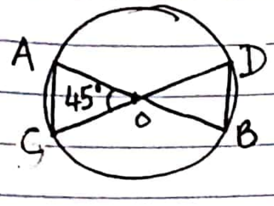
X

# Homework - 16 (TRIANGLES - MCQs)

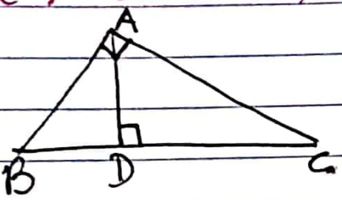
1) 


O is the point of intersection of two chords AB and CD such that OB = OD. Then $\Delta OAC$ and $\Delta ODB$ are

(a) equilateral but not similar
(b) isosceles but not similar
(c) equilateral and similar
(d) isosceles and similar

2) D and E are respectively the points on the sides AB and AC of a triangle ABC such that AD = 2cm, BD = 3cm, BC = 7.5cm and $DE \parallel BC$. Then, length of DE (in cm) is

(a) 2.5cm (b) 3cm (c) 5cm (d) 6cm

3) 


$\angle BAC = 90°$ and $AD \perp BC$, then

(a) $BD.CD = BC^2$ (b) $AB.AC = BC^2$
(c) $BD.CD = AD^2$ (d) $AB.AC = AD^2$

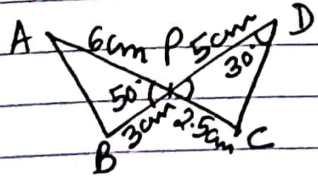
4) If the lengths of the diagonals of a rhombus are 16cm and 12cm, then, the length of the side of the rhombus is (a) 9cm (b) 10cm (c) 8cm (d) 20cm

5) If $\Delta ABC \sim \Delta EDF$ and $\Delta ABC$ is not similar to $\Delta DEF$, then which of the following is not true?

(a) $BC.EF = AC.FD$ (b) $AB.EF = AC.DE$ (c) $BC.DE = AB.EF$
(d) $BC.DE = AB.FD$

6) If in two triangles ABC and PQR, $\frac{AB}{QR} = \frac{BC}{PR} = \frac{CA}{PQ}$, then

(a) $\Delta PQR \sim \Delta CAB$ (b) $\Delta PQR \sim \Delta ABC$
(c) $\Delta CBA \sim \Delta PQR$ (d) $\Delta BCA \sim \Delta PQR$

7) 


Two line segments AC and BD intersect each other at P such that PA = 6cm, PB = 3cm, PC = 2.5cm, PD = 5cm, $\angle APB = 50°$ and $\angle CDP = 30°$. Then $\angle PBA =$

(a) 50° (b) 30° (c) 60° (d) 100°

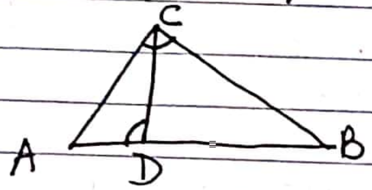
8) If in $\Delta DEF$ and $\Delta PQR$, $\angle D = \angle Q$ and $\angle R = \angle E$, then which of the following is not true?

(a) $\frac{EF}{PR} = \frac{DE}{QR}$ (b) $\frac{DE}{PQ} = \frac{EF}{RP}$ (c) $\frac{DE}{QR} = \frac{DF}{PQ}$ (d) $\frac{EF}{RP} = \frac{DE}{QR}$

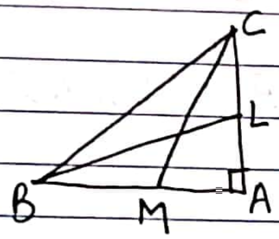
9) If in $\Delta ABC$ and $\Delta DEF$, $\angle B = \angle E$, $\angle F = \angle C$ and $AB = 3DE$,

then the two triangles are
(a) congruent but not similar (b) similar but not congruent
(c) neither congruent nor similar (d) congruent as well as similar

10) If it is given that $\Delta ABC \sim \Delta PQR$, with $\frac{BC}{QR} = \frac{1}{3}$, then
$\frac{\text{area}(\Delta PQR)}{\text{area}(\Delta BCA)} =$ (a) 9 (b) 3 (c) $\frac{1}{3}$ (d) $\frac{1}{9}$

11)



If $\angle ACB = \angle CDA$, $AC = 6cm$, $AD = 3cm$, then the length of $AB =$ ___
(a) 8cm (b) 10cm (c) 12cm (d) 14cm

12)


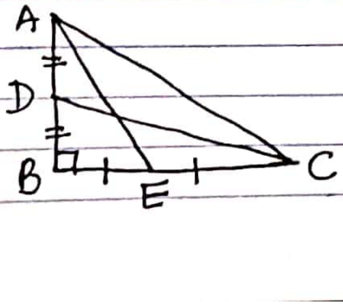

BL and CM are medians of $\Delta ABC$ right angled at A; $4(BL^2 + CM^2) =$
(a) $6BC^2$ (b) $5BC^2$ (c) $13BC^2$ (d) $11BC^2$

13) In an equilateral $\Delta ABC$, D is a point on side BC such that $BD = \frac{1}{3}BC$. Then
(a) $9AD^2 = 7AB^2$ (b) $7AD^2 = 9AB^2$ (c) $13AD^2 = 11AB^2$ (d) $17AB^2 = 13AD^2$

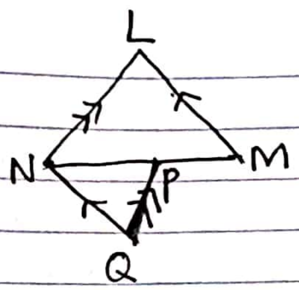
14) In $\Delta ABC$, D and E are points on the sides AB and AC respectively such that $DE \parallel BC$. If $AD = 4x-3$; $AE = 8x-7$; $BD = 3x-1$ and $CE = 5x-3$, then the value of $x$ is
(a) 3cm (b) 2cm (c) 1.5cm (d) 1cm

15) X and Y are points on the sides AB and BC respectively of $\Delta ABC$ such that $XY \parallel AC$ and XY divides $\Delta ABC$ into two parts equal in area. Then $\frac{AX}{AB}$ is
(a) $\frac{3-\sqrt{3}}{3}$ (b) $\frac{2-\sqrt{2}}{2}$ (c) $\frac{\sqrt{2}}{2}$ (d) $\frac{\sqrt{3}}{3}$

16) If the area of the equilateral $\Delta$ described on the side of a square is $48cm^2$, then the area of equilateral $\Delta$ described on its diagonal is
(a) $46cm^2$ (b) $68cm^2$ (c) $76cm^2$ (d) $96cm^2$

17)



ABC is a right $\Delta$ with $\angle B = 90°$. Median CD and AE are respectively of lengths $\sqrt{20}$ cm and 5cm. The length of hypotenuse $AC =$ (a) 11cm (b) 9cm (c) 6cm (d) 4cm

18) 


$LM \parallel NQ$ and $LN \parallel PQ$. If $MP = \frac{1}{3} MN$, then the ratio of areas of $\Delta LMN$ and $\Delta QNP$ is

(a) 9:4 (b) 16:4 (c) 25:16 (d) 64:9

19) The areas of two similar triangles are $121 cm^2$ and $64 cm^2$ respectively. If the medians of the first $\Delta$ is 12.1 cm, then the corresponding median of the other $\Delta$ is

(a) 6.8 cm (b) 0.8 cm (c) 11.2 cm (d) 12.6 cm

20) In an equilateral $\Delta ABC$, D is a point on the side BC such that $4BD = BC$. Then,

(a) $11AD^2 = 13BC^2$ (b) $16AD^2 = 13BC^2$ (c) $15AD^2 = 13BC^2$ (d) $16AD^2 = 11BC^2$

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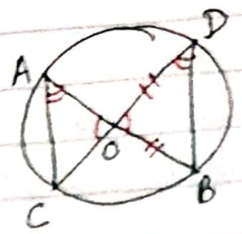
1) 


In $\triangle OAC$ and $\triangle ODB$,

$\angle OAC = \angle ODB$ (angles in the same segment)

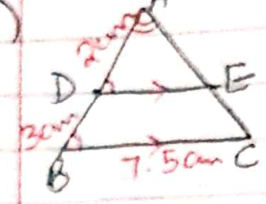
$\angle AOC = \angle DOB$ (V.O.A)

$\therefore \triangle OAC \sim \triangle ODB$ (AA Similarity)

Thus $\frac{OA}{OD} = \frac{OC}{OB}$

Since $OB = OD$, $OA = OC$

Hence $\triangle OAC$ and $\triangle ODB$ are isosceles and similar (d)

2) 

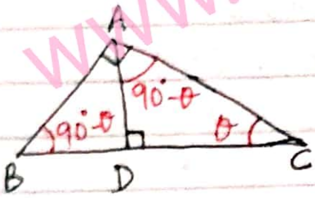

Since $DE \parallel BC$, $\angle ADE = \angle ABC$ (corresponding angles)

$\angle DAE = \angle BAC$ (common angle)

$\therefore \triangle ADE \sim \triangle ABC$ (AA Similarity)

Thus, $\frac{AD}{AB} = \frac{DE}{BC} \Rightarrow \frac{2}{5} = \frac{DE}{7.5}$

$\therefore DE = \frac{2}{\cancel{5}_1} \times \cancel{7.5}^{1.5} = 3cm$ (b)

3) 


Let $\angle ACB = \theta$

Then in rt. $\triangle ADC$, $\angle DAC = 90° - \theta$

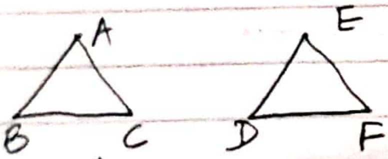
and also in rt. $\triangle ABC$, $\angle ABC = 90° - \theta$

In $\triangle BDA$ and $\triangle ADC$, $\angle BDA = \angle ADC$ (each 90°)

$\angle ABD = \angle DAC$ (each $90° - \theta$)

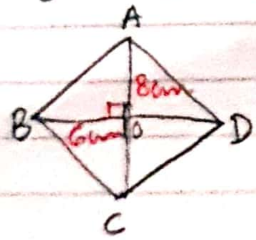
$\therefore \triangle BDA \sim \triangle ADC$ (AA Similarity)

Thus, $\frac{AD}{DC} = \frac{BD}{AD} \Rightarrow AD^2 = BD.CD$ (c)

5) 


Thus $\frac{AB}{DE} = \frac{BC}{DF} = \frac{AC}{EF}$

$BC.DE \neq AB.EF$ (c)

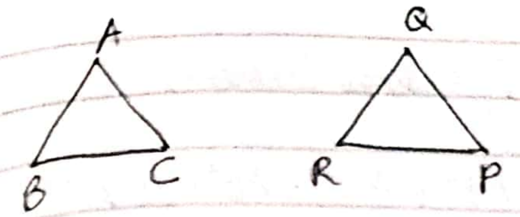
4) 


Using Pythagoras Theorem in rt. $\triangle AOB$

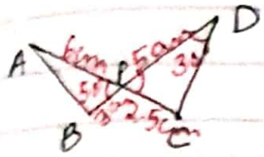
$AB^2 = OA^2 + OB^2 = 8^2 + 6^2 = 64 + 36$

$= 100$

$\therefore AB = 10cm$ (b)

6) 


$\Delta PQR \sim \Delta CAB$ (a)

7) 


$\frac{AP}{PD} = \frac{6}{5}$

$\frac{BP}{PC} = \frac{3}{2.5} = \frac{\cancel{30}\,6}{\cancel{25}\,5} = \frac{6}{5}$

$\angle APB = \angle DPC$ (V.O.A)

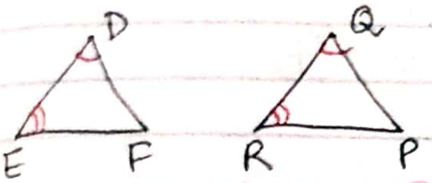
$\therefore \Delta APB \sim \Delta DPC$ (SAS congruency)

$\therefore \angle BAP = \angle CDP = 30°$

using angle sum property in $\Delta ABP$, $\angle PBA = 180° - (50° + 30°)$

$= 180° - 80°$

$= \underline{100°}$ (d)

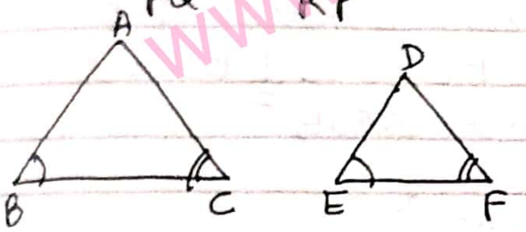
8) 


$\Delta DEF \sim \Delta QRP$ (AA Similarity)

$\frac{DE}{QR} = \frac{EF}{RP} = \frac{DF}{PQ}$

Thus, $\frac{DE}{PQ} \neq \frac{EF}{RP}$ (b)

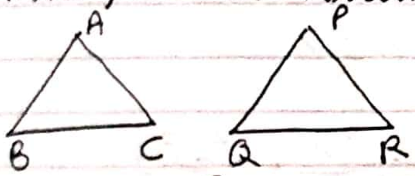


9) 


$\therefore \Delta ABC \sim \Delta DEF$ (AA Similarity)

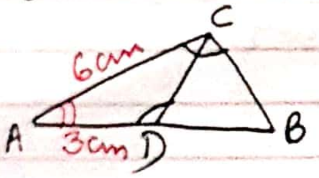
But $AB = 3DE$

Thus, the two triangles are similar but not congruent (b)

10) 


Since $\Delta ABC \sim \Delta PQR$,

$\frac{\text{area}(\Delta PQR)}{\text{area}(\Delta BCA)} = \left(\frac{QR}{BC}\right)^2 = \left(\frac{3}{1}\right)^2 = 9$ (a)

11) 


In $\Delta ACB$ and $\Delta ADC$,

$\angle ACB = \angle ADC$ (given)

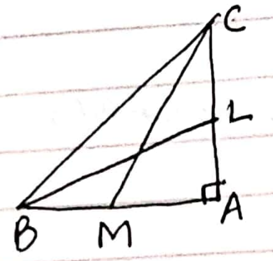
$\angle CAB = \angle CAD$ (common angle)

$\therefore \Delta ACB \sim \Delta ADC$ (AA Similarity)

Thus, $\frac{AC}{AD} = \frac{AB}{AC} \Rightarrow \frac{6}{3} = \frac{AB}{6}$

$\Rightarrow AB = \frac{36}{3} = 12\text{cm}$ (c)

12)




Using Pythagoras Theorem,

$$BL^2 = AB^2 + AL^2 = AB^2 + \left(\frac{1}{2}AC\right)^2$$

$$= AB^2 + \frac{AC^2}{4}$$

$$= \frac{4AB^2 + AC^2}{4}$$

$$\therefore 4BL^2 = 4AB^2 + AC^2 \longrightarrow (1)$$

$$CM^2 = AC^2 + AM^2 = AC^2 + \left(\frac{1}{2}AB\right)^2 = AC^2 + \frac{AB^2}{4} = \frac{4AC^2 + AB^2}{4}$$

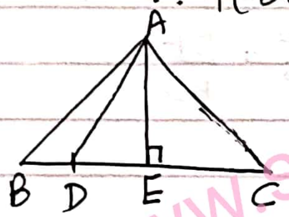
$$\therefore 4CM^2 = 4AC^2 + AB^2 \longrightarrow (2)$$

$(1)+(2)$, $4(BL^2 + CM^2) = 5AC^2 + 5AB^2$

$$= 5(AB^2 + AC^2)$$

$$\therefore 4(BL^2 + CM^2) = 5BC^2 \text{ (b)}$$

13)




Let $AB = BC = AC = x$ units

Draw $AE \perp BC$.

Then, $AE$ is $\perp$ bisector of $BC$.

Thus, $BE = EC = \frac{1}{2}BC = \frac{x}{2}$

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

$$AD^2 = AE^2 + DE^2$$

$$= AB^2 - BE^2 + (BE - BD)^2$$

$$= AB^2 - \cancel{BE^2} + \cancel{BE^2} + BD^2 - 2BE \cdot BD$$

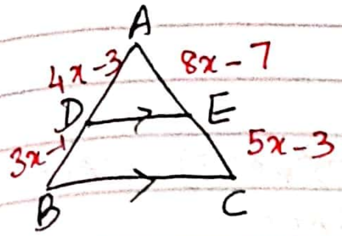
$$= x^2 + \left(\frac{1}{3}x\right)^2 - \cancel{2} \times \frac{1}{\cancel{2}}x \times \frac{1}{3}x$$

$$= x^2 + \frac{x^2}{9} - \frac{x^2}{3} = \frac{9x^2 + x^2 - 3x^2}{9}$$

$$= \frac{7x^2}{9}$$

$$= \frac{7AB^2}{9}$$

$$\therefore 9AD^2 = 7AB^2 \text{ (a)}$$

14) 


Since DE ∥ BC, using Thales theorem:

$$\frac{AD}{DB} = \frac{AE}{EC} \Rightarrow \frac{4x-3}{3x-1} = \frac{8x-7}{5x-3}$$

$$\Rightarrow (4x-3)(5x-3) = (8x-7)(3x-1)$$

$$\Rightarrow 20x^2 - 12x - 15x + 9 = 24x^2 - 8x - 21x + 7$$

$$\Rightarrow -4x^2 - 27x + 9 = -29x + 7$$

$$\Rightarrow -4x^2 + 2x + 2 = 0$$

$\div(-2)$ $$\Rightarrow 2x^2 - x \quad 1 = 0$$

$$\Rightarrow 2x^2 + x - 2x - 1 = 0$$

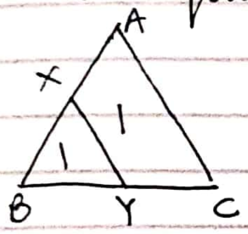
$$\Rightarrow x(2x+1) - (2x+1) = 0$$

$$\Rightarrow (x-1)(2x+1) = 0$$

S P
-1 -2
1, -2

$$\therefore x = 1 \text{ or } -\frac{1}{2}$$

∴ The required value of $x$ = 1 cm (d)

15) 


$\triangle XBY \sim \triangle ABC$ (AA similarity)

$$\frac{\text{Area}(\triangle XBY)}{\text{area}(\triangle ABC)} = \frac{1}{2}$$

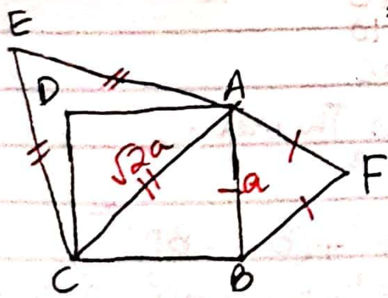
$$\Rightarrow \left(\frac{XB}{AB}\right)^2 = \frac{1}{2}$$

$$\Rightarrow \frac{XB}{AB} = \frac{1}{\sqrt{2}}$$

$$\Rightarrow 1 - \frac{XB}{AB} = 1 - \frac{1}{\sqrt{2}}$$

$$\Rightarrow \frac{XA}{AB} = \frac{\sqrt{2}-1}{\sqrt{2}} = \frac{(\sqrt{2}-1)\sqrt{2}}{2}$$

$$\Rightarrow \frac{XA}{AB} = \frac{2-\sqrt{2}}{2} \quad \text{(b)}$$

16) 


area($\triangle ABF$) = $48 cm^2$

$$\frac{\sqrt{3}a^2}{4} = 48$$

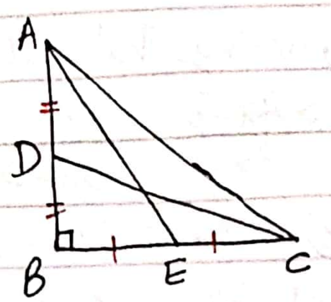
$$a^2 = \frac{48 \times 4}{\sqrt{3}} = \frac{\overset{16}{\cancel{48}} \times 4\sqrt{3}}{\cancel{3}\,1}$$

$$= 64\sqrt{3}$$

AC = $\sqrt{2}a$ units

$$\text{area}(\triangle AEC) = \frac{\sqrt{3}(\sqrt{2}a)^2}{4} = \frac{2\sqrt{3}a^2}{4}$$

$$= \frac{\sqrt{3} \times 2 \times \overset{16}{\cancel{64}}\sqrt{3}}{\cancel{4}\,1} = 96 cm^2 \text{ (d)}$$

17) 

$CD = \sqrt{20}$ cm

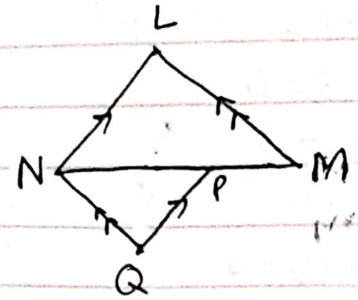
$AE = 5$ cm

we know that $4(CD^2 + AE^2) = 5AC^2$

$\Rightarrow 4(20+25) = 5AC^2$

$= AC^2 = \frac{4 \times \cancel{45}^{9}}{\cancel{5}_{1}} = 36$

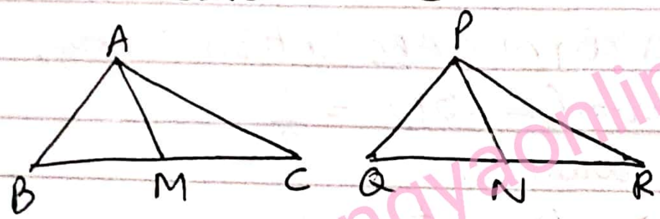
$\therefore AC = 6$ cm (c)

18) 

$MP = \frac{1}{3} MN$

$\Rightarrow \frac{MP}{MN} = \frac{1}{3} \Rightarrow \frac{NP}{MN} = \frac{2}{3}$

$\therefore \frac{\text{area}(\triangle LMN)}{\text{area}(\triangle QNP)} = \left(\frac{MN}{NP}\right)^2 = \left(\frac{3}{2}\right)^2 = \frac{9}{4}$ (a)

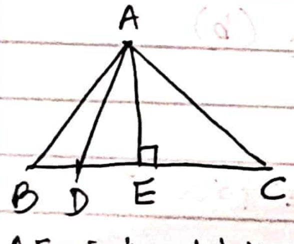
19) 

$\frac{\text{area}(\triangle ABC)}{\text{area}(\triangle PQR)} = \left(\frac{AM}{PN}\right)^2$

$\Rightarrow \frac{121}{64} = \left(\frac{12.1}{PN}\right)^2$

$\Rightarrow \frac{11}{8} = \frac{12.1}{PN}$

$\Rightarrow PN = \frac{12.1 \times 8}{11} = \frac{\cancel{121}^{11} \times 8}{\cancel{110}_{10}} = \frac{88}{10} = 8.8$ cm (b)

20) 

AE is the ⊥ bisector of BC.

ie, $BE = EC = \frac{1}{2} BC$

Given : $4BD = BC$

Using Pythagoras Theorem,

$AD^2 = AE^2 + DE^2$

$= AB^2 - BE^2 + (BE - BD)^2$

$= AB^2 - BE^2 + BE^2 + BD^2 - 2BE \cdot BD$

$= AB^2 + \left(\frac{BC}{4}\right)^2 - 2 \times \frac{1}{2} BC \times \frac{BC}{4}$ $\left[\because BD = \frac{BC}{4}\right]$

$= AB^{2 \times 16} + \frac{BC^2}{16} - \frac{BC^{2 \times 4}}{4} = \frac{13BC^2}{16}$ $[\because AB = BC]$

$\therefore 16AD^2 = 13BC^2$ (b)