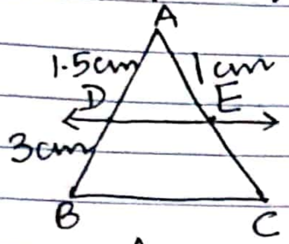
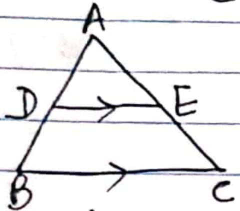
X Test – 13 (TRIANGLES)

1) The sides of two similar triangles are in the ratio 2:3, then the areas of these triangles are in the ratio
(a) 4:9 (b) 2:3 (c) 8:27 (d) 16:81

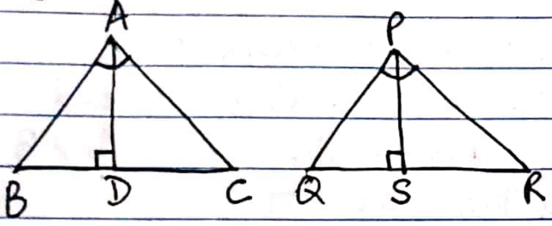
2) 

If $DE \parallel BC$, the length of EC =

(a) 5cm (b) 4cm (c) 3cm (d) 2cm.

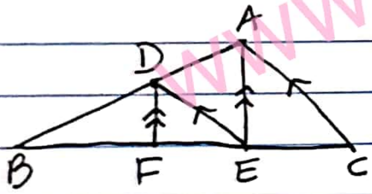
3) 

$DE \parallel BC$, AD = 1cm, BD = 2cm. The ratio of the ~~ratio~~ area (ΔABC) to the area (ΔADE) is (a) 9:1 (b) 16:1 (c) 64:1 (d) 1:81

4) 

ΔABC and ΔPQR are isosceles triangles in which $\angle A = \angle P$.
If $\frac{\text{area}(\Delta ABC)}{\text{area}(\Delta PQR)} = \frac{9}{16}$,
then $\frac{AD}{PS} =$

(a) $\frac{2}{3}$ (b) $\frac{3}{4}$ (c) $\frac{5}{9}$ (d) $\frac{7}{81}$

5) 

$DE \parallel AC$ and $DF \parallel AE$. If the lengths of BF and FE are 4cm and 5cm respectively, then the length of EC is
(a) 11.25cm (b) 9.6cm (c) 12.5cm (d) 13.2cm

6) D, E and F are the mid-points of the sides BC, CA and AB respectively of ΔABC. Then the ratio of the areas of ΔDEF and ΔABC is (a) 1:4 (b) 4:1 (c) 1:3 (d) 1:9

7) In a trapezium ABCD, $AB \parallel CD$ and AB = 2CD. If the area of $\Delta AOB = 84\ cm^2$, then the area of ΔCOD =
(a) $18\ cm^2$ (b) $20\ cm^2$ (c) $20.5\ cm^2$ (d) $21\ cm^2$

8) D is a point on the side BC of an equilateral ΔABC such that $DC = \frac{1}{4} BC$. Then $AD^2 =$

(a) $11\ CD^2$ (b) $12\ CD^2$ (c) $13\ CD^2$ (d) $15\ CD^2$

9) If in ΔABC, $\angle BCA$ is a right angle, if Q is the mid-point of side BC, AC = 4cm, AQ = 5cm, Then AB^2 =
(a) $36\ cm^2$ (b) $42\ cm^2$ (c) $50\ cm^2$ (d) $52\ cm^2$

10) The hypotenuse of a right triangle is 25cm and out of the remaining two sides, one is longer than the other by 5cm. The length of the other two sides are:
(a) 10cm, 15cm (b) 15cm, 20cm (c) 15cm, 18cm (d) 20cm, 22cm

11) The diagonals of a rhombus are 15cm and 36cm long. Then its perimeter is
(a) 82cm (b) 80cm (c) 78cm (d) 76cm.

12) In a rhombus of side 10cm, one of the diagonals is 12cm long. The length of the second diagonal is
(a) 18cm (b) 16cm (c) 14cm (d) 8cm.

13) ΔABC is an isosceles Δ with $AB = AC = 13$cm. The length of the altitude from A on BC is 5cm. Then BC =
(a) 36cm (b) 32cm (c) 24cm (d) 20cm

14) The length of altitude of an equilateral Δ of side a is (a) $\frac{2a}{\sqrt{3}}$ (b) $\frac{\sqrt{3}}{2a}$ (c) $\frac{a\sqrt{3}}{2}$ (d) $\frac{a}{2\sqrt{3}}$

15) In an equilateral ΔABC, if $AD \perp BC$ then
(a) $3AB^2 = 2AD^2$ (b) $3AB^2 = 4AD^2$ (c) $4AB^2 = 3AD^2$ (d) $2AB^2 = 3AD^2$

16) CASE - STUDY

14. Kajal and Mayank are good friends. They both study in class X. Due to the corona virus pandemic, the schools are closed. They both study online. One day while chatting, they discussed the following questions :

(i) In a triangle, ABC, if $AB^2 + AC^2 = BC^2$, then :

(a) $\angle A = 90°$ (b) $\angle B = 90°$ (c) $\angle C = 90°$ (d) none of these

(ii) Tick the correct statement :

(a) All similar figures are congruent

(b) All congruent figures are similar

(c) The criterion for similarity and congruency is same.

(d) Similar figures have same size and shape.

(iii) If a line divides any two sides of the triangle in the same ratio, then the line is parallel to the third side. The statement depicts which theorem?

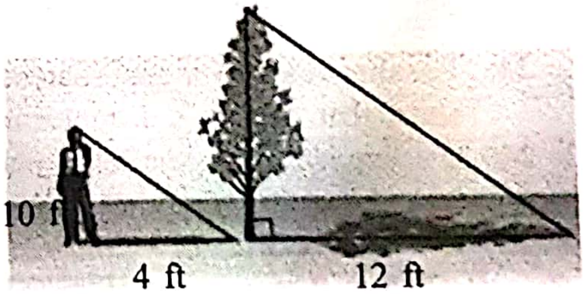
(a) Pythagoras (b) Thales Theorem

(c) Coverse of Thales theorem (d) Converse of Pythagoras theorem

(iv) Using the concept of similarity, the height of the tree is :

(a) 12 ft (b) 20 ft

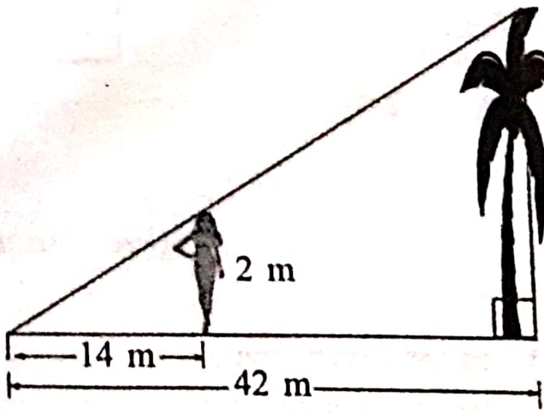
(c) 30 ft (d) 40 ft



(v) The height of the tree, standing on the same straight line as the girl and casts a shadow 42 m long, is :

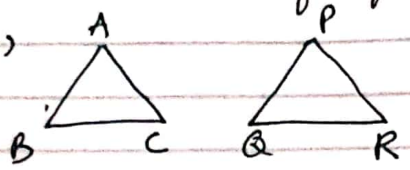
(a) 6 m (b) 8 m

(c) 12 m (d) 16 m



X | Test - 13 (MCQs - Triangles)

1) Since ratio of areas of two similar triangles is equal to the ratio of squares of its corresponding sides,



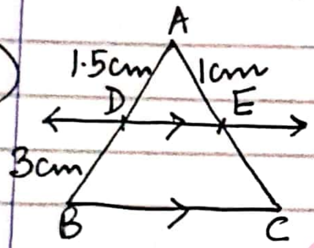
$\Delta ABC \sim \Delta PQR$

Given, $\dfrac{AB}{PQ} = \dfrac{2}{3}$

$\therefore \dfrac{\text{area}(\Delta ABC)}{\text{area}(\Delta PQR)} = \left(\dfrac{AB}{PQ}\right)^2 = \dfrac{4}{9}$

4:9 (a)

2)



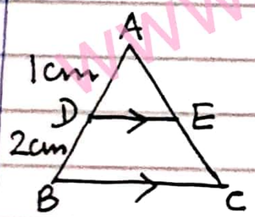
Since DE || BC, using Thales theorem

$\dfrac{AD}{DB} = \dfrac{AE}{EC} \Rightarrow \dfrac{1.5}{3} = \dfrac{1}{EC}$

$\therefore EC = \dfrac{3}{1.5} = \dfrac{30}{15}$

$= 2cm$ (d)

3)



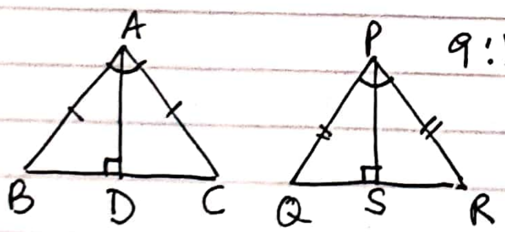
$\Delta ADE \sim \Delta ABC$ (AA Similarity)

$\therefore \dfrac{\text{area}(\Delta ABC)}{\text{area}(\Delta ADE)} = \left(\dfrac{AB}{AD}\right)^2 = \left(\dfrac{1+2}{1}\right)^2$

$= \left(\dfrac{3}{1}\right)^2 = \dfrac{9}{1}$

9:1 (a)

4)



Since ΔABC and ΔPQR are isosceles triangles,

$AB = AC \rightarrow (1)$

$PQ = PR \rightarrow (2)$

$\dfrac{(1)}{(2)}$, $\dfrac{AB}{PQ} = \dfrac{AC}{PR}$

Also, $\angle A = \angle P$

$\therefore \triangle ABC \sim \triangle PQR$

Then $\angle B = \angle Q$ (corresponding parts of congruent $\triangle$s)

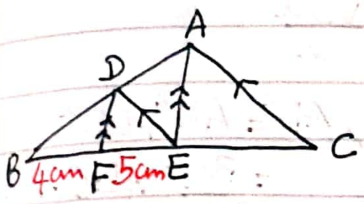
Then, $\triangle ABD \sim \triangle PQS$ (AA similarity)

$\therefore \frac{AB}{PQ} = \frac{AD}{PS}$

Thus, $\frac{\text{area}(\triangle ABC)}{\text{area}(\triangle PQR)} = \left(\frac{AB}{PQ}\right)^2 = \left(\frac{AD}{PS}\right)^2 = \frac{9}{16}$

$\Rightarrow \frac{AD}{PS} = \frac{3}{4}$ (b)

5)



Since $DF \parallel AE$ in $\triangle ABE$, using Thales theorem

$\frac{BD}{DA} = \frac{BF}{FE} = \frac{4}{5} \rightarrow (1)$

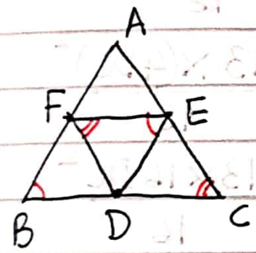
Similarly, since $DE \parallel AC$,

$\frac{BD}{DA} = \frac{BE}{EC} = \frac{9}{EC} \rightarrow (2)$

From (1) and (2), $\frac{4}{5} = \frac{9}{EC}$

$\therefore EC = \frac{9 \times 5}{4} = \frac{45}{4} = 11.25\text{cm}$ (a)

6)



Using mid-point theorem,

$FE \parallel BC \Rightarrow FE \parallel BD$

and $FE = \frac{1}{2}BC \Rightarrow FE = BD$

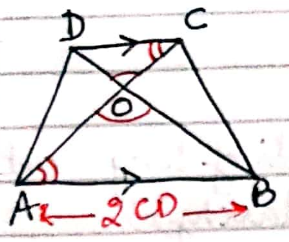
Thus BDEF is a ||gm with one pair of opposite sides equal and parallel.

$\therefore \angle B = \angle E$ (opposite angles of a parallelogram)

Similarly, we can prove that FECD is a ||gm and $\angle C = \angle F$.

Thus, $\triangle ABC \sim \triangle DEF$ (AA similarity).

$\therefore \frac{\text{area}(\triangle DEF)}{\text{area}(\triangle ABC)} = \left(\frac{EF}{BC}\right)^2 = \left(\frac{\frac{1}{2}BC}{BC}\right)^2 = \frac{1}{4} = 1:4$ (a)

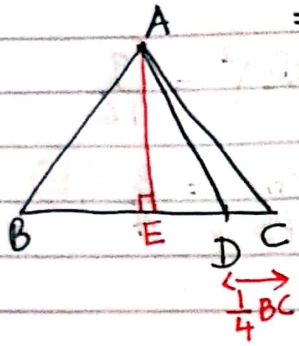
7) 

$\therefore \triangle AOB \sim \triangle COD$ (AA Similarity)

$$\frac{\text{area}(\triangle AOB)}{\text{area}(\triangle COD)} = \left(\frac{AB}{CD}\right)^2 = \left(\frac{2CD}{CD}\right)^2$$

$$\Rightarrow \frac{84}{\text{area}(\triangle COD)} = \frac{4}{1}$$

$$\Rightarrow \text{area}(\triangle COD) = \frac{84}{4} = 21\text{ cm}^2 \text{ (d)}$$

8) 

Let $AB = BC = AC = a$

Then, $AE = \frac{\sqrt{3}a}{2}$

In rt. $\triangle AED$, $AD^2 = AE^2 + ED^2$

$$= \frac{3a^2}{4} + (EC - DC)^2$$

$$= \frac{3a^2}{4} + \left(\frac{1}{2}BC - \frac{1}{4}BC\right)^2$$

$$= \frac{3a^2}{4} + \left(\frac{1}{4}BC\right)^2$$

$$= \frac{3a^{2\times 4}}{4\times 4} + \frac{a^2}{16}$$

$$= \frac{13a^2}{16}$$

$$= \frac{13 \times (4DC)^2}{16}$$

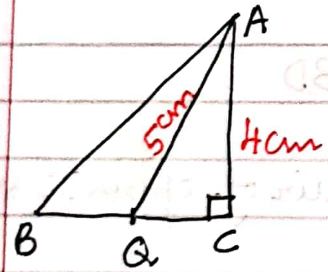
$$= \frac{13 \times 16DC^2}{16}$$

$$= 13DC^2 \text{ (c)}$$

$DC = \frac{1}{4}BC$

$= \frac{1}{4}a$

$\therefore a = 4DC$

9) 

Using Pythagoras Theorem in rt. $\triangle AQC$,

$QC^2 = AQ^2 - AC^2$

$= 5^2 - 4^2 = 25 - 16 = 9$

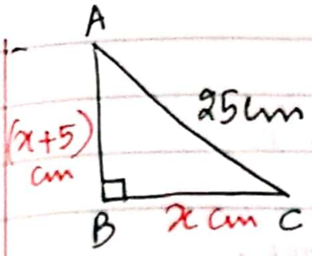
$QC = 3\text{ cm}$

$\therefore BC = 2QC = 6\text{ cm}$

Thus, in rt. $\triangle ACB$, $AB^2 = AC^2 + BC^2$

$= 4^2 + 6^2 = 16 + 36$

$= 52\text{ cm}^2$ (d)

10) 

Using Pythagoras Theorem in rt. $\triangle ABC$,

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

$25^2 = (x+5)^2 + x^2$

$625 = x^2 + 10x + 25 + x^2$

$2x^2 + 10x - 600 = 0$

$x^2 + 5x - 300 = 0$

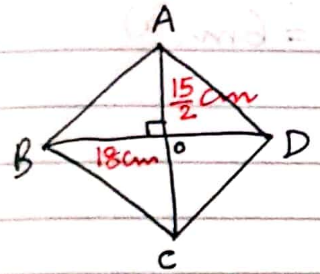
$(x-15)(x+20) = 0$

$x = 15, -20$

S P
5 −300
−15, 20

x cannot be −ve, ∴ required value of $x = 15$

∴ The other two sides are 15cm, 20cm (b)

11) 

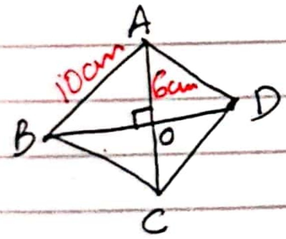
Since diagonals of a rhombus bisect each other at 90°, in rt. $\triangle AOB$

$AB^2 = OA^2 + OB^2 = \frac{225}{4} + 18^2$

$= \frac{225 + 1296}{4} = \frac{1521}{4}$

$AB = \frac{39}{2}$ cm

∴ Perimeter $= 4 \times AB = \cancel{4}^{2} \times \frac{39}{\cancel{2}_{1}} = 78$cm (c)

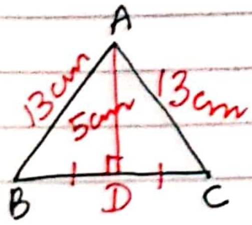
12) 

In rt. $\triangle AOB$, $OB^2 = AB^2 - OA^2$

$= 100 - 36 = 64$

$OB = 8$cm

∴ the length of second diagonal $= 2OB = 16$cm (b)

13) 

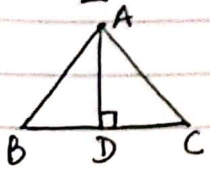
In rt. $\triangle ADB$, $BD^2 = AB^2 - AD^2$

$= 169 - 25 = 144$

$BD = 12$cm

∴ $BC = 2BD = 24$cm (c)

14) $\frac{a\sqrt{3}}{2}$ (c)

15) 

In rt. $\triangle ADB$, $AB^2 = AD^2 + BD^2 \Rightarrow AB^2 = AD^2 + \left(\frac{1}{2}BC\right)^2$

$\Rightarrow AB^2 = AD^2 + \frac{AB^2}{4} \Rightarrow 4AB^2 = 4AD^2 + AB^2$

$\Rightarrow 3AB^2 = 4AD^2$ (b)

16) $\angle A = 90^\circ$ (a)

17) All congruent figures are similar (b)

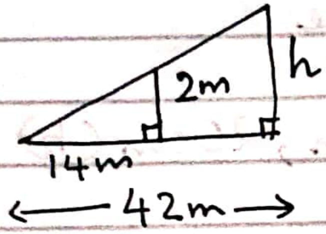
18) Converse of Thales theorem (c)

19) Let h ft be the ~~tree~~ height of the tree.

$$\frac{10}{h} = \frac{4}{12}$$

$$\Rightarrow h = \frac{10 \times \cancel{12}^{\,3}}{\cancel{4}_{\,1}} = 30 \text{ ft} \quad (c)$$

20)



$$\frac{14}{42} = \frac{2}{h} \Rightarrow h = \frac{2 \times \cancel{42}^{\,3}}{\cancel{14}_{\,1}}$$

$$= 6\text{m} \quad (a)$$