



CREST Mathematics Olympiad (CMO) Worksheet *for* Class 10



Topic

Constructions



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Worksheet on Constructions

1. Which of the following steps of construction is INCORRECT while constructing a circumscribing circle of an equilateral triangle ABC of side 5 cm?

Step 1: Draw a line segment AB = 5 cm.

Step 2: With A and B as the centres, draw arcs of radius 5 cm intersecting each other at C.

Step 3: Join AC and BC. $\triangle ABC$ is an equilateral triangle.

Step 4: Draw the median of AB and AC that intersect each other at O.

Step 5: Join OA.

Step 6: With O as the centre and OA as the radius, draw a circle passing through A, B and C.

- a. Step 2
- b. Step 6
- c. Step 4
- d. Step 3

2. If the angle bisectors of angles P and R of a triangle PQR meet at O, then what is the point O called?

- a. Centroid
- b. Orthocentre
- c. Circumcentre
- d. Incentre

3. What is the measure of each internal angle of a regular hexagon?

- a. 100°
- b. 110°
- c. 120°
- d. 130°

4. What will be the radius of the circle circumscribing an equilateral triangle of side 4.5 cm constructed using a ruler and compass?

- a. 2.4 cm
- b. 2.6 cm
- c. 3.4 cm
- d. 3.6 cm

5. Arrange the given steps for constructing an inscribing circle of a regular hexagon of side 6 cm in **CORRECT** order.

Steps of Construction:

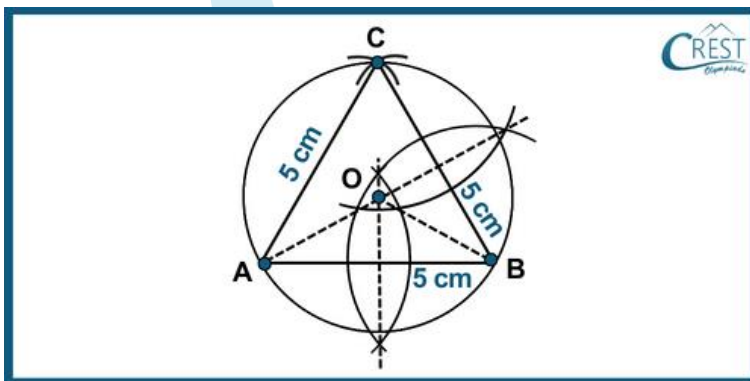
- Step 1:** At points A and B, draw the angle bisectors of angles A and B intersecting each other at point O.
- Step 2:** With O as the centre and OL as the radius, draw a circle touching the hexagon's sides.
- Step 3:** Draw a line segment AB of length 6 cm.
- Step 4:** From O, draw OL perpendicular to AB.
- Step 5:** At points F and C, draw rays making an angle of 120° each. These lines cut off segments FE and CD, both measuring 6 cm.
- Step 6:** Draw rays making an angle of 120° each at points A and B. These lines cut off segments AF and BC, each measuring 6 cm.
- Step 7:** Join DE. Thus, ABCDEF is the required regular hexagon.

- a. 3 - 5 - 6 - 1 - 7 - 4 - 2
- b. 3 - 1 - 6 - 5 - 7 - 4 - 2
- c. 3 - 6 - 5 - 7 - 1 - 4 - 2
- d. 3 - 1 - 5 - 6 - 7 - 4 - 2

Answer Key

1. c - Step 4

Explanation: Consider the figure given below:



The steps to construct a circumscribing circle of an equilateral triangle ABC of side 5 cm are:

Step 1: Draw a line segment AB = 5 cm.

Step 2: With A and B as the centres, draw arcs of radius 5 cm intersecting each other at C.

Step 3: Join AC and BC. $\triangle ABC$ is an equilateral triangle.

Step 4: Draw the perpendicular bisectors of side AB and AC intersecting each other at O.

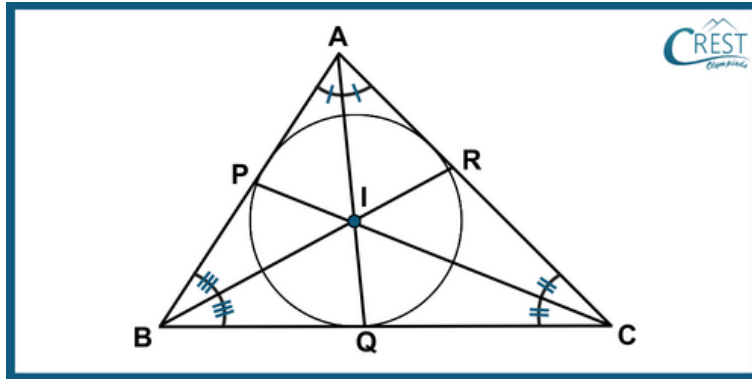
Step 5: Join OA.

Step 6: With O as the centre and OA as the radius, draw a circle passing through A, B and C.

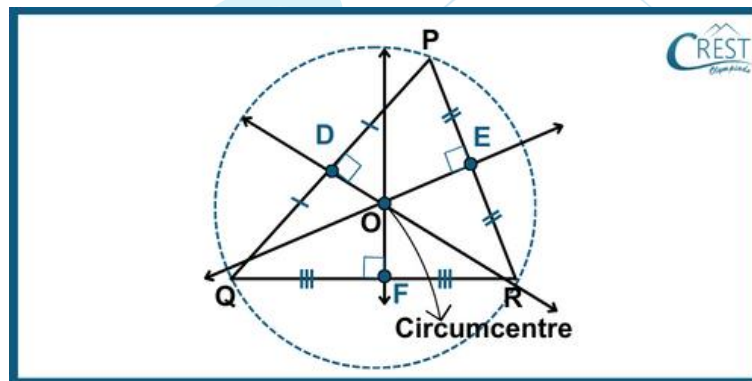
2. d - Incentre

Explanation:

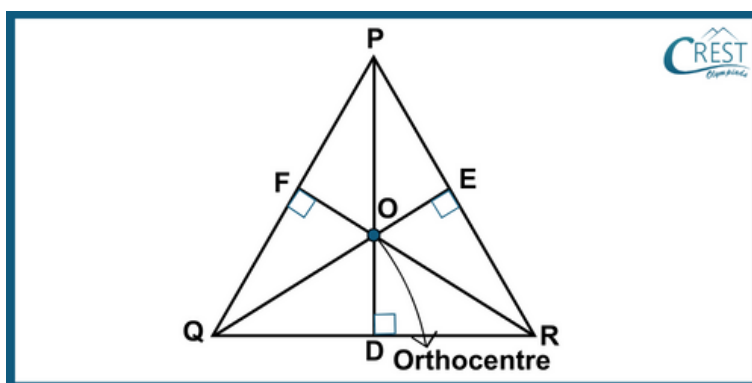
- **Incentre:** The incentre of a triangle is where the three angle bisectors meet. It is like the centre of a circle that fits inside the triangle perfectly and touches all three sides.



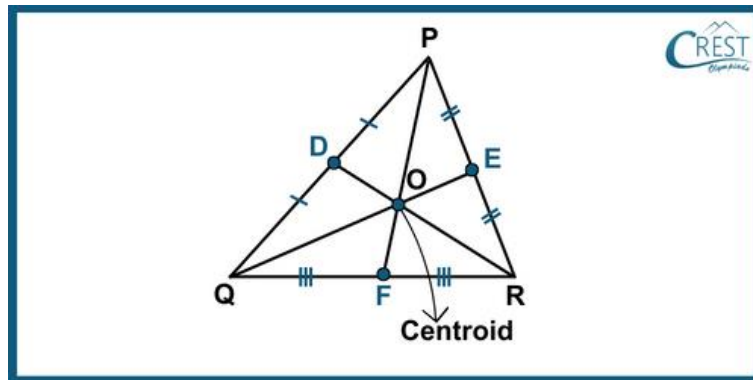
- **Circumcentre:** The circumcentre is a point where the perpendicular bisectors of the three sides of a triangle intersect. It is the centre of a circle that passes through all three vertices of the triangle.



- **Orthocentre:** The orthocentre is a point where the three altitudes of a triangle intersect. It is where the lines drawn straight up from each corner meet.



- **Centroid:** The centroid is a point where the three medians (lines joining each vertex to the midpoint of the opposite side) of a triangle intersect.



3. c - 120°

Explanation: The interior angle of the regular polygon of n sides is given by:

$$\text{Each interior angle} = \frac{2n - 4n}{n} \times 90^\circ$$

A regular hexagon has 6 sides.

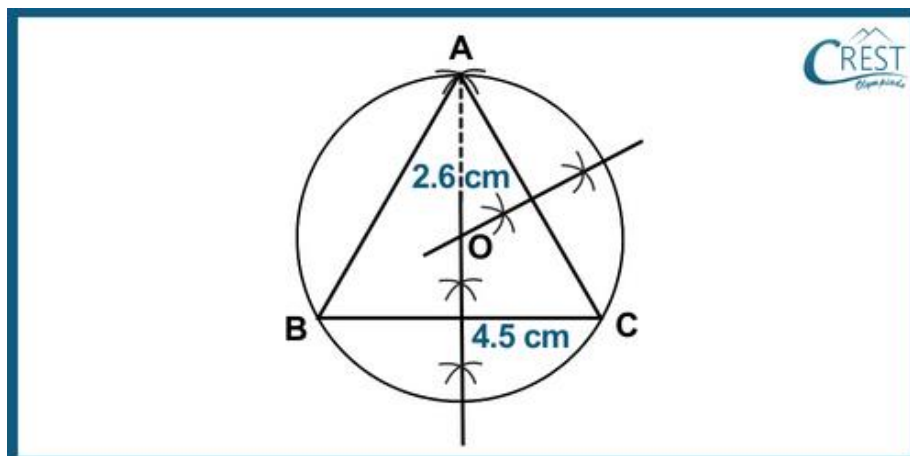
Thus, $n = 6$

$$\begin{aligned} \text{Each interior angle of a regular hexagon} &= \frac{2n - 4n}{n} \times 90^\circ \\ &= \frac{2(6) - 4}{6} \times 90^\circ \\ &= (12 - 4) \times 15^\circ \\ &= 8 \times 15^\circ \\ &= 120^\circ \end{aligned}$$

Each interior angle of a regular hexagon = 120°

4. b - 2.6 cm

Explanation: Construct the figure using the given steps:



Steps of Construction:

Step 1: Make a line segment BC of length 4.5 cm.

Step 2: Use points B and C as centres and draw two arcs with a radius of 4.5 cm intersecting each other at point A.

Step 3: Join AC and AB.

Step 4: Draw the perpendicular bisectors of AC and BC intersecting each other at O.

Step 5: Using O as the centre and OA, OB or OC as the radius, draw a circle. This circle will pass through points A, B, and C.

Step 6: This is the required circumcircle of triangle ABC. After measuring, the radius is OA is 2.6 cm.

5. c - 3 - 6 - 5 - 7 - 1 - 4 - 2

Explanation:

Steps of Construction:

Step 1: Draw a line segment AB of length 6 cm.

Step 2: Draw rays making an angle of 120° each at points A and B. These lines cut off segments AF and BC, each measuring 6 cm.

Step 3: At points F and C, draw rays making an angle of 120° each. These lines cut off segments FE and CD, both measuring 6 cm.

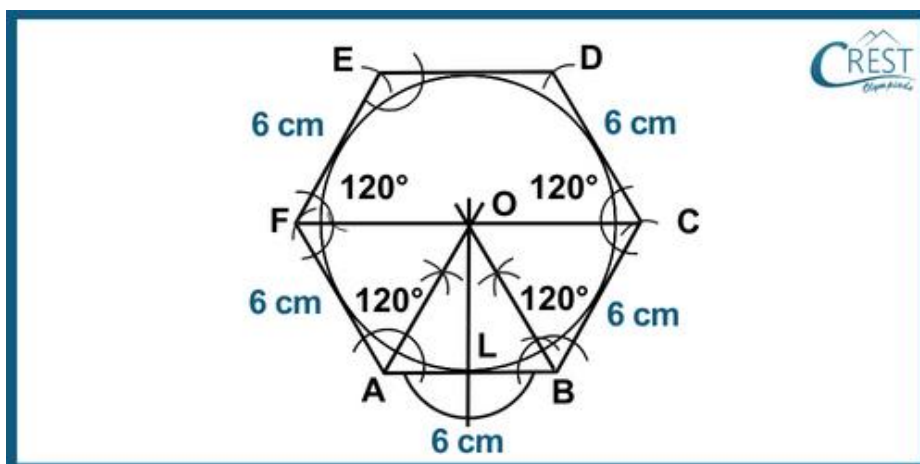
Step 4: Join DE. Thus, ABCDEF is the required regular hexagon.

Step 5: At A and B, draw the angle bisectors of angles A and B intersecting each other at point O.

Step 6: From O, draw OL perpendicular to AB.

Step 7: With O as the centre and OL as the radius, draw a circle touching the hexagon's sides. Thus, this circle is the required incircle.

Construct the figure using the given steps:



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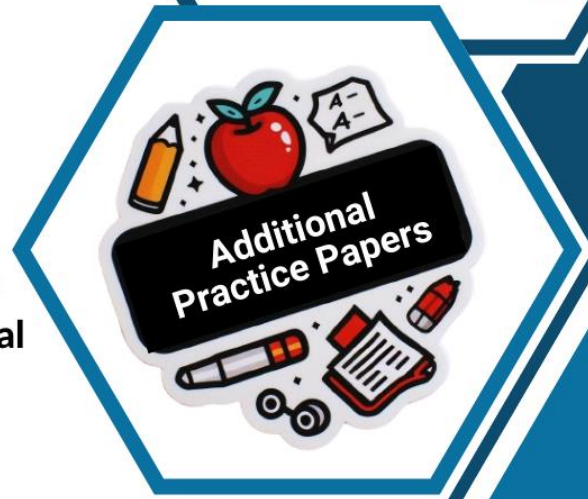
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