Maharashtra State Board
Class X Maths Part-II
Geometry Answers Set-2

Q. 1 (A) **4**

(1) line PQ $\parallel$ line RS

$\therefore x = 50^\circ$ .... (Corresponding angle)

(2) ΔABC and ΔPQR are congruent by hypotenuse side test.

(3) In ΔABC, $\angle A = 65^\circ$, $\angle B = 40^\circ$

$\angle A + \angle B + \angle C = 180^\circ$

$\therefore 65^0 + 40^0 + \angle C = 180^\circ$

$\therefore \angle C = 180^\circ - 105^0$

$\therefore \angle C = 75^\circ$

(4) $\square$PQRS is a parallelogram.

$\therefore \angle P + \angle Q = 180^\circ$ .... (Sum of measures of interior angles is 180°)

(5) Radius $= \frac{1}{2} \times$ hypotenuse ....(The circumcentre of a right angled triangle is the mid-point of its hypotenuse)

$= \frac{1}{2} \times 5$

$= 2.5$

(6) The co-ordinates of point of intersection of $x = 2$ and $y = -3$ are $(2,-3)$.

(B) **4**

(1) Let breadth of the tank be x.

$\therefore$ Length of the tank $= 2x$.

Area of the walls of the tank = 2(length + breadth) $\times$ depth.

$\therefore 108 = 2(2x + x) \times 3$

$\therefore 108 = 18x \quad \therefore x = 6 \quad \therefore 2x = 12$

$\therefore$ Length of the tank = 12m.

(2) In Δ PQR, $PQ^2 + QR^2 = PR^2$ ....(Pythagoras Theorem)

$$PQ^2 = 5^2 - 4^2$$

$$PQ^2 = 9$$

$$PQ = 3$$

$$\tan R = \frac{PQ}{QR} = \frac{3}{4}$$

(3) In ΔPQR, S and T are midpoints of side PQ and side PR.

$ST = 6.2$

$ST = \frac{1}{2} \times QR$ ....(Theorem of midpoints of two sides of a triangle.)

$\therefore 6.2 = \frac{1}{2} \times QR$

$\therefore QR = 6.2 \times 2$

$\therefore QR = 12.4$

Q. 2 (A) (1) D (2) C (3) B (4) D 4

(B) 4

(1)(i) In ΔPQB and ΔADB ,

$\angle B \cong \angle B$

$\angle PQB \cong \angle ADB$ .... (each right angle)

$\therefore \Delta PQB \sim \Delta ADB$ .... (A-A test of similarty)

$\therefore \frac{A(\Delta PQB)}{A(\Delta ADB)} = \frac{PQ^2}{AD^2} = \frac{4^2}{6^2} = \frac{16}{36} = \frac{4}{9}$ ...(Theorem of areas of similar triangle)

(ii) $\frac{A(\Delta PBC)}{A(\Delta ABC)} = \frac{PQ}{AD} = \frac{4}{6} = \frac{2}{3}$ ......(triangles having equal bases)

(2) Diagonal of square = 20 cm.

Let side of square = x

$\therefore x^2 + x^2 = 20^2$ ....(By Pythagoras theorem)

$\therefore 2x^2 = 400$

$\therefore \quad x^2 = 200$

$\therefore \quad x = 10\sqrt{2}$ cm.

Perimeter of square $= 4 \times 10\sqrt{2} = 40\sqrt{2}$

(i) Side of square $= 10\sqrt{2}$ cm.

(ii) Perimeter of square $= 40\sqrt{2}$ cm.

(3) In figure, PQ = 12, PR = 8

$PQ^2 = PR \times PS$ ....(Tangent secant theorem)

$\therefore \quad 12^2 = 8 \times PS$

$\therefore \quad 144 = 8 \times PS$

$\therefore \quad PS = \frac{144}{8}$

$\therefore \quad PS = 18$

Q. 3 (A) **4**

(1) From the figure,

(i) $m(\text{arc AXB}) = \boxed{110^0}$

(ii) $m(\text{arc CAB}) = \boxed{155^0}$

(iii) $\angle COB = \boxed{155^0}$

(iv) $m(\text{arc AYB}) = \boxed{250^0}$

(2) $\square$ABCD is a cyclic quadrilateral.

$\therefore \angle ADC + \angle ABC = 180^\circ$

$\therefore \quad 120 + \angle ABC = 180^\circ$

$\therefore \quad \angle ABC = \boxed{60^\circ}$

But $\angle ACB = \boxed{90^\circ}$ .... (Angle in semicircle)

In ΔABC,

$\angle BAC + \angle ACB + \angle ABC = 180^\circ$

$\therefore \angle BAC + 90^\circ + 60^\circ = 180^\circ$

$\therefore \angle BAC + \boxed{150^\circ} = 180^\circ$

$\therefore \quad \angle BAC = 180^\circ - 150^0$

$\therefore \quad \angle BAC = \boxed{30^\circ}$

(3) From the graph

Sr. no.	First point	Second point	Co-ordinates of first point (x_1, y_1)	Co- ordinates of second point (x_2, y_2)	$\frac{y_2 - y_1}{x_2 - x_1}$
1	C	E	(1, 0)	(3, 4)	$\boxed{\frac{4}{2}} = \boxed{2}$
2	A	B	(-1,-4)	(0,-2)	$\boxed{\frac{2}{1}} = \boxed{2}$
3	B	D	(0,-2)	(2, 2)	$\boxed{\frac{4}{2}} = \boxed{2}$

$\therefore$ For any two points (x_1, y_1) and (x_2, y_2) on a line graph, the ratio $\frac{y_2 - y_1}{x_2 - x_1}$ is always constant.

Q. 3 (B) **4**

(1) If $\tan\theta = \frac{3}{4}$

$1 + \tan^2\theta = \sec^2\theta$

$\therefore\ 1 + \left(\frac{3}{4}\right)^2 = \sec^2\theta$

$\therefore\ 1 + \frac{9}{16} = \sec^2\theta$

$\therefore\ \frac{25}{16} = \sec^2\theta$

$\therefore\ \sec\theta = \frac{5}{4}$

(2) Measure of arc $= 90°$

Radius of circle $= 14$ cm

Length of arc $= \frac{\theta}{360} \times 2\pi r$

$= \frac{90}{360} \times 2 \times \frac{22}{7} \times 14$

$= 22$ cm

(3) MN = 5, PN = 7, MQ = 2.5, QP = ?

From the figure $\frac{MN}{NP} = \frac{MQ}{QP}$ ....(Angle bisector theorem)

$\therefore \frac{5}{2.5} = \frac{7}{QP}$

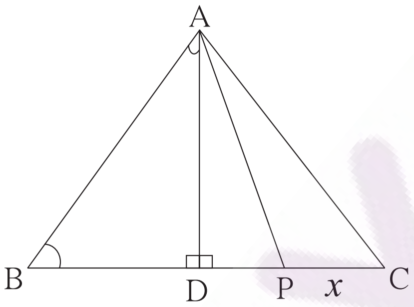
$\therefore 5 \times QP = 7 \times 2.5$

$\therefore QP = \frac{7 \times 2.5}{5}$

$\therefore QP = 3.5$

Q. 4 9

(1)



$PC = \frac{1}{3} BC$, AB = 6

ΔABC is an equilateral triangle.

$\therefore AB = BC = AC = 6$

$\therefore PC = \frac{1}{3} BC = \frac{1}{3} \times 6 = 2$

Draw Seg AD $\perp$ Seg BC.

In Δ DAC, $\angle ADC = 90°$, $\angle ACB = 60°$ $\therefore \angle DAC = 30°$

$\therefore DC = \frac{1}{2} \times AC = \frac{1}{2} \times 6 = 3$ ....($30^0, 60^0, 90^0$ theorem)

$\therefore DP = DC - PC = 3 - 2 = 1.$

Now , $AD = \frac{\sqrt{3}}{2} \times AC = \frac{\sqrt{3}}{2} \times 6 = 3\sqrt{3}$

In ΔADP

$AP^2 = AB^2 + DP^2$ ....(Pythagoras theorem)

$= (3\sqrt{3})^2 + 1^2$

$= 9 \times 3 + 1$

$= 28$

$\therefore AP = \sqrt{28} = 2\sqrt{7}$ cm

(2) $3AX = 2BX$

$\therefore \frac{AX}{BX} = \frac{2}{3}$

$\therefore \frac{AX+BX}{BX} = \frac{3+2}{3}$ ....(By componando)

$\therefore \frac{AB}{BX} = \frac{5}{3}$

In ΔBCA and ΔBYX,

$\angle B \cong \angle B$

$\angle BCA \cong \angle BYX$ .... (Corresponding angles)

$\therefore \Delta BCA \sim \Delta BYX$ .... (A-A test of similarity)

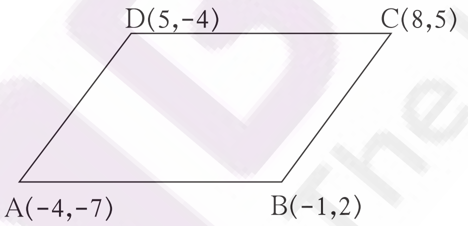
$\therefore \frac{BA}{BX} = \frac{AC}{XY}$

$\therefore \frac{5}{3} = \frac{AC}{9}$

$\therefore 3 \times AC = 45$

$\therefore AC = 15$

(3)



$AD = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$= \sqrt{(5+4)^2 + (-4+7)^2}$

$= \sqrt{81+9}$

$= \sqrt{90}$

$= 3\sqrt{10}$ ....(1)

$BC = \sqrt{(8+1)^2 + (5-2)^2}$

$= \sqrt{81+9}$

$= \sqrt{90}$

$= 3\sqrt{10}$ ....(2)

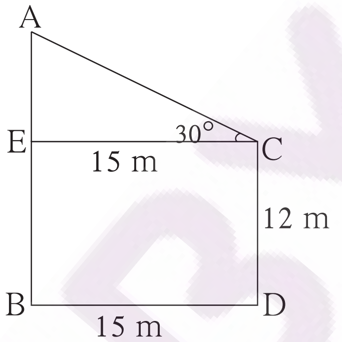
$$AB = \sqrt{(-1+4)^2 + (2+7)^2}$$
$$= \sqrt{9+81}$$
$$= \sqrt{90}$$
$$= 3\sqrt{10} \qquad \ldots\ldots\ldots\ldots\ldots(3)$$

$$CD = \sqrt{(8-5)^2 + (5+4)^2}$$
$$= \sqrt{9+81}$$
$$= \sqrt{90}$$
$$= 3\sqrt{10} \qquad \ldots\ldots\ldots\ldots\ldots(4)$$

From (1), (2), (3) and (4); AB = BC = CD = DA

∴ □ABCD is a rhombus.

(4)



As shown in the figure, suppose AB and CD are the buildings. Distance between AB and CD is 15 m. Angle of elevation at point C is 30°.

$\angle ECA = 30°$ $EC \perp AB$.

BD = 15 m.   ∴ EC = 15 m.

CD = 12 m.   ∴ BE = 12 m.

In ΔAEC,

$$\tan 30 = \frac{AE}{EC}$$

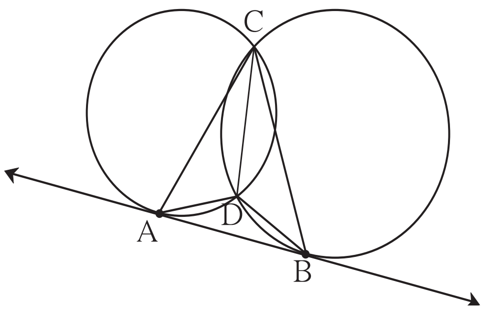
$$\therefore \quad \frac{1}{\sqrt{3}} = \frac{AE}{15}$$

$$\therefore \quad \sqrt{3} \times AE = 15$$

$$\therefore \quad AE = \frac{15}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = 5\sqrt{3}$$

Height of the second building = BE + AE = $(12+5\sqrt{3})$m.

Q. 5 (1) 4



Draw seg CD.

$\angle DAB = \angle ACD$ .... (1) } Tangent secant

$\angle DBA = \angle DCB$ .... (2) } angle theorem

From (1) and (2)

$\angle DAB + \angle DBA = \angle ACD + \angle DCB$

Now, $\angle ACB = \angle ACD + \angle DCB$ ...... (3)

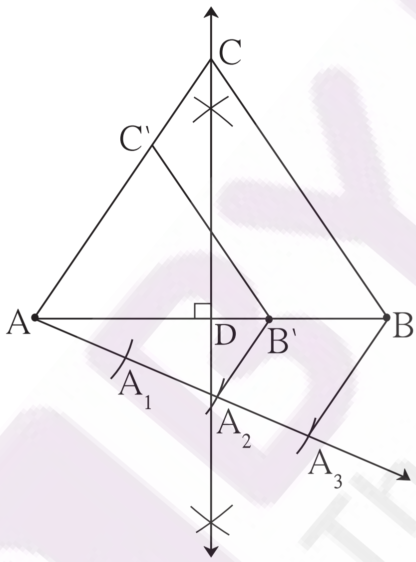
In ΔADB,

$\angle DAB + \angle DBA + \angle ADB = 180°$.... (Sum of angles of a triangle.)

$\therefore$ $\angle ACD + \angle DCB + \angle ADB = 180^0$ ......From (1) and (2)

$\therefore$ $\angle ACB + \angle ADB = 180°$......................From (3)

(2)



Q. 6 3

(1) For barrel : Height = 50 cm, Radius of base = 20 cm

$\therefore$ Volume of barrel = $\pi r^2 h = \pi \times (20)^2 \times 50 = 400 \times 50 \times \pi$

For mug : Height = 15 cm, Diameter of base = 10 cm

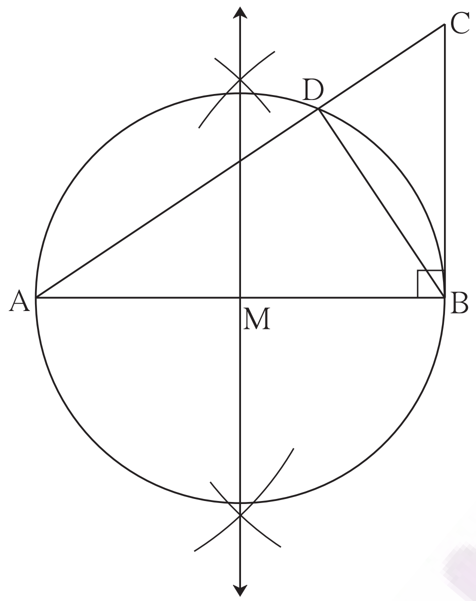
$\therefore$ Radius of Base = 5 cm

$\therefore$ Volume of mug = $\pi r^2 h = \pi \times (5)^2 \times 15 = 25 \times 15 \times \pi$

$$\frac{\text{Volume of barrel}}{\text{Volume of mug}} = \frac{400 \times 50 \times \pi}{25 \times 15 \times \pi} = \frac{160}{3} = 53\frac{1}{3}$$

$\therefore$ when 54^{th} mug is poured in the barrel it will overflow.

(2)



Seg BD ⊥ Seg AC

∴ ΔADB is a right angled triangle.

∴ Seg AB is a diameter of the circle passing through the points A,B and D

∴ Seg MB is a radius of the circle.

∠MBC is a right angle ....(Given)

∴ line CB is a tangent of the circle.