

By. Er. Dharmendra Sir

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DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

BASIC NOTES (CBSE/NCERT)

UNDERSTANDING ELEMENTRY SHAPES

PART -1 OUT OF 1

6th, 7th & 8th

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-; understanding elements shapes :-

- Q. Shapes making using :- Corners, edges, planes, open curves and closed curves.
- Q. Shapes organising into :- line segment, Angles, Triangles, polygons and circles.
- Q. Triangle : Triangle makes three no. of line segments.
- Q. Rectangle : Rectangle makes four no. of line segments.
- Q. Line segment : A line segment is a fixed portion of line.
- Q. Length : measure of each line segment is a unique number called length.
- Q. measuring line segment :-
 - (a) Comparison by observation.
 - (b) Comparison by Tracing.
 - (c) Comparison using ruler and a divider.
- Q. measuring error :-
 - (a) Thickness of ruler create error.
 - (b) looking error if see from side view.
- Q. Error less measuring :-
 - (a) Use always divider for correct measurement.



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-: understanding elementary shapes :-

Q. Angles : - Right and straight :-

(a) Right means 90° angle turned.(b) straight means 180° angle turned.

Q. Four main directions :-

North (N), South (S), East (E) and West (W)

Q. How to find direction :-

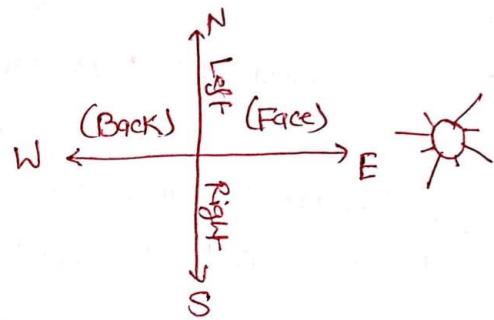
East start from the rising sun.

West start from the sets sun

If face in East directions :- then

South start from the Right hand.

North start from the left hand.



Q. See direction on paper :-

(a) upward - North

(b) downward - South

(c) Right hand - East

(d) Left hand - West



Q. clockwise and anticlock wise direction :-

(a) moving in direction Right to left - clockwise

(b) moving in direction Left to Right - anticlock wise.

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-: Understanding Elementary Shapes :-

Q. Clock Revolution :-

- (a) Complete Revolution is 4 right angles ($90 \times 4 = 360^\circ$)
- (b) Half Revolution is 2 right angles ($90 \times 2 = 180^\circ$)
- (c) one-fourth Revolution is 1 right angle ($90 \times 1 = 90^\circ$)
- (d) Two-fourth Revolution is 2 right angles ($90 \times 2 = 180^\circ$)
- (e) Three-fourth Revolution is 3 right angles ($90 \times 3 = 270^\circ$)

Q. Angles in clock :-

(a) Complete clock - 360°  360° (b) Half clock - 180°  180° (c) one-fourth clock - 90°  90° (d) Three-fourth clock - 270°  270° 

(e) Angles between two minutes

$$\frac{360^\circ}{60} = 6^\circ$$

(f) Angles between 5 minutes

$$\frac{360}{12} = 30^\circ$$

(g) Angles between 15 minutes

$$\frac{360}{4} = 90^\circ$$

(h) Angles between 30 minutes or Half hour $\frac{360}{2} = 180^\circ$ 

B.

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∴ Understanding Elementary Shapes :-

Q. Angles :- 'Acute', 'obtuse', and reflex

(a) Acute - Angle between 0 and 90°

(b) Obtuse - Angle $90^\circ < \text{obtuse} < 180^\circ$

(c) reflex - Angle $180 < \text{reflex} < 360^\circ$



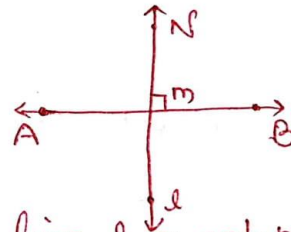
Q. Find angles using compass :-

$15^\circ, 30^\circ, 45^\circ, 60^\circ, 75^\circ, 90^\circ, 105^\circ, 120^\circ, 135^\circ, 150^\circ,$
 $165^\circ, 180^\circ, 22\frac{1}{2}^\circ = 22.5^\circ, 157\frac{1}{2}^\circ = 157.5^\circ$

Also find angles from ready made protector.

Q. perpendicular Lines :- When two lines intersect and the angle between them is a right angles, then the lines are said to be perpendicular

$NM \perp AB$



Q. perpendicular bisector :- Let AB line segment marks its midpoint and construct or make perpendicular by using compass or protector (see above figure) MN is the perpendicular bisector of AB.

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∴ Understanding Elementary Shapes :-

②. classification of triangles :- (based on sides)

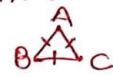
(a) Scalene triangle: A triangle having all three unequal sides is called a scalene triangle.



(b) Isosceles triangle: A triangle having two equal sides is called isosceles triangle.



(c) Equilateral triangle: A triangle having three equal sides is called equilateral triangle.



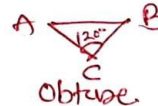
③. classification of triangles :- (based on angles)

(a) Acute angle triangle: If each angle is less than 90° , then the triangle is an acute angled triangle.



(b) Right angled triangles: If any one angle is a right angle then the triangle is called a right angled triangle.

(c) obtuse angled triangle: If any one angle is greater than 90° , then the triangle is called an obtuse angled triangle.



④. Quadrilaterals :- A quadrilateral is a polygon which has four sides.

(a). Rectangle :- Make rectangle use a pair of 30° , 60° , 90° set square.

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∴ understanding Elementary Shapes :-

(b) Square :- make square use a pair of $45^\circ-45^\circ-90^\circ$ set square.

(c) parallelogram: make parallelogram use a pair of $30^\circ-60^\circ-90^\circ$ set square

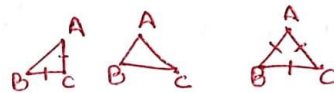
(d) rhombus: make rhombus use four $30^\circ-60^\circ-90^\circ$ square.

(e) trapezium: make trapezium use three $30^\circ-60^\circ-90^\circ$ set square.

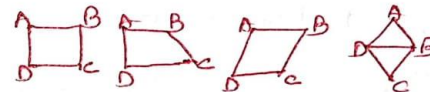


Q. Polygons :- These figure are makes from no. of line segment :-

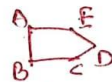
• Triangle - 3 sides.



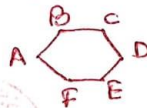
• quadrilateral - 4 sides



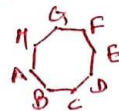
• pentagon - 5 sides



• Hexagon - 6 sides



• octagon - 8 sides.



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∴ Understanding elementary shapes :-

②. Three dimensional shapes :-

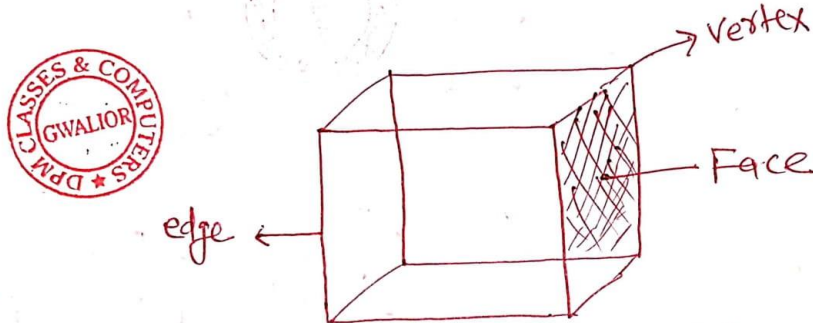
EX - Ball, Ice-cream, Dice, match-box etc.

• Faces, Edges and vertices of 3-dimensional shapes.

(a) Face :- The flat surface is called face.

(b) Edge :- Line segment called edge

(c) vertex :- The line meet at a point called vertex.
Plural of vertex is vertices.

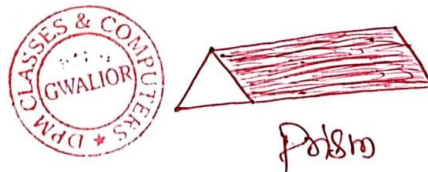


③. Triangular prism and Rectangular prism :-

A prism has two identical bases one is triangle and another is rectangle.

If the prism has a rectangular base. It is a rectangular prism.

If the prism has a triangular base, it is a triangular prism.



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∴ Understanding Elementary Shapes :-

- ③. pyramid :- A pyramid is a shape with a single base, the other faces are triangles.
If base is a square called square pyramid.
If base is a triangle called triangular pyramid.

④. other three dimensional shapes are :-

(a) cylinder



cylinder

(b) cone



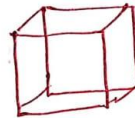
cone

(c) sphere



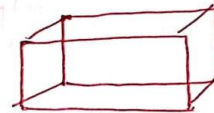
sphere

(d) cube



cube

(e) cuboid



cuboid.

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~! Understanding Elementary Shapes! -

Q. What is the disadvantage in comparing line segments by mere observation?

Ans. By mere observation, we cannot be absolutely sure about the judgement. When we compare two line segments of almost same lengths.

We cannot be sure about the line segment of greater length. Therefore, it is not an appropriate method to compare line segments having a slight difference between their lengths.

This is disadvantage in comparing line segments by mere observation.



Q. Why is it better to use a divider than a ruler, while measuring the length of a line segment?

Ans. It is better to use a divider than a ruler,

while using a ruler, ~~position~~ positioning error may occur due to the incorrect positioning of the eye.



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∴ understanding Elementary Shapes! -

Q. Draw any line segment, say $\overline{AB}$. Take any point C lying in between A and B . Measure the lengths of AB , BC and AC . Is $AB = AC + CB$?

Sol. It is given that point C is lying somewhere A and B , Therefore, all these points are lying on the same line segment $\overline{AB}$.

Hence, for every situation in which point C is lying in between A and B , it may be said that

$$AB = AC + CB$$



For Example! -

$\overline{AB}$ is a line segment of 6 cm and C is a point between A and B . Such that it is 2 cm away from point B . We can find that the measure of line segment $\overline{AC}$ comes to 4 cm .

Hence, relation $AB = AC + CB$ is verified.



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~! understanding elementary shapes!~

Q. If A, B, C are three points on a number line such that $AB = 5\text{ cm}$, $BC = 3\text{ cm}$ and $AC = 8\text{ cm}$, which one of them lies between the other two?

Sol. Given that,

$$AB = 5\text{ cm}, BC = 3\text{ cm}, AC = 8\text{ cm}$$

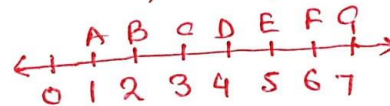
It can be observed that:

$$AC = AB + BC$$

clearly, point B is lying between A and C.



Q. Verify, whether D is the mid point of $\overline{AG}$



Sol. It can be observed that:

$$\overline{AD} = 4 - 1 = 3 \text{ unit}$$

$$\overline{DG} = 7 - 4 = 3 \text{ unit}$$

$$\overline{AG} = 7 - 1 = 6 \text{ unit}$$

clearly, D is the mid point of $\overline{AG}$.



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∴ understanding Elementary Shapes! -

Q. If B is the mid point of AC and C is the mid point of BD, where A, B, C, D lie on a straight line, say why $AB = CD$? (imp)

Sol.



Since B is the mid-point of AC

$$AB = BC \dots\dots (i)$$

Since C is the mid point of BD

$$BC = CD \dots\dots (ii)$$

from eq (i) and (ii) we obtain,

$$AB = CD$$



Q. What fraction of a clockwise revolution does the hour hand of a clock turn through when it goes from:

(a) 3 to 9 (b) 4 to 7 (c) 7 to 10

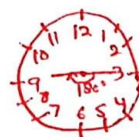
(d) 12 to 9 (e) 1 to 10 (f) 6 to 3



Sol. (a) 1 complete clockwise revolution, the hour hand will rotate by 360°

When the hour hand goes from 3 to 9 clockwise, it will rotate by 2 right angles or 180°

$$\text{Fraction} = \frac{180}{360} = \frac{1}{2}$$



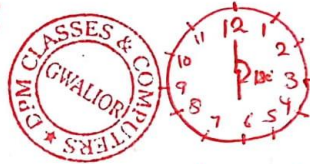
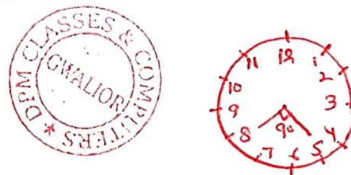
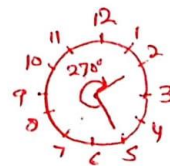
[do other it self]

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∴ understanding elementary shapes! -

Q. Where will the hand of a clock stop if it.

(a) starts at 12 and makes $\frac{1}{2}$ of a revolution, clockwise?(b) starts at 2 and makes $\frac{1}{2}$ of a revolution, clockwise?(c) starts at 5 and makes $\frac{1}{4}$ of a revolution, clockwise?(d) starts at 5 and makes $\frac{3}{4}$ of a revolution, clockwise?Sol. In 1 complete clockwise revolution, the hand of a clock will rotate by 360° (a) If the hand of a clock starts at 12 and makes $\frac{1}{2}$ of a revolution, then it will be rotated by 180° and hence, it will stop at 6(c) If the hand of the clock starts at 5 and makes $\frac{1}{4}$ of a revolution clockwise, then it rotates 90° and it will stop at 8(d) If the hand of the clock starts at 5 and makes $\frac{3}{4}$ of a revolution clockwise, then it will rotate by 270° and hence, it will stop at 2

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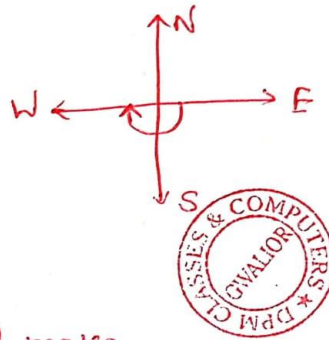
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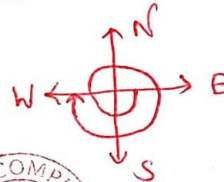
Q. Which direction will you face if you start facing

- east and make $\frac{1}{2}$ of a revolution clockwise?
- east and make $1\frac{1}{2}$ of a revolution clockwise?
- West and make $\frac{3}{4}$ of a revolution anti-clockwise?
- South and make one full revolution?

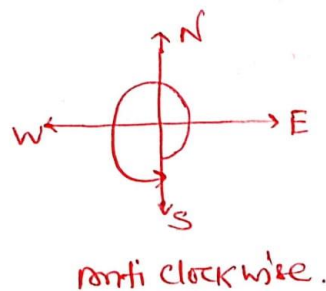
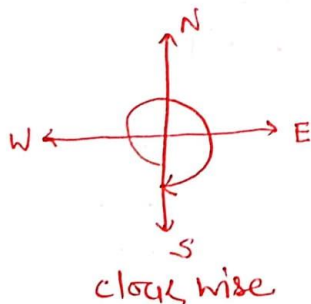
Sol. (a) If we start facing East and makes $\frac{1}{2}$ of a revolution clockwise, then we will face the west direction



(b) If we start facing East and make $1\frac{1}{2}$ of a revolution clockwise, then we will face the west direction



(d) If we start facing South and make a full revolution, then we will again face the South direction.



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-! understanding elementary shapes! -

Q. What part of a revolution have you turned through if you stand facing

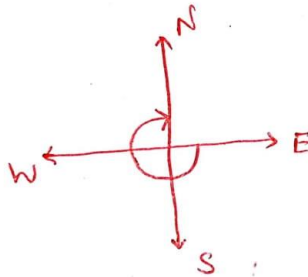
(a) east and turn clockwise to face north?

(b) south and turn clockwise to face east?

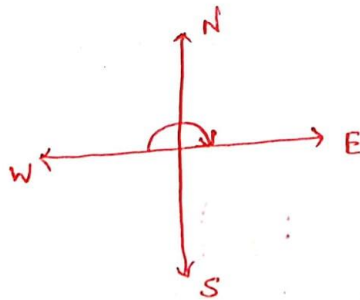
(c) west and turn clockwise to face east?

Sol.

(a) If we start facing East and turn clockwise to face North, then we have to make $\frac{3}{4}$ of a revolution.



(c) If we start facing west and turn clockwise to face east, then we have to make $\frac{1}{2}$ of a revolution.



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-! Understanding elementary shapes! -

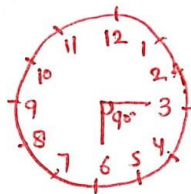
Q. Find the number of right angles turned through by the hour hand of a clock when it goes from

- (a) 3 to 6 (b) 2 to 8 (c) 5 to 11
 (d) 10 to 1 (e) 12 to 9 (f) 12 to 6

Sol. The hour hand of a clock revolves by 360° or 4 right angles in 1 complete round.

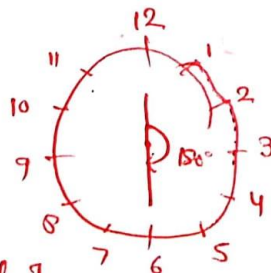
(a) 3 to 6

The hour hand of a clock revolves by 90° or 1 right angle when it goes from 3 to 6



(f) 12 to 6

The hour hand of a clock revolves by 180° or 2 right angles when it goes from 12 to 6



[do other itself]

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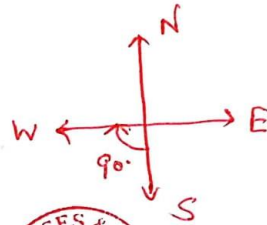
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-: Understanding Elementary shapes :-

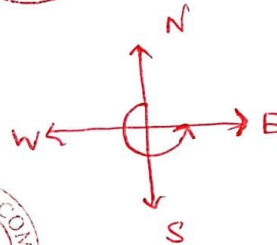
Q. How many right angles do you make if you start facing:

- South and turn clockwise to West?
- North and turn anti clockwise to East?
- West and turn to West?
- South and turn to North?

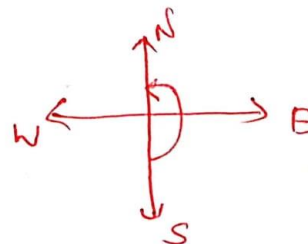
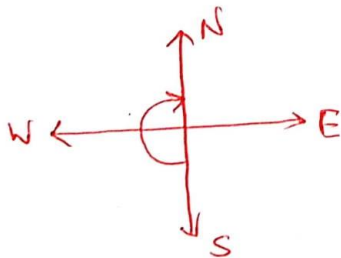
Sol. If we facing South and turn clockwise to West, then we make 1 right angle



(b) If we start facing North and anticlockwise to East, then we make 3 right angles



(d) If we start facing South and turn to North, then we make 2 right angles.



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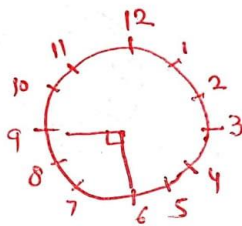
∴ understanding elementary shapes:-

Q. Where will the hour hand of a clock stop if it starts -

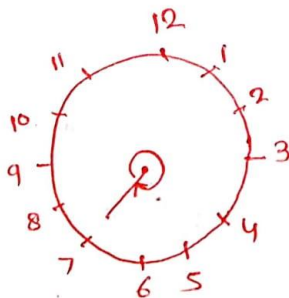
- (a) from 6 and turn through 1 right angles?
- (b) from 8 and turn through 2 right angles?
- (c) from 10 and turn through 3 right angles?
- (d) from 7 and turn through 2 straight angles?

Sol.

(a) If the hour hand of a clock start from 6 and turn through 1 right angle, then it will stop at 9



(d) If the hour hand of a clock starts from 7 and turn 2 straight angles, then it will stop at 7.



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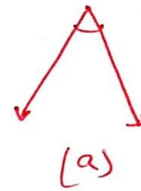
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-! understanding elementary shapes!-

Q. classify each one of the following angles as right, straight, acute, obtuse or reflex:

Sol.

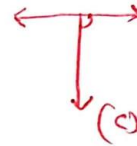
(a) Acute angle as its measure is less than 90°



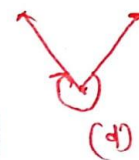
(b) obtuse angle as its measure is more than 90° but less than 180°



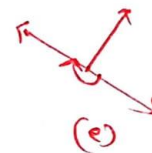
(c) Right angle as its measure is 90°



(d) Reflex angle as its measure is more than 180° but less than 360°



(e) straight angle as its measure is 180°



(f) Acute angle as its measure is less than 90°



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~ understanding elementary shapes! ~

- Q. What is the measure of (i) a right angle ?
(ii) a straight angle ?

- sol. (i) the right angle is 90°
(ii) the straight angle is 180°



- Q. Say true or false!

- (a) The measure of an acute angle < 90

sol. True, the measure of an acute angle is less than 90°

- (b) The measure of an obtuse angle < 90

sol. False, the measure of an obtuse angle is greater than 90° but less than 180°

- (c) The measure of a reflex angle > 180



sol. True, the measure of a reflex angle is greater than 180°

- (d) The measure of one complete revolution = 360°

sol. True, the measure of one complete revolution is 360°

- (e) If $m\angle A = 53^\circ$ and $m\angle B = 35^\circ$, then $m\angle A > m\angle B$

sol. True, $53^\circ > 35^\circ$
 $m\angle A > m\angle B$

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~ Understanding elementary shapes ~

Q. Write down the measures of

- (a) some acute angles (b) some obtuse angles
(Give at least two examples of each)

Sol. [do it self]

Q. Which of the following are model for perpendicular lines:

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

Sol. (a) The adjacent edge of a table top are perpendicular to each other.

(b) The line of a railway track are parallel to each other.

(c) The line segments forming the letter 'L' are perpendicular to each other.

(d) The sides of letter V are inclined at some acute angle on each other.

Hence, (a) and (c) are the model for perpendicular lines.

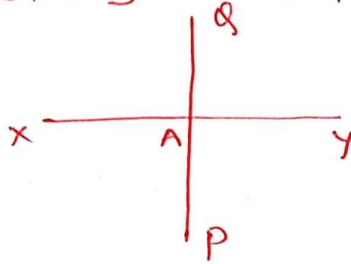
DPM CLASSES

6th to 10th (Math's & Science), 11th & 12th (Physics, Chemistry, Math's)

~ understanding elementary shapes! -

Q. Let $\overline{PQ}$ be the perpendicular to the line segment $\overline{XY}$. Let $\overline{PQ}$ and $\overline{XY}$ intersect in the point A. What is the measure of $\angle PAY$?

Sol.



From the figure, it can be easily observed that the measure of $\angle PAY$ is 90° .

Q. 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?

Sol. one has a measure of $90^\circ, 45^\circ, 45^\circ$
 other has a measure of $90^\circ, 30^\circ, 60^\circ$

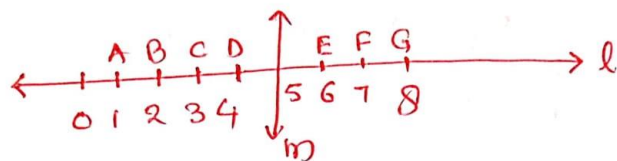
Therefore, the angles of 90° measure is common between them.



DPM CLASSES

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- understanding elementary shapes :-

Q. 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) $BC < EH$ Sol. (a) yes, As $CE = EG = 2$ units(b) yes, PE bisect CG since $CE = EG$ (c) $\overline{DF}$ and $\overline{BH}$

(d) (i) True, As length of AC and FG are of 2 units and 1 unit respectively.

(ii) True, As both have 1 unit length.

(iii) True, As the length of BC and EH are of 1 unit and 3 units respectively.



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∴ understanding elementary shapes! ∴

Q. 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 $\angle D = 90^\circ$
- (e) $\triangle XYZ$ with $\angle Y = 90^\circ$, and $XY = YZ$
- (f) $\triangle LMN$ with $\angle L = 30^\circ$, $\angle M = 70^\circ$ and $\angle N = 80^\circ$

- Sol. (a) Scalene Triangle
(b) Scalene triangle
(c) Equilateral triangle
(d) Right-angled triangle
(e) Right-angled isosceles triangle
(f) Acute-angled triangle.



DPM CLASSES

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-: understanding elementary shapes!:-

Q. 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.

Sol. (a) True (b) True (c) True (d) True
(e) False (f) False



Q. 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?

Sol. In a square, all the interior angles are of 90° and all the sides are of the same length. Therefore, a square is a regular quadrilateral.

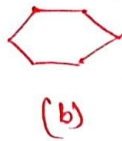
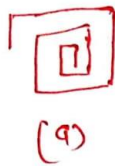


DPM CLASSES

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~ Understanding elementary shapes! -

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



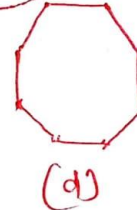
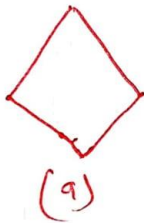
Sol. (a) It is not a polygon as it is not a closed figure.

(b) Yes, it is a polygon made of 6 sides.

(c) No, it is not made of line segments.

(d) No, it is not made of only line segments.

Q. Name each polygon :-



Sol. (a) Quadrilateral (have four sides figure)

(b) Triangle (have three sides figure)

(c) Pentagon (have five sides figure)

(d) Octagon (have eight sides figure)

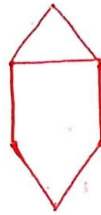
DPM CLASSES

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:- Understanding elementary shapes :-

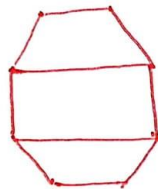
Q. Draw a rough sketch of a regular hexagon. Connecting any three of its vertices, draw a triangle. Identify the type of the triangle you have drawn.

Sol.



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

Sol.



DPM CLASSES

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∴ Understanding Elementary Shapes :-

Q.1.

(a) Cone



(b) Sphere



(c) cylinder



(d) cuboid



(e) cube



(f) pyramid



Q.2. What shape is :

(a) your instrument box ?

(b) A brick ? sol. cuboid

(c) A match box ? sol. Cuboid

(d) A road-roller ? sol. cylinder

(e) A sweet laddu ? sol. Sphere.

