TRIANGLES

CHAPTER AT A GLANCE

1. BPT : If a line is drawn parallel to one side of a triangle, to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.

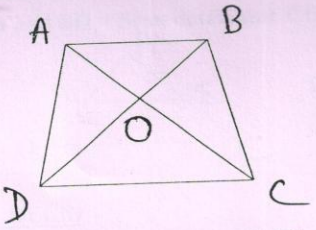
2. PYTHAGORAS THEOREM : In a right –angle triangle, the square of the hypotenuse is equal to the sum of the squares of the other two sides.

3. THEOREM : The ratio of the areas of two similar triangles is equal to the squares of any two corresponding sides.

4. (a) A A Similarity : If in two triangles, two angles of one triangle are respectively equal to the two angles of the other triangle, then the two triangles are similar.

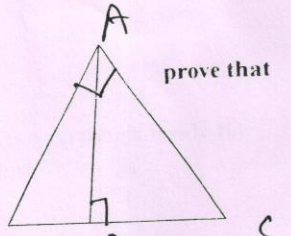
(b) SSS Similarity : If in two triangles, corresponding sides are in the same ratio, then their corresponding angles are equal and hence the triangles are similar.

(c) SAS Similarity : If one angle of a triangle is equal to one angle of another triangle and the sides including these angles are in the same ratio, then the triangles are similar.

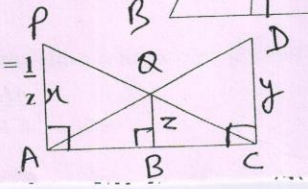


Q.1 $\frac{AO}{OC} = \frac{BO}{OD} = \frac{1}{2}$ and AB = 5cm. Find the value of DC.

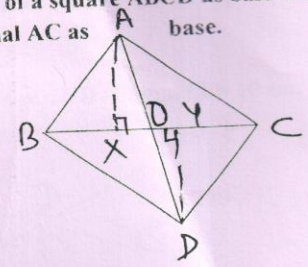
Q.2 D is a point on the side BC of ▲ABC such that angle ADC = angleBAC, prove that $\frac{CA}{CD} = \frac{CB}{CA}$



Q.3 PA, QB, RC are perpendiculars to AC. Prove that $\frac{1}{x} + \frac{1}{y} = \frac{1}{z}$



Q.4 Prove that the area of the triangle BCE described on one side BC of a square ABCD as base is one half the area of the similar triangle ACF described on the diagonal AC as base.



Q.5 Prove that $\frac{\text{Area } (\triangle ABE)}{\text{Area } (\triangle DBC)} = \frac{AO}{DO}$

Q.6 ABC is a triangle right-angled at C and p is the length of the perpendicular from C to AB. Show that

(i) $pc = ab$ (ii) $\frac{1}{p^2} = \frac{1}{a^2} + \frac{1}{b^2}$; where $a = BC$, $b = AC$ and $c = AB$.

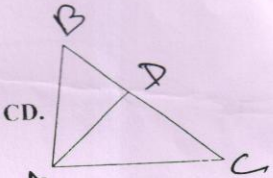
Q.7 In a triangle ABC, AC>AB, D is the mid point of BC and AE perpendicular BC. Prove that :

(a) $AC^2 = AD^2 + BC.DE + 1/4\ BC^2$ (b) $AB^2 = AD^2 - BC.DE + \frac{1}{4} BC^2$

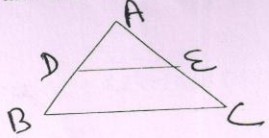
(c) $AB^2 + AC^2 = 2AD^2 + \frac{1}{2} BC^2$

Q.8 In an equilateral triangle ABC, D is a point on BC such that BD = 1/3 BC. Prove that $9\ AD^2 = 7\ AB^2$

Q.9 AD bisects angle A, AB = 12cm, AC = 20cm and BD = 5cm, determine CD.



Q.10 In the adjoining Fig., DE is parallel to



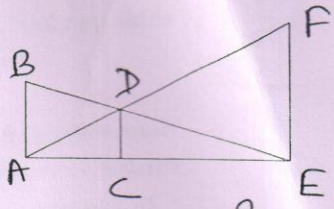
BC and $\frac{AD}{DB} = \frac{2}{3}$. calculate $\frac{\text{ar(Trapezium DECB)}}{\text{ar } (\triangle ABC)}$

Q.11 ABC is an isosceles triangle in which AB = AC 10cm, BC = 12cm. PQRS is a rectangle inside the isosceles triangle. Given PQ = SR = y cm and PS = QR = 2x cm. Prove that $x = 6 - \frac{3y}{4}$.

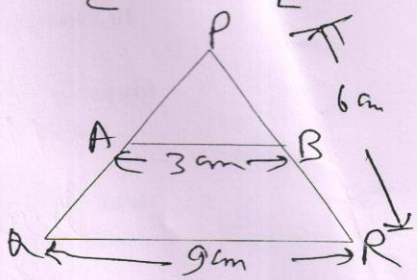
Q.12 If A is the area of a right-angled triangle and b is one of the sides containing the right angle, prove that the length of the altitude on the hypotenuse is $\frac{2Ab}{\sqrt{b^4 + 4A^2}}$

Q.13 A right triangle ABC has hypotenuse of length `p` cm and one side of length `q` cm. If p – q = 1, express the length of third side of he right triangle in terms of p.

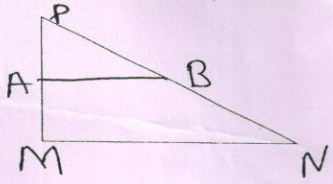
Q.14 In the given figure, we have AB parallel CD parallel EF. If AB = 6cm, CD = x cm, EF= 10 cm, BD = 4 cm and DE = y cm, find x and y.



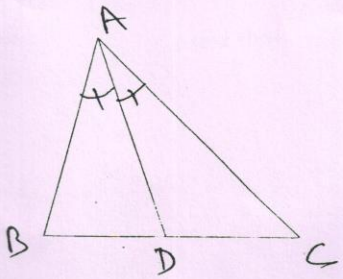
Q.15 In the given fig., AB parallel QR. Find the length of PB.



Q.16 In the given fig., AB parallel MN. If PA = x – 2, PM = x, PB = x – 1 and PN = x + 2, find the value of x.



Q.17 In ▲ABC, AD bisects angle A. If AB = 2.1 cm, AC = 4.2 cm and DC = 3.2 cm, find BD.



Q.18 In a ▲ ABC, AB = BC = CA = 2a and AD perpendicular BC. Prove that AD = a√3 and area of ▲ABC = $\sqrt{3}a^2$