

Exercise 7E

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Question 1: State the two properties which are necessary for given two triangles to be similar.

Solution:

Two properties for similarity of two triangles are:

- (i) Angle-Angle-Angle (AAA) property.
- (ii) Angle-Side-Angle (ASA) property.

Question 2: State the basic proportionality theorem.

Solution:

In a triangle, if a line parallel to one side is drawn, it will divide the other two sides proportionally.

Question 3: State the converse of Thales' theorem.

Solution:

If a line divides any two sides of a triangle in the same ratio. Then, the line must be parallel to the third side.

Question 4: State the midpoint theorem.

Solution:

The line joining the midpoints of two sides of a triangle, is parallel to the third side.

Question 5: State the AAA-similarity criterion.

Solution:

In two triangles, if three angles of the one triangle are equal to the three angles of the other, the triangles are similar.

Question 6: State the AA-similarity criterion.

Solution:

In two triangles, if two angles of the one triangle are equal to the corresponding angles of the other triangle, then the triangles are similar.

Question 7: State the SSS-criterion for similarity of triangles.

Solution:

In two triangles, if three sides of the one are proportional to the corresponding sides of the other, the triangles are similar.

Question 8: State the SAS-similarity criterion.

Solution:

In two triangles, if two sides of the one are proportional to the corresponding sides of the other and their included angles are equal, the two triangles are similar.

Question 9: State Pythagoras' theorem.

Solution:

In a right angled triangle, the square on the hypotenuse is equal to the sum of squares on the other two sides.

Question 10: State the converse of Pythagoras theorem.

Solution:

In a triangle, if the square on the longest side is equal to the sum of the squares on the other two sides,

then the angle opposite to the hypotenuse is a right angle.

Question 11: If D, E and F are respectively the midpoints of sides AB, BC and CA of $\triangle ABC$ then what is the ratio of the areas of $\triangle DEF$ and $\triangle ABC$?

Solution:

The ratio of their areas will be 1 : 4.

Question 12: Two triangles ABC and PQR are such that $AB = 3$ cm, $AC = 6$ cm, $\angle A = 70^\circ$, $PR = 9$ cm, $\angle P = 70^\circ$ and $PQ = 4.5$ cm. Show that $\triangle ABC \sim \triangle PQR$ and state the similarity criterion.

Solution:

In two triangles $\triangle ABC$ and $\triangle PQR$,
 $AB = 3$ cm, $AC = 6$ cm, $\angle A = 70^\circ$
 $PR = 9$ cm, $\angle P = 70^\circ$ and $PQ = 4.5$ cm
Now,
 $\angle A = \angle P = 70^\circ$ (Same)
 $AC/PR = 6/9 = 2/3$ and
 $AB/PQ = 3/4.5 = 2/3$

$$\Rightarrow AC/PR = AB/PQ$$

Both $\triangle ABC$ and $\triangle PQR$ are similar.

Question 13: If $\triangle ABC \sim \triangle DEF$ such that $2AB = DE$ and $BC = 6$ cm, find EF.

Solution:

$\triangle ABC \sim \triangle DEF$ (given)
 $2AB = DE$, $BC = 6$ cm (given)

$$\angle E = \angle B \text{ and } \angle D = \angle A \text{ and } \angle F = \angle C$$

$$2AB = DE$$

$$\Rightarrow AB/DE = 1/2$$

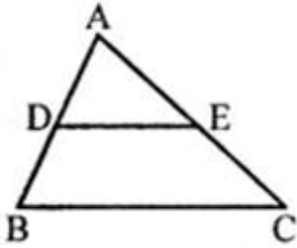
Therefore,

$$AB/DE = BC/EF$$

$$1/2 = 6/EF$$

$$\text{or } EF = 12 \text{ cm}$$

Question 14: In the given figure, $DE \parallel BC$ such that $AD = x$ cm, $DB = (3x + 4)$ cm, $AE = (x + 3)$ cm and $EC = (3x + 19)$ cm. Find the value of x .



Solution:

From figure:

$DE \parallel BC$

$AD = x$ cm, $DB = (3x + 4)$ cm

$AE = (x + 3)$ cm and $EC = (3x + 19)$ cm

In $\triangle ABC$

$$AD/DB = AE/EC$$

$$x/(3x+4) = (x+3)/(3x+19)$$

$$3x^2 + 19x - 3x^2 - 9x - 4x = 12$$

$$x = 2$$

Question 15: A ladder 10 m long reaches the window of a house 8 m above the ground. Find the distance of the foot of the ladder from the base of the wall.

Solution:

Let AB is the ladder and A is window.

Then, $AB = 10$ m and $AC = 8$ m

Let $BC = x$

In right $\triangle ABC$,

By Pythagoras Theorem:

$$AB^2 = AC^2 + BC^2$$

$$(10)^2 = 8^2 + x^2$$

$$100 = 64 + x^2$$

$$x^2 = 100 - 64 = 36$$

$$\text{or } x = 6$$

Therefore, Distance between foot of ladder and base of the wall is 6 m.