



INDIAN SCHOOL AL WADI AL KABIR

Class X, Mathematics

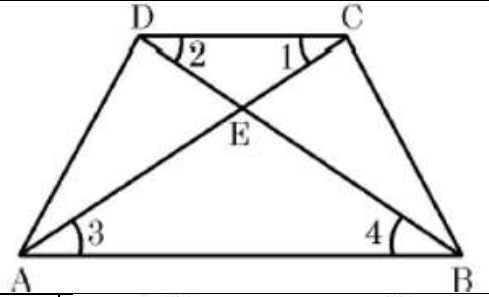
TRIANGLES WORKSHEET

Questions of 2 marks each

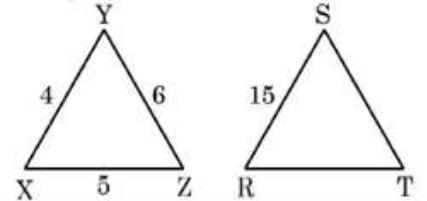
Q.1. X and Y are points on the sides PQ and PR respectively, of a PQR. If the lengths of PX, QX, PY and YR (in cm) are 4, 4.5, 8 and 9 respectively, then show that $XY \parallel QR$.

Q.2. ABCD is a trapezium in which $AB \parallel DC$ and P and Q are points on AD and BC respectively, such that $PQ \parallel DC$. If $PD = 18$ cm, $BQ = 3.5$ cm and $QC = 15$ cm, then find the length of AD.

Q.3. In the figure, $\angle 1 = \angle 3$, $\angle 2 = \angle 4$, $DE = 4$ cm, $CE = 6$ cm, $AE = 3x$ cm, $BE = 2x$ cm. The value of x is

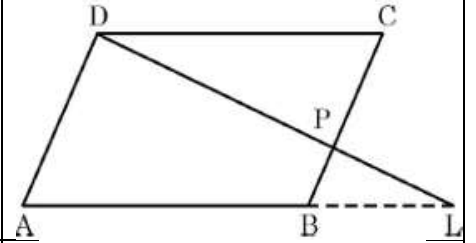


Q.4. In the given figure, if $\triangle XYZ \sim \triangle STR$ and $XY = 4$ cm, $XZ = 5$ cm, $YZ = 6$ cm and $SR = 15$ cm, Find the perimeter of $\triangle SRT$

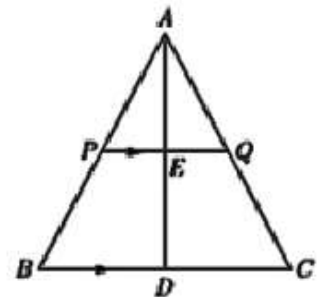


Questions of 3 marks each

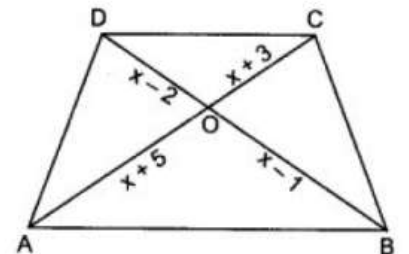
Q.5. In the figure, ABCD is a parallelogram. P is a point on side BC and DP when produced meets AB produced at L. Prove that $\frac{DP}{PL} = \frac{PC}{BP}$ and $\frac{DL}{DP} = \frac{AL}{DC}$

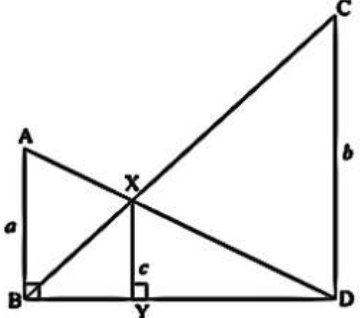
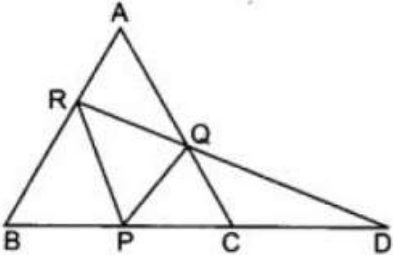
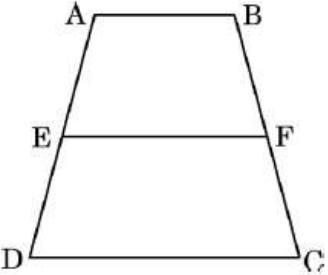
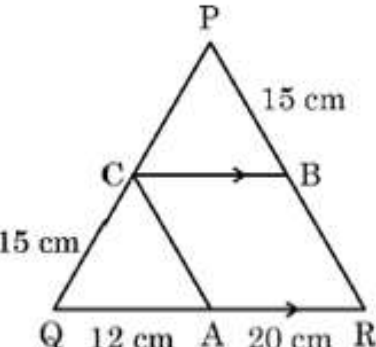


Q.6. In a $\triangle ABC$, let P and Q be points on AB and AC respectively such that $PQ \parallel BC$. Prove that the median AD bisects PQ.



Q.7. In the given figure, if $AB \parallel DC$, find the length of AC and BD.



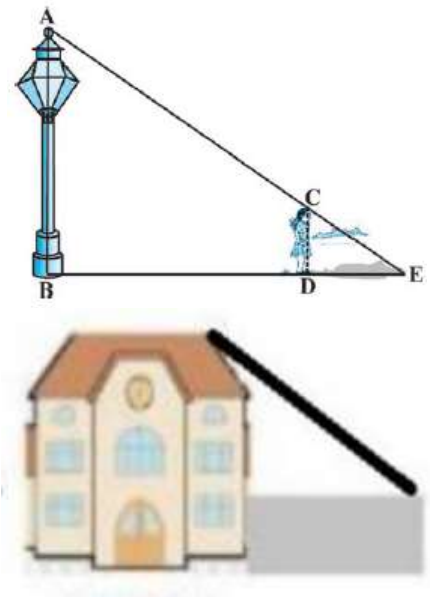
Q.8.	In the figure, if $\angle ABD = \angle XYD = \angle CDB = 90^\circ$. $AB = a$, $XY = c$ and $CD = b$, then prove that $c(a + b) = ab$.	
Q.9.	In the given figure $PQ \parallel BA$; $PR \parallel CA$. If $PD = 12$ cm. Find $BD \times CD$	
Questions of 5 marks each		
Q.10.	State and prove Basic Proportionality Theorem (BPT).	
Q.11.	ABCD is a trapezium with $AB \parallel DC$. E and F are points on non-parallel sides AD and BC respectively such that EF is parallel to AB. Show that $\frac{AE}{ED} = \frac{BF}{FC}$.	
Q.12.	i. If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, then prove that the other two sides are divided in the same ratio. ii. Using the above, find the value of x, if a line $DE \parallel BC$ intersects the sides AB and AC of $\triangle ABC$ such that $AD = x$, $DB = x - 2$, $AE = x + 2$ and $CE = x - 1$.	
Q.13.	i. Prove that if a line is drawn parallel to one side of a triangle intersecting the other two sides at distinct points, then the other two sides are divided in the same ratio. ii. If $CB \parallel QR$, $CA \parallel PR$, $AQ = 12$ cm, $AR = 20$ cm and $PB = CQ = 15$ cm. Find the perimeter of $\triangle PQR$.	

Q.14.

CASE STUDY QUESTION:

Rohan is trying to find the average height of a lighthouse near his locality. He is using the properties of similar triangles. The height of Rohan's building is 24 m, and it casts a shadow 8 m long on the ground. At the same time, the lighthouse casts a shadow 60 m long, and the house of Priya casts a 15 m long shadow. Based on the above information, answer the following questions:

- i. (i) What is the height of the lighthouse?
- (ii) What will be the length of the shadow of the lighthouse when Rohan's building casts a shadow of 14 m?
- (iii) What is the height of Priya's house?
- (iv) When the lighthouse casts a shadow of 45 m, at the same time, what will be the length of the shadow of Priya's house?



ANSWERS

Q.1.

$PX / QX = PY / YR = 8/9$
 Apply the converse of Basic Proportionality Theorem (Thales' theorem)
 If a line divides two sides of a triangle in the same ratio, then the line is parallel to the third side.

Q.2.

$AD = 22.2 \text{ cm}$

Q.3.

$x = 2 \text{ cm}$

Q.4.

Perimeter of $\triangle SRT = 45 \text{ cm}$

Q.5.

Both statements are proved using:
 - Basic Proportionality Theorem.
 - AA similarity of triangles
 - Property of parallelogram (opposite sides are equal)

Q.6.

In $\triangle ABD$, $PE \parallel BD \Rightarrow \triangle APE \sim \triangle ABD$
 So, $PE/BD = AP/AB = k \dots(1)$
 In $\triangle ACD$, $QE \parallel DC \Rightarrow \triangle AQE \sim \triangle ACD$
 So, $QE/DC = AQ/AC = k \dots(2)$
 Since $PQ \parallel BC$, $\triangle APQ \sim \triangle ABC \Rightarrow AP/AB = AQ/AC = k$
 Also, $BD = DC$ (D is midpoint)
 From (1) and (2):
 $PE/BD = QE/DC$
 $\Rightarrow PE/BD = QE/BD$ (since $BD = DC$)
 $\Rightarrow PE = QE$

Q.7.

$x = 7 \text{ units}$
 $AC = 22 \text{ units}$
 $BD = 11 \text{ units}$

	Q.8.	Given: $AB \perp BD$, $CD \perp BD$, $XY \perp BD$ So, $AB \parallel XY \parallel CD$. $\triangle ABD \sim \triangle XYD \Rightarrow a/c = BD/YD$ (1) $\triangle CDB \sim \triangle XYB \Rightarrow b/c = BD/YB$ (2) From (1): $a = c \cdot BD/YD$ From (2): $b = c \cdot BD/YB$ Now, $a + b = c \cdot BD(1/YD + 1/YB)$ $= c \cdot BD \cdot [(YB+YD)/(YD \cdot YB)] = c \cdot BD \cdot [BD/(YD \cdot YB)]$ $= c \cdot BD^2/(YD \cdot YB)$ Also, $ab = c^2 \cdot BD^2/(YD \cdot YB)$ Therefore, $a + b = ab/c$ $\Rightarrow c(a + b) = ab$			Q.9.	$BD \times CD = 12^2$ $= 144 \text{ cm}^2$
	Q.10.	Proof of BPT	Q.11.	Draw diagonal AC intersecting EF at O. In $\triangle ADC$, $EO \parallel DC \Rightarrow AE/ED = AO/OC$ (BPT) In $\triangle ABC$, $OF \parallel AB \Rightarrow AO/OC = BF/FC$ (BPT) Therefore, $AE/ED = BF/FC$. Hence proved.	Q.12	i. Proof ii. $x = 4\text{cm}$
	Q.13.	Perimeter of $\triangle PQR$ $= PQ + QR + PR$ $= 40 + 32 + 24$ $= 96 \text{ cm}$		Q.14	(i) Height of lighthouse = 180 m (ii) Shadow of lighthouse = 105 m (iii) Height of Priya's house = 45 m (iv) Shadow of Priya's house = 11.25 m	
