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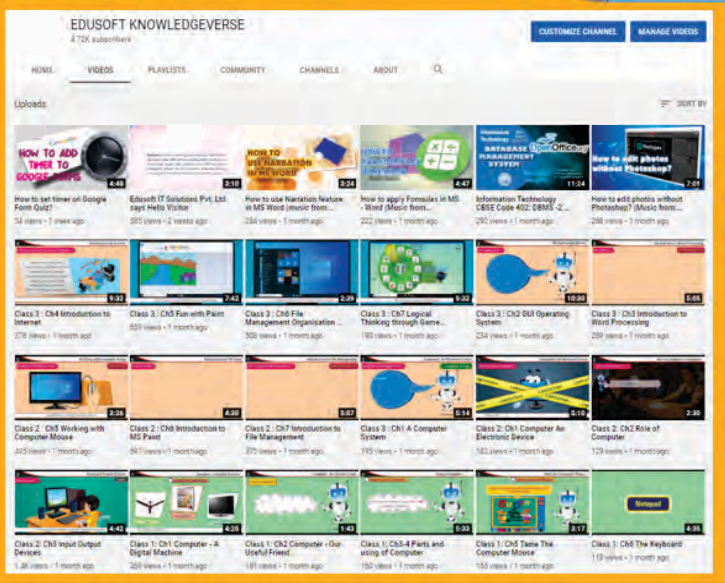

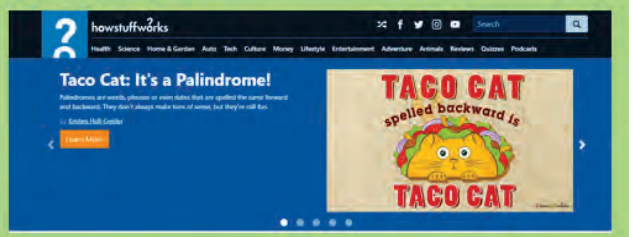

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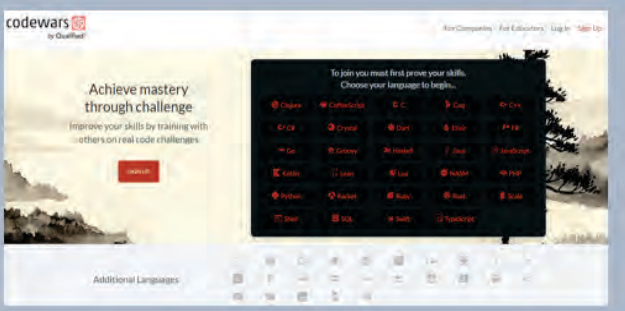


Database Management System

Dear Students,
You have learnt about data management in spreadsheet. Now let us look at database management system.

Ok Teacher,
We are keen to explore the features and benefits of a database management system.

Storing data and retrieving information has been a necessity of all businesses. Data can be anything such as, name of a person, a number, images, sound, etc. For example, Ravi, 4, student, etc. When the data is processed and converted into a meaningful and useful form, it is known as information.

For example, Ravi *is* 4 *years old and he is a* student is information.

Earlier, the data was stored manually in the form of files, books and ledgers. Storing data and retrieving information from them was a very tiring and time-consuming task. With computers, this problem has been resolved. Computers have replaced paper, files and ledgers as the principal media for storing important information. Computers help manage and organize the data so that useful information can be accessed easily and efficiently.

A database is a collection of related data from which users can efficiently retrieve the desired information. A database can be a simple collection of text data in a simple tabular form to a complex collection of images, audio or video.

Database Management System

DBMS is a collection of programs that enables users to create, maintain database and control all the access to the database. The primary goal of the DBMS is to provide an environment that is both convenient and efficient for user to retrieve and store information.

Some popular database management systems are Microsoft Access, Microsoft SQL Server, MySQL, MongoDB, Oracle DB, IBM DB2, SAP Sybase ACE, Teradata, Informix, SQLite etc.

The basic concepts behind a DBMS are:

a) Specification of data types, structures and constraints to be considered.
b) Storing the data and manipulating it as required.
c) Querying the database to retrieve desired data.
d) Updating the content of the database.

Need for Database Management System

Database approach came into existence due to the drawbacks and limitations of file processing system. In file processing systems; updating, deleting and maintaining the data is difficult. A number of application programs are written by programmers to maintain the data. In the database approach, the data is stored at a central location and is shared among multiple users. Thus, the main advantage of DBMS is centralization of data.

Advantages of Database Management System

a) **The ability to update and retrieve data:** This is the fundamental feature of a DBMS. Without the ability to view or manipulate data, there would be no point to using a database system. Updating data in a database includes adding new records, deleting existing records and changing information within a record.

b) **Support Concurrent Updates:** Concurrent updates occur when multiple users make updates to the database simultaneously. Supporting concurrent updates is also crucial to database management as this ensures that updates are made correctly. Otherwise it would lead to the loss of important data and/or inaccurate data stored.

c) **Recovery of Data:** DBMS provides ways to backup and recover database. There are times computers may crash, a fire or other natural disaster may occur, or a user may enter incorrect information invalidating or making records inconsistent.

d) **Security:** To prevent unauthorized access to the database, DBMS uses features like encryption, authentication, authorization and views to provide security to the database.

e) **Data Integrity:** Data integrity is a set of rules that DBMS provides to see that data incorrect or inconsistent data is not stored.

f) **Controlled data redundancy:** During database design, various files are integrated and each logical data item is stored at central location. This removes replicating the data item in different files, and ensures consistency and saves the storage space.

g) **Data sharing:** The data stored in the database can be shared among multiple users or application programs. Due to shared data, it is possible to integrate new applications without having to create any additional data or with minimal modification.

h) **Ease of application development:** The application programmer needs to develop the application programs according to the users' needs. The other issues like concurrent access, security, data integrity, etc., are handled by the DBMS itself. This makes the application development an easier task.

Application Areas of Database System

Database systems support businesses of almost every nature now a days. Some of the most common database applications are listed here.

- **Travel Industry:** Airlines, railways, hotels and cab industry use online databases for reservation, room bookings and for displaying the schedule information.
- **Banking & Finance:** Databases are used for storing information such as sales, purchases of stocks and bonds or data useful for online trading, customers, accounts, loans, and other transactions.
- **Education:** Schools and colleges use databases for course registration, result, and other information.
- **E-commerce:** Integration of heterogeneous information sources (for example, catalogues) for business activity such as online shopping, booking of holiday package, consulting a doctor, etc.
- **Health Care Industry:** Databases are used for maintaining the patient health care details.
- **Digital libraries & publishing:** Databases manage bulk text & multimedia data.
- **Human resources:** Organizations use databases for storing information about their employees, salaries, benefits, taxes, and for generating salary cheques.

Relational Database

Relational databases store the data in one or more tables called relations.

Table

A Table is a collection of data related to a single topic and a database is a collection of tables. A table organizes the information about a single topic into rows and columns.

AuthorCode	AuthorName
A001	Ken Follet
A002	John Grisham
A003	Tom Clancy
A004	Frederick Forsyth

AuthorCode	BookCode	Title
A001	B001	Eye of the Needle
A003	B002	The Hunt for Red October
A004	B003	The Day of the Jackal
A001	B004	The Third Twin
A004	B005	The Cobra
A002	B006	The Firm
A003	B007	Clear and Present Danger
A002	B008	The Innocent Man

Parts of a Table

- **Columns:** The columns of a table are also called attributes. The column is the vertical part of a table.

- **Rows:** This is the horizontal part of the table. One row represents one record of the table. The row of a table is also called tuple.
- **Cell:** Cell is a small rectangular box that contains a value in the table. It is an intersection point of row and column.
- **Degree:** The number of attributes in a table is called the degree of the table. Degree of the table Author is 2 while that of the table Book is 3.
- **Cardinality:** The number of rows in the table is called its cardinality. Cardinality of the table Author is 4 while that of table Book is 8.

Tables are related in such way that information is taken out from them. For example, consider the following 2 tables. Here, the tables are related on the basis of common field AuthorCode.

Table: AUTHOR

AuthorCode	AuthorName
A001	Ken Follet
A002	John Grisham
A003	Tom Clancy
A004	Frederick Forsyth

Table: BOOK

AuthorCode	BookCode	Title
A001	B001	Eye of the Needle
A003	B002	The Hunt for Red October
A004	B003	The Day of the Jackal
A001	B004	The Third Twin
A004	B005	The Cobra
A002	B006	The Firm
A003	B007	Clear and Present Danger
A002	B008	The Innocent Man

Primary Key and Foreign Key

Primary Key

Notice that table Author contains exactly one record of each author. So, each record in the table Author is unique. What if two authors have same name? What if, there were two John Grishams?

To handle such cases, records are given codes. One field of the table is created to store unique values. Each such unique value identifies the record uniquely. Such field is called Primary key field. *Primary key uniquely identifies each record in a table.*

In table Author, the field AuthorCode is primary key field.

In some cases, combination of two or more fields is used as primary key.

Properties of Primary Key

- It should always store some value. No null values are allowed in primary key field.
- It should store unique value.
- Once decided, the value must not change as long as that record remains in the database.

AuthorCode	AuthorName
A001	Ken Follet
A002	John Grisham
A003	Tom Clancy
A004	Frederick Forsyth

Table containing a primary key is also called *Parent table*.

What is a null value?

Do not confuse null value with zero. Zero is also a value.

Null value means absence of data. For example, if you have not appeared in a subject during an exam then in the database, for that subject, table will store NULL for you, not zero.

Foreign Key

Now, let us have a look at table Book. In this table, can we keep the Author Codes unique? No. We cannot. The reason is that one author may have written many books so, for that author, the value of the field AuthorCode will repeat. Refer to the table shown.

So, in the table Book, the field AuthorCode is not a primary key. There is no field in the table Book as primary key.

It is not necessary to have primary key in every table in a database.

But the field AuthorCode is helping in relating this table with the table Author. Such fields are called foreign key fields. The field AuthorCode in the table Book is foreign key.

A foreign key in child table refers to a matching primary key value in parent table.

AuthorCode	BookCode	Title
A001	B001	Eye of the Needle
A003	B002	The Hunt for Red October
A004	B003	The Day of the Jackal
A001	B004	The Third Twin
A004	B005	The Cobra
A002	B006	The Firm
A003	B007	Clear and Present Danger
A002	B008	The Innocent Man

BOOK

Foreign key can store duplicate values. Table having a foreign key is called child table.

Query

Data is organised as several records in one or more tables. Tables store the data. One of the most important feature of the database is that we can ask questions from it. We can take out information we desire from the database. The process of looking up and taking out information from the database is called *querying* the database.

A query is used for extracting information from one or more tables. This is called *selection*.

Introduction to MS-Access

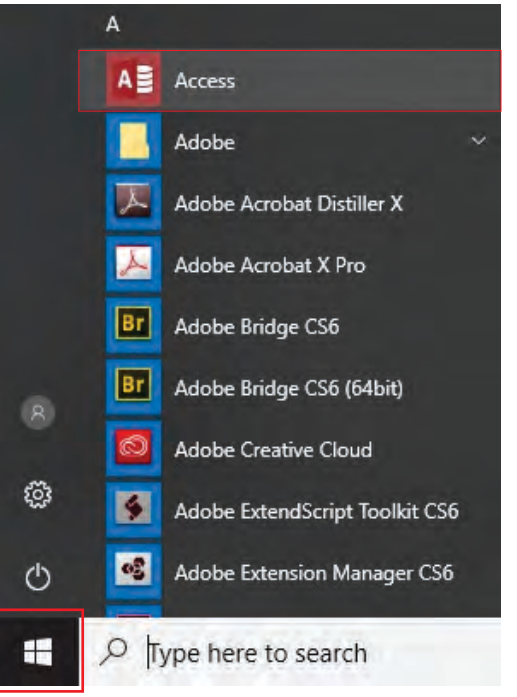
MS Access is a RDBMS (Relational Database Management System). It has many in-built features to create, organize and manipulate data. Different types of data objects like table, forms, queries, reports, etc. can be created in MS Access to add, delete, update, find and view data. Each object has a specific use in respect to add, delete, modify, update and view the data. Other popular RDBMS are Oracle, SQL Server, MySql, DB2, MemSQL, Apache Derby, Amazon Aurora etc.

Opening MS Access

Click on Start button → Access.

OR

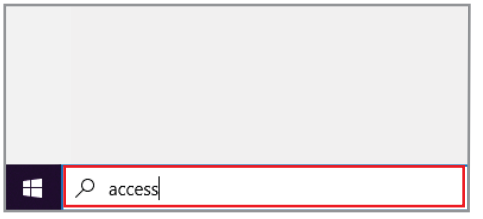
Type 'access' in the Search text box as shown here and press Enter key.

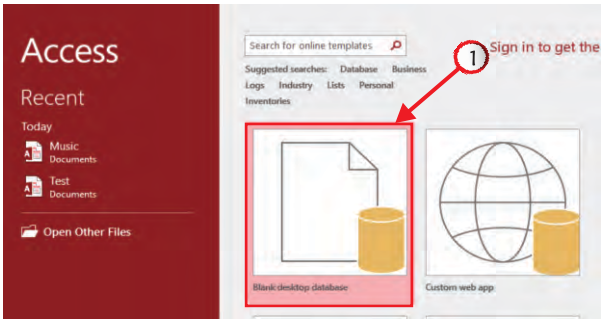


MS Office 2019

All steps are same as MS Office 2016

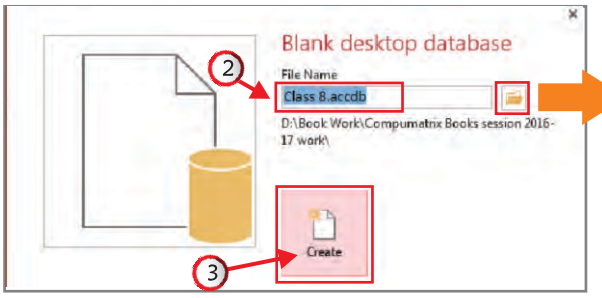
MS Access 2019 Icon

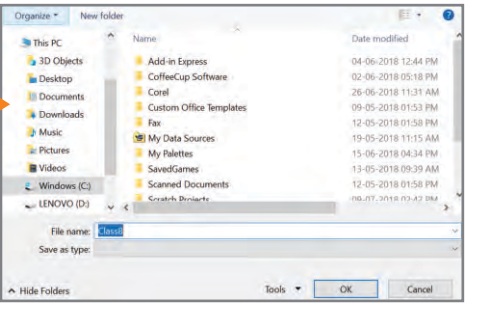


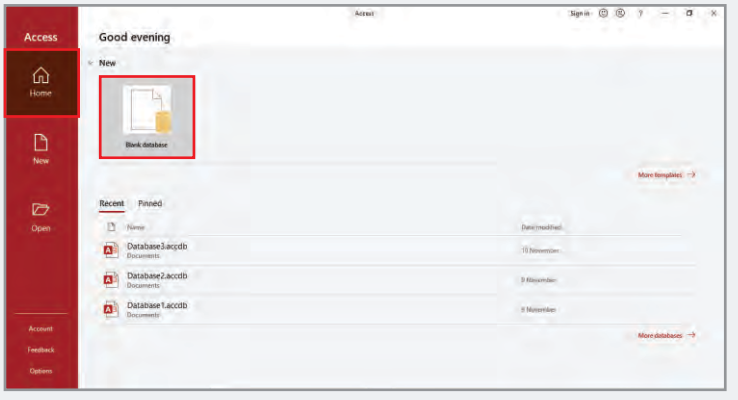


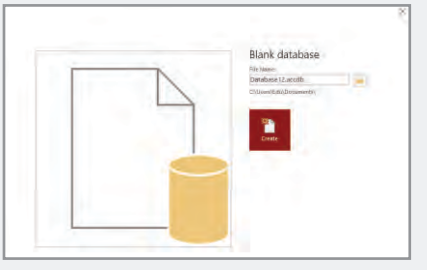
1. Click on Blank desktop database.
2. A pop- up window appears. Give a name for your file in File name box.

   You can select the location to save your file by clicking on Browse button.
3. Click on Create button.









MS Office 2019

Steps for MS Office 2019

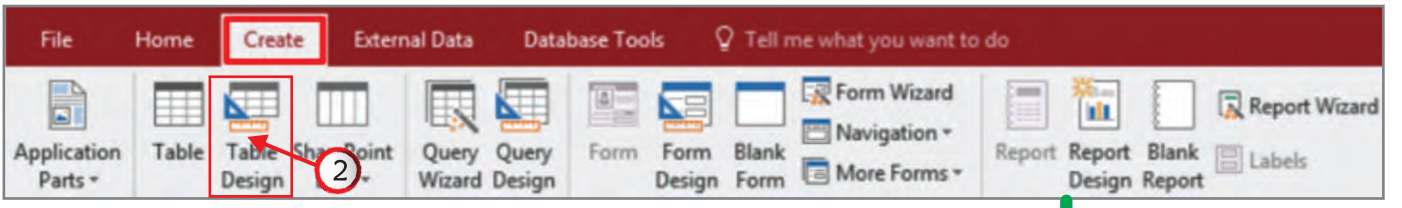
1. Click on New or Home tab → Blank Database option.
2. A pop-up window appears. Give a name for your file in File name box.
   You can select the location to save your file by clicking on Browse button.
3. Click on Create button.

The new database is created with given database name. The extension of database file in MS Access is .accdb (2007 and higher versions). Older versions are .mdb files.

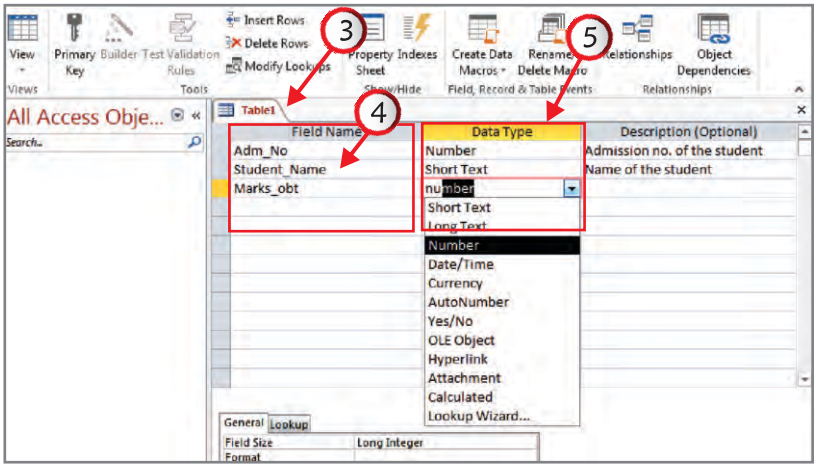
Creating Table in Design View

Tables can be created using Table View or Table Design View. Table Design view gives complete control to the user in designing the structure of the table by specifying the field names, data types and the properties of each column. The steps to create a table using design view are:

1. Click on Create tab.



2. In Tables group, click on Table Design.
3. Table creation window appears.
4. Type the column name under Field Name section.
5. Set a suitable data type for field name in Data Type section.



Note

Data Type: The Data Type describes the type of value that can be stored in a column. Some of the common data types are explained below:

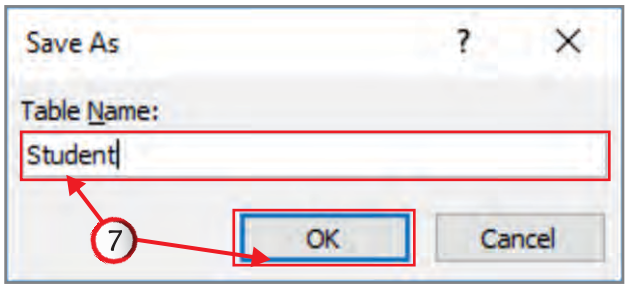
Data Type	Description
Short/Long Text	It stores the text which might be an alphabet, a number or both.
Number	It stores the numbers that can be used for calculations.
Auto Number	It stores auto-generated numbers and automatically increases the value.
Date/Time	It stores the date and time values in different formats.
Currency	It specifies the currencies and displays them in different formats.
Yes/No	It stores only those values which have two answers: True/False.
OLE Object	It stores the data from other software like Word, Excel etc.

Note

The default Data Type for a field is Short Text, with the field size '255'.

6. You can also give the description of the field in Description section. It helps a new user of the table to understand the aim of a field.
7. Click on Save button on the Quick Launch Toolbar. Or, click on File → Save option.

   In the Save As dialog box, type the table name and click on OK button.



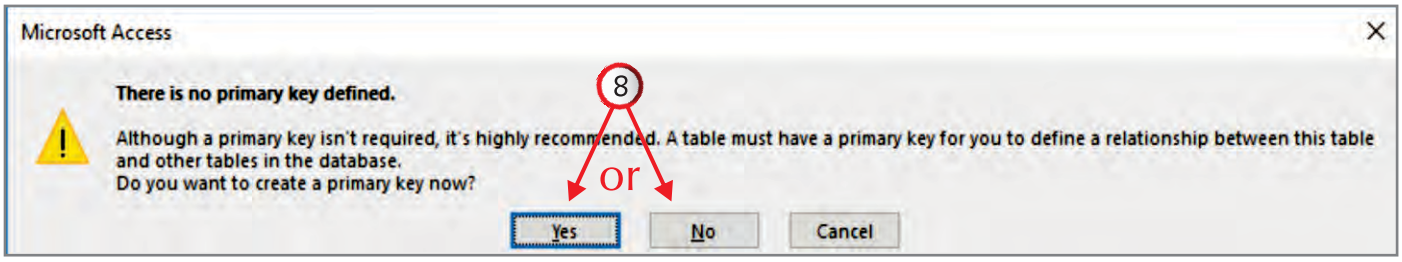
MS Office 2019

All steps are same as MS Office 2016.

8. A warning message appears to set the primary key in the table.
   - If you don't want to create a primary key, click on No button.
   - If you want to crate a primary key, click on Yes button. It creates a primary key on a column on its own.

Shortcut

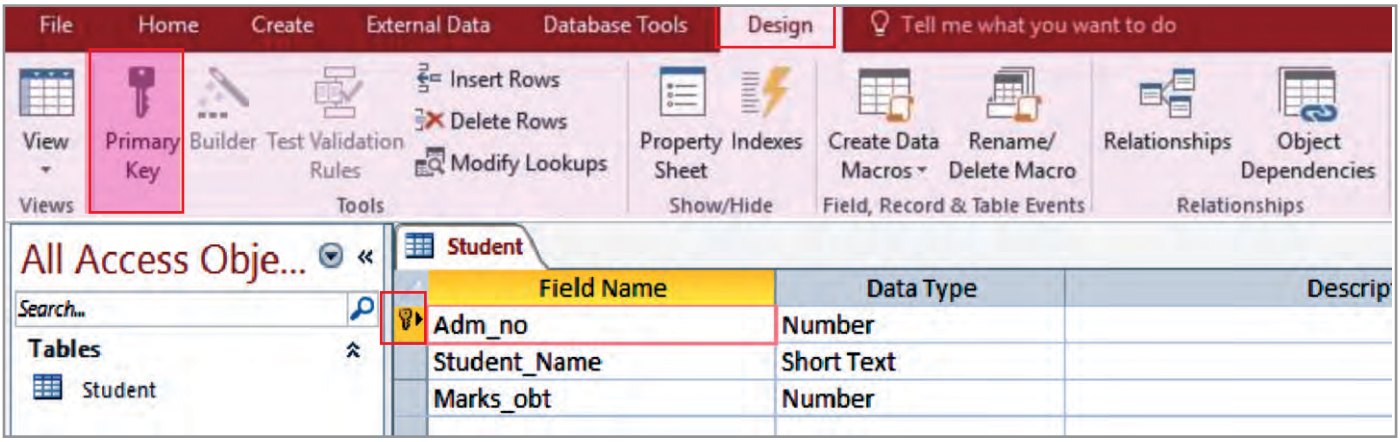
To save a table:
Ctrl + S



Setting primary key manually

1. Select the desired field. On the Design tab, in Tools section, click on Primary Key.

A 'key' icon appears before the field name which is now set as primary key.

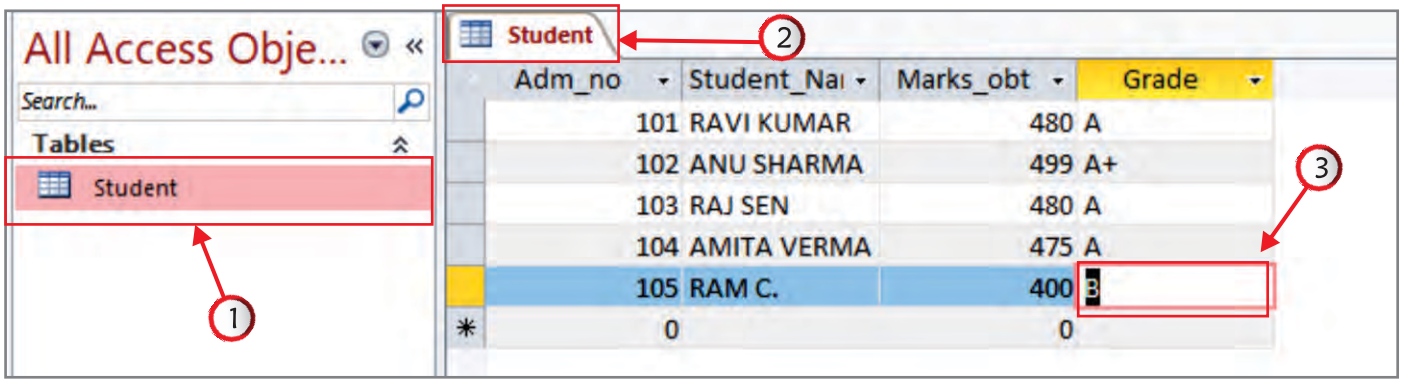


Enter data in a Table

The steps to enter data in a table are:

1. In the navigation pane, under Tables section, double-click on the desired table name.
2. The table opens in the working area, in a tab.
3. Click on any cells and use arrow keys to browse in the table. Go to the last blank row and enter data. To start a new row, press Enter key.

When you close the table, all the data entered by you will be saved automatically.



Glossary

Data	:	Data can be defined as a raw fact with an incomplete meaning.
Database	:	A database is a collection of related data.
DBMS	:	Database Management System.
Primary Key	:	Primary key uniquely identifies each record in the table.
Foreign Key	:	A foreign key refers to a matching primary key value in parent table.
Table	:	Collection of related data for any object, transaction or event.
Query	:	A tool to extract desired information from the tables in a database.

- *DBMS is a collection of programs that enable users to create, maintain database and control all the access to the database.*
- *In relational database, the data and relations between them are organized in tables.*
- *Table is a collection of data related to a single topic.*
- *Primary key identifies a record uniquely in a table.*
- *Foreign key in a child table refers to a matching primary key value in a parent table.*
- *A query can be used for selection of information in one or more tables.*
- *Access database objects are Table, Queries, Forms, Reports, Macros and Modules.*
- *MS Access is a RDBMS (Relational Database Management System).*
- *The extension of database file in MS Access is .accdb (2007 and higher versions). Older versions are .mdb files.*
- *Tables can be created using Table view or Table Design view.*
- *The Data Type describes the type of value that can be stored in a column.*

Exercise

A. Choose the correct answer.

1. The term _____ can be defined as a raw fact.
   a) Data ☐ b) Database Administrator ☐
   c) Information ☐ d) All of these ☐
2. Primary key uniquely identifies each _____ in a table.
   a) Record ☐ b) Row ☐
   c) Both a) and b) ☐ d) Field ☐
3. The process of taking out information using a query is called _____.
   a) Extraction ☐ b) Selection ☐
   c) Manipulation ☐ d) Formation ☐
4. A foreign key in _____ table refers to a matching primary key value in _____ table.
   a) parent, child ☐ b) primary, foreign ☐
   c) foreign, primary ☐ d) child, parent ☐
5. A query can be created using _____.
   a) Query Wizard ☐ b) Query Design view ☐
   c) Both a) and b) ☐ d) None of these ☐

B. Fill in the blanks.

Files, Fields, Field, .mdb, Data, .accdb

1. "Amit", "15", "Male" - these are examples of _____.
2. The extension of MS Access 2007 and above files is _____ and older versions are _____ files.
3. It is easier to update, delete and maintain data in a database than in _____.
4. Both primary and foreign key concepts refer to the _____ of a table.
5. We decide data type for a _____ while creating a table.

C. Tick (✓) the correct statement and cross out (X) the incorrect one.

1. A table is a collection of related data. ☐
2. Relational databases store the data in one or more tables called *relations*. ☐
3. Foreign key should not store duplicate values. ☐
4. The process of querying tables is called *selection*. ☐
5. A query works only on one table. ☐
6. Degree refers to the number of rows in a table. ☐

D. Answer the following questions.

1. Define the terms *Data* and *Information*.

_____

_____

2. What is the significance of a DBMS?

_____

_____

3. What is the use of a table and a query in a database?

_____

_____

4. What is the significance of Primary key in a database?

_____

_____

5. Explain foreign key with a small example.

_____

_____

6. Describe any 5 data types in MS Access.

_____

_____

Lab Activity

1. Your school library runs on the database of books. Try to find out how your librarian uses that database.
2. Design a table BOOK with fields namely: Book_No, Book_Title, Author.

   Design another table BOOK_ISSUE with the fields namely: Book_No, Student_name, Issue_Date, Return_Date.

   Now, decide the primary key and foreign key in the above tables.
3. Create the above tables in MS Access in a database named SCHOOL_LIBRARY.

Teacher's Signature : _____ *Teacher's Remark :* ☆☆☆☆☆

Beyond the Book

https://en.wikipedia.org/wiki/Database
https://www.geeksforgeeks.org/dbms/

Watch & Learn

www.eduitspl.com
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Teacher Corner

The analogy of books organised in the library is a good example for explaining DBMS concepts. Students can be given a practical task to create a sample database showing books issued to them.

Working with MS Access

Dear Teacher,
We know database basics and how to create table in MS Access. What more is there in MS Access?

Dear Students,
Table creation is the fundamental part in MS Access. Let us learn more we can do with it.

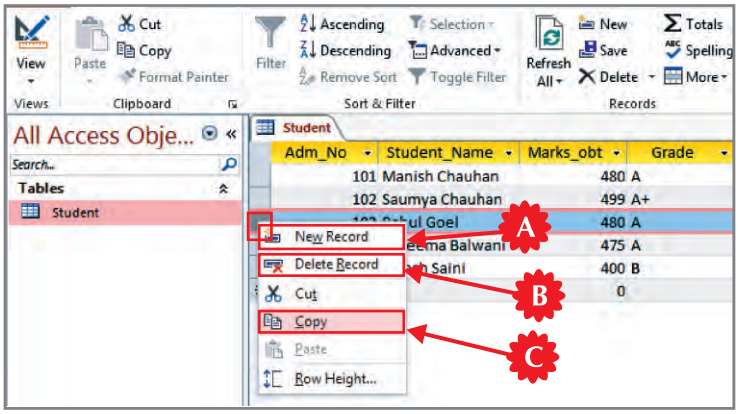
Now we know that MS Access is a RDBMS (Relational Database Management System). It has many in-built features to create, organize and manipulate data. Different types of database objects like table, forms, queries, reports, etc. can be created in MS Access to add, delete, update, find and view data.

We also know how to create a database and tables using MS Access and how to insert records in a table.

Let us learn in detail the other features of database using MS Access.

Working with Table

Add, Delete, Copy Record in Tables



First, right-click on row-header of the record then,

A. To add a new record: Select New Record option.

B. To delete a record: Select Delete option.

C. To copy a record:

1. Select Copy option.
2. Right-click on row-header of the new/blank record and select the Paste option.

- If you paste the data in existing row, it will replace the data with the new one.

Do it Yourself

Create a table to store the details of 5 of your friends (Name, City, Hobbies) in MS Access.

1. Cut the first record and paste it as the last record.
2. Copy the third record and paste it after the first record.

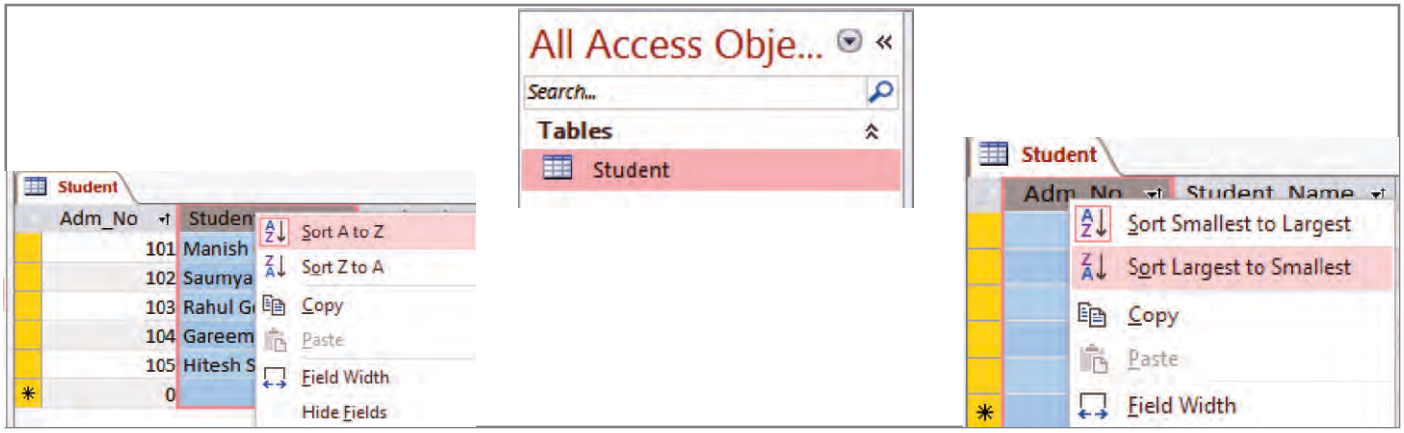
Sort the data in table

Data in the table can be sorted in ascending or descending order alphabetically (A > Z/ Z > A) or numerically (Smallest to largest/ Largest to smallest) . The steps to sort the data in a table are:

1. In the navigation pane, under Tables section, double-click on required table.
2. In the table, click the drop-down arrow beside the desired field name.
3. Click on:

   For Non-numeric data: Sort A to Z/Sort Z to A.

   For Numeric data: Sort smallest to largest/Sort largest to smallest.



Filtering Data in a Table

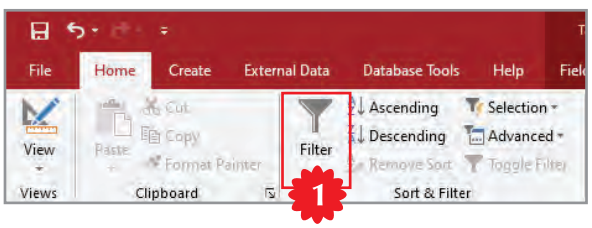
Options in Sort & Filter group of Home tab allow filtering table data in different ways.

For simple filtering,

1. Click the drop-down arrow beside the desired field.

   Or

   Select the field and click on the Filter option in Sort & Filter group.

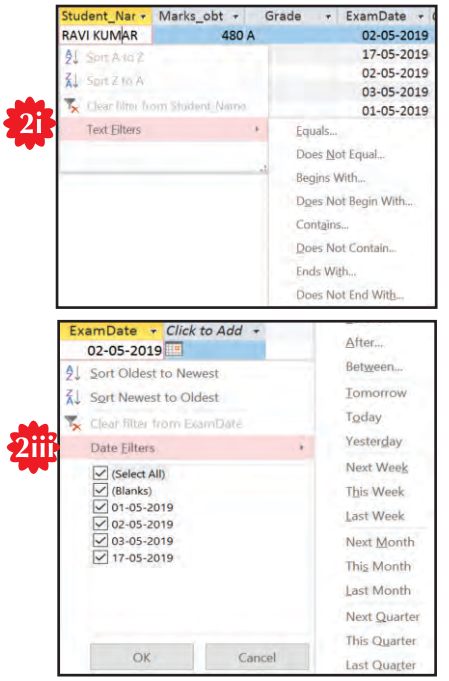


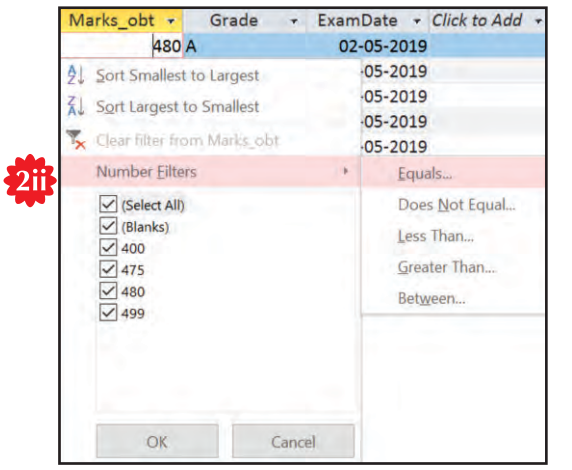
2. In the drop-down below the field, select any 3 of the following:

   i. Text Filters: These are applied on a field which contains text type of values.

   ii. Number Filters: These are applied on a field which contains numeric values.

iii. Date Filters: These are applied on a field which contains dates.



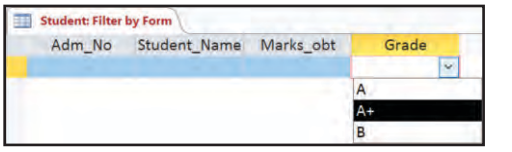


MS Office 2019

All steps are same as MS Office 2016.

Filter By Form

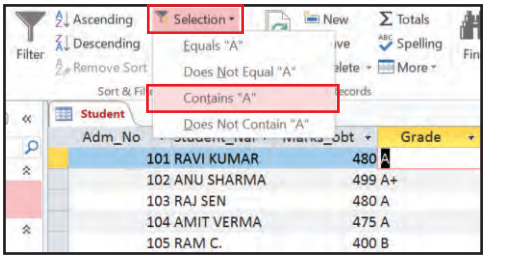
This option allows to open the fields in the table as drop-down lists and select the value on the basis of which records will be filtered.



1. Select Filter By Form option in Advanced drop-down.
2. Table will open up. Go to the desired field and click the drop-down list below it.
3. Select the desired value.

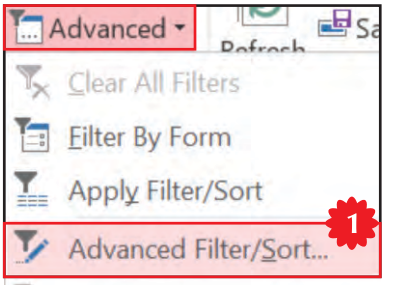
Filter By Selection

1. Select the field on which you need to filter the records.
2. Click on the Filter option in Sort & Filter group.
3. Select the desired criteria.



Advanced Filter

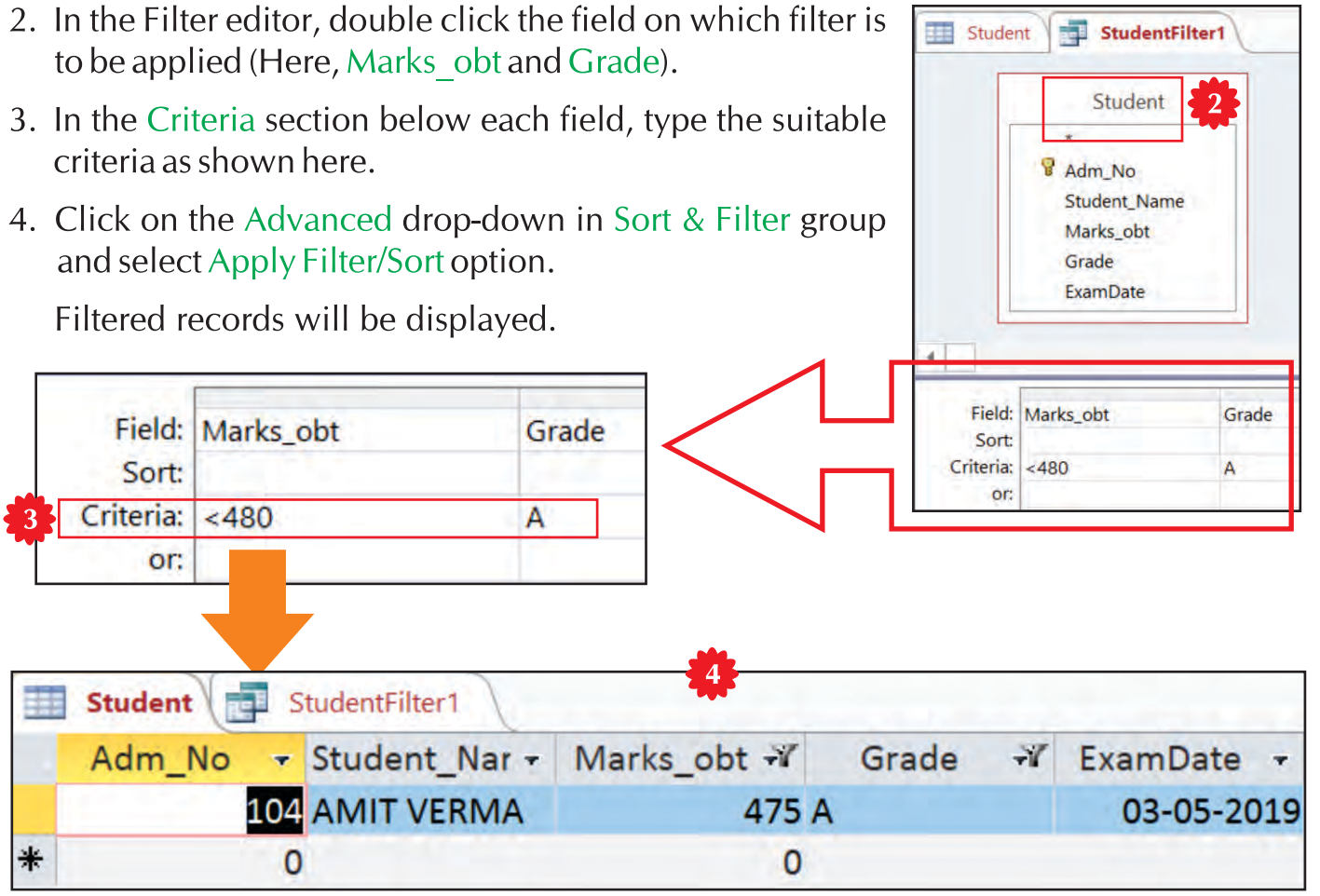
This option opens up a filter editor where you can apply one or more criteria on the selected fields to filter the desired records. For example, to list the records where field Grade contains value A and field Marks_obt contains values less than 480 following are the steps:



1. Click on the Advanced drop-down in Sort & Filter group and select Advanced Filter/Sort option.

2. In the Filter editor, double click the field on which filter is to be applied (Here, Marks_obt and Grade).
3. In the Criteria section below each field, type the suitable criteria as shown here.
4. Click on the Advanced drop-down in Sort & Filter group and select Apply Filter/Sort option.

   Filtered records will be displayed.



Working with Queries

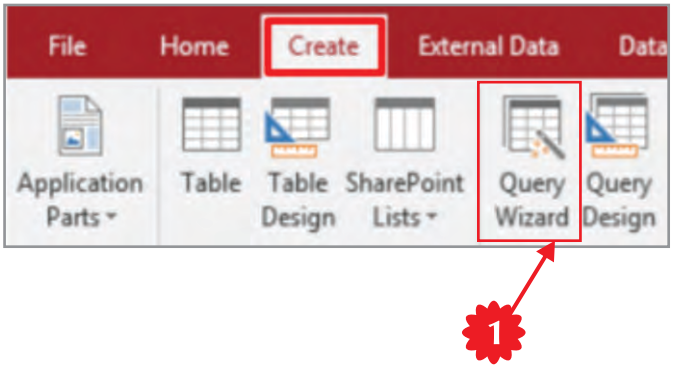
We have already learnt that queries are used to take out desired information from the tables in a database. In MS Access, queries can be used not only to get information but also to delete and update the tables.

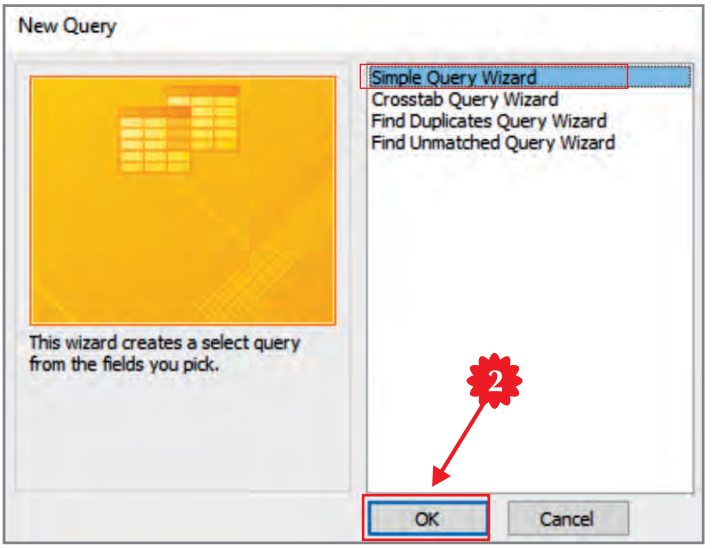
Creating Query Using Query Wizard

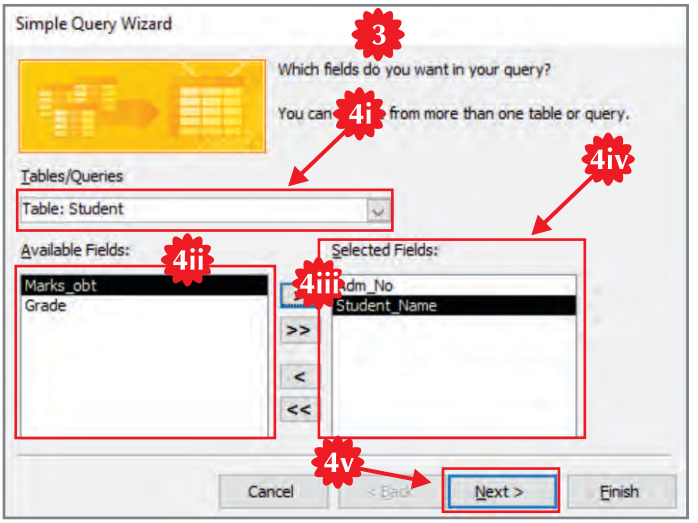
The steps to create a query using Query Wizard are:

1. On Create tab, in Queries group, click on Query Wizard.
2. The New Query dialog box appears. The Simple Query Wizard option is selected. Click on OK button.
3. The Simple Query Wizard dialog box appears. Select the table/query, from Table/Query list box, on which you want to create a query.
4. Now choose the fields in Available fields box, which you want to add in query e.g. Adm_no, Student_Name and move them to Selected fields box using arrow buttons. Click on Next button.

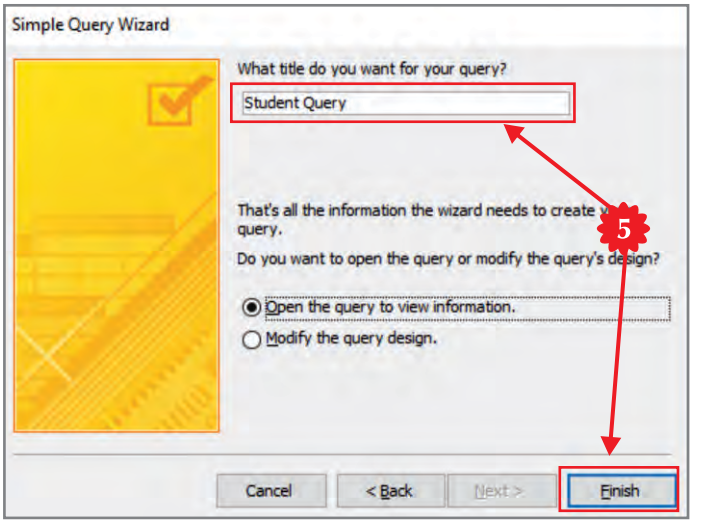
5. Give the name of the query and click on Finish button.



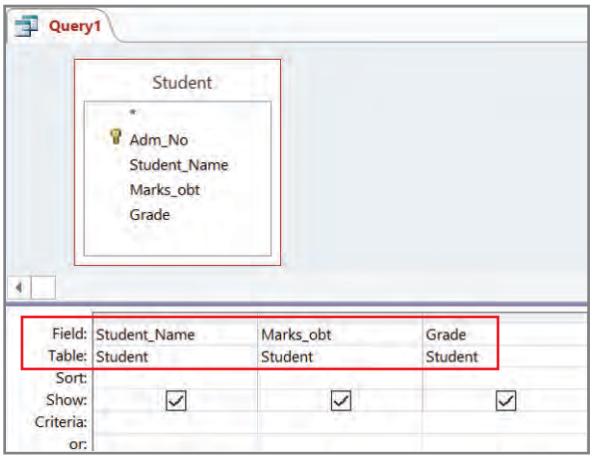




Select the fields



Give the query's name



Note

To add all the fields of the table in the query, drag the * (asterisk) in the table down to the Field section of the grid. * refers to all the fields in a table.

MS Office 2019

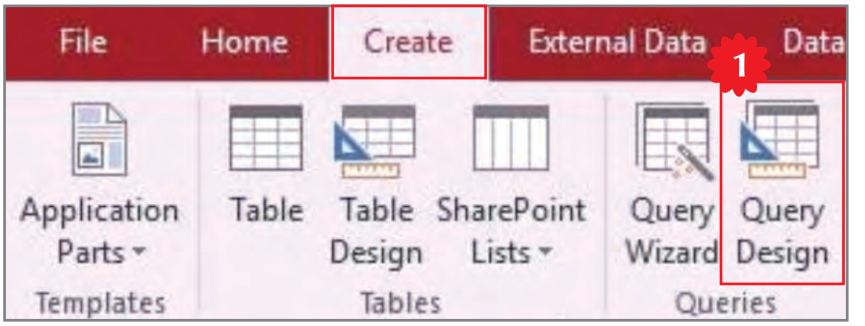
All steps are same as MS Office 2016.

Creating Query in Query Design View

Query design gives complete control to the designer in designing the query. We can use query design to apply formulas for calculations. The distinct feature of query design is that it allows to apply criteria for taking out the data which matches the criteria.

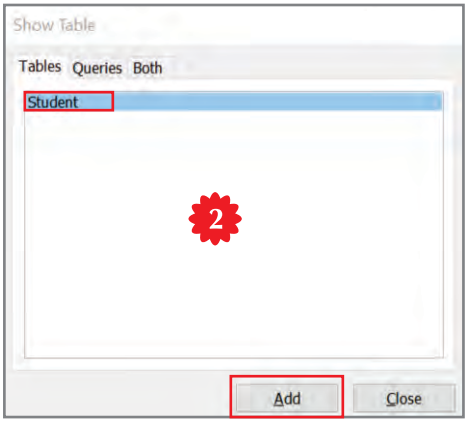
Let us learn how to create a simple query in Query Design View.

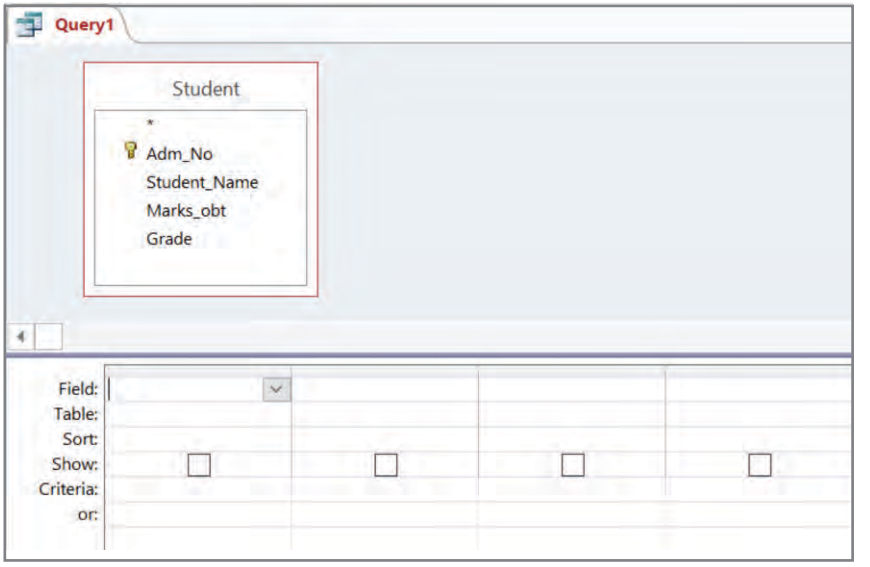
1. Under Create tab, in Queries group, click on Query Design.
2. In Show Table pop-up, select the table Student and click on Add button. Then click on Close button.



The table Student will be added to the Query Design.

In Query Design, the upper part shows all the tables added to it and the lower part shows a grid to add fields, table names, sections for sorting, show/hide field and criteria to apply.





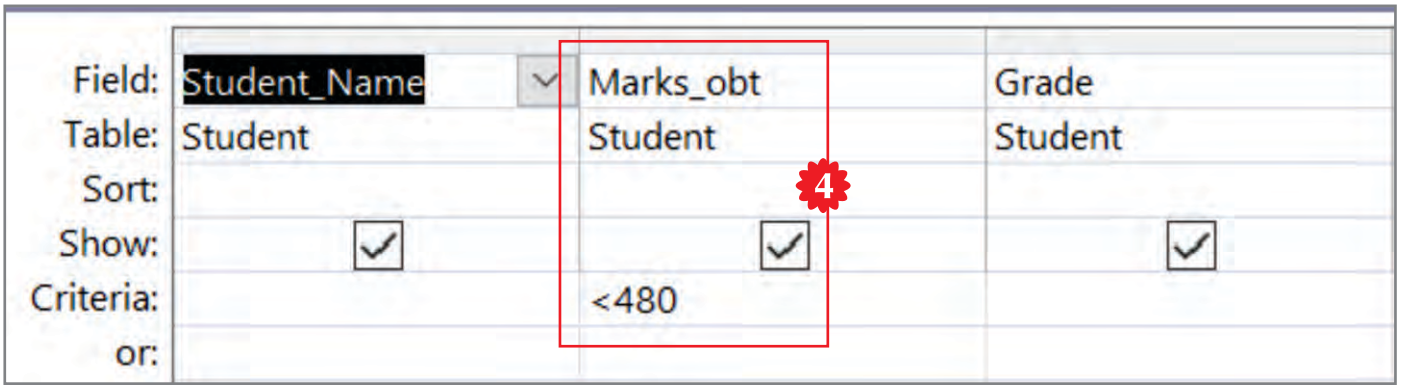
3. To add the fields in the query grid below do any one of the following:
   a. Drag the desired field from the table down to the Field section of the grid.
   b. Double click on the desired field in the table.
   c. Open the drop-down list of the Field section and select the desired field.

So, in our example, let us drag-drop fields Student_Name, Marks_obt and Grade as shown here.

Adding Criteria in the Query

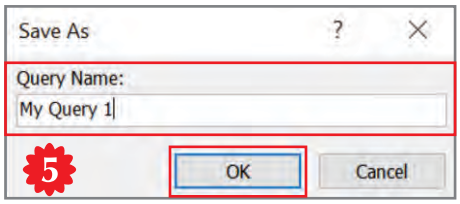
Criteria simply means rule to filter. Criteria depends on our requirement. For example, if we need to display the details of only those students who obtained marks less than 480, which field should we check? Marks_obt.

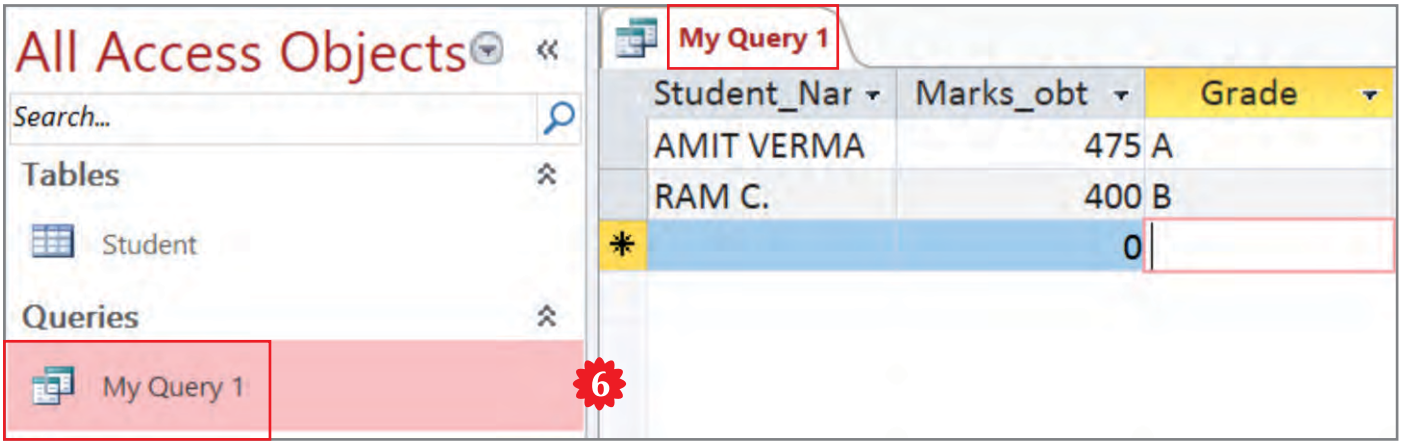
4. So, below the field Marks_obt, in the Criteria section, type < 480 as shown here.



5. Close the query and click Yes to save it. Type the query name as My Query 1 and click on OK.

6. Double click on the query name Student Query to see the output.





Querying Multiple Tables

We learnt earlier that when data is stored in multiple tables then tables are related with each other on the basis of common fields.

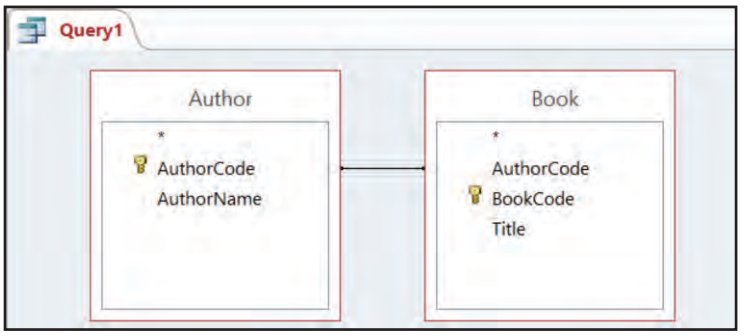
Let us take a new example to understand query on muiitple tables. Consider the two tables Author and Book given here. Let us find out which books Ken Follet has written.

AuthorCode	AuthorName
A001	Ken Follet
A002	John Grisham
A003	Tom Clancy
A004	Frederick Forsyth

AuthorCode	BookCode	Title
A001	B001	Eye of the Needle
A003	B002	The Hunt for Red October
A004	B003	The Day of the Jackal
A001	B004	The Third Twin
A004	B005	The Cobra
A002	B006	The Firm
A003	B007	Clear and Present Danger
A002	B008	The Innocent Man

Field AuthorCode is common in both the tables. It is primary key field in the table Author and hence foreign key in the table Book.

Let us see the steps to perform query on these tables.



1. Go to Create tab, Queries section and click Query Design.
2. Add both the tables in query design.

   Notice that a thread between the common fields AuthorCode is showing the relationship between the tables.
3. Now drag drop the fields AuthorName from the table Author and field Title from the table Book.
4. In the Criteria section of the field AuthorName, type Ken Follet as shown here.

Field:	AuthorName	Title
Table:	Author	Book
Sort:		
Show:	☑	☑
Criteria:	Ken Follet	
or:		

5. Save and run the query.

Since both the tables are related on AuthorCode, the book titles matching with the AuthorCode of Ken Follet i.e. A001 will be listed.

AuthorName	Title
Ken Follet	Eye of the Needle
Ken Follet	The Third Twin

Note

To remove the relationship between the tables, select the relationship thread and press Delete key on the keyboard.

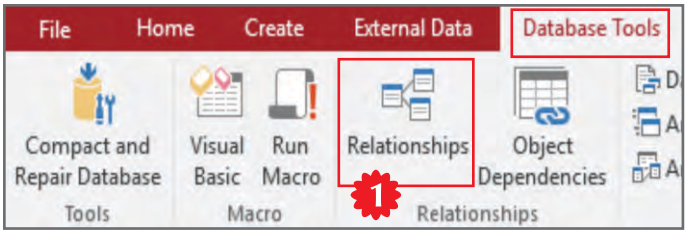
Note

A query displays the fields which have been included in it while designing it.

Queries are useful in making reports since reports also include the required data only.

Setting the Relationship Manually

Let us see how we can relate the tables manually.

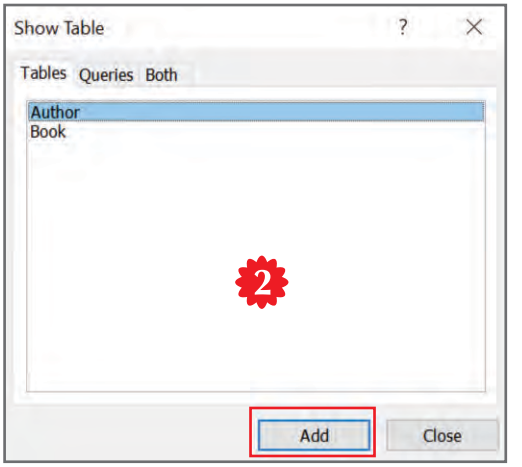


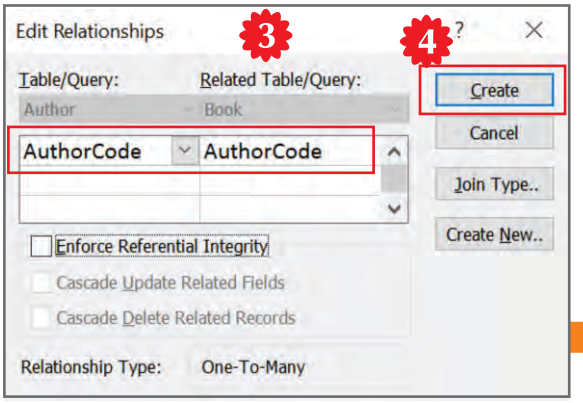
1. Under the tab Database Tools, in Relationships group, select Relationships option.

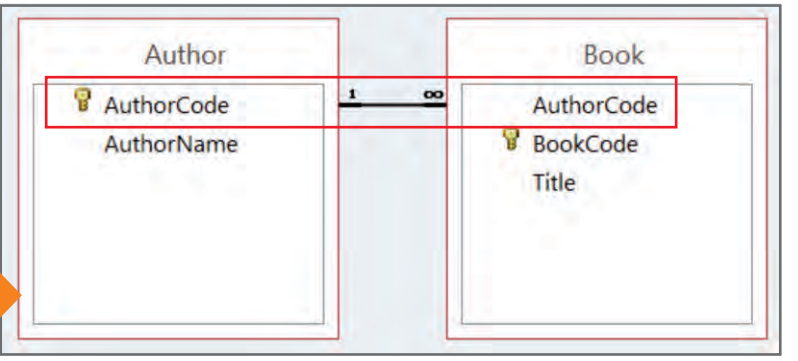
   The Relationship editor will open and Show Table dialog box will pop-up.

2. In the Show Table dialog box, add the tables Author and Book one by one to the Relationship editor and close the dialog box.
3. Click on the field AuthorCode (it is the common field in both the tables) in Author table and drag it up to the same field in table Book.

   The Edit Relationships dialog will pop-up.
4. Click on Create button. The tables will be related.







Referential Integrity

The term reference implies any value in the foreign key field in child table which is also present in the master table. Referential integrity means to ensure that correct data should be maintained in the tables.

MS Access ensures referential integrity in two ways:

1. If primary key value is changed, then matching values in the child tables will also be changed.

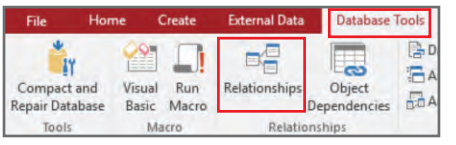
   For example, If we change any AuthorCode in the table Author, the same AuthorCode should change automatically in the table Book also.
2. The record in any table will not be deleted if a matching record is present in the related table.

   For example, If we delete the record of an author in the table Book, it will not be deleted because a matching AuthorCode is there in the table Author.

Let us try out integrity related to Update of values.

1. Under the tab Database Tools, in Relationships group, select Relationships option.

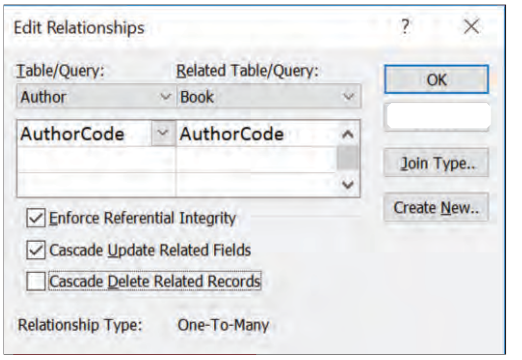
   The Relationship editor will open and show the two tables related.



2. Double click on the relationship thread between the tables.
   The Edit Relationships dialog will pop-up.
3. Select the Enforce Referential Integrity checkbox.
4. Select the Cascade Update Related Fields checkbox and click OK button.
5. Close the Relationship editor.
6. Open the table Author.
7. Change the AuthorCode of Ken Follet to A009.
8. Close the table Author and open the table Book.

What did you notice in table Book?

AuthorCode of Ken Follet books is changed to A009 in table Book also.



MS Office 2019

All steps are same as MS Office 2016.

Types of Relationship

Relationships between the two tables can be of 3 types:

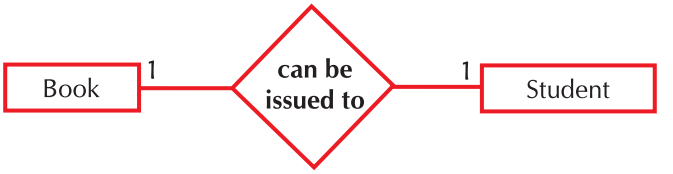
1. One to many 2. One to one 3. Many to many

One to Many Relationship: This means one record in one table has many matching records in the other related table. One is denoted by number 1 and Many is denoted by infinite (∞) sign.

For example, One author can write many books.

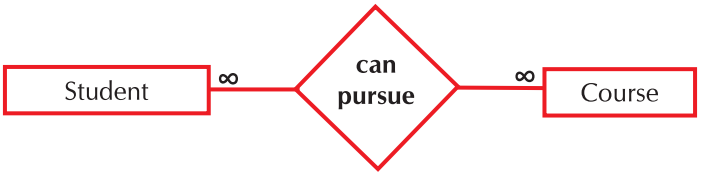
One to One Relationship: This means one record in one table has exactly one matching record in the other related table.

For example, In a school library, exactly one book can be issued to a student at a time.



Many to Many Relationship: This means multiple records in one table have many matching records in the other related table.

For example, In a college, many students can pursue multiple courses.



Glossary

RDBMS	:	Relational Database Management System.
Primary Key	:	A unique key to identify each row in a table.
Data Type	:	Describes the type of value stored in a field.
Relationship	:	Refers to the two tables related on the basis of common field.
Referential Integrity	:	A way to ensure that matching records are not affected by update or delete operations on the tables.

- *Query is used to access only desired data from tables.*
- *Design view gives full control to the user to design a query.*
- *Reference means foreign key value having matching value in the master table.*
- *Referential integrity is a way to ensure that matching records are not affected by update or delete operations on the tables.*
- *Relationships are of 3 types: one-to-many, one-to-one and many-to-many.*

Exercise

A. Choose the correct answer.

1. To filter the data in a table, following types of filters can be applied:

   a) Text ☐ b) Date ☐

   c) Number ☐ d) All of these ☐

2. _____ option opens up an editor where you can apply criteria to filter the desired records.

   a) Filter by form ☐ b) Filter by selection ☐

   c) Advanced filter ☐ d) None of these ☐

3. In Query Design, the criteria to select the data is given in _____ section.

   a) Sort ☐ b) Criteria ☐

   c) Field ☐ d) Table ☐

4. _____ data type is used to store the numerical values in MS Access.

   a) Long text ☐ b) OLE Object ☐

   c) Yes/No ☐ d) Number ☐

5. _____ data type stores data from other softwares, like Excel.

a) Number ☐ b) Currency ☐

c) Memo ☐ d) OLE object ☐

B. Fill in the blanks.

Sort A to Z, Relationship, * (asterisk), numeric, one

1. Number filter is applied on a field which contains _____ values.
2. One to _____ relationship means one record in a table has exactly one matching record in the related table.
3. Non-numeric data can be sorted in ascending order by _____ option.
4. In Query Design, _____ in the table means all the fields.
5. Referential integrity can be applied on the tables while creating _____ between them.

C. Tick (✓) the correct statement and cross out (X) the incorrect one.

1. Tables are related on the basis of common fields. ☐
2. Text filter can be used to filter out date type data also. ☐
3. Marks < 78 is an example of criteria. ☐
4. Referential integrity ensures that correct data should be maintained in the tables. ☐
5. It is necessary to set a foreign key in a table. ☐

D. Answer the following questions.

1. What is the basic difference between sorting and filtering the data?

_____

_____

_____

2. Name the 3 types of relationships in a database.

_____

_____

3. What do you mean by referential integrity?

_____

_____

_____

_____

4. What is the significance of relationship between the tables?

_____

_____

Lab Activity

Create following table in a blank database and design the queries as given. Admission Number is Primary Key in table Student. Fields Grade and Marks are Short Number type.

STUDENT		
ADMISSION NUMBER	STUDENT_NAME	GRADE
A001	RAVI GUPTA	9
A002	ANU SEN	8
A003	RAJ SHARMA	8
A004	ALKA GUHA	7
A005	SAMEER JHA	9
A006	RAM RAGHAV	7
A007	KAMAL PUROHIT	9
A008	SEEMA SINGH	8

PERFORMANCE		
ADMISSION NUMBER	TERM	MARKS
A003	TERM 1	65
A002	TERM 1	88
A003	TERM 2	76
A001	TERM 1	92
A003	TERM 2	59
A002	TERM 2	23
A005	TERM 1	87
A008	TERM 1	60
A005	TERM 2	35
A008	TERM 2	85

1. Who all are studying in Grade 8?
2. How many marks have Grade 9 students secured in Term 1?
3. How much has Alka Guha secured in both the terms?
4. List the names and Grades of the failures in any term. (Pass percentage is 60).
5. List the details of all the students in all the terms if Grade 7.
6. In which terms has Anu Sen got distinction? (Distinction is 75% or above).

Teacher's Signature : _____ *Teacher's Remark :* ☆☆☆☆☆

Beyond the Book

https://products.office.com/en-in/access
http://officeskills.org/microsoft-office-tutorials.html

Watch & Learn

www.eduitspl.com
www.youtube.com/edusoftknowledgeverse

Teacher Corner

Dear Teacher, please explain the working of queries in lab session in an stepwise manner and emphasise on the importance of relationship.

Brief Introduction to MS Access Forms and Reports

Supplement-I

Forms

A Form is a database object that can be used to create a user interface for a database application. With the help of 'forms', you can enter and view data in an easy manner.

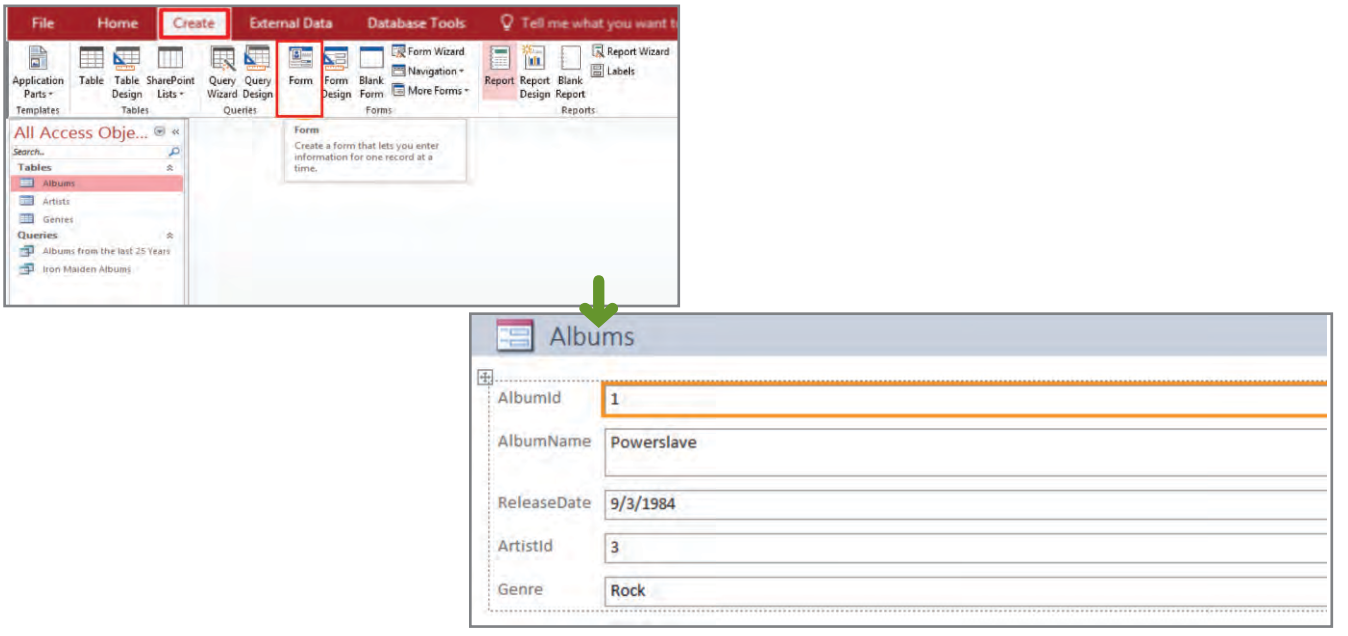
A Form is a collection of buttons, text boxes and labels. These are also known as controls. You can create forms in Access Database by various methods.

Here you will learn about creating form in two ways.

1. To create a form using Form button

The steps to create a form using Form button are:

1. In the Navigation Pane, select the table or query that contains the data you want to see on your form.
2. On the Create tab, in the Forms group, click Form button.



A Form is created

2. Create a form using Form Wizard

If you want to select only some of the specific fields to appear on your form, you can use the Form Wizard option. You can also define the manner the data is grouped and sorted, and you can use fields from more than one table or query.

The steps to create a form using Form Wizard are:

1. On Create tab, in Forms group, click on Form Wizard.

2. The Form Wizard dialog box appears. Select the table/query, from Table/Query list box, on which you want to create a form.

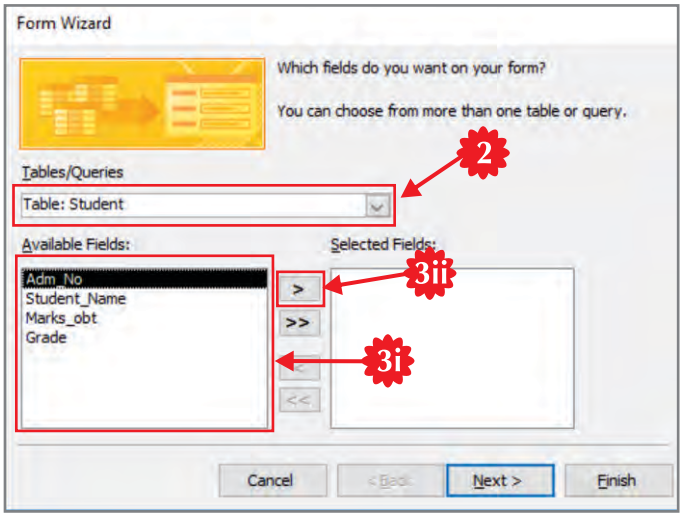
3. Now choose the fields in Available fields box ,which you want to add in form e.g. Adm_no, Student_Name and move them to Selected fields box using arrow buttons. Click on Next button.

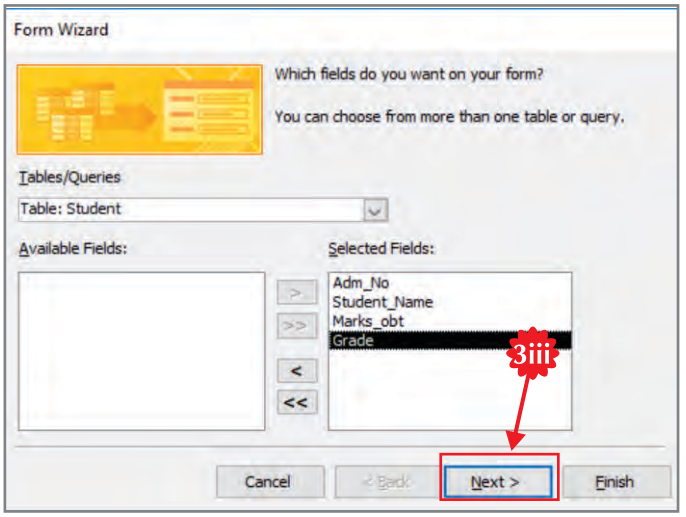
4. Select the layout of the form and click on Next button.

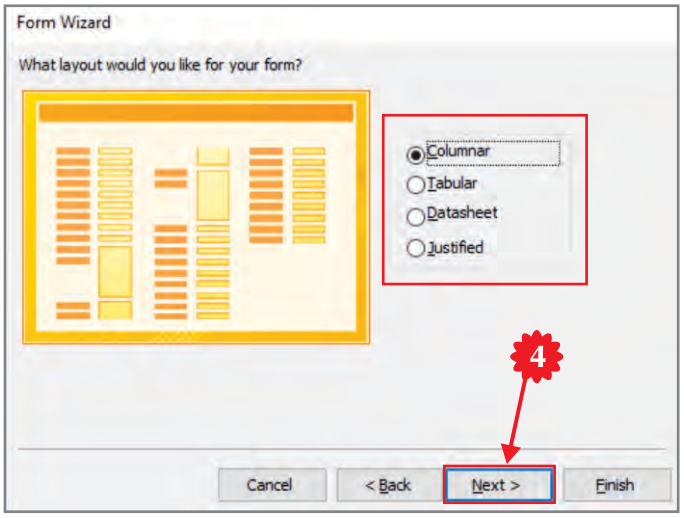
5. Type the name of the form and click on Finish button.

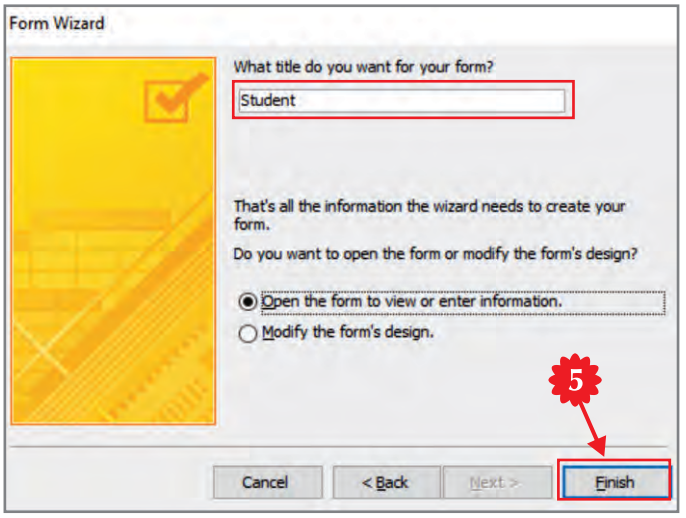
MS Office 2019

All steps are same as MS Office 2016.









Reports

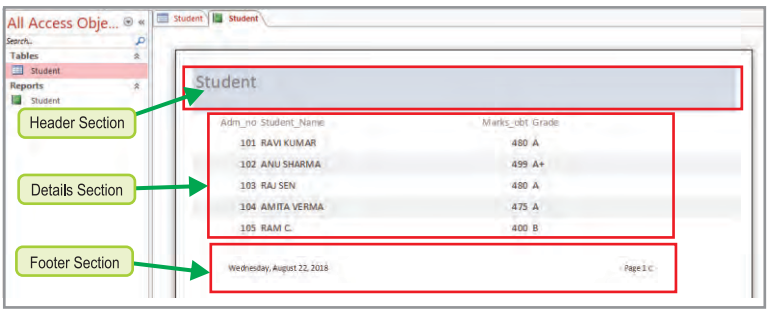
Reports are the final object of our database. It is a combination of all the raw facts of the database and presents the result with a visual meaning. Reports are also the best way to format and print your data, and they're a good way to summarize data.

Different Sections of Report

- The Header Section is the top most section of the report. Report headers usually contain titles and logos. Page headers usually contain column headings.
- The Details Section is the body of the report which contains the main data. All reports must have a detail section.
- The Footer Section can appear in several places. You can create page footers that appear at the bottom of each report page and display elements such as page numbers.

The header and footer sections are optional.

For example, if you don't want to group the data, you don't need to group headers or footers. However, make sure that your reports contain enough information to make them meaningful and easy to understand.



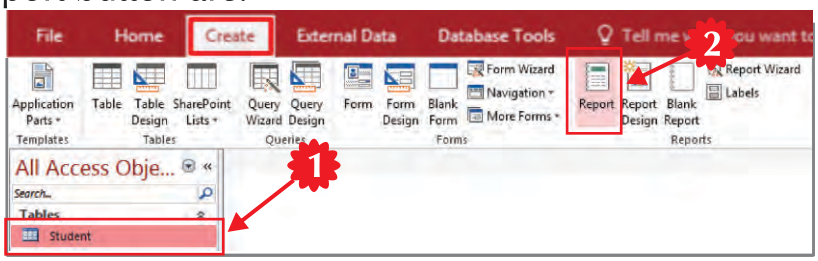
A Report

Here you will learn about creating a report in two ways.

1. To create a report using Report button

The steps to create a report using Report button are:

1. In the Navigation Pane, select the table or query on which you want to create a report.
2. On Create tab, click on Report icon.



The report will be created.

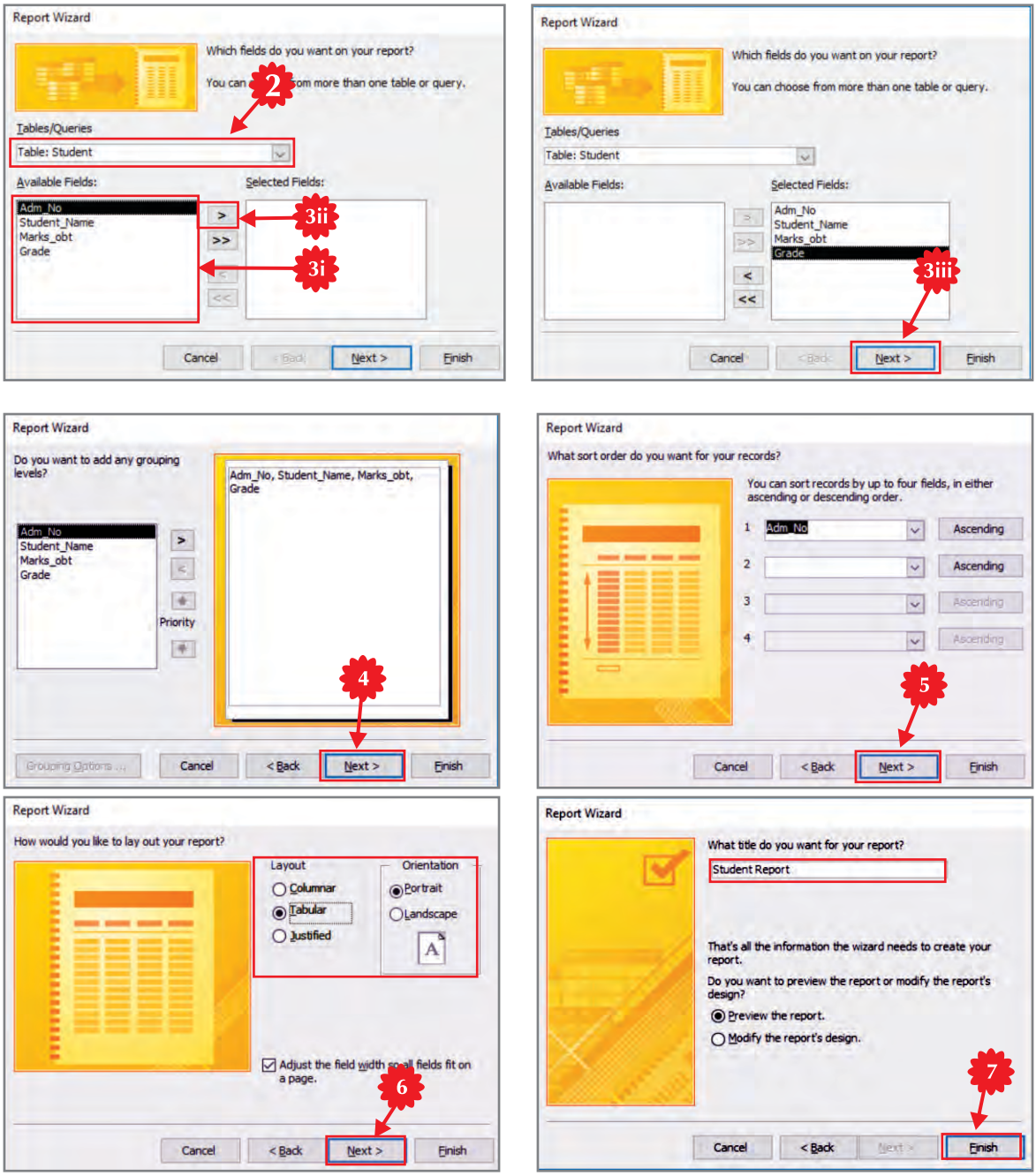
2. To create report using wizard

The Report Wizard is a faster way to create a report with a large number of fields and a complex layout. The steps to create a report using Report Wizard are:

1. On Create tab, in Reports group, click on Report Wizard.

2. In the Report Wizard dialog box, select the table/query, on which you want to create the report.

3. Choose the desired fields in Available fields box, e.g. Adm_no, Student_Name and move them to Selected fields box using arrow buttons. Click on Next button.
4. Select the column on which any grouping needs to be dobe and click on Next button.
5. Select the column on which you want to sort the data (ascending/descending) and click on Finish button.
6. Select the layout and orientation of the report and click on Next button.
7. Give a title to your report and click on Finish button. Report will be displayed.



Tables, Hyperlinks and Forms in HTML

Dear Students,
Earlier you learnt about various HTML tags. Now, let us have a look at HTML tables, hyperlinks and forms.

Yes Teacher,
Let us learn how to display data in tabular format using HTML, linking the documents and creating forms for users to enter data.

The HTML table model allows you to arrange data (text, preformatted text, images, links, forms, form fields, other tables, etc.) into rows and columns. Each table may have an associated caption that provides a short description of the purpose of the table.

Parts of a Table

Row: 'Row' stands for a horizontal line that represents a record in a table. Table rows may be grouped into a head, foot and body sections.

Column: 'Column' stands for a vertical line that contains a particular type of value.

Cell: 'Cell' is a rectangular box that contains the data or value in a table. Cells may span multiple rows and columns.

Table in HTML - the <TABLE> Element

To insert a table in HTML document <table> tag is used along with <tr> tag (to insert a new row) and <td> tag (to insert data/ cell). Example:

```
<table>
<tr>      <td> .....</td>    <td> ..... </td>          </tr>
</table>
```

- <TR> tag stands for "Table Row" and will insert a new row in the table.
- <TD> tag stands for "Table Data" and will insert a cell in the row to store the value. This tag is also used to insert a new Column in a table.

```
File Edit Format View Help
<html>
<head>
        <title>My web page</title>
        <body>
        <table>
                <tr>
                        <th>MEETING</th>
                        <th>DAYS</th>
                        <th>TIME</th>
                </tr>
                <tr>
                        <td>Morning</td>
                        <td>Mon, Wed, Fri</td>
                        <td>9 AM</td>
                </tr>
                <tr>
                        <td>Evening</td>
                        <td>Tue, Thu, Sat</td>
                        <td>4 PM</td>
                </tr>
        </table>
</body>
</html>
```

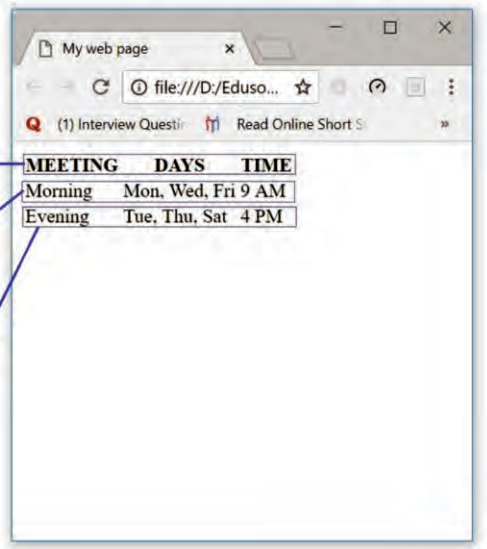


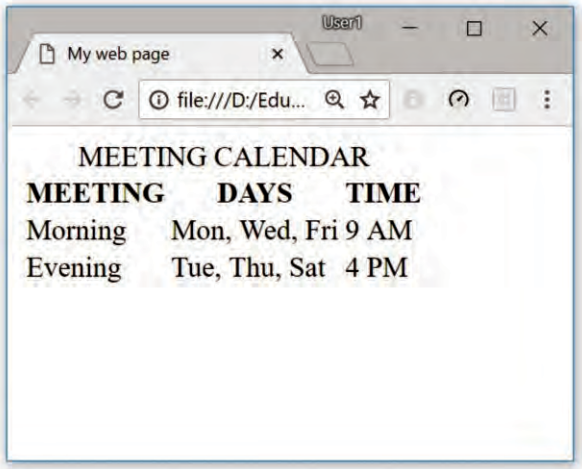
Table Caption <caption> and Table Heading <TH> Element

<caption>: It specifies the title of table and shows up at the top of the table.

Syntax: <caption> caption of table </caption>

<th> : It stands for "Table Heading". Table heading can be defined using <th> element. Normally, you will put your top row as a table heading. Most browsers display table headers in bold text.

```
File Edit Format View Help
<html>
<head>
        <title>My web page</title>
        <body>
        <table><caption>MEETING CALENDAR</caption>
                <tr>
                        <th>MEETING</th>
                        <th>DAYS</th>
                        <th>TIME</th>
                </tr>
                <tr>
                        <td>Morning</td>
                        <td>Mon, Wed, Fri</td>
                        <td>9 AM</td>
                </tr>
                <tr>
                        <td>Evening</td>
                        <td>Tue, Thu, Sat</td>
                        <td>4 PM</td>
                </tr>
        </table>
</body>
</html>
```



Attributes of <table> Tag

Border : This attribute places a border around the table and each cell. It takes a number for border width as value.

Syntax: <table border=3> ... </table>

Bordercolor : This attribute sets the colour of the border.

Syntax: <table bordercolor= "red"> ... </table>

Bgcolor : This attribute is used to change the background color of a table.

Syntax: <table bgcolor= "lime"> ... </table>

Background : This attribute will set a picture as the background of a table.

Syntax: <table background= "compumatrix.jpg"> ... </table>

Cellspacing : It gives the amount of space between the cells.

Syntax: <table cellspacing= 5> ... </table>

Cellpadding : It gives the space between the cell border and the content of the cell.

Syntax: <table cellpadding= 5> ... </table>

Align : This attribute aligns the table left, right or center.

Syntax: <table align= "left"> ... </table>

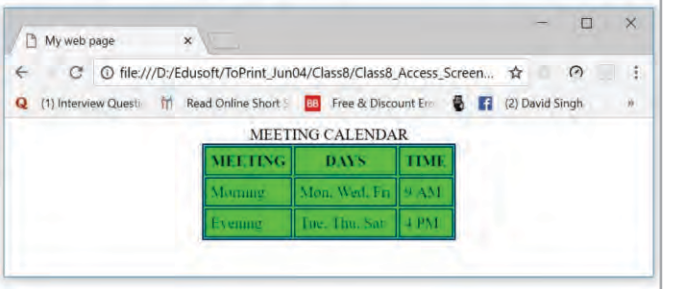
Height and Width : These attributes specify table dimensions as a number or in terms of percentage of available screen area.

Syntax: <table width=400 height=150> ... </table>

Note

It is not necessary to enclose the values of attributes in quotes unless the value has a any embedded spaces like <TABLE background="indian sun set.jpg">

```
<html>
<head>
        <title>My web page</title>
        <body>
        <table border=1 bgcolor="#00ff00" bordercolor="#0000ff" cellspacing=2 cellpadding=5
align="center" height="20%" width="40%"><caption>MEETING CALENDAR</caption>
                <tr>
                        <th>MEETING</th>
                        <th>DAYS</th>
                        <th>TIME</th>
                </tr>
                <tr>
                        <td>Morning</td>
                        <td>Mon, Wed, Fri</td>
                        <td>9 AM</td>
                </tr>
                <tr>
                        <td>Evening</td>
                        <td>Tue, Thu, Sat</td>
                        <td>4 PM</td>
                </tr>
        </table>
</body>
</html>
```



Attributes of <TD> Tag

<TD> tag is used to specify the table data. The <td> tag defines a standard cell in an HTML table. This tag has various attributes to make the value of a cell more presentable and attractive.

Align : This attribute is used to set the position of text in a cell. It can have the value left, right, center or justify.

Syntax: <td align = "center"> ... </td>

Width : This attribute is used to specify the width of a cell either in pixels or in percentage value.

Syntax: <td width = 400> ... </td>

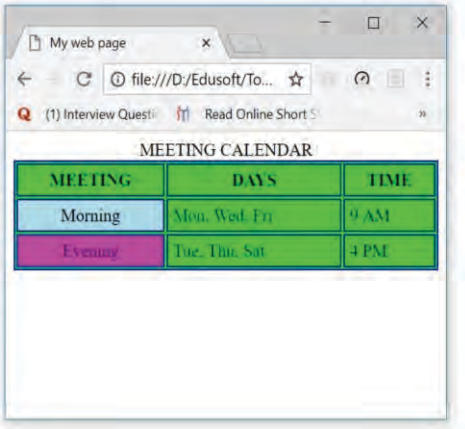
Bgcolor : It is used to change the background color of each cell in a table.

Syntax: <td bgcolor = "lime"> ... </td>

Background : It is used to apply a picture as a background of each cell in a table.

Syntax: <td background = "lotus.jpeg"> ... </td>

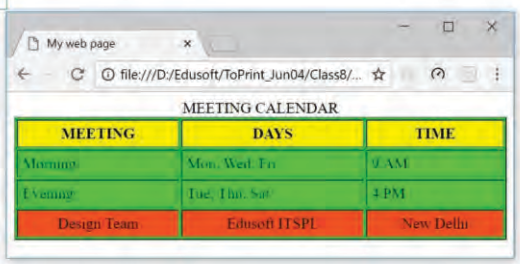
```
<html>
<head>
        <title>My web page</title>
        <body>
        <table border=1 bgcolor="#00ff00" bordercolor="#0000ff" cellspacing=2 cellpadding=5
height="20%" width="100%"><caption>MEETING CALENDAR</caption>
        <tr>
                <th>MEETING</th>
                <th>DAYS</th>
                <th>TIME</th>
        </tr>
        <tr>
                <td bgcolor="lightblue" align="center">Morning</td>
                <td>Mon, Wed, Fri</td>
                <td>9 AM</td>
        </tr>
        <tr>
                <td bgcolor="magenta" align="center">Evening</td>
                <td>Tue, Thu, Sat</td>
                <td>4 PM</td>
        </tr>
        </table>
</body>
</html>
```



A table can be divided into table head, table body and table foot. The three elements for separating the head, body, and foot of a table are:

- <thead> : It is used to create a horizontal header over the complete width of a table.
- <tbody> : It is used to create groups of rows in a table body.
- <tfoot> : It indicates that a group of rows are the footer rows at the bottom of the table.

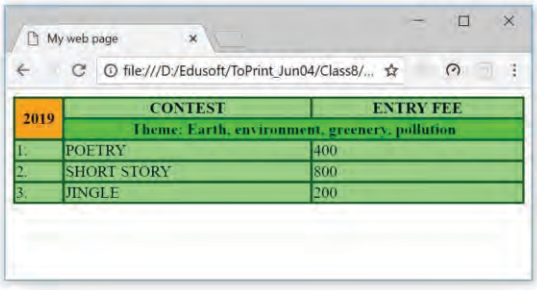
```
<html>
<head>
        <title>My web page</title>
        <body>
        <table border=1 bgcolor="#00ff00" cellspacing=2 cellpadding=5  width="100%">
        <caption>MEETING CALENDAR</caption>
        <thead bgcolor="yellow"><tr> <th>MEETING</th> <th>DAYS</th> <th>TIME</th> </tr> </thead>
        <tbody>
        <tr>
                <td>Morning</td> <td>Mon, Wed, Fri</td> <td>9 AM</td>
        </tr>
        <tr>
                <td>Evening</td> <td>Tue, Thu, Sat</td> <td>4 PM</td>
        </tr>
        </tbody>
        <tfoot bgcolor="#ff5500" align="center">
        <tr>
        <td>Design Team</td>
        <td>Edusoft ITSPL</td>
        <td>New Delhi</td>
        </tr>
        </tfoot>
        </table>
</body>
</html>
```



Colspan & Rowspan attribute

Table cells can span or merge across more than one column or row. Use colspan attribute if you want to merge two or more columns into a single column. In a similar way, use rowspan attribute if you want to merge two or more rows. Both the attributes take number as a value for the number of columns and number of rows to be merged.

```
<html>
<head>
        <title>My web page</title>
        <body>
        <table border=1 cellspacing=0 bgcolor="lightgreen" bordercolor="darkgreen" width="100%">
        <tr>
                <TH rowspan=2 bgcolor="orange">2019</th>
                <th>CONTEST</th> <th>ENTRY FEE</th>
        </tr>
        <tr>
                <th colspan=2 bgcolor="lime">Theme: Earth, environment, greenery, pollution</th>
        </tr>
        <tr>
                <td>1. </td> <td>POETRY</td> <td>400</td>
        </tr>
        <tr>
                <td>2. </td> <td>SHORT STORY</td> <td>800</td>
        </tr>
        <tr>
                <td>3. </td> <td>JINGLE</td> <td>200</td>
        </tr>
</table>
</body>
</html>
```



Note

<TD> tag is used as a sub tag inside <TR> tag and it should be closed within the <TR> and </TR> tags.

Hyperlinks in HTML

A hyperlink can be any text or image that (when you click it) takes you to another page or file, either on the website or elsewhere on the Internet. A hyperlink can also take you to another part of the same web page.

When you move the cursor over a link in a Web page, the arrow will turn into a little hand.

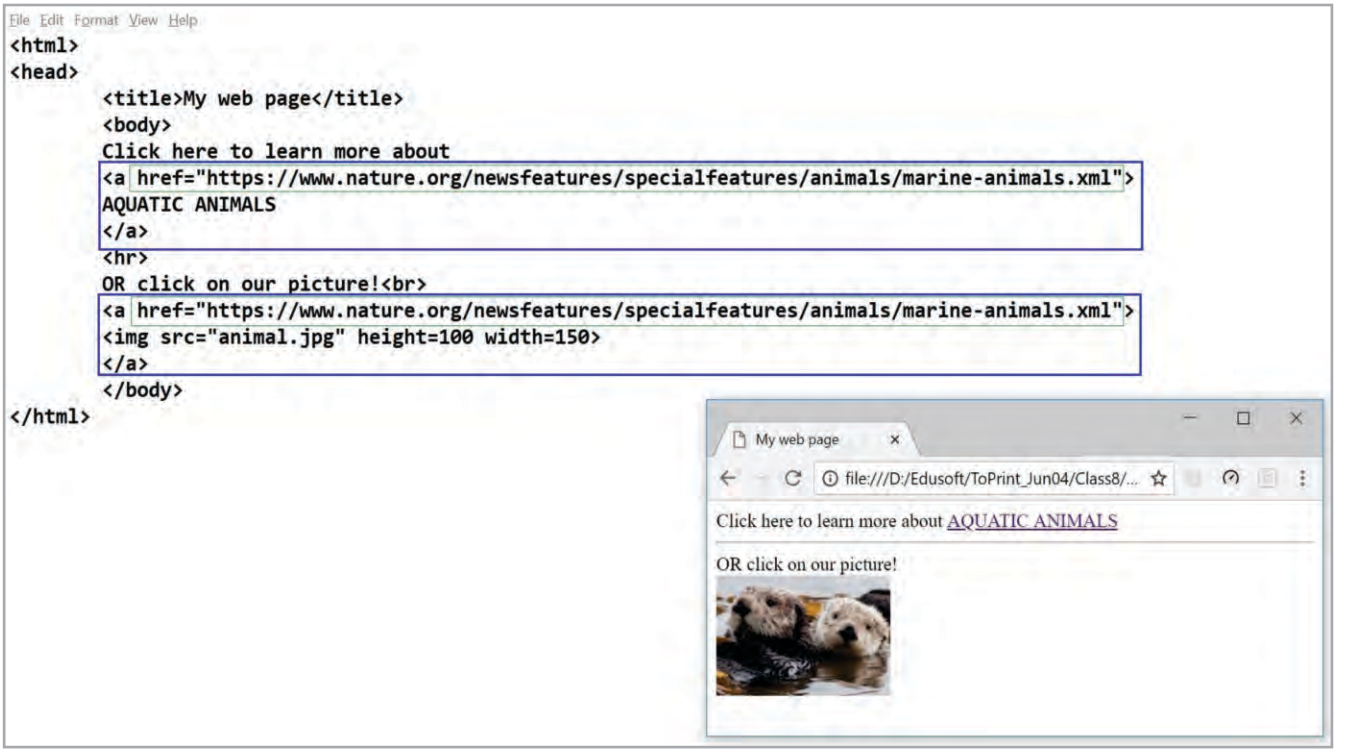
The HTML <a> tag defines a hyperlink. The most important attribute of the <a> element is the href attribute, which indicates the link's destination.

Attributes of <A> Tag

HREF: It stands for Hypertext Reference. It refers to the full web address of the linked resource which could be a document, multimedia file or any part of the same document.

Target: Target attribute is used with frames and defines where to open the document/url, specified in 'href' attribute. It is now gradually becoming out of use since most of the modern browsers do not support frames.

Name: Name attribute of anchor tag is used to define a named anchor. This named anchor is invisible to the reader.



Types of Hyperlink

There are two types of hyperlink in HTML. These are internal hyperlink and external hyperlink. Internal linking is used to link a part of the same document and external linking is used to link one document with another document.

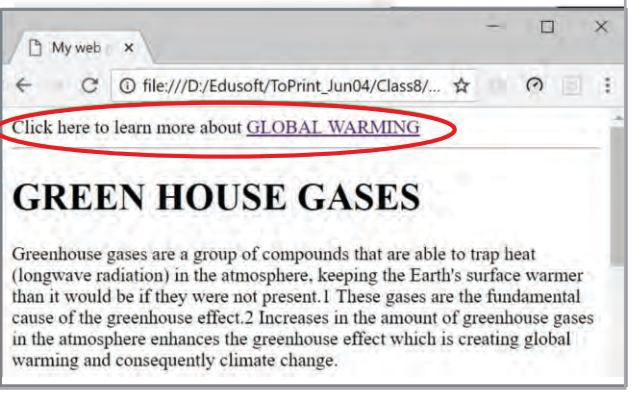
Internal hyperlinks require an anchor tag with the "name" attribute e.g,

.....

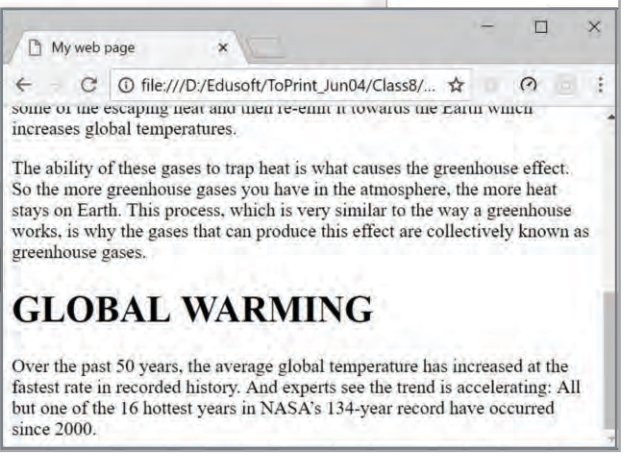
Create an anchor (given above) at the place in the page where you want to link to. Then create a hyperlink which refers to this anchor with a hash (#) e.g,

Click here to learn more about GLOBAL WARMING

```
File Edit Format View Help
<html>
<head>
        <title>My web page</title>
        <body>
        Click here to learn more about
        <a href="#global_warming">
        GLOBAL WARMING
        </a>
        <hr>
        <H1>GREEN HOUSE GASES</H1>
        Greenhouse gases are a group of compounds that are ab
radiation) in the atmosphere, keeping   the Earth's surface w
were not present.1 These gases are the fundamental cause of t
Increases in the amount of greenhouse gases in the atmosphere
effect  which is creating global warming and consequently cli
```



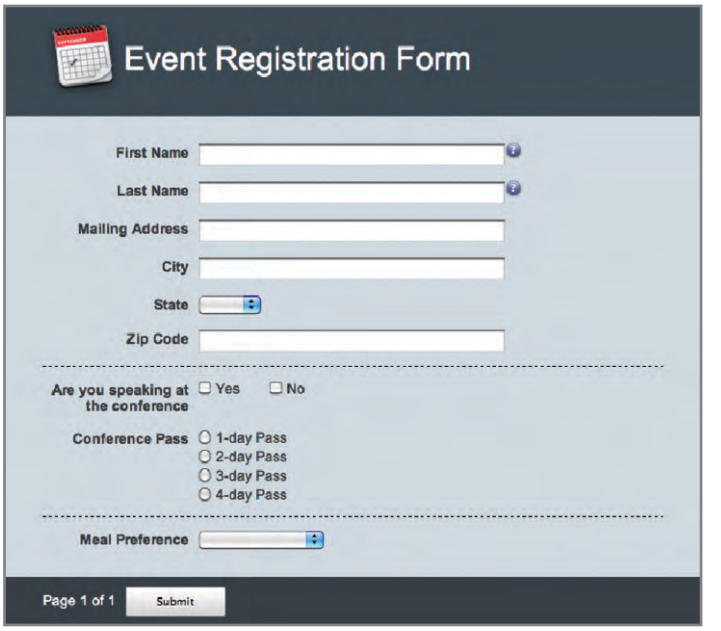

```
File Edit Format View Help
towards the Earth which increases global temperatures.
        </P><P>
        The ability of these gases to trap heat is what causes the greenhouse effect. So
the more greenhouse gases you have             in the atmosphere, the more heat stays on
Earth. This process, which is very similar to the way a greenhouse works,              is
why the gases that can produce this effect are collectively known as greenhouse gases.

        <H1>GLOBAL WARMING</H1>
        <a name="global_warming">
        Over the past 50 years, the average global temperatur
rate in recorded history. And          experts see the trend
of the 16 hottest years in NASA's 134-year record have occurr
</a>
</body>
</html>
```



Forms in HTML

HTML forms are used to take the data as input from the users and pass them to the web server for further processing. A form can contain input elements like text field, text area, check box and radio button and some action buttons (submit, reset) and more.

Examples of HTML Forms are registration forms, compose e-mail form, filling credit card details, giving online exam or survey, filling shipping address etc.



The <Form> Tag

The <form> tag tells the browser where the form will start and end. You can add all kinds of HTML tags between the <form> and </form> tags.

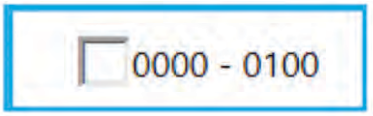
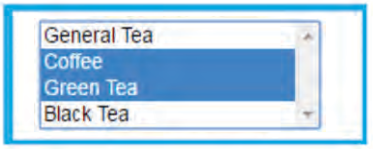
```
<form>
    The input element goes here.....
</form>
```

This means that a form can easily include a table or an image along with the form fields.

Form Controls

A control is a container or command which is used to receive or display data from the users. Users interact with forms through named controls.

Control Name	Control Image	Specification
Buttons - Submit - Reset - Simple	SUBMIT RESET BUTTON	It is clickable. - It is used to submit the data. - It is used to reset the data. - It is a simple button.
Text Box - Single Line - Password	type value here ••••••••••••	It is clickable. - It is used to enter the text in one line only. - It is used to enter the text in a password form.

Check Box		It is used for multiple selection of options.
Radio Button		It is used for single selection of options.
List Box		It is the list of options from the list box.
Drop down List Box		It is the list opened when we click the drop down list.
Text Area		It is used to enter multiple lines of a text.
File Upload		It is used to upload files.

Attributes of <Form> tag

Most frequently used attributes of a form are:

name : This is used to specify the name of the form.

action : This is used to specify any script URL which will receive the uploaded data.

method : This is used to specify the method to be used to upload data. It can take various values but most frequently used are GET and POST.

Example:

```
<form action= "registration.html" method= "post">
    Form elements like textbox, radio button, etc.
</form>
```

The <INPUT> Element

The <input> element is the most important element of **<form>** element.

Attributes of <INPUT> Element

type : Indicates the type of input control that you want to create. This element is also used to create other form controls such as radio buttons and checkboxes.

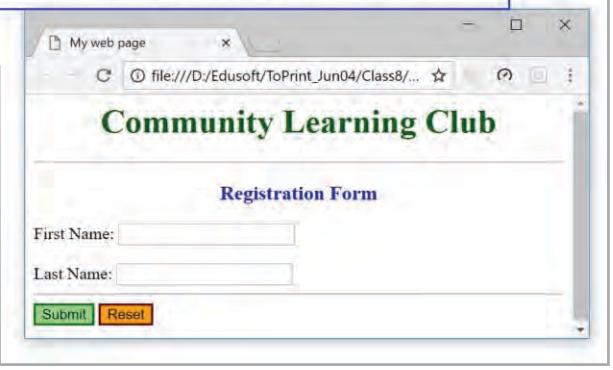
name : Used to give the name to the part of the name/value pair that is sent to the server, representing each form control and the value entered by the user.

value : Provides an initial value for the text input control that the user will see when the form loads.

Text Box Control

Textbox is single line text field that allows the user to input text. Single-line text input controls are created using an <input> element, whose type attribute should have the value "text".

```
File Edit Format View Help
<html>
<head>
        <title>My web page</title>
        <body>
        <h1 align="center" style="color:darkgreen">Community Learning Club</h1>
        <hr>
        <form action="registration.html" method="get">
                <h3 align="center" style="color:blue">Registration Form</h3>
                First Name: <input type="text" name="first_name"><br><br>
                Last Name: <input type="text" name="last_name"><hr>
                <input type="submit" value="Submit" style="background-color:lightgreen;border:2px solid green">
                <input type="reset" value="Reset" style="background-color:orange;border:2px solid maroon">
        </form>
        </body>
</html>
```



Note

Submit and Reset buttons are given some style using **Style** attribute. This is just for the decoration of the two buttons. Style settings are given as: **Property:Value**. Here, value of property ***background-color*** is given as lightgreen and orange.

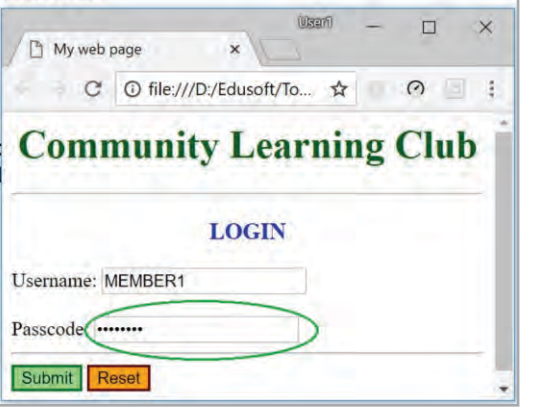
Property ***border*** is set as 2 pixel thick, solid border with green & maroon colours.

Do it Yourself

Use following type for input tag and observe the output. Discuss the output with the teacher.

Enter pass code: <input type=password>

```
File Edit Format View Help
<html>
<head>
        <title>My web page</title>
        <body>
        <h1 align="center" style="color:darkgreen">Community Learning Club</h1>
        <hr>
        <form action="login.html" method="get">
                <h3 align="center" style="color:blue">LOGIN</h3>
                Username: <input type="text" name="user_name"><br><br>
                Passcode: <input type="password" name="pass_code"><hr>
                <input type="submit" value="Submit" style="background-c
                <input type="reset" value="Reset" style="background-col
        </form>
        </body>
</html>
```



Button Control

There are various ways in HTML to create clickable buttons. You can create clickable buttons using <input> tag and <button> tag. In both <input> tag and <button> tag, the type attribute is used to set the type of button (<input type= "button"> Or <button type= "button">). The type attribute can take the following values:

submit : This creates a button that automatically submits a form.

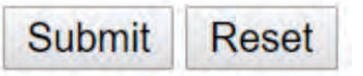
reset : This creates a button that automatically resets form controls to their initial values

button : This creates a button that is used to trigger a client-side script when the user clicks that button.

Example:

<input type="submit" value="Submit">

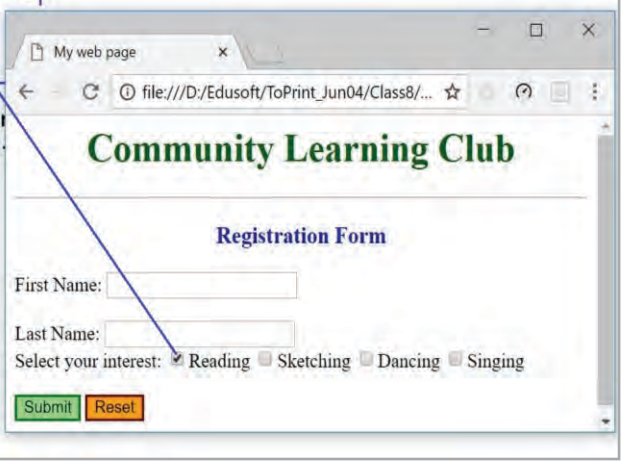
<input type="reset" value="Reset">



Check Box Control

Checkboxes are used when one or more than one option is required to be selected. They are created using <input> tag. Check Box is a selection control which has only two values True or False.

```
File Edit Format View Help
<html>
<head>
        <title>My web page</title>
        <body>
        <h1 align="center" style="color:darkgreen">Community Learning Club</h1>
        <hr>
        <form action="registration.html" method="get">
                <h3 align="center" style="color:blue">Registration Form</h3>
                First Name: <input type="text" name="first_name"><br><br>
                Last Name: <input type="text" name="last_name"><br>
                Select your interest:
                <input type="checkbox" value="reading" CHECKED>Reading
                <input type="checkbox" value="sketching">Sketching
                <input type="checkbox" value="dancing">Dancing
                <input type="checkbox" value="singing">Singing
                <br><br>
                <input type="submit" value="Submit" style="backgrou
                <input type="reset" value="Reset" style="background-
        </form>
        </body>
</html>
```



Radio Button Control

Radio Buttons are used when only one option is required to be selected. They are created using <input> tag. Radio button is a selection control that lets the users to select any one button among the same group.

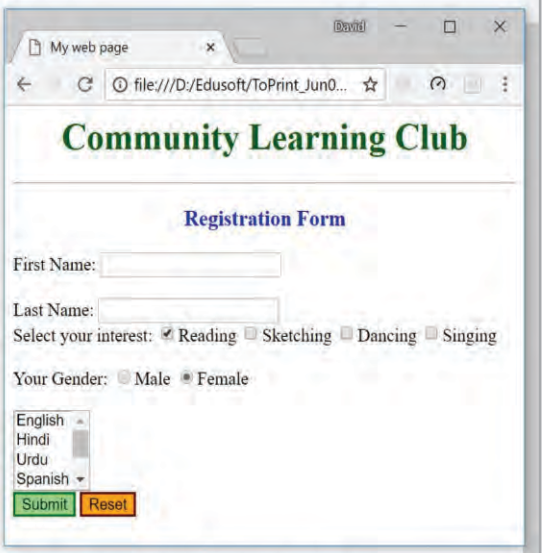
```
<form action="registration.html" method="get">
        <h3 align="center" style="color:blue">Registration Form</
        First Name: <input type="text" name="first_name"><br><br
        Last Name: <input type="text" name="last_name"><br>
        Select your interest:
        <input type="checkbox" value="reading" CHECKED>Reading
        <input type="checkbox" value="sketching">Sketching
        <input type="checkbox" value="dancing">Dancing
        <input type="checkbox" value="singing">Singing
        <br><br>
        Your Gender: <input type="radio" value="male">Male
        <input type="radio" value="female" CHECKED>Female
```

Your Gender: Male Female

List Box Control

List Box control is used to select single/multiple options at once. List box is created using the <select> tag and each item of a list box is created using the <option> tag. The <select> tag is used with size attribute. This attribute also decides the number of items the list box can display at a time.

```
File  Edit  Format  View  Help
        <body>
        <h1 align="center" style="color:darkgreen">Community Learning Club</h1>
        <hr>
        <form action="registration.html" method="get">
                <h3 align="center" style="color:blue">Registration Form</h3>
                First Name: <input type="text" name="first_name"><br><br>
                Last Name: <input type="text" name="last_name"><br>
                Select your interest:
                <input type="checkbox" value="reading" CHECKED>Reading
                <input type="checkbox" value="sketching">Sketching
                <input type="checkbox" value="dancing">Dancing
                <input type="checkbox" value="singing">Singing
                <br><br>
                Your Gender: <input type="radio" value="male">Male
                <input type="radio" value="female" CHECKED>Female
                <br><br>
                <select name="language" size=4 multiple>
                <option value="english">English</option>
                <option value="hindi">Hindi</option>
                <option value="urdu">Urdu</option>
                <option value="spanish">Spanish</option>
                <option value="german">German</option>
                <option value="french">French</option>
                </select>
                <br>
                <input type="submit" value="Submit" style="background-color:lightgreen;border:2px solid green">
                <input type="reset" value="Reset" style="background-color:orange;border:2px solid maroon"><br>
        </form>
        </body>
```



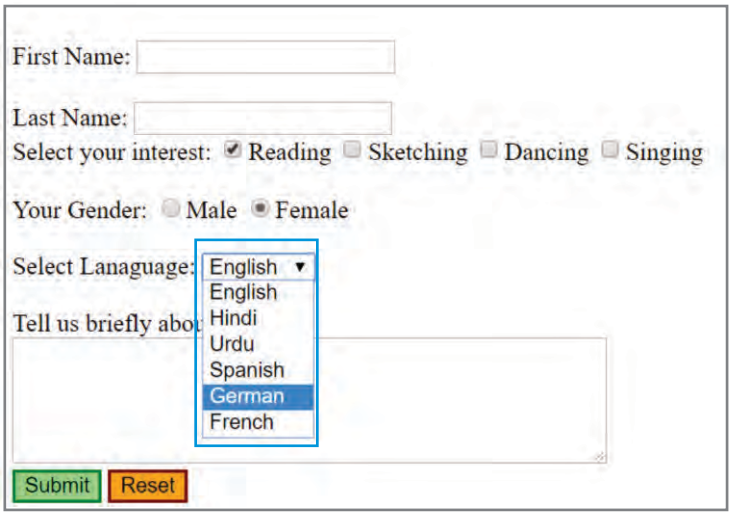
Text Area Control

To let the visitor enter more than one line of text, you need a multiple-line text input control called text area using <textarea> tag. It has two major attributes rows and cols. Rows attribute sets the number of rows and cols attribute sets the number of columns in the text area control. Example: Tell us briefly about yourself:
<textarea name="vname" rows=5 cols=50></textarea>

Drop Down List Control

Drop down list is also known as the combo box. It is used to select single option at a time. Drop down list box is used when we have many options available to be selected but only one will be selected. Example:

```
Select Lanaguage:
<select name="language">
    <option value="english">English
    </option>
    <option value="hindi">Hindi
    </option>
    <option value="urdu">Urdu
    </option>
    <option value="spanish">Spanish
    </option>
    <option value="german">German
    </option>
    <option value="french">French
    </option>
</select>
```

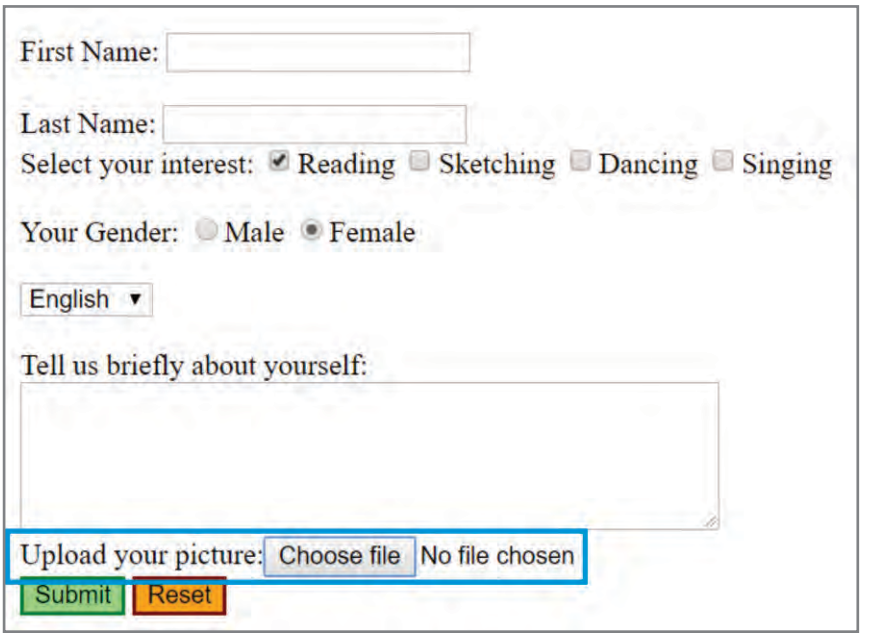


File Upload Control

If you want to allow a user to upload a file on your web site, you will need to use a file upload box, also known as the file select box. File upload control is used to browse files from the user's computer and upload them on the web server. This is also created using the <input> element.

Example:

Upload your picture: <input type="file" name="vpic">



Glossary

Cellpadding	:	Space between cell border and cell content.
Colspan	:	Merging adjacent columns into one.
Rowspan	:	Merging adjacent rows into one.

Quick Review

- *<form> tag is used to design a form on the web page.*
- *The <input> element of <form> tag is used to select user information using different types of control.*
- *The three types of buttons are Submit, Reset and Push button and the two types of textboxes are Single Line and Password.*
- *Checkbox is used to select multiple options while radio button is used to select single option.*
- *Dropdown List control and ListBox control are used to display the values in the form of list.*

Exercise

A. Choose the correct answer.

1. Table heading can be defined using _____ element.
   a) <caption> ☐ b) <head> ☐
   c) <table head> ☐ d) <th> ☐
2. _____ hyperlinks take you to another part of the same web page.
   a) Internal ☐ b) External ☐
   c) Anchor ☐ d) Image ☐
3. HREF attribute of anchor tag takes the _____ of the link as value.
   a) address ☐ b) name ☐
   c) number ☐ d) hyperlink ☐
4. _____ attribute of <form> tag is used to define the name of a form.
   a) Check Box ☐ b) Name ☐
   c) Action ☐ d) None of these ☐

B. Fill in the blanks.

Colspan, Internal, forms, Cellspacing, body

1. Table rows may be grouped into head, foot and _____ sections.
2. _____ attribute gives the amount of space between the cells.
3. _____ merges cells across the columns in a table.
4. _____ hyperlinks require name attribute in the anchor tag.
5. Users interact with _____ through named controls. .

C. Tick (✓) the correct statement and cross out (X) the incorrect one.

1. 'Bgcolor' attribute of <td> tag is used to define background colour of entire table on a web page. ☐
2. 'Rowspan' attribute is used to merge the rows in a table on a web page. ☐
3. In HTML, a user is not allowed to align the table. ☐
4. External link in a web page is used to connect one page with another. ☐
5. Radio buttons are used to accept multiple choices from the user. ☐

D. Answer the following questions.

1. What is the use of rowspan attribute?

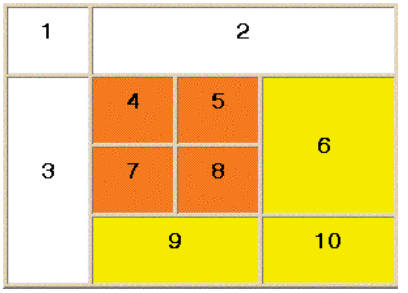
2. Differentiate between radio button and check box control.

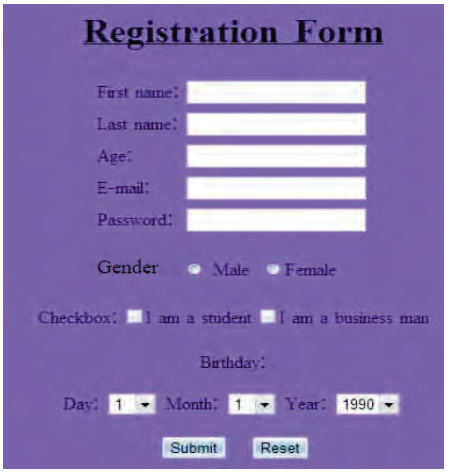
3. What is the significance of a form in HTML?

4. Differentiate between 'textbox' and 'textarea' control in a form, in HTML.

Lab Activity

Design the following table and form.





Teacher's Signature : _____ *Teacher's Remark :* ☆☆☆☆☆

Beyond the Book

https://developer.mozilla.org/en-US/docs/Learn/HTML/Tables/Basics
https://www.w3.org/TR/html401/interact/forms.html

Watch & Learn

www.eduitspl.com
www.youtube.com/edusoftknowledgeverse

Teacher Corner

Dear Teacher, some common examples from daily life can be taken to present data in tabular format like school time table and to capture data in a form like filling registration details for admission.

Creating Interactive Web Pages

Dear Students,
Nature of Internet is interactive. Would you like to learn how to make web pages interactive?

Yes Teacher,
We think that would be very exciting! Sure, we would love to learn that.

When you visit a website, the web pages change appearance according to the choices made by us. This interactivity is possible by scripts written for them. *A script is a program that runs embedded in a web page to perform a particular task.* For example, when you click a button on the web page a message is displayed.

JavaScript is a programming language to write scripts that run in a web page. A web browser that supports JavaScript can execute scripts written using JavaScript.

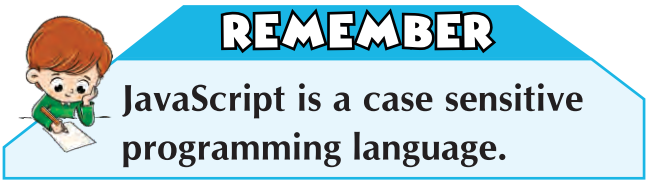
My First JavaScript Program

Let us try a simple program that displays a greeting when the user visits the web page. The code is given below:

```
<html>
<head><title>Interactive Web</title></head>
    <body>
        <script language="JavaScript">
            alert("hello")
        </script>
    </body>
</html>
```

Did you notice something familiar? Yes, the HTML and BODY tags. What is new here is the SCRIPT tag. Within script tags is written: alert("hello")

This is a JavaScript statement. It is using a Javascript function alert() to display message hello. When this web page loads in the browser, script tags are read by the browser. Notice language attribute of script tag. It tells the browser which language is used in writing the script. Then alert() function is executed. alert() function is used to display text strings on the screen. Here, the text string is hello enclosed in double quotes.



How to Save and Run a JavaScript program?

There are several advanced software applications that are used to design web pages with JavaScript but here we shall use notepad to create our interactive web pages.

- Open Notepad and type the above code.
- Click on File menu > Save option.
- In the Save as... dialog box, open the Save as type dropdown and select All Files.
- Type the file name as first.html (Note that it is not a .txt file).
- Double click on this file to view in browser.

Variables – the value holders

Variables are storehouses for values. Variables store one value at a time. If a new value is stored in a variable, the earlier value stored in it is lost forever. Variable of a particular type can store a particular type of value. In JavaScript, there are basically 3 fundamental types of variable. Variables to store numbers, strings and Boolean values. Every variable has a unique name and it is declared using the keyword **var**. For example:

```
var m    = 1
var city = "Mumbai"
var age  = 10
```

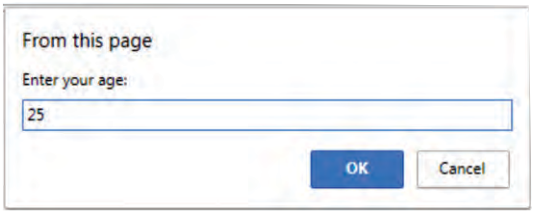
JavaScript needs the strings to be mentioned within double quotes. To store a value in a variable, mention the keyword var, then the name of the variable followed by = sign and then mention the value.

Taking Input

There are many ways to take inputs from the user in JavaScript. One of them is to use prompt(). It is a built-in function of JavaScript library.

Let us see how to use prompt():

```
<html>
<head> <title> Interactive Web </title> </head>
<body>
        <script language = "JavaScript" >
                var age
                age = prompt("Enter your age:")
                alert(age)
        </script>
</body>
</html>
```



prompt() displays a message to the users to tell them what input is required from the user. Here the message is Enter your age: Since it is a string, it is in double quotes.

When user enters the value, prompt() returns that value to be stored in a variable. Notice that variable age is storing the value returned by prompt().

In next statement, alert() is displaying that value back to the user. How? To alert(), the same variable age is passed.

Run the program and check for yourself.

Comments

Comments are a great way to document the programs or to mark desired part of a program as non-executable. Any part of the program that is commented is ignored by the computer and not considered for execution. The double forward slash (//) is used to comment a single line and a pair of /* and */ is used to mark multiple lines as comment. Let us use comments to document our previous example in detail:

```
<script language = "JavaScript" >
/*
This is my first javascript program.
It accepts your age and displays it back
*/
var age       //variable age is declared
age = prompt("Enter your age:") //age accepted as input from the user
alert(age)        //value of variable age is displayed
//end of program
</script>
```

Simple Arithmetic

JavaScript allows arithmetic operations with the help of following symbols. These symbols are called arithmetic operators.

OPERATOR	OPERATION	EXAMPLE
+	Addition	15 + 20 a = 5 + 7
–	Subtraction	20 – 6 a = 6 – 5
/	Division	20/5 a = 12/3
*	Multiplication	20 * 5 a = 12 * 3
%	Modulus	a = 13 % 3 (here value of a will be 1, the remainder of the division)
+ +	Unary increment operator	a = 5 a+ + (here value of a becomes 6)
– –	Unary decrement operator	a = 5 a- - (here value of a becomes 4)

Let us accept a number from the user and display its square.

```
<html>
<body>
    <script language="JavaScript">
        var n, a
        n = prompt("Enter a number:")
        a = n * n
        alert(a)
    </script>
</body>
</html>
```

In the first statement of the script, two variables **n** and **a** are declared. *Notice that multiple variables can be declared as comma separated list.*

prompt() asks the user to enter a number. The number entered by the user is stored in variable n. Let us assume that user enters 3. So, value 3 is

stored in variable n. Third statement is showing the use of multiplication (*) operator. Value in variable n is multiplied by itself (n * n). Then, the result of multiplication is stored in variable a. So, a stores 9. Finally, alert() displays the value of variable a that is the square of 3. Run this program and enter 5. Check if you get the result as 25.

Can you figure out the output of the following program?

```
<script language="JavaScript">
    var a, b, r
    a = prompt("Enter a number:")
    b = prompt("Enter another number:")
    r = a + b
    alert(r)
</script>
```

Converting Strings to Integers

prompt() always returns the values as strings. Numbers entered through prompt() are treated as strings but if we apply arithmetic operators *, /, - and % to them, they are auto converted to number types. But in case of + operator the handling of values returned by prompt() is different. Since + functions as addition as well as concatenation operator when prompt() returns any numbers entered by the user, the numbers are concatenated instead of getting added. In such case, numbers need to be explicitly converted into their numeric equivalents. This is done by a Javascript function parseInt().

See the modified version of above program to add two numbers returned by prompt:

```
<script language="JavaScript">
    var a, b, r
    a = prompt("Enter a number:")
    b = prompt("Enter another number:")
    a = parseInt(a)
    b = parseInt(b)
    r = a + b
    alert(r)
</script>
```

parseInt() takes the value to be converted into integer as parameter and returns its

numeric equivalent. Numbers returned by prompt() as strings are converted into integers by parseInt function. Now, instead of concatenation, addition operation will occur and numbers will be added.

Converting Integers to Strings

Numbers can be converted into their string equivalent by using toString().

For example:

```
var a = 100;
var b = a.toString();
```

Here, variable b is string type since value 100 is converted into string type 100.

Concatenation in JavaScript

We have seen that + operator is used for addition. + operator can also be used with strings to concatenate them. This helps in designing user output.

For example:

```
<html>
<body>
    <script language="JavaScript">
        var a, b, r
        a = prompt("Enter a number:")
        b = prompt("Enter another number:")
        a = parseInt(a)
        b = parseInt(b)
        r = a + b
        r = r.toString()
        alert("The answer is " + r)
    </script>
</body>
</html>
```

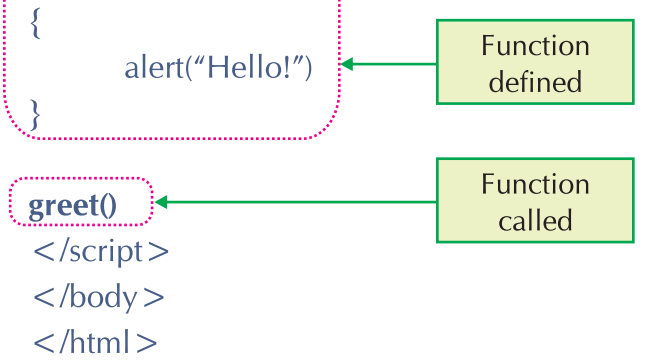
Writing Simple Functions

We have seen two functions – alert() and prompt() – which are the part of JavaScript library. We can define our own functions to perform a particular task. Functions which are not the part of JavaScript library but defined by the user are called user defined functions.

Let us look at the modified version of an earlier example to understand the concept:

Version-1	Version-2

<html>
<body>
<script language="JavaScript">
 	
alert("hello")
 	
</script>
</body>
</html>
	<html>
	<body>
	<script language="JavaScript">
	function greet()
	{
	alert("Hello!")
	}
	
	greet()
	</script>
	</body>
	</html>



In the revised version, the responsibility of displaying Hello is given to the function greet() defined by user. Notice that a function needs to have a unique name preceded by the keyword function.

function greet()

functions definition has its own block defined by the pair of { and }

```
function greet()
{
}
```

Within its block, function contains all the statements which need to be executed by that function.

```
function greet()
{
    alert("Hello!")
}
```

Functions do not execute until they are *called* by their name. Once defined, functions can be called to execute as many times as and whenever required anywhere in the program.

Did you notice how greet() is called after its definition? Yes, by its name followed by the pair of parentheses.

Simple Event Handling

Imagine you are busy reading a book and suddenly the phone rings. Phone rings is an event. There are 2 possible responses to it – you will answer the call or you do not. These responses are called event handling.

Event: An event is an interrupt that occurs due to user action or software application. For example, button click, mouse click, key pressed on the keyboard etc. JavaScript helps in adding interactivity to the web pages using event handling.

Event Handler: When an event occurs, JavaScript calls a function in response to it. For example, when user clicks on a button, JavaScript would call a function that would display a message.

Event Handling: To handle an event you need to identify the event you desire to handle and write a function to run in response to that event. Most common events in JavaScript are related to mouse and keyboard. Then the event is bound with a function to run when that event is raised. To bind an event with a function, following is the syntax:

Event_name = "function_name()"

All the events are available as attributes of various tags in HTML.

Handling Mouse Events

JavaScript mouse events are listed as follows:

- **onMouseEnter:** When mouse pointer comes over an object like button, text, web page etc.
- **onMouseOut:** Reverse of onMouseEnter i.e. when mouse goes away from an object.
- **onMouseDown:** When mouse button is pressed.
- **onMouseUp:** When mouse button is released.

Activity 1: Change text colour when mouse pointer comes over it & goes away.

Let us write some text in FONT tag.

```
<FONT ID=mytext size=7 color=green onmouseenter="do_enter()"
onmouseout="do_out()">Welcome</FONT>
```

Notice how the events are mentioned as attributes of FONT tag. The value of each attribute is the name of a function you need to code in JavaScript later. You can give any valid name to the functions. Here, for example, when mouse will enter the text WELCOME, a function named do_enter() will run. Let us assume that when mouse pointer comes over the text, it will turn red and when mouse pointer goes away, it will turn back to green colour.

How will JavaScript access FONT tag to change its colour? The ID attribute in FONT tag. ID identifies the FONT tag uniquely. Here, the ID of FONT tag is mytext. ID attribute should have unique values through out your HTML code. No two tags should have same ID unless you want to manipulate them together. Let us write function do_enter().

```
function do_enter()
{
    mytext.color="red"
}
```

Here, mytext is the ID of FONT tag. Using . (dot) operator of JavaScript, we are accessing the color property(attribute) of FONT tag and setting its value to red. red is a string hence it must be enclosed in double quotes.

Below is function do_out() resetting the font colour to green.

```
function do_out()
{
    mytext.color = "green"
}
```

The Complete Code:

For the ease of understanding, the Javascript part is kept in HEAD and HTML markup is in BODY.

```
<html>
    <head>
        <script language = "JavaScript">
            function do_enter()
            {
                    mytext.color = "red"
            }

            function do_out()
            {
                    mytext.color = "green"
            }
        </script>
    </head>
    <body>
    <FONT ID = mytext size = 7 color = green onmouseenter = "do_enter()"
onmouseout = "do_out()" > Welcome
    </FONT>
</body>
</html>
```

Activity 2: Change text colour when mouse button is pressed and released.

Consider the previous activity where we changed the colour of the text in FONT tag by handling onMouseEnter and onMouseOut events. The same can be achieved by handling onMouseDown and onMouseUp events. You just need to change the event names. The remaining code is not changed.

```
<FONT ID=mytext size=7 color=green onmousedown="do_enter()"
onmouseup="do_out()">Welcome
</FONT>
```

Activity 3: Manipulating Image

We can manipulate images also using mouse interaction such as changing the dimensions of an image.

Let us shrink an image in size with onMouseDown. For this, you need to do the following:

- Display an image using <IMG>
- Give an ID to IMG tag.
- Mention onMouseDown attribute in IMG tag and assign it the function shrink().
- Write function shrink to decrease the height and width of IMG.

The code is given here:

```
<html>
<head>
   <script language="JavaScript">
      function shrink()
      {
            logo.height = logo.height - 5
            logo.width = logo.width - 5
      }
   </script>
</head>
<body>
<IMG id="logo" src="logo.png" height=100 width=200 onmousedown="shrink()">
</body>
</html>
```

Here, when mouse is clicked on the image with ID logo, shrink() is called. In shrink(), the ID logo of IMG tag is used to access height and width attributes of IMG and they are decreased by 5. This way, on every mouse down, the dimensions of the image will decrease and image will shrink in size.

Handling Keyboard Events

Following are the keyboard events:

- **onKeyDown:** It occurs when key is pressed on the keyboard.
- **onKeyUp:** Reverse of onKeyDown. It Occurs when key is released on the keyboard.
- **onKeyPress:** It is the combination of the above two events. It occurs when a key is typed on the keyboard.

Let us try some examples.

Activity 1: Display the text typed in the textbox onto the web page.

Let us assume that we have a text box. When user keys in the text in it, the same text appears on the web page. Here, we shall handle onKeyUp event so that when user has typed the key, the desired action will occur.

```
<html>
<head>
   <script language="JavaScript">
      function display()
      {
            mytext.innerHTML=mytextbox.value
      }
   </script>
</head>
<body>
   <INPUT ID=mytextbox onkeyup="display()">
   <FONT id=mytext size=7></FONT>
</body>
</html>
```

Here, the event onKeyUp is mentioned as attribute of INPUT tag and it is assigned the value, the name of the function display(). The ID of the INPUT tag is mytextbox. To display the text on web page, we have arranged for a FONT tag with no text in it presently. Its ID is mytext. When user types in the textbox, onKeyUp event will occur

for each key typed. As a result, for each such key, function display() will run. Let us see what function display() is doing.

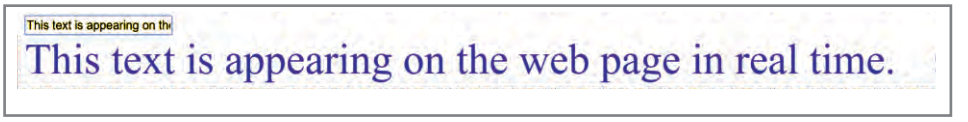
Consider the statement in display():

mytext.innerHTML = mytextbox.value

innerHTML is that area in web page which lies between any start tag and its matching end tag. Here, innerHTML is referred to for mytext which is the ID of FONT tag. So, innerHTML here means the space between <FONT> and </FONT>.

The text typed in the textbox mytextbox is accessed from the value attribute of INPUT tag.

This way, text typed in the textbox mytextbox is assigned to the innerHTML of FONT.



Activity 2: Creating a dynamic Marquee.

Previous activity can be modified to display typed text as a marquee on the web page. We just need to replace FONT tag with MARQUEE tag.

```
<html>
<head>
    <script language="JavaScript">
        function display()
        {
                mymarquee.innerHTML = mytextbox.value
        }
    </script>
</head>
<body>
    <INPUT ID=mytextbox onkeyup="display()">
    <MARQUEE ID=mymarquee width=50% bgcolor=orange style="font-
size:100px;color:white">
    <MARQUEE>
</body>
</html>
```

Handling Button Click

A button is displayed using INPUT tag type as button. When user clicks on the button then onclick event is raised. We can capture this event to respond in various ways.

Activity 1: Display alert message on button click.


```
<html>
<head>
   <script language="JavaScript">
      function show_msg()
      {
         alert("Welcome")
      }
   </script>
</head>
<body>      <INPUT type=button onclick="show_msg()">      </body>
</html>
```

Here, when user clicks on the button, event onclick is generated. In response to it, function show_msg() is displaying the message Welcome.

Activity 2: Display message on the webpage on button click.


```
<html>
<head>
   <script language="JavaScript">
      function welcome()
      {
         mytext.innerHTML="WELCOME TO THE WEB SITE."
      }
   </script>
</head>
<body>
<INPUT type=button value="Please click on me" onclick="welcome()">
<hr>
<FONT id=mytext size=7>  </FONT>
</body>
</html>
```

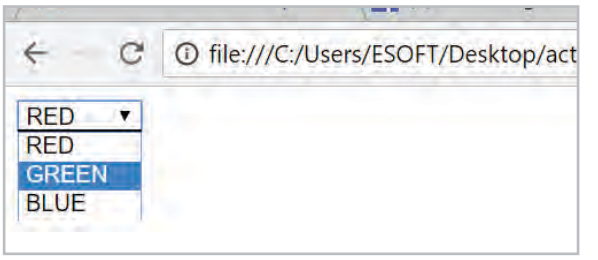
Handling List Selection

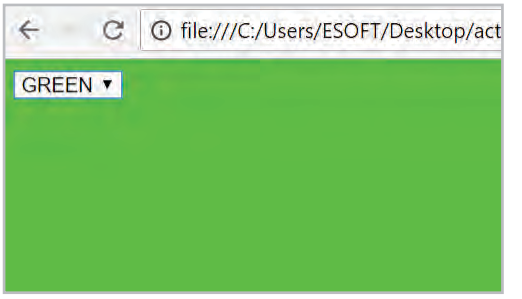
On selecting any value in the SELECT list of HTML, onchange event occurs.

Activity 1: Apply web page background colour selected in a list.

Let us set the BGCOLOR of BODY as the colour selected by the user from a SELECT list.

```
<html>
<head>
    <script language="JavaScript">
        function set_colour()
        {
            mywebpage.bgColor = mylist.value
        }
    </script>
</head>
<body id="mywebpage">
    <select id="mylist" onchange="set_colour()">
        <option value="#ff0000">RED</option>
        <option value="#00ff00">GREEN</option>
        <option value="#0000ff">BLUE</option>
    </select>
</body>
</html>
```





JavaScript provides the property bgColor which is used here for BODY tag. The ID of BODY tag is mywebpage. In set_colour(), ID mywebpage is referring to the BODY tag and its bgColor property is set to the value which is selected in the SELECT list with ID mylist.

This way, using various events and JavaScript properties you can add a variety of interactive responses to your web page.

Glossary

Script : A program that runs embedded within a webpage.
Unary operator : An operator that performs operation on single operand, like ++.

Quick Review

- *JavaScript is a programming language to write programs that run in a webpage.*
- *alert() display text strings and prompt() accepts user input.*
- *parseInt() converts strings to integers.*
- *Functions defined by the user are called user defined functions.*
- *An event is any interrupt raised by user action or software like mouse click, keypress on the keyboard etc.*

Exercise

A. Choose the correct answer.

1. Which of the following statements are true about scripts?
   a) Scripts are compiled and run on individual computers.
   b) Scripts are complex software applications.
   c) Scripts make the web page interactive.
   d) Scripts run after installation.
2. Which of the following keywords is used to declare a variable in Javascript?
   a) variable b) declare
   c) create d) var
3. What is wrong with the statement: 5 + + 7?
   a) + + is a unary operator b) + + is a binary operator
   c) + + is a not an arithmetic operator d) Statement is correct
4. Which of the following statements is not correct about prompt()?
   a) prompt() returns the input value. b) prompt() accepts arguments.
   c) prompt() returns numeric values. d) prompt() returns string type values.
5. Onclick event refers to which of the following events?
   a) Mouse click b) Button click
   c) Webpage click d) Keyboard keypress

B. Fill in the blanks.

concatenation, ID, function, onchange, . (dot)

1. JavaScript identifies the HTML tags by their unique _____.
2. When user makes a selection in the HTML select list, _____ event is raised.
3. The property for an ID is referred to by _____ operator.
4. JavaScript functions are defined by the keyword _____.
5. + operator is used for addition as well as _____.

C. Answer the following questions.

1. Describe the use of parseInt() and toString() with an example.

_____

_____

2. Explain the terms event and event handler with a small example.

3. What do the operators /, %, ++ do? Give examples.

4. Describe any 2 mouse related events with example.

5. What is the use of innerHTML property? Give example.

Lab Activity

1. Write a script that accepts price of 3 items one by one using prompt() and then displays the actual total price and total price after 12.5% discount. Modify this program to use three textboxes instead of prompt() and display the result as innerHTML of an H2 tag.
2. Write a user defined function enlarge() that enlarges the dimensions of an image by 10 pixels when user clicks on a button labelled ENLARGE. Write complete HTML coding also.

Teacher's Signature : _____ *Teacher's Remark :* ☆☆☆☆☆

Beyond the Book

https://developer.mozilla.org/en-US/docs/Learn/Getting_started_with_the_web/JavaScript_basics

Watch & Learn

www.eduitspl.com
www.youtube.com/edusoftknowledgeverse

Teacher Corner

Encourage the students to explore more about JavaScript on Internet.

Introduction to Flash CS6

Dear Students,
You know that computers help us in making animations. Flash is such a computer application to make exciting animations.

Wow Teacher,
This sounds really great to learn about creating animation using Flash.

An animation is the simulation of movement created by displaying a series of pictures or frames. For example, cartoons. An animation is one of the chief ingredients of multimedia presentations. There are many software applications that enable you to create animations that you can display on a computer monitor.

Note

There is a difference between animation and video. Whereas video takes continuous motion and breaks it up into discrete frames, animation starts with independent pictures and puts them together to form the illusion of continuous motion.

Introduction to Flash

Adobe Flash, popularly known as Flash, is a multimedia graphic software that is used to create interactive animated vector graphics for the web as well as for desktop presentations, movies, games, etc.

Starting Flash

1. Click on Start.
2. Click on Adobe Flash Professional CS6.

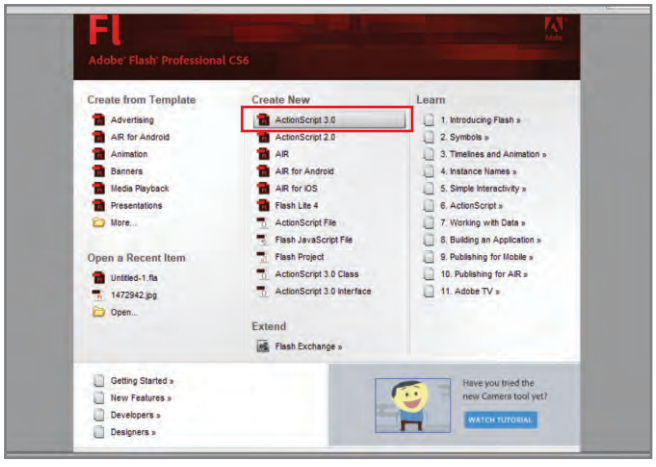


Figure 1: Selecting the type of file

3. In Create New section, click ActionScript 3.0 option. The Flash window appears with by default name 'Untitled-1' (figure-2).

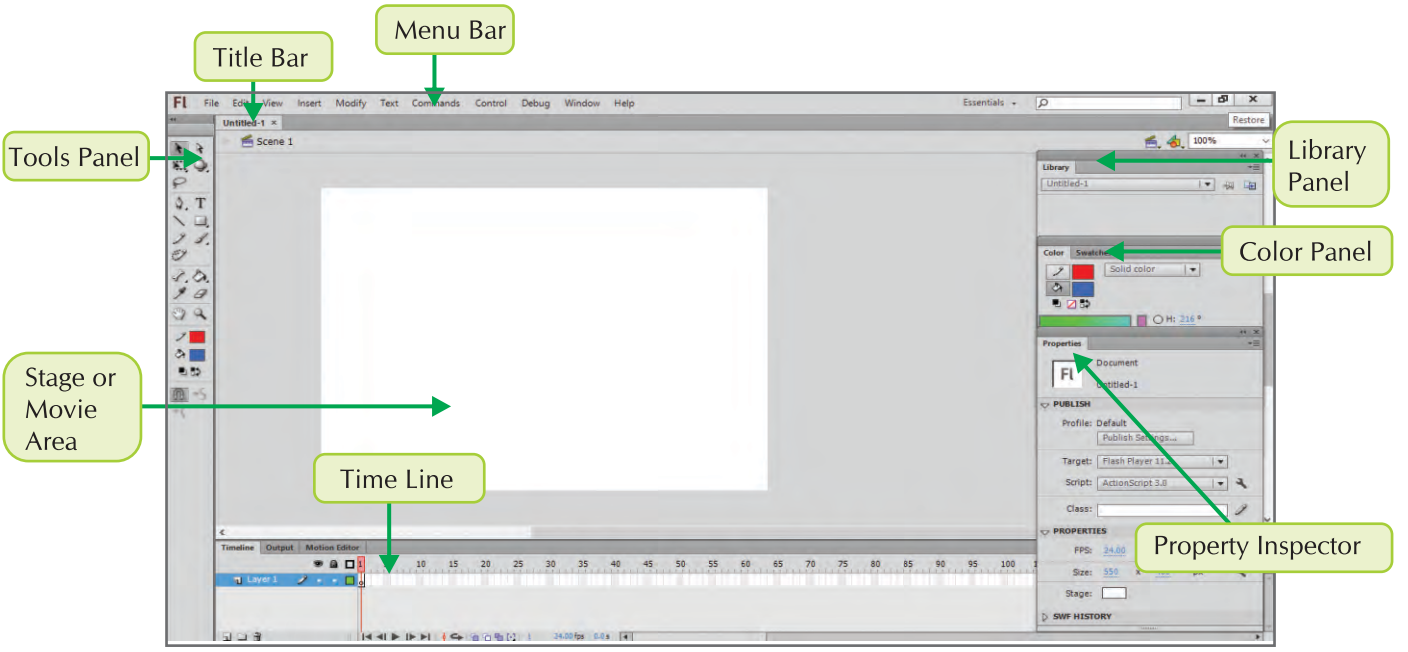


Figure 2: New Flash Document

Main Components of Flash

Menu Bar	Lists the Menu options such as File, Edit, View, Insert, and Help. These menu options include commands to access most of the features of the Flash program.
Edit Bar	Displays the current scene number, the Edit scene button, the edit Symbol button, and the Zoom control.
Toolbar	Contains the Flash tools; the toolbar includes tools for drawing and painting lines and shapes, selecting objects, changing the views of the Stage, and choosing colors.
Work Area	Located in the document window and is used to place objects that are not part of the viewable stage, also used to position objects that move on or off the stage as part of an animation.
Timeline	Located at the document window, displays and contains the layers and frames that make up an animation and organizes the objects that are part of the document.
Panels	Contain controls for viewing and changing the properties of objects.
Property Inspector	Provides easy access to the most common attributes of the currently selected tool or object.
Stage	The Stage is the white area at the center of the window. It is where the Flash movies are created.

Saving a Flash File

The steps to save a flash file are:

1. Click on File menu → Save As. The Save As dialog box appears.
2. Give the file name, select the location to save the file and click Save button.

Tool Box Overview

Flash provides various tools to draw graphic, fill colour, gradient colour and modify the shape drawn by the tools (figure 3).

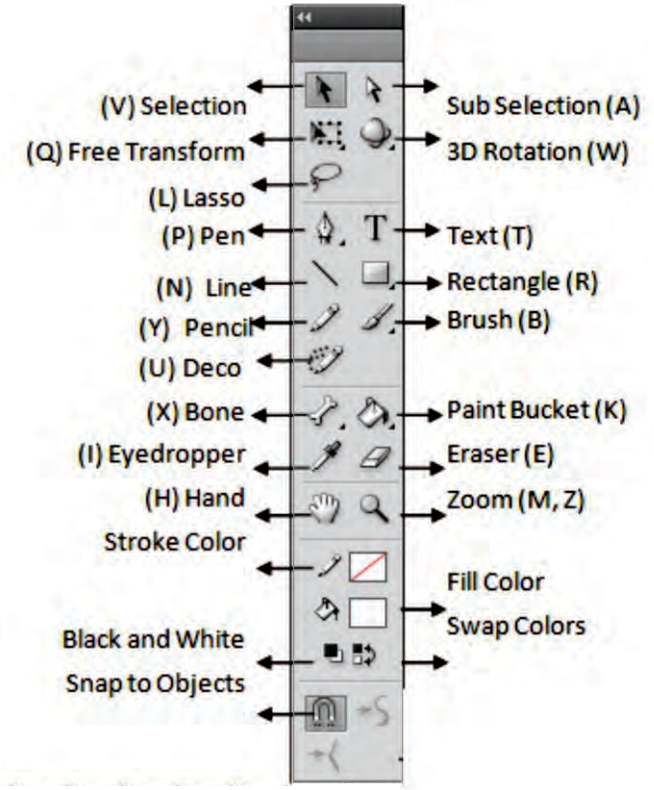


Figure 3: Adobe Flash Professional CS6 Toolbox

Selection Tool

The Selection tool is used most commonly to select and move an item or multiple items on the Stage. It is also used to edit lines and shapes, in a way that is familiar to users who have worked in other vector graphic applications (figure 4).

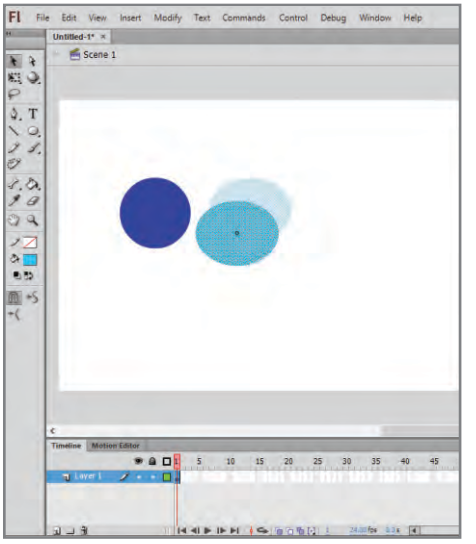


Figure 4: Use of Selection Tool

Sub Selection Tool

The Sub Selection is the companion for the Pen and is found in the Tools panel to the right of the Selection tool. The Sub Selection tool has two purposes (figure 5): To either move or edit individual anchor points and tangents on lines and outlines.

When you position the Sub Selection tool over a line or point, the hollow cursor displays one of the two states:

- When over a line, it displays a small, filled square next to it, indicating that the whole selected shape or line can be moved.
- When over a point, it displays a small, hollow square, indicating that the point will be moved to change the shape of the line.

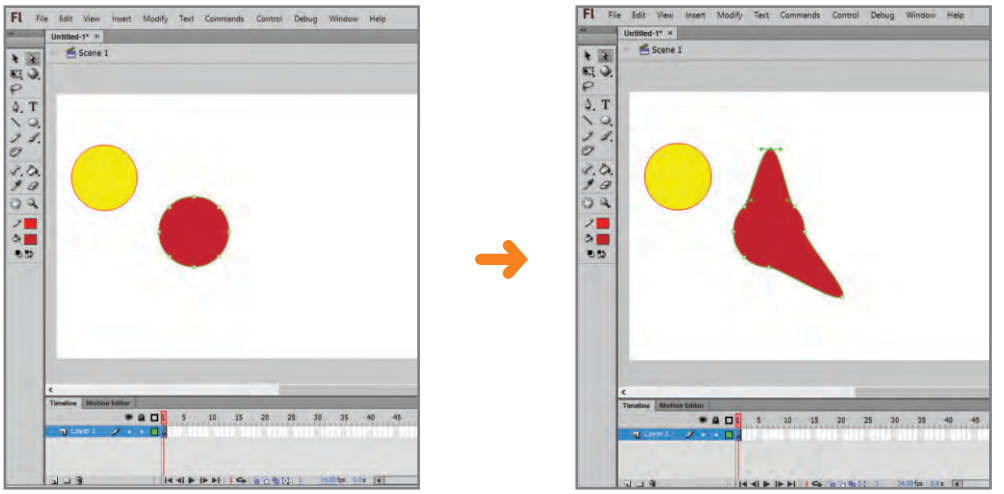


Figure 5: Use of Sub Selection Tool

Lasso Tool

The Lasso tool is used to select a non-regular shaped portion of an object like tree outline (figure 6).

1. Click on Lasso tool on the toolbox.
2. Click and drag the mouse on the image to select the part.

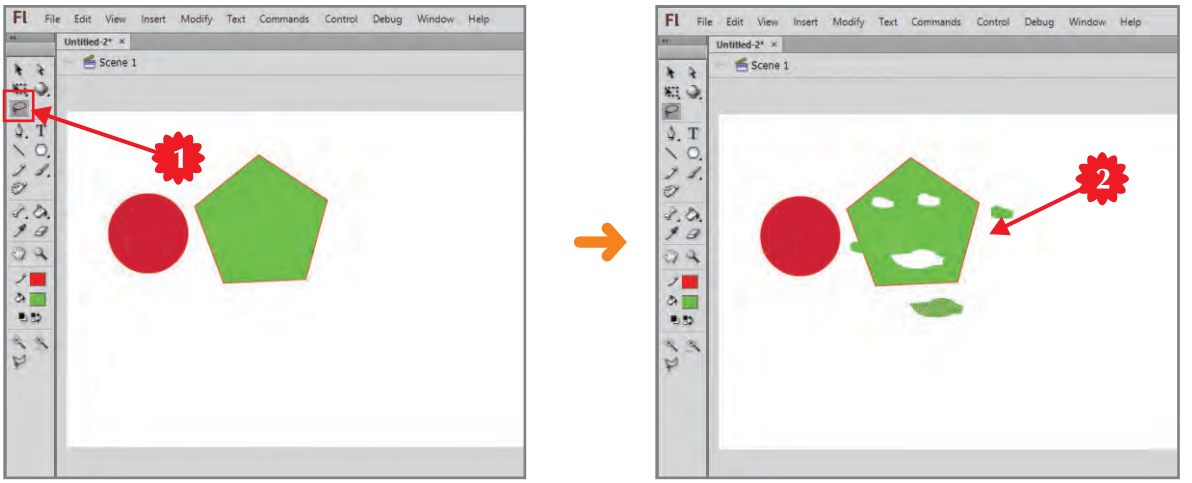


Figure 6: Use of Lasso Tool

Line Tool

The Line tool is used to draw straight lines.

The steps to draw straight lines are:

1. Select the Line tool on the toolbox.
2. Select the properties of stroke from Property Inspector.
3. Click and drag on the Stage to draw straight lines (figure 7).

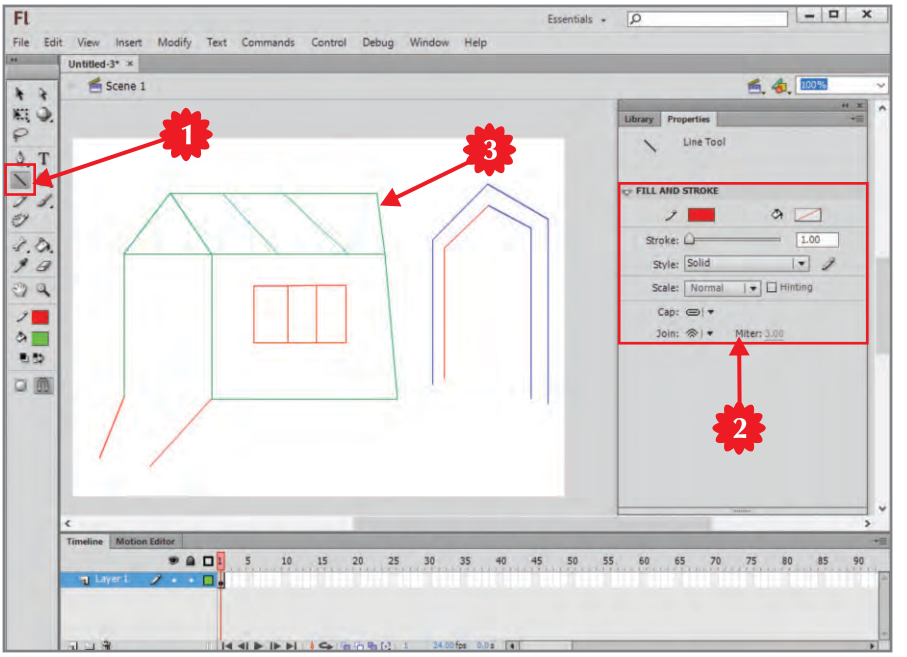


Figure 7: Use of Line Tool

Pencil Tool

The Pencil tool lets you draw free form strokes on the Stage, similar to the way you draw using a regular pencil on a regular sheet of paper.

The steps to use Pencil tool are:

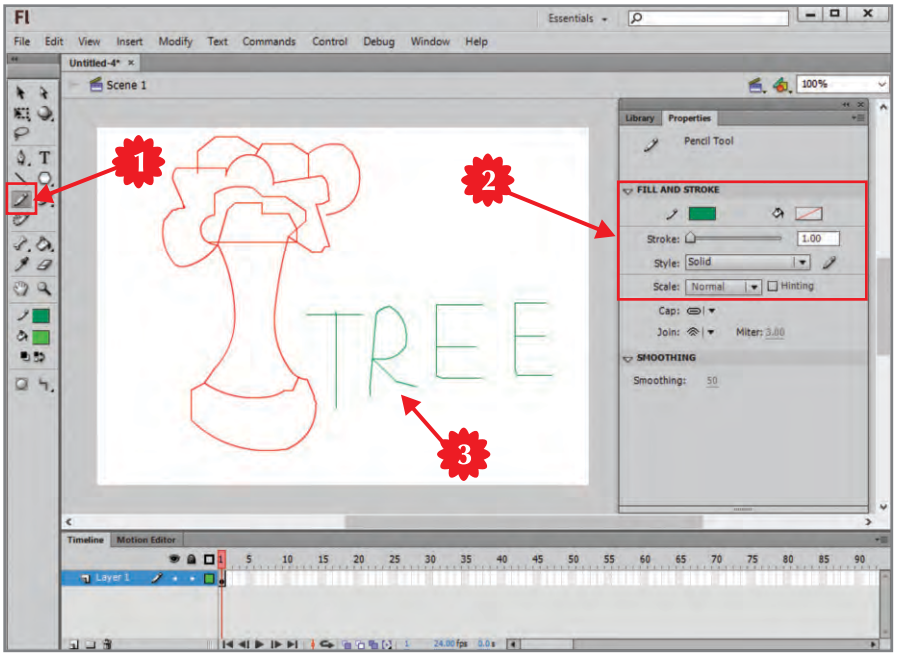


Figure 8: Use of Pencil Tool

1. Select the Pencil tool on the toolbox and select the line's type from Options.
2. Select the proprieties of stroke from Property Inspector.
3. Click and drag on the Stage to draw lines (figure 8).

Pen Tool

Pen tool is used to create a complex shape consisting of a lot of perfect arcs and a lot of perfect straight lines.

To create curved or straight lines with the Pen tool, follow these steps:

1. Select the Pen tool on the toolbox.
2. Select the properties of stroke from Property Inspector.
3. Click and drag on the Stage to draw line with perfect curves (figure 9).

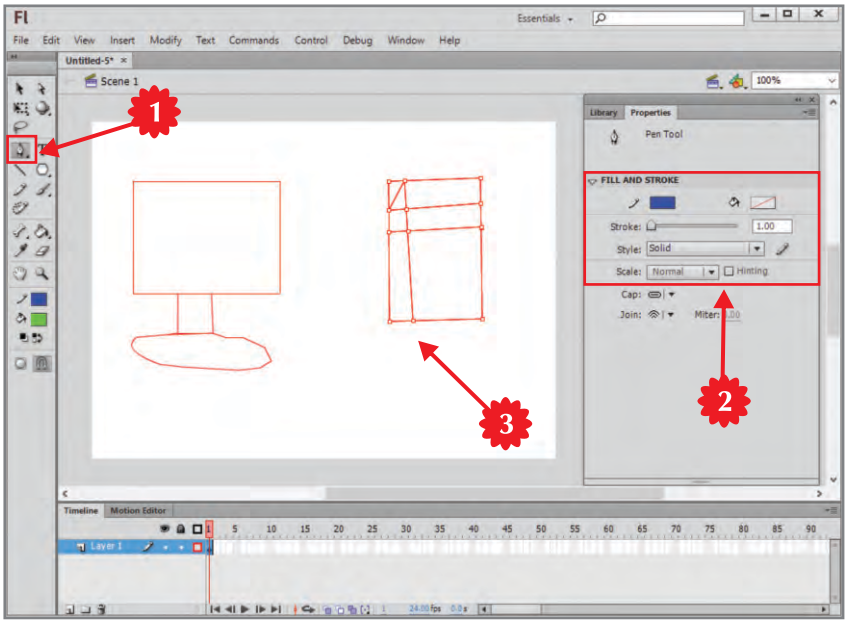


Figure 9: Use of Pen Tool

Oval Tool

Drawing with the Oval tool creates a perfectly smooth ovals and circles.

The steps to use Oval tool are:

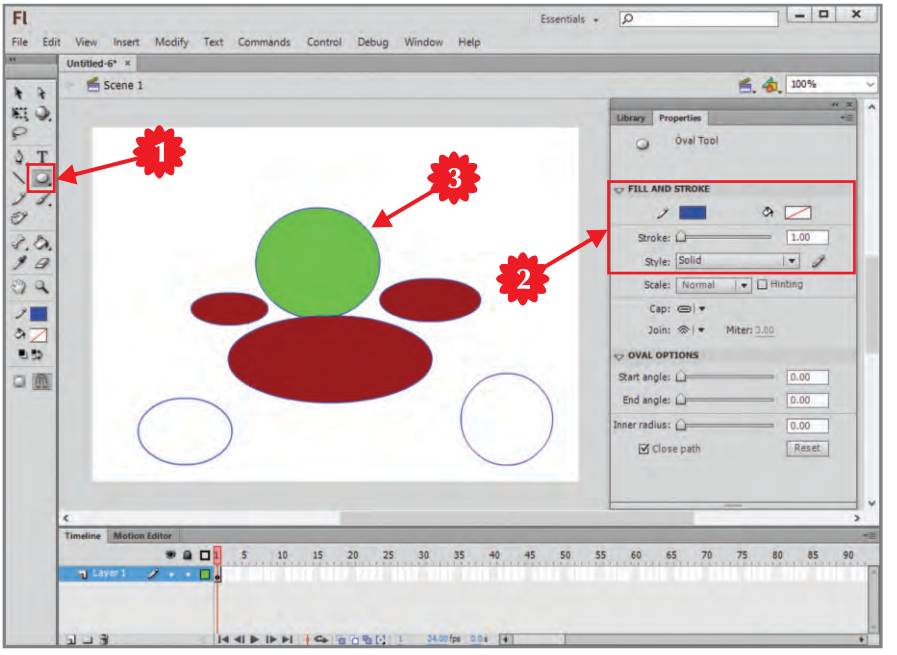


Figure 10: Use of Oval Tool

1. Click Oval tool on the toolbox.
2. Set line colour, style and fill style from Property Inspector.
3. Drag over the Stage to draw oval or circular shapes (figure 10).

Note

To draw a circle, press Shift key, click and drag mouse over the Stage, while keeping Shift key pressed.

Rectangle Tool

The Rectangle tool creates rectangles and squares.

The steps to use Rectangle tool are:

1. Click Rectangle tool on the toolbox.
2. Set line colour, style and fill style from Property Inspector.
3. Drag over the Stage to draw rectangle or square shapes (figure 11).

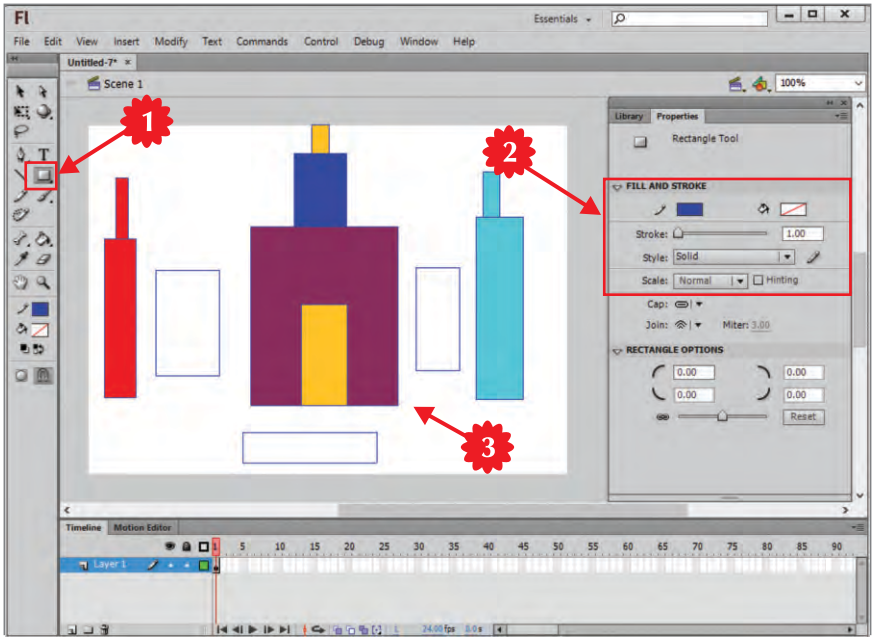


Figure 11: Use of Rectangle Tool

Note

To draw a square, press Shift key, click and drag mouse over the Stage, while keeping Shift key pressed.

Brush Tool

Brush tool is used to create smooth or tapered marks. Unlike the Pencil tool, which creates marks with a single row of anchor points, the Brush tool actually creates marks by using filled shapes. The fills can be solid colours, gradients, or fills derived from bitmaps (figure 12).

The steps to use Brush tool are:

1. Click Brush tool on toolbox.
2. Select brush size, shape and colour.
3. Drag over the Stage to draw oval or circular shapes.

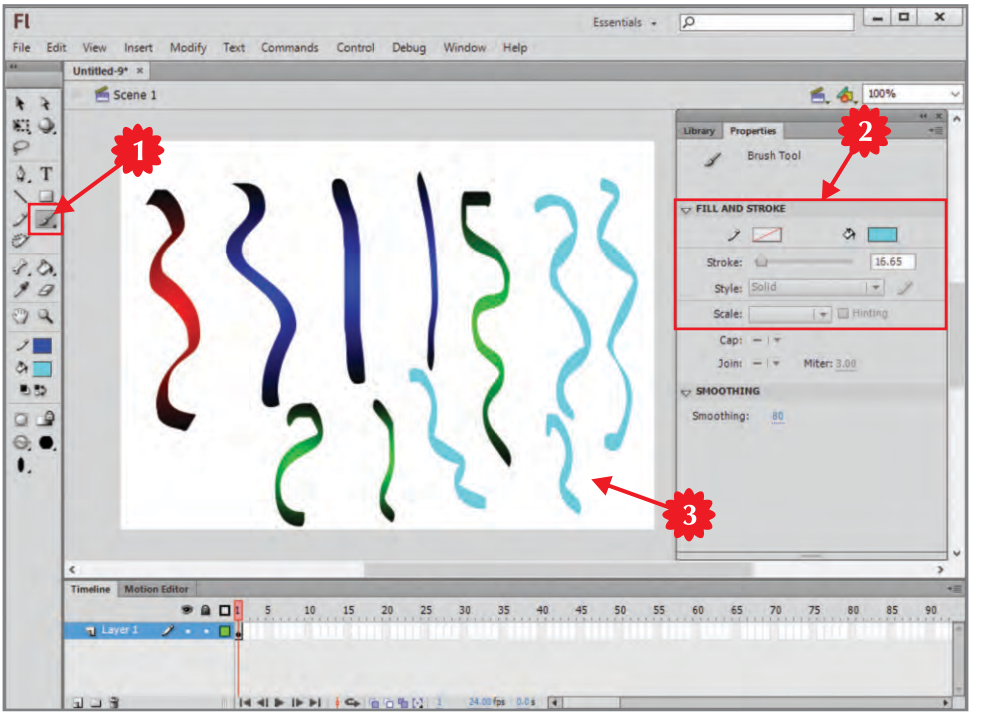


Figure 12: Use of Brush Tool

Eraser Tool

The Erase tool works similar to a classic eraser. Simply select the tool and drag on the Stage to erase things.

Double-click Eraser Tool

To erase all, you can double-click the Eraser tool to delete everything on the stage. (If it is done by mistake you can use shortcut Ctrl + Z to undo).

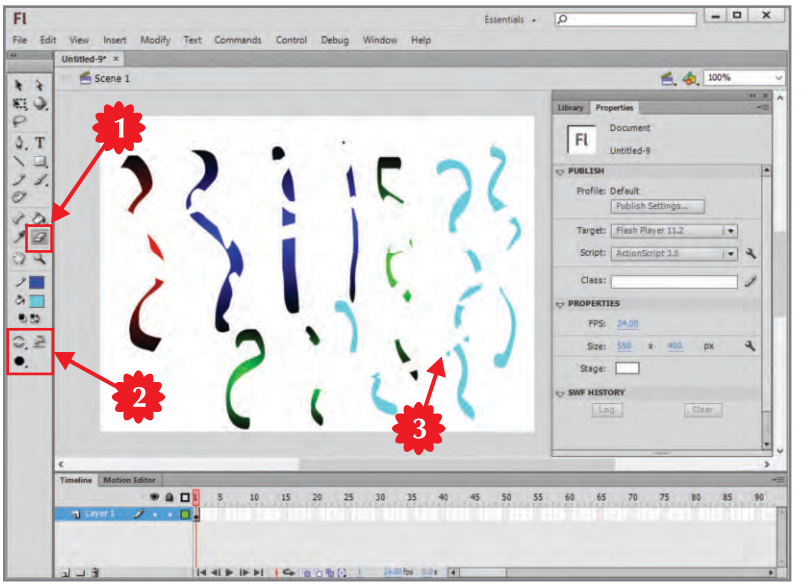


Figure 13: Erase Normal

Using the Eraser Mode Option

In the options listed at the bottom of the toolbox you can specify the Eraser Mode:

Erase Normal: Erases strokes and fills on the same layer (figure 13).

Erase Fills: Erases only fills; strokes are not affected (Figure 14).

Erase Lines: Erases only lines; fills are not affected (Figure 15).

Erase Selected Fills: Erases only the currently selected fills and does not affect strokes, selected or not. (Select the fills you want to erase before using the Eraser tool in this mode.)

Figure 14: Erase Fill

Figure 15: Erase Line

Erase Inside: Erases only the fill on which you begin the eraser stroke. If you erase from an empty point, nothing will be erased. Strokes are unaffected by the eraser in this mode.

Using the Faucet Option

To remove stroke segments or filled areas:

1. Select the Eraser tool and then click the Faucet modifier.
2. Click the stroke segment or filled area that you want to delete.

Using the Eraser Shape Option

In the options listed at the bottom of the toolbox there is a drop down that lets you specify the Eraser shape and size. Use this option to customize the size and look of the eraser.

Ink Bottle Tool

The Ink Bottle tool lets you change the stroke colour, line width and style of lines or shape outlines. Using the Ink Bottle tool, rather than selecting individual lines and objects, makes it easier to change the stroke attributes of multiple objects at one time (figure 16).

The steps to use the Ink Bottle tool are:

1. Select the Ink Bottle tool.
2. Choose a stroke colour as described in using the Fill and Stroke controls in the toolbox.
3. Choose line style and line width from the Stroke panel.

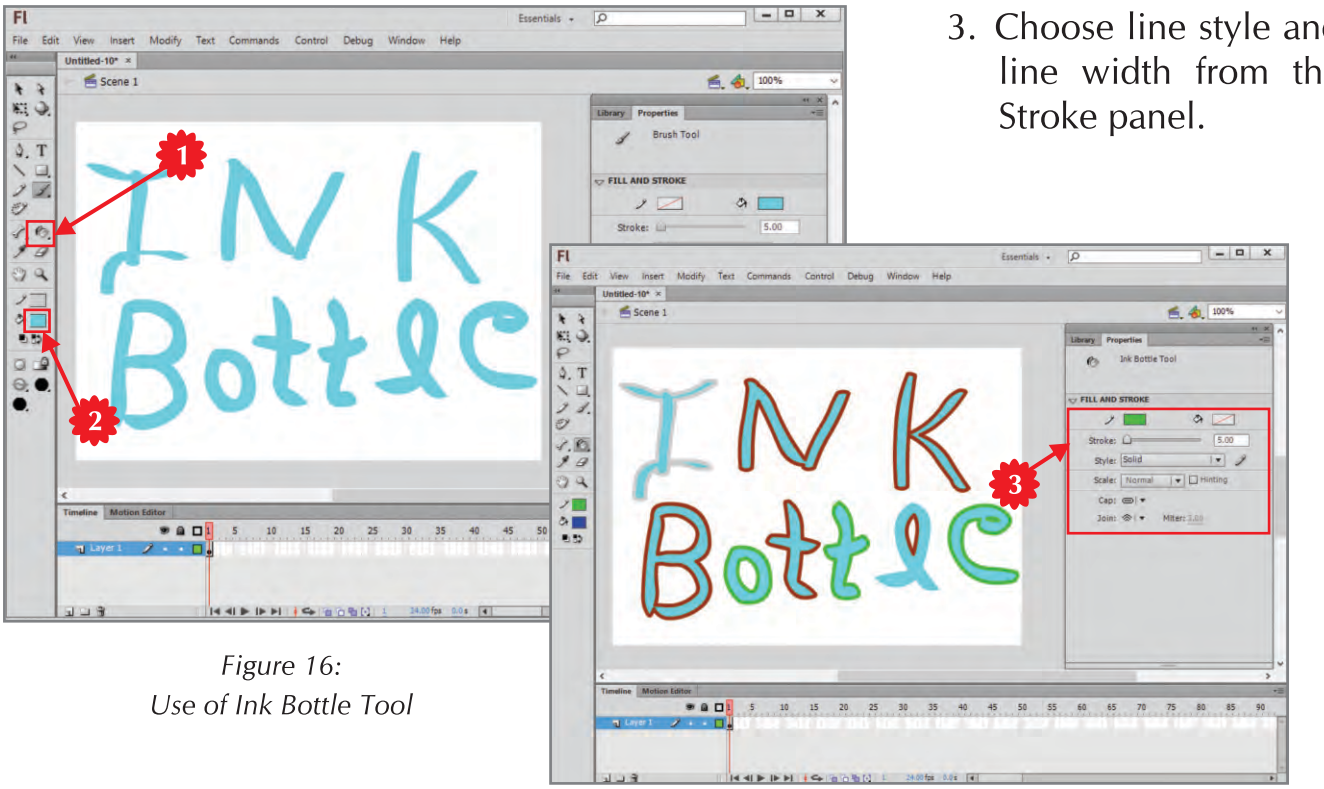


Figure 16:
Use of Ink Bottle Tool

Paint Bucket Tool

The Paint Bucket tool fills enclosed areas with colour. It can both fill empty areas and change the colour of already painted areas. You can paint with solid colours, gradient fills, and bitmap fills (figure 17). You can also use the Paint Bucket tool to adjust the size, direction, and center of gradient and bitmap fills.

The steps to use Paint Bucket tool to fill an area are:

1. Select the Paint Bucket tool.
2. Choose a fill colour from the Color tool box.
3. Click the Gap Size modifier and choose a gap size option (figure 17b):
   - Don't Close Gaps: If you want to close the gaps manually before filling the shape. Closing gaps manually can be faster for complex drawings.
   - Choose one of the Close options to have Flash fill a shape that has gaps.

4. Click the shape or enclosed area that you want to fill.

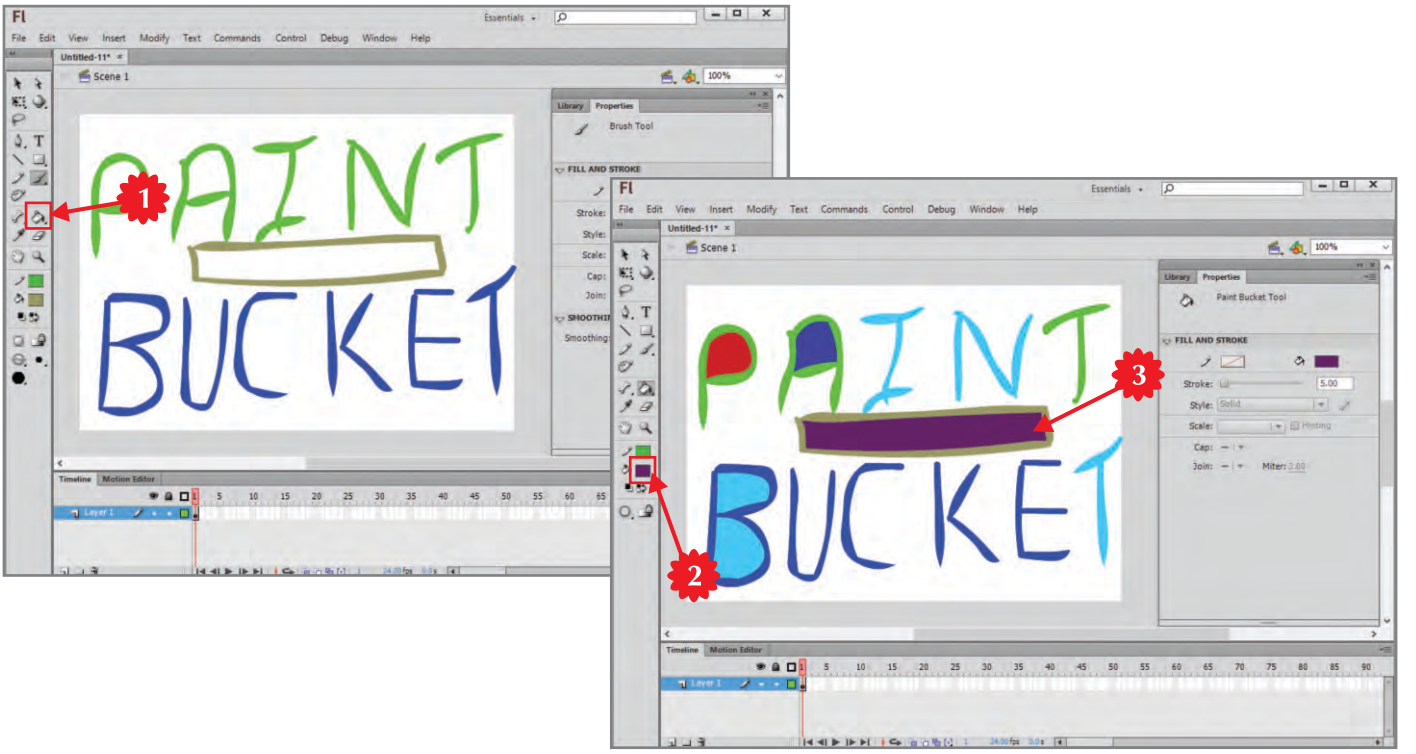


Figure 17a: Use of Paint Bucket Tool

The steps to adjust a gradient or bitmap fill with the Paint Bucket tool are:

1. Select the Paint Bucket tool.
2. Click the Transform Fill.
3. Click an area filled with a gradient or bitmap fill.

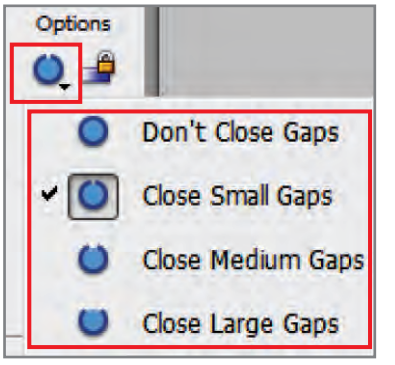


Figure 17b: Options available in 'Gap Size'

The Timeline

The Timeline is the area where we organize and control time based animation in Flash. Flash documents divide lengths of time into frames. In our document, we can set how many frames are shown per second. This is known as the frame rate. When the frames are shown in a sequential order, our brain interprets changes between frames as animation. When an animation has a slow frame rate we are able to see each frame individually and the movement appears choppy. When the frame rate is high our brain can no longer pick out individual frames and the animation looks clean.

To give you a reference for what typical frame rates are, keep these numbers in mind. The default fps (frames per second) setting in Flash is 12fps. A typical Hollywood movie uses 24fps and TV movies are usually around 30fps. It is not necessary for a

Flash document to have a frame rate of 24 or 30 fps since animations are typically used on the Web and a higher frame rate dramatically increases the size of the document. 12 fps gives us a smooth animation without a large file size.

The Timeline layout

Different components of the timeline (figure 18).

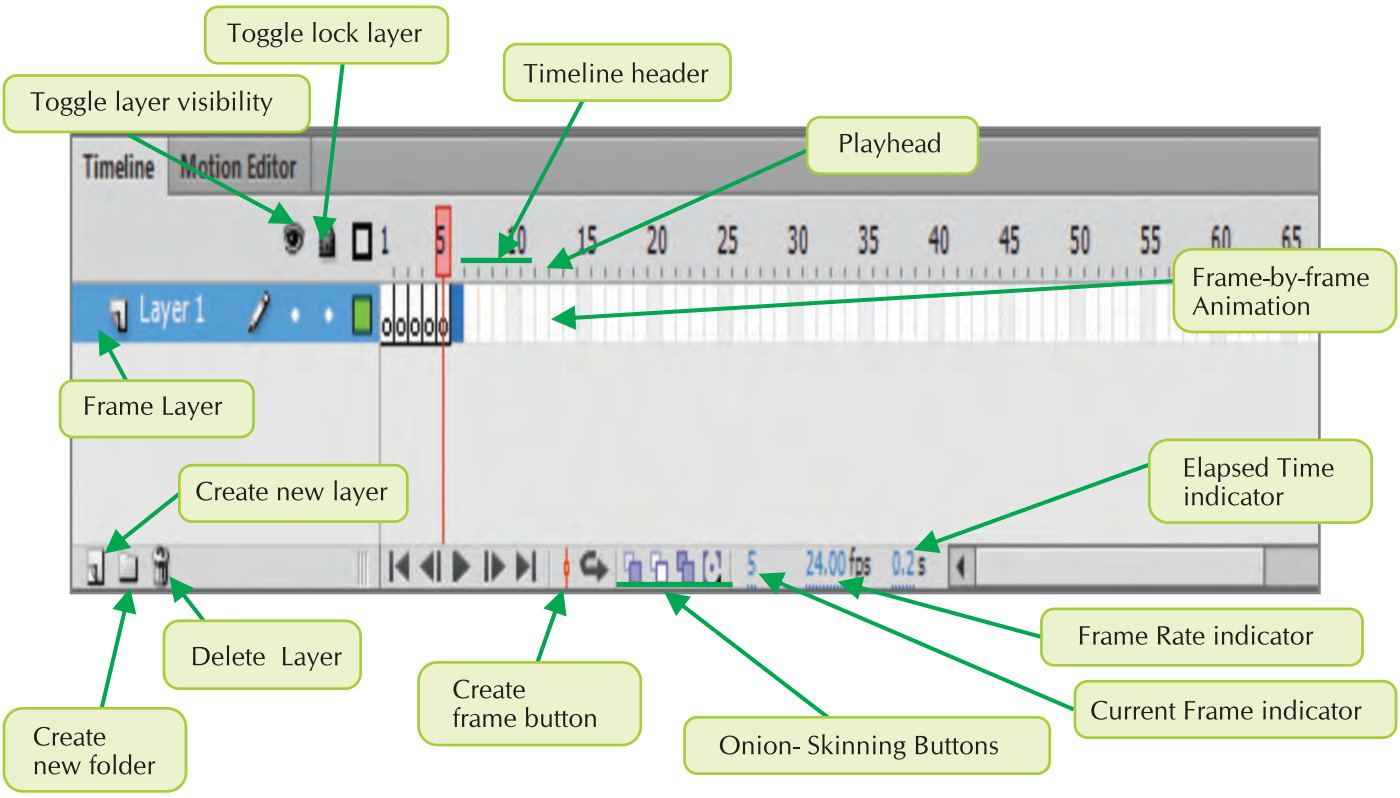


Figure 18: Timeline Layout

Layer

Layers are used to determine which elements appear in the foreground and which appear in the background, creating a visual stacking order for objects on the Stage.

While a single layer is sufficient for static graphics, computer-assisted animations require their own layers. To create multiple animations, you need multiple layers. Layers appear above the Stage in the main Flash document window, in a timeline. The timeline actually resides in its own panel, which is anchored at the top of the main document window by default.

Working with Layers

The standard view of a layer is the one that shows the image. Let's see the different buttons available in the Layers panel and how to use them.

Adding layers

New layers can be added as needed when working with a particular scene in the Flash movie.

The steps to add an additional layer are:

1. In the Timeline, click one of the existing Layers to select it (figure 19).
2. Select the Insert menu → Timeline → Layer. A new layer will be created on top of the selected layer. The layer will be given a default name (figure 20).

   Or

   Select the Insert layer button on Timeline panel, the new layer will be inserted.

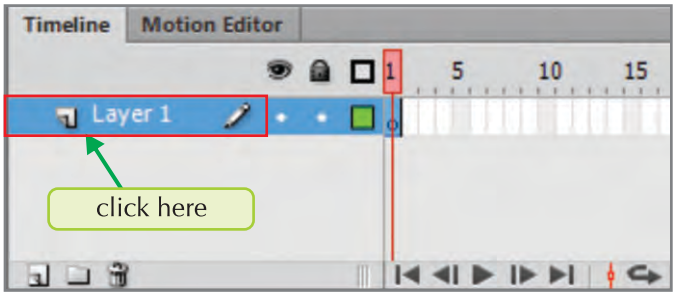


Figure 19: Selecting a Layer

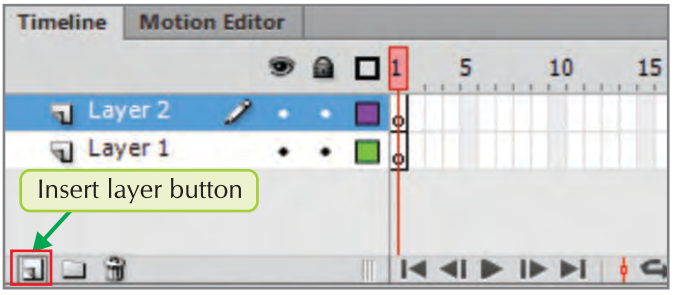


Figure 20: The Insert Layer Button

Note

Another way to add a layer is by clicking the Insert Layer button (figure 20).

Renaming Layers

By default, each layer is named in numeric sequence such as 'Layer 1', 'Layer 2', 'Layer 3' and so on. It is always more useful to assign meaningful names to each layer so that their function within the Flash project is understood. Meaningful names can be assigned to a layer by renaming it.

The steps to rename a layer are:

1. In the Timeline, double-click on the layer name (figure 21). The layer name will appear in a text box with the entire name selected.
2. Enter the desired name of the layer.
3. Press the Enter key.

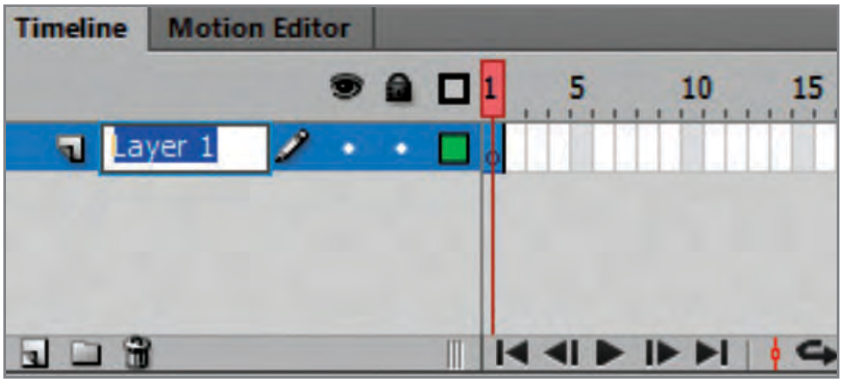


Figure 21: Renaming a Layer

Working with multiple layers

As previously discussed, layers provide a means to manage and control specific elements of a Flash project. In the coming sections, we will illustrate the use of multiple layers in a project.

The steps to create a circle layer are:

1. Open a new Flash document.

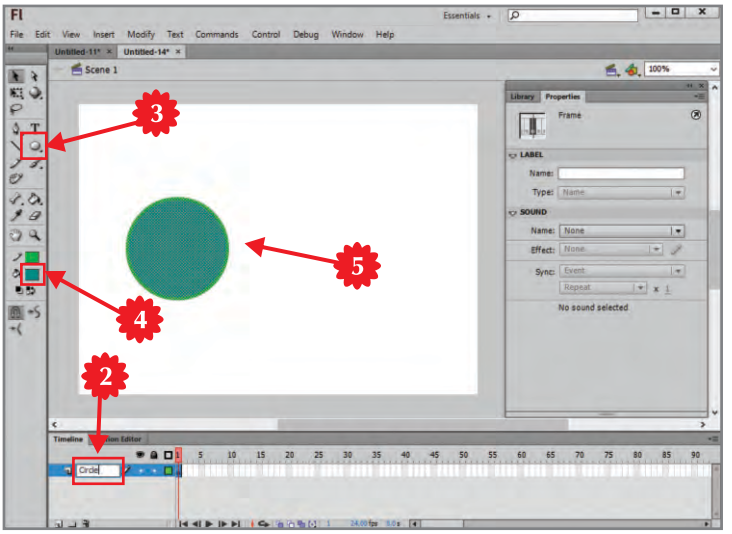


Figure 22: Circle Layer

2. In the Timeline, double-click on the default layer name and rename the layer: 'Circle'.
3. In the Tools panel, select the Oval Tool ( ).
4. In the Colors panel, set the fill color as required.
5. Draw a circle in the middle of the stage (figure 22).

The steps to create a rectangle layer are:

1. Insert a new layer from Insert menu → Timeline →Layer.
2. *A new layer is added above the 'Circle' layer in the Timeline. Double-click on it and rename it to 'Rectangle'.*
3. In the toolbox panel, select the Rectangle tool ( ).
4. In the Colors panel, set the fill colour as required.
5. Draw a rectangle on top of the circle on the Stage (figure 23).

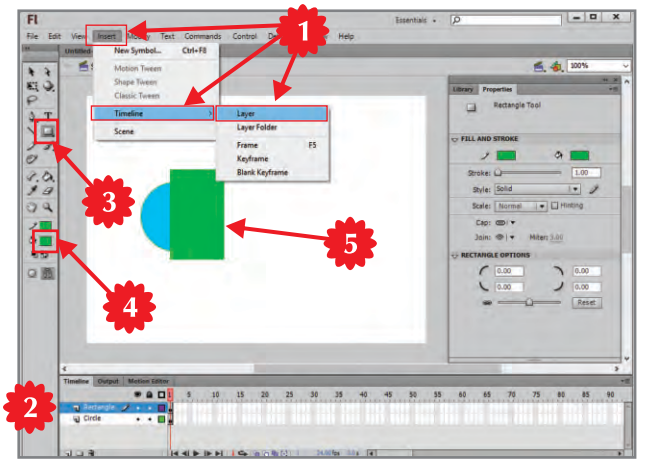


Figure 23: Rectangle on Top of a Circle

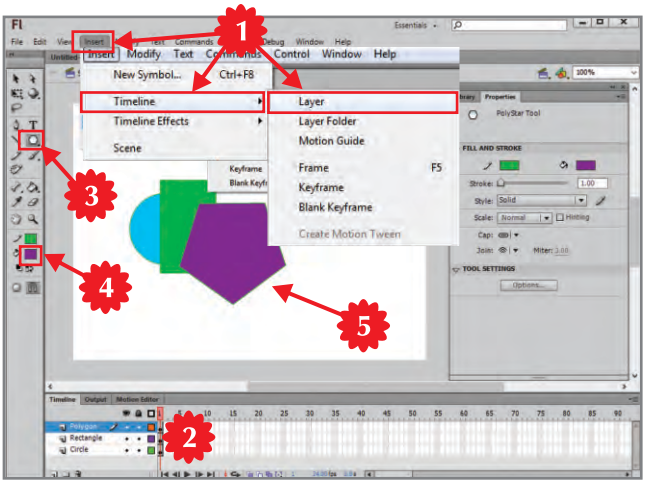


Figure 24: Polygon on Top of a Rectangle

The steps to create a polygon Layer are:

1. Insert a new layer from Insert menu → Timeline →Layer.
2. *A new layer is added above the 'Rectangle' Layer in the Timeline and rename it to 'Polygon'.*
3. Right-click on Rectangle tool in the toolbox panel and select the PolyStar tool.
4. In the Colors panel, set the fill colour as required.
5. Draw a polygon on top of the rectangle on the Stage (figure 24).

Note

Notice how the graphics are distributed on the different layers. The layer on the top will always have priority over the lower levels. This priority ordering can be modified by changing the order of the layers. At present the "Polygon" Layer is on the top. By putting the "Polygon" Layer below the "Rectangle" Layer, the "Rectangle" Layer will have priority over the "Polygon" Layer.

The steps to change the layer order are:

On the Timeline, left-click and drag 'Polygon' Layer below the 'Rectangle' Layer (figure 25). The 'Rectangle' Layer will now be on top of the 'Polygon' Layer (figure 26).

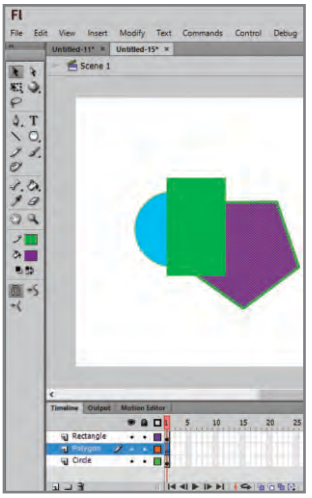


Figure 25: Changing the Layer Order

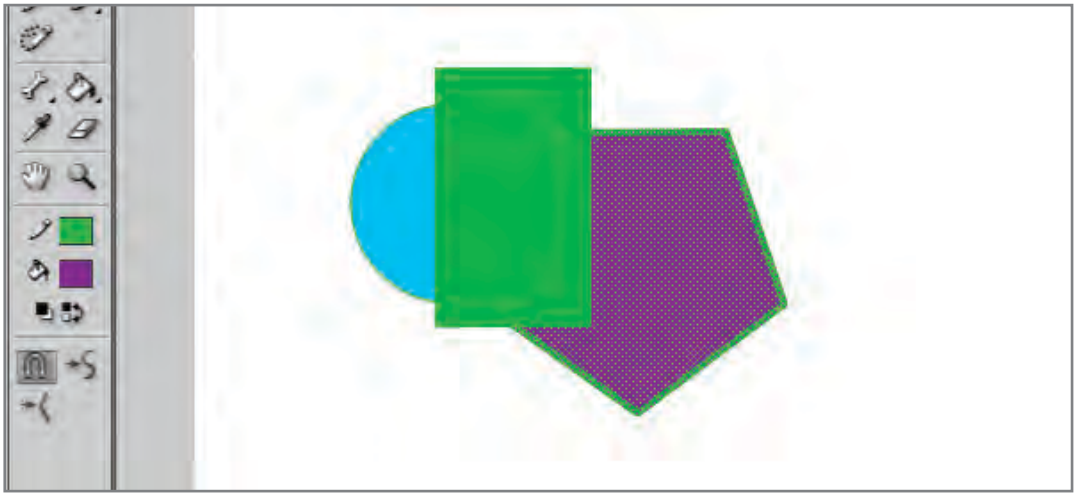


Figure 26: Rectangle on the top of Polygon

Advanced Layer Techniques

In addition to adding, renaming and changing the order of layers, there are additional features that make it easier to work with layers. These include locking and hiding layers.

Locking and Unlocking a Layer

Locking layers is particularly useful when many layers are used and the user does not want a particular layer or layers to be modified.

To lock a layer:

- In the Timeline, click the Bullet button below the Lock/Unlock All Layers button of the Layer to be locked. Once clicked, the Bullet will change to the Lock/Unlock button.

To unlock a layer:

- Click the Lock/Unlock button.

Hiding and Displaying a Layer

Hidden layers are useful when working with multiple layers. Instead of viewing all the layers at once, layers can be hidden from view to make the work easier.

To hide a layer

- In the Timeline, click the Bullet button below the Show/Hide All Layers button of the layer that will be hidden. Once clicked, the Bullet will change to the Cross button.

To display a hidden layer

- Click the Cross button.

Frames

Animation is the rapid display of sequential still images that, when displayed fast enough give the illusion of motion. In Flash we call each of these still images a Frame.

Frame(s): Refer to the still images that when shown sequentially, create the illusion of animation.

FPS: It stands for Frames Per Second. When the FPS number is between 16 and 24, the human brain can perceive motion.

Keyframe: Keyframes are the drawings which define a movement. In the workflow of traditional hand-drawn animation, the senior or key artist would draw the keyframes. After testing and approval of the rough animation, the scene would be handed over to their assistant. In Flash, the keyframes represent the starting and ending points for tweens.

Creating a Simple Animation

Let us now learn to create simple actions in Flash with an example.

1. Click the initial frame on timeline.
2. Choose the Oval Tool from the toolbox and make a ball at the middle left corner of the stage.
3. Select the Arrow Tool to get the mouse pointer. Right-click on frame 1 and select Insert Keyframe (figure 27).

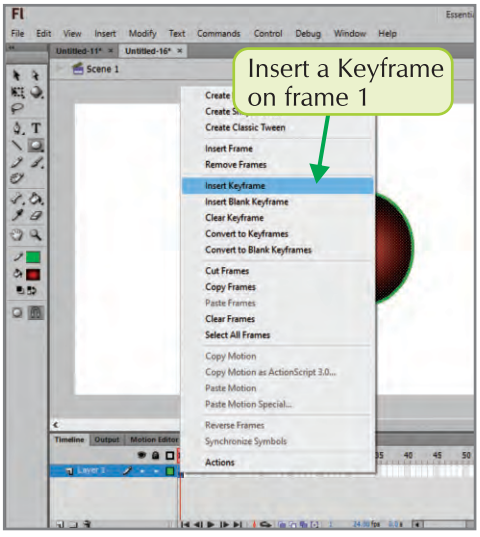


Figure 27: Insert Keyframe on frame 1

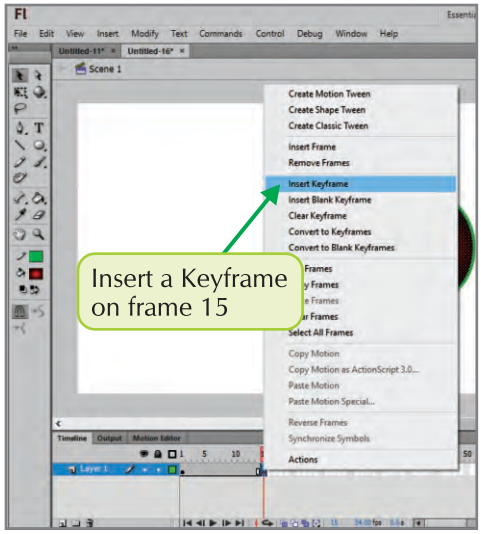


Figure 28: Insert key Frame on frame 15

4. Select the 15th frame from timeline and select Insert Frames option. The grey frames appear on timeline. (figure 28).
5. Now click on frame 8. Right-click and select Insert Keyframe. A black dot appears on this

frame on the timeline (figure 29).

6. Click the ball and drag it to the center bottom of the stage.
7. Now select frame 15. Right click and select Insert Keyframe as done earlier at frame 15.
8. Select and drag the ball from middle left corner to top right corner of the stage (figure 30).
9. Now you have the ball at three positions as indicated by frames 1, 8, 15.

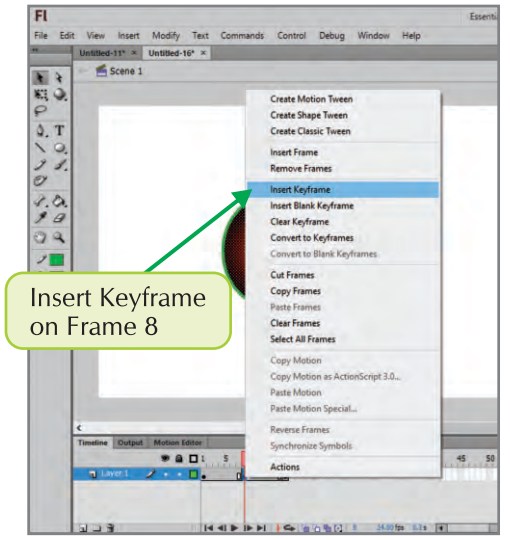


Figure 29 : Insert Keyframe on frame 8

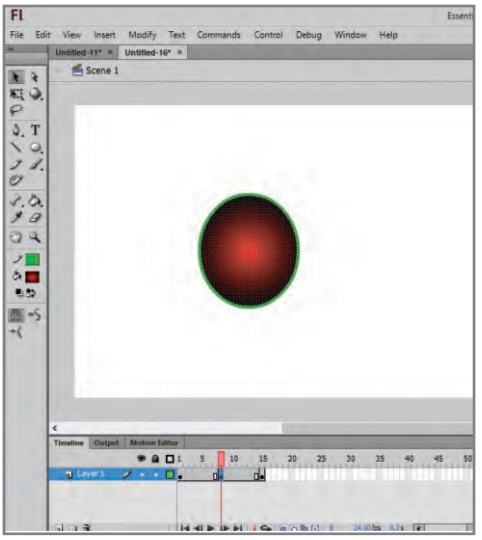


Figure 30: Drag to top right corner

10. Click on Control menu → Play option. The ball will appear to bounce once.
11. To repeat the bouncing, click Control menu → Stop option.

Glossary

Keyframe	:	A keyframe in animation and film making is a drawing which defines the starting and ending points of any smooth transition.
Frame	:	Frames are rectangular areas meant for inserting graphics and text. They allow users to place objects wherever they want to appear on the stage.
Pen Tool	:	Allows you to draw precise paths as straight lines or smooth, flowing curves.
Panels	:	Panels allow you to change related items in a document.
Stage	:	The Stage is the area in a Flash Movie that will become visible in the final published Movie.
Layer	:	It refers to the transparent sheet to perform tasks such as composing multiple images, adding text to an image, or adding vector graphics and shapes.

- *Flash is a multimedia platform that is used to create stand-alone and web animations and applications that are interactive.*
- *The menu bar is aimed to make easier access to different program features.*
- *The Flash toolbox helps you to create and modify shapes for the network in movies.*
- *Hand tool is used to move document on any side or just hold down the spacebar and move the file with the help of a mouse.*
- *The Oval tool is used to make circular objects.*
- *The Pencil tool is used in the same way that you would use a real pencil to draw.*
- *Pen tool is used to allow you to draw precise paths as straight lines or smooth, flowing curves.*
- *Animation is the rapid display of sequential still images that when displayed fast enough give the illusion of motion.*
- *The Timeline is the area where we organize and control time based animation in Flash.*

Exercise

A. Choose the correct answer.

1. Which of the following tools is used to select a nonregular region of an image?
   a) Pen ☐ b) Lasso ☐
   c) Selection ☐ d) None of these ☐
2. Which of the following tools is used to complex shapes?
   a) Line ☐ b) Hand ☐
   c) Oval ☐ d) Pen ☐
3. In Flash, to create a striaght line, _____ tool can be used.
   a) Eraser ☐ b) Pencil ☐
   c) Pen ☐ d) Line ☐
4. Which of the following tools works as a classic eraser on the Stage.
   a) Selection ☐ b) Lasso ☐
   c) Paint Bucket ☐ d) Eraser ☐
5. To draw a circle, click on ____, press ___ key and drag the mouse over the stage.
   a) Hand, Alt ☐ b) Circle, Ctrl ☐
   c) Paint, Tab ☐ d) Oval, Shift ☐

B. Fill in the blanks.

Ink Bottle, Layers, Keyframes, Panels, 12

1. _____ contain controls for viewing and changing the properties of objects.
2. _____ provide a means to manage and control specific elements of a Flash project.
3. _____ are the drawings which define a movement..
4. The _____ tool allows changing stroke colour, shape outlines, line width etc.
5. The default frame rate in Flash is _____ fps.

C. Answer the following questions.

1. List salient features of Flash.

2. What is the use of Sub-selection tool?

3. What is the significance of Timeline in managing frames and layers?

4. Why do we need to take multiple layers in a Flash document? How a layer is identified uniquely in an animation?

5. How will you change the sequence of layers in an animation?

6. Explain the statement: “An animation is a series of Frames”.

7. What is the use of Keyframe in a Flash Document?

_____

_____

_____

Lab Activity

1. Draw 3 boxes and apply suitable tweening to make them move from one point to other.
2. Create a simple drawing to show sea, sky, sun and clouds. Apply animation for showing sunset until sun sets completely and darkness befalls.
3. Draw a simple helicopter and make it fly from left to right with its fan rotating.
4. Draw two simple flying saucers that should fly on the stage and hit each other.
5. Create an animation to simulate a progress bar from 1% to 100%. After it reaches 100%, display the message: *Download complete*.

Teacher's Signature : _____ *Teacher's Remark :* ☆☆☆☆☆

Beyond the Book

https://www.adobe.com/devnet/flash/articles/create-first-flash-document.html
https://helpx.adobe.com/flash/archive.html

Watch & Learn

www.eduitspl.com
www.youtube.com/edusoftknowledgeverse

Teacher Corner

Teachers are advised to provide a simple assignment to the students to make a picture story about their school, family or hobby in Flash with simple animation.

Flash CS6: Advanced Features

Dear Teacher,
We have already learnt the basics in Flash. We are keen to explore powerful animation features of Flash.

Yes Students,
In this chapter we shall learn about the concepts related to make effective animations in Flash.

Symbol

In addition to the texts and shapes, your movies can include symbols. You can create new symbols or convert existing objects such as texts or shapes. You can easily change attributes such as brightness, tint and alpha transparency (the opacity of the object). Symbols are stored in the library for the current document. To use a symbol in your movie:

1. Drag in an instance of the symbol from the Library panel to the Stage.
2. When the dialog box appears, enter a name for your new symbol.
3. Select its behaviour.

Let us see which behaviour is used for what purpose.

A graphic symbol is used for creating a static image. You can use a graphic symbol multiple times on your stage. When you create a Motion Tween, it automatically converts the object you are Tweening into a graphic symbol.

A button symbol is used to create interactive buttons that can have rollover effects and animation applied to them. Buttons are used to trigger events by the user.

A movie Clip is used to create a reusable piece of animation. Movie clips have their own timeline that is independent of the main timeline. Movie clips can be used to create animated buttons.

To convert a shape into a symbol

The steps to convert a shape into a symbol are:

1. Draw a circle using Oval tool.

2. Use the Selection tool and select the circle.
3. Select Modify →Convert to Symbol on the menu bar (Figure 1). The Convert to Symbol dialog box opens.

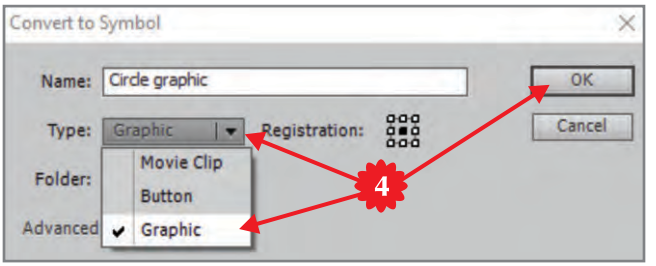


Figure 2: Convert to Symbol dialog box

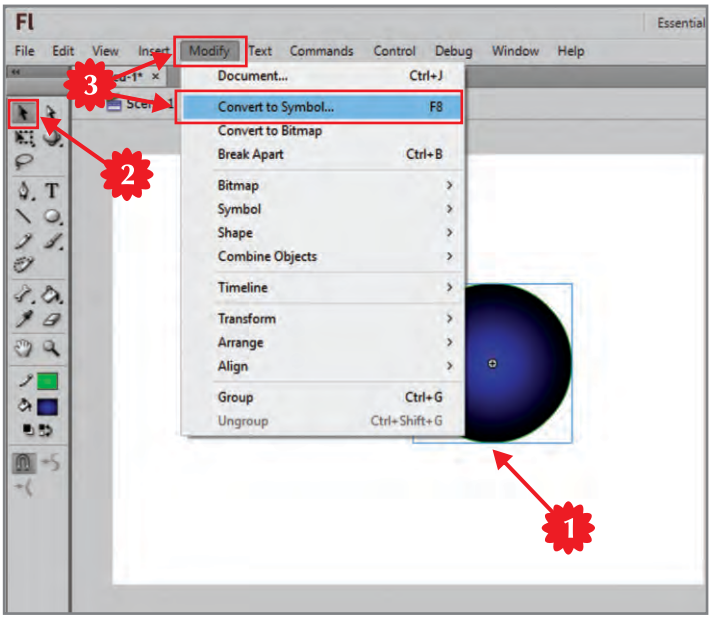


Figure 1

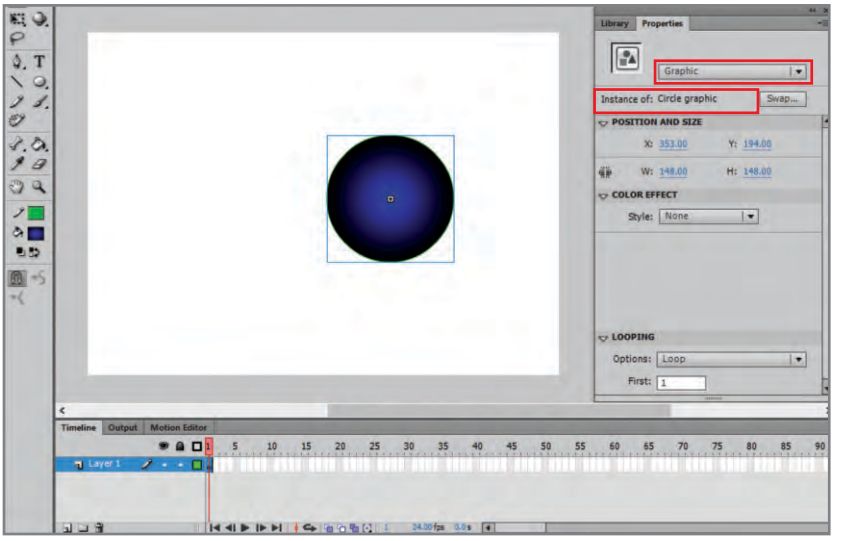


Figure 3

4. Name the symbol Circle graphic, select Graphic as the option and click on OK button (Figure 2).

   A blue outline and small circle in the middle of the circle appears and it indicates that the shape is converted into is a symbol.

The Property Inspector shows that it is an instance of the circle graphic symbol (Figure 3). The actual symbol is stored in the memory.

Library

All symbols used in Flash movie are stored in the Library from where you can drag and drop the new instances of symbols into your movie.

When a symbol is used outside the library it is called an instance. The instance refers to the symbol. There is no limit to how many instances that can be created from a symbol. When the symbol is edited, all the instances referring to the symbol will change accordingly.

The steps to create a symbol are:

1. Insert a new Flash Document from File menu →New.
2. Click on Insert menu →New Symbol. The Create New Symbol dialog box appears.
3. Type 'Circle' in Name: text box, select Graphic option in the Type: section and click on OK button.

4. The symbol definition scene appears. Click on Oval Tool ( ) in the toolbox and draw a circle anywhere in the first frame.

   A symbol is created on the frame.

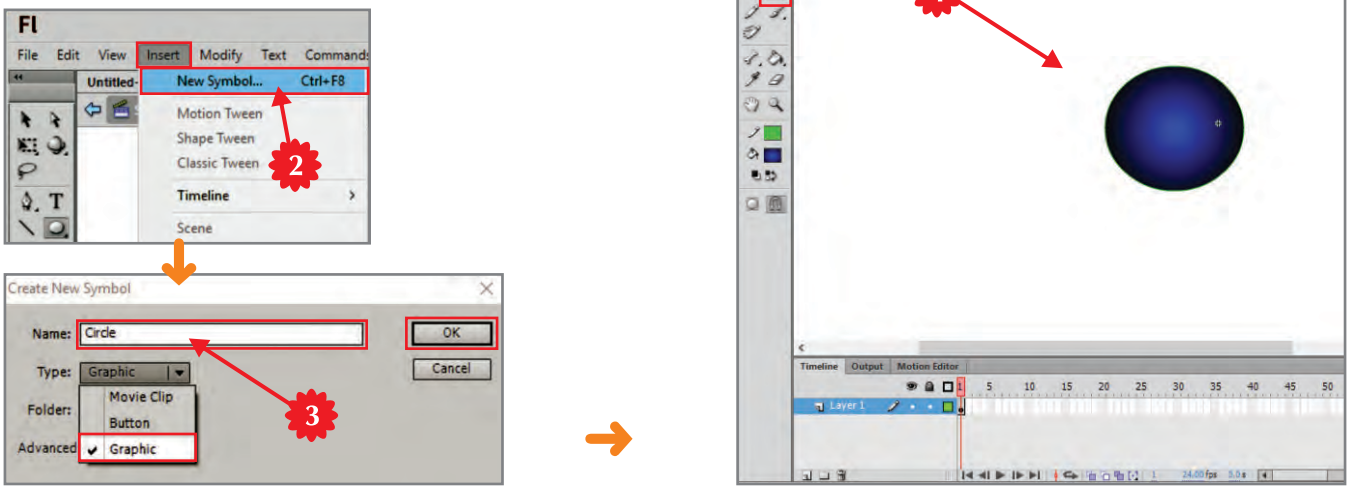


Figure 4: Creating a symbol

Sound

Sound is soul of animation. Flash can import a variety of standard file formats, including AIFF (Mac only), WAV (Window only), and MP3 (both Platforms).

The steps to import a sound are:

1. Insert a new layer by clicking on Insert menu → Timeline → Layer.
2. Click on File menu → Import → Import to Library (figure 5).
3. The Import to Library dialog box appears.
4. Browse the location and find the required sound file. Click on Open button.

Note: If your current Flash installation does not support required sound formats then reopen your animation in Flash by selecting ActionScript 2.0 option in Create New section.

Figure 5: Import Library

The sound will be ready to use, you can find it in the Library (Window menu → Library).

Sounds Properties

To set the sound properties, click the frame of the movie. After doing this, the Properties panel takes the following appearance (figure 6).

Let's see the parts of this panel.

Sound : In this list box, the imported songs will be displayed. Select the song which is to be added to your movie (in the next item we will learn about inserting other sound to a movie).

Effect : From here we will be able to add some effects to our sound, for example, the sound passes from the left canal to the right one.

Sync : This option allows us to determine at which event/ moment our sound will start acting.

Repeat : It specifies the number of times the sound is played. To play it indefinitely, calculate the possible time of the movie duration and the time of the sound, and then repeat it as many times as necessary (that is better than to set 99999 times).

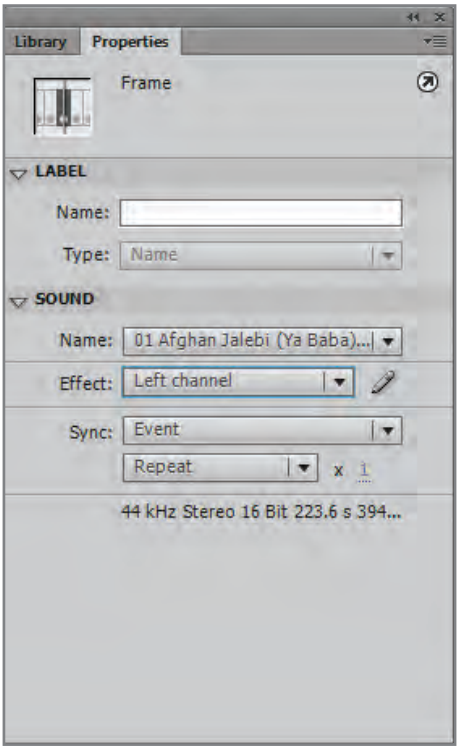


Figure 6: Sound Properties

Tweening

Tween is the short form of "in-between", which is the process of generating intermediate frames between two images to give the appearance that the first image evolves from the second image.

Classic Tween

Classic Tween is used to create animation between two Keyframes. It requires that the object being "tweened" be converted to a graphic and that the physical parameters of the shape are not changed throughout the process. This is a less memory-intensive method of tweening.

While using classic tween in Flash, all that needs to be done is defining two keyframes. Flash fills in the gaps between the two frames (see figure 7). With classic tween, the user is able to animate the following properties: location, scale, rotation, tint and alpha.

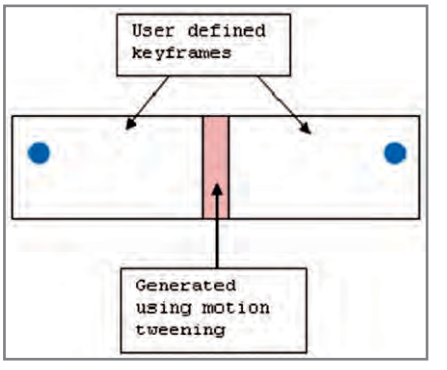


Figure 7: Flash Fills in the Extra Frames Using Classic Tweening.

The following example will demonstrate how to create an animation of a circle moving from the left side of the screen to the right side.

The steps to perform a simple classic tween are:

1. Select the File menu →New. The New Document dialog box opens up.
2. Select Flash Document in the Type: list box.

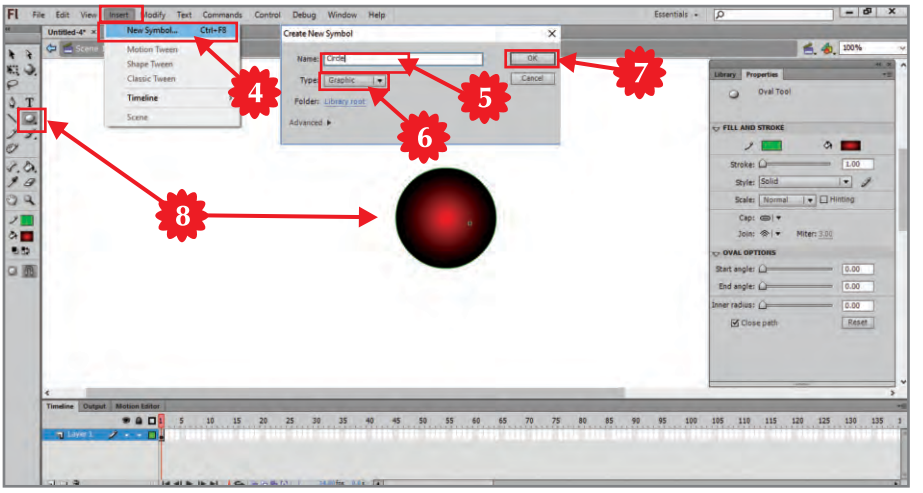


Figure 8: Defining a New Symbol

3. Click the OK button. A blank Flash file will be created.
4. Select the Insert menu →New Symbol. The Create New Symbol dialog box appears.
5. Type 'Circle' in the Name: text box.
6. Click the Graphic option button in the Type: section.
7. Click the OK button. The symbol definition scene opens.
8. Using the Oval Tool (O), draw a circle anywhere in the first frame (figure 8).
9. Click on Scene1 button on the timeline (see figure 9).
10. Click on Window menu and select Library option. Click and drag the newly created 'Circle' symbol from the Library panel to the stage of the first frame in Scene1 (figure 10).
11. Right-click inside frame 12 and select Insert Keyframe.
12. With the Selection tool, move the circle in frame 12 to the right side on the stage (see figure 12).
13. In the timeline, left-click the frame 1, then hold down the [Shift] key on keyboard and left-click on frame 12. Frames 1 to 12 will be selected (see figure 12).

Figure 9: Buttons on the Timeline

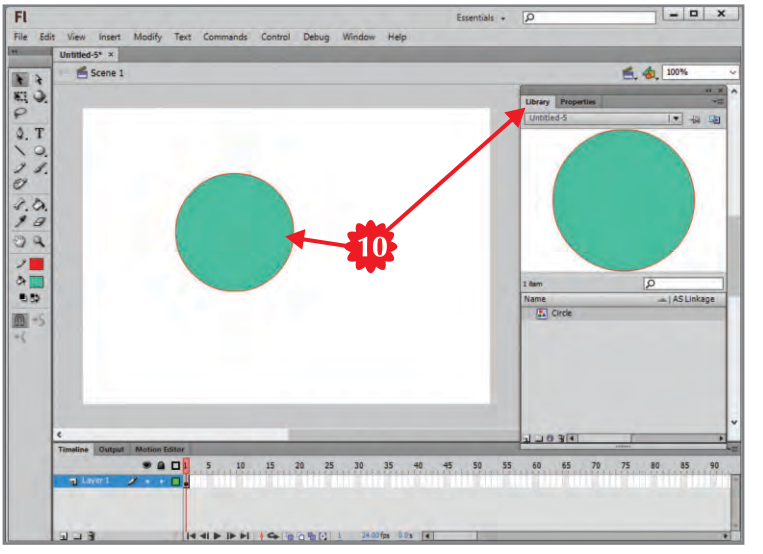


Figure 10: Creating an Instance of a Symbol

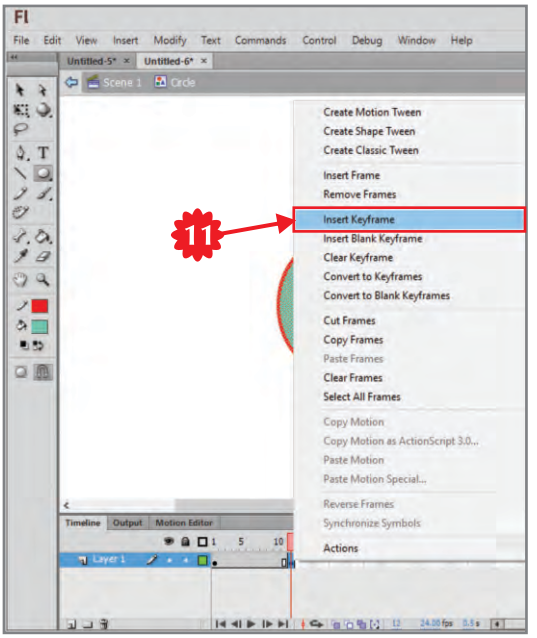


Figure 11:
Right-click inside frame 12

14. In the Insert menu, select Classic Tween option.
15. The animation is applied. To play the animation, hold down the [Ctrl] key while pressing the [Enter] key on the keyboard.

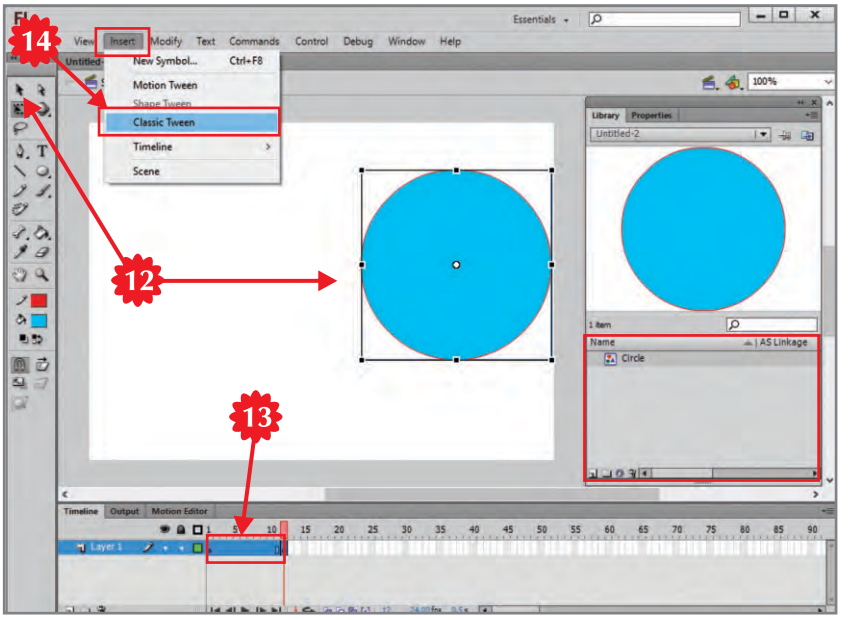


Figure 12

Shape Tween

Shape tween is used to create a morph effect. Morphing is an animation style that describes one shape turning into another shape. In shape tween, the user only needs to define the first and the last frame (see Figure 13). Flash fills in the rest of the frames. Shape tween increases the file size, since the flash library and symbols are not available for this tween type.

This following example will demonstrate how to create an animation of a circle changing its shape.

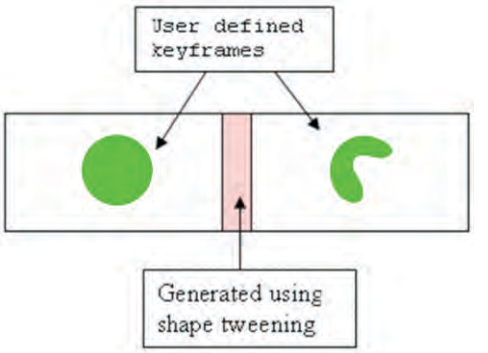


Figure 13: Flash Fills in the Extra Frames Using Shape Tweening.

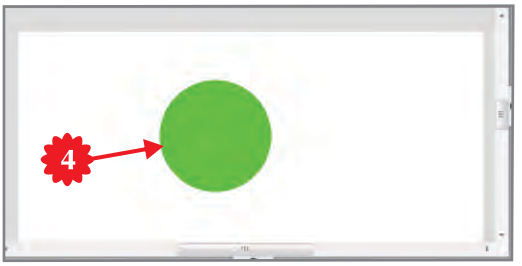


Figure 14: A Simple Circle

The steps to perform a simple shape tween are:

1. Select the File menu →New. The New Document dialog box opens.
2. Select Flash Document in the Type: list box.
3. Click the OK button. A blank Flash file will be created.
4. Using the Oval Tool (O), draw a circle as shown in figure 14.

Right-click inside frame 12 and select Insert Keyframe.

5. Deselect the circle in frame 12 by clicking anywhere outside the circle.
6. Select the Selection Tool (V) from the Toolbox.
7. Place cursor near the outer edge of the circle as shown in figure 15.

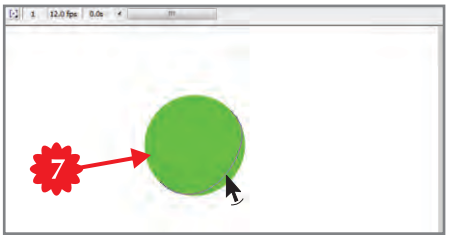


Figure 15: Using the Selection Tool Next to a Shape

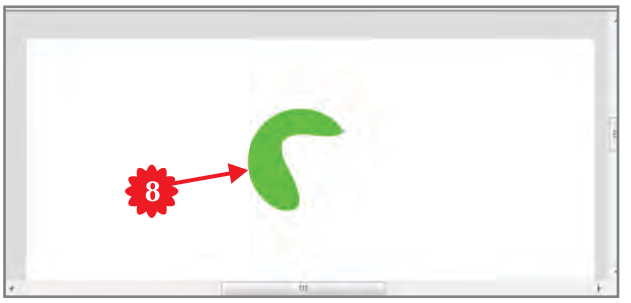


Figure 16: Changing the Shape of the Circle

8. Left-click and hold the mouse button and drag to change the shape of the circle into something like shown in figure 16.
9. Left-click in frame 1 on the timelie.
10. In the Insert menu, select Shape Tween option (see figure 17).
11. To play the animation, hold down the [Ctrl] key while pressing [Enter] key on the keyboard.

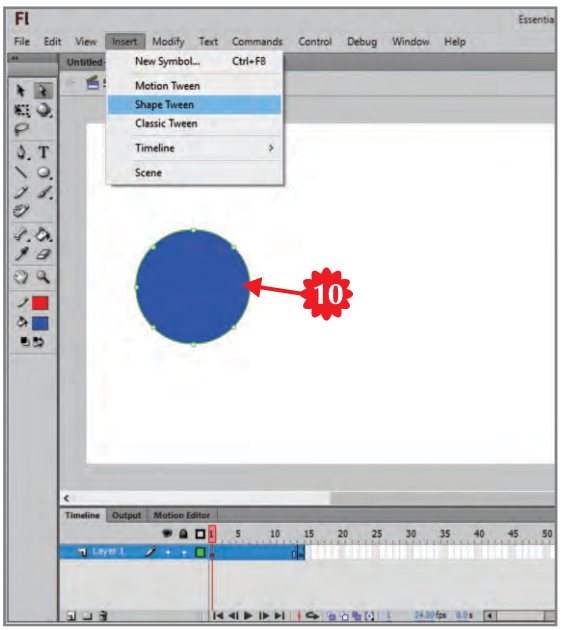


Figure 17: Adding Shape Tween to Frames

Animating Text

Text animations are no different from regular animations using motion tween. The first step is to create the necessary symbols containing the text. After the symbols are created, they can be easily added to the keyframes. The steps to add animation to text are:

1. Select the File menu → New. The New Document dialog box opens.
2. Select Flash Document in the Type: list box.
3. Click the OK button. A blank Flash file will be created.
4. Select the Insert menu → New Symbol. The Create New Symbol dialog box opens.
5. Type [Text] in the Name: text box.
6. Click the Graphic option button in the Type: section.

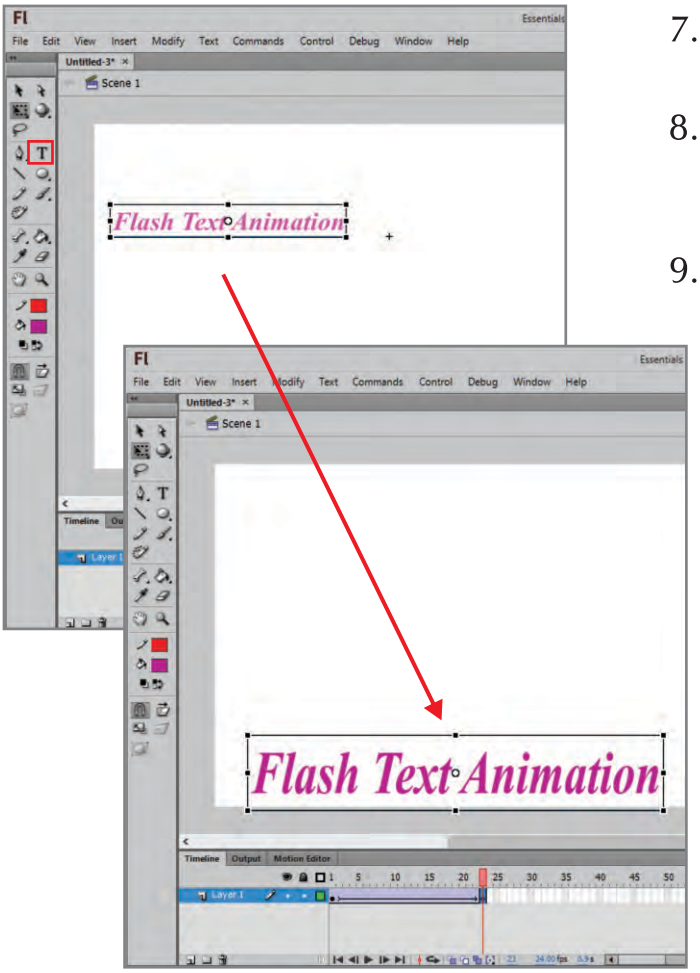


Figure 18: Adding Text to the Graphic Symbol

7. Click OK button. The symbol definition scene opens.
8. Using the Text Tool (T) add some text in the first frame (see figure 18). Format the text as required.
9. Click the Scene 1 button on the timeline to go back to Scene 1.
10. Add the newly created symbol to top-left corner of the stage in frame 1 by left-clicking and dragging it from the Library panel.
11. Insert a new keyframe in frame 24.
12. With the Selection Tool (V), move the text to middle of the stage in frame 24.
13. Enlarge the text in frame 24 using Free Transform tool
14. Left-click in frame 1 on the timeline.
15. Select Classic Tween from Insert menu.
16. To play the animation, hold down the [Ctrl] key while pressing the [Enter] key on the keyboard.

Glossary

Instance : It refers to a copy of a Flash symbol, whether it's a movie clip, a graphic or a button.
Tween : It is a short form of "in-between", and refers to the creation of computer animation.

Quick Review

- *You can create new symbols or convert existing objects such as texts or shapes into symbols.*
- *Soundtracks give a touch of realism to an animation or a bit of life to an interface.*
- *Tween is a short form of "in-between" which is the process of generating intermediate frames between two images.*
- *MotionTween is used to create animation between two Keyframes.*
- *Morphing is an animation style that describes one shape turning into another shape.*

Exercise

A. Choose the correct answer.

1. Which of the following helps in managing layers as well as frames.
   a) Normal ☐ b) Graphic ☐
   c) Time line ☐ d) None of these ☐
2. A _____ symbol is used to create interactive buttons that can have rollover effects and animation applied on them.
   a) Graphic ☐ b) Button ☐
   c) Movie Clip ☐ d) None of these ☐
3. A collection of symbols is called _____.
   a) Tween ☐ b) Sound ☐
   c) Library ☐ d) None of these ☐
4. Classic tween is used to create animation between two _____.
   a) Frames ☐ b) Layers ☐
   c) Symbols ☐ d) Keyframes ☐
5. Morph effect can be created using _____.
   a) Shape Tween ☐ b) Motion Tween ☐
   c) Property Tween ☐ d) Morph ☐

B. Fill in the blanks.

Shape Tween, Instance, WAV, Morphing, Sound

1. _____ automatically converts the object to be Tweened into a graphic symbol.
2. When a symbol is used outside the library, it is called _____.
3. _____ is an animation style in which one shape turns into another shape.
4. _____ is soul of animation.
5. _____ is a Windows-only sound file format.

C. Answer the following questions.

1. What do you mean by shape tween?

_____

_____

_____

2. How will you change the sequence of layers in your animation?

_____

_____

3. What is the significance of sound in animation? How will you add sound in an animation?

_____

_____

4. How will you apply classic tween on Text?

_____

_____

Lab Activity

1. Using suitable tween type, create an animation to show an airplane take off.
2. Using suitable tween type, show a sad smiley face that turns into happy smiley face
3. Animate the following:

Flash	Fun

The blue coloured text Flash on the left side slowly changes from Frame 1 to red coloured text Fun in Frame 25.

Teacher's Signature : _____ *Teacher's Remark :* ☆☆☆☆☆

Beyond the Book

https://gcctech.org/cmm/cmm219/flash/tweenalongapath/CS6-flash_tween-on_path.html
https://ruvideos.org/Zl475-vS10U-shape-tween-in-flash-cs6.html

Watch & Learn

www.eduitspl.com
www.youtube.com/edusoftknowledgeverse

Teacher Corner

Provide small, simple exercises to students to consolidate the concept of tween and morphing.

Introduction to Data Science

Dear teacher,
we have learnt that there is a huge ocean of data online. How is such immense data processed?

Dear students,
such immense data is processed by the help of data science and techniques of artificial intelligence.

Today, various service providers and businesses are aware of our online presence and behaviour which help them reach out to prospective customers among our circle and promote their business. Of course, many would like to buy what we are buying! What these service providers are doing is nothing but very intelligent and prudent use of our data available to them. For businesses out there today, customers are data-sets. More data businesses have about people, better would be the chances for their businesses to grow and expand. This is something called datification.

Datification is the process to convert various aspects of life into meaningful data. Describing the life's aspects in the form of useful data is the art of datification.

Data collected after tracking and monitoring the online activities of the prospects is used to create organised data-sets. These data-sets can be optimised to get useful insights in order to analyse the prospects of a person being a potential customer or to understand problems or to see trends as solutions to address the problems and to do projections which could prove useful in various ways.

Understanding Data Science

In simple terms, science of discovering knowledge by analysing data is called data science. Data science involves mathematical techniques, statistics and algorithms to analyse data and derive some useful insight which is beneficial for the businesses or the purpose at hand. Data

science approaches help in observing and making some sense out of the data and to explain that sense in the form of a useful pattern, trend or prediction. This makes data science a tremendously significant and multidisciplinary field. It requires both quantitative and technical skills to pursue the discipline of data science. Data science is seen as a technical extent of statistics that handles enormous amount of data. So, data science can also be defined as an approach or methodology applied on the data-sets to derive useful conclusions from them.

Data science involves the methods and models of statistics, algorithmic and programming tools of computer science and machine learning approaches of artificial intelligence field.

In true sense, data science involves the tools and methods that deal with enormous, dynamic and complex form of data called Big Data.

Today, there is an immense ocean of data emanating from countless computers and other devices world over as part of internet and world wide web. This enormous amount of data in petabytes and exabytes had been in making since the advent of internet in past decades. This vast, complex and dynamic form of data is called big data.

Voluminous, dynamically generated and complex lot of data is collectively called the Big Data.

Benefits of Data Science

Having understood the basic meaning of data science and how big data is related to it, now let us look at some major benefits that data science offers to enterprises, people, governments and the world.

Unlocking hidden intelligence: Data sets have patterns and internal relations which are not seen at a casual look or consideration. Data science tools and techniques enable us to see the useful trends and meaningful patterns quickly and accurately.

Answering the unanswered: Human brain and even traditional fast computers are not capable to manage and analyse the enormous data. Principles, methods and tools of data science can open the ways to find answers to many questions such as useful relationships between the hunger data and poverty statistics of a region or, how the unemployment data in a particular sector relates to the skill and literacy data in that sector etc. In every field you think of, data science may have the key to not only answer many questions but to find new questions also.

Precision and speed: Businesses and enterprises expect timely and precise answers to their business-related questions. Data science methods enable data scientists to come up with precise predictions and trends out of the vast big data quickly. For example, accurate and timely predictions of weather trends for farmers can save them a lot of loss during monsoons and droughts.

Better decisions making, strategies and opportunities: Owing to its accuracy and ability to analyse big data to see useful patterns and trends, data science makes businesses improve upon making better decisions which help in further growth and dealing with the problems with an improved efficiency.

Applications of Data Science

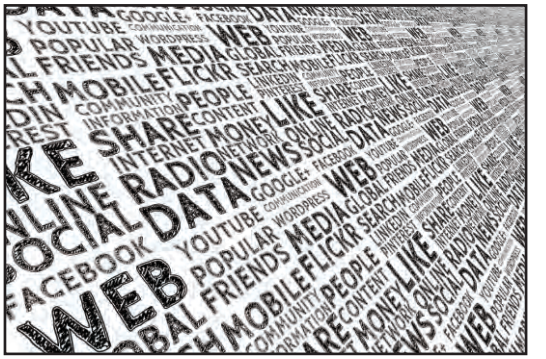
At the heart of data science is data. Prime characteristic of data science is immense volume of data. Techniques of artificial intelligence add speed and accuracy to the process of data analytics of such big data. Data science prepares the data for AI algorithms to process. Some major applications of data science are discussed here.

Social Media

Facebook, Instagram, Twitter, Linkedin and many other such sites have almost more than half the world online. All interactions we do are digital in nature hence it is easy to translate them into numbers such as amount, location coordinates, times, dates, frequency, duration, averages etc. Data science methods can process these numbers to turn them into profitable predictions for businesses.

We are analysed on the basis of our personality, values and beliefs, interests, lifestyle, opinions etc. This is called psychographic analysis or psychographics.

E-Commerce and Retail



For E-commerce giants such as Amazon, Flipkart, OLX etc., the biggest concern is customer experience. Data collected from the transactions done on the web sites, reviews written by influencers, rating given by people and also detailed analysis of their social media presence help E-commerce industries understand how to improve on the customer experience on their web site and in their services. Customer loyalty and customer retention is the core of an E-commerce portal's survival. Constant feed of big data through customer's browsing behaviour, buying behaviour and online interactions goes into data science algorithms. Data science helps in accurate predictions which are very useful in digital marketing, developing better customer relations and brand building.

Healthcare

Imaging of human body is a common occurrence in hospitals. Millions of patients are scanned and X-rayed through various advanced machines. Visual and numerical data collected through these equipment are analysed by algorithms to predict life threatening diseases such as cancer cells, tumours, organ cirrhosis, internal infections etc., to diagnose undetectable diseases, to raise alarm for a likely medical threat etc. Data science can also help bringing down expenses in research, medi-care, diagnosis and treatments. The field of healthcare can benefit from data science in various ways such as diagnosis, patient care and research etc.

Manufacturing

Major areas which are common to manufacturing are production, quality assurance, managing supply chain, storage and maintenance, automation of production processes and energy efficiency. Data science can help in very effective way in manufacturing

domain such as predicting demand-supply gaps, bringing down expenses, calculating risks, reduce downtimes, predict failures, quality check etc.

Banking and Finance

This domain deals purely in numbers – denominations, profit, loss, loan, returns, investments, frauds, payments, credits, revenues, costs, expenses, stocks etc. Let us see how data science helps in financial sector. Data science can help in detecting frauds by analysing historical financial transactions. Clustering and classification of customer data are two popular data science techniques done on the basis of customer's preferences and financial health. Risk analysis by analysing finances before granting huge loans, investments and acquisitions etc. Evaluation of benefits from a customer's lifetime to predict future business and revenues. This helps in identifying loyal and profitable customers by customer segregation and classification. This is called assessment of Customer Lifetime Value (CLV).

Electronics

Electronics is an umbrella term for a number of fields such as communications, engineering, computing, robotics, machine automation etc. Capturing and managing machine generated data in the form of readings, measurements, signals, pulses, logs, scans and images, data from sensors, device memories and storages, pin numbers, codes etc. is the major part of data science in electronics and communications. Predicting device malfunction, capturing and analysing data emitted from the radio frequency ID (RFID) chips used by scientists involved in wildlife researches and other environmental science projects, pixel scanning and comparison of images scanned by device and satellites to detect anomalies such as tiny fatal tumour, internal infection, deforestation in a region, to analyse crop maps, tectonic shifts, water bodies etc. Monitoring communication data among devices connected over internet or personal area network over Bluetooth.

Network of devices sharing data and signals over internet or personal area networks through Bluetooth or other short-range protocol is called Internet of Things (IoT)

Other applications

Search Engine Optimisation: SEO is the process to increase the visibility of a website by making it appear in the top search results returned by search engines. Data science helps in search optimisation by the content of the website with social media data and mapping it with the search keywords and phrases typed by the users in the search engines.

Search algorithms: It is the data science algorithms that makes search engines fast, efficient and accurate in returning search results. Data science methods help in efficient update of the search databases and searching logic of the crawler (programs that collect the information on web for the search engine).

Improved public services: Government uses data science methods to analyse big data related to demographics (population statistics), social groups and classes, workers, employment, poverty, rural regions, urban regions, electricity consumption, drinking water availability, diseases and public health, education, child labour etc. to provide better public services to the masses.

Glossary

Datification	:	Datification is the process to convert various aspects of life into meaningful data.
Data science	:	an approach or methodology applied on the data-sets to derive useful conclusions from them.
Big data	:	Voluminous, dynamically generated and complex lot of data.
Psychographics	:	Analysis on the basis of one's personality, values and beliefs, interests, lifestyle, opinions etc.
Customer Lifetime Value (CLV)	:	Estimate of benefits to a business from a customer's lifetime.

Quick Review

- *Datification describes objects and events in the form of data.*
- *Science of discovering knowledge from data analysis is called data science.*
- *Voluminous, dynamically generated and complex lot of data is collectively called the Big Data.*
- *Data science has tremendous useful applications in all the industries and society.*

Exercise

A. Choose the correct answer.

1. Describing aspects of life in the form of data is called _____.
   a) Data science ☐ b) Datification ☐
   c) Big data ☐ d) Machine learning ☐
2. Immense, dynamically generated, variety of data is called which of the following?
   a) Database ☐ b) Big data ☐
   c) Intelligence ☐ d) Machine data ☐
3. Data science involves the methods and tools of which of the following?
   a) Mathematics ☐ b) Statistics ☐
   c) Algorithms ☐ d) All of these ☐
4. Data science methods can convert our online actions into which of the following?
   a) Numbers ☐ b) Text ☐
   c) Records ☐ d) Evidences ☐

5. Data science prepares the data to be used by _____.

a) Computer ☐ b) Software ☐

c) AI algorithms ☐ d) Databases ☐

B. Fill in the blanks.

Diagnosis, IoT, Digital, Numbers, E-Commerce

1. All online interactions we do are _____ in nature hence it is easy to translate them into _____.
2. Customer experience is the main concern of an _____ portal's survival.
3. The field of healthcare can benefit from data science in various ways such as _____.
4. Devices communicating with each other over a small local network are part of _____.

C. Match the following applications with their correct field/area.

Column-A	Column-B
1. Identifying threats such as terrorism, crime, fake news.	a. E-Commerce
2. Customer loyalty and customer retention.	b. Banking
3. Reduce machine downtime.	c. Electronics
4. Fraud detection and prevention.	d. Social media
5. Monitoring communication data among devices.	e. Manufacturing

D. Answer the following questions.

1. What do you mean by the terms datification and data science?

_____

2. What do you mean by Big Data? What is the general source of big data?

_____

3. List any 3 benefits of data science and describe any 2 very briefly.

_____

4. List any 5 applications of data science.

_____

5. What do you mean the term SEO? Explain briefly.

_____

Artificial Intelligence

Dear Teacher,
We have heard a lot about Artificial Intelligence. What does that mean? We want to learn more about it.

Yes Students,
Artificial Intelligence is a buzz word today. Let us learn about fundamentals of AI in this chapter.

When we browse through social websites and online stores, a lot of suggestions pop-up or slide-in in our way. Where have they come from? A programmed component of the web site or mobile app is doing it. The big question is - How do these programs know what we might be interested in? Answer is, we are tracked right from the moment we logon to any online platform until we logoff.

Our browsing pattern is called our browsing signature or browsing habit.

These programs compile browsing signatures of millions of visitors daily and churn out the intelligent results out of this huge mass of data. This analysis of such an enormous amount of data to produce useful patterns of visitor's browsing habits, interests and buying preferences is called analytics.

This is one glimpse of artificial intelligence. But we did not recognize it as artificial intelligence because it worked so naturally around us that it did not feel like AI. What works, does not surprise us much, no?

Apple's Siri, Microsoft's Cortana, IBM's Watson, Amazon, Netflix, Google, Facebook and Linkedin, all have been using these intelligent algorithms to analyse our online movements, interests and networking with others.

Artificial Intelligence

The term Artificial Intelligence was first coined by Stanford researcher John McCarthy in 1956. In plain and simple words, the ability of a machine to think and learn is called artificial intelligence.

The AI field refers to the study of the principles, concepts and technology for building such machines and systems that should think, act and learn like humans.

Machines possessing AI should be able to interact with their environment and perceive it through various stimuli such as visual perception, speech recognition, language comprehension etc. in the form of received data and respond to them, based on gathered intelligence.

According to McCarthy: *"AI is the science & engineering of making intelligent machines."*

Human Intelligence and Machines

What makes humans intelligent is their ability to reason. We receive a variety of stimuli from our surroundings and then we process them. This processing of what we sense is called reasoning. Human brain reasons at a very higher and different level than animals. This power of reasoning determines our actions.

Sensing: A human brain senses, reasons and then acts upon it. Like, we come across an old friend, recognise him or her and greet him or her. We sense through our receptive organs. How should a machine sense?

A machine should first know what it is supposed to sense and then it should be able to sense (input) images, patterns, faces, signatures, prints, textures, audio, moving images, numbers etc.

What should it sense from these? - the purpose is another aspect. For instance, in an image of a group of people, is it supposed to sense entire image, a face or just the background?

So, sensing is not just about simple input. That can be achieved by scanners and sensors. The purpose of sensing is determined by the intelligence.

Image scanner, audio sensor, speech recognition engine, fingerprint recognition program, motion sensor, thermal sensor, light sensors, proximity (distance) sensor, chemical sensors, barometric sensors etc. are the equipment which play central role where a machine is designed to receive various stimuli from its surroundings.

Reasoning: After sensing, what to do with the stimulus (input) is entirely the problem domain of artificial intelligence. Comparing facts and making decisions like in an Expert System, recognising speech and identifying the language to process the command given in voice, assessing the situation, identifying blocks and barriers during movement and deciding the course of movement, making logical comparisons, planning before action by considering all available facts, able to compare complex rules to solve problems etc. are some of the basic expectations from a machine in the field of AI.

Then comes the action, the response. Responding with voice, moving in a particular direction or taking a pause before next movement, accomplishing a task as desired etc. are expected of the intelligent machine.

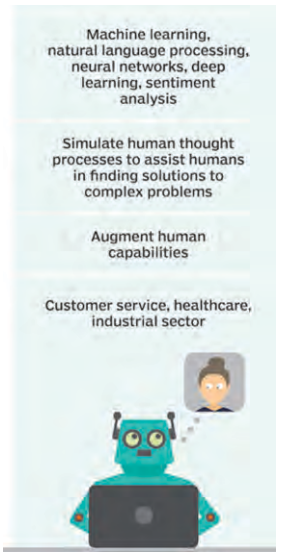
Human intelligence is the combination of the following traits:

Perception

Humans perceive their surroundings with their sensory organs. Then the objects that make the surroundings are identified or recognized depending on the retained knowledge about the world. A machine can have artificial sensory organs like cameras, scanners, photosensors for light, thermo-sensors for temperature etc. to picture and understand the surroundings (cognitive computing). Think of a robot or machine designed to move in a closed area like office or factory, more complex environments are railway platforms & airports and most complex of them is a busy road.

Learning

Humans learn in many ways – guidance and training by others or by self-paced trial and error method. They retain the learning by practice, remembering and applying it in various situations. For machines this is quite challenging. A machine playing a strategy game like chess may keep looking for a move that matches the closest correct move and stores it for further usage. This is like learning by rote. Generalised learning is difficult as it demands application of learning in various situations by using previous knowledge and experience.



Problem Solving

In a simple situation, a machine can be programmed into finding and applying the possible steps of solution to achieve a set goal. Such machines are useful in a specific task-oriented environment like bottling, loading/ unloading, counting, assembling etc.

In a generalized situation, a machine needs to be trained into selecting the best suited approach to achieve the goal and then retain it for future use. Machine should be able to analyse and update its algorithm in such a way as to recognize similar situation and able to understand that such and such previously learnt solution is needed to be applied. This is what AI is trying to achieve.

Reasoning

Reasoning has broadly 2 types: Deductive and Inductive. In deductive reasoning the facts are analysed and guarantee a conclusion. For example, Raj is a non-vegetarian so he will also eat a vegetable if non-vegetarian dish is not available. In inductive reasoning, facts only support the conclusion without any guarantee. For example, Ram falls sick most often when he eats eggs. Ram must be allergic to eggs. Hardest challenge in AI is to develop machines that are able to apply inductive reasoning which needs a critical and intelligent analysis of the available facts in different scenarios or contexts on the basis of previous experience.

Language

Learning any language is a complex process even for humans unless a methodical approach, right kind of training and enough practice is not involved. Language contains grammar and words – word with multiple meanings, pronunciation, accent, symbols,

signs and special notations. After learning the language an endless variety of sentences can be formed which is challenging for a machine to do. AI based voice response systems and chat bots etc. are being developed in a restricted application area but there is still a lot needs to be done.

AI and Neurons

Study of neurons focuses on how human brain works. A lot of research has been done in this direction. This research has made the basis of Connectionism – neuron like computing. Each neuron in the brain is a tiny processor and brain is the big machine composed of millions of these processors. AI focuses on building an artificial network of neurons.

Artificial Neural Networks (ANN)

In 1954, at Massachusetts Institute of Technology (MIT), Farley and Clark developed a 128-neurons system which could memorise simple patterns and distinguish one among many. The algorithm was developed in such a way that each neuron was able to hold the information taught (fed repeatedly) to it by a computer program. ANN has paved the foundation for machine learning.

Machine Learning (ML)

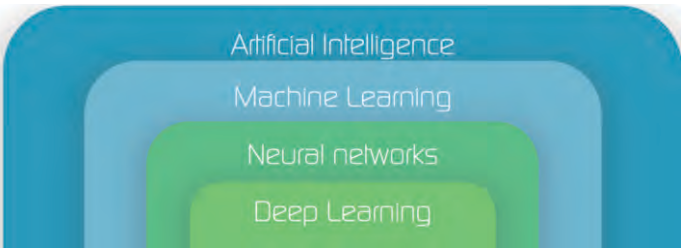
ML is the application of AI. It enables a computer system to learn from experience without programming it further. This technique is used to make computer do accurate predictions after analyzing the input given to them.

Machine learning has two approaches:

Supervised ML

In this approach, the computer system equipped with ML ability is fed with the inputs and trained with the details about the prediction it is supposed to do. Professionals who operate such computers are generally called data scientists or data analysts. After the prediction, the new findings are stored by the machine for doing any new predictions in future.

Unsupervised ML and Deep Learning



In this approach, machine is equipped with neural network capability is fed only with input data but not the desired output details. It uses input data to analyse enormous amount of data in its knowledge base to generate any output it can. Such machines are considered more intelligent and their process of data analysis is called deep learning. After prediction, the output is stored by the machine to use it for deep learning to do any future predictions.

Applications of Machine Learning

Predictions about weather conditions, disease outbreaks, success of crops, results of exams, sales, accidents, customer preferences, customer response to the products are some applications of ML. Some examples of prediction by ML equipped computers are:

- How many students are likely to get distinction in Science in next board exams?
- How many passengers are likely to book flights to a particular vacation destination?
- What will be the food preferences of the customers from a particular region while eating out of home?
- How many road accidents are likely on a particular highway and how many would possibly die in them?
- Is there a possibility of a storm and when in a particular region?

Other applications are face recognition, gene finger printing, fingerprints analysis, voice recognition, expert systems to consult in various fields like medicine, education, design, constructions, customer service, travel, sales, defense, finance and banking.

AI Programming Languages

LISP (List processing), Java, C++, Prolog and Python are the programming languages which can be used in AI application development. While Lisp is the premier and oldest of all these languages, Prolog is best suited for expert system development and management. Popular AI languages are described here:

R

R is the most preferred of all programing language for AI. It is used for effective manipulation and analysis of statistics data. It allows mathematical symbols and formulae to design plots out of available immense data. It has a library of pre-designed programs arranged in packages for developing ML algorithms easily and quickly.

Python

Python is very popular due to its simplicity in usage and being equally powerful as R. Python has all the features which a modern object-oriented programming language should have. It also provides procedure-oriented approach for those who do not wish to use object orientation. It has a variety of data types and data structures for complex data analysis and developing ML algorithms. Pybrain is the feature of Python used for ML.

Artificial Intelligence	:	Capability of a machine to thinks and act like humans.
AI field	:	Study of the principles, concepts and technology for building such machines and systems that should think, act and learn like humans.
Neural Network	:	A network of neurons which are capable of memorising information. It is the fundamental of Machine learning.
Machine Learning	:	Application of AI that enables a computer system to learn from experience without programming it further.
Deep Learning	:	Neural network capability of a machine fed only with input data but not the desired output details for making predictions.

Quick Review

- *The ability of a machine to think and learn is called artificial intelligence.*
- *Human intelligence involves perception, learning, problem solving, reasoning and language.*
- *The biggest challenge is to develop a machine that can store knowledge and improve its own program to solve new problems with its evolved or improved intelligence.*
- *Machine Learning is an application of AI.*
- *Python and R are the most preferred modern programming laguages for AI.*

Exercise

A. Choose the correct answer.

1. Our browsing habits make our browsing _____.

   a) Faster ☐ b) Efficient ☐

   c) Signature ☐ d) Style ☐

2. AI is the science and engineering of making _____ machines.

   a) Artificial ☐ b) Intelligent ☐

   c) Super ☐ d) Robot ☐

3. Sensing triggers _____ in human beings.

   a) Tingling ☐ b) Thinking ☐

   c) Analysis ☐ d) Reasoning ☐

4. Machine learning has following approache/s:

   a) Supervised ML ☐ b) Unsupervised ML ☐

   c) Both a) and b) ☐ d) None of the above ☐

B. Fill in the blanks.

Inductive, Reason, Deep learning, Habits, Machine

1. Websites and apps track our online browsing _____.
2. The ability to _____ makes the humans intelligent.
3. Camera and scanners are sensory organs of a _____.
4. Reasoning has broadly 2 parts: Deductive and _____.
5. Machine equipped with Unsupervised ML is capable of _____.

C. Tick (✓) the correct statement and cross out (X) the incorrect one.

1. Artificial Intelligence is a field to make robots. ☐
2. Humans are more intelligent than machines. ☐
3. Logical reasoning is the distinct characteristic of human brain. ☐
4. Study of neurons focuses on how human brain works. ☐

D. Answer the following questions.

1. What do you mean by sensing and reasoning in humans?

_____

_____

_____

2. List 5 traits of human intelligence.

_____

3. List any 3 applications of Machine Learning.

_____

_____

_____

Teacher's Signature : _____ *Teacher's Remark :* ☆☆☆☆☆

Beyond the Book

http://aiforanyone.org/learn-about-a-i-technical/
https://en.wikipedia.org/wiki/Artificial_intelligence

Watch & Learn

www.eduitspl.com
www.youtube.com/edusoftknowledgeverse

Teacher Corner

Encourage students to read and explore about AI online and in school library.

Computer Ethics and Crimes

Dear Students,
Internet is an open medium which everyone can access hence it is imperative that we use it responsibly and carefully.

Yes Teacher,
We agree with this fact. We would like to learn how to do this and be a responsible citizen.

A set of guiding principles for using computers without causing harm to others is called Computer ethics. Computer ethics sets certain guidelines for communication and interaction among people over internet without causing any harm to the people and their data. There are a variety of cyber threats on internet today that may cause psychological harms as well as loss of your important data and information.

Cyber Threats and Protection from Them

An online computer is exposed to the threat of viruses, spyware, unauthorized access and information theft. Once information is stolen it can be used for criminal purposes by hackers. Hackers can use a computer to commit criminal activities and send out spam.

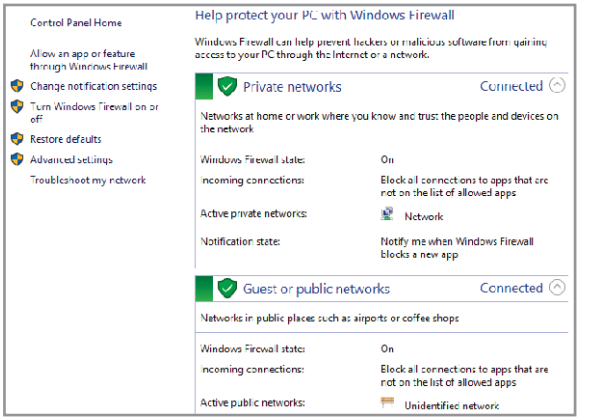
Viruses, Trojans and Worms

Viruses are malicious codes that attach themselves with program files and corrupt them. They destroy useful data, format or corrupt data storage. Entire computer system can be rendered useless.

Trojans are the malicious programs that are promoted as useful utilities or software and, once installed, affect the computer system and files. Worms are the program codes that spread their copies over a network from one computer to the other and make the computers slower in processing.

Protection from Viruses

- **Anti-viruses:** Anti-viruses like Norton AntiVirus, McAfee VirusScan, Kaspersky etc. provide robust and effective protection to the computer. Users should have the anti-virus software installed on their computers. It is also important to keep the antivirus updated regularly to identify and neutralize newly developed malicious programs.



- **Firewall:** A firewall provides another level of protection to prevent incoming attacks. Operating system provides firewall protection which can be activated to filter unwanted access to the computers over a network. Private networks use firewalls to keep unwanted IP addresses filtered out.
- **Operating System Update:** Windows updates and update of your browser fills any security holes and bugs which hackers can use to access your computer. Do not install undesired utilities or plugins in your browser.
- Do not open strange, unrecognized emails or attachments even from a reliable source. Worms spread by infected attachments and may launch email attack to other users. Necessary attachments should be saved and virus scanned.

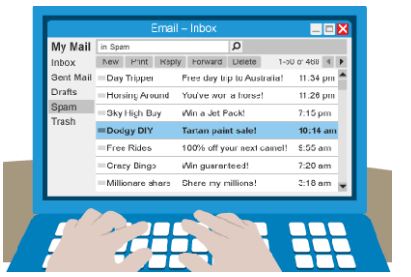
Spyware or Adware

Spyware installs itself on the computer without user's knowledge and monitors keystrokes, takes screenshots, reads chat, collects device and user information and forwards it to the malicious owners of such program. Loss of confidential information and identity theft are the threats posed by spywares.

Protection from Spyware

- Install an effective spyware detecting software.
- Keep your operating system and browser updated.
- Check if any unnecessary software is being installed.
- Carefully read and close any warning boxes that look like important messages.
- Be careful while installing free programs, games or shareware. Free programs may contain spyware.

Spam



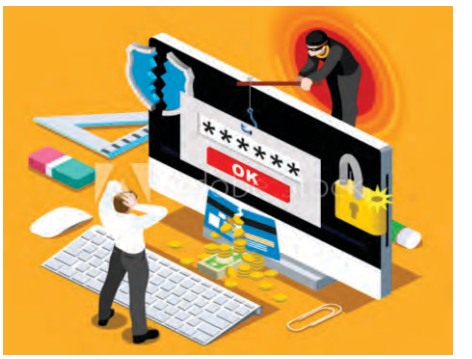
Spam is unsolicited or undesired junk email usually a promotional material. Senders of such emails are called spammers. Spams have a link that lures the user into clicking it. This confirms user's email ID and that brings in more spam in future.

Protection from Spam

- Use spam filtering settings in the email service.
- Share your personal email ID only with those you trust.
- Do not display your email ID online for everyone to access.
- Create separate email accounts for public use.
- Look out for spelling mistakes and bad grammar in the mail. These mistakes are done by spammers to pass through the spam filter.

Phishing and Pharming

Phishing: Fraudulently acquiring sensitive information from the users by impersonating trusted websites like banks and e-commerce merchants etc. is called Phishing. Phishers target the details like pins, passwords and answers to security questions. Phishing occurs generally in the form of an email or through a legitimate sounding phone call.

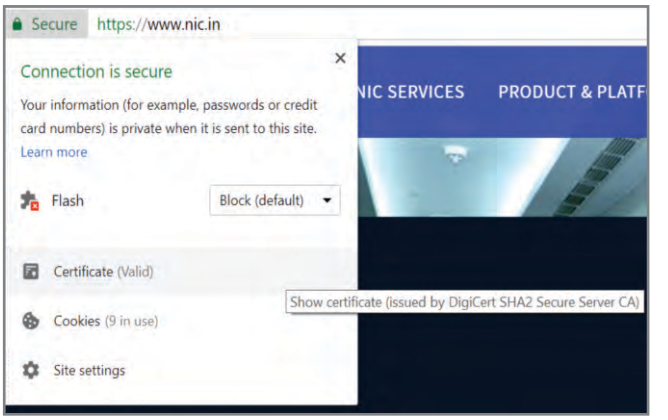


Pharming: When website's traffic is redirected to another unauthorized fake URL then it is called pharming. Hackers somehow get access to the website's servers and manipulate the configuration files which identify the server as host website on Internet.

Protection from Phishing and Pharming

- Install anti-phishing software.
- Never give away any sensitive information related to finance and security like pins, passwords, bank balance, transaction details, identification numbers etc. in reply to undesired emails and never on phone.
- Always cross check the source of email and phone call with the concerned agency.
- Today all authentic agencies like banks and merchants have their own secured apps for transactions. Download and use them on your mobile phones instead of unknown third- party apps.
- Phishers address their targets with fancy terms like “valued customer” but genuine agency will address you by your correct name, username, customer ID etc.
- Regularly check your financial statements and account details.

- Secured Socket Layer Certification is done for websites by known authorised Certification Authorities (CA). CAs do not issue SSL certificates to phishers, spammers or any agency that is not properly identified and cleared. Check the website's certificate icon of a padlock in the address bar. All secured websites have SSL (Secured Socket Layer) certificates. If padlock icon is of open lock then website is not secured and must be left immediately.



- Never ignore operating system, antivirus and browser upgrades. Do them as and when prompted or required.
- Web sites should deploy effective firewalls with suitable settings to prevent unauthorized access and intrusion. Let us understand what a firewall is and what does it do.

Firewall: A firewall is a security combination of hardware and software that is used to protect a server and network resources from unauthorized access and intrusion. Firewall checks the incoming data packets over the networks and filters out which do not have suitable and sufficient permission to access the network. This way an extra level of protection is created right at the gates of the network.

Internet Frauds and Scams

Today we virtually live and shop on Internet. Scammers send the users tempting newsletters and prompts of getting rich quick through online gambling, lottery or games alluring them to click the link. Once you accept the offer they attempt to take sensitive information like credit card numbers, pins etc.

Protection from Internet Frauds

- Do not accept offers impulsively.
- Ask yourself: *Do I really need it? Does it really concern me?*
- Avoid individuals asking for donations.
- Avoid accepting or vouching for any financial transaction with online friends whom you have never met especially those in known notorious regions of the world.
- Avoid charity involvement offers, placement schemes with instant visas, medical claims of quacks to cure certain disease instantly.

Cyber Bullying

Any sort of threat or harassment over internet is the act of cyber bullying. Messages in bad taste and intentions, online mockery in friend groups or circles, stalking someone's online profile and trying to post unwanted updates, sending unsolicited private messages, videos, and pictures are considered as Cyber bullying that affects young minds intensely even up to the threats of death.

Protection from Cyber Bullying

- Children must know that their parents and teachers are always available for them when they face such problem.
- Children must know that no matters what, parents and teachers are their first support.
- Children should inform their elders about any incident that sounds nasty even remotely.
- Children must know the fact that cyber bullies are not capable to do any harm and they can never carry out their claims of harming someone.
- Children are advised to block such intruders immediately and never entertain them.
- In case of cyber bully attack, save all his/ her messages offline as evidence for later use.

Malicious Smartphone Applications

Many smart phone applications seem attractive but in fact contain malicious code that steals information stored in the smart phone, such as the address book data without the owner's knowledge. The personal information stolen this way is forwarded to the hackers who abuse it to commit cyber crimes such as spam operations, billing frauds and cyber scams. Every trending app is not worth downloading.

Smartphone Safety Measures

- Set up emergency numbers for instant calling.
- Do not use cell phone everywhere – keep your senses free to perceive other stimuli like while crossing road, driving, using escalators, crowded areas etc.
- Get rid of unwanted data as soon as possible – keep your phone data tidy.
- Protect your phone from physical theft. Make it a habit to check while leaving any place.
- Keep good password and pattern protection.
- Keep the antivirus and software updated.
- Sign out of and close the apps that are used.
- Avoid automatic download settings.
- Keep your wireless access secured.
- Do not install just any app impulsively or in peer pressure.
- Keep a regular backup of your phone data.

Glossary

Trojans	:	A malicious program that is promoted as useful utility but causes harm to the computer.
Firewall	:	Protects a server and network resources from unauthorized access and intrusion.
Spam	:	Unsolicited junk email.
Pharmig	:	When website's traffic is redirected to another unauthorized fake URL.
Cyber bullying	:	Any sort of threat, scare or harassment over internet.

Quick Review

- *A set of guiding principles for using computers without causing harm to others is called Computer ethics.*
- *Viruses are malicious codes that attach themselves with program files and corrupt them.*
- *Trojans are the malicious programs that are promoted as useful utilities but harm the computer.*
- *Worms are the program codes that replicate over a network from one computer to the other and make the computers slower.*
- *A firewall is used to protect a server and network resources from unauthorized access and intrusion.*
- *Spyware is used for the purpose of eavesdropping.*
- *Spam is unsolicited or undesired junk email usually a promotional material*

Exercise

A. Choose the correct answer.

1. Which of the following are promoted as useful programs and are actually threat for computers?

   a) Trojans ☐ b) Viruses ☐

   c) Worms ☐ d) Firewalls ☐

2. _____ is used for the purpose of eavesdropping.

   a) Spam ☐ b) Virus ☐

   c) Spyware ☐ d) Trojan ☐

3. Running a regular Windows update ensures which of the following?

   a) Removal of malicious program

   b) Installation of firewall

   c) New features in Windows software

   d) Fixing of security bugs

4. To minimize the receipt of undesired junk mail, which of the following is the best way?

   a) Install a firewall

   b) Use spam filtering settings in the email service.

   c) Install SSL certificate

   d) Unsubscribe such mails manually.

5. Which of the following is not an example of cyber bullying?

   a) Sending unwanted emails

   b) Sending undesired messages in bad taste and intentions

   c) stalking someone's online profile and trying to post unwanted updates

   d) sending unsolicited private messages

B. Fill in the blanks.

spyware, phishing, firewall, virus

1. _____ is a malicious code that attaches itself with files and corrupts them.
2. Private networks use _____ to keep unwanted IP addresses filtered out.
3. _____ installs itself on the computer without user's knowledge and monitors activities on that computer.
4. Fraudulently acquiring sensitive information from the users is called _____.

C. Tick (✓) the correct statement and cross out (X) the incorrect one.

1. We should always accept financial transactions with our online friends.
2. We should keep a good password and pattern for our mobile phone.
3. Children must immediately inform police about any cyber bully threat.
4. Pharming is website's traffic redirected to another unauthorized fake URL.

D. Answer the following questions.

1. What is the basic difference between a trojan and a worm?

2. Briefly describe Phishing and Pharming. Mention the two most effective ways to protect computer from them.

3. List any 5 steps children must take if they are threatened by a cyber bully.

4. What is a firewall? How does it keep networks safe?

Teacher's Signature : _____ *Teacher's Remark :* ☆☆☆☆☆

Beyond the Book

https://www.technologyreview.com/s/609641/six-cyber-threats-to-really-worry-about-in-2018/
https://www.secureworks.com/blog/cyber-threat-basics

Watch & Learn

www.eduitspl.com
www.youtube.com/edusoftknowledgeverse

Teacher Corner

Teachers must quiz the students after teaching regarding responsible and safe use of Internet as well as mobile phones.

A Tryst with Python

Dear Teacher,
We came to know that Python is one of the most popular programming languages today. Can we learn more about it?

Sure Students,
This chapter will give you a quick glimpse into the features and fundamentals of Python.

Python is the most popular programming language today. The prime objective of this chapter is to give you a primary introduction to Python to help you understand the language in detail in higher classes.

Main Features of Python

- Python is open source programming language. You do not need to buy any license to use it. Download it and start using it just for free.
- Python is an easier language to learn and use over any platform (platform independent) such as Windows, Mac OS and Unix.
- Python has a huge library of pre-designed data structures and modules (sub programs) to perform complex operations quickly and easily.
- Python is an interpreter-based language. It saves the time on program development and you can easily test your programs. *An interpreted language is translated and executed statement by statement until the end of the program or until any error is encountered.*

You can download Python from https://www.python.org/downloads/

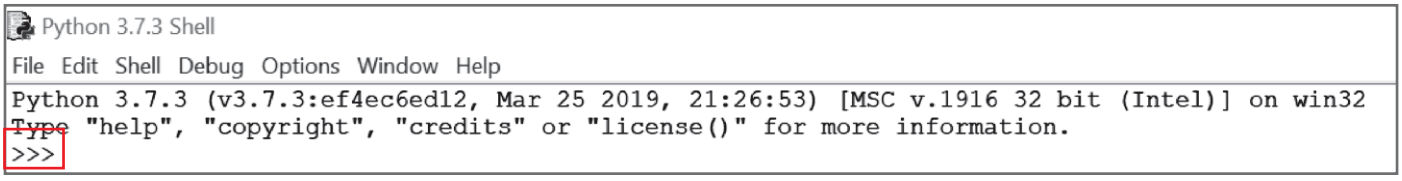
Python IDLE

IDLE is Python's **I**ntegrated **D**evelopment and **L**earning **E**nvironment. It allows interactive as well as script modes to work with Python interpreter. It provides an editor to write and edit your scripts and to save them. Python shell is built into IDLE which interprets the commands and scripts submitted to it.

Python Interactive Mode

In interactive mode, user keys in one command at a time and in response to that command,

Python displays the output. The commands are issued at Python command prompt denoted by >>>. For example, If you type: (1 + 7) * 2 then, immediately the result 16 will be displayed. Then you issue next command, get its output and so on. Interactive mode does not save your commands for later use.



Let us have little experience of interactive mode.

Fun with Numbers

On the command prompt, issue the following commands and observe the output.

COMMAND	OUTPUT	EXPLANATION
>>> 2 + 2	4	Simple addition using + operator.
>>> 43 - 7 * 9	-20	Simple arithmetic using subtraction and multiplication operators
>>> (23 + 2 * 5) / 5	6.6	Division by 5 using / operator.
>>> 15 / 2	7.5	A division returning float value (number with decimal points)
>>> 17 / 3	5.666666666666667	Division result with several decimal places.
>>> 17 // 3	5	Decimal places are suppressed using division by // instead of /
>>> 5 % 2	1	Remainder of the division returned using modulus (pron: modulo) operator %
>>> 5 ** 2	25	Calculating 5 to the power of 2
>>> 2 ** 8	256	Calculating 2 to the power of 8

>>> A = 5
>>> B = 2
>>> A * B
	10	Creating variables A and B. Assigning them values using assignment operator = and then performing multiplication on variables (A * B)

>>> A = A + 5 >>> A	10	Increasing the value of variable A by 5
>>> B = B - 1 >>> B	1	Decreasing the value of variable B by 1

>>> discount = 12
>>> price = 2599
>>> amount = price - (price * discount/100)
>>> amount
	2287.12	Calculating amount to be paid after 12% discount.

Do it Yourself

Try out the above commands in Interactive Mode on the computer.

Fun with Strings

Strings are the characters or letters in a sequence. In Python, strings are enclosed within single or double quotes. For example, “Bengaluru”, “New Delhi”, “DL 29 AS 1590”, “123456”.

Any sequence of letters within quotes is treated as a string. Let us look at some examples.

Simple Strings

> > > "Hello"

Output: 'Hello'

> > > "Python is powerful. I am loving it!"

Output: 'Python is powerful. I am loving it!'

```
>>> "Hello"
'Hello'
>>> "Python is powerful. I am loving it!"
'Python is powerful. I am loving it!'
>>> 'Python is cool. Isn't it?'
SyntaxError: invalid syntax
>>> "Python is cool. Isn't it?"
"Python is cool. Isn't it?"
```

Enclose Single Quotes within Double Quotes

> > > 'Python is cool. Isn't it?'

Output: SyntaxError: invalid syntax

Single quotes cannot enclose another single quote. Use double quotes.

> > > "Python is cool. Isn't it?"

Output: "Python is cool. Isn't it?"

String Variables

> > > fname = "Raj"

> > > sname = "Kumar"

> > > print(fname, sname)

Output: Raj Kumar

```
>>> fname="Raj"
>>> sname="Kumar"
>>> print(fname,sname)
Raj Kumar
```

print() is a Python function for output. You shall learn more about it in detail in this chapter.

Displaying range of letters in a string: A range of letters can be accessed by mentioning starting index position followed by : and then (ending index position – 1). Let us look at the examples where str contains the string *pseudocode*.

> > > str[0:4]	**Output:** 'pseu'	first four letters
> > > str[6:9]	**Output:** 'cod'	letters from index 6 to (9-1)
> > > str[:4]	**Output:** 'pseu'	letters from index 0 to (4-1)
> > > str[6:]	**Output:** 'code'	letters from index 5 to last letter

The len() function: len() is an in-built Python function which accepts a string as parameter and returns number of letters in it i.e. length of string. For example, len(“star”) will return 4 and len(“New Delhi”) will return 9 (space counted). Let us look at our str example.

> > > len(str)

Output: 10

Concatenating strings: Consecutive strings can be combined using addition operator + .

```
>>> fname + sname
```

Output: 'RajKumar'

```
>>> fname + " " + sname
```

Output: 'Raj Kumar'

```
>>> sname + " " + fname
```

Output: 'Kumar Raj'

Accessing individual letters of a string: Python positions letters in a string on the basis of zero-based index. It means that first letter of the string is at position 0, second on position 1 and so on. For example, in the string "MORNING", index of letter M is 0. In reverse, index of last letter in the string begins with -1. In the above example, if we read the string in reverse then -1 is the index of letter G.

Let us have a look at certain examples.

```
>>> str = "pseudocode"
>>> str[0]
```

Output: 'p'

```
>>> str[1]
```

Output: 's'

```
>>> str[4]
```

Output: 'd'

```
>>> str[-2]
```

Output: 'd' second last letter is displayed.

Do it Yourself

Try out str[-3] and str[-1] commands where str is a variable holding a string "The Lion King". Write the output here:

_____

Try out str[2:(len(str)-1)] and str[2:-2] commands where str is a variable holding a string "The Lion King". Write the output here:

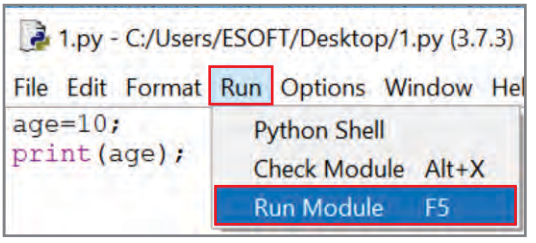
_____

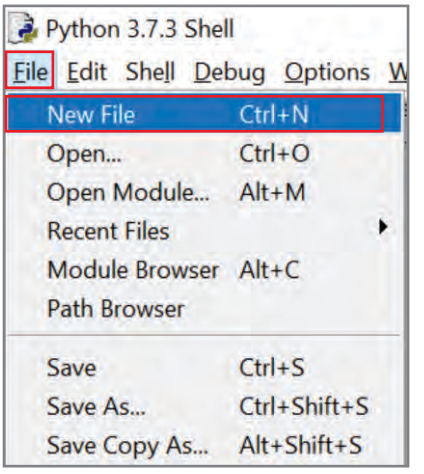
Python Script Mode

In script mode, the python commands are saved in a logical order to get the desired output. This logical set of instructions is called script. Once the script is saved, it can be executed anytime.

To create a new script file, got to File menu and select New File option or press Ctrl + N.

To run a script, go to Run menu of the script window and select Run Module option or press F5.





Note

Python script files have the extension **.py**

Shortcut

To run Python script: F5

Python Comments

Comments are a way to document the script or put explanatory remarks to your script. Any line in Python code that begins with # sign is treated as a comment by the Python interpreter and it is not executed.

For example:

```
#Following script displays greeting to the user
age = 25;
#print("This is not going to execute")
```

Note

In Python, it is not necessary to terminate the statements with semicolon (;).

Here, first line is a comment and informs what the script is doing. Notice the last line. Since it is also prefixed with # sign it will not be executed.

Understanding Variables

A variable is a named identifier of program data. A computer program written in any language takes some input, processes it and generates the output. The values input to the program are stored in computer memory. In the program, these values are identified by unique names called variables. A variable stores one value at time. Variables also store the result of data processed. When a new value is stored in a variable the earlier value gets overwritten. As a program runs, the values in a variable might change hence the term variable.

Naming the Variables

The names given to the variables are called identifiers. Identifiers should begin with letters A-Z or a-z or an underscore. Then names can contain numbers, more letters, underscores. Special characters like @, #, % etc., punctuation characters, arithmetic operators etc. are not allowed. Some valid identifiers are: DOB, Date_of_Birth, Counter1, ctr_1. Python

variables do not have defined data types. Their type is defined by the value they store. For example, a = 10 means variable a is number type while a = "hello" means the same variable is now string type. You shall learn about Python data types in detail in higher classes.

User Input with input() Function

input() returns the input from the user in string form.

For example:

```
age = input("Enter your age:");
print(age);
```

Assuming that user inputs 25, the output will be: 25

Showing Output using print() Function

print() displays the output. After displaying, print appends a new line automatically. To suppress this, comma can be used. For example,

```
print (5, "hello", 23.4)
print ("This is on the same line")
```

There are two print statements but since first print statement ends with a comma, the new line character will be suppressed and output of the second print will be displayed in the same line.

A blank print statement displays a blank line.

For example:

```
print ("hello")
print()
print ("there")
```

Here, second print is displaying blank line.

Comparing Values

In real life programming, decisions are made by making comparisons. We compare two values and depending on the result we decide further course of the program. For example, if a user needs to be checked for his or her eligibility to cast vote, he/ she must be 18 or more. So, the age of the user can be checked if it is greater than or equal to 18. Another example is that if you need to check a number is odd or even, you will divide it by 2 and check if the result is equal to 0 or not.

The values are compared by using comparison or relational operators.

Comparison or Relational Operators

Comparison operators compare two values and return either true or false. These operators are given below.

Operator	Explanation
<	Less than
>	Greater than
==	Equal to
<=	Less than or equal to
>=	Greater than or equal to
!=	Not equal to

Comparing Values Using if Construct

if construct is used in making decisions and deciding which course the program should follow depending on the condition evaluated. The syntax of if is as below:

```
if condition :
        statement 1
        statement 2
```

Note

Statements that are part of **if** or any such block should be written with an indent. Indentation in Python tells the interpreter that indented statement is part of that block. **if** is also followed by a colon sign (:).

Let us see a simple example:

```
n = input("Enter a number: ")
if n >= 0:
        print(n, " is positive.")
```

Here, value input in the variable n is compared with 0 if it is greater than or equal (>=). Assuming if user enters 4 then message will be displayed 4 is positive. otherwise no message will be displayed.

Controlling Program Using if-else Construct

In if-else construct, if the condition given with if returns true then statements that are part of if will execute *otherwise* statements that are part of else will execute. if and else are followed by a colon sign (:).

For example,

```
n = input("Enter a number: ")
if n >= 0
        print(n, " is positive.")
else:
        print(n, " is negative.")
```

Here, a number is input by the user in variable n. the condition n >= 0 will evaluate to true if the value of n is 0 or more. Let us assume that user enters 5 then the message: 5 is positive. will be displayed.

If user had entered a number less than 0, say -2 then the condition n >= 0 would have returned false and else block would have executed, displaying the message: -2 is negative.

Do it Yourself

Open Python IDLE and write a program to accept user's age. Check the age and tell the user if he/she is eligible for casting vote or not. Eligible age for casting vote is 18 years.

Executing Statements Repeatedly

Usually, program is executed from top to bottom, line-by-line in a sequence. If you need to execute a statement several times then it is tedious to write as many statements. The better way is that you write the required statements just once and program should execute them as many times as you need. The process of executing the statements repeatedly is called reiteration or looping. The constructs that help in reiteration are called loop constructs or simply loops. Python provides two loops namely while and for. Here, we shall learn about while loop construct.

Looping Using while Construct

while loop executes the statements within itself as long as the condition associated with it returns true. When the condition returns false, the loop terminates. Let us see an example.

```
n = 0
while n < 5:
        print(n, "\n")
        n = n + 1
print("Done")
```

```
0
1
2
3
4
Done
```

The above code will print numbers from 0 to 4, one in each line.
Variable n is initialised by 0. First time, the condition n < 5 will return true and 0 will be displayed. Then, value of n will be increased by 1 (n = n + 1).
In next iteration, the condition will be evaluated again which will be true again since value of n i.e. 1 is still < 5 so the loop body will execute the second time. Thus, as long as value of n remains < 5, the loop will execute displaying the value of n and increasing n by 1. When the value of n becomes 5 the condition n < 5 will return false and loop will terminate. Eventually, Done will be displayed. Note the indentation! The last statement is not indented for while block hence it is not the part of while block. It will execute after the while block is over.

Do it Yourself

*Open Python IDLE and write a program to accept a number from the user. Then display the message **Thank you** as many times as the number.*

This completes the quick introduction to Python. There is a lot more in Python to learn which you will explore in higher classes. The purpose of this chapter was to make you familiar with basic programming approach using Python. This will help you learn Python in detail as you progress further.

Glossary

IDLE	:	Integrated Development and Learning Environment.
String	:	Sequence of letters enclosed within quotes.
Variable	:	An identifier to store data.
Operator	:	A symbol to perform some operation on the data.
Operand	:	A data value.
Reiteration	:	Executing a statement repeatedly using a loop construct.

- *Python is an open source, interpreted programming language.*
- *IDLE is Python's Integrated Development and Learning Environment.*
- *In interactive mode, user keys in one command at a time.*
- *Strings are the characters or letters in a sequence.*
- *len() returns the length of a string.*
- *In script mode, the python commands are saved in a logical order.*
- *Python script files have the extension .py*
- *Python comments begin with #.*
- *Python variables do not have defined data types.*
- *input() takes user input and print() displays output.*
- *if & if-else are decision making constructs and while is a loop construct.*

Exercise

A. Choose the correct answer.

1. Python is _____ based language.

   a) Compiler ☐ b) Interpreter ☐

   c) Both a) and b) ☐ d) None of these ☐

2. In _____ mode user types commands on Python command prompt.

a) Interactive ☐ b) Script ☐

c) Command ☐ d) All of these ☐

3. Python command prompt is denoted by _____.

a) $$$ ☐ b) > > ☐

c) > ☐ d) > > > ☐

4. "500.45" is an example of _____.

a) Number ☐ b) Float ☐

c) String ☐ d) Variable ☐

5. len("I love python") will return ____.

a) 11 ☐ b) 10 ☐

c) 13 ☐ d) 15 ☐

6. *#print("Hello")* will display:

a) Hello ☐ b) Nothing ☐

c) H ☐ d)print("Hello") ☐

B. Fill in the blanks.

#, Script, 1, 0, len()

1. The position of second letter in a string in Python is _____.
2. str[:2] means index ____ to index 1.
3. Python comands are saved in a file in _____ mode.
4. Python comments begin with ____ sign.
5. _____ returns number of letters in a string.

C. Tick (✓) the correct statement and cross (✗) out the wrong one.

1. Python is an interpreter based programming language. ☐
2. // divide operator returns result of division with decimal places. ☐
3. "12" is an example of number in Python. ☐
4. Python positions letters in a string on the basis of zero-based index. ☐
5. A variable is a named identifier of program data. ☐

D. Answer the following questions.

1. List any 3 features of Python programming language.

2. What do you mean by Interactive mode and Script mode in Python?

3. What is a variable?

4, Describe any 2 comparison operators with example.

Lab Activity

Write the Python scripts to do the following:

1. In a string: *I love my country!* display the first and last letter.
2. Accept length in inches, convert it into feet and display the result.
3. Accept the age and display the years left in user's retirement (retirement age is 60 years).
4. Accept a number and display all the numbers between this number and 0 in reverse.
5. Keep accepting numbers from the user until 0 is entered. Count how many of them are even and odd. Finally, program should display the count of even and odd numbers.

Teacher's Signature : _____ *Teacher's Remark :* ☆☆☆☆☆

Beyond the Book

https://www.python.org/about/gettingstarted/
https://www.pythonforbeginners.com/basics/

Watch & Learn

www.eduitspl.com
www.youtube.com/edusoftknowledgeverse

Teacher Corner

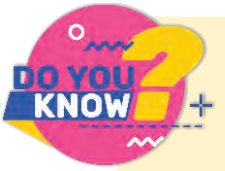
Dear teachers, please demonstrate the practical examples to the students for better understanding.

E-Commerce, M-Commerce and Net Banking

You must have seen people ordering a pizza using a cell phone or buying a book from an online book store. Today, buying things like books, household items, shoes etc. and booking hotel rooms, flights and holiday travel packages etc. over Internet using computers and mobile phones is a common sight.

E-Commerce

The service that authorises all modes of online payments is called payment gateway. Buyers make payment using various options like credit cards or debit cards and Net-banking. Online sites provide payment features where buyers can enter their payment details like card number or bank account number in a secured way. Buyers also enter their address. Once the payment is done the item is scheduled to be dispatched to the buyer's address and we get the item delivered at our doorstep. Buying and selling things and services using computers and Internet is called as Electronic Commerce.



The service that authorises all modes of online payments is called payment gateway.

M-Commerce

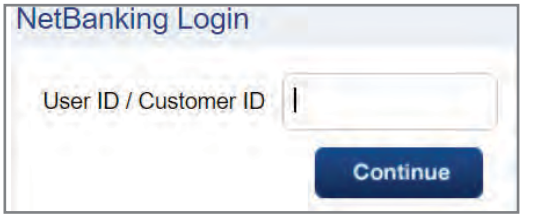
With the advent of smart phones people prefer buying things with the help of mobile phones and other handheld devices. This way, buying involves the use of cellular mobile network.

Buying and selling things and services over cellular network and Internet using mobile devices is called M-Commerce.

For various products and services various apps are available. You can download these apps and sell or buy the things using them. For example, using Snapdeal, Flipkart and Amazon apps you can buy a wide variety of products. The most popular sources for Apps to download are Google Play store and Apple App store.

Net Banking

The days of standing in long queues for depositing money in our accounts and withdrawing the money are over. Today, most of the transactions related to money are easily done from the comfort of our homes or while we are moving or traveling anywhere. This has been possible due to highly secured feature



provided by the banks called Net Banking. Security is a big issue in online payments. Data is encrypted while it is transferred online. Encryption is done by scrambling the information. This is done by a protocol called Secure Sockets Layer (SSL).

Encryption protects the information that travels between your browser and the banking servers by scrambling them. This is done by a protocol called Secure Sockets Layer (SSL).

Net Banking allows us to connect with our bank using a highly secured password and access our account. Making online payments or transferring money from one account to another is done easily and securely using Net Banking. To use this feature, users go to the bank's website or launch mobile app to login into their account. All E-Commerce and M-Commerce websites allow us to use net banking for making payments.

Digital Marketing

Web sites track our buying behaviour and browsing habits in various ways while we are online and then reach us with specific advertisements that interest us. You see a lot of advertisements and promotional messages while watching television. Advertisements are found in newspapers and magazines also. We also see advertisements in the form of banners, posters and pamphlets in marketplace.

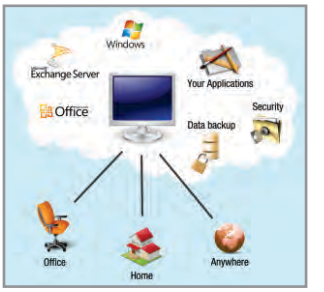
How do online sellers reach us to sell their goods and services? They use online medium to do so. We receive promotional mails in our email account. When we go online to use social media like Facebook and Twitter etc., a variety of promotional material and advertisements are displayed. Many times we get irritating popups while surfing the World Wide Web.

The process of reaching out to people and customers online with the information of products and services mainly over social media and email is called digital marketing.

When we buy something online, the seller keeps track of our preferences, interests, buying habits and surfing habits. Then, according to our buying preferences they display us with the suitable advertisements and offers. This is called targeted digital marketing. This form of marketing is highly effective and beneficial for online sellers. This is also suitable and less distracting for people as they get those offers and advertisements in which they might be interested.

Cloud Computing and SaaS

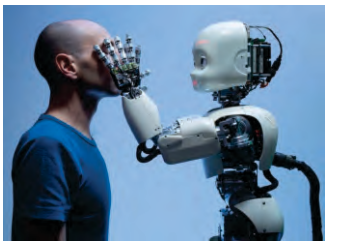
The programs and games we use are installed on our computer or mobile phone. Imagine that you want to use a program but you do not want it permanently installed on your computer. This is possible with the technology called Cloud computing. Here, the term cloud refers to the Internet.



Today, over Internet, you can use several programs and software without having them installed on your computer. This way you pay only for the exact usage of the service instead of buying the whole software unnecessarily. Such software which is available over Internet as and when you need it is called Software as a Service (SaaS) and the technology is called Cloud Computing. The software is installed on advanced and powerful servers across Internet. User just needs to subscribe to the required service and use it after reasonable payment. For businesses and large organisations cloud computing is an economical option.

Artificial Intelligence and Robotics

Artificial intelligence (AI) is the field to design and develop such computers and machines which can demonstrate human-like intelligence. For example, translating a language into another, recognizing face among several hundred digital images, recognising a specific voice from among several voices, making smart decisions like navigation through traffic on road. It is a futuristic technology and a lot of research and experiments are ongoing in this field. AI makes the machines learn from their data and previous processing. Depending on that learning they must make further decision to accomplish a complex task.



Engineering and science together form the field of Robotics. This field involves design and development of robots. Robots are used mostly in dangerous environment where human lives are valuable. Today robots are used in manufacturing, mining and tasks that involves danger for humans.

Big Data and Data Analytics

Due to thousands of online transactions and interactions world over, it is difficult for large business corporations to deal with and process the bulk of data using common computing devices. This huge bulk of data is called Big Data. This huge bulk of data is analysed as sets of data using complex algorithms to derive meaningful information. This process of analysing data sets for meaningful information is called data analytics. Data analytics is highly beneficial for large businesses deriving useful conclusions from the raw data.

Online Learning

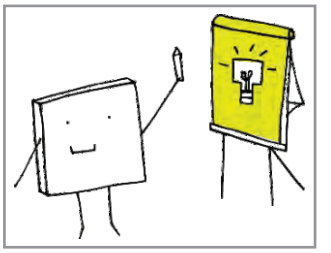
Using computers and mobile devices to access Internet for learning is called online learning. For higher studies or specialised courses we do not need to visit the institute and attend the classes physically. Using our computers and mobile devices, we can register for various courses we require and eligible for. After registering, we can attend the classes online on making applicable payment. Many basic courses are available free also. The online classes are conducted either in the form of a pre-recorded video or by an instructor present online. Pre-recorded

videos can be seen anytime and learner can watch them at any convenient time while online instructor-based courses have scheduled timetable. In video-based course there is no provision of interacting with the instructor during the time of lecture hence it is suitable for certain specialised courses only. Instructor-based courses are suitable where learners need constant guidance from the instructor.

Design Thinking

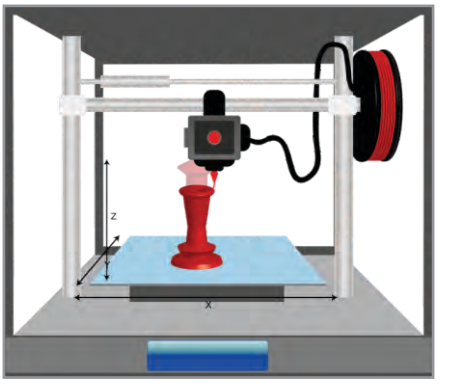
This term has two words – design and thinking. Design refers to the creativity and thinking relates to finding a solution to a problem. So, the term, coined by Tim Brown (ideo.com), means creative approach towards thinking and arriving at the best suited solution to any problem. Design thinking focuses on two things – customer's requirements as they see them being end users, technical feasibility of the solution and its economic viability. Design thinking approach help us to understand the problem from human point of view and think of an initial solution after brainstorming on several ideas. This prototype is tested and improved to implement finally. Design thinking can be applied in any area of life and by anyone to address any problem.

Stages of Design Thinking

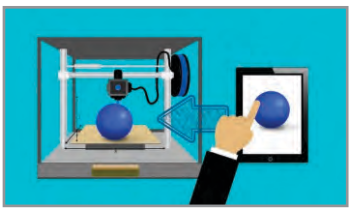


Design thinking approach involves, firstly, the research of the user's needs (Empathise), precise description of the needs to identify the problem to address (Define), consider assumptions and come up with possible ideas that may solve the problem (Ideate), select the best idea and build an initial working model (Prototype), test the design for improvements and final implementation (Test) and finally, launch the working model (Launch). So, design thinking is human-centred, creative, iterative (visit previous steps again) and collaborative (team work).

3D Printing



3D printing is the process of making real objects from the digital design. Complex solid shapes can be created using this technology. 3D printing first requires a 3D drawing of the object to be created. Once the 3D object is designed in computer using a designing software then this object is put through a process called slicing. Slicing cuts the object into a vertical layer of hundreds or thousands of thin slices. This sliced file is submitted to a 3D printer connected with the computer.



3D printer draws out one layer over another until entire solid

object is created. Some free, browser-based, 3D design software are Tinkercad, Blender, BRL-CAD, DesignSpark, FreeCAD, OpenSCAD and Wings3D. Some open-source slicer software are Ultimaker Cura, Slic3r, Repetier and ideaMaker.

The Internet of Things (IoT)

We often listen people talking about smart devices. We already have smart devices around. A smartphone has been the most common of them all.

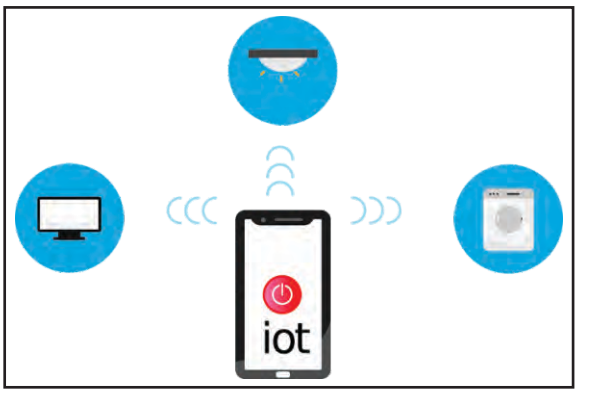
The Internet of Things (IoT) is the concept of networking devices which communicate over Internet to share data and signals in order to execute the required tasks accomplished.

Consider the following scenarios:

- As you get up in the morning, switching off the alarm clock, which sends a signal to the geyser and it turns on heating.
- As your school bus enters the school gate, the gate sensors detect the chip in the id cards of all the 55 students in the bus and sends a confirmation message to all parents and school's attendance system. (The face reader fitted in the bus "tells" the gate scanner that count of students is one less than the count of id cards. AI-system in the gate scanner quickly scans all the faces in the face reader of the bus and compares them with the bus database. The absent student is spotted and alert is sent to the parents).
- Your school canteen checks day's menu and lists food items on your tab, you confirm your order and get it fresh during recess.
- You push your answer sheets in the digital answer sheet collector and within seconds the digital AI-equipped examiner connected with it, detects your handwriting, checks your answers and flashes the score on your tab.
- As you start back from home, from your tab, you send a signal to the oven at home to keep the noodles hot as you arrive.
- Your refrigerator senses the milk going out of stock and signals the online store the required quantity of fresh milk.
- You control devices at your home through a mobile app.

Did you notice something common in all these scenarios? Yes, devices (alarm clock and geyser, school gate sensor and face reader, answer sheet collector and answer sheet examiner, school canteen menu system and your tablet,

oven and refrigerator) are "talking" to each other. How? Through embedded sensors and chip-controllers.



What is the medium of this entire communication? Internet, Bluetooth or Infrared. All these "things" are communicating through control chips with each other over Internet. Welcome to the Internet of Things!

Some popular IoT devices are:

- Google Home Voice Controller and Amazon Echo Plus to control digital equipment like TV, music system etc.
- Smart doorbell camera that has AI that recognises your guests.
- Smart locks operable through mobile app.
- Mobile robots that help in small domestic chores.
- Universal Remote Controller to control all devices at home.
- Smart watches that track your fitness workout and health data, talks to your phone and shows notifications.
- Autonomous car.
- Google-Levi's IoT Jacket Jacquard with sensors in fabrics to answer hands-free calls and operate the phone by gestures.

Smart Homes

A home that is equipped with appliances and gadgets that run on smart applications or AI-enabled applications and technologies like IoT to provide a sustainable (not harmful to environment and society), healthy and safe stay is called smart home.

What are the major aspects that need consideration to make a home smart? Let us see:

Kitchen – Smart oven operable through alerts from other devices like smartphone, coffee maker that lets you know when coffee beans run out of stock, refrigerator that suggests grocery list depending on the items consumed.

Living room – Digital photo frame synced with your Instagram and Facebook account, smart TV that lists top 3 movies being watched in your friends' group and prompts you to watch them with your friends in real time, a snacks trolley that knows its way around the house.

Washroom – Geyser that switches itself on when morning alarm goes off, smart water flow control system as you take bath or shave, a mirror that shows notifications or displays TV feed in its corner.

Bedroom – App operated lights, air conditioner that senses when you are asleep and adjust temperature, alarm clock that also displays number of overnight notifications that came in on your smartphone and that talks to the geyser, your car and other appliances.

Car – knows when its documents need renewal, when it needs next servicing and car wash, knows your regular routes and locates the best and fastest route, senses threats around while driving.

Security – Smart burglar sensors, doorbell that recognises your closer ones, lock that opens with voice command and that can talk to your phone, fire alarms and sensors which share data with each other.

In addition to this, there are several other possibilities such as smart lighting system, heating system, air quality system, cleaning and dusting bots, bots that help in small house chores, smart accessories, apparels and footwear.

Generally, the distance among the devices at a home would be a few meters so Bluetooth and WiFi are most suitable technologies. Appliances are connected with a central controller called smart home hub such as SmartThings and Wink by Samsung. Through this hub, all the devices communicate using Z-Wave protocol. Devices' communication is controlled by the hub.

AI-powered smart homes: Being surrounded with "intelligent", "trainable" and "predicting" appliances makes an "AI-powered smart home". An AI-powered smart home learns to know your needs better as the time passes and optimises itself to offer better service responses than earlier.

At the heart of entire AI-based smartness is the learning algorithms. Once AI is integrated to an IoT device, its functionality evolves in more useful ways. These devices, after getting trained, can perform routine tasks on their own such as:

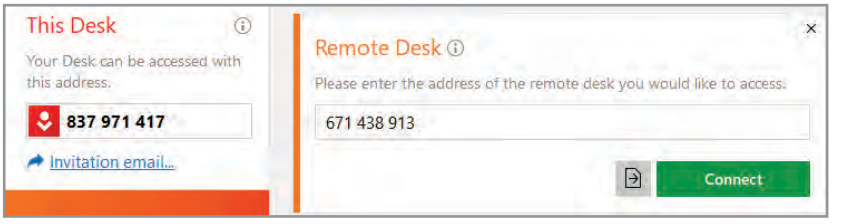
- Preparing grocery list.
- Schedule money transfers and payments.
- Automatically replying to routine messages.
- Managing your appointments on priority-basis.
- Identifying stocks to invest and suggest how much to invest.
- Predicting potential threats such as accidents, break downs, theft etc.
- Information and documents update such as vehicle registration, expiry of food items and medicines, upcoming payments and bills etc.
- Function as your personal health trainer which tracks your food habits, hygiene, personal habits and suggests precautions to take.
- Analyse your study and assessment data and suggest study schedule and guidelines.
- Comfort you with soothing music depending on the stress you face.

AnyDesk – Remote PC Access Software

Download AnyDesk from anydesk.com. It is a simple program to connect with a remote computer and work on it as if it is your local computer. Its free version is available for personal use.

To use it, the computers of both the parties should have AnyDesk running. Let us call the person Guest who needs to work on remote computer via AnyDesk and the one allowing access to his computer Host. Following are the steps to use AnyDesk:

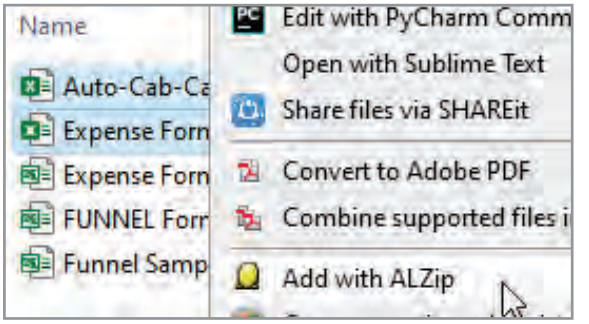
- Both, the Guest and the Host run AnyDesk on their respective computers. AnyDesk generates a unique ID on the screen.
- Host should tell this ID to the Guest.
- Guest should enter the ID in his AnyDesk interface and click Connect button.



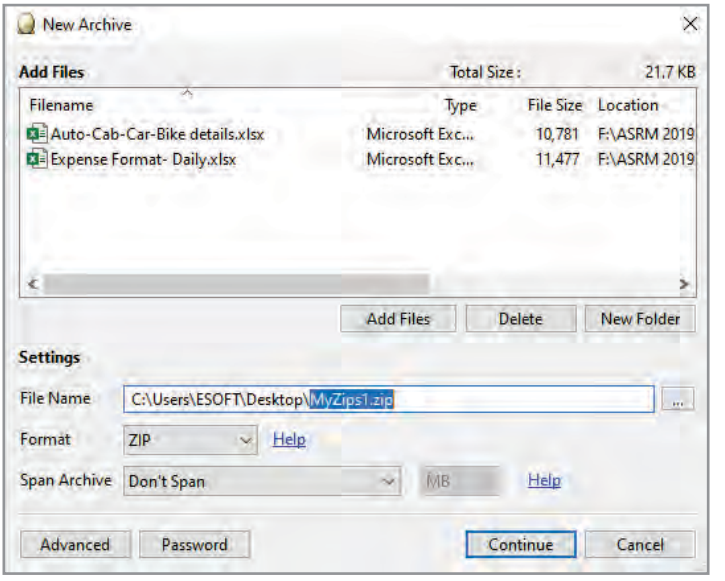
- Now, Guest has access to the Host's computer through his own computer.

AnyDesk comes in handy to give remote technical assistance or to access data on remote computer in case of emergency.

File Compression with AlZip

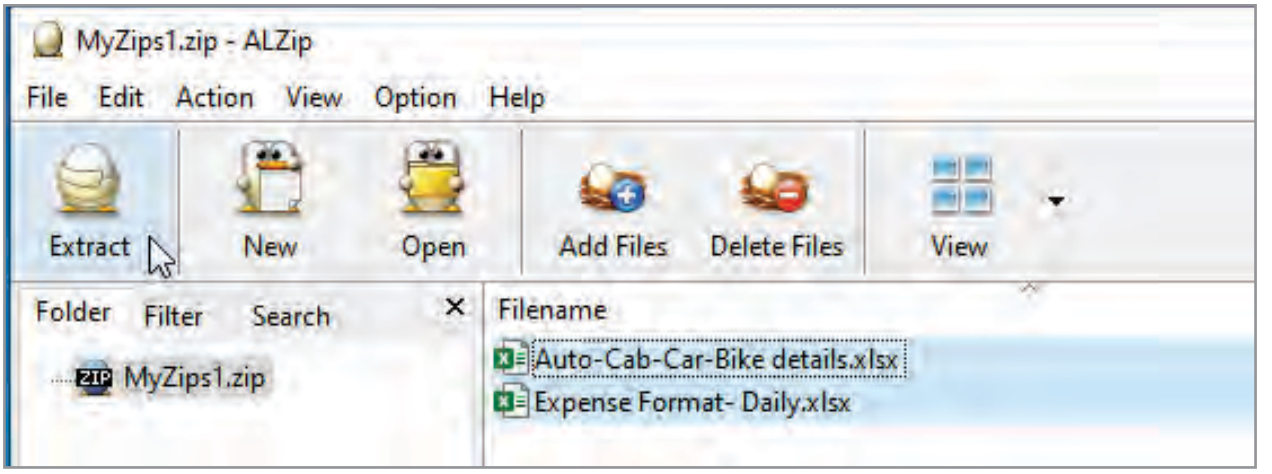


Many a times we need to transfer files of larger size and need them to compress in size. Process of compressing a file in size is called zipping and compressed files are called zipped files. This process creates a zip folder in which zipped files are stored. Later, the zipped files can be extracted from this zip folder. This process of extraction is called unzipping. There are many free zip tools are available online and their process is almost the same. Here, we look at AlZip. AlZip can be downloaded from https://download.cnet.com/ALZip/3000-2250_4-10326198.html or from Microsoft App store. After downloading and installing, simply select the files you need to zip, right click on them and select Add with AlZip. Select the location to save the zipped file and give a name to the file. Press Continue.



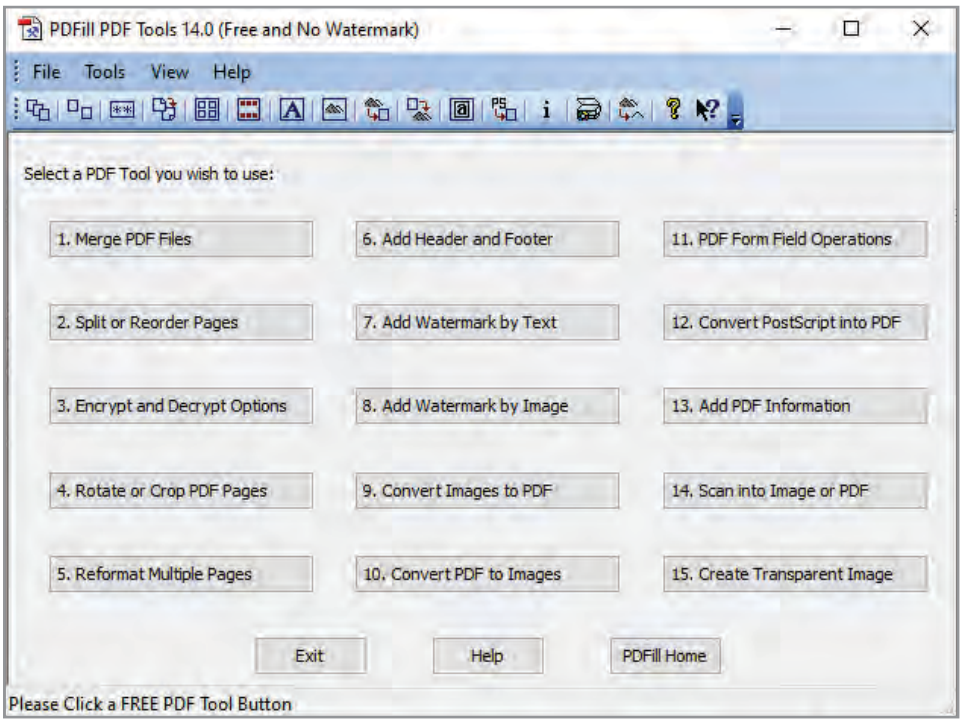
The zipped file will be created. 

To unzip the files, double-click on the zip file. Select the files to extract and click on Extract.



PDF Management with PDFill

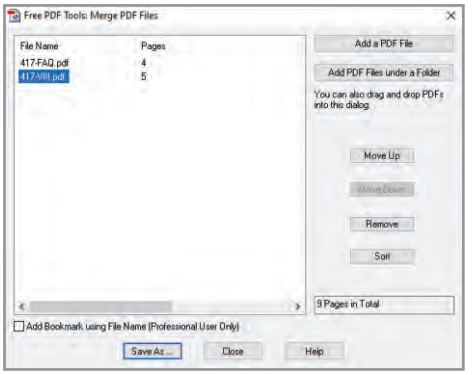
Portable Data Format (PDF) files are a common way of sharing files with others. They are lighter in size and open on any device easily. Creating PDF files is the basic task. Many software today provide options to generate PDF easily. But, sometimes we need to split the pdf files into parts, merge multiple pdf files into one, remove or insert pages and many such manipulations. For this, let us have a look at a free software PDFill. Its free basic version can be downloaded from pdfill.com.

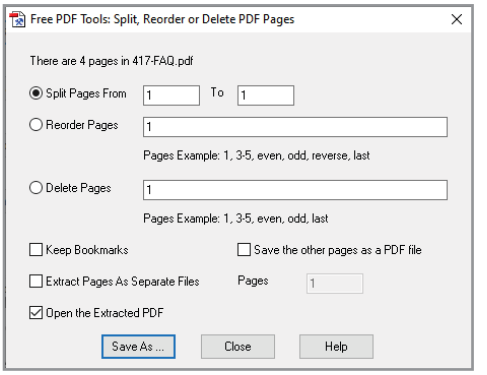


After installation, when you open PDFill, you can easily figure out what all tasks can be done in it. Mainly, you can merge and split pdf files, convert images to pdf and vice versa, add watermark to pdf files and crop pages.

To merge pdf files, add desired pdf files in to the interface and give the output file name by clicking on Save As.

To split, reorder and delete pages, you need to add desired file in the interface and specify the page number range to split, reorder or delete. Click on Save As to save the output file by some name.





PROJECTS

Database - Online Mangao, Offline Khao

Create a database **OMOK-DB** with following tables:

Table Food: This should store the Food item ID, food name, type, size and price.

Type can be Snacks, Beverage, Icecream, Sweet etc.

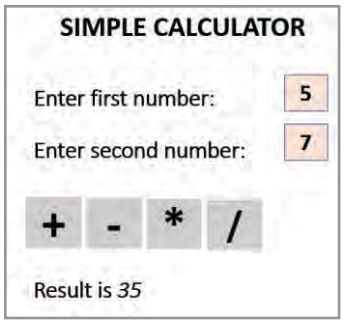
Size can be Half, Full, Small, Medium, Large, Piece etc.

Table Order: This should store customer mobile number, order date, food item ID (ordered by the customer), number of orders (how much quantity ordered)

Create forms for data entry into both the tables.

Create a report Order Report to display Food item ID, food name, customer mobile number, order date and number of orders

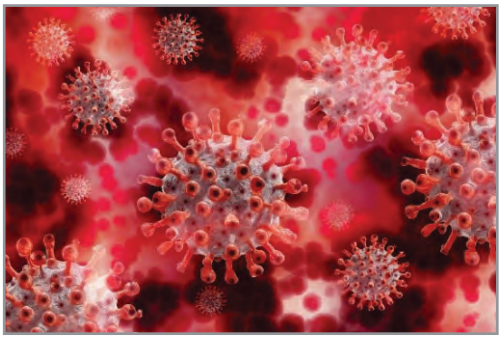
JavaScript - Simple Calculator

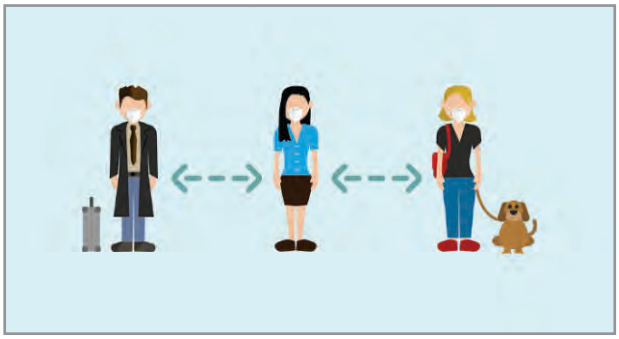


Create an HTML form to accept two numbers in two separate text boxes. Also, display buttons for Addition, Multiplication, Subtraction and Division. When user clicks on any button after entering the numbers, display the result on the webpage using *inner*HTML property.

HTML - Corona Pandemic

Create a 5-page website informing about Covid-19, its effect on the world, safety measures against it and how your life has been affected by it. Give credits to respective sources if you are using any images and content from any online source.





deCODE IT™

CODING | AI | DATA SCIENCE | PYTHON

deCODE IT™, a series of 8 books, is a humble effort to provide futuristic and comprehensive learning of computer applications covering basic concepts and in-detail insight into the software applications and programming approach. The series incorporates interactive, interesting and hands on methodology. Through class 1 to 8, the series covers features of MS-Office 2016 & 2019 over Windows 10. It also includes many futuristic applications and concepts like Tux Paint, Tux Math, GIMP, Flash CS6, Photoshop, CSS, App development, JavaScript, Python, AI & Data Science etc.

- **Suitable language** of explanation considering student's grade & age.
- **Do it Yourself** section poses simple challenges to the student as exercises to consolidate the learning.
- **Quick Review** section covers recap of key topics for summarised revision.
- **Teacher's Corner** section enriches teaching-learning experience with relevant tips for teachers.
- **Amazing Facts** section engages the interest by listing interesting facts and figures about the topic.
- **Shortcuts** section brings attention towards the key shortcuts necessary to do the things quickly.
- **Notes** section provides supportive information that is useful in completing the learning.
- **Do you Know** section throws light on any additional information necessary for the related topic.
- **Fun Zone** section helps children reinforce their learning while enjoying the activity at the same time.
- **Project Work** for students to apply their knowledge in real life scenarios.
- **Lab Activity** section covers complete practical application of the concepts learnt.
- **Beyond the book** section provides opportunity to explore more about the concepts over internet.

www.eduitspl.com
www.youtube.com/edusoftknowledgeverse

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- An Internet connection - preferably 3G or higher.

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"Any suffiicently advanced technology is indistinguishable from magic."
— C. Clarke

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