CHAPTER-6
TRIANGLES
SYNOPSIS

❖ Congruent Figures: Two geometric figures which have the same shape and size are known as congruent figures.
❖ Similar Figures: Two geometric figures which have the same shape but different sizes are known as similar figures. Two congruent figures are always similar but two similar figures need not be congruent.
❖ Similar Polygons: Two polygons are said to be similar to each other. If
i)their corresponding angles are equal and
ii) the lengths of their corresponding sides are proportional.
❖ If a line is drawn parallel to one side of a triangle to intersect the other two sides at distinct points, then the other two sides are divided in the same ratio(Basic proportionality theorem or Thales theorem).
❖ Ratio of the areas of two similar triangles is equal to the ratio of the squares of their corresponding sides.
❖ Perpendicular drawn from the vertex of the right angle of a right triangle to its hypotenuse divides the triangle into two triangles which are similar to the whole triangle and to each other.
❖ In a right triangle, the square on the hypotenuse is equal to the sum of the squares on the other two sides (Pythagoras Theorem) and its converse

A.	MULTIPLE CHOICE QUESTIONS (1 Mark)
	1. If in two triangles ABC and PQR, $\frac{AB}{QR} = \frac{BC}{PR} = \frac{CA}{PQ}$ then (a) ΔPQR ~ ΔCAB (b) ΔPQR ~ ΔABC (c) ΔPQR ~ ΔCBA (d) ΔPQR ~ ΔBCA

2. Sides of two similar triangles are in the ratio of 4:9, then the ratio of the areas of two triangles is

a. 12:64 b. 16:81 c. 25:49 d. 36:100

3. A vertical stick 20m long casts a shadow 10m long on the ground. At the same time, a tower casts a shadow 50m long on the ground. The height of the tower is

a. 100m b. 120m c.25m d.200m

4. The perimeters of two similar triangles ABC and PQR are 36cm and 24cm respectively. If PQ = 10 cm, then AB is

(a) 9cm (b) 12cm (c) 15cm (d) 18cm

5. Triangle ABC is such that AB = 3cm, BC = 2 cm and CA = 2.5cm. If Δ DEF ~ Δ ABC and EF = 4cm, then perimeter of triangle DEF is

(a) 7.5cm (b) 15cm (c) 22.5cm (d) 30 cm

6. Two poles of height 6m and 11m stand vertically upright on a plane ground. If the distance between their foot is 12m, the distance between their tops is

(a) 12m (b) 14m (c) 13m (d) 11m

8.In Δ ABC, a line XY parallel to BC cuts AB at X and AC at Y. If BY bisects $\angle XYC$, then

(a) BC = CY (b) BC = BY (c) BC $\neq$ CY (d) BC $\neq$ BY

9. In Δ ABC, D & E are points on side AB and AC respectively such that DE || BC and AD : DB = 3 : 1. If EA = 3.3cm then AC is

(a) 1.1 cm (b) 4 cm (c) 4.4cm (d) 5.5 cm

10. If ABC and DEF are similar triangles such that $\angle A = 47°$ and $\angle E = 83°$, then $\angle C$ is

(a) 50° (b) 60° (c) 70° (d) 80°

11. If D, E, F are the mid points of sides BC, CA and AB respectively of Δ ABC, then the ratio of

the areas of triangles DEF and ABC is

a. 1 : 4 b. 1 : 2 c. 2: 3 d) 4 : 5

12.In an equilateral triangle ABC, if AD ⊥ BC, then

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

(c) $3AB^2 = 4AD^2$ (d) $3\ AB^2 = 2AD^2$

13.In the trapezium ABCD , AB// DC and AB= 2DC. If area of ΔAOB = $84cm^2$then the area of ΔCOD is :

(a) $24\ cm^2$ (b) $20\ cm^2$

(c) $36\ cm^2$ (d) $21\ cm^2$

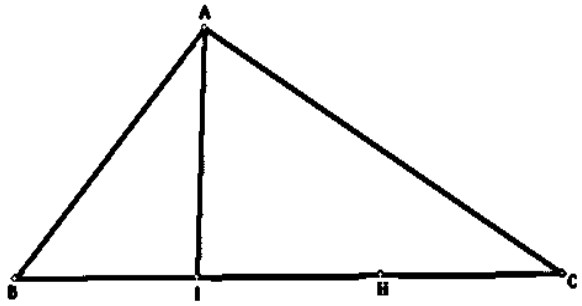
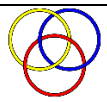
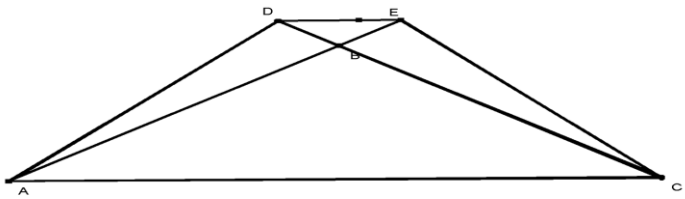
14. ΔPQR is an equilateral triangle with each side of length 2p. If PS⊥ QR, then PS =

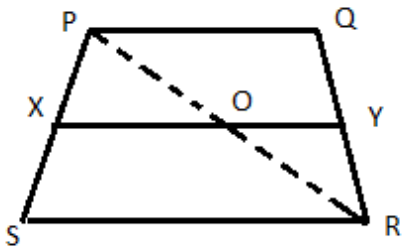
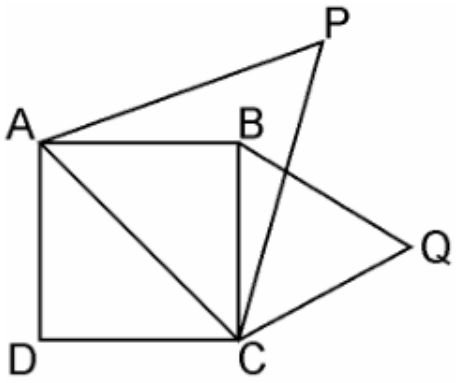
(a) $\frac{\sqrt{3}}{2}$p (b) 2p (c) √3p (d) p

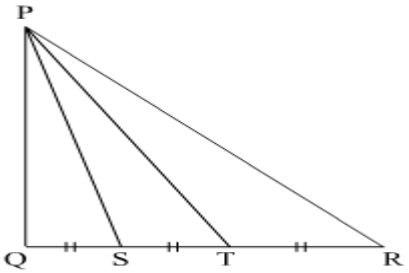
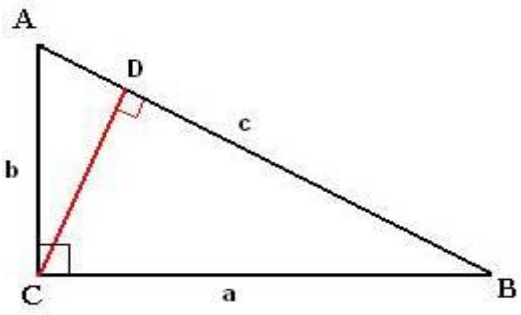
15.If in two triangles DEF and PQR, ∠D = ∠Q and ∠R = ∠E then which of the following is not true

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

A.		Very Short Answer Questions (VSA) (1 Mark)	Level
1		The corresponding altitudes of two similar triangles are 6cm and 9cm respectively. Find the ratio of their area	C
2		It is given that Δ FED ~ Δ STU . Is it true to say that $\frac{DE}{ST}=\frac{EF}{TU}$ Why?	U
3		In a triangle ABC, DE || BC. If AD = x, AE = (x + 2), BD = (x -2) and CE = (x-1), find the value of x.	C
4		In Δ ABC, AB = 24 cm, BC = 10 cm and AC = 26 cm. Is this triangle a right triangle? Give reasons for your answer.	C
5		If the sides of a triangle are 3 cm, 4 cm and 6 cm, determine whether the triangle is a right-angled triangle.	U
		SECTION-B	
B.		Short Answer Questions (2 marks)	level
6		In Δ ABC, AB = 13 cm, AC = 12 cm, and BC = 5cm, then find $\angle C$.	C
7		Δ ABC is a right angled triangle at A. If AD ⊥BC, show that Δ ABD ~ Δ CAD .	HOT
8		Legs (sides other than the hypotenuse) of a right triangle are of lengths 16cm and 8 cm. Find the length of the side of the largest square that can be inscribed in the triangle	U
9		Hypotenuse of a right triangle is 25 cm and out of the remaining two sides, one is longer than the other by 5 cm. Find the lengths of the other two sides.	HOT
10		ABC is a triangle. PQ is the line segment intersecting AB in P and AC in Q such that PQ parallel to BC and divides triangle ABC into two parts equal in area. Find BP: AB.	HOT

			
11		A man goes 24cm towards west and then 10m towards north. How far is he from the starting point.	MD
C		V Long Answer Questions (VLA) (4 Marks)	
12		In a Δ ABC, BD ⊥ AC such that BD^2 = DC x AD. Prove that Δ ABC is a right angled triangle.	C
13		Prove that the diagonals of a trapezium divide each other in the same ratio. 	C
14		In an equilateral triangle,prove that three times the square of one side is equal to four times the square of one of its altitudes.	HOT
15		Prove that in a ΔABC with AD ⊥ BC, $AB^2 + CD^2 = AC^2 + BD^2$	U
D.		V Long Answer Questions (VLA) (4 Marks)	

16		PQRS is a trapezium in which PQ || SR || XY. Prove that: $\frac{PX}{XS} = \frac{QY}{YR}$ 	U
17		In a triangle if the square on one sides is equal to the sum of squares on the other two sides, prove that the angle opposite to the first side is a right angle. Apply the above theorem in the following: In a quadrilateral ABCD, $\angle B = 90^0$. If $AD^2 = AB^2 + BC^2 + CD^2$, then prove that $\angle ACD = 90^0$.	U
18		State and prove Basic proportionality theorem	C
19		State and prove Pythagoras theorem.	U
20		Prove that the area of the equilateral triangle described on the side of a square is half the area of the equilateral triangle described on its diagonal. 	HOT

21		In the figure, Δ PQR is right angled at Q, and the points S and T trisect the side QR. Prove that: $8PT^2 = 3PR^2 + 5PS^2$. 	HOT
22		Δ ABC is a right angled triangle in which ∠C = 90^0 and CD ⊥ AB. If BC = a, CA = b, AB = c and CD = p then prove that: i) $cp = ab$ ii) $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$ 	HOT

ANSWERS
MCQ

1) a 2) a 3) b 4) a 5) c 6) b 7) c 8) a 9) c 10) a 11) a 12) c 13) d 14) c 15) b
SECTION A
1)36:81
2) No, because the correct correspondence is F → S, E → T, D → U.
With this correspondence $\frac{EF}{ST} = \frac{DE}{TU}$
3) x=4 4) yes 5) No
SECTION B
$\angle C$ =90 7) length =16/3 cm 8) 15cm and 20cm 9) 26
SECTION C PROVE
SECTION D PROVE

Lesson- Triangles

Learning Objective	Achieved 	Working towards 	Needs reinforcement 
I can understand and identify the similar figures.			
I can understand the theorems based on tringles.			
I can apply the theorems learnt.			
I can relate my learning to real life through various examples of triangles.			

Teacher's feedback: _____

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Student's feedback: _____

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Next step in Learning:

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