ANSWER KEY

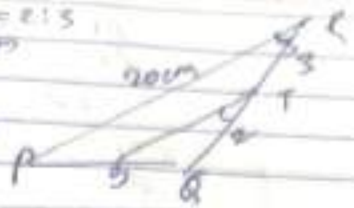
1	**b**
2	**c**
3	**a**
4	**d**
5	**c**
6	**c**
7	**c**
8	**b**
9	**c**
10	**d**
11	**(A)**The possible values for x are 2 and 3 **Or** **(B)** In ΔRPQ and ΔRST, ∠RPQ = ∠RTS ...(Given) ∠R = ∠R ...(Common angle) ∴ ΔRPQ ~ ΔRTS ...(By AA similarity criterion)
12	Length of side AB: Points are $A(0,4)$ and $B(0,0)$. $AB = \sqrt{(0-0)^2+(0-4)^2} = \sqrt{0^2+(-4)^2} = \sqrt{0+16} = \sqrt{16} = 4$ units Length of side BC: Points are $B(0,0)$ and $C(3,0)$. $BC = \sqrt{(3-0)^2+(0-0)^2} = \sqrt{3^2+0^2} = \sqrt{9+0} = \sqrt{9} = 3$ units. Length of side AC: Points are $A(0,4)$ and $C(3,0)$. $AC = \sqrt{(3-0)^2+(0-4)^2} = \sqrt{3^2+(-4)^2} = \sqrt{9+16} = \sqrt{25} = 5$ units $P = AB + BC + AC = 4 + 3 + 5 = 12$ units.
13	

13.

Given: 1) $\angle PRQ = \angle STQ$

2) $QT : TR = 2:3$

3) $PR = 20cm$



Soln

$\angle R = \angle T$ given

$\angle Q = \angle Q$ common

$\Delta SQT \sim \Delta PQR$

By AA similarity

$\Rightarrow \frac{SQ}{PQ} = \frac{QT}{QR} = \frac{ST}{PR}$

$\frac{2}{5} = \frac{ST}{20}$

$ST = 8$

OR

Given $PQ \parallel AB$

$AQ \parallel CB$

To prove $AR^2 = PR \times CR$

proof In ΔPQR $PQ \parallel AB$

By BPT

$\frac{RA}{AP} = \frac{RB}{BQ}$ — (1)

In ΔARQ, $AQ \parallel CB$

By BPT

$\frac{RC}{CA} = \frac{RB}{BQ}$ — (2)

fm (1) & (2) $\frac{AR}{AP} = \frac{RC}{AC}$

$\frac{AP}{AR} = \frac{AC}{RC}$

Add 1

$1 + \frac{AP}{AR} = 1 + \frac{AC}{RC}$

$\frac{AR + AP}{AR} = \frac{RC + AC}{RC}$

$\frac{PR}{AR} = \frac{AR}{RC}$

$PR \times RC = AR^2$ (HP)

14

Line segment is divided by x-axis

∴ co-ordinate P $(x, 0)$

A $(-4, -6)$ k   P $(x, 0)$ 1   B $(-1, 7)$

A/q. Sect. formula

$0 = \frac{1 \times (-6) + k \times 7}{k+1}$

$0 = -6 + 7k$

$\frac{6}{7} = k$

∴ ratio $= \frac{6}{7}$

Now, $x = \frac{1 \times (-4) + k \times (-1)}{k+1}$

$x = \frac{-4 + \frac{6}{7} \times (-1)}{\frac{6}{7} + 1}$

$x = \frac{-4 - \frac{6}{7}}{\frac{13}{7}}$ ⇒ $x = \frac{\frac{-28-6}{7}}{\frac{13}{7}}$

⇒ $x = \frac{-34}{13}$

coordinate $= \left(\frac{-34}{13}, 0\right)$

Or

Mid−point of a line $= \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

$(x, y) = \left(\frac{3+p}{2}, \frac{4+7}{2}\right)$

$= \left(\frac{3+p}{2}, \frac{11}{2}\right)$

The point $\left(\frac{3+p}{2}, \frac{11}{2}\right)$ lies on $2x + 2y + 1 = 0$

$2\left(\frac{3+p}{2}\right) + 2\frac{11}{2} + 1 = 0$

$3 + p + 11 + 1 = 0$

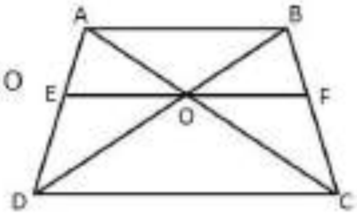
$\Rightarrow p + 15 = 0$

$\Rightarrow p = -15$

The value of p is −15.

15

Given: ABCD is a quadrilateral where diagonals AC & BD intersect at O & $\frac{AO}{BO} = \frac{CO}{DO}$

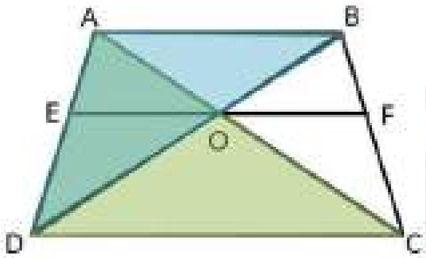


To prove: ABCD is a trapezium

Construction: Let us draw a line EF II AB passing through point O.

Proof: Given $\frac{AO}{BO} = \frac{CO}{DO}$

$\Rightarrow \frac{AO}{CO} = \frac{BO}{DO}$ ...(1)



Now,

in ΔADB

EO II AB *(Because EF II AB)*

(Line drawn parallel to one side of triangle, intersects the other two sides in distinct points, Then it divides the other 2 side in same ratio)

$\frac{AE}{DE} = \frac{BO}{DO}$

$\Rightarrow \frac{AE}{DE} = \frac{AO}{CO}$ *(From (1))*

Thus in Δ ADC,

Line EO divides the triangle in the same ratio

Now, EO II DC

But, we know that EO II AB

⇒ EO II AB II DC

⇒ AB II DC

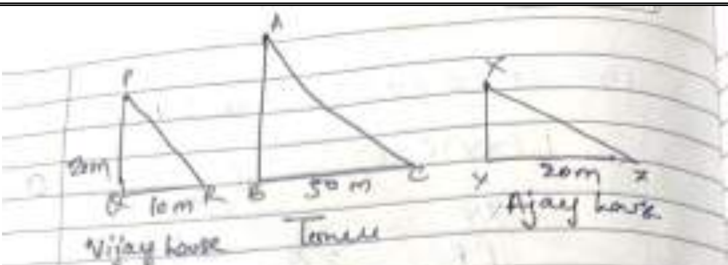
Hence,

one pair of opposite sides of quadrilateral ABCD are parallel

Therefore ABCD is a trapezium .

Hence proved

16



(i) In ΔPQR & ΔABC

$\angle Q = \angle B = 90^\circ$ (vertical height of house & tower)

$\angle R = \angle C$ (Sun's altitude)

By AA similarity

$\Delta PQR \sim \Delta ABC$

$\frac{PQ}{AB} = \frac{QR}{BC}$

$\frac{20}{AB} = \frac{10}{50}$

$100m = AB$

height of tower is 100m

(ii) $\Delta PQR \sim \Delta XYZ$ (By AA criterion)

$\frac{PQ}{XY} = \frac{QR}{YZ} \Rightarrow$

$\frac{20}{XY} = \frac{10}{20}$

$\frac{200}{10} = XY$

$10m = XY$

height of Ajay's house = 10m.

iii (a) when QR = 12m find BC

$\Delta PQR \sim \Delta ABC$

$\frac{PQ}{AB} = \frac{QR}{BC} = \frac{PR}{AC}$

$\frac{20}{100} = \frac{12}{BC}$

$BC = 12 \times 5$

$= 60m$

(b) As $\Delta ABC \sim \Delta XYZ$

$\frac{AB}{XY} = \frac{BC}{YZ}$

$\frac{100}{10} = \frac{40}{YZ} \Rightarrow YZ = 4m$

17

(i) Bank (A): (9, 5)
Hospital (B): (-3, -1)
Supermarket (C): (5, -5)
Distance between Bank and Hospital=$6\sqrt{5}$

(ii) Supermarket (C): (5,−5)
Bank (A): (9,5)
Using mid point formula E = (7, 0)

(iii) (a) Distance from Bank(A) to Bus Stand (D)
Distance from A (9,5) to D (1,−3): $8\sqrt{2}$

Or

(iii)(b) Find 'a' and 'b' for BP = PQ = QA
a = 1, b = 5.

18

$$A = (0,5), \quad B = (4,-3), \quad C = (4,9)$$

Or

O(0, 0) and A(3, √3) be the given points and let B(x, y) be the third vertex of equilateral ΔOAB. Then, OA = OB = AB

$\Rightarrow OA^2 = OB^2 = AB^2$

We have,

$OA^2 = (3-0)^2 + \left(\sqrt{3}-0\right)^2 = 12,$

$OB^2 = x^2 + y^2$ and , $AB^2 = (x-3)^2 + \left(y-\sqrt{3}\right)^2$

$\Rightarrow AB^2 = x^2 + y^2 - 6x - 2y + 12$

$\therefore OA^2 = OB^2 = AB^2$

$\Rightarrow OA^2 = OB^2$ and $OB^2 = AB^2$

$\Rightarrow x^2 + y^2 = 12$

and , $x^2 + y^2 = x^2 + y^2 - 6x - 2\sqrt{3}y + 12$

$\Rightarrow x^2 + y^2 = 12$ and $6x + 2\sqrt{3}y = 12$

$\Rightarrow x^2 + y^2 = 12$ and $6x + 2\sqrt{3}y = 12$

$\Rightarrow x^2 + y^2 = 12$ and $3x + \sqrt{3}y = 6$

$\Rightarrow x^2 + \left(\frac{6-3x}{\sqrt{3}}\right)^2 = 12 \left[\because 3x + \sqrt{3}y = 6 \therefore y = \frac{6-3x}{\sqrt{3}}\right]$

$\Rightarrow 3x^2 + (6-3x)^2 = 36$

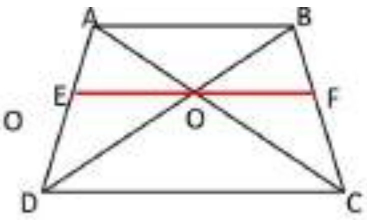
$\Rightarrow 12x^2 - 36x = 0 \Rightarrow x = 0, 3$

$\therefore$ x = 0 ⇒ √3y = 6

$\Rightarrow y = \frac{6}{\sqrt{3}} = 2\sqrt{3}$|

and, x = 3 ⇒ 9 + √3 y = 6

$\Rightarrow y = \frac{6-9}{\sqrt{3}} = -\sqrt{3}$

	Hence, the coordinates of the third vertex B are $(0, 2\sqrt{3})$ or $(3, -\sqrt{3})$.
19	Prove BPT Given: ABCD is a trapezium where diagonals AC & BD intersect at O EF is a line passing through O, parallel to CD  To prove: We need to prove $\frac{AE}{ED} = \frac{BF}{FC}$ Since EO ∥ CD *Using Basic Proportionality theorem* $\frac{AE}{DE} = \frac{BO}{DO}$ ...(1) Since OF ∥ CD *Using Basic Proportionality theorem* $\frac{BO}{DO} = \frac{BF}{FC}$ ...(2) Comparing (1) and (2) $\frac{AE}{ED} = \frac{BF}{FC}$ Hence proved