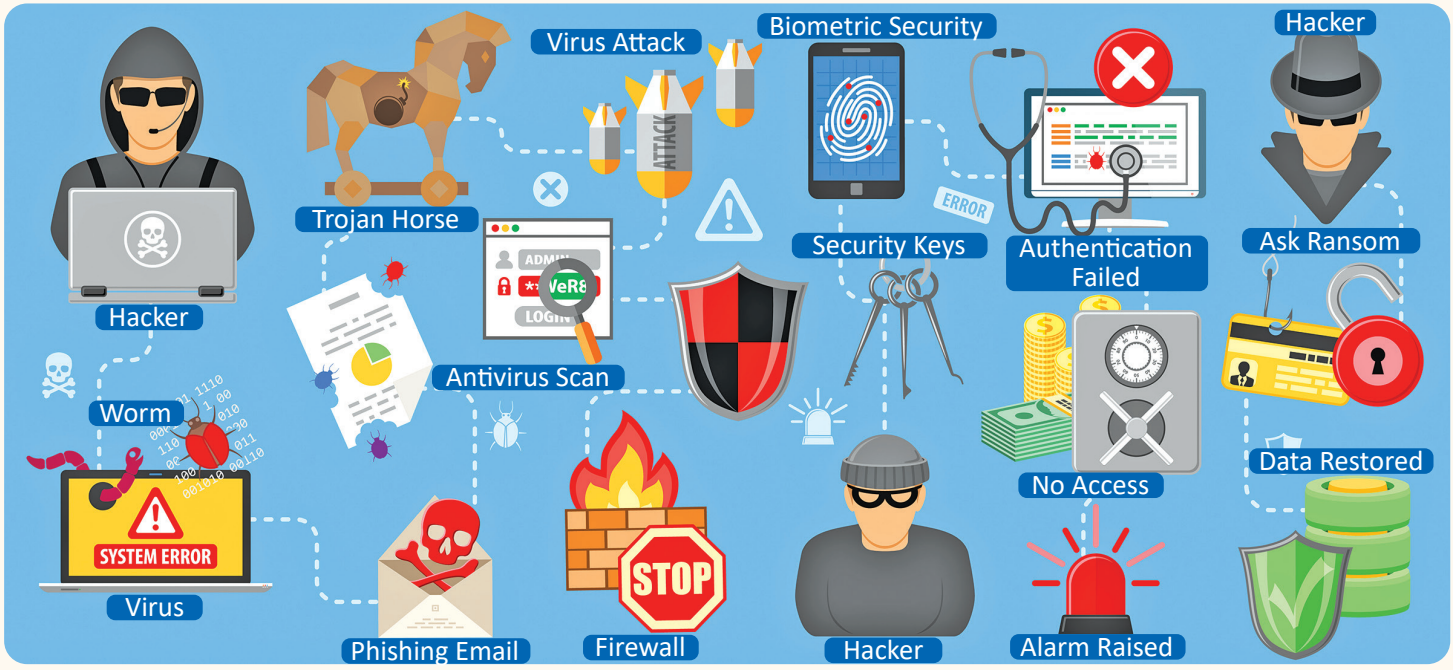


ONline Links

- If you are looking for more, check out the link:
  https://www.arduino.cc/
- Visit the following link to create a humaniod AI Robot with Arduino:
  https://create.arduino.cc/projecthub/ashwini-kumar-sinha/humaniod-a-i-talking-robot-with-arduino-433972

Cyber Crimes

Cyber Ethics



HACKING



An activity by which someone gains unauthorised access to other computers or network by identifying the weaknesses in it. It is done by an individual known as a hacker.

VIRUS



A program or code designed to operate a computer in order to damage, steal personal information, modify data, display unpleasant messages, or a combination of these activities.

PHISHING



A cyber-attack or fake attempt often used to steal sensitive information or data, by impersonating as a trusted individual using deceptive emails and websites.

RANSOMWARE

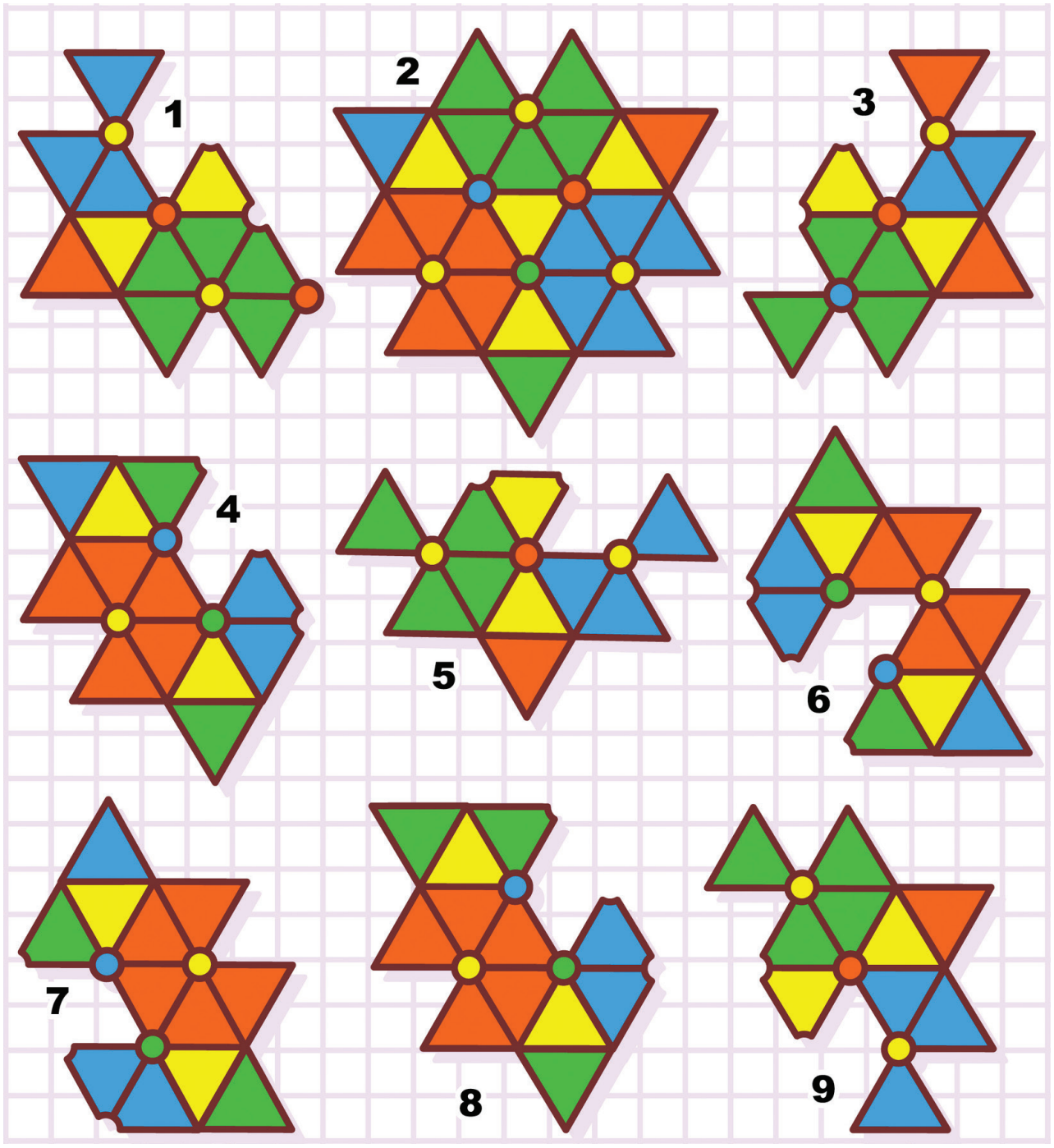


A type of malware attack that locks the computer and encrypts the critical data so that the user cannot access files, databases, or applications. He is asked to pay a ransom for the data to be restored.

Computational Thinking

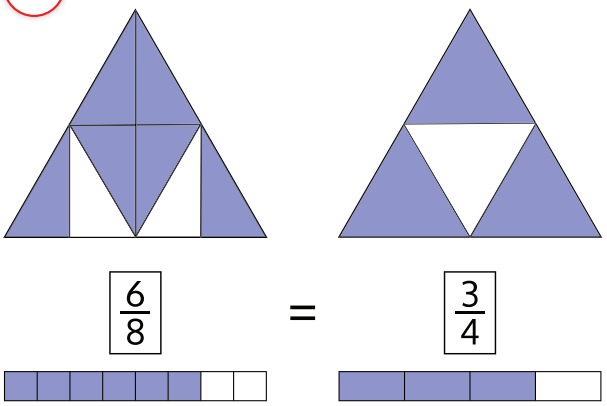


A. Find the two pieces that are used to create the pattern 2.



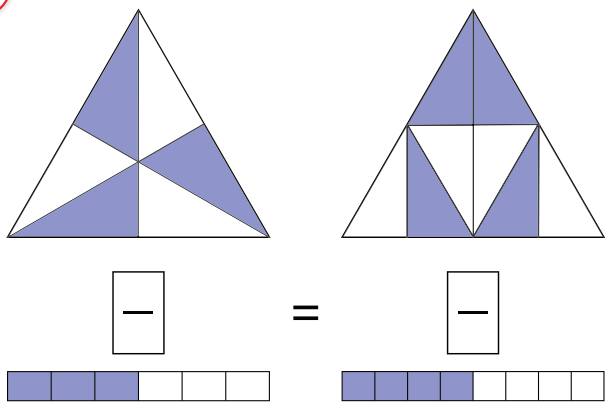
B. Find the equivalent fractions in the given images.

1



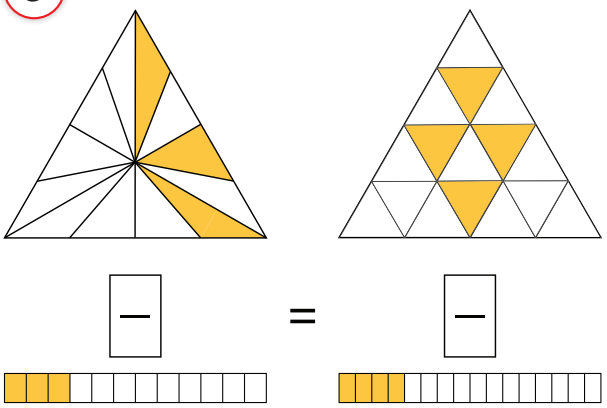
$\frac{6}{8} = \frac{3}{4}$

2



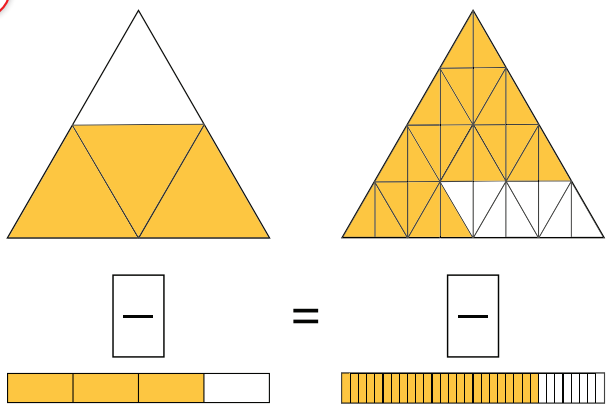
$\frac{\quad}{\quad} = \frac{\quad}{\quad}$

3



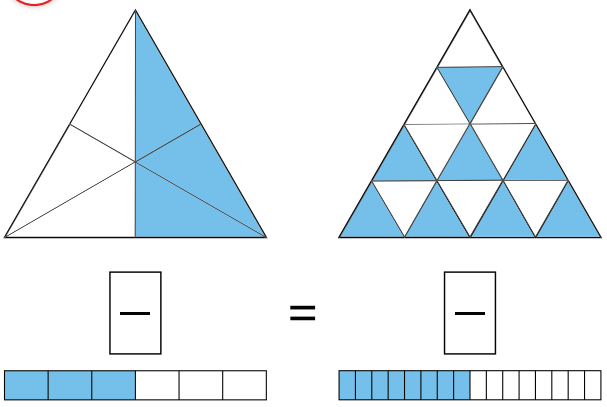
$\frac{\quad}{\quad} = \frac{\quad}{\quad}$

4



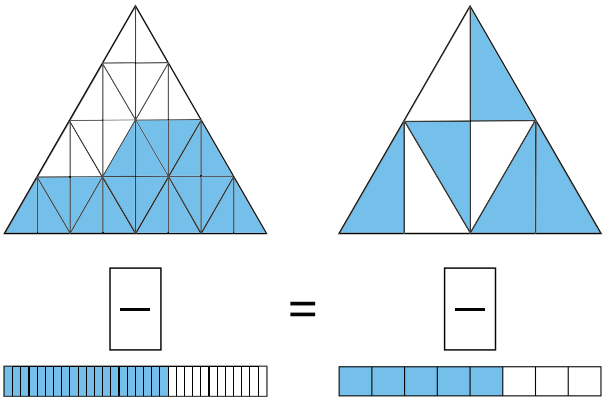
$\frac{\quad}{\quad} = \frac{\quad}{\quad}$

5



$\frac{\quad}{\quad} = \frac{\quad}{\quad}$

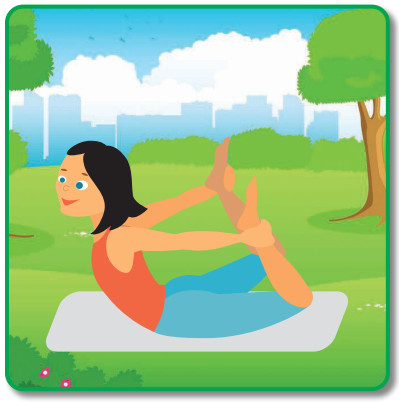
6



$\frac{\quad}{\quad} = \frac{\quad}{\quad}$

Everyday Yoga!

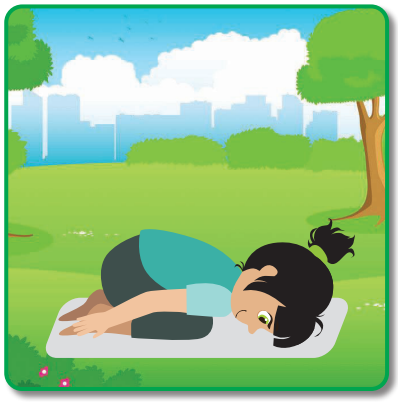
Do yoga everyday to stay calm and healthy.



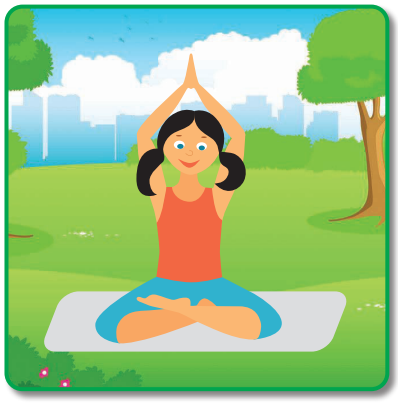
Bow Pose

- Stretches the front of the body, ankles, and thighs
- Increases the elasticity of back, arms, and chest
- Reduces belly fat and tones the abdomen

- Lengthens and stretches the spine
- Improves digestion and eases the lower back
- Beneficial in maintaining mental health



Child Pose

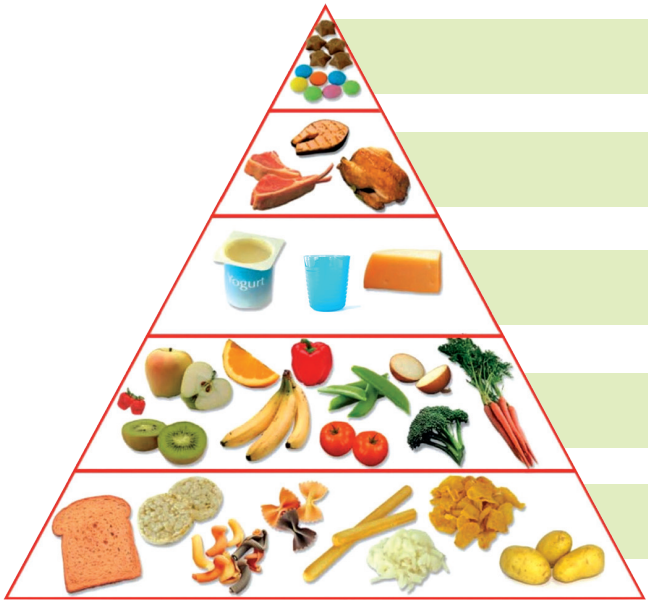


Seated Mountain Pose

- Calms the brain and increases attentiveness
- Gives flexibility to joints and ligaments
- Strengthens the ankles and knees

My Healthy Pyramid!

Given below is a 'Food Pyramid'. Can you name the different food groups and write their percentages in which you should include them to create your healthy diet?



You should drink water regularly—At least 8 cups of fluid per day.

SCIENCE OLYMPIAD FOUNDATION

SAMPLE PAPER SYLLABUS 2020-21

CLASS 7

NCO

SOF NATIONAL CYBER OLYMPIAD

Total Questions : 50 | Time : 1 hr.

PATTERN & MARKING SCHEME			
Section	**(1) Logical Reasoning**	**(2) Computers & IT**	**(3) Achievers Section**
No. of Questions	10	35	5
Marks per Ques.	1	1	3

SYLLABUS

Section – 1 : Verbal and Non-Verbal Reasoning.

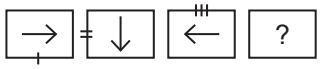
Section – 2 : Fundamentals of Computer, Evolution of Computers, Memory & Storage Devices, Using Windows 7, MS-Word(Links, Mail Merge, Macros, Exploring Styles group), MS-PowerPoint (Working with Slides Master and Themes, Advancing slides using Hyperlink and Actions, Customizing and Broadcasting Slide Shows), MS-Excel (Components of MS-Excel window, Editing and formatting cells in a worksheet, Introduction to Formulas, Sorting and filtering data, Macros, Features of Insert and Page layout tabs), Programming in QBasic, Internet & Viruses, Networking, Latest Developments in the field of IT.

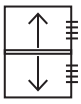
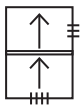
Section – 3 : Higher Order Thinking Questions - Syllabus as per Section – 2.

Questions are based on Windows 7 and MS-Office 2010.

LOGICAL REASONING

1. Which of the following options will continue the given series?



(A) 
(B) 
(C)
(D)

2. In a certain code language, if TOGETHER is written as RQEGRJCT, then how will PAROLE be written in same language?

(A) NCPQJG (B) NCQPJG
(C) RCPQJK (D) RCTQNG

3. In the given figure, the triangle represents girls, square represents sportspersons and circle represents coaches. Which of the following alphabet reperesents girls who are sportspersons but not coaches?

(A) P
(B) Q
(C) R
(D) S

4. Five boys A, B, C, D and E are standing in a row. A is between C and D and B is between D and E. Which of the following pairs represents the boys standing at both the ends?

(A) C, B (B) E, C
(C) E, A (D) A, C

5. A man goes towards East ive kilometres, then he takes a turn towards right and goes ive kilometres. He again takes a turn towards right and goes ive kilometres. In which direction is he now with respect to the starting position?

(A) East (B) North
(C) West (D) South

COMPUTERS AND INFORMATION TECHNOLOGY

6. MBP is a short form for a famous high end notebook from Apple. It is called _____.

(A) Macintosh Book Pro
(B) Mac Book Programmable
(C) Mountain Book Pro
(D) MacBook Pro

7. You can join an Active Directory domain in which of the following Windows 7 versions?

(i) Windows Home Edition
(ii) Windows Professional Edition
(iii) Windows Ultimate Edition
(iv) Windows Enterprise Edition

(A) Only (i) and (ii) (B) Only (iv)
(C) Only (ii), (iii) and (iv)
(D) All of these

8. The function of 'Wrap Text' icon in MS Excel is used to _____.

(A) Join selected cells into one larger cell
(B) Rotate text to a diagonal angle
(C) Make all content visible within a cell by displaying it on multiple lines
(D) Highlight interesting cells

9. What is Microblog?

(A) It is a combination of instant messaging and content production.

(B) A blog which is an online diary or commentary written by an individual.

(C) A blog that creates micro proxy.

(D) All of these

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10. A browser is an interactive program that permits a user to view web pages on the computer. The browser performs which of the following services?

(A) Connecting to the source computer whose address is specified

(B) Requesting new page from the server

(C) Receiving new page

(D) All of these

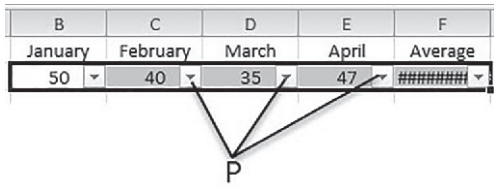
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11. Modern Computers compared to earlier computers are _____.

(A) Faster and larger (B) Less reliable

(C) Larger and stronger (D) Faster and smaller

12. The arrows indicated by 'P' in the given image are called _____ in MS-Excel 2010.



(A) Filter switches (B) Data switches

(C) Form switches (D) Label switches

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13. Match the virus types given in Column-I with their corresponding examples given in Column-II

	Column-I		Column-II
(a)	Macro Virus	(i)	Lamer Exterminator
(b)	Boot Sector Virus	(ii)	Natas
(c)	Polymorphic Virus	(iii)	Melissa

(A) (a)-(iii), (b)-(i), (c)-(ii)

(B) (a)-(i), (b)-(ii), (c)-(iii)

(C) (a)-(ii), (b)-(i), (c)-(iii)

(D) (a)-(iii), (b)-(ii), (c)-(i)

ACHIEVERS SECTION

14. Match the following output devices given Column-II.

	Column-I		Column-II
(a)	Voice Response System	(i)	It produces audio output by selecting an audio output from a set of pre-recorded audio response.
(b)	Voice Reproduction System	(ii)	It enables a computer to tal to a user.
(c)	Speech Synthesizer	(iii)	It converts text information into spoken sentences.

(A) (a)-(ii), (b)-(i), (c)-(iii)

(B) (a)-(i), (b)-(ii), (c)-(iii)

(C) (a)-(iii), (b)-(ii), (c)-(i)

(D) (a)-(i), (b)-(iii), (c)-(ii)

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15. Which of the following QBASIC codes will produce the given output?

Output:

1

2

3

(A)
```
FOR × = 1 TO 3
PRINT ×
NEXT ×
```

(B)
```
FOR × = 1 TO 5
PRINT ×
NEXT ×
```

(C)
```
FOR × = 1 TO 3
PRINT ×
EXIT FOR
NEXT ×
```

(D)
```
FOR × = 1 TO 3
PRINT ×
EXIT FOR
MORE ×
```

SPACE FOR ROUGH WORK

ANSWERS

1. (A) 2. (A) 3. (B) 4. (B) 5. (D) 6. (D) 7. (C) 8. (C) 9. (A) 10. (D) 11. (D) 12. (A) 13. (A) 14. (A) 15. (A)



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