Mid Term

SOLUTIONS

1. **(d) :** π is irrational and $\frac{22}{7}$ is rational.

2. **(b) :** Lines parallel to same line are parallel to each other.

3. **(b) :** Diagonals of rhombus are perpendicular to each other.

4. Let $P(x) = x^{21} + 101$ ...(i)

When $P(x)$ is divided by $(x + 1)$, then for finding remainder put $x + 1 = 0$ *i.e.*, $x = -1$

Putting $x = -1$ in (i), we get

$P(-1) = (-1)^{21} + 101 = -1 + 101$

$\therefore$ $P(-1) = 100$

Hence, the remainder is 100.

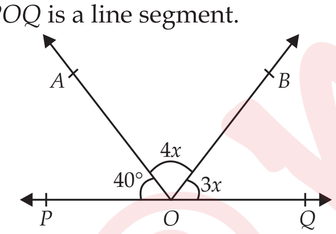
5. Given, $AB = 5$ cm and $CD = 3$ cm.

or $AB > CD$

Hence, $\angle AOB > \angle COD$

[$\because$ Longer chord subtends greater angle at the centre].

6. Since, POQ is a line segment.



$\therefore$ $\angle POQ = 180°$

$\Rightarrow$ $\angle POA + \angle AOB + \angle BOQ = 180°$

$\Rightarrow$ $40° + 4x + 3x = 180°$

$\Rightarrow$ $7x = 180° - 40°$ $\Rightarrow$ $7x = 140°$ $\Rightarrow$ $x = 20°$

7. We have, $(x - 7, -2) = (2, x + y)$

On comparing the coordinates, we get

$x - 7 = 2 \Rightarrow x = 9$

and $x + y = -2$

$\Rightarrow$ $y = -2 - 9 = -11$

$\therefore$ $7(x - y) = 7(9 - (-11)) = 7 \times 20 = 140$

8. In triangles IBX and IBY,

$\angle IXB = \angle IYB$ (Each equal to 90°)

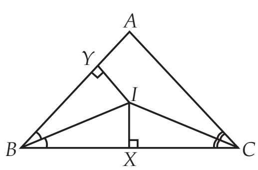
$\angle IBX = \angle IBY$ (Given)

$IB = IB$ (Common)

$\Delta IBX \cong \Delta IBY$

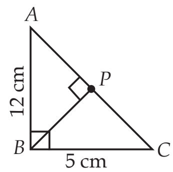
(By AAS congruency)

$IX = IY$ (By C.P.C.T.)



9. Area of $\Delta ABC = \frac{1}{2} \times BC \times AB$

$= \frac{1}{2} \times 12 \times 5$ ...(i)



Also, area of $\Delta ABC = \frac{1}{2} \times AC \times BP$ ...(ii)

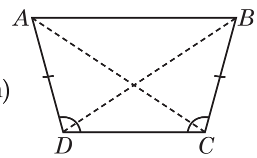
$= \frac{1}{2} \times 13 \times BP$

From (i) and (ii), we get

$\therefore$ $\frac{1}{2} \times 13 \times BP = \frac{1}{2} \times 12 \times 5$

$\Rightarrow$ $13 \times BP = 12 \times 5 \Rightarrow BP = \frac{60}{13} = 4.62$ cm

10. Join BD and AC.



In ΔDCB and ΔCDA,

$DC = DC$ (Common)

$AD = BC$ (Given)

$\angle ADC = \angle BCD$ (Given)

$\therefore$ $\Delta DCB \cong \Delta CDA$ (By SAS congruency)

$\Rightarrow$ $\angle DAC = \angle DBC$ (By C.P.C.T.)

$\therefore$ A, B, C and D are on con-cyclic.

i.e., Points A, B, C and D lie on a circle.

11. We have, $PO \perp AB$ $\therefore$ $\angle POB = \angle AOP = 90°$

Also, $x : y : z = 2 : 3 : 4$

Let $x = 2a$, $y = 3a$ and $z = 4a$

Now, $x + y + z = \angle AOP = 90°$

$\Rightarrow$ $2a + 3a + 4a = 90° \Rightarrow 9a = 90° \Rightarrow a = 10°$

Hence, $x = 2a = 2 \times 10° = 20°$,

$y = 3a = 3 \times 10° = 30°$ and $z = 4a = 4 \times 10 = 40°$

12. In triangle OAP and OBP,

$AP = PB$ (Given)

$\angle OPA = \angle OPB$ (Each equal to 90°)

$OP = OP$ (Common)

So, $\Delta OPA \cong \Delta OPB$ (By SAS congruency)

$\therefore$ $OA = OB$ ...(i) (By C.P.C.T.)

Similarly, $\Delta OQB \cong \Delta OQC$ (By SAS congruence)

$\therefore$ $OB = OC$ ...(ii) (By C.P.C.T.)

From (i) and (ii), we get

$OA = OB = OC$

13. Let the two numbers be x and y such that $x > y$.

According to the question, we have

$4x = 10y + 2 \Rightarrow 2x = 5y + 1$, which is required linear equation in two variables.

When $x = 8$, $2 \times 8 = 5y + 1 \Rightarrow 5y = 15 \Rightarrow y = 3$

When $x = 3$, $2 \times 3 = 5y + 1 \Rightarrow 5y = 5 \Rightarrow y = 1$

14. In ΔABD and ΔYCD

$BD = CD$ ($\because$ Given, AD is median)

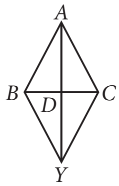
$\angle ADB = \angle YDC$ (Vertically opposite angles)

$AD = YD$ (Given)

$\therefore$ $\Delta ABD \cong \Delta YCD$ (By SAS congruency)

$\therefore$ $AB = YC$ (By C.P.C.T.) ...(i)

In ΔYBD and ΔACD



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

$\angle YDB = \angle ADC$ (Vertically opposite angles)

$DY = DA$ (Given)

$\therefore$ $\Delta YBD \cong \Delta ACD$ (By SAS congruency)

$BY = CA$ (By C.P.C.T.) ...(ii)

From (i) and (ii), opposite sides are equal.

So, $ABYC$ is a parallelogram.

15. We have, $AB = 7.6$ cm, $BC = 8.4$ cm and $CA = 9.2$ cm

In ΔABC, F and E are the mid-points of sides AB and AC respectively.

$\therefore$ $FE \parallel BC$ and $FE = \frac{1}{2}BC$ [By mid-point theorem]

$\Rightarrow$ $FE = \frac{1}{2} \times 8.4 = 4.2$ cm

Similarly, $DE = \frac{1}{2}AB = \frac{1}{2} \times 7.6 = 3.8$ cm

And $FD = \frac{1}{2}AC = \frac{1}{2} \times 9.2 = 4.6$ cm

Now, in ΔDEF, P and Q are mid-points of sides EF and FD respectively.

$\therefore$ $PQ \parallel DE$ and $PQ = \frac{1}{2}DE$

$\Rightarrow$ $PQ = \frac{1}{2} \times 3.8 = 1.9$ cm

Similarly, $QR = \frac{1}{2}FE = \frac{1}{2} \times 4.2 = 2.1$ cm

And, $PR = \frac{1}{2}FD = \frac{1}{2} \times 4.6 = 2.3$ cm

Now, perimeter of $\Delta PQR = PQ + QR + PR$

$= 1.9 + 2.1 + 2.3 = 6.3$ cm