Exercise 5.1

Question 1:

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

Answer:

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 the disadvantage in comparing line segments by mere observation.

Question 2:

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

Answer:

It is better to use a divider than a ruler because while using a ruler, positioning error may occur due to the incorrect positioning of the eye.

Question 3:

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?

[Note: If A, B, C are any three points on a line such that AC + CB = AB, then we can be sure that C lies between A and B]

Answer:

It is given that point C is lying somewhere in between 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.

Question 4:

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

Answer:

Given that,

AB = 5 cm

BC = 3 cm

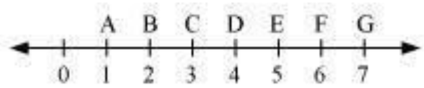
AC = 8 cm

It can be observed that AC = AB + BC

Clearly, point B is lying between A and C.

Question 5:

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



Answer:

From the given figure, it can be observed that

$\overline{AD}$ = 4 − 1 = 3 units

$\overline{DG}$ = 7 − 4 = 3 units

$\overline{AG}$ = 7 − 1 = 6 units

Clearly, D is the mid-point of AG.

Question 6:

If B is the mid point of $\overline{AC}$ and C is the mid point of $\overline{BD}$, where A, B, C, D lie on a straight line, say why AB = CD?

Answer:

Since B is the mid-point of AC,

AB = BC (1)

Since C is the mid-point of BD,

BC = CD (2)

From equation (1) and (2), we may find that

AB = CD

Exercise 5.2

Question 1:

What fraction of a clock wise 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

Answer:

We may observe that in 1 complete clockwise revolution, the hour hand will

rotate by 360º.

(a) When the hour hand goes from 3 to 9 clockwise, it will rotate by 2 right angles or 180º.

Fraction = $\frac{180^\circ}{360^\circ} = \frac{1}{2}$

(b) When the hour hand goes from 4 to 7 clockwise, it will rotate by 1 right angle or 90º.

Fraction = $\frac{90^\circ}{360^\circ} = \frac{1}{4}$

(c) When the hour hand goes from 7 to 10 clockwise, it will rotate by 1 right angle or 90º.

Fraction = $\frac{90^\circ}{360^\circ} = \frac{1}{4}$

(d) When the hour hand goes from 12 to 9 clockwise, it will rotate by 3 right angles or 270º.

Fraction = $\frac{270^\circ}{360^\circ} = \frac{3}{4}$

(e) When the hour hand goes from 1 to 10 clockwise, it will rotate by 3 right angles or 270º.

Fraction = $\frac{270^\circ}{360^\circ} = \frac{3}{4}$

(f) When the hour hand goes from 6 to 3 clockwise, it will rotate by 3 right angles or 270º.

Fraction = $\frac{270^\circ}{360^\circ} = \frac{3}{4}$

Question 2:

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?

Answer:

In 1 complete clockwise revolution, the hand of a clock will rotate by 360º.

(a) If the hand of the clock starts at 12 and makes $\frac{1}{2}$ of a revolution clockwise, then it will rotate by 180º and hence, it will stop at 6.

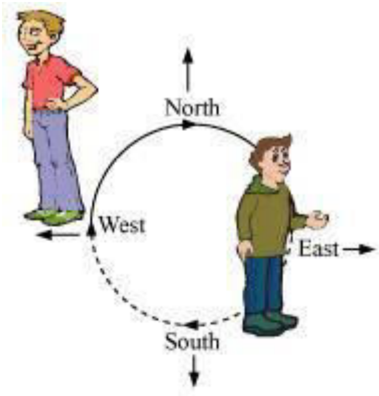
(b) If the hand of the clock starts at 2 and makes $\frac{1}{2}$ of a revolution clockwise, then it will rotate by 180º and hence, it will stop at 8.

(c) If the hand of the clock starts at 5 and makes $\frac{1}{4}$ of a revolution clockwise, then it will rotate by 90º and hence, 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 270º and hence, it will stop at 2.

Question 3:

Which direction will you face if you start facing



(a) East and make $\frac{1}{2}$ of a revolution clockwise?

(b) East and make $1\frac{1}{2}$ of a revolution clockwise?

(c) West and make $\frac{3}{4}$ of a revolution anti-clockwise?

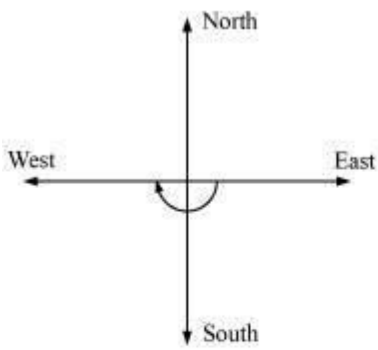
(d) South and make one full revolution?

(Should we specify clockwise or anti-clockwise for this last question? Why not?)

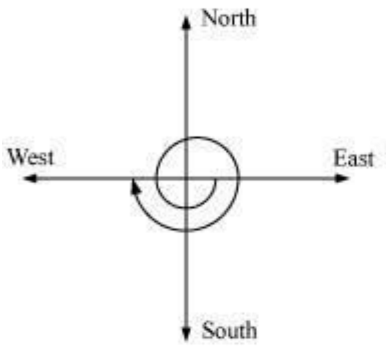
Answer:

If we revolve one complete round in either clockwise or anti-clockwise direction, then we will revolve by 360º and the two adjacent directions will be at 90º or $\frac{1}{4}$ of a complete revolution away from each other.

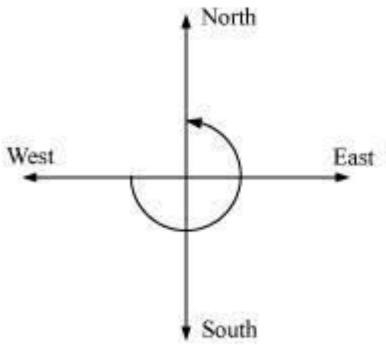
(a) If we start facing East and make $\frac{1}{2}$ of a revolution clockwise, then we will face the West direction.



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

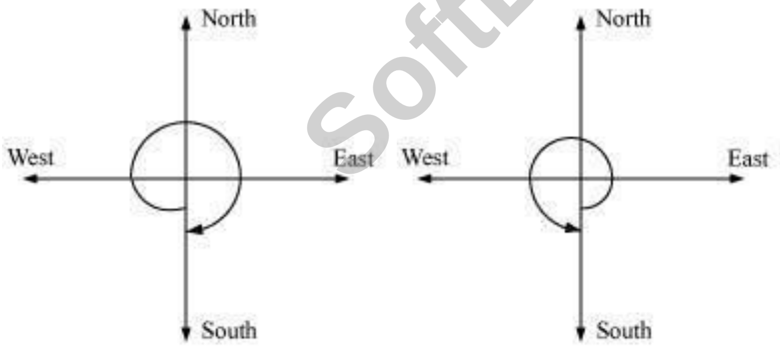


(c) If we start facing West and make $\frac{3}{4}$ of a revolution anti-clockwise, then we will face the North direction.



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

face the South direction.



In case of revolving by 1 complete round, the direction in which we are revolving does not matter. In both cases, clockwise or anti-clockwise, we will be back at our initial position.

Question 4:

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

(a) East and turn clock wise to face north?

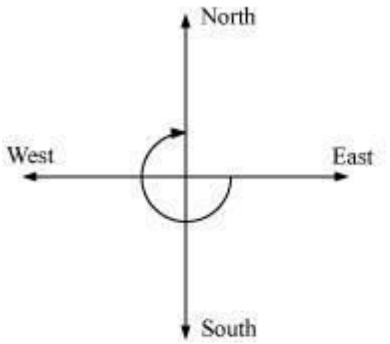
(b) South and turn clockwise to face east?

(c) West and turn clockwise to face east?

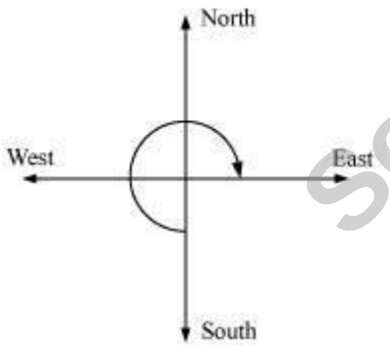
Answer:

If we revolve one complete round in either clockwise or anti-clockwise direction, then we will revolve by 360º and the two adjacent directions will be at 90º or $\frac{1}{4}$ of a complete revolution away from each other.

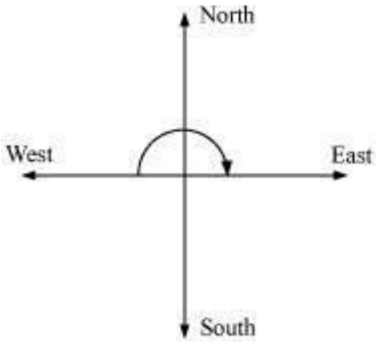
(a) If we start facing East and turn clockwise to face North, then we have to make $\frac{3}{4}$ of a revolution.



(b) If we start facing South and turn clockwise to face east, 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.



Question 5:

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

Answer:

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

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

(b) The hour hand of a clock revolves by 180º or 2 right angles when it goes from 2 to 8.

(c) The hour hand of a clock revolves by 180º or 2 right angles when it goes from 5 to 11.

(d) The hour hand of a clock revolves by 90º or 1 right angle when it goes from 10 to 1.

(e) The hour hand of a clock revolves by 270º or 3 right angles when it goes from 12 to 9.

(f) The hour hand of a clock revolves by 180º or 2 right angles when it goes from 12 to 6.

Question 6:

How many right angles do you make if you start facing

(a) South and turn clockwise to west?

(b) North and turn anti-clockwise to east?

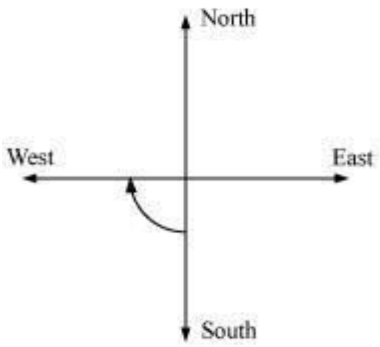
(c) West and turn to west?

(d) South and turn to north?

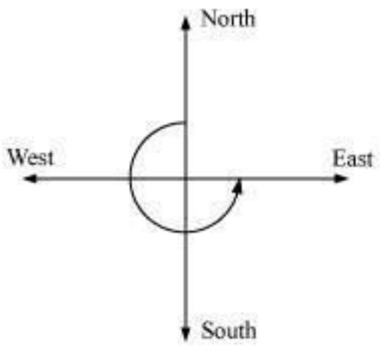
Answer:

If we revolve one complete round in either clockwise or anti-clockwise direction, then we will revolve by 360º or 4 right angles and the two adjacent directions will be at 90º or 1 right angle away from each other.

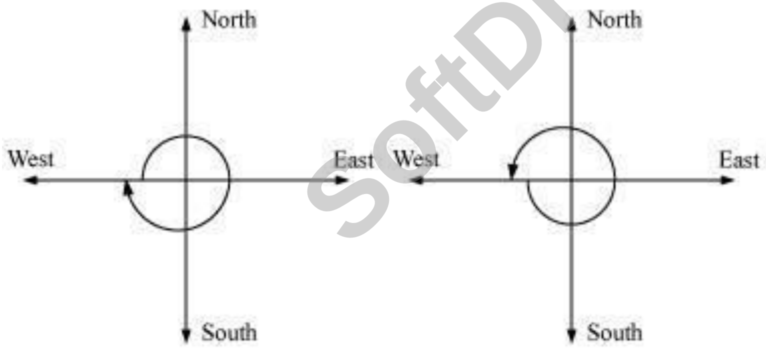
(a) If we start facing South and turn clockwise to West, then we make 1 right angle.



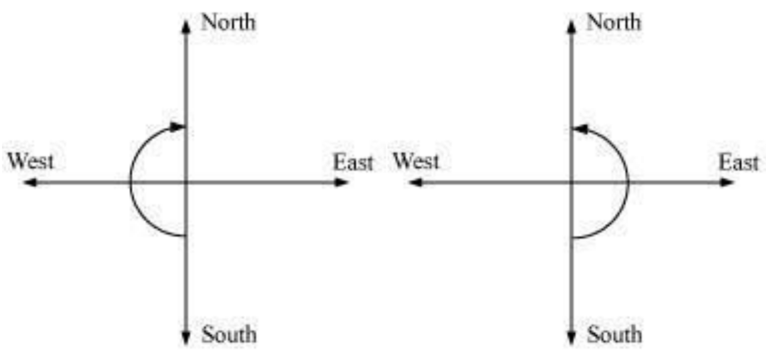
(b) If we start facing North and turn anti-clockwise to East, then we make 3 right angles.



(c) If we start facing West and turn to West, then we make 1 complete round or 4 right angles.



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



Question 7:

Q7. Where will the hour hand of a clock stop if it starts

(a) From 6 and turns through 1 right angle?

(b) From 8 and turns through 2 right angles?

(c) From 10 and turns through 3 right angles?

(d) From 7 and turns through 2 straight angles?

Answer:

In 1 complete revolution (clockwise or anti-clockwise), the hour hand of a clock will rotate by 360º or 4 right angles.

1. If the hour hand of a clock starts from 6 and turns through 1 right angle, then it will stop at 9.

2. If the hour hand of a clock starts from 8 and turns through 2 right angles, then it will stop at 2.

3. If the hour hand of a clock starts from 10 and turns through 3 right angles, then it will stop at 7.

4. If the hour hand of a clock starts from 7 and turns through 2 straight angles, then it will stop at 7.

Exercise 5.3

Question 1:

Match the following:

(i) Straight angle (a) Less than one-fourth of a revolution

(ii) Right angle (b) More than half a revolution

(iii) Acute angle (c) Half of a revolution

(iv) Obtuse angle (d) One-fourth of a revolution

(v) Reflex angle (e) Between $\frac{1}{4}$ and $\frac{1}{2}$ of a revolution

(f) One complete revolution

Answer:

(i) Straight angle is of 180º and half of a revolution is 180º.

Hence, (i) ↔ (c)

(ii) Right angle is of 90º and one-fourth of a revolution is 90º.

Hence, (ii) ↔ (d)

(iii) Acute angles are the angles less than 90º. Also, less than one-fourth of a revolution is the angle less than 90º.

Hence, (iii) ↔ (a)

(iv) Obtuse angles are the angles greater than 90º but less than 180º. Also, between $\frac{1}{4}$ and $\frac{1}{2}$ of a revolution is the angle whose measure lies between 90º and 180º.

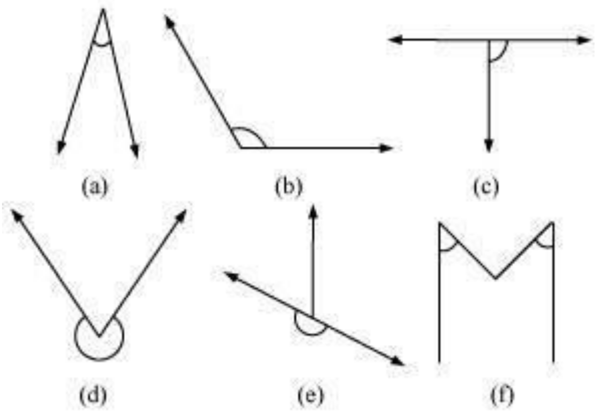
Hence, (iv) ↔ (e)

(v) Reflex angles are the angles greater than 180º but less than 360º. Also, more than half a revolution is the angle whose measure is greater than 180º.

Hence, (v) ↔ (b)

Question 2:

Classify each one of the following angles as right, straight, acute, obtuse or reflex:



Answer:

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

(b) Obtuse angle as its measure is more than 90º but less than 180º.

(c) Right angle as its measure is 90º.

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

(e) Straight angle as its measure is 180º.

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

Exercise 5.4

Question 1:

What is the measure of (i) a right angle? (ii) a straight angle?
Answer:

(i) The measure of a right angle is 90°.

(ii) The measure of a straight angle is 180°.

Question 2:

Say True or False:

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

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

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

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

(e) If m∠A = 53° and m∠B = 35°, then m∠A > m∠B.
Answer:

(a) True

The measure of an acute angle is less than 90°.

(b) False

The measure of an obtuse angle is greater than 90º but less than 180º.

(c) True

The measure of a reflex angle is greater than 180°.

(d) True

The measure of one complete revolution is 360º.

(e) True

Question 3:

Write down the measures of

(a) Some acute angles. (b) Some obtuse angles.

(Give at least two examples of each).

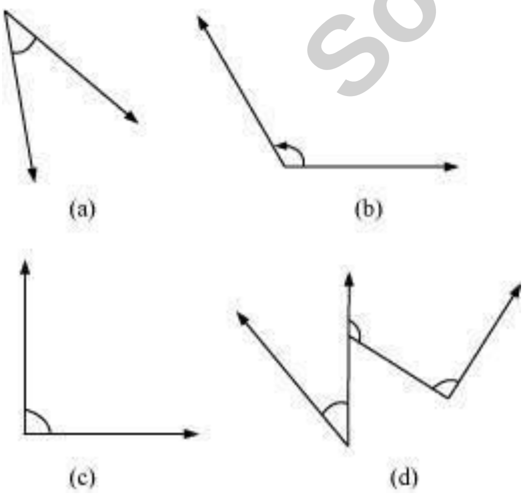
Answer:

(a) 45°, 70°

(b) 105°, 132°

Question 4:

Measure the angles given below using the Protractor and write down the measure.



Answer:

(a) 45º

(b) 120º

(c) 90º

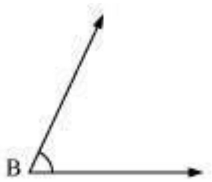
(d) 60º, 90º, and 130º

Question 5:

Which angle has a large measure? First estimate and then measure.

Measure of angle A =

Measure of angle B =



Answer:

Measure of angle A = 40º

Measure of angle B = 68º

∠B has the greater measure than ∠A.

Question 6:

From these two angles which has larger measure? Estimate and then confirm by measuring them.

Answer:

The measures of these angles are 45º and 55º. Therefore, the angle shown in 2nd figure is greater.

Question 7:

Fill in the blanks with acute, obtuse, right or straight:

(a) An angle whose measure is less than that of a right angle is _______.

(b) An angle whose measure is greater than that of a right angle is _______.

(c) An angle whose measure is the sum of the measures of two right angles is _______.

(d) When the sum of the measures of two angles is that of a right angle, then each one of them is _______.

(e) When the sum of the measures of two angles is that of a straight angle, and if one of them is acute then the other should be _______.

Answer:

(a) Acute angle

(b) Obtuse angle (if the angle is less than 180º)

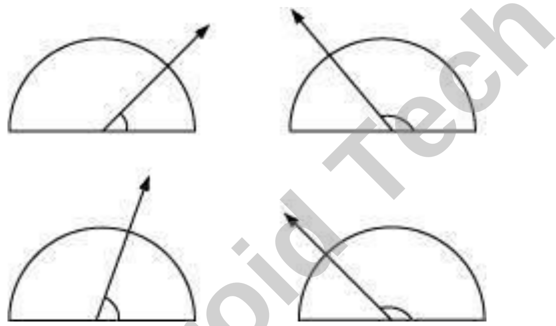
(c) Straight angle

(d) Acute angle

(e) Obtuse angle

Question 8:

Find the measure of the angle shown in each figure. (First estimate with your eyes and then find the actual measure with a protractor).



Answer:

The measures of the angles shown in the above figure are 40º, 130º, 65º, 135º respectively.

Question 9:

Find the angle measure between the hands of the clock in each figure:

9.00 a.m. 1.00 p.m. 6.00 p.m.

Answer:

(a) 90°

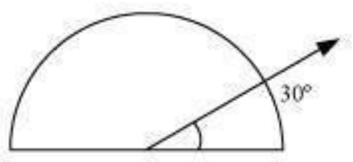
(b) 30°

(c) 180°

Question 10:

Investigate

In the given figure, the angle measures 30°. Look at the same figure through a magnifying glass. Does the angle become larger? Does the size of the angle change?

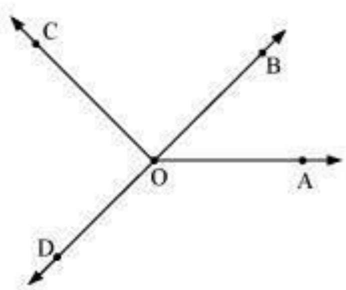


Answer:

The measure of this angle will not change.

Question 11:

Measure and classify each angle:



Angle	**Measure**	**Type**
∠AOB	–	–
∠AOC	–	–
∠BOC	–	–
∠DOC	–	–
∠DOA	–	–
∠DOB	–	–

Answer:

Angle	**Measure**	**Type**
∠AOB	40º	Acute

∠AOC	125º	Obtuse
∠BOC	85º	Acute
∠DOC	95º	Obtuse
∠DOA	140º	Obtuse
∠DOB	180º	Straight

Exercise 5.5

Question 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.

Answer:

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

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

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

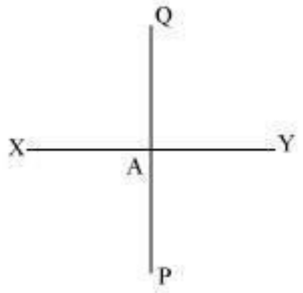
(d) The sides of letter V are inclined at some acute angle on each other.

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

Question 2:

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 ∠PAY?

Answer:



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

Question 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?

Answer:

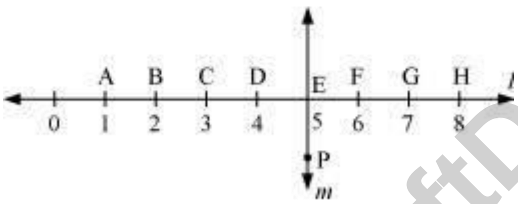
One has a measure of 90°, 45°, 45°.

Other has a measure of 90°, 30°, 60°.

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

Question 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.

Answer:

(a) Yes. As CE = EG = 2 units

(b) Yes. PE bisects 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.

Exercise 5.6

Question 1:

Name the types of following triangles:

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

(b) ΔABC with AB = 8.7 cm, AC = 7 cm and BC = 6 cm.

(c) ΔPQR such that PQ = QR = PR = 5 cm.

(d) ΔDEF with m∠D = 90°

(e) ΔXYZ with m∠Y = 90° and XY = YZ.

(f) ΔLMN with m∠L = 30°, m∠M = 70° and m∠N = 80°

Answer:

(a) Scalene triangle

(b) Scalene triangle

(c) Equilateral triangle

(d) Right-angled triangle

(e) Right-angled isosceles triangle

(f) Acute-angled triangle

Question 2:

Match the following:

Measures 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) Equilateral (e)

(ii) Isosceles (g)

(iii) Scalene (a)

(iv) Acute-angled (f)

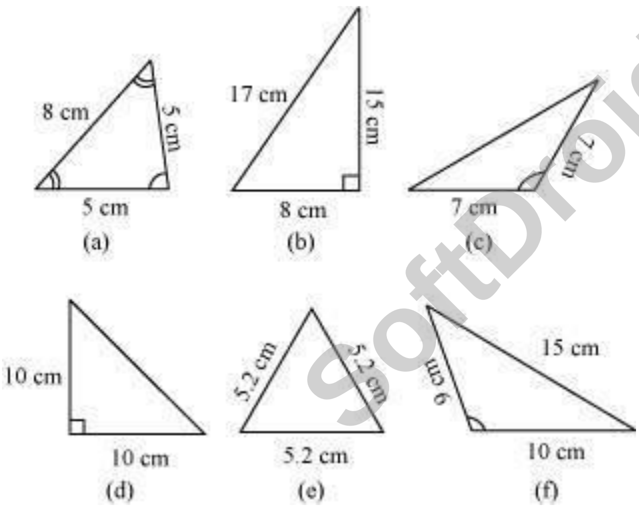
(v) Right-angled (d)

(vi) Obtuse-angled (c)

(vii) Isosceles right-angled (b)

Question 3:

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



Answer:

(a) Acute-angled and isosceles

(b) Right-angled and scalene

(c) Obtuse-angled and isosceles

(d) Right-angled and isosceles

(e) Acute-angled and equilateral

(f) Obtuse-angled and scalene

Question 4:

Try to construct triangles using match sticks. Some are shown here. 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 matchsticks, we can form a triangle as

(b) By using 4 matchsticks, we cannot form a triangle. This is because the sum of the lengths of any two sides of a triangle is always greater than the length of the remaining side of the triangle.

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

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

Exercise 5.7

Question 1:

Say True of 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

Question 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) In a rectangle, all the interior angles are of the same measure, i.e., 90º and only the opposite sides of the rectangle are of the same length whereas in case of a square, all the interior angles are of 90° and all the sides are of the same length. In other words, a rectangle with all sides equal becomes a square. Therefore, a square is a special rectangle.

(b) Opposite sides of a parallelogram are parallel and equal. In a rectangle, the opposite sides are parallel and equal. Also, all the interior angles of the rectangle are of the same measure, i.e., 90º. In other words, a parallelogram with each angle a right angle becomes a rectangle. Therefore, a rectangle can be thought of as a special parallelogram.

(c) All sides of a rhombus and a square are equal. However, in case of a square, all interior angles are of 90º measure. A rhombus with each angle a right angle becomes a square. Therefore, a square can be thought of as a special rhombus.

(d) All are closed figures made of 4 line segments. Therefore, all these are quadrilaterals.

(e) Opposite sides of a parallelogram are parallel and equal. In a square, the opposite sides are parallel and the lengths of all the four sides are equal. Therefore, a square can be thought of as a special parallelogram.

Question 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?

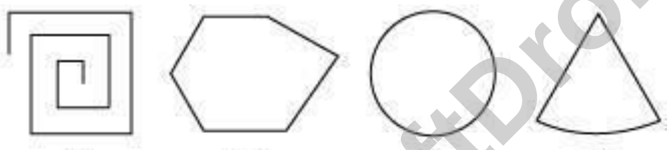
Answer:

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.

Exercise 5.8

Question 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 polygon as it is not a closed figure.

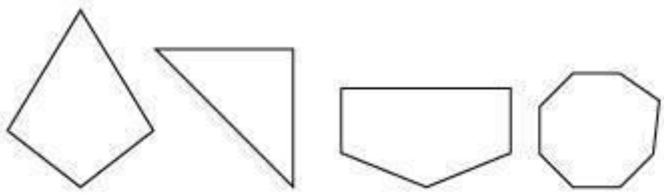
(b) Yes, it is a polygon made of 6 sides.

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

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

Question 2:

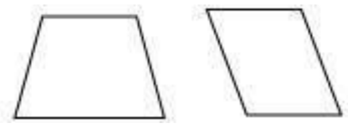
Name each polygon.



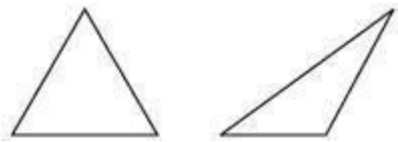
(a) (b) (c) (d)

Make two more examples of each of these.
Answer:

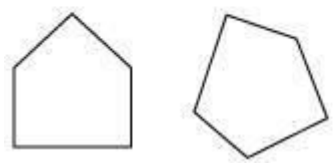
(a) The given figure is a quadrilateral as this closed figure is made of 4 line segments. Two more examples are



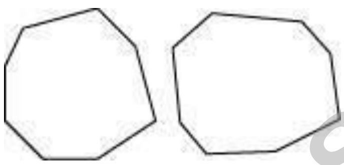
(b) The given figure is a triangle as this closed figure is made of 3 line segments. Two more examples are



(c) The given figure is a pentagon as this closed figure is made of 5 line segments. Two more examples are



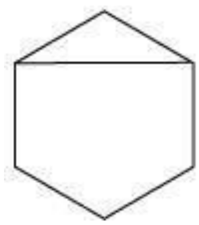
(d) The given figure is an octagon as this closed figure is made of 8 line segments. Two more examples are



Question 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.
Answer:

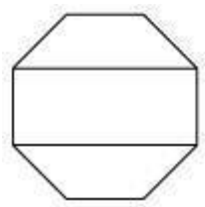
An isosceles triangle by joining three of the vertices of a hexagon can be drawn as follows.



Question 4:

Draw a rough sketch of a regular octagon. (Use squared paper if you wish). Draw a rectangle by joining exactly four of the vertices of the octagon.

Answer:

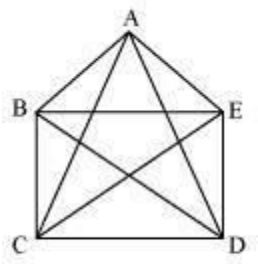


Question 5:

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.

Answer:

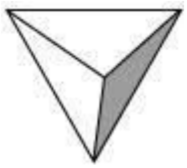
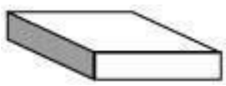
It can be observed here that AC, AD, BD, BE, CE are the diagonals.

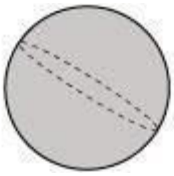


Exercise 5.9

Question 1:

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.

Answer:

(a) (ii)

(b) (iv)

(c) (v)

(d) (iii)

(e) (i)

Question 2:

What shape is

(a) Your instrument box? (b) A brick?

(c) A match box? (d) A road-roller?

(e) A sweet laddu?

Answer:

(a) Cuboid

(b) Cuboid

(c) Cuboid

(d) Cylinder

(e) Sphere