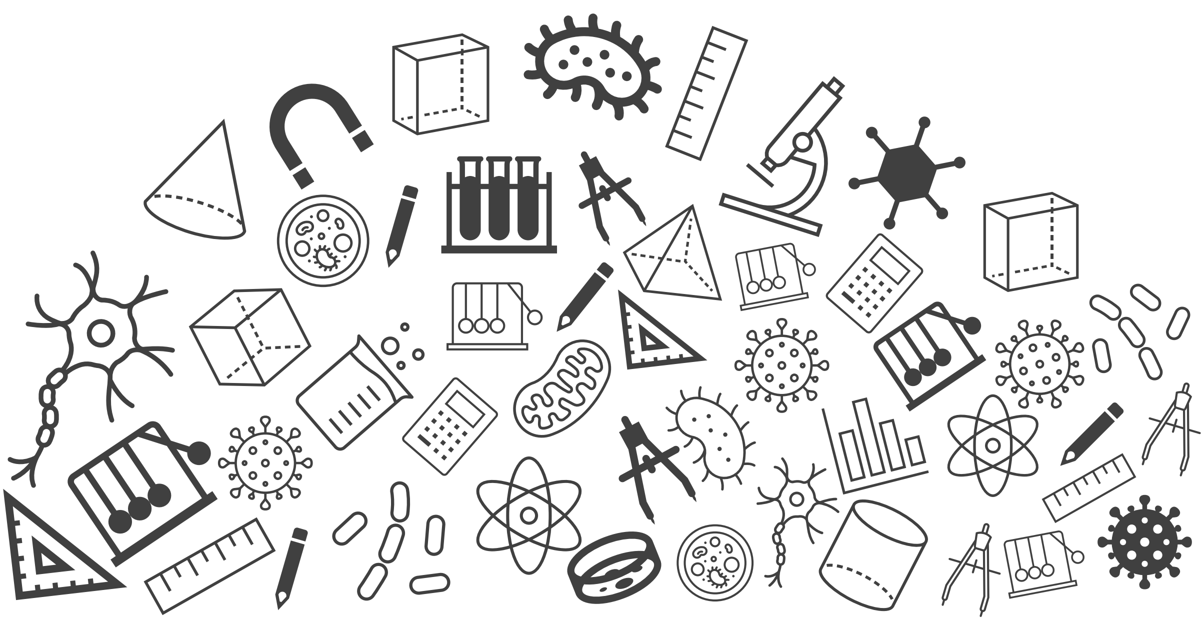
Grade 10
Mathematics
Exam Important Questions



Triangles

Topic : Exam Important Questions

1. The perimeters of two similar triangles ABC and PQR are 32 cm and 24 cm respectively. If PQ = 12 cm, find AB.
(2 marks)

Solution:
Given,
$\Delta ABC \sim \Delta PQR$

$\frac{AB}{PQ} = \frac{BC}{QR} = \frac{AC}{PR} = \frac{AB+BC+AC}{PQ+QR+PR}$
(Corresponding sides are proportional)

$\Rightarrow \frac{AB+BC+AC}{PQ+QR+PR} = \frac{AB}{PQ}$ (1 mark)

$\Rightarrow \frac{\text{Perimeter of ABC}}{\text{Perimeter of PQR}} = \frac{AB}{PQ}$

$\Rightarrow \frac{32}{24} = \frac{AB}{12}$

$\Rightarrow AB = \frac{32}{24} \times 12 = 16\ cm$ (1 mark)

2. One triangle has side measures 4, 5, and 8. Another has side lengths 8, 10, and 14. Are these triangles similar? Justify your answer. [2 Marks]

Two triangles are similar if and only if their side lengths are proportional.

In this case, two of the sides are proportional, leading us to a scale factor of 2. (1 Mark)

However, with the last side, 8 x 2 = 16 which is not our side length.

Thus, these pair of sides are not proportional and therefore our triangles cannot be similar. (1 Mark)

3. The sides of $\Delta \mathrm{ABC}$ are 6 cm, 8 cm and 10 cm. Find the perimeter of the larger triangle which is similar to $\Delta \mathrm{ABC}$ if the ratio of corresponding sides is 2. [2 Marks]

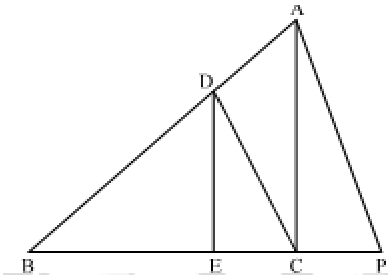
Solution:
Let's assume the triangle similar to $\Delta \mathrm{ABC}$ to be $\Delta \mathrm{XYZ}$.
Given that the ratio of corresponding sides is 2.

So, $\frac{XY}{AB} = \frac{YZ}{BC} = \frac{XZ}{AC} = 2$

The sides of $\Delta \mathrm{ABC}$ are 6 cm, 8 cm and 10 cm.
Hence,
$\Rightarrow \frac{XY}{6} = \frac{YZ}{8} = \frac{XZ}{10} = 2$ $\quad [1\ Mark]$
$\Rightarrow XY = 12\ cm, YZ = 16\ cm$ and $XZ = 20\ cm.$

The perimeter of $\Delta \mathrm{XYZ}$ is
$XY + YZ + XZ = 12 + 16 + 20 = 48\ cm$ $\quad [1\ Mark]$

4. In figure, $DE \parallel AC$ and $DC \parallel AP$. Prove that $\frac{BE}{BC} = \frac{BC}{CP}$.



(3 Marks)

In △BPA, we have

DC ∥ AP [Given]

∴ By basic prportionality theorem, we have

$\frac{BC}{CP} = \frac{BD}{DA}$ $(1 Mark)$

In △BCA, we have

DE ∥AC [Given]

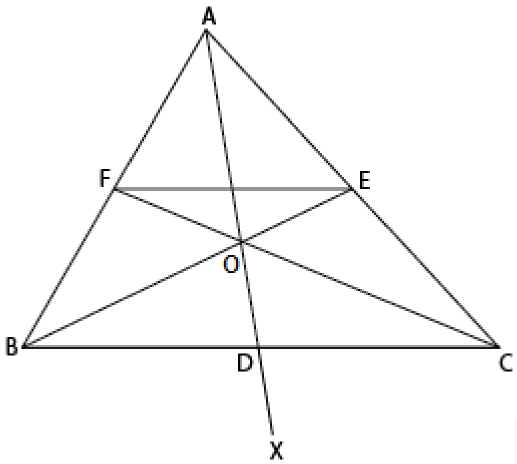
∴ By basic proportionality theorem, we have

$\frac{BE}{BC} = \frac{BD}{DA}$ $(1 Mark)$

From (i) and (ii), we get

$\frac{BC}{CP} = \frac{BE}{BC} or \frac{BE}{BC} = \frac{BC}{CP}$ $(1 Mark)$

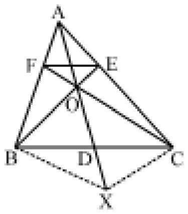
5. The side BC of a Δ ABC is bisected at D; O is any point in AD. BO and CO produced meet AC and AB in E and F respectively and AD is produced to X so that O is the mid-point of OX. Prove that AO : AX = AF : AB and show that FE $\parallel$ BC.



[3 Marks]

Solution:
In order to solve this question, we will do a construction.
We join BX and CX.

It is given that, BD = CD and OD = DX



Thus, BC and OX bisect each other.
⇒ OBXC is a parallelogram.
$\Rightarrow BX \parallel CO$ and $CX \parallel BO$
$\Rightarrow BX \parallel CF$ and $CX \parallel BE$
Then, $BX \parallel OF$ and $CX \parallel OE$

In △ABX, we have
$BX \parallel OF$
$\Rightarrow \frac{AO}{AX} = \frac{AF}{AB} \ldots . (i)$ $(1 Mark)$

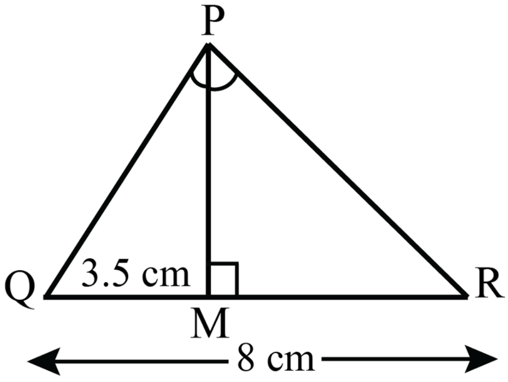
In △ACX, we have
$CX \parallel OE$
$\Rightarrow \frac{AO}{AX} = \frac{AE}{AC} \ldots (ii)$ $(1 Mark)$

From equations (i), (ii), we get
$\frac{AF}{AB} = \frac{AE}{AC}$
Thus, E and F are points on AB and AC such that they divide AB and AC respectively in the same ratio.

Therefore, by the converse of Thale's Theorem or Basic Proportionality Theorem, FE || BC.
(1 Mark)

Triangles: Criteria for Similarity -3

6. In the right -angles triangle QPR, PM is an altitude. Given that QR=8cm and MQ =3.5 cm, calculate the value of PR.



(2 Marks)

We have

∠QPR = ∠PMR = 90°

∠PRQ = ∠PRM (common)

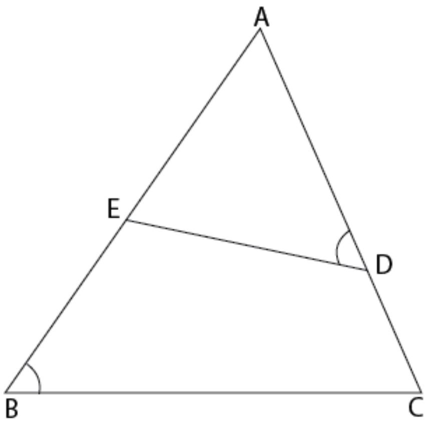
ΔPQR ~ ΔMPR (AA similarity) (1 mark)

$$\therefore \frac{QR}{PR} = \frac{PR}{MR}$$

$$PR^2 = 8 \times 4.5 = 36$$ (1 mark)

$$PR = 6\ cm$$

7. In the given figure, if $\angle ADE = \angle B$, show that $\Delta ADE \sim \Delta ABC$. If AD = 3.8 cm, AE = 3.6 cm, BE = 2.1 cm and BC = 4.2 cm, find DE.



(2 Marks)

Solution:

In $\Delta ADE \; and \; \Delta ABC$,

$\angle A = \angle A$ (Common angle)

$\angle ADE = \angle B$ (Given)

So by AA similarity, triangles are similar. (1 mark)

By CPCT,

$\frac{AD}{AB} = \frac{DE}{BC}$

$\frac{3.8}{3.6+2.1} = \frac{DE}{4.2}$

$DE = \frac{3.8 \times 4.2}{5.7} = 2.8 \; cm$

(1 mark)

8. Two triangles ABC and PQR are such that AB=3 cm,AC=6 cm, ∠A=70°,PR=9 cm,∠P=70°, and PQ=4.5 cm. Show that ΔABC ~ ΔPQR and state the similarity criterion.
[2 Marks]

Given: AB = 3 cm, AC = 6 cm, ∠A = 70°, PR = 9 cm , ∠P = 70°, PQ = 4.5 cm.

$\frac{AB}{PQ} = \frac{AC}{PR}$

$\frac{3}{4.5} = \frac{6}{9}$

Therefore, $\frac{1}{1.5} = \frac{1}{1.5}$ **(1 mark)**

∠A =∠P=70°

∴ΔABC ~ ΔPQR (By SAS similarity) (1 mark)

