EDUTECH® ACADEMY
NURTURING THE FUTURE...
— Classes 5 to 10 —

SET A

N 926

Seat No. | | | | | | | |

2025 XII 30 1100 – N 926 – MATHEMATICS (71) GEOMETRY– PART II (E)

(NEW COURSE)

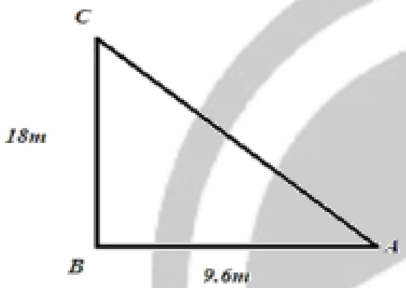
Time : 2 Hours **(Pages 6)** **Max. Marks : 40**

----MODEL ANSWER----

Q.1 (A) Choose the correct alternative: **4**

(1) Ans. (b)

According to given question



The far end of shadow is represented by point A,
Therefore we need to Find AC
By Pythagoras theorem,
$(18)^2 + (9.6)^2 = (AC)^2$
$\Rightarrow AC^2 = 416.16$
$\Rightarrow AC = 20.4$ m

(2) Ans. (b)

Two congruent triangles are actually similar triangles with the ratio of corresponding sides as 1: 1.

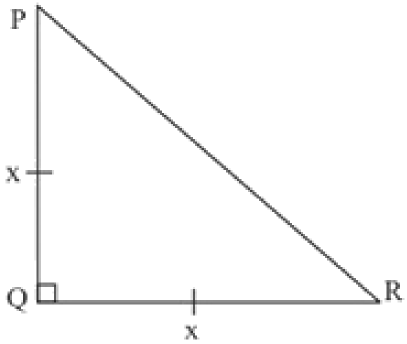
(3) Ans. (c)

AB is tangent to smaller circle of radii 3 cm
In ΔOAP
$OP \perp AB$ (radius is ⊥ar to tangent)
$\therefore OA^2 = OP^2 + AP^2$
$(5)^2 = (3)^2 + AP^2$
$\Rightarrow AP^2 = 5^2 - 3^2 = 25 - 9 = 16$ cm
$AP^2 = 16$ cm
AP = 4 cm
AB = 2AP (⊥ar drawn from the centre on the chord bisect the chord)
$\therefore AB = 2 (4) = 8$ cm

(4) Ans. (c) any two sides

(B) Solve the following: **4**

(1) Ans.



In ΔPQR, $\angle Q = 90°$ [Given]

$\therefore PR^2 = PQ^2 + QR^2$ [Pythagoras theorem]

$= x^2 + x^2$

$\therefore PR^2 = 2x^2$

$\therefore PR = \sqrt{2}\,x$ [Taking square roots]

$\therefore$ The length of the hypotenuse is $\sqrt{2}\,x$ units.

(2) Ans. $25^2 = 625$ 1

$7^2 + 24^2 = 49 + 576$

$7^2 + 24^2 = 625$ 2

$\therefore 25^2 = 7^2 + 24^2$ [From 1 & 2]

$\therefore$ By converse of Pythagoras theorem, given triangle is a right angled triangle.

(3) Ans. In Δ XYZ and Δ LMN,

$\angle Y = 100°$, $\angle M = 100°$, $\therefore \angle Y \cong \angle M$

$\angle Z = 30°$, $\angle N = 30°$, $\therefore \angle Z \cong \angle N$

$\therefore \Delta XYZ \sim \Delta LMN$ ..... by AA test.

(4) Ans. $m\angle ABE = \frac{1}{2}$[m (arc AE) – m (arc DC)]

$\therefore 108 = \frac{1}{2}$[95° - m(arc DC)]

$\therefore 108 \times 2 = 95°$ -m (arc DC)

$\therefore 216 - 95 =$ m (arc DC)

$\therefore$ m (arc DC) = 121

Q.2 (A) Complete the following activities:(Any TWO) **4**

(1) Ans. P(−2, 3), Q(1, 2) and R(4, 1) are given points

slope of line PQ $= \frac{y_2 - y_1}{x_2 - x_1} = \frac{2-3}{1-\boxed{(-2)}} = \boxed{-\frac{1}{3}}$

Slope of line QR $= \frac{y_2 - y_1}{x_2 - x_1} = \frac{1-2}{4-1} = \boxed{-\frac{1}{3}}$

Slope of line PQ and line QR is equal.

But point $\boxed{Q}$ lies on both the lines.

$\therefore$ Point P, Q, R are collinear.

(2) Ans. Measure of minor arc = Measure of corresponding central angle

$\therefore$ m (arc EF) = m $\angle$ECF

$\therefore$ m (arc EF) = 70° 1

M (arc DE) + m (arc EF) + m (arc DGF) = 360° [Measure of a circle is 360°]

$\therefore$ m (arc DE) + 70° + 200° = 360° [From 1 & given]

$\therefore$ m (arc DE) = 360° - 270

$\therefore$ m (arc DE) = 90°

M (arc DEF) = m (arc DE) + m (arc EF) [Arc addition property]

$\therefore$ m (arc DEF) = 90° + 70° [From 1 & given]

M (arc DEF) = 160°

(3) Ans. Sol. In Δ ABC, $\angle$ABC = 90°, $\angle$C = θ°

$AB^2 + BC^2 = AC^2$ ...... (Pythagoras theorem)

Divide both sides by AC^2

$$\frac{AB^2}{AC^2} + \frac{BC^2}{AC^2} = \frac{AC^2}{AC^2}$$

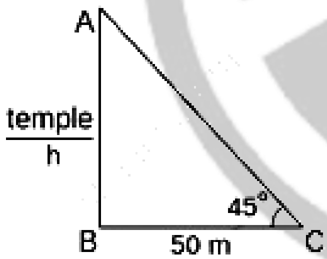
$$\therefore \left(\frac{AB^2}{AC^2}\right) + \left(\frac{BC^2}{AC^2}\right) = 1$$

But $\frac{AB}{AC} = \sin$ and $\frac{BC}{AC} = \cos$

$\therefore \sin^2\theta + \cos^2\theta = 1$

(B) Solve the following: (Any FOUR) **8**

(1) Ans.



$$\tan\theta = \frac{AB}{BC}$$

$$\tan 45° = \frac{AB}{50}$$

$$1 = \frac{h}{50}$$

1 x 50 = h

h = 50 m

The height of the temple is 50 m.

(2) Ans. By theorem on interesecting chords,

$PN \times PM = PR \times PS$... (I)

let $PN = x$. $\therefore PM = 11 - x$

substituting the values in (I),

$x(11 - x) = 6 \times 4$

$\therefore 11x - x^2 - 24 = 0$

$\therefore x^2 - 11x + 24 = 0$

$\therefore (x - 3)(x - 8) = 0$

$\therefore x - 3 = 0$ or $x - 8 = 0$

$\therefore x = 3$ or $x = 8$

$\therefore PN = 3$ or $PN = 8$

(3) Ans. Seg AB $\parallel$ seg CD $\parallel$ seg EF [Given]

$\therefore \frac{AC}{CE} = \frac{BD}{DE}$

[Property of intercepts made by three parallel lines]

$\therefore \frac{12}{x} = \frac{8}{4}$

$\therefore x = \frac{12 \times 4}{8}$

$\therefore x = 6$

$AE = AC + CE$

$\therefore AE = 12 + 6$

$\therefore AE = 18$ units

(4) Ans. Let $A(-7, 6) = (x_1, y_1)$

$B(4, 3) = (x_2, y_2)$

$C(11, -4) = (x_3, y_3)$

Let G(x, y) be the centroid of ABC.

By centroid formula,

$x = \frac{x_1 + x_2 + x_3}{3}$ and $y = \frac{y_1 + y_2 + y_3}{3}$

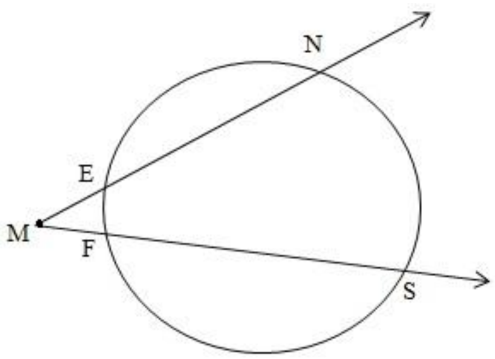
$= \frac{-7 + 2 + 8}{3}$ and $= \frac{6 - 2 + 5}{3}$

$= \frac{3}{3}$ and $= \frac{9}{3}$

$x = 1$ and $y = 3$

$\therefore G(1, 3)$

(5) Ans.



Chords EN and FS intersect externally at point M.

$\therefore$ m $\angle$NMS = ½ [m(arc NS) − m(arc EF)]
= ½ (125° − 37°)
= ½ × 88°
$\therefore$ m $\angle$NMS = 44°

Q.3 (A) Complete the following activity:(Any ONE) **3**

(1) Ans. We have

$\sin^2\theta + \boxed{\cos^2\theta} = 1$

$\boxed{\left(\frac{20}{29}\right)^2} + \cos^2\theta = 1$

$\boxed{\frac{400}{841}} + \cos^2\theta = 1$

$\cos^2\theta = 1 - \boxed{\frac{400}{841}}$

$= \boxed{\frac{441}{841}}$

Taking square root of both sides.

$\cos\theta = \boxed{\frac{21}{29}}$

(2) Ans. (i) For arc RXQ, $\theta = \angle ROQ = 60°$
OR (r) = $\boxed{7\ cm}$

Length of arc RXQ = $\boxed{\frac{\theta}{360}}$ x $2\pi r$

$= \frac{60}{360}$ x 2 x $\frac{22}{7}$ x 7

= $\boxed{7.33\ cm}$

Length of arc RXQ is $\boxed{7.33\ cm}$

(ii) For arc MYN, OM(r) = 21 cm, $\theta = \angle MON$ = 60°

Length of arc MYN = $\frac{60}{360}$ x 2 x $\frac{22}{7}$ x 21

= $\boxed{22\ cm}$

Length of arc(MYN) is $\boxed{22\ cm}$

(B) Solve the following: (Any TWO) **6**

(1) Ans. For circular roller,

Diameter = 120 cm,

$\therefore$ radius (r) = $\frac{120}{2}$ = 60 cm

Length (h) = 84 cm

Number of rotations required to level the ground (N) = 200

Rate of levelling (R) = Rs. 10 per sq. Meter

Area levelled in 1 rotation = curved surface area of the roller.

$\therefore$ Area levelled in 200 rotations (A) = 200 x 2 πrh

$= 200 \times 2 \times \frac{22}{7} \times 60 \times 84$

$= 6336000 \text{ cm}^2$

$= \frac{6336000}{100 \times 100} \text{ m}^2$

$\therefore A = 633.6 \text{ m}^2$

Cost of levelling = A x R

= 633.6 x 10 = Rs. 6336

$\therefore$ Cost of levelling the ground is Rs. 6336.

(2) Ans. m (arc PQR) = m$\angle$POR

...(Definition of measure of minor arc)

M $\angle$PQR = 60° ...(i)

For segment PQR, r = OP = 10cm.

= m $\angle$POR = 60° [from (i)]

Area of shaded portion = A(segment PQR)

$= r^2 \left[\frac{\pi\theta}{360} - \frac{\sin\theta}{2}\right]$

$= 10 \times 10 \left[\frac{3.14 \times 60}{360} - \frac{\sin 60}{2}\right]$

$= 100 \left[\frac{3.14}{6} - \frac{\sqrt{3}}{2 \times 2}\right]$

$= 100 \left[\frac{3.14 \times 2}{6 \times 2} - \frac{1.73 \times 3}{4 \times 3}\right]$

$= 100 \left[\frac{6.28 - 5.19}{12}\right]$

$= 100 \times \frac{1.09}{12}$

$= 9.08 \text{cm}^2$

Area of shaded portion = 9.08cm^2

(3) Ans. Construct Δ ABC of given measure.

Δ ABC and Δ PQR are similar.

$\therefore$ their corresponding sides are proportional.

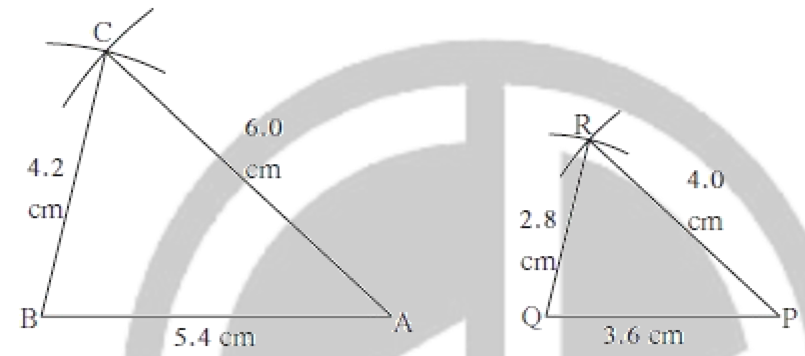
$\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR} = \frac{3}{2}$ .... (I)

As the sides AB, BC, AC are known, we can find the lengths of sides PQ, QR, PR.

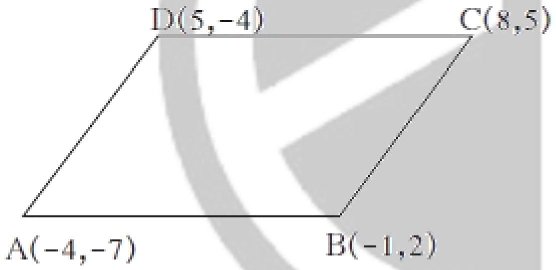
Using equation [I]

$\frac{5.4}{PQ} = \frac{4.2}{QR} = \frac{6.0}{PR} = \frac{3}{2}$

$\therefore$ PQ = 3.6 cm, QR = 2.8 cm and PR = 4.0 cm



(4) Ans.



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

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

$$= \sqrt{81+9}$$

$$= \sqrt{90}$$

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

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

$$= \sqrt{81+9}$$

$$= \sqrt{90}$$

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

$$AB = \sqrt{(-1+4)^2 + (2+7)^2}$$

$$= \sqrt{9+81}$$

$$= \sqrt{90}$$

$$= 3\sqrt{10} \quad \text{..............(3)}$$

$$CD = \sqrt{(8-5)^2 + (5+4)^2}$$

$$= \sqrt{9+81}$$

$$= \sqrt{90}$$

$$= 3\sqrt{10} \quad \text{..............(4)}$$

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

∴ □ABCD is a rhombus.

Q.4 Solve the following: (Any TWO) **8**

(1) Ans. Let □ABCD be the rectangle.

$\sin 48° = \dfrac{BC}{AC}$ $\quad \therefore 0.743 = \dfrac{BC}{AC}$

$\therefore BC = 0.743 \times AC$ ... (1)

In right angled ΔABC,

$AC^2 = AB^2 + BC^2$ (Pythagoras theorem)

$\therefore AC^2 = 16^2 + (0.743 \times AC)^2$ [From (1)]

$\therefore AC^2 = 256 + 0.552049\ AC^2$

$\therefore AC^2 - 0.552\ AC^2 = 256$

$\therefore AC^2 (1 - 0.552) = 256$

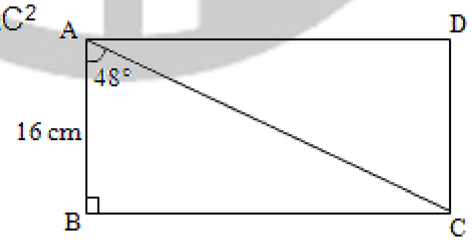
$\therefore AC^2 \times 0.448 = 256$

$\therefore AC^2 = \dfrac{256}{0.448} = 571.429$

$\therefore AC = 23.90$

$\therefore BC = 0.743 \times 23.90 = 17.7577$ cm

Length of greater side of the rectangle = 17.76 cm.



(2) Ans. Distance formula

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

$\therefore AB = \sqrt{(5-7)^2 + (3-(-3))^2}$

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

$= \sqrt{4+36} = \sqrt{40}$

$BC = \sqrt{(3-5)^2 + (-1-3)^2}$

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

$= \sqrt{4+16} = \sqrt{20}$

$CA = \sqrt{(7-3)^2 + (-3-(-1))^2}$

$= \sqrt{4^2 + (-3+1)^2}$

$= \sqrt{4^2 + 4^2} = \sqrt{16+16}$

$= \sqrt{32}$

BD = CD ($\because$ D is median)

BD + CD = BC

2CD = BC

$CD = \sqrt{\frac{20}{2}}$

In Δ ACD

$(AC)^2 = (AD)^2 + (CD)^2$

$(\sqrt{32})^2 = (AD)^2 + \left(\frac{\sqrt{20}}{2}\right)^2$

$32 = AD^2 + \frac{20}{4}$

$32 = AD^2 + 5$

$AD = \sqrt{32-5} = \sqrt{27} = 3\sqrt{3}$ cm

Hence the length of median is $3\sqrt{3}$ cm

(3) Ans. Construction: Draw seg CM ⊥ side AB, A-M-B

Draw seg CN ⊥ side AB, A-N-B

In Δ ABC, ∠ACB = 90° [Given]

$\therefore AC^2 + BC^2 = AB^2$ [Pythagoras theorem]

$\therefore AC^2 + 15^2 = 25^2$

$\therefore AC^2 = 625 - 225 = 400$

$\therefore$ AC = 20 units [Taking square roots]

$A(\Delta ABC) = \frac{1}{2}$ x AB x CM ...1

Also, $A(\Delta ABC) = \frac{1}{2}$ x AC x BC 2

$\therefore \frac{1}{2}$ x AB x CM = $\frac{1}{2}$ x AC x BC.

$\therefore$ 25 x CM = 20 x 15

$\therefore CM = \frac{20x15}{25}$

$\therefore$ CM = 12 units. 3

In Δ BMC, ∠BMC = 90° [Construction]

$\therefore BC^2 = CM^2 + BM^2$ [Pythagoras theorem]

$\therefore 15^2 = 12^2 + BM^2$

$\therefore 225 - 144 = BM^2$

$\therefore BM^2 = 81$

$\therefore$ BM = 9 units ... 4 [Taking square roots]

CM = DN

... 5 [Distance between two parallel lines is equal]

In Δ BMC & Δ AND
∠BMC ≅ ∠AND [each 90°]
Hyp. BC ≅ Hyp.AD [given]
seg CM ≅ seg DN [from 5]
∴ Δ BMC ≅ Δ AND Hypotenuse side test
∴ seg BM ≅ seg AN .... 6 [C.S.C.T.]
∴ AN = 9 units ... 7 [from 4 & 6]
AB = AN + MN + BM [A-N-M-B]
∴ 25 = 9 + MN + 9
∴ MN = 25 – 18 = 7 units 8
In □CMND, Seg MN ∥ seg CD
[Given, A-N-M-B]
seg CM ∥ seg DN
[Segments ⊥ to same line are parallel]
∴□ CMND is a parallelogram [Definition]
∴ CD = MN
[Opposite sides of parallelogram are equal]
∴ CD = 7 units [from 8]

A (Trapezium ABCD) = $\frac{1}{2}$ x (AB + CD) x CM

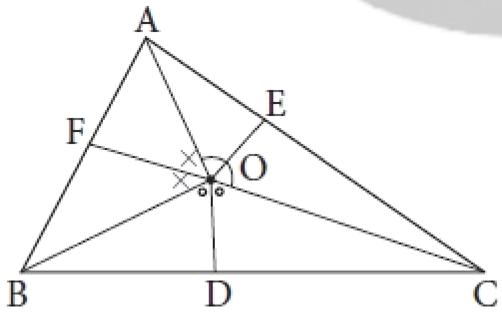
= $\frac{1}{2}$ x (25+ 7) x 12

A (Trapezium ABCD) = 210 square units.

Q.5 Solve the following: (Any ONE) **3**

(1) Ans. ∠A +∠B+∠C= 180°
∴100+45+∠C= 180°
∴∠C= 180°- 145°
∴∠C= 35°
Construct ΔABC with BC = 6 cm, ∠B=45°, ∠C= 35°
Make any convenient ∠CBD.
On BD take 7 equal parts as shown in the fig.
Join CB_7. Through point B_4 draw B_4C' ∥ B_7C intersecting BC in C'.
BC' = 4/7 times BC.
Draw C'A' ∥ CA intersecting BA in A'.
Δ BC'A' is the required triangle.

(2) Ans.



In Δ AOB, OF is bisector of $\angle$ AOB

$\therefore \frac{OA}{OB} = \frac{AF}{BF}$ .... (1) (by angle bisector theorem)

In Δ BOC, OD is bisector of angle $\angle$ BOC.

$\therefore \frac{OB}{OC} = \frac{BD}{CD}$ .... (2)(by angle bisector theorem)

In Δ AOC, OE is bisector of angle$\angle$ AOC.

$\therefore \frac{OC}{OA} = \frac{CE}{AE}$ .... (3)(by angle bisector theoem)

$\therefore \frac{OA}{OB} \times \frac{OB}{OC} \times \frac{OC}{OA} = \frac{AF}{BF} \times \frac{BD}{CD} \times \frac{CE}{AE}$ from (1), (2) and (3)

$\therefore \frac{OA \times OC \times OB}{OB \times OA \times OC} = \frac{AF \times CE \times BD}{BF \times AE \times CD}$

$\therefore \quad 1 = \frac{AF \times CE \times BD}{BF \times AE \times CD}$

$\therefore BF \times AE \times CD = AF \times CE \times BD$

....All The Best....