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Class: EM - CLASS 10 **Subject:** Mathematics - Part 2 (Geometry)
Date: 25-02-2025 **Paper:** CH 1

1) Choose the correct alternative and write its alphabet with subquestion number **(3)**

(1) In △ PQR, seg ST || seg QR. Which of the following is true?

a) $\frac{PQ}{RS} = \frac{PR}{RT}$

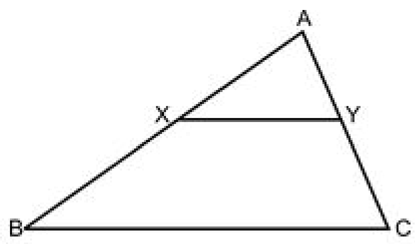
b) $\frac{A(\Delta PQR)}{A(\Delta PST)} = \frac{PQ}{PS}$

c) $\frac{A(\Delta PQR)}{A(\Delta PST)} = \frac{(PQ)^2}{(PS)^2}$

d) None of above

Answer: $\frac{A(\Delta PQR)}{A(\Delta PST)} = \frac{(PQ)^2}{(PS)^2}$

(2) In figure, seg XY || seg BC, then which of the following statements is true?



a) $\frac{AB}{AC} = \frac{AX}{AY}$

b) $\frac{AX}{YC} = \frac{AY}{XB}$

c) $\frac{AX}{XB} = \frac{AY}{AC}$

d) $\frac{AB}{YC} = \frac{AC}{XB}$

Answer: $\frac{AB}{AC} = \frac{AX}{AY}$

(3) △ ABC ~ △ PQR, length of median drawn from point B is 4 and length of median drawn from point Q is 16.

Find $\frac{A(\Delta PQR)}{A(\Delta ABC)}$ = ?

a) $\frac{8}{1}$

b) $\frac{64}{1}$

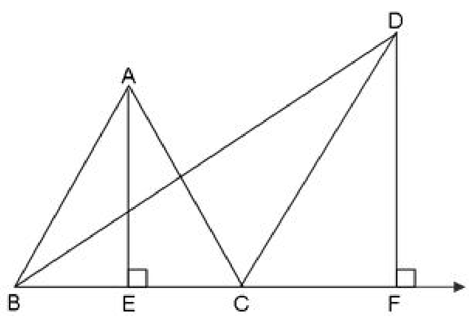
c) $\frac{1}{16}$

d) $\frac{16}{1}$

Answer: $\frac{16}{1}$

2) Solve the following subquestions **(3)**

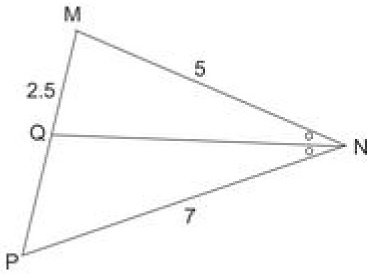
(1) In adjoining figure AE ⊥ seg BC, seg DF ⊥ line BC, AE = 4, DF = 6, than find $\frac{A(\Delta ABC)}{A(\Delta DBC)}$.



Answer: $\frac{A(\Delta ABC)}{A(\Delta DBC)} = \frac{AE}{DF}$ ... bases are equal, hence areas proportional to heights.

$\frac{AE}{DF} = \frac{4}{6} = \frac{2}{3}$

(2) In △MNP, NQ is a bisector of ∠N. If MN = 5, PN = 7 MQ = 2.5 then find QP.



Answer: In △ MNP, ray NQ bisects ∠MNP

∴ by property of angle bisector of triangle

$\frac{MN}{NP} = \frac{MQ}{QP}$ ∴ $\frac{5}{7} = \frac{2.5}{QP}$ ∴ QP = $\frac{7 \times 2.5}{5}$

∴ QP = 3.5

(3) △ ABC ~ △ PQR , A (△ ABC) = 16 , A (△ PQR) = 25, then find the value of ratio $\frac{AB}{PQ}$.

Answer: △ ABC ~ △ PQR

∴ $\frac{A(\Delta ABC)}{A(\Delta PQR)} = \frac{(AB)^2}{(PQ)^2}$ ... theorem of areas similar triangles

∴ $\frac{16}{25} = \frac{(AB)^2}{(PQ)^2}$

∴ $\frac{AB}{PQ} = \frac{4}{5}$ ... taking square roots

3) Solve the following **(4)**

(1) If △ ABC ~ △ PQR, A (△ ABC) = 80, A (△ PQR) = 125, then find $\frac{AB}{PQ}$.

Answer: $\frac{A(\Delta ABC)}{A(\Delta PQR)} = \frac{80}{125}$

△ ABC ~ △ PQR ... (given

$\frac{A(\Delta ABC)}{A(\Delta PQR)} = \frac{(AB)^2}{(PQ)^2}$ ... (given)

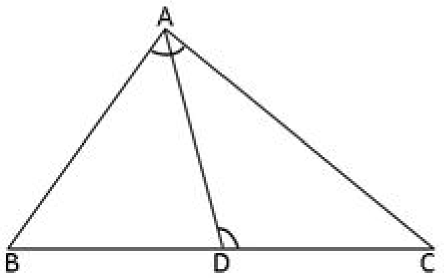
$\frac{80}{125} = \frac{(AB)^2}{(PQ)^2}$

$\frac{16}{25} = \frac{(AB)^2}{(PQ)^2}$ Taking square root on Both the sides.

∴ $\frac{4}{5} = \frac{AB}{PQ}$

∴ $\frac{AB}{PQ} = \frac{4}{5}$

(2) In the figure, in △ ABC, point D on side BC is such that, ∠BAC = ∠ADC. Prove that, $CA^2 = CB \times CD$.



Answer: In △ ABC and △ DAC

∠BAC ≅ ∠ADC ... (given)

∠C ≅ ∠C ... (common angle)

△ ABC ~ △ DAC ... (AA test of similarity)

$\frac{AB}{DA} = \frac{BC}{AC} = \frac{AC}{DC}$ ... (C.S.S.T) ∴ $\frac{BC}{AC} = \frac{AC}{DC}$

∴ $AC^2 = BC \times DC$

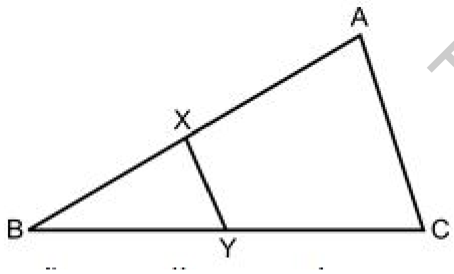
4) Complete the following activities **(4)**

(1) If Δ ABC ~ Δ PQR and AB : PQ = 2 : 3, then fill in the blanks.

$\frac{A(\Delta ABC)}{A(\Delta PQR)}$ = ... = $\frac{(2)^2}{(3)^2}$ = ...

Answer: 1) $\frac{(AB)^2}{(PQ)^2}$ 2) $\frac{4}{9}$

(2)



In figure XY || seg AC. If 2AX = 3BX and XY = 9. Complete the activity to find the value of AC.

2 AX = 3 BX

∴ $\frac{AX}{BX}$ = ... = $\frac{AX + BX}{BX}$ = ... by componendo

$\frac{AB}{BX}$ = ... (I)

△ BCA ~ △ BYX ... . test of similarity.

∴ $\frac{BA}{BX} = \frac{AC}{XY}$ ... corresponding sides of similar triangles.

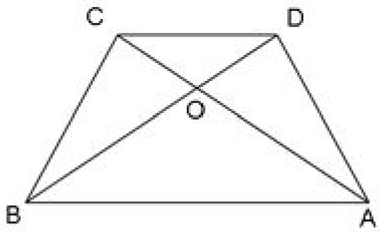
∴ $\frac{5}{2} = \frac{AC}{9}$

∴ AC = ... from (I)

Answer: 1) $\frac{3}{2}$ 2) $\frac{3 + 2}{2}$ 3) $\frac{5}{2}$ 4) AA 5) 22.5

5) Solve the following questions **(6)**

(1) In trapezium ABCD, side AB || side DC, diagonals AC and BD intersect in point O. If AB = 20, DC = 6, OB = 15 then find OD.



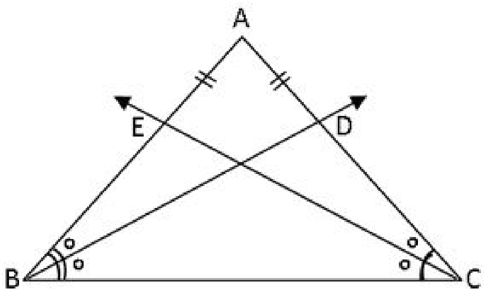
Answer: In △ AOB and △ COD

∠AOB ≅ ∠COD ... (Vertically opposite)

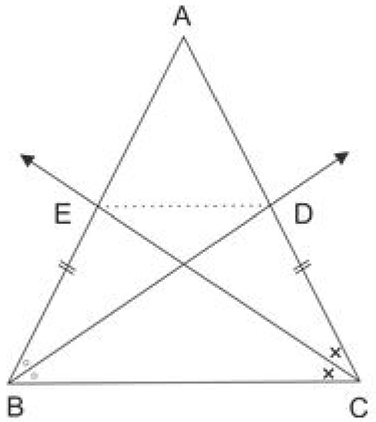
∠ABO ≅ ∠CDO ... (Alternate angles)

∴ △ AOB ~ △ COD ... (AA) $\frac{AO}{CO} = \frac{OB}{OD} = \frac{AB}{CD}$ ... (C.S.S.T.) $\frac{15}{OD} = \frac{20}{6}$ ∴ 15 × 6 = 20 × OD ∴ $\frac{15 \times 6}{20}$ = OD ∴ OD = $\frac{45}{10}$ ∴ OD = 4.5

(2) In Δ ABC, ray BD bisects ∠ABC and ray CE bisects ∠ACB. If seg AB ≅ seg AC then prove that ED || BC.



Answer:



Construction : Draw seg ED.

In Δ ABC, ray BD bisects ∠ABC .... [Given] .... (1)

∴ $\frac{AB}{BC} = \frac{AD}{DC}$ ... [Angle bisector theorem of a triangle] In Δ ABC, ray CE bisects ∠ACB ... [Given] .... (2)

∴ $\frac{AE}{EB} = \frac{AB}{BC}$ ... [Angle bisector theorem of a triangle] $\frac{AE}{EB} = \frac{AC}{BC}$ ... [from (2) seg AB ≅ seg AC, given] .... (3)

$\frac{AD}{DC} = \frac{AE}{EB}$ ... [from (1), (3)] In Δ ABC

$\frac{AE}{EB} = \frac{AD}{DC}$ ... [from (4)]

∴ seg ED ∥ BC ... [Converse of Basic proportionality theorem]

i.e. ED ∥ BC.