

**CLASS 6**

**LESSON 5**

**UNDERSTANDING ELEMENTARY SHAPES (Part – 2)**

**PERPENDICULAR LINES**

Two intersecting lines are perpendicular if the angle between them is 90 degree.

The perpendicular bisector of a line segment is a perpendicular to the line segment that divides it into two equal parts.

**EXERCISE 5.5**

1. Which of the following are models for perpendicular lines:

- a) The adjacent edges of a table top.
- b) The lines of a railway track.
- c) The line segments forming the letter L
- d) The letter V.

Ans.

The adjacent edges of a table top and the line segments forming the letter L are perpendicular lines.

2. Let PQ be the perpendicular to the line segment XY. Let PQ and XY intersect in the point A. What is the measure of angle PAY?

Ans. Angle PAY = 90 degree since PQ is perpendicular to the line segment XY.

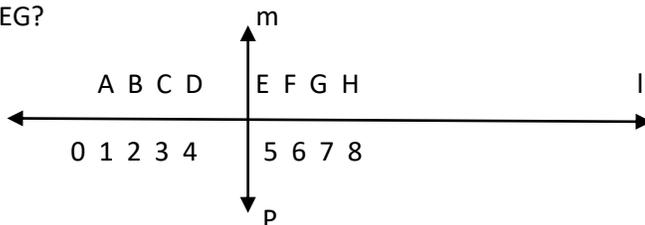
3. There are two set-squares in your box. What are the measures of the angles that are formed at their corners? Do they have any angle measure that is common?

Ans. One is a 30-60-90 set square; the other is a 45-45-90 set square.

The angle of measure 90 degree is common between them.

4. Study the diagram. The line l is perpendicular to line m.

a) Is CE=EG?



b) Does PE bisect CG?

c) Identify any two line segments for which PE is the perpendicular bisector.

d) Are these true?

i)  $AC > FG$

ii)  $CD = GH$

iii)  $BC < EH$

Ans.a) Yes

b) Yes

c) BH, DF

d) All are true.

### **CLASSIFICATION OF TRIANGLES**

#### **Naming triangles based on sides**

A triangle having all three unequal sides is called a **Scalene Triangle**.

A triangle having two equal sides is called an **Isosceles Triangle**.

A triangle having three equal sides is called an **Equilateral Triangle**.

#### **Naming triangles based on angles**

If each angle is less than 90 degree, then the triangle is called an **acute angled triangle**.

If anyone angle is a right angle then the triangle is called a **right angled triangle**.

If anyone angle is greater than 90 degree, then the triangle is called an **obtuse angled triangle**.

### **EXERCISE 5.6**

1. Name the types of following triangles:

a) Triangle with lengths of sides 7 cm, 8 cm and 9 cm.

b)  $\triangle ABC$  with  $AB = 8.7$  cm,  $AC = 7$  cm and  $BC = 6$  cm.

c)  $\triangle PQR$  such that  $PQ = QR = PR = 5$  cm.

d)  $\triangle DEF$  with angle D = 90 degree.

e)  $\triangle XYZ$  with angle  $Y = 90$  degree and  $XY = YZ$ .

f)  $\triangle LMN$  with angle  $L = 30$  degree,  $M = 70$  degree and angle  $N = 80$  degree.

Ans.

a) Scalene Triangle

b) Scalene Triangle

c) Equilateral Triangle

d) Right Triangle

e) Isosceles right triangle

f) Acute angled triangle.

2. Match the following

**Measure of Triangle**

**Type of Triangle**

i) 3 sides of equal length

a) Scalene

ii) 2 sides of equal length

b) Isosceles right angled

iii) All sides are of different length

c) Obtuse angled

iv) 3 acute angles

d) Right angled

v) 1 right angle

e) Equilateral

vi) 1 obtuse angle

f) Acute angled

vii) 1 right angle with two sides of equal length

g) Isosceles

Answer:

i) 3 sides of equal length ----- Equilateral

ii) 2 sides of equal length -----Isosceles

iii) All sides are of different length ----- Scalene

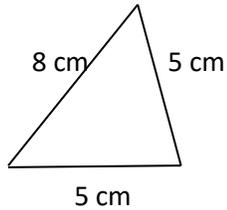
iv) 3 acute angles ----- Acute angled

v) 1 right angle -----Right angled

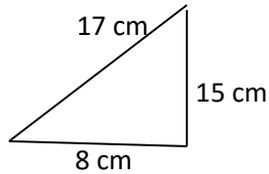
vi) 1 obtuse angle -----Obtuse angled

vii) 1 right angle with two sides of equal length ----- Isosceles right angled

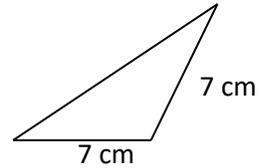
3. Name each of the following triangles in two different ways (you may judge the nature of the angle by observation)



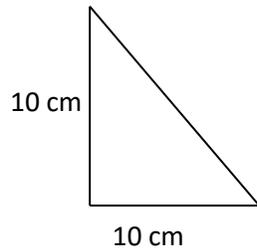
(a)



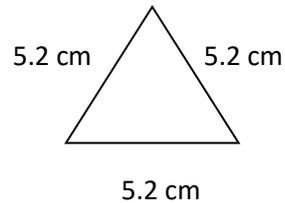
(b)



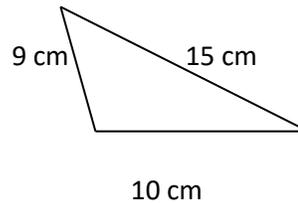
(c)



(d)



(e)



(f)

Answer:

a) Acute-angled and isosceles

b) Right angled and scalene.

c) Obtuse-angled and isosceles.

d) Right angled and isosceles.

e) Equilateral and acute angled.

f) Obtuse angled and scalene.

4. Try to construct triangles using match sticks. Can you make a triangle with

a) 3 matchsticks

b) 4 matchsticks

c) 5 matchsticks

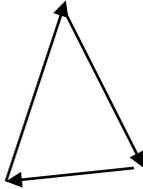
d) 6 matchsticks

(Remember you have to use all the available matchsticks in each case)

Name the type of triangle in each case. If you cannot make a triangle, think of reasons for it.

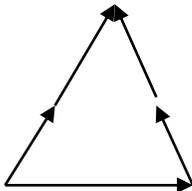
Answer:

a) By using 3 match sticks, we can form a triangle as follows

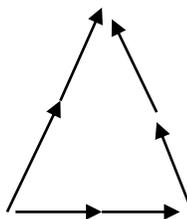


b) By using 4 match sticks, we cannot make a triangle. Because the sum of the lengths of any sides of a triangle has to be greater than the third side.

c) By using 5 matchsticks, we can form a triangle as follows



d) By using 6 matchsticks, we can form a triangle as follows



## QUADRILATERALS

A quadrilateral is a polygon which has four sides.

A rectangle is a quadrilateral, whose opposite sides are of equal length.

A square is a quadrilateral, with all the sides are of equal length.

A parallelogram is a quadrilateral, with two pairs of parallel sides.

A trapezium is a quadrilateral, with one pair of parallel sides.

A rhombus is a parallelogram with 4 sides of equal length.

### **EXERCISE 5.7**

1. Say True or False:

- a) Each angle of a rectangle is a right angle.
- b) The opposite sides of a rectangle are equal in length.
- c) The diagonals of a square are perpendicular to one another.
- d) All the sides of a rhombus are of equal length.
- e) All the sides of a parallelogram are of equal length.
- f) The opposite sides of a trapezium are parallel.

Answer:

- a) True
- b) True
- c) True
- d) True
- e) False
- f) False

2. Give reasons for the following:

- a) A square can be thought of as a special rectangle.
- b) A rectangle can be thought of as a special parallelogram.
- c) A square can be thought of as a special rhombus.
- d) Squares, rectangles, parallelograms are all quadrilaterals.
- e) Square is also a parallelogram.

Answer:

- a) A rectangle with all sides equal becomes a square.

b) A parallelogram with each angle a right angle becomes a rectangle.

c) A rhombus with each angle a right angle becomes a square.

d) All these are four-sided polygons made of line segments.

e) The opposite sides of a square are parallel, so it is a parallelogram.

3. A figure is said to be regular if its sides are equal in length and angles are equal in measure. Can you identify the regular quadrilateral?

Ans. A square is a regular quadrilateral.

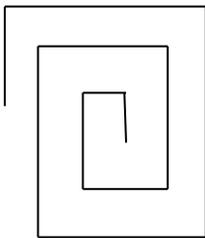
### **POLYGONS**

A polygon is a closed figure made up of only line segments.

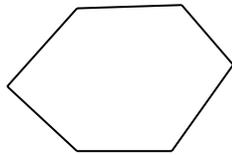
Number of sides	Name of the polygon
3	Triangle
4	Quadrilateral
5	Pentagon
6	Hexagon
8	Octagon

### **EXERCISE 5.8**

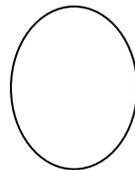
1. Examine whether the following are polygons. If any one among them is not, say why?



(a)



(b)



(c)



(d)

Answer:

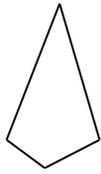
a) It is not a closed figure and hence is not a polygon.

b) It is a polygon of six sides.

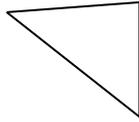
c) It is not a polygon since they are not made of line segments.

d) It is not a polygon since they are not made of line segments.

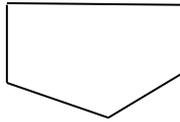
2. Name each polygon. Make two more examples of each of these.



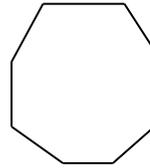
(a)



(b)



(c)



(d)

Answer:

a) A Quadrilateral

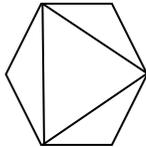
b) A Triangle

c) A Pentagon

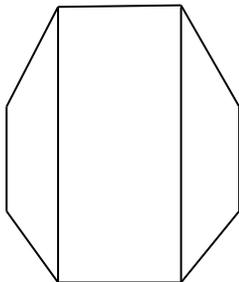
d) An Octagon

3. Draw a rough sketch of a regular hexagon. Connecting any three of its vertices, draw a triangle. Identify the type of the triangle you have drawn.

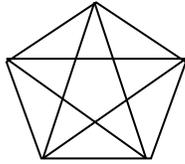
Ans.



4. Draw a rough sketch of a regular octagon. Draw a rectangle by joining exactly four of the vertices of the octagon.



5. A diagonal is a line segment that joins any two vertices of the polygon and is not a side of the polygon. Draw a rough sketch of a pentagon and draw its diagonals.



### **THREE DIMENSIONAL SHAPES**

We see around us many three dimensional shapes. Cubes, cuboids, spheres, cylinders, cones, prisms and pyramids are some of them.

#### **Faces, edges and vertices**

Consider a cube,

Each side of the cube is a flat surface called a flat face or simply a face.

Two faces meet at a line segment called an edge.

Three edges meet at a point called a vertex.

A cuboid looks like a rectangular box.

It has 6 faces. Each face has 4 edges. Each face has 4 corners (called vertices)

**A cube** is a cuboid whose edges are all of equal length.

It has 6 faces.

It has 12 edges

It has 8 vertices.

**A triangular pyramid** has a triangle as its base. It is also known as a tetrahedron.

Faces: 4

Edges: 6

Corners: 4

**A square pyramid** has a square as its base.

Faces: 5

Edges: 8

Corners: 5

**A triangular prism** looks like the shape of a Kaleidoscope. It has triangles as its bases.

Faces: 5

Edges: 9

Corners: 6

**EXERCISE 5.9**

Match the following:

a) Cone

i)



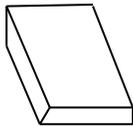
b) Sphere

ii)



c) Cylinder

iii)



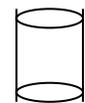
d) Cuboid

iv)



e) Pyramid

v)



Give two new examples of each shape.

a) ----ii

b) ----iv

c) ----v

d) ----iii

e) ----i

2. What shape is

a) Your instrument box?

b) A brick?

c) A match box?

d) A road-roller?

e) A sweet laddu?

Ans.

a) Cuboid

b) Cuboid

c) Cuboid

d) Cylinder

e) Sphere

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