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## PRACTICE PAPER 06 (2023-24)

## CHAPTER 06 TRIANGLES (ANSWERS)

**SUBJECT: MATHEMATICS** **MAX. MARKS : 40**
**CLASS : X** **DURATION : 1½ hrs**

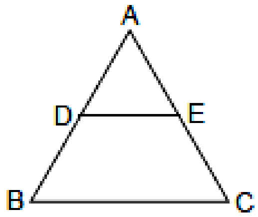
**General Instructions:**

(i). **All** questions are compulsory.
(ii). This question paper contains 2**0** questions divided into five Sections A, B, C, D and E.
(iii). **Section A** comprises of **10 MCQs** of **1 mark** each. **Section B** comprises of 4 questions of **2 marks** each. **Section C** comprises of 3 questions of **3 marks** each. **Section D** comprises of 1 question of **5 marks** each and **Section E** comprises of 2 Case Study Based Questions of **4 marks** each.
(iv). There is no overall choice.
(v). Use of Calculators is not permitted

## SECTION – A

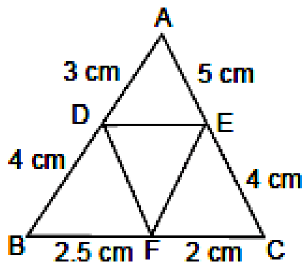
**Questions 1 to 10 carry 1 mark each.**

**1.** In the given figure, $\frac{AD}{BD} = \frac{AE}{EC}$ and ∠ADE = 70°, ∠BAC = 50°, then angle ∠BCA =




(a) 70° (b) 50° (c) 80° (d) 60°
Ans: (d) ∵ DE || BC
∴ ∠ABC = 70º. (Corresponding angles)
Using angle sum property of triangle ∠ABC + ∠BCA + ∠BAC = 180°
∠BCA = 60º.

**2.** In given figure, AD = 3 cm, AE = 5 cm, BD = 4 cm, CE = 4 cm, CF = 2 cm, BF = 2.5 cm, then




(a) DE || BC (b) DF || AC (c) EF || AB (d) none of these
Ans: (c) $\frac{CF}{FB} = \frac{CE}{AE} \Rightarrow EF \parallel AB$

**3.** If ΔABC ~ ΔEDF and ΔABC is not similar to ΔDEF, 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
Ans: (c) ∵ ΔABC ~ ΔEDF
Then, $\frac{AB}{ED} = \frac{BC}{DF} = \frac{AC}{EF}$

$\Rightarrow$ AB.DF = ED.BC
or AB.EF = AC.ED
or BC.EF = DF.AC
$\therefore$ BC.DE $\neq$ AB.EF

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

(a) ΔPQR ~ ΔCAB (b) ΔPQR ~ ΔABC (c) ΔCBA ~ ΔPQR (d) ΔBCA ~ ΔPQR
Ans: (a) ΔPQR ~ ΔCAB

**5.** If in triangles ABC and DEF, $\frac{AB}{DE} = \frac{BC}{FD}$, then they will be similar, when

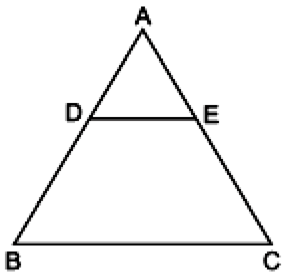
(a) ∠B = ∠E (b) ∠A = ∠D (c) ∠B = ∠D (d) ∠A = ∠F
Ans: (c) ∠B = ∠D

**6.** The perimeters of two similar triangles are 25 cm and 15 cm respectively. If one side of first triangle is 9 cm., what is the corresponding side of the other triangle?
(a) 5.4 (b) 3.5 (c) 5.5 (d) 4.5
Ans: (a) 5.4
Let corresponding sides of two similar Δ's are *a*, *b*, *c* and *d*, *e*, *f* respectively, let a = 9 cm.
$\therefore$ Δ's are similar

$$\frac{a}{d} = \frac{b}{e} = \frac{c}{f} \Rightarrow \frac{a+b+c}{d+e+f} = \frac{a}{d}$$ (Using property of proportion)

$$\Rightarrow \frac{25}{15} = \frac{9}{d} \Rightarrow d = \frac{9 \times 15}{25} = 5.4cm$$

**7.** In figure DE || BC. If BD = $x - 3$, AB = $2x$. CE = $x - 2$ and AC = $2x + 3$. Find $x$.



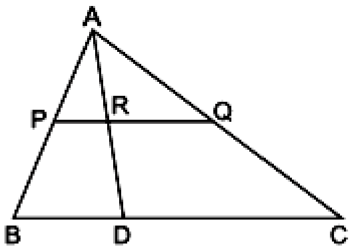

(a) 3 (b) 4 (c) 9 (d) none of these
Ans: (c) 9
In ΔABC, DE || BC

$$\therefore \frac{AD}{BD} = \frac{AE}{CE} \Rightarrow \frac{AB - BD}{BD} = \frac{AC - CE}{CE}$$

$$\Rightarrow \frac{2x-(x-3)}{x-3} = \frac{2x+3-(x-2)}{x-2} \Rightarrow \frac{x+3}{x-3} = \frac{x+5}{x-2}$$

$\Rightarrow (x-2)(x+3) = (x+5)(x-3) \Rightarrow x^2 + x - 6 = x^2 + 2x - 15$
$\Rightarrow x = 9 \quad \therefore x = 9$ cm

**8.** In the figure, AP = 3 cm, AR = 4.5 cm, AQ = 6 cm, AB = 5 cm and AC = 10 cm. Find the length of AD.




(a) 6.5 (b) 7.5 (c) 5.5 (d) 4.5

Ans: (b) 7.5

In ΔABC, $\frac{AP}{AB}=\frac{3}{5}$ ...(i)

$\frac{AQ}{AC}=\frac{6}{10}=\frac{3}{5}$ ...(ii)

From (i) and (ii),

$\frac{AP}{AB}=\frac{AQ}{AC}$ ⇒ PQ || BC

(By converse of BPT)

In ΔABD, PR || BD

$\Rightarrow \frac{AP}{AB}=\frac{AR}{AD}$ (By BPT) $\Rightarrow \frac{3}{5}=\frac{4.5}{AD}\Rightarrow AD=7.5cm$

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:

(a)Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

(b)Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

(c)Assertion (A) is true but reason (R) is false.

(d)Assertion (A) is false but reason (R) is true.

**9.** **Assertion (A):** D and E are points on the sides AB and AC respectively of a ΔABC such that DE $\parallel$ BC then the value of x is 11, when AD = 4cm, DB = (x – 4) cm, AE = 8cm and EC = (3x – 19) cm.

**Reason (R):** If a line divides any two sides of a triangle in the same ratio then it is parallel to the third side.

Ans: (b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

**10.** **Assertion (A):** D and E are points on the sides AB and AC respectively of a ΔABC such that AD = 5.7cm, DB = 9.5cm, AE = 4.8cm and EC = 8cm then DE is not parallel to BC.

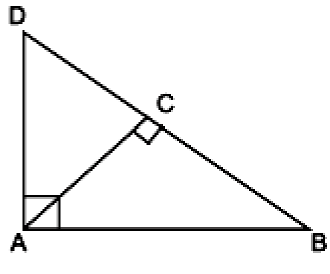
**Reason (R):** If a line divides any two sides of a triangle in the same ratio then it is parallel to the third side.

Ans: (d) Assertion (A) is false but reason (R) is true.

## SECTION – B

**Questions 11 to 14 carry 2 marks each.**

**11.** In figure, ΔABD is a right triangle, right angled at A and AC ⊥ BD. Prove that $AB^2$ = BC.BD.



Ans: In Δ DAB, and ΔACB

$\angle DAB = \angle ACB = 90°$

$\angle B = \angle B$ (common)

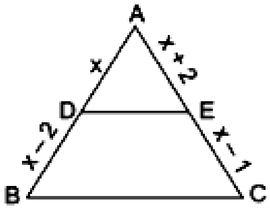
$\therefore$ ΔDAB ~ ΔACB

$\Rightarrow \frac{AD}{AC} = \frac{AB}{BC} = \frac{BD}{AB} \Rightarrow \frac{AB}{BC} = \frac{BD}{AB}$

$\Rightarrow AB^2 = BC.BD$ Hence proved.

**12.** In ΔABC, D and E are points on the sides AB and AC respectively, such that DE || BC. If AD = $x$, DB = $x - 2$, AE = $x + 2$ and EC = $x - 1$, Find the value of $x$.

Ans: In ΔABC, DE || BC (Given)




$\frac{AD}{DB} = \frac{AE}{EC}$ (By BPT)

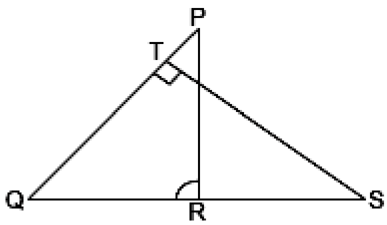
$\Rightarrow \frac{x}{x-2} = \frac{x+2}{x-1}$

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

$\Rightarrow x^2 - x = x_2 - 2^2 \Rightarrow x^2 - x = x^2 - 4$

$\Rightarrow x = 4$

**13.** In the figure, PQR and QST are two right triangles, right angled at R and T respectively. Prove that QR × QS = QP × QT




Ans: In ΔPRQ and ΔSTQ

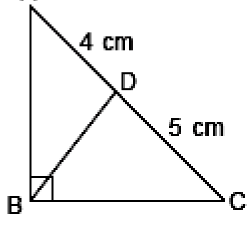
$\angle Q = \angle Q$ (common)

$\angle R = \angle T$ (each 90°)

$\therefore$ ΔPRQ ~ DSTQ (SS similarity corollary)

$\Rightarrow \frac{QR}{QT} = \frac{QP}{QS} \Rightarrow$ QR × QS = QP × QT

**14.** In the given figure, ABC is a triangle, right angled at B and BD ⊥ AC. If AD = 4 cm and CD = 5 cm, find BD and AB.




Ans: Here ΔADB ~ ΔBDC

$\therefore \frac{AD}{BD} = \frac{BD}{CD} \Rightarrow$ AD × CD = BD × BD

$\Rightarrow 4 \times 5 = BD^2$

$\Rightarrow$ BD = $(2\sqrt{5})^2$ cm

In right ΔBDA

$AB^2 = BD^2 + AD^2$

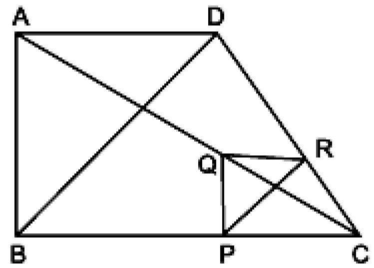
$\Rightarrow AB^2 = (2\sqrt{5})^2 + 4^2$

$\Rightarrow AB^2 = 36 \Rightarrow AB = 6$ cm

## SECTION – C

**Questions 15 to 17 carry 3 marks each.**

**15.** In figure, two triangles ABC and DBC lie on the same side of base BC. P is a point on BC such that PQ || BA and PR || BD. Prove that QR || AD.




Ans:

Given : In ΔABC, PQ || AB and PR || BD

To prove : QR || AD

Proof : By BPT $\frac{CP}{BP} = \frac{CQ}{AQ}$ ...(i)

Now in ΔBCD, PR || BD

$\Rightarrow$ By using BPT $\frac{CP}{BP} = \frac{CR}{RD}$ …(ii)

From (i) and (ii), $\frac{CQ}{AQ} = \frac{CR}{RD} \Rightarrow$ By converse of BPT, QR || AD

**16.** P and Q are points on the sides AB and AC respectively of a triangle ABC. If AP = 2 cm, PB = 4 cm, AQ = 3cm, QC = 6 cm, prove that BC = 3PQ.

Ans: $\frac{AP}{PB} = \frac{2}{4} = \frac{1}{2}$ ...(i) $\frac{AQ}{QC} = \frac{3}{6} = \frac{1}{2}$ ...(ii)

From (i) and (ii) $\frac{AP}{PB} = \frac{AQ}{QC} \Rightarrow$ PQ || BC

In ΔABC and ΔAPQ.

$\frac{AB}{AP} = \frac{AC}{AQ}$ (∵ PQ || BC)

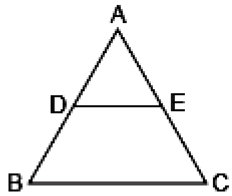
∠A = ∠A (Common)

∴ ΔABC ~ ΔAPQ, (SAS similarity)

$\Rightarrow \frac{AB}{AP} = \frac{BC}{PQ} \Rightarrow \frac{AP+PB}{AP} = \frac{BC}{PQ}$

$\Rightarrow \frac{2+4}{2} = \frac{BC}{PQ} \Rightarrow \frac{6}{2} = \frac{BC}{PQ} = \frac{1}{3}$ $\Rightarrow$ BC = 3PQ. Hence proved.

**17.** In figure, D and E are points on AB and AC respectively, such that DE || BC. If AD = $\frac{1}{3}$BD, AE = 4.5 cm, find AC.




Ans: Here AD = $\frac{1}{3}$BD,
AE = 4.5 cm, DE || BC

$\therefore \frac{AD}{BD} = \frac{AE}{EC}$ (using B.P.T.)

$\Rightarrow \frac{\frac{1}{3}BD}{BD} = \frac{4.5}{EC}$

$\Rightarrow \frac{1}{3} = \frac{4.5}{EC}$

$\Rightarrow$ EC = 4.5 × 3 cm

$\Rightarrow$ EC = 13.5 cm

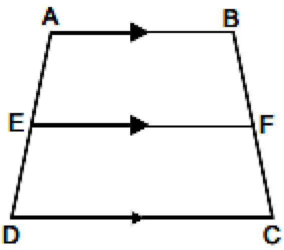
Now AC = AE + EC = 4.5 + 13.5 = 18 cm

## SECTION – D

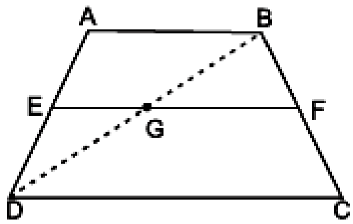
**Questions 18 carry 5 marks.**

**18.** If a line is drawn parallel to one side of a triangle, the other two sides are divided in the same ratio, prove it. Use this result to prove the following :

In the given figure, if ABCD is a trapezium in which AB || DC || EF, then $\frac{AE}{ED} = \frac{BF}{FC}$




Ans: Given - ½ mark
To prove - ½ mark
Figure - ½ mark
Construction - ½ mark
Proof – 2 marks




Second part - 1 mark
Join BD intersecting EF at G.
In ΔDAB, EG || AB

$\therefore \frac{AE}{ED} = \frac{BG}{GD}$ (Using B.P.T.) ...(i)

In ΔDBC, GF || DC

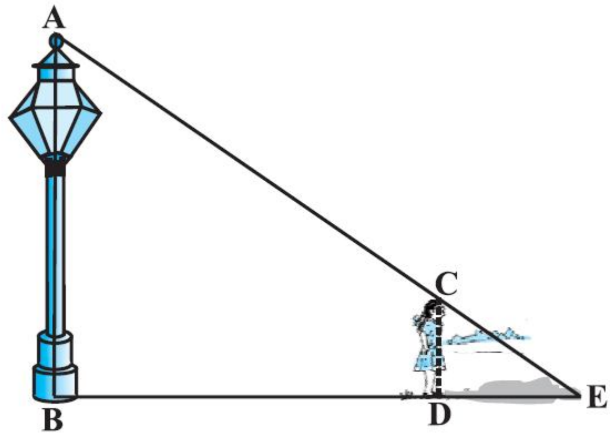
$\therefore \ \frac{BG}{GD} = \frac{BF}{FC}$ ...(ii)

From (i) and (ii) $\frac{AE}{ED} = \frac{BF}{FC}$

## SECTION – E (Case Study Based Questions)

**Questions 19 to 20 carry 4 marks each.**

**19.** On one day, a poor girl of height 90 cm is looking for a lamp-post for completing her homework as in her area power is not there and she finds the same at some distance away from her home. After completing the homework, she is walking away from the base of a lamp-post at a speed of 1.2 m/s. The lamp is 3.6 m above the ground (see below figure).




(i) Find her distance from the base of the lamp post. (2)
(ii) Find the length of her shadow after 4 seconds. (2)

**OR**

(ii) Find the ratio AC:CE. (2)

Ans:

(i) Let AB denote the lamp-post and CD the girl after walking for 4 seconds away from the lamp-post. From the figure, DE is the shadow of the girl.

Let DE be $x$ metres.

Now, her distance from the base of the lamp =

BD = 1.2 m × 4 = 4.8 m.

(ii) $\Delta ABE \sim \Delta CDE$

$$\Rightarrow \frac{BE}{DE} = \frac{AB}{CD} \Rightarrow \frac{4.8 + x}{x} = \frac{3.6}{0.9} \Rightarrow 4.8 + x = 4x \Rightarrow 3x = 4.8 \Rightarrow x = 1.6m$$

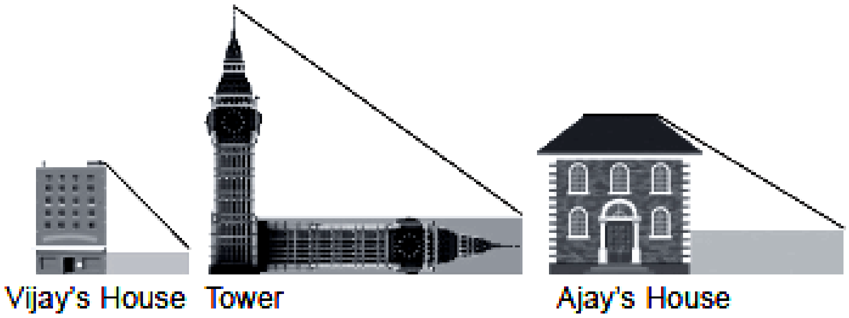
**OR**

$$\frac{AE}{CE} = \frac{BE}{DE} \Rightarrow \frac{4.8 + 1.6}{1.6} = \frac{6.4}{1.6} = 4$$

$$\Rightarrow AE = 4CE \Rightarrow AC + CE = 4CE \Rightarrow AC = 3CE$$

$$\Rightarrow \frac{AC}{CE} = \frac{3}{1}$$

**20.** Vijay is trying to find the average height of a tower near his house. He is using the properties of similar triangles. The height of Vijay's house if 20 m when Vijay's house casts a shadow 10 m long on the ground. At the same time, the tower casts a shadow 50 m long on the ground and the house of Ajay casts 20 m shadow on the ground.




(a) What is the height of the tower? (1)
(b) What is the height of Ajay's house? (1)
(c) What will be the length of the shadow of the tower when Vijay's house casts a shadow of 12 m? (2)

**OR**

(c) When the tower casts a shadow of 40 m, same time what will be the length of the shadow of Ajay's house? (2)
Ans:
(a) When two corresponding angles of two triangles are similar, then ratio of sides are equal.
Height of Vijay's house/Length of Shadow = Height of Tower/Length of Shadow
⇒ 20 m/10 m = Height of Tower/50 m
⇒ Height of Tower = 20 × 50/10 = 100 m
(b) Height of Vijay's house/Length of Shadow = Height of Ajay's house/Length of Shadow
20 m/10 m = Height of Ajay's house/20 m
Height of Ajay's house = 20 × 20/10 = 400/10 = 40m
(c) The height of Vijay's house is AC = 20m.
The height of the tower is A'C' = 100m.
The length of shadow of Vijay's house is AB = 12cm.
∵ A′B′/A B = A′C′/A C
⇒ A′B′ = AB/A C × A′C′ = 12/20 × 100 = 12 x 5 = 60m

**OR**

(c) The height of tower is A'C'= 100m.
And the height of Ajay's house is PR = 40m
The length of shadow of tower is A'B'= 40m.
The length of shadow of Ajay's house is PQ.
∵ ΔA′B′C′ and ΔPQR are similar triangles.
∴ PQ/A′B′ = PR/A′C′
⇒ PQ = (PR/A′C′) × A′B′ = 40 × 40 /100 = 16m