PYRAMID
IIT-JEE | MEDICAL | FOUNDATION

^,dy0;* TEST SERIES PAPER

STD : X [HL]

SUBJECT : MATHEMATICS - 2

TOPIC : SIMILARITY, PYTHAGORAS THEOREM, TRIGONOMETRY

TIME : 2 HR. **MAX. MARKS : 40**

Note :

(i) All questions are compulsory

(ii) Use of Calculator is not allowed.

(iii) The numbers to the right of questions indicate full marks

(iv) Draw proper figures for answers wherever necessary.

(v) The marks of construction should be clear and distinct. Do not erase them.

(vi) While writing any proof, drawing relevant figure is necessary. Also the proof should be consistent with the figure.

(vii) In case of MCQ's Q. No. 1(A), only the first attempt will be evluated and will be given credit.

(viii) For every MCQ, the correct alternative (A), (B), (C) and (D) of answers with subquestion number is to be written as an answer.

Q.1 (A) For alternative answers are given for each of the following subquestions. Choose the correct alternative. [04]

01. If a, b, c are sides of triangle $a^2+b^2=c^2$, then the name the type of the triangle.

(a) Obtuse anled triangle (b) Acute angled triangle

(c) Right angled triangle (d) Equilaterial triangle.

02. If $\Delta ABC \sim \Delta PQR$ and $4A(\Delta ABC)=25A(\Delta PQR)$, then AB : PQ = ?

(a) 4 : 25 (b) 2 : 5 (c) 5 : 2 (d) 25 : 4

03. $\cot\theta \times \tan\theta = ?$

(a) 0 (b) 1 (c) 2 (d) $1/\sqrt{2}$

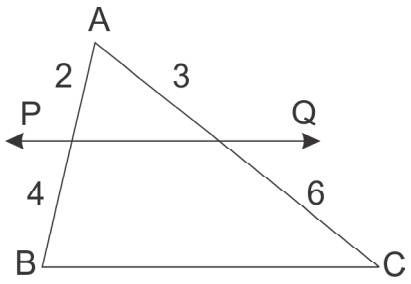
04. If $\frac{1-\sin^2 A}{\cos^2 A} = \tan\theta$, then the value of θ is _____.

(a) 60^o (b) 45^o (c) 90^o (d) 30^o

(B) Solve the following subquestions : **[04]**

i) What will be the result when each term of $\sin^2\theta + \cos^2\theta = 1$ is divided by $\sin^2\theta$?

ii) From the following given in figure,
State by giving stable reason whether
line PQ || side BC.

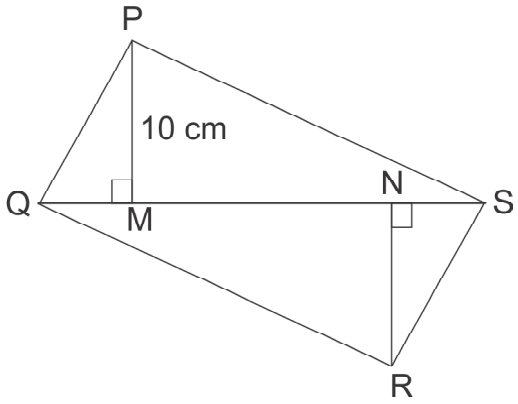


iii) $\Delta PQR \sim \Delta XYZ$, then write its corresponding sides in proportion.

iv) In ΔPQR, $PQ^2 = PR^2 + QR^2$ then state which angle will be the right angle.

Q.2 (A) Complete any two of the three activities. **[04]**

i) In the adjoining figure,
$A(\Delta PQS) = 100\ cm^2$,
$A(\Delta QRS) = 150\ cm^2$,
PM = 10 cm.



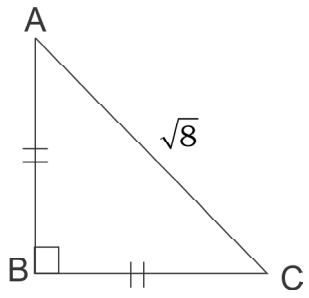
Complete the following activity to find NR.
ΔPQS and ΔQRS have same base QS
Triangle having same base have areas
proportional to their corresponding _____

$$\frac{A(\Delta PQS)}{A(\Delta QRS)} = \frac{\_\_\_\_}{NR}$$

$$\frac{100}{50} = \frac{\_\_\_\_}{NR}$$

$NR =$ _____ cm

ii) In the figure, $\angle ABC = 90^{o}$ and AB = BC



Complete the following activity to find AB and BC:

AB = BC

$\angle BAC = \angle BCA =$ ____

AB = BC = _____ x AC

= _____ x $\sqrt{8}$

= _____ x $\times 2\sqrt{2} = 2$

iii) if $\sin^2\theta = 144/169$ then complete the following.

Activity to find the value of $\cos\theta$

$\sin^2\theta + \cos^2\theta = 1$

$\therefore \quad \left(\frac{\square}{\square}\right)^2 + \cos^2\theta = 1$

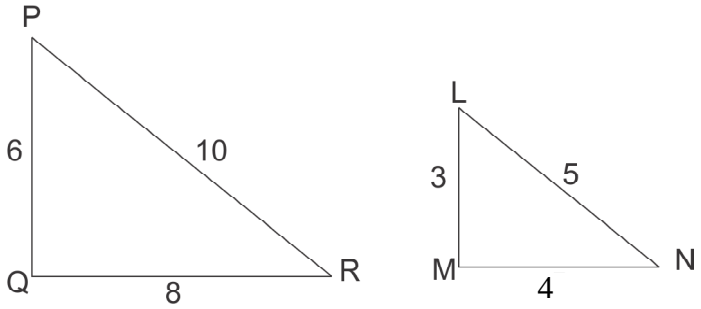
$\therefore \quad \cos^2\theta = 1 - \frac{\square}{\square}$

$\therefore \quad \cos^2\theta = \frac{\square}{\square}$

$\therefore \quad \cos\theta = \frac{\square}{\square}$

Q.2 (B) Solve any four of the following sub-questions : [08]

i) Are the triangle in following figures similar? If yes, by which test?



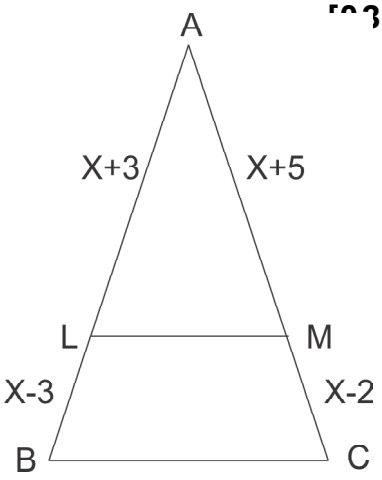
ii) Areas of two similar triangles are 225 sq cm and 81 sq cm. If a side of the smaller triangle is 12 cm, the find the corresponding side of the bigger triangle.

iii) Is (5, 12, 13) a Pythagorean triplet? Why?

iv) Prove : $\cot^2\theta - \tan^2\theta = \text{cosec}^2\theta - \sec^2\theta$

v) If $\tan\theta + \frac{1}{\tan\theta} = 2$ then show that $\tan^2\theta + \frac{1}{\tan^2\theta} = 2$

Q.3 (A) Complete any one out of two activities : **[03]**



i) In the figure, seg LM || side BC,
AL = x + 3, BL x - 3, AM = x + 5
and CM = x - 2, then complete the following activity to find the value of x.
Activity : In ΔABC, seg LM || side BC,
By _____ theorem, $\frac{AL}{LB} = \frac{AM}{\_\_\_}$

$\frac{x+3}{x-3}$ $\frac{x+5}{\_\_\_}$

$(x+3)\_\_\_\_\_ = (x+5)(x-3)$

$x^2 + x - \_\_\_\_ = x^2 + 2x - 15$

x = _____

ii) Complete the following activity to prove

$$\frac{1}{1+\sin\theta} + \frac{1}{1-\sin\theta} = 2\sec^2\theta$$

LHS = $\frac{1}{1+\sin\theta} + \frac{1}{1-\sin\theta}$

= $\frac{(1-\sin\theta) + \_\_\_\_\_}{(1+\sin\theta)(1-\sin\theta)}$

= $\frac{\_\_\_\_\_}{1-\_\_\_\_}$

= $\frac{2}{\_\_\_\_}$

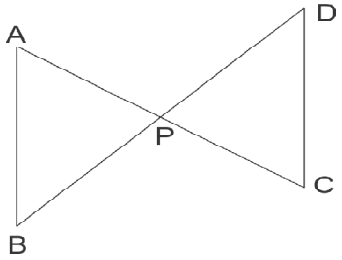
= $2\sec^2\theta$

= RHS

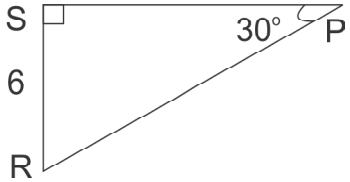
Q.3 (B) Solve any two of the following sub questions : **[06]**

i) Prove that when two triangles are similar, the ratio of areas of those triangles is equal to the ratio of the squares of their corresponding sides.

ii) In the figure, seg AC and seg BD intersect each other in point P and $\frac{AP}{CP}=\frac{BP}{DP}$, Prove that $\Delta ABP \sim \triangle CDP$



iii) See figure.
Find RP and PS using the information given in $\triangle PSR$



iv) If $\tan\theta = 1$, then find the value of $\frac{\sin\theta+\cos\theta}{\sec\theta+\text{cosec}\theta}$

Q.4 Solve any two of the following sub questions [08]

i) In trpezium PQRS, side PQ || side SR. Diagonals PR and QS intersect each other at the point M. PQ = 2 RS. Prove that PM = 2 RM and Q = 2 SM.

ii) Suppose *m* and *n* are any two numbers. If $m^2 - n^2$, $2mn$ and $m^2 + n^2$ are the three side of a triangle. Show that it is a right angled triangle and hence write any two pairs of Pythagorean triplet.

iii) If $\frac{1}{\sin^2\theta}-\frac{1}{\cos^2\theta}-\frac{1}{\tan^2\theta}-\frac{1}{\cot^2\theta}-\frac{1}{\sec^2\theta}-\frac{1}{\text{cosec}^2\theta}=-3$, then find the value of θ.

Q.5 Solve the following sub question (Any one) [03]

i) Prove that, in a right angles triangle, the square of the hypotenuse is equal to the sum of the squares of the remaining two sides.

ii) Area of a rhombus is $50\sqrt{3}$ sq. units. One of its diagonal is 10 units, then
(a) Find the length of its other diagonal.
(b) Using the diagonal property of rhombus and the concept of Pythagoras theorem find the length of side of rhombus.
(c) Find the perimeter of rhombus.