



महाराष्ट्र शासन
शालेय शिक्षण व क्रीडा विभाग
राज्य शैक्षणिक संशोधन व प्रशिक्षण परिषद, महाराष्ट्र

७०८ सदाशिव पेठ, कुमठेकर मार्ग, पुणे ४११०३०

संपर्क क्रमांक (०२०) २४४७ ६९३८

E mail: evaluationdept@maa.ac.in

Question Bank

Standard :- 10th

Subject :- Mathematics Part 1

सूचना

१. फक्त विद्यार्थ्यांना प्रश्नप्रकारांचा सराव करून देण्यासाठीच
२. सदर प्रश्नसंचातील प्रश्न बोर्डाच्या प्रश्नपत्रिकेत येतीलच असे नाही याची नोंद घ्यावी.

Standard: 10
Subject-Mathematics
Question bank

1.linear equation in two variables

Q.1(A) MCQ

1. To draw the graph of $4x + 5y = 19$, if $x = 1$ is taken then what will be the value of y ?

- A) 4 B) 3 C) 2 D) -3

2) For the equations with variables x and y , if $Dx = 26$, $Dy = -39$ and $D = 13$ then $x = ?$

- A) 2 B) -3 C) -2 D) 3

3) Which of the following is linear equation in two variables?

- A) $\frac{x}{3} + \frac{5}{y} = 6$ B) $2x^2 - 3y = 8 - 3y$ C) $x + 2y = 5 - 3y$ D) $3x^2 + y$

4) which of the following is not the solution of $3x + 6y = 12$?

- A) (-4,4) B) (0,2) C) (8, -2) D) (3,1)

5) $\begin{vmatrix} 3 & 5 \\ 2 & x \end{vmatrix} = 2 \therefore x = \text{-----}$

- A) 3 B) 4 C) -3 D) -4

6) For equations $5x + 3y + 11 = 0$ and $2x + 4y = -10$ find D .

- A) 14 B) -14 C) 26 D) -26

7) If $49x - 57y = 172$ and $57x - 49y = 252$ then $x + y = ?$

- A) 80 B) 0 C) 10 D) 8

8) The solution of the equation $2x - y = 2$ is -----.

- A) (2,2) B) (5,2) C) (2,5) D)
(5,5)

9) The solution of the equation $x-y=10$ and $x+y=70$ is -----.

- A) (40,30) B) (30,40) C) (10,60) D) (50,20)

10) Find the value of D_x for the equation $4x + 3y = 19$ and $4x - 3y = -11$

- A) 24 B) 0 C) -24 D) 108

Q. 1 B) Each of 1 mark

- 1) State with reason whether the equation $3x^2 - 7y = 13$ is a linear equation with two variables?
- 2) Show the condition using variable x and y : Two numbers differ by 3
- 3) For the equation $4x + 5y = 20$ find y when $x = 0$
- 4) Write any two solutions of the equation $x + y = 7$.
- 5) Decide whether $(0, 2)$ is the solution of the equation $5x + 3y = 6$
- 6) Write any two solution of the equation $a - b = -3$
- 7) If $x+2y=5$ and $2x+y=7$ then find the value of $x+y$
- 8) If $D_x = 24$ and $x = -3$ then find the value of D .
- 9) The cost of the book is 5 rupees more than twice the cost of a pen. Show this using linear equation by taking Cost of book(x) and cost of a pen(y).
- 10) If $\frac{a}{4} + \frac{b}{3} = 4$, write the equation in standard form.

Q.2 A) Complete the activity (2 marks)

1) Complete the table to draw the graph of $2x - 3y = 3$,

X	-6	
y		1
(x, y)		

2. Solve the following to find the value of following determinant.

$$\begin{vmatrix} 3 & -2 \\ 4 & 5 \end{vmatrix} = 3 \times \square - \square \times 4 = \square + 8 = \square$$

3) Complete the activity to find the value of x

$$3x + 2y = 11 \quad \text{----- (I) and } 2x + 3y = 4 \quad \text{----- (II)}$$

Solution: Multiply equation (I) by ----- and equation (II) by -----.

$$\square \times (3x + 2y = 11) \quad \therefore 9x + 6y = 33$$

$$\square \times (2x + 3y = 4) \quad \therefore 4x + 6y = 8$$

subtract (II) from (I),

$$\square x = 25$$

$$\therefore x = \square$$

4) If (2, 0) is the solution of $2x + 3y = k$ then finds the value of k by completing the activity

Solution: (2,0) is solution of the equation $2x + 3y = k$

Putting $x = \square$ and $y = \square$

$$\therefore 2(\square) + 3 \times 0 = k$$

$$\therefore 4 + 0 = k$$

$$\therefore k = \boxed{}$$

5) To find the values of x and y for the equations $x - 2y = 5$ and $2x + 3y = 10$ complete the activity.

$$D = \begin{vmatrix} 1 & -2 \\ 2 & 3 \end{vmatrix} = 3 + 4 = 7$$

$$D_x = \begin{vmatrix} 5 & -2 \\ 10 & 3 \end{vmatrix} = \boxed{}$$

$$D_y = \begin{vmatrix} 1 & 5 \\ 2 & 10 \end{vmatrix} = \boxed{}$$

By Cramer's rule

$$x = \frac{D_x}{D} = \boxed{}, y = \frac{D_y}{D} = \boxed{}$$

Q. 2 B) Each of 2 marks

1) The difference between an angle and its complement is 10° find measure of larger angle.

2) Find the value of $\begin{vmatrix} 5 & 2 \\ 0 & -1 \end{vmatrix}$

3) For the equation $y + 2x = 19$ and $2x - 3y = -3$ Find the value of D

4) In the equation $2x - y = 2$ if $x = 3$ then find $y = ?$

5) If $(2, -5)$ is the solution of the equation $2x - ky = 14$ then find $k = ?$

6) For the equation $a + 2b = 7$ find a when $b = 4$

7) Decide whether $x = 2$ and $y = -1$ is the solution of the equation $2x + y = 3$ or not?

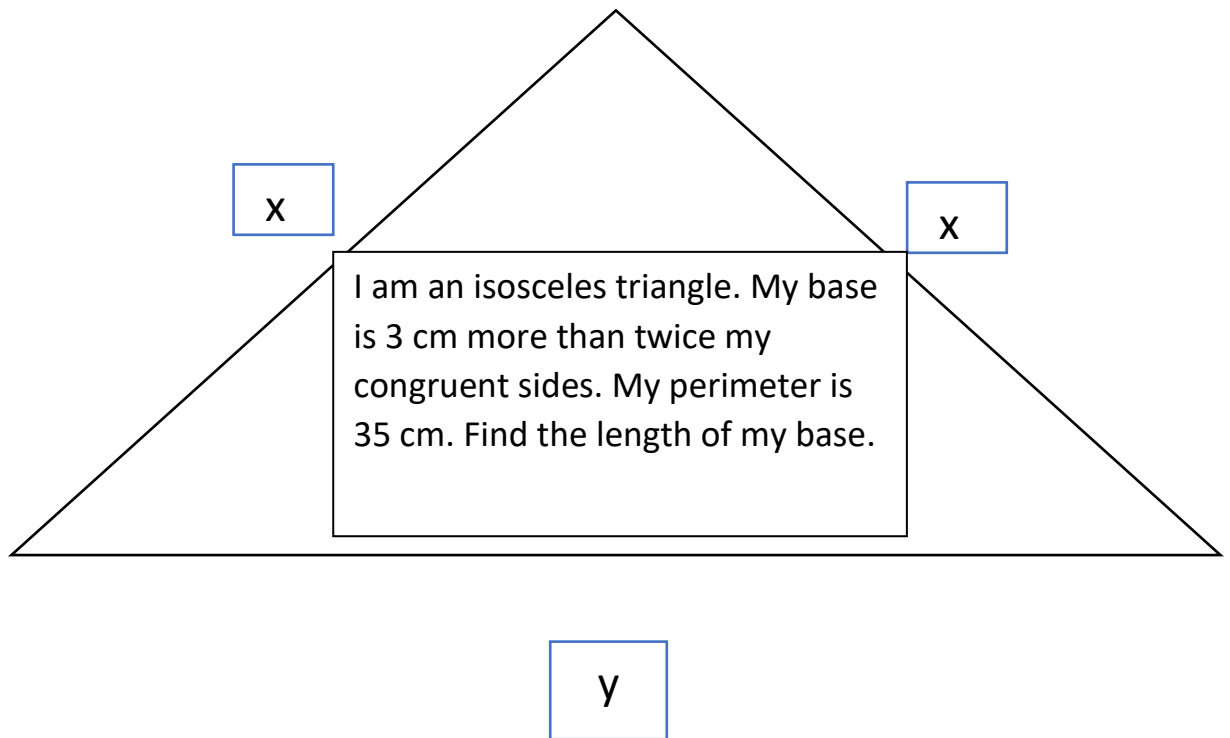
8) Using variables a and b write any two equations whose solution is $(0, 2)$

9. If $52x + 65y = 183$ and $65x + 52y = 168$ then find $x + y = ?$

10. State with reason whether the point $(3, -2)$ will lie on the graph of the equation $5m - 3n = -21$.

Q.3 A) Complete the activity.

1)



2) Complete the following table to draw the graph of $3x - 2y = 18$

X	0	4	2	-1
Y	-9	-----	-----	-----
x, y	$(0, -9)$	$(--, --)$	$(--, --)$	-----

3) The sum of the two-digit number and the number obtained by interchanging the digits is 132. The digit in the ten's place is 2 more than the digit in the unit's place. Complete the activity to find the original number.

Activity: Let the digit in the unit's place is y and the digit in the ten's place is x .

$\therefore$ The number = $10x + y$

$\therefore$ The number obtained by interchanging the digits =

$\therefore$ The sum of the number and the number obtained by interchanging the digits = 132

$\therefore 10x + y + 10y + x =$

$\therefore x + y =$ (I)

, By second condition,

Digit in the ten's place = digit in the unit's place + 2

$\therefore x - y = 2$. . . (II)

Solving equation (I) and (II)

$\therefore x =$ $y =$

Ans: The original number =

Q.3 B) Each of 3 marks

- 1) Solve the given simultaneous equations graphically $x + y = 5$ and $y = 5$,
- 2) Ajay is younger than Vijay by 3 years. The sum of their ages is 25 years, what is the age of Ajay.
- 3) Solve by Cramer's rule, $3x - 4y = 10$; $4x + 3y = 5$
- 4) Difference between two numbers is 3, the sum of three times the bigger number and two times the smaller number is 19. Then find the numbers.
- 5) Solve: $4m - 2n = -4$; $4m + 3n = 16$
- 6) Solve: $99x + 101y = 499$; $101x + 99y = 501$
- 7) The length of the rectangle is 5 more than twice its breadth. The perimeter of a rectangle is 52 cm then find the length of the rectangle.
- 8) The graph of the equations $2x - y - 4 = 0$ and $x + y + 1 = 0$ intersect each other in point P (a, b) then find the coordinates of P?
- 9) The solution of the equation $ax + by + 5 = 0$ and $bx - ay - 12 = 0$ is (2, -3)
Find the values of a and b.
- 10) A person starts a job with some fixed salary and yearly increment. After 4 years his salary is Rs.15000 and after 10 years it becomes Rs. 18000. Then find his monthly salary and increment.
- 11). For the equation $3x - 2y = 17$ find the value of x when $y = -1$ and find the value of y when $x = 3$.

Q.4 Solve (Each of 4 marks)

1) Solve the following equations by graphical method, $x - y = 1$; $2x + y = 8$

2) Using the determinants given below form two linear equations and solve them.

$$D = \begin{vmatrix} 5 & 7 \\ 2 & -3 \end{vmatrix} \quad D_y = \begin{vmatrix} 5 & 4 \\ 2 & -10 \end{vmatrix}$$

3) For an A.P, $t_{17} = 54$ and $t_9 = 30$ find the first term(a) and common difference(d).

4) A train covered a certain distance at a uniform speed. If the train would have been 6 km/h faster, it would have taken 4 hours less than the scheduled time. And ,if the train was slower by 6 km/h it would have taken 6 hours more than the scheduled time. Find the length of the journey.

5) Solve, $0.4x + 0.3y = 1.7$; $0.7x - 0.2y = 0.8$

6) The semi perimeter of a rectangular shape garden is 36 m. The length of the garden is 4 m more than its breadth. Find the length and the breadth of the garden.

Q. 5 Solve (Each of 3 marks)

1) Form the simultaneous linear equation using the determinants.

$$D = \begin{vmatrix} 4 & -3 \\ 2 & 5 \end{vmatrix} \quad Dx = \begin{vmatrix} 5 & -3 \\ 9 & 5 \end{vmatrix} \quad Dy = \begin{vmatrix} 4 & 5 \\ 2 & 9 \end{vmatrix}$$

2) I held a number 75 in my mind.

Write any condition showing the relation between their digits.

Write the condition showing relation between the number and the number obtained by interchanging the digits.

3) Write any two linear equations in two variables in which the value of one variable is 12 and the other 10.

4) From the railway station I took a rickshaw to go home. It is decided that I have to pay Rs. X for the first kilometre and for each kilometre Rs. Y for the next. For 10 kilometres the fare is Rs. 40 and for 16 kilometres fare is Rs. 58. Find the fare for the first kilometre.

2. Quadratic Equations

Q 1 A) Multiple choice questions (for 1 mark each) :

Choose the correct alternative answer for each of the following sub questions and write the correct alphabet.

- 1) Which of the following is a quadratic equation?
A) $X^3+5X^2+X+3=0$ B) $4X^2-3X-5=0$ C) $X+5=0$ D) $4X^5 = 0$
- 2) Which of the following is not a quadratic equation?
A) $2X^2-X+3=0$ B) $4X^2-3X=0$ C) $X^3-5X +3 =0$ D) $4X^2 = 0$
- 3) If the root of the given quadratic equation are real and equal then find the value of 'k' $X^2 + 2X + k = 0$.
A) 1 B) -1 C) 2 D) -2
- 4) What is the value of discriminant for the quadratic equation $X^2 - 2X - 3 = 0$?
A) -16 B) 16 C) 8 D) 4
- 5) Which of the following quadratic equation has roots -3 and -5 ?
A) $X^2-8X+15=0$ B) $X^2-8X-15=0$ C) $X^2+8X+15=0$ D) $X^2+8X-15=0$
- 6) If one of the roots of quadratic equation $X^2 - kX + 27 = 0$ is 3 then find the value of 'k'.
A) 10 B) 12 C) -12 D) 16
- 7) Degree of quadratic equation is always -----.
A) 1 B) 2 C) 3 D) 4

Q 1 B) Examples for 1 mark :

- 1) Write the given quadratic equation in standard form and also write the values of a, b and c .

$$4y^2 - 3y = -7$$

- 2) Write the roots of following quadratic equation.

$$(p - 5) (p + 3) = 0$$

- 3) If $a = 1$, $b = 4$, $c = -5$ then find the value of $b^2 - 4ac$.

- 4) If $b^2 - 4ac > 0$ and $b^2 - 4ac < 0$ then write the nature of roots of the quadratic equation for each given case.

- 5) Write the given quadratic equation in standard form.

$$m(m - 6) = 9$$

Q 2 A) Activity based questions for 2 marks each:

- 1) Complete the following activity to solve the given quadratic equation by factorization method.

Activity: $X^2 + 8x - 20 = 0$

$$X^2 + (...) - 2x - 20 = 0$$

$$X(x+10) - (...) (x+10) = 0$$

$$(x + 10) (.....) = 0$$

$$X = ... \text{ or } x = 2$$

- 2) Complete the following activity to find the value of discriminant for quadratic equation $4x^2 - 5x + 3 = 0$.

Activity: $4x^2 - 5x + 3 = 0$

$$a = 4, b = ..., c = 3$$

$$b^2 - 4ac = (-5)^2 - (....) \times 4 \times 3$$

$$= (\dots) - 48$$

$$b^2 - 4ac = \dots$$

- 3) If one of the root of quadratic equation $X^2 + kx + 54 = 0$ is -6 then complete the following activity to find the value of 'k'.

Activity: one of the roots of the quadratic equation $X^2 + kx + 54 = 0$ is -6

$$\begin{aligned} \text{Therefore let's take } x &= \dots \\ (-6)^2 + k(-6) + 54 &= 0 \\ (\dots) - 6k + 54 &= 0 \\ -6k + \dots &= 0 \\ k &= \dots \end{aligned}$$

- 4) To decide whether 1 is a root of quadratic equation $X^2 + 4x - 5 = 0$ or not complete the following activity.

Activity: when $x = (\dots)$

$$\begin{aligned} \text{L.H.S.} \\ &= 1^2 + 4(\dots) - 5 \\ &= 1 + 4 - 5 \\ &= (\dots) - 5 \\ &= \dots \\ &= \text{R.H.S.} \end{aligned}$$

Therefore $x = 1$ is a root of quadratic equation $X^2 + 4x - 5 = 0$.

Q 2 B) Examples for 2marks each:

- 1) Solve the following quadratic equation by factorization method.

$$3p^2 + 8p + 5 = 0$$

- 2) If one of the roots of quadratic equation $X^2 - kx - 15 = 0$ is -3 then find the value of 'k'.

- 3) If the Roots of a quadratic equation are 4 and -5 then form the quadratic equation.

- 4) If roots of a quadratic equation $3y^2 + ky + 12 = 0$ are real and equal then find the value of 'k'.
- 5) Roots of a quadratic equation are 5 and -4 then form the quadratic equation.

Q 3 A) Examples for 3 marks each:

- 1) Complete the following activity to solve the given quadratic equation by formula method.

$$2x^2 + 13x + 15 = 0$$

Activity : $2x^2 + 13x + 15 = 0$

$$a = (\dots), b = 13, c = 15$$

$$b^2 - 4ac = (13)^2 - 4 \times 2 \times (\dots\dots\dots)$$

$$= 169 - 120$$

$$b^2 - 4ac = 49$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-(\dots\dots) \pm \sqrt{49}}{4}$$

$$x = \frac{-13 \pm (\dots)}{4}$$

$$x = \frac{6}{4} \quad \text{or} \quad x = \frac{-20}{4}$$

$$X = (\dots) \quad \text{or} \quad x = (\dots)$$

- 2) Complete the following activity to solve the given word problem.
Sum of squares of two consecutive even natural numbers is 244 then find those numbers.

Activity: let the first even natural number be X,

Therefore its consecutive even natural number will be = (....)

By the given condition,

$$X^2 + (x+2)^2 = 244$$

$$X^2 + X^2 + 4x + 4 - (....) = 0$$

$$2x^2 + 4x - 240 = 0$$

$$X^2 + 2x - 120 = 0$$

$$X^2 + (.....) - (.....) - 120 = 0$$

$$X(x+12) - (....)(x+12) = 0$$

$$(x+12)(x-10) = 0$$

$$X = (.....) / X = 10$$

But natural number cannot be negative $x = -12$ is not possible.

Therefore first even natural number is $x = 10$.

Second even consecutive natural number = $x+2 = 10+2 = 12$.

Q 3 B) Examples for 3 marks each:

- 1) If the roots of the given quadratic equations are real and equal then find the value of 'k'.

$$kx(x-2) + 6 = 0$$

- 2) Mukund has Rs. 50 more than Sagar. If the product of the amount they have is 15,000 then find the amount each has.

- 3) Solve the following quadratic equation.

$$\sqrt{3}x^2 + \sqrt{2}x - 2\sqrt{3} = 0$$

- 3) Solve the following quadratic equations by formula method.

a) $5m^2 - 4m - 2 = 0$

b) $Y^2 + \frac{1}{3}y = 2$

- 4) Form a quadratic equation if the roots of the quadratic equation are $2 + \sqrt{7}$ and $2 - \sqrt{7}$.

Q 4) Examples for 4 marks each :

- 1) Present age of mother of Manish is 1 year more than 5 times the present age of Manish. Four years before If the product of their ages was 22 then find the present age of Manish and his mother.
- 2) In an orchard there are total 200 trees. If the number of trees in each column is more by 10 than the number of trees in each row then find the number of trees in each row.
- 3) If the roots of the given quadratic equation are real and equal then find the value of 'm'.

$$(m-12)x^2 + 2(m-12)x + 2 = 0$$

- 4) Solve the following quadratic equation.

$$\frac{1}{4-p} - \frac{1}{2+p} = \frac{1}{4}$$

- 5) Sum of the roots of the quadratic equation is 5 and sum of their cubes is 35 then find the quadratic equation.

Q 5) Examples of 3 marks each:

- 1) **Form a quadratic equation such that one of its roots is 5. Form a quadratic equation for it and write. (For the formation of word problem you can use quantities like age, rupees or natural numbers.) (sample solution for the above example is given below students can take another number to form another example)**

Solution: We need one of the solutions of quadratic equation as 5. Then we can take another root as any number like positive or negative number or zero. Here I am taking another root of quadratic equation as 2.

Then we can form a word problem as below,

Smita is younger than her sister Mita by 3 years ($5-2=3$). If the product of their ages is ($5 \times 2 = 10$). Then find their present ages. (to form a word problem 1 mark)

Let the age of Mita be x ,

Therefore age of Smita = $x-3$ (1 mark for this)

By the given condition,

$$X(x-3) = 10$$

$$X^2 - 3x - 10 = 0 \text{ (to form a quadratic equation 1 mark)}$$

3.Arithmetic Progression

- **Question for 1 Mark.**

A) Choose the correct alternative answer for each of the following sub questions.

1. In an Arithmetic Progression 2,4,6,8,.....the common difference d is.....
(A) 8 (B) 6 (C) 2 (D) -2
2. What is the common difference of the sequence 0,-4,-8,-12 ?
(A) 4 (B) -4 (C) 8 (D) -8
3. For an A.P. 5,12,19,26,..... $a=?$
(A) 12 (B) 26 (C) 19 (D) 5
4. A set of numbers where the numbers are arranged in a definite order, like the natural numbers, is called a
(A) index (B) numbers (C) line (D) sequence
5. First four terms of an A.P., are.....whose first term is -2 and common difference is -2.
(A)-2,0,2,4 (B)-2,4,-8,16 (C)-2,-4,-6,-8 (D)-2,-4,-8,-16
6. 1,4,7,10,13..... Next two terms of this A.P. are.....
(A) 16,19 (B) 10,7 (C) 19,22 (D) 16,18
7. Find d of an A.P. whose first two terms are -3 and -4.
(A) 7 (B) 4 (C) -7 (D) -3
8. If third term and fifth term of an A.P. are 13 and 25 respectively, find its 7th term.
(A) 30 (B) 33 (C) 37 (D) 38
9. Find $t_3 = ?$ in an A.P. 9,15,21,27
(A) 27 (B) 21 (C) 15 (D) 9

10. In an A.P., 0, -4, -8, -12.....find $t_2 = ?$
(A) -8 (B) -4 (C) -12 (D) 0

B) Solve the following sub questions.

1. Decide whether the given sequence 2, 4, 6, 8.....is an A.P.
2. Find a and d for an A.P., 1, 4, 7, 10.....
3. Write the formula of the sum of first n terms for an A.P.
4. Find t_n if $a=20$ आणि $d=3$
5. Find t_5 if $a=3$ आणि $d=-3$
6. $t_n = 2n-5$ in a sequence, find its first two terms.
7. Find first term of the sequence $t_n=2n+1$
8. Find two terms of the sequence $t_n=3n-2$
9. Find common difference of an A.P., 0.9, 0.6, 0.3.....
10. Find d if $t_9=23$ व $a=7$.

• **Question for 2 Marks.**

A) complete the following activity

- 1) Find the sum of first 1000 positive integers.

Activity :- Let $1+2+3+\dots+1000$

Using formula for the sum of first n terms of an A.P.,

$$S_n = \boxed{}$$

$$S_{1000} = \frac{\boxed{}}{2} (1+1000)$$

$$= 500 \times 1001$$

$$= \boxed{}$$

Therefore, Sum of the first 1000 positive integer is $\boxed{}$

- 2) Which term of following A.P. is -940.

50, 40, 30, 20.....

Activity:- Here $a = \square$ $d = \square$ $t_n = -940$

According to formula, $t_n = a + (n-1)d$

$$-940 = \square$$

$$n = \square$$

3) For an A.P., If $t_1 = 1$ and $t_n = 149$ then find S_n .

Activity :- Here $t_1 = 1$, $t_n = 149$, $S_n = ?$

$$S_n = \frac{n}{2} (\square + \square)$$

$$= \frac{n}{2} \times \square$$

$$= \square n$$

4) $t_{19} = ?$ for the given A.P., 9, 4, -1, -6, ...

Activity :- Here $a = 9$, $d = \square$

$$t_n = a + (n-1)d$$

$$t_{19} = 9 + (19-1)\square$$

$$= 9 + \square$$

$$= \square$$

5) Common difference, $d = ?$ for the given A.P., 7, 14, 21, 28, ...

Activity :- Here $t_1 = 7$, $t_2 = 14$, $t_3 = 21$, $t_4 = \square$

$$t_2 - t_1 = \square$$

$$t_3 - t_2 = 7$$

$$t_4 - t_3 = \square$$

Therefore, common difference $d = \square$

B) Solve the following.

1. Decide whether the following sequence is an A.P. or not.

3,5,7,9,11.....

2. Find first four terms of an A.P., whose first term is 3 and common difference is 4.
3. 1,6,11,16.....Find the 18th term of this A.P.
4. In an A.P. $a=2$ and $d=3$, then find S_{12} .
5. Find first four terms of the sequence $t_n=n+2$.
6. In an A.P., $a=10$ and $d= -3$ then find its first four terms.
7. 1,7,13,19.....find 18th term of this A.P.
8. In an A.P. $a=4$ and $d=0$, then find first five terms.
9. If $a=6$ and $d=10$, then find S_{10} .
10. Decide whether the given sequence 24,17,10,3.....is an A.P.? If yes find its common term (t_n) .

- **Question for 3 Marks**

A) complete the following activity

- 1) how many two-digit numbers are divisible by 5?

Activity :- Two-digit numbers divisible by 5 are, 10,15,20.....95.

Here, $d=5$, therefore this sequence is an A.P.

Here $a=10$, $d=5$, $T_n=95$, $n=?$

$$t_n = a+(n-1 \quad \square \quad)$$

$$\square = 10+(n-1)\times 5$$

$$\square = (n-1)\times 5$$

$$\square = (n-1)$$

therefore $n=\square$

there are $\square$ two-digit numbers divisible by 5.

2) Kalpana saves some amount every month. In first three months she saves Rs.100, Rs.150 and Rs.200 respectively. In how many months will she save Rs.1200?

Activity :- Kalpana's monthly saving is Rs.100, Rs.150, Rs.200.....Rs.1200

Here $d=50$. Therefore this sequence is an A.P.

$$a=100, \quad d=50, \quad t_n = \boxed{} \quad n=?$$

$$t_n = a + (n-1) \boxed{}$$

$$\boxed{} = 100 + (n-1) \times 50$$

$$\frac{\boxed{}}{50} = n-1$$

$$n = \boxed{}$$

therefore, she saves Rs.1200 in $\boxed{}$ months.

3) Determine the sum of first 100 terms of given A.P. 12, 14, 16, 18, 20.....

Activity :- here, $a=12$, $\boxed{}$ $n=100$, $S_{100}=?$

$$S_n = \frac{n}{2} [\boxed{} (n-1) d]$$

$$S_{100} = \frac{\boxed{}}{2} [24 + (100-1) d]$$

$$= 50 (24 + \boxed{})$$

$$= \boxed{}$$

$$= \boxed{}$$

4) Find the sum of natural numbers between 1 to 140, which are divisible by 4.

Activity :- Natural numbers between 1 to 140 divisible by 4 are,

4, 8, 12, 16, ... 136

Here $d=4$, therefore this sequence is an A.P.

$$a=4, \quad d=4, \quad t_n=136, \quad S_n=?$$

$$t_n = a + (n-1)d$$

$$\square = 4 + (n-1) \times 4$$

$$\square = (n-1) \times 4$$

$$n = \square$$

Now,

$$S_n = \frac{n}{2} [a + t_n]$$

$$S_n = 17 \times \square$$

$$S_n = \square$$

Therefore, the sum of natural numbers between 1 to 140, which are divisible by 4 is $\square$

5) Decide whether 301 is term of given sequence 5, 11, 17, 23, ...

Activity :- Here, $d = \square$ therefore this sequence is an A.P.

$$a = 5, d = \square$$

Let n th term of this A.P. be 301.

$$t_n = a + (n-1)\square$$

$$301 = 5 + (n-1) \times 6$$

$$301 = 6n - 1$$

$$n = \frac{302}{6} = \square$$

But n is not positive integer

Therefore, 301 is $\square$ the term of sequence 5, 11, 17, 23, ...

B) Solve the following sub questions.

1. Find S_{10} if $a=6$ and $d=3$
2. 12, 16, 20, 24, ... Find 25th term of this A.P.
3. If $t_n = 2n - 5$ is the n th term of an A.P., then find its first five terms.

4. Find the sum of three-digit natural numbers, which are divisible by 4.
5. Merry got a job with salary Rs.15000 per month. If her salary increases by Rs.100 per month, how much would be her salary after 20 months?
6. The n^{th} term of an A.P 5,8,11,14..... is 68. Find n =?
7. What is the sum of an odd numbers between 1 to 50.
8. For an A.P., $t_4=12$ and its common difference $d=-10$, then find t_n .
9. Find 27th and n^{th} term of given A.P. 5,2,-1,-4.....
10. Find the first terms and common difference of an A.P. whose $t_8=3$ and $t_{12}=52$.

• **Question for 4 marks**

Solve the following sub questions.

1. Sum of first 55 terms of an A.P. is 3300. Then find its 28th term.
2. Find the sum of numbers between 1 to 140, divisible by 4.
3. In a 'Mahila Bachat Gat', Sharvari invested Rs.2 on first day, Rs.4 on second day and Rs.6 on third day. If She saves like this, then what would be her total savings in the month of February 2010?
4. Find the sum of odd natural numbers from 1 to 101.
5. Shubhankar invested in a national savings certificate scheme. In the first year he invested Rs.500, in the second year Rs.700, in the third year Rs.900 and so on. Find the total amount that he invested in 12 years.
6. A merchant borrows Rs.1000 and agrees to repay its interest Rs.140 with principal in 12 monthly instalments. Each instalment being less than the preceding one by Rs.10. Find the amount of the first first instalment.
7. Find t_{21} , if $S_{41} = 4510$ in an A.P.
8. In an A.P. $t_{10}=57$ and $t_{15}=87$ then find t_{21} .

9. If Rs.3900 will have to repay In 12 monthly instalments such that each instalment being more than the preceding one by Rs.10, then find the amount of the first and last instalment.
10. Find the next 4 terms of the sequence $\frac{1}{6}$, $\frac{1}{4}$, $\frac{1}{3}$ also find S_n .

4.Probability

Q.1 (A) There are four alternative answers for each of the following sub-questions. Choose the correct alternative answer for each of the following questions and write the alphabet. (1 mark question)

1) Which of the following number cannot represent a probability?

- A) 0.66 B) 1.5 C) 0.15 D) 0.7

2) If $n(A) = 5$, $P(A) = \frac{1}{2}$ then $n(S) = ?$

- A) 10 B) $\frac{3}{5}$ C) $\frac{4}{5}$ D) $\frac{1}{3}$

3) When a dice is thrown the number of sample points in the sample space are

- A) 4 B) 6 C) 2 D) 52

4) In how many ways a card can be drawn from a well shuffled pack of playing cards,

- A) 4 B) 1 C) 26 D) 52

5) What is the probability of the event that a number chosen from 1 to 50 is a prime number ?

- A) $\frac{3}{10}$ B) $\frac{1}{2}$ C) $\frac{1}{4}$ D) $\frac{3}{25}$

6) Which of the following options shows the highest probability.

- A) $\frac{4}{5}$ B) 0.83 C) %58 D) $\frac{1}{2}$

7) When two dice are thrown the number of sample points in the sample space are

- A) 6 B) 12 C) 36 D) 52

Q.1 (B) Solve the following sub-questions. (1 mark question)

1) Write a sample space if two coins are tossed simultaneously.

2) Write a sample space when a die is thrown.

3) In a set of 25 cards, each card bears only one number from 1 to 25. One card

is drawn randomly. Write the sample space for this random experiment?

4) A two digit number is formed with digits 2, 3, 5 without repetition, Write the sample space ?

5) write the event in the set form for the following random experiment.

‘ If one die is thrown, the number obtained on the upper face is even.’

Q.2 (A) Complete the following activity. (2 marks question)

1) If one die is rolled then find the probability of the following event by completing the activity.

Event A: Number on the upper face is prime.

Activity : Let ‘S’ is the sample space.

$$S = \{1, 2, 3, 4, 5, 6\} \therefore n(S) = 6$$

Event A : Prime number on the upper face.

$$A = \{ \dots\dots\dots \} \therefore n(A) = 3$$

$$P(A) = \frac{\square}{n(S)} \dots\dots\dots \text{(Formula)}$$

$$= \frac{\square}{6}$$

$$\therefore P(A) = \frac{1}{\square}$$

2) Two coins are tossed simultaneously. Write the sample space (S) and expected

sample points in the given events by completing the activity.

i) Event A : to get at least one head.

ii) Event B : to get no head.

Activity : Let ‘S’ is the sample space , when two coins are tossed simultaneously.

$$\therefore S = \{ \square, HT, TH, \square \}$$

Event A : to get at least one head.

$$\therefore A = \{ HH, \square, TH \}$$

Event B : to get no head.

$$\therefore B = \{ \square \}$$

3) A card is drawn from a well shuffled pack of 52 playing cards. Find the

probability of i) Event A : Card drawn is a red card.

Activity : Let 'S' is the sample space. $\therefore n(S) = 52$

Event A : Card drawn is a red card.

$\therefore$ Total red cards = () hearts + 13 diamonds

$\therefore n(A) = ()$

$\therefore P(A) = \frac{\square}{n(S)}$ Formula

$$P(A) = \frac{26}{52}$$

$$P(A) = \square$$

- 4) In Adarsh High School , out of 30 students in a class 3 students wear glasses(spectacles). If a student in the class is randomly selected, find the probability that he or she wears glasses(spectacles) by completing the following activity.

Activity : There are a total of 30 students in the class.

$\therefore n(S) = \square$

Event : A Selected student wears glasses(spectacles)

$\therefore n(A) = \square$

$P(A) = \frac{\square}{n(S)}$ Formula

$$P(A) = \square$$

Q.2 (B) Solve the following sub-questions. (2 marks question)

- 1) A card is drawn at random from a pack of well shuffled 52 playing cards. Find the probability that the card drawn is a spade.
- 2) If two coins are tossed, find the probability of event getting head on both the coins.
- 3) If one die is rolled then find the probability of event that the number on the upper face is greater than 6?
- 4) If three coins are tossed simultaneously, find the probability of the event to get no head
- 5) There are 30 cards in a box, each bearing one of the numbers from 1 to 30.

One card is drawn at random from the box. Find the probability of event that the card drawn shows a number which is a multiple of 5.

Q.3 (A) Complete the following activity. (3 marks question)

- 1) A box contains 5 strawberry chocolates, 6 coffee chocolates and 2 peppermint chocolates. If one of the chocolates is picked from the box at randomly, Find the probability of the following events by completing the activity. (i) Event A : it is a coffee chocolate.
(ii) Event B : it is a peppermint chocolate.

Activity : Let 'S' is the sample space.

$$\therefore n(S) = 5+6+2 = 13$$

- (i) Event A : it is a coffee chocolate

$$\therefore n(A) = \square$$

$$\therefore P(A) = \frac{\square}{n(S)} \quad \text{..... Formula}$$

$$P(A) = \frac{\square}{13}$$

- (ii) Event B : it is a peppermint chocolate.

$$\therefore n(B) = \square$$

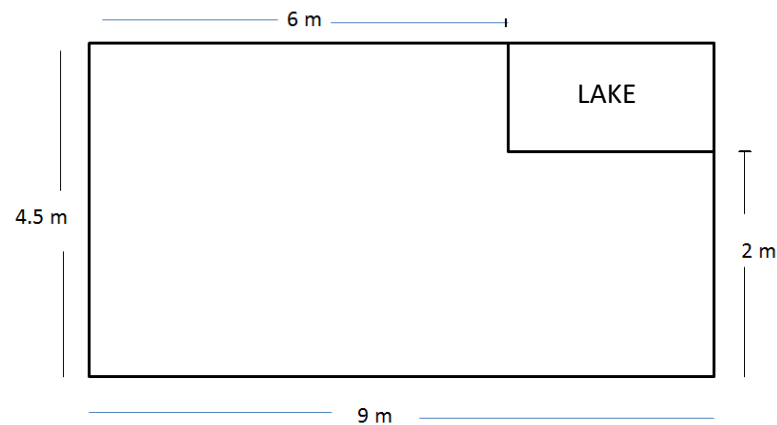
$$\therefore P(B) = \frac{\square}{n(S)} \quad \text{..... Formula}$$

$$P(B) = \frac{\square}{13}$$

Q.3 (B) Solve the following sub-questions. (3 marks question)

- 1) If two dice are rolled simultaneously, find the probability of the following events.
 - i) Event A : The sum of the digits on the upper faces is at least 10.
 - ii) Event B : The sum of the digits on the upper faces is 33.
- 2) If Three coins are tossed simultaneously, find the probability of the following events.
 - i) Event A : To get no heads.
 - ii) Event B : To get at least two heads.
- 3) If One coin and one die are thrown simultaneously, find the probability of the following events.

What is the probability that it crashed inside the lake shown in the figure ?



- 4) Three horses A ,B and C are in a race. A is twice as likely to win as B and B is twice as likely to win as C What is their individual probability of winning?
- 5) A bag contains 8 red balls and some blue balls. If one ball is drawn randomly the probability of drawing a red ball to a blue ball are in the ratio 5 : 2, determine the probability of drawing a blue ball from the bag.



महाराष्ट्र शासन
शालेय शिक्षण व क्रीडा विभाग
राज्य शैक्षणिक संशोधन व प्रशिक्षण परिषद, महाराष्ट्र

७०८ सदाशिव पेठ, कुमठेकर मार्ग, पुणे ४११०३०

संपर्क क्रमांक (०२०) २४४७ ६९३८

E mail: evaluationdept@maa.ac.in

Question Bank

Standard :- 10th

Subject :- Mathematics Part 2

सूचना

१. फक्त विद्यार्थ्यांना प्रश्नप्रकारांचा सराव करून देण्यासाठीच
२. सदर प्रश्नसंचातील प्रश्न बोर्डाच्या प्रश्नपत्रिकेत येतीलच असे नाही याची नोंद घ्यावी.

Class-10

Mathematics part-2

Question bank

1.Similarity

Q.1 A) MCQ (1 Mark)

1.If $\triangle ABC \sim \triangle PQR$ and $AB:PQ = 3:4$ then $A(\triangle ABC):A(\triangle PQR) = ?$

- (A) 9:25 (B) 9:16 (C) 16:9 (D) 25:9

2.Which of the following is not a test of similarity?

- (A) AAA (B) SAS (C) SAA (D) SSS

3.If $\triangle XYZ \sim \triangle PQR$ and $A(\triangle XYZ) = 25 \text{ cm}^2$, $A(\triangle PQR) = 4 \text{ cm}^2$ then $XY:PQ = ?$

- (A) 4:25 (B) 2:5 (C) 5:2 (D) 25:4

4.Ratio of areas of two similar triangles is 9:25. _____ is the ratio of their corresponding sides.

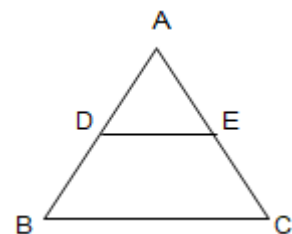
- (A) 3:4 (B) 3 :5 (C) 5:3 (D) 25:81

5. Given $\triangle ABC \sim \triangle DEF$, if $\angle A = 45^\circ$ and $\angle E = 35^\circ$ then $\angle B = ?$

- (A) 45° (B) 35° (C) 25° (D) 40°

6. In fig, seg $DE \parallel$ seg BC , identify correct statement.

- (A) $\frac{AD}{DB} = \frac{AE}{AC}$ (B) $\frac{AD}{DB} = \frac{AB}{AC}$
(C) $\frac{AD}{DB} = \frac{EC}{AC}$ (D) $\frac{AD}{DB} = \frac{AE}{EC}$



7.If $\triangle XYZ \sim \triangle PQR$ then $\frac{XY}{PQ} = \frac{YZ}{QR} = ?$

(A) $\frac{XZ}{PR}$

(B) $\frac{XZ}{PQ}$

(C) $\frac{XZ}{QR}$

(D) $\frac{YZ}{PQ}$

8. If $\triangle ABC \sim \triangle LMN$ and $\angle A = 60^\circ$ then $\angle L = ?$

(A) 45°

(B) 60°

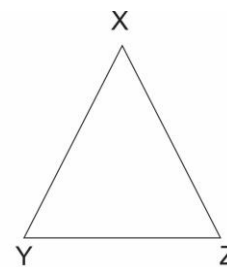
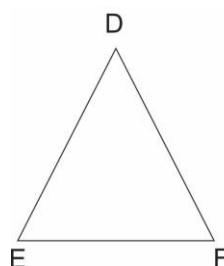
(C) 25°

(D) 40°

9. In $\triangle DEF$ and $\triangle XYZ$, $\frac{DE}{XY} = \frac{FE}{YZ}$ & $\angle E \cong \angle Y$ _____ test gives similarity between $\triangle DEF$ & $\triangle XYZ$.

(A) AAA (B) SAS

(C) SAA (D) SSS



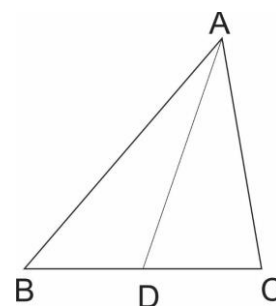
10. In fig $BD=8$, $BC=12$ B-D-C then $\frac{A(\triangle ABC)}{A(\triangle ABD)} = ?$

(A) 2:3

(B) 3:2

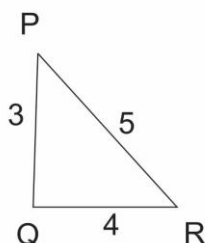
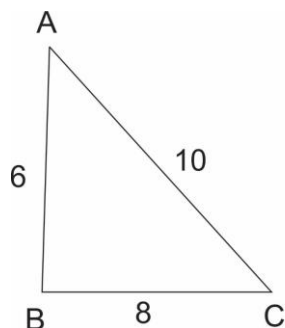
(C) 5:3

(D) 3:4

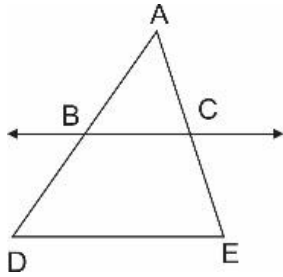


Q.1 B) Solve 1 mark

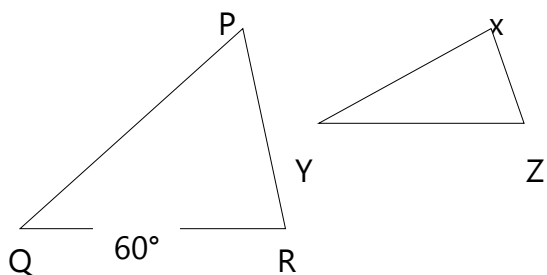
B.1 Are triangles in figure similar? If yes then write the test of similarity.



2. In fig line $BC \parallel$ line DE , $AB=2$, $BD=3$, $AC=4$ and $CE=x$, then find the value of x .



3.State whether the following triangles are similar or not : If yes , then write the test of similarity.



$\angle P = 35^\circ$, $\angle x = 35^\circ$ and $\angle Q = 60^\circ$, $\angle Y =$

4. If $\triangle ABC \sim \triangle LMN$ & $\angle B = 40^\circ$ then $\angle M = ?$ Give reason .

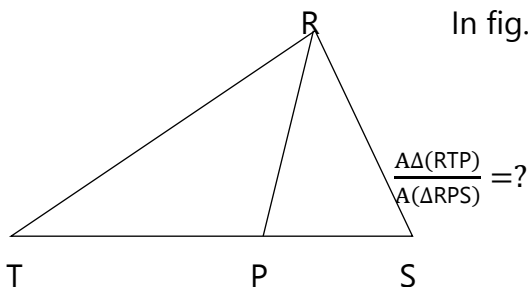
5.Areas of two similar triangles are in the ratio 144:49. Find the ratio of their corresponding sides.

6. $\triangle PQR \sim \triangle SUV$ write pair of congruent angle.

7. $\triangle ABC \sim \triangle DEF$ write ratio of their corresponding sides.

8.

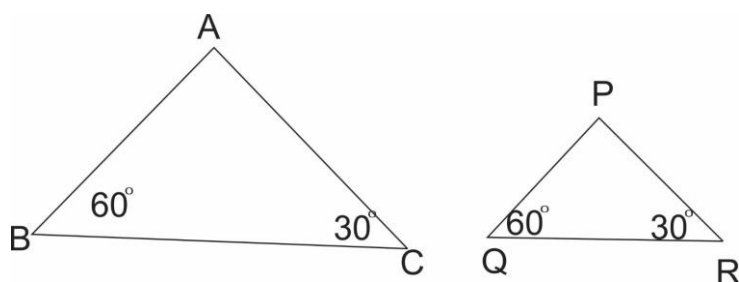
In fig. $TP = 10$ cm $PS = 6$ cm



$$\frac{A(\triangle RTP)}{A(\triangle RPS)} = ?$$

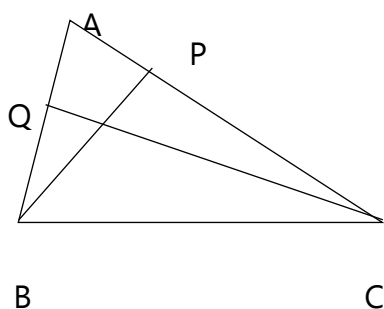
9.Ratio of corresponding sides of two similar triangles is 4:7 then find the ratio of their areas = ?

10. Write the test of similarity for triangles given in figure.



Q.2 A. Complete the activity 2marks

1.



in fig. $BP \perp AC, CQ \perp AB$ A-P-C

& A-Q-B then show that

$\triangle APB$ & $\triangle AQC$ are similar

In $\triangle APB$ & $\triangle AQC$ $\angle APB = [\quad]^\circ \dots (I)$

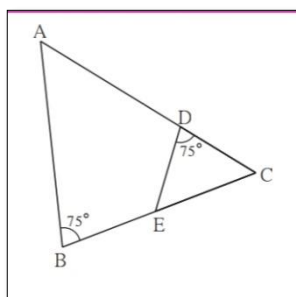
$\angle AQC = [\quad]^\circ \dots (II)$

$\angle APB \cong \angle AQC$ (I) & (II)

$\angle PAB \cong \angle QAC$ [.....]

$\triangle APB \sim \triangle AQC$ [.....]

2. Observe the figure & complete following activity.



in fig $\angle B = 75^\circ, \angle D = 75^\circ$

$\angle B \cong [\dots]$ each of 75°

$\angle C \cong \angle C$ [.....]

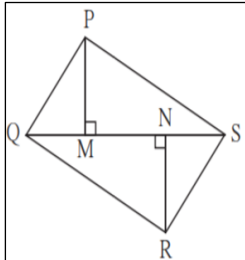
$\triangle ABC \sim \triangle [\dots]$

....[.....]similarity test

3. $\triangle ABC \sim \triangle PQR$, $A(\triangle ABC) = 80 \text{ sqcm}$ $A(\triangle PQR) = 125 \text{ sqcm}$ then complete

$$\frac{A(\triangle ABC)}{A(\triangle PQR)} = \frac{80}{125} = \frac{[\dots]}{[\dots]} \text{ hence } \frac{AB}{PQ} = \frac{[\dots]}{[\dots]}$$

4. in fig. PM=10 cm $A(\triangle PQS) = 100 \text{sqcm}$ $A(\triangle QRS) = 110 \text{sqcm}$ then NR?



$\triangle PQS$ & $\triangle QRS$ having seg QS common base

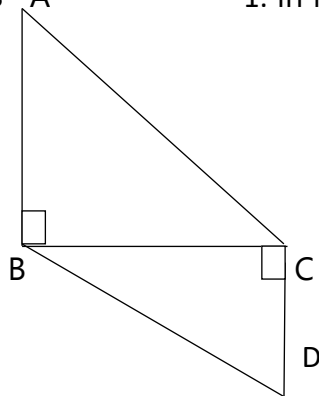
Areas of two triangles whose base are common, are in proportion of their corresponding [.....]

$$\frac{A(\triangle PQS)}{A(\triangle QRS)} = \frac{[\dots]}{NR}, \quad \frac{100}{110} = \frac{[\dots]}{NR}, \quad NR = [\dots] \text{ cm}$$

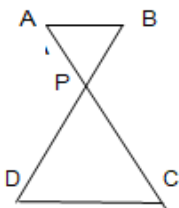
Q.2 B A

1. In fig $AB \perp BC$ and $DC \perp BC$ $AB=6$, $DC=4$

$$\text{then } \frac{A(\triangle ABC)}{A(\triangle BCD)} = ?$$



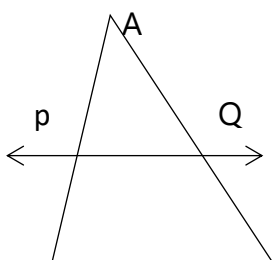
2. In fig seg AC & seg BD intersect each other at point p



$$\frac{AP}{PC} = \frac{BP}{PD} \text{ then prove that } \triangle ABP \sim \triangle DPC$$

3. $\triangle ABP \sim \triangle DEF$ & $A(\triangle ABP) : A(\triangle DEF) = 144 : 81$ then $AB : DE = ?$

4. From given information is $PQ \parallel BC$?



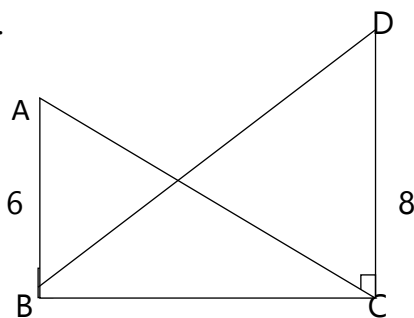
$$AP=2, PB=4 \quad AQ=3, QC=6$$

B

C

5. Areas of two similar triangles are 225 cm^2 and 81 cm^2 if side of smaller triangle is 12cm. find corresponding side of major triangle

6.

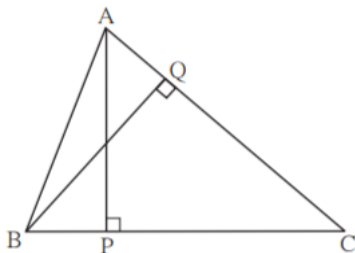


from adjoining figure

$$\angle ABC = 90^\circ \quad \angle DCB = 90^\circ \quad AB = 6,$$

$$DC = 8 \quad \text{then} \quad \frac{A(\triangle ABC)}{A(\triangle DCB)} = ?$$

Q.3A) Complete the following activity 3 marks



1. $\triangle ABC$ AP perpendicular BC & BQ perpendicular AC, B-P-C, A-Q-C
then show that $\triangle CPA \sim \triangle CQB$ if $AP = 7, BQ = 8, BC = 12$
then $AC = ?$ In $\triangle CPA$ and $\triangle CQB$ $\angle CPA \cong \angle CQB$ (each 90°)

$$\angle ACP \cong \angle BCQ \text{ (common angle)}$$

$$\triangle CPA \sim \triangle CQB \text{ (.....similarity test)}$$

$$\frac{AP}{BQ} = \frac{CP}{CQ} \text{ (corresponding sides of similar triangle)}$$

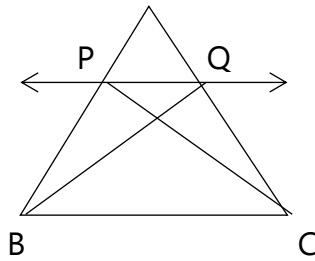
$$\frac{7}{8} = \frac{CP}{12}$$

$$AC \times \frac{7}{8} = 7 \times 12 \quad AC = 10.5$$

2. A line is parallel to one side of triangle which intersects remaining two sides in two distinct points then that line divides sides in same proportion.

Given :In $\triangle ABC$ line $l \parallel$ side BC & line l intersect side AB in P & side

AC in Q A



Given: $\frac{AP}{PB} = \frac{AQ}{QC}$ construction :draw CP & BQ

Proof: $\triangle APQ$ & $\triangle PQB$ have equal height

$$\frac{A(\triangle APQ)}{A(\triangle PQB)} = \frac{[...]}{PB} \text{ (areas in proportion of base)}$$

$$\frac{A(\triangle APQ)}{A(\triangle PQC)} = \frac{[...]}{QC} \text{ (areas in proportion of base)}$$

$\triangle PQC$ & $\triangle PQB$ have [...] is common base

Seg PQ $\parallel$ Seg BC hence height of:

$\triangle APQ$ & $\triangle PQB$

$$A(\triangle PQC) = A(\triangle ...) \text{(III)}$$

$$\frac{A(\triangle APQ)}{A(\triangle PQB)} = \frac{A(\triangle ...)}{A(\triangle ...)} \text{[(I), (II) & (III)]}$$

$$\frac{AP}{PB} = \frac{AQ}{QC} \text{[(I) & (II)]}$$

From fig. seg PQ $\parallel$ side BC

$$AP = x + 3, PB = x - 3, AQ = x + 5, QC = x - 2$$

then complete the activity to find the value of x

in $\triangle PQB$, PQ $\parallel$ side BC

$$\frac{AP}{PB} = \frac{AQ}{QC} \text{[(I) & (II)]}$$

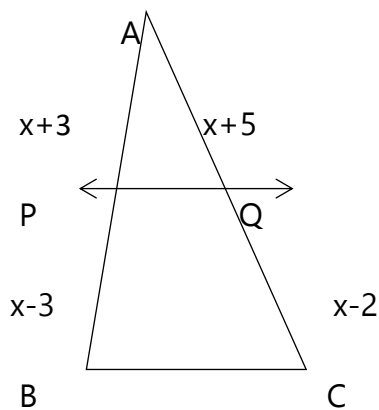
$$\frac{x + 3}{x - 3} = \frac{x + 5}{x - 2}$$

$$(x + 3)[...] = (x + 5)(x - 3)$$

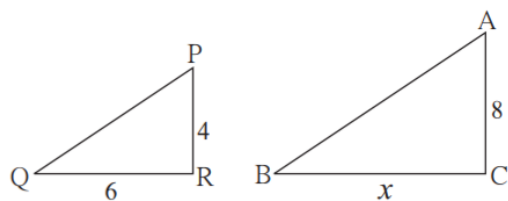
$$x^2 + x - [...] = x^2 + 2x - 15$$

$$x = [...]$$

3.

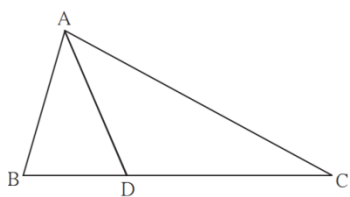


Q.3 B 3 marks

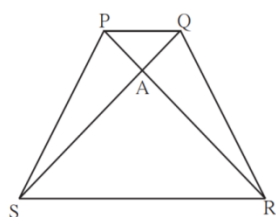


1. There are two poles having heights 8m & 4m on plane ground as shown in fig. Because of sunlight shadow of smaller pole is 6m long then find the length of shadow of longer pole.

2. In $\triangle ABC$ B-D-C & BD=7, BC=20 then find the following ratio

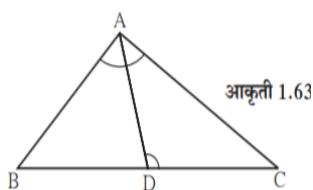


- 1) $\frac{A(\triangle ABD)}{A(\triangle ADC)}$
- 2) $\frac{A(\triangle ABD)}{A(\triangle ABC)}$
- 3) $\frac{A(\triangle ADC)}{A(\triangle ABC)}$



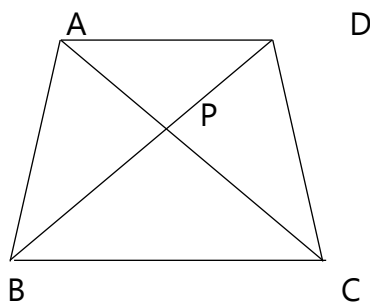
3. In given fig. quadrilateral PQRS side $PQ \parallel$ side SR, $AR=5$ AP, then prove that, $SR=5PQ$

4.



In triangle ABC point D is on side BC (B-D-C) such that $\angle BAC = \angle ADC$ then prove that $CA^2 = CB \times CD$

5.



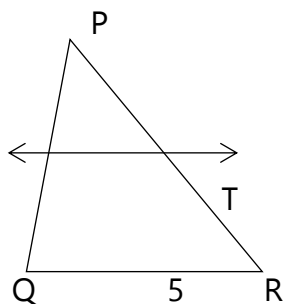
In Quadrilateral ABCD Side $AD \parallel BC$ diagonal AC & BD intersect in point P then prove that $\frac{AP}{PD} = \frac{PC}{BP}$

Q.4 4 marks

1. Side of equilateral triangle PQR is 8 cm then find the area of triangle whose side is half of side of triangle PQR
2. Areas of two similar triangle are equal then prove that triangles are congruent
3. Two triangles are similar. Smaller triangle sides are 4 cm, 5 cm, 6 cm perimeter of larger triangle is 90 cm then find the sides of larger triangle.

Q.5 3 marks

1. In fig, $PS = 2$, $SQ = 6$, $QR = 5$, $PT = x$ & $TR = y$. then find the pair of value of x & y such that $ST \parallel$ side QR .



2. An architect has a model of a building, length of building is 1m then length of model is 0.75cm then find length & height of model building whose actual length is 22.5m & height is 10m.

2. PYTHAGORAS THEOREM

Que. 1 (A). Choose the correct alternative from those given below

(1 mark each)

1. Out of given triplets, which is a Pythagoras triplet ?

- (A) (1,5,10) (B) (3,4,5) (C) (2,2,2) (D) (5,5,2)

2. Out of given triplets, which is not a Pythagoras triplet ?

- (A) (5,12,13) (B) (8,15,17) (C) (7,8,15) (D) (24,25,7)

3. Out of given triplets, which is not a Pythagoras triplet ?

- (A) (9,40,41) (B) (11,60,61) (C) (6,14,15) (D) (6,8,10)

4. In right angled triangle, if sum of square of sides of right angle is 169 then what is the length of hypotenuse?

- (A) 15 (B) 13 (C) 5 (D) 12

5. A rectangle having length of a side is 12 and length of diagonal is 20 then what is length of other side?

- (A) 2 (B) 13 (C) 5 (D) 16

6. If the length of diagonal of square is $\sqrt{2}$ then what is the length of each side ?

- (A) 2 (B) $\sqrt{3}$ (C) 1 (D) 4

7. If length of both diagonals of rhombus are 60 and 80 then what is the length of side?

- (A)100 (B)50 (C) 200 (D) 400

8. If length of sides of triangle are a, b, c and $a^2 + b^2 = c^2$ then which type of triangle it is ?

- (A) Obtuse angled triangle (B) Acute angled triangle
(C) Equilateral triangle (D) Right angled triangle

9. In $\triangle ABC$, $AB = 6\sqrt{3}$ cm, $AC = 12$ cm, and $BC = 6$ cm then $m\angle A = ?$

- (A) 30° (B) 60° (C) 90° (D) 45°

10. The diagonal of a square is $10\sqrt{2}$ cm then its perimeter is

- (A) 10 cm. (B) $40\sqrt{2}$ cm. (C) 20 cm. (D) 40 cm.

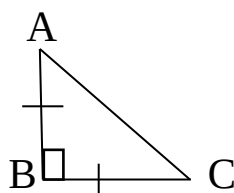
11. Out of all numbers from given dates, which is a Pythagoras triplet ?

- (A) 15/8/17 (B) 16/8/16 (C) 3/5/17 (D) 4/9/15

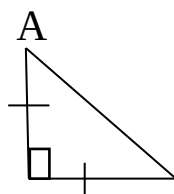
Que. 1 (B). Solve the following questions : (1 mark each)

1. Height and base of a right angled triangle are 24 cm and 18 cm find the length of its hypotenuse ?

2. From given figure, In $\triangle ABC$, $AB \perp BC$, $AB = BC$ then $m\angle A = ?$

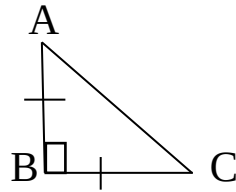


3. From given figure, In $\triangle ABC$, $AB \perp BC$, $AB = BC$, $AC = 2\sqrt{2}$ then $l(AB) = ?$



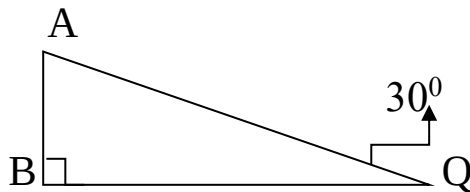
B C

4. From given figure, In ΔABC , $AB \perp BC$, $AB = BC$, $AC = 5\sqrt{2}$ then what is the height of ΔABC ?



5. Find the height of an equilateral triangle having side 4 cm. ?

6. From given figure, In ΔABQ , If $AQ = 8$ cm. then $AB = ?$



7. In right angled triangle, if length of hypotenuse is 25 cm. and height is 7 cm. then what is the length of its base ?

8. If a triangle having sides 50 cm., 14 cm, and 48 cm., then state wheather given triangle is right angled triangle or not.

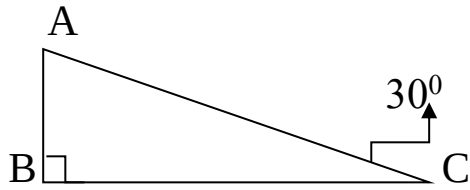
9. If a triangle having sides 8 cm., 15 cm., and 17 cm., then state wheather given triangle is right angled triangle or not.

10. A rectangle having dimensions 35 m X 12 m, then what is the length of its diagonal ?

Que. 2 (A). Complete the following activities (2 marks each)

*** (Write complete answers, don't just fill the boxes)**

1. From given figure, In ΔABC , If $AC = 12$ cm. then $AB = ?$



Activity : From given figure, In ΔABC , $\angle ABC = 90^\circ$, $\angle ACB = 30^\circ$

$$\therefore \angle BAC = \boxed{}$$

$\therefore \Delta ABC$ is $30^\circ - 60^\circ - 90^\circ \Delta$.

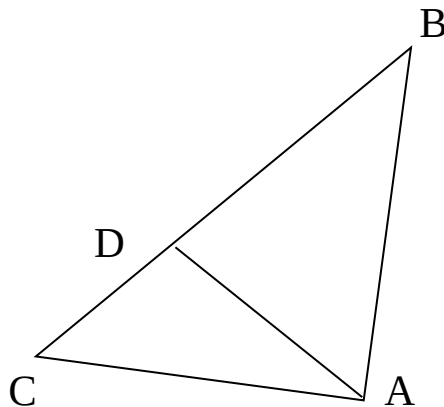
$\therefore$ In ΔABC by Property of $30^\circ - 60^\circ - 90^\circ \Delta$.

$$\therefore AB = \frac{1}{2}AC \text{ and } \boxed{} = \frac{\sqrt{3}}{2} AC.$$

$$\therefore \boxed{} = \frac{1}{2} \times 12 \text{ And } BC = \frac{\sqrt{3}}{2} \times 12$$

$$\therefore \boxed{} = 6 \text{ \& } BC = 6\sqrt{3}.$$

2. From given figure, In ΔABC , $AD \perp BC$, then prove that $AB^2 + CD^2 = BD^2 + AC^2$ by completing activity.



Activity : From given figure, In ΔABC , By pythagoras theorem

$$AC^2 = AD^2 + \boxed{}$$

$$\therefore AD^2 = AC^2 - CD^2 \dots\dots (I)$$

Also, In ΔABD , by pythagoras theorem,

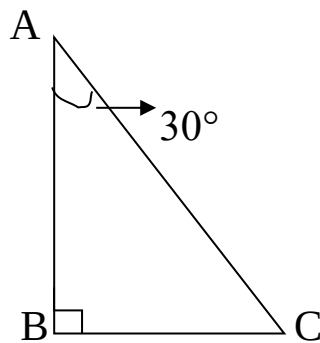
$$AB^2 = \boxed{} + BD^2$$

$$\therefore AD^2 = AB^2 - BD^2 \dots\dots\dots (II)$$

$$\therefore \boxed{} - BD^2 = AC^2 - \boxed{}$$

$$\therefore AB^2 + CD^2 = AC^2 + BD^2$$

3. From given figure, In ΔABC , If $\angle ABC = 90^\circ$ $\angle CAB = 30^\circ$, $AC = 14$ then for finding value of AB and BC , complete the following activity.



Activity : In ΔABC , If $\angle ABC = 90^\circ$ $\angle CAB = 30^\circ$

$$\therefore \angle BCA = \boxed{}$$

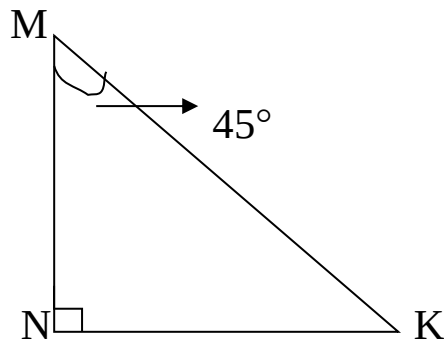
By theorem of $30^\circ - 60^\circ - 90^\circ \Delta^{le}$,

$$\therefore \boxed{} = \frac{1}{2}AC \quad \text{and} \quad \boxed{} = \frac{\sqrt{3}}{2}AC$$

$$\therefore BC = \frac{1}{2} \times \boxed{} \quad \& \quad AB = \frac{\sqrt{3}}{2} \times 14$$

$$\therefore BC = 7 \quad \& \quad AB = 7\sqrt{3}.$$

4. From given figure, In ΔMNK , If $\angle MNK = 90^\circ$ $\angle M = 45^\circ$, $MN = 6$ then for finding value of MN and KN , complete the following activity.



Activity : In ΔMNK , If $\angle MNK = 90^\circ$ $\angle M = 45^\circ$...(given)

$\therefore \angle K = \boxed{}$ (remaining angles of ΔMNK)

By theorem of $45^\circ - 45^\circ - 90^\circ \Delta^le$,

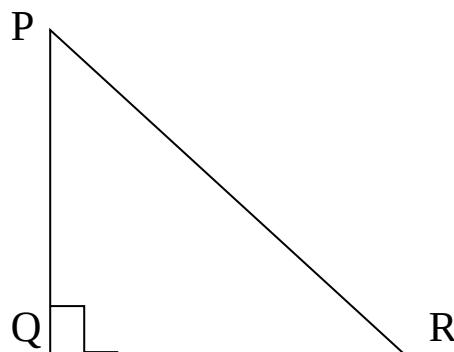
$\therefore \boxed{} = \frac{1}{\sqrt{2}} MK$ and $\boxed{} = \frac{1}{\sqrt{2}} MK$

$\therefore MN = \frac{1}{\sqrt{2}} \times \boxed{}$ & $KN = \frac{1}{\sqrt{2}} \times 6$

$\therefore MN = 3\sqrt{2}$. & $KN = 3\sqrt{2}$.

5. A ladder 10 m long reaches a window 8m above the ground. Find the distance of the foot of the ladder from the base of wall. Complete the given activity.

Activity : as shown in fig. suppose



PR is the length of ladder = 10 m

At P – window, At Q – base of wall, At R – foot of ladder

$$\therefore PQ = 6 \text{ m}$$

$$\therefore QR = ?$$

In ΔPQR , $\angle PQR = 90^\circ$

By Pythagoras Theorem,

$$\therefore PQ^2 + \boxed{} = PR^2 \dots\dots (I)$$

Here, $PR = 10$, $PQ = \boxed{}$

From equation (I)

$$8^2 + QR^2 = 10^2$$

$$QR^2 = 10^2 - 8^2$$

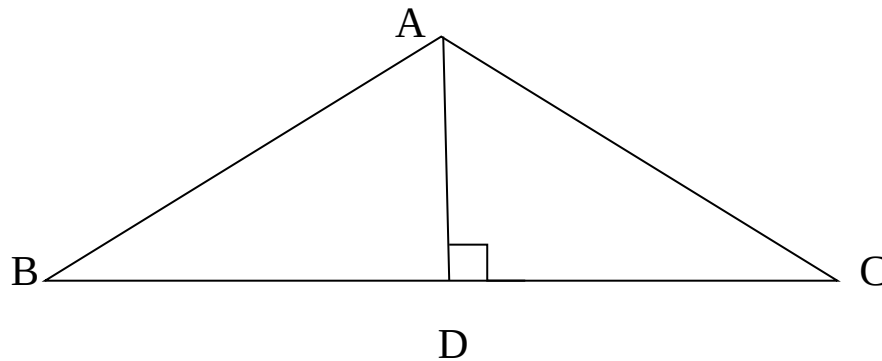
$$QR^2 = 100 - 64$$

$$QR^2 = \boxed{}$$

$$QR = 6$$

$\therefore$ The distance of foot of the ladder from the base of wall is 6 m.

6. From the given figure, In ΔABC , If $AD \perp BC$, $\angle C = 45^\circ$, $AC = 8\sqrt{2}$, $BD = 5$ then for finding value of AD and BC , complete the following activity.



Activity : In ΔADC , If $\angle ADC = 90^\circ$ $\angle C = 45^\circ$... (given)

$\therefore \angle DAC =$ (remaining angles of ΔADC)

By theorem of $45^\circ - 45^\circ - 90^\circ \Delta^le$,

$\therefore$ $= \frac{1}{\sqrt{2}} AC$ and $= \frac{1}{\sqrt{2}} AC$

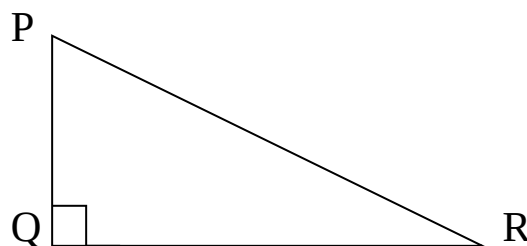
$\therefore AD = \frac{1}{\sqrt{2}} \times$ & $DC = \frac{1}{\sqrt{2}} \times 8\sqrt{2}$

$\therefore AD = 8$ & $DC = 8$

$\therefore BC = BD + DC = 5 + 8 = 13$

7. Complete the following activity to find the length of hypotenuse of right angled triangle, if sides of right angle are 9 cm and 12 cm.

Activity : In ΔPQR , $m \angle PQR = 90^\circ$



By Pythagoras Theorem,

$$\therefore PQ^2 + \boxed{} = PR^2 \dots\dots (I)$$

$$\therefore PR^2 = 9^2 + 12^2$$

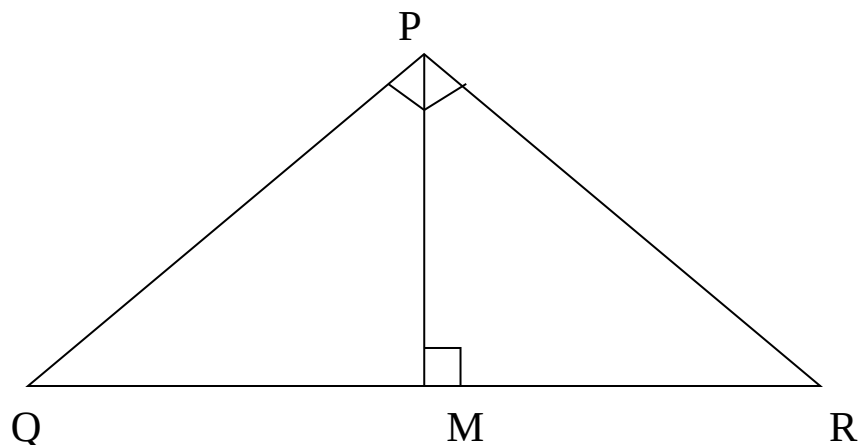
$$\therefore PR^2 = \boxed{} + 144$$

$$\therefore PR^2 = \boxed{}$$

$$\therefore PR = 15$$

$\therefore$ Length hypotenuse of triangle PQR is $\boxed{}$ cm.

8. From given figure, In ΔPQR , If $\angle QPR = 90^\circ$, $PM \perp QR$, $PM = 10$, $QM = 8$ then for finding the value of QR , complete the following activity.



Activity : In ΔPQR , If $\angle QPR = 90^\circ$, $PM \perp QR$, ..., (given)

In ΔPMQ , By Pythagoras Theorem,

$$\therefore PM^2 + \boxed{} = PQ^2 \dots\dots (I)$$

$$\therefore PQ^2 = 10^2 + 8^2$$

$$\therefore PQ^2 = \boxed{} + 64$$

$$\therefore PQ^2 = \boxed{}$$

$$\therefore PQ = \sqrt{164}$$

Here, $\Delta QPR \sim \Delta QMP \sim \Delta PMR$

$$\therefore \Delta QMP \sim \Delta PMR$$

$$\therefore \frac{PM}{RM} = \frac{QM}{PM}$$

$$\therefore PM^2 = RM \times QM$$

$$\therefore 10^2 = RM \times 8$$

$$RM = \frac{100}{8} = \boxed{}$$

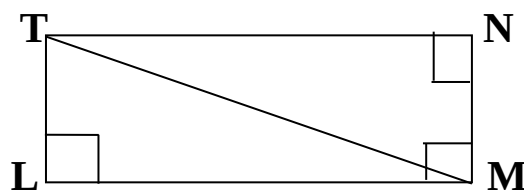
And,

$$QR = QM + MR$$

$$QR = \boxed{} + \frac{25}{2} = \frac{41}{2}$$

9. Find the diagonal of a rectangle whose length is 16 cm and area is 192sq.cm. Complete the following activity.

Activity :



As shown in fig. $\square LMNT$ is rectangle

$$\therefore \text{Area of rectangle} = \text{length} \times \text{breadth}$$

$$\therefore \text{Area of rectangle} = \boxed{} \times \text{breadth}$$

$$\therefore 192 = \boxed{} \times \text{breadth}$$

$$\therefore \text{Breadth} = 12 \text{ cm.}$$

Also, $\angle TLM = 90^\circ \dots\dots$ (each angle of rectangle is right angle)

In ΔTLM , By Pythagoras theorem

$$\therefore TM^2 = TL^2 + \boxed{}$$

$$\therefore TM^2 = 12^2 + \boxed{}$$

$$\therefore TM^2 = 144 + \boxed{}$$

$$\therefore TM^2 = 400$$

$$\therefore TM = 20$$

10. In ΔLMN , $l = 5$, $m = 13$, $n = 12$ then complete the activity to show that wheather given traingle is right angled traingle or not.

* (l , m , n are opposite sides of $\angle L$, $\angle M$, $\angle N$ respectively)

Activity :

In ΔLMN मध्ये, $l = 5$, $m = 13$, $n = \boxed{}$

$$\therefore l^2 = \boxed{} ; \quad m^2 = 169 ; \quad n^2 = 144.$$

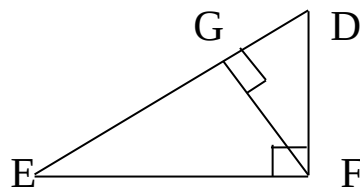
$$\therefore l^2 + n^2 = 25 + 144 = \boxed{}$$

$$\therefore \boxed{} + l^2 = m^2$$

$\therefore$ By Converse of Pythagoras theorem, ΔLMN is right angled triangle.

Que. 3 (B). Solve the following questions : (3 marks each)

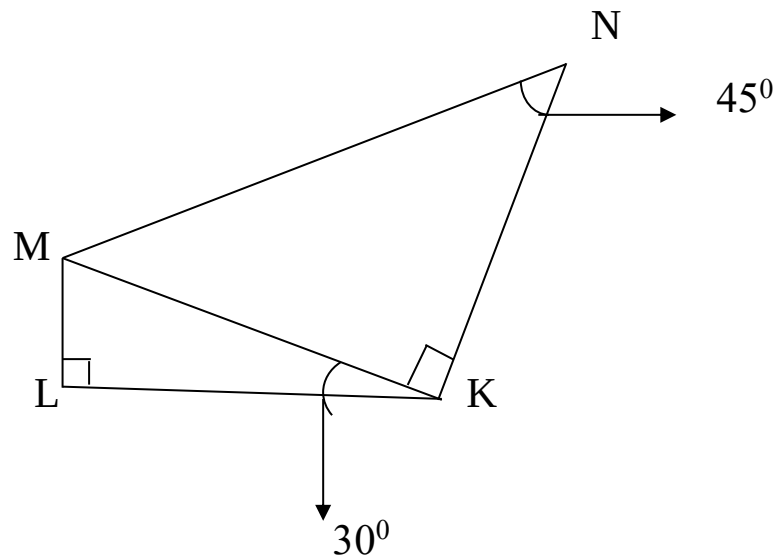
1. As shwon in figure, $\angle DFE = 90^\circ$, $FG \perp ED$, If $GD = 8$, $FG = 12$, then (1) $EG = ?$ (2) $FD = ?$ (3) $EF = ?$



2. A congruent side of an isosceles right angled triangle is 7 cm ,Find its perimeter .

Que. 4. Solve the following questions : (Challenging question 4 marks each)

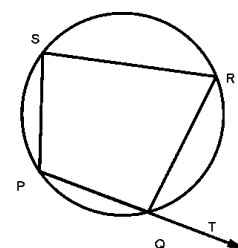
1. As shwon in figure, $LK = 6\sqrt{2}$ then 1) $MK = ?$ 2) $ML = ?$ 3) $MN = ?$



3 Circle.

**Q.1. Four alternative answers for each of the following questions are given.
Choose the correct alternative.**

- 1) Two circles intersect each other such that each circle passes through the centre of the other. If the distance between their centres is 12, what is the radius of each circle ?
(A) 6 cm (B) 12 cm (C) 24 cm (D) can't say
- 2) A circle touches all sides of a parallelogram. So the parallelogram must be a, ...
(A) rectangle (B) rhombus (C) square (D) trapezium
- 3) $\angle ACB$ is inscribed in arc ACB of a circle with centre O . If $\angle ACB = 65^\circ$, find $m(\text{arc } ACB)$.
(A) 65° (B) 130° (C) 295° (D) 230°
- 4) In a cyclic $\square ABCD$, twice the measure of $\angle A$ is thrice the measure of $\angle C$. Find the measure of $\angle C$?
(A) 36 (B) 72 (C) 90 (D) 108
- 5) How many circles can draw passing through three non-collinear points?
(A) 0 (B) Infinite (C) 2 (D) One and only one(unique)
- 6) Two circles of radii 5.5 cm and 4.2 cm touch each other externally. Find the distance between their centres
(A) 9.7 (B) 1.3 (C) 2.6 (D) 4.6
- 7) What is the measurement of angle inscribed in a semicircle?
(A) 90° (B) 120° (C) 100° (D) 60°
- 8) Two circles having diameters 8 cm and 6 cm touch each other internally. Find the distance between their centres.
(A) 2 (B) 14 (C) 7 (D) 1
- 9) Points A, B, C are on a circle, such that $m(\text{arc } AB) = m(\text{arc } BC) = 120^\circ$. No point, except point B , is common to the arcs. Which is the type of $\triangle ABC$?
(A) Equilateral triangle (B) Scalene triangle
(C) Right angled triangle (D) Isosceles triangle
- 10) In $\square PQRS$ if $\angle RSP = 80^\circ$ then find $\angle RQT$?
(A) 100° (B) 80°
(C) 70° (D) 110°

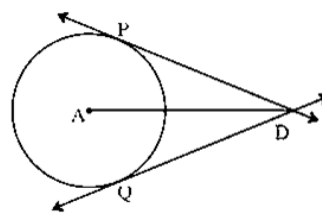


Q.2 Solve the following sub-questions. (1 mark question)

1) How many circles can be drawn passing through a point?

2) Segment DP and segment DQ are tangent segments to the circle with center A,

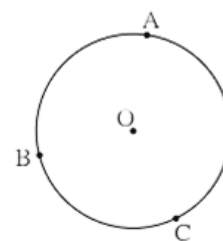
If $DP = 7$ cm. So find the length of the segment DQ?



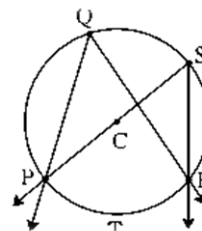
3) Two circles having radii 3.5 cm and 4.8 cm touch each other internally. Find the distance between their centres.

4) What is the measure of a semi circular arc?

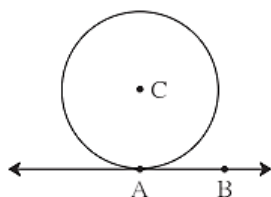
5) A, B, C are any points on the circle with centre O. If $m \text{ arc } (BC) = 110^\circ$ and $m \text{ arc } (AB) = 125^\circ$, find measure arc AC



6) In the figure if $\angle PQR = 50^\circ$ then find $\angle PSR$

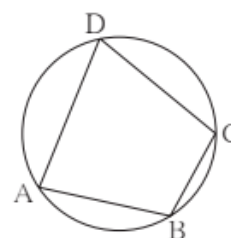


7)

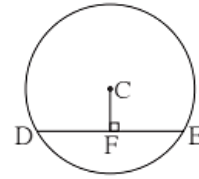


In the adjoining figure the radius of a circle with centre C is 6 cm, line AB is a tangent at A. What is the measure of $\angle CAB$? Why?

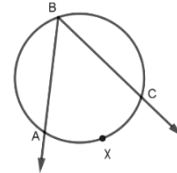
8) In the figure quadrilateral ABCD is a cyclic, if $\angle DAB = 75^\circ$ then find measure of $\angle DCB$



- 9) In the adjoining figure, seg DE is the chord of the circle with center C. seg $CF \perp$ seg DE and $DE = 16$ cm, then find the length of DF?

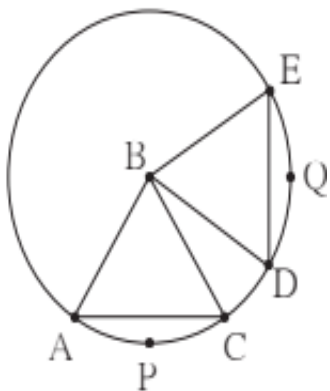


- 10) In the figure, if $\angle ABC = 35^\circ$ then find $m(\text{arc } AXC)$?



Q.3 Complete the following activities (2 marks each).

The chords corresponding to congruent arcs of a circle are congruent. Prove the theorem by completing following activity.



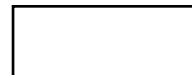
Given : In a circle with centre B

$\text{arc } APC \cong \text{arc } DQE$

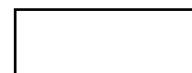
To Prove : Chord $AC \cong$ chord DE

Proof : In $\triangle ABC$ and $\triangle DBE$,

side $AB \cong$ side DB



side $BC \cong$ side



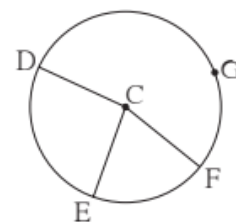
$\angle ABC \cong \angle DBE$

(measure of congruent arcs)

$\triangle ABC \cong \triangle DBE$



- 2) In figure , points G, D, E, F
are concyclic points of a circle with centre C.
 $\angle ECF = 70^\circ$, $m(\text{arc } DGF) = 200^\circ$
find $m(\text{arc } DEF)$ by completing activity.



$$m(\text{arc EF}) = \angle \text{ECF} \quad \dots \quad (\text{Definition of measure of arc})$$

$$\therefore m(\text{arc EF}) = \boxed{}$$

$$\text{But; } m(\text{arc DE}) + m(\text{arc EF}) + m(\text{arc DGF}) = \boxed{} \quad (\text{measure of a complete circle})$$

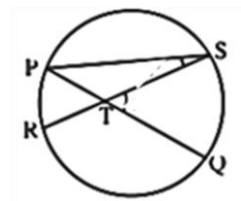
$$\therefore m(\text{arc DE}) = \boxed{}$$

$$\therefore m(\text{arc DEF}) = m(\text{arc DE}) + m(\text{arc EF})$$

$$\therefore m(\text{arc DEF}) = \boxed{}$$

3)

In the figure if the chord PQ and chord RS intersect at point T Prove that :
 $m\angle \text{STQ} = \frac{1}{2} [m(\text{arc PR}) + m(\text{arc SQ})]$ for any measure of $\angle \text{STQ}$ by filling out the boxes.

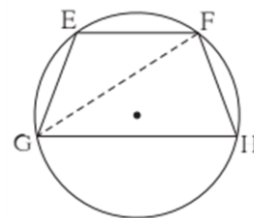


$$\text{Proof: } m\angle \text{STQ} = m\angle \text{SPQ} + \boxed{} \quad \text{.. (Theorem of the external angle of a triangle)}$$

$$= \frac{1}{2} m(\text{arc SQ}) + \boxed{} \quad \dots \quad (\text{inscribed angle theorem})$$

$$= \frac{1}{2} [+]$$

- 4) In figure, chord $EF \parallel$ chord GH . Prove that, chord $EG \cong$ chord FH . Fill in the blanks and write the proof.
Proof : Draw seg GF .



$$\angle EFG = \angle FGH \quad \dots \quad \boxed{} \quad (I)$$

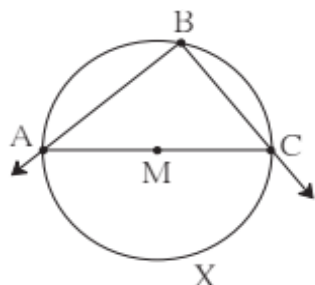
$$\angle EFG = \boxed{} \quad \dots (\text{inscribed angle theorem}) \quad (II)$$

$$\angle FGH = \boxed{} \quad \dots (\text{inscribed angle theorem}) \quad (III)$$

$$\therefore m(\text{arc } EG) = \boxed{} \quad \dots [\text{By (I) , (II) \& (III) }]$$

chord $EG \cong$ chord FH (corresponding chords of congruent arcs)

The angle inscribed in the semicircle is a right angle Prove the result by completing the following activity .



Given: $\angle ABC$ is inscribed angle in a semicircle with center M.

To prove : $\angle ABC$ is a right angle.

Proof: segment AC is a diameter of the circle.

$$\therefore m(\text{arc } AXC) = \boxed{}$$

Arc AXC is intercepted by the inscribed angle $\angle ABC$.

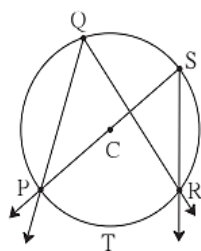
$$\angle ABC = \boxed{} \quad \dots (\text{Inscribed angle theorem})$$

$$= \frac{1}{2} \times \boxed{}$$

$$\therefore m \angle ABC = \boxed{}$$

$\therefore \angle ABC$ is a right angle.

- 6) Prove that angles inscribed in the same arc are congruent.



Given: In a circle with centre C, $\angle PQR$ and $\angle PSR$ is inscribed in same arc PQR. Arc PTR is intercepted by the angles.

To prove : $\angle PQR \cong \angle PSR$.

Proof : $m\angle PQR = \frac{1}{2} \times [m(\text{arc PTR})]$ (i)

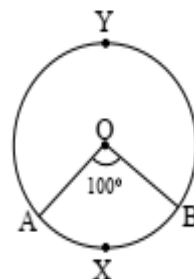
$m\angle$ $= \frac{1}{2} \times [m(\text{arc PTR})]$

$m\angle$ $= m\angle PSR$ By(i) &(ii)

$\therefore \angle PQR \cong \angle PSR$

- 7) If O is the center of the circle in the figure alongside , then complete the table from the given information.

The type of arc

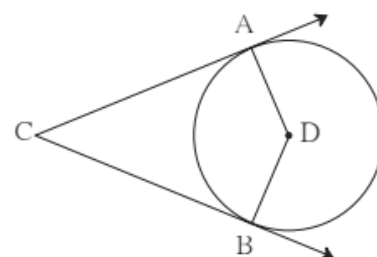


Type of circular arc	Name of circular arc	Measure of circular arc
Minor arc		
Major arc		

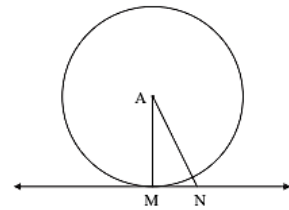
Q.4. Solve the following sub-questions. (2 marks question)

1)

In the adjoining figure circle with Centre D touches the sides of $\angle ACB$ at A and B. If $\angle ACB = 52^\circ$, find measure of $\angle ADB$.

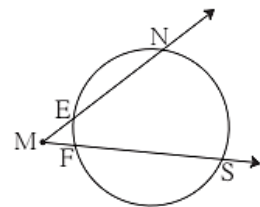


- 2) In the adjoining figure, the line MN touches the circle with center A at point M. If AN = 13 and MN = 5 then find the radius of the circle?



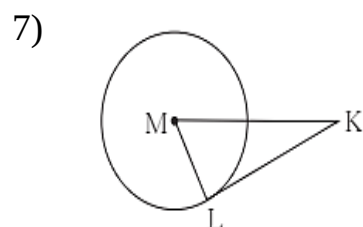
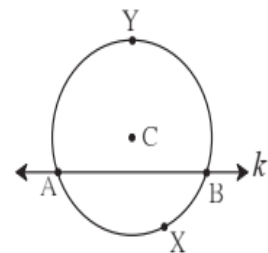
- 3) What is the distance between two parallel tangents of a circle having radius 4.5 cm? Justify your answer.

- 4) In figure, $m(\text{arc NS}) = 125^\circ$, $m(\text{arc EF}) = 37^\circ$, find the measure $\angle NMS$.



- 5) Length of a tangent segment drawn from a point which is at a distance 15 cm from the centre of a circle is 12 cm, find the diameter of the circle?

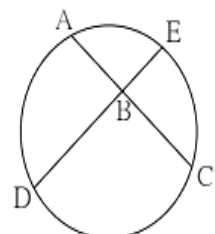
- 6) In the figure a circle with center C has $m(\text{arc AXB}) = 100^\circ$ then find central $\angle ACB$ and measure $m(\text{arc AYB})$.



In figure, M is the centre of the circle and seg KL is a tangent segment. If $MK = 12$, $KL = 6\sqrt{3}$ then find (1) Radius of the circle.

(2) Measures of $\angle K$ and $\angle M$.

- 8) In figure, chords AC and DE intersect at B. If $\angle ABE = 108^\circ$, $m(\text{arc AE}) = 95^\circ$, find $m(\text{arc DC})$.

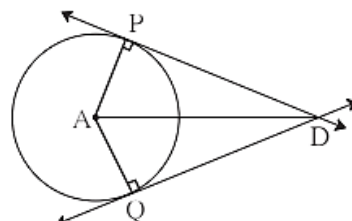


Q. 5. Complete the following activity. (3 marks each)

- 1) Tangent segments drawn from an external point to a circle are congruent, prove this theorem. Complete the following activity.

Given :

To Prove:



Proof : Draw radius AP and radius AQ and complete the following proof of the theorem.

In $\triangle PAD$ and $\triangle QAD$,

Seg PA $\cong$ (radii of the same circle.)

Seg AD $\cong$ Seg AD ()

$\angle APD \cong \angle AQD = 90^\circ$ (tangent theorem)

$\therefore \triangle PAD \cong \triangle QAD$ ()

$\therefore \text{seg DP} \cong \text{seg DQ}$ ()

2)

$\square$ MRPN is cyclic, $\angle R = (5x - 13)^\circ$, $\angle N = (4x + 4)^\circ$. Find measures of $\angle R$ and $\angle N$, by completing the following activity.

Solution : $\square$ MRPN is cyclic

The opposite angles of a cyclic square are

$$\angle R + \angle N = \text{$$

$$\therefore (5x-13)^\circ + (4x+4)^\circ = \text{$$

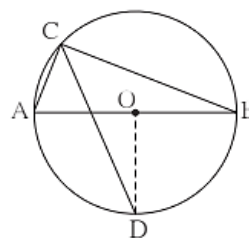
$$\therefore 9x = 189$$

$$\therefore x = \text{$$

$$\therefore \angle R = (5x-13)^\circ = \text{$$

$$\therefore \angle N = (4x+4)^\circ = \text{$$

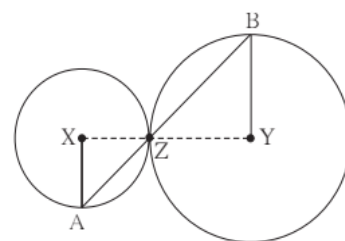
- 3) In figure , seg AB is a diameter of a circle with centre O . The bisector of $\angle ACB$ intersects the circle at point D. Prove that, seg $AD \cong$ seg BD . Complete the following proof by filling in the blanks.



Proof Draw seg OD.

$\angle ACB =$ angle inscribed in semicircle
 $\angle DCB =$ CD is the bisector of $\angle C$
 $m(\text{arc } DB) =$ inscribed angle theorem
 $\angle DOB =$ definition of measure of an arc (I)
seg $OA \cong$ seg OB (II)
 $\therefore$ line OD is of seg AB From (I) and (II)
 $\therefore$ seg $AD \cong$ seg BD

- 4) In the adjoining figure circles with centres X and Y touch each other at point Z. A secant passing through Z intersects the circles at points A and B respectively.



Prove that , radius $XA \parallel$ radius YB .
Fill in the blanks and complete the proof.

Construction : Draw segments XZ and YZ.

Proof : By theorem of touching circles, points X, Z, Y are
 $\therefore \angle XZA \cong$ opposite angles
Let $\angle XZA = \angle BZY = a$ (I)
Now, seg $XA \cong$ seg XZ (radii of the same circle.)
 $\therefore \angle XAZ =$ $= a$ (isosceles triangle theorem) (II)
similarly, seg $YB \cong$ seg YZ (radii of the same circle.)
 $\therefore \angle BZY =$ $= a$ (isosceles triangle theorem.) (III)

∴ from (I), (II), (III),

$$\angle XAZ = \boxed{}$$

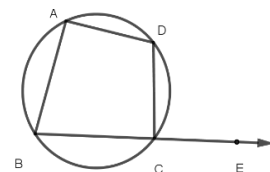
∴ radius $XA \parallel$ radius YB $\boxed{}$)

- 5) An exterior angle of a cyclic quadrilateral is congruent to the angle opposite to its adjacent interior angle, to prove the theorem complete the activity .

Given : $\square ABCD$ is cyclic ,

$\boxed{}$ is the exterior angle of $\square ABCD$

To prove : $\angle DCE \cong \angle BAD$



Proof : $\boxed{} + \angle BCD = \boxed{}$ (Angles in linear pair) (I)

$\square ABCD$ is a cyclic .

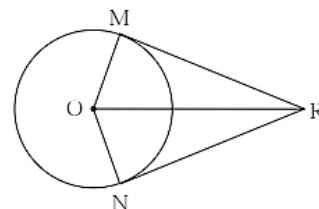
$\boxed{} + \angle BAD \boxed{}$ (Theorem of cyclic quadrilateral) (II)

By (I) and (II)

$$\angle DCE + \angle BCD \boxed{} + \angle BAD$$

$$\angle DCE \cong \angle BAD$$

- 6) Seg RM and seg RN are tangent segments of a circle with centre O . Prove that seg OR bisects $\angle MRN$ as well as $\angle MON$ with the help of activity.



Proof : In ΔRMO and ΔRNO ,

$$\angle RMO \cong \angle RNO = 90^\circ \quad \dots (\quad)$$

$$\text{hypt } OR \cong \text{hypt } OR \quad \dots (\quad)$$

$$\text{seg } OM \cong \text{seg } \quad \dots (\text{ radii of the same circle })$$

$$\therefore \Delta RMO \cong \Delta RNO \quad \dots (\quad)$$

$$\angle MOR \cong \angle NOR$$

$$\text{Similarly } \angle MRO \cong \quad \dots (\quad)$$

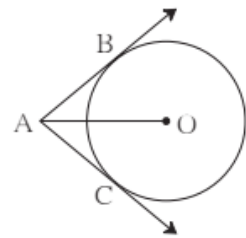
7)

In figure , O is the centre of the circle.

Seg AB, seg AC are tangent segments.

Radius of the circle is r and $\ell(AB) = r$,

Prove that, $\square ABOC$ is a square.



Proof : Draw segment OB and OC.

$$\ell(AB) = r \quad \dots (\text{Given}) \quad (I)$$

$$AB = AC \quad \dots (\quad) \quad (II)$$

$$\text{But } OB = OC = r \quad \dots (\quad) \quad (III)$$

From (I),(II) and (III)

$$AB = \quad = OB = OC = r$$

$\therefore$ Quadrilateral ABOC is $\square$.

$$\text{Similarly } \angle OBA = \quad \dots (\text{Tangent Theorem})$$

If one angle of $\square$ is right angle ,then it is a square.

$\therefore$ Quadrilateral ABOC is a square.

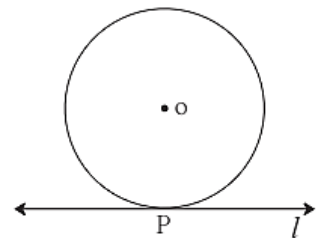
Q.6. Solve the following sub-questions. (3 marks question)

1) Prove the following theorems:

- i) Opposite angles of a cyclic quadrilateral are supplementary.
- ii) Tangent segments drawn from an external point to a circle are congruent.
- iii) Angles inscribed in the same arc are congruent.

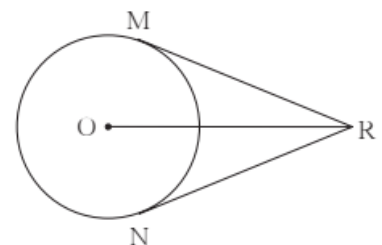
2) Line ℓ touches a circle with centre O at point P. If radius of the circle is 9 cm, answer the following.

- (i) What is $d(O, P)$ = ? Why ?
- (ii) If $d(O, Q) = 8$ cm, where does the point Q lie ?
- (iii) If $d(PQ) = 15$ cm, How many locations of point R are line on line ℓ ? At what distance will each of them be from point P ?



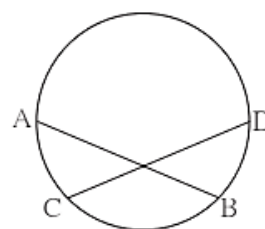
3) In the adjoining figure, O is the centre of the circle. From point R, seg RM and seg RN are tangent segments touching the circle at M and N. If $(OR) = 10$ cm and radius of the circle = 5 cm, then

- (1) What is the length of each tangent segment ?
- (2) What is the measure of $\angle MRO$?
- (3) What is the measure of $\angle MRN$?



4)

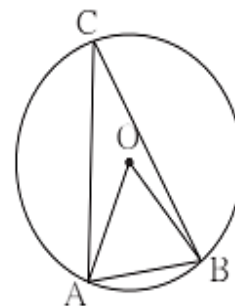
In figure ,chord $AB \cong$ chord CD ,
Prove that, arc $AC \cong$ arc BD



5)

In figure , in a circle with centre O, length of chord AB is equal to the radius of the circle. Find measure of each of the following.

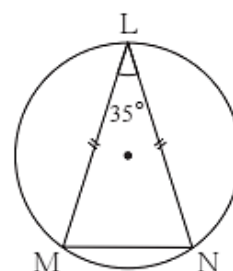
- (1) $\angle AOB$ (2) $\angle ACB$
(3) arc AB



6)

In figure , chord $LM \cong$ chord LN , $\angle L = 35^\circ$
find (i) $m(\text{arc MN})$

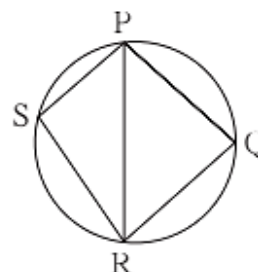
(ii) $m(\text{arc LN})$



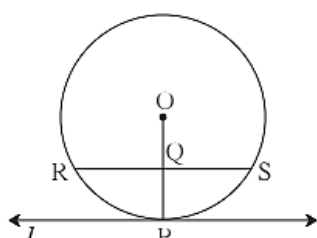
7) Prove that, any rectangle is a cyclic quadrilateral.

8)

In figure , PQRS is cyclic.
side $PQ \cong$ side RQ . $\angle PSR = 110^\circ$,
Find- (1) measure of $\angle PQR$
(2) $m(\text{arc PQR})$
(3) $m(\text{arc QR})$



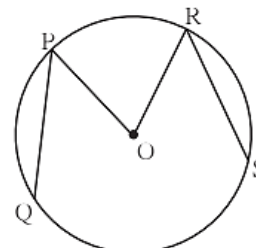
9)



In figure , line ℓ touches the circle with centre O at point P. Q is the mid point of radius OP. RS is a chord through Q such that chords $RS \parallel$ line ℓ . If $RS = 12$ find the radius of the circle

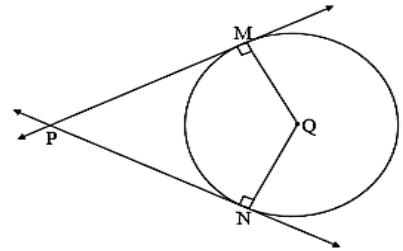
10)

In figure , O is the centre of a circle,
chord $PQ \cong$ chord RS If $\angle POR = 70^\circ$
and $(\text{arc RS}) = 80^\circ$, find (1) $m(\text{arc PR})$ (2)
 $m(\text{arc QS})$ (3) $m(\text{arc QSR})$



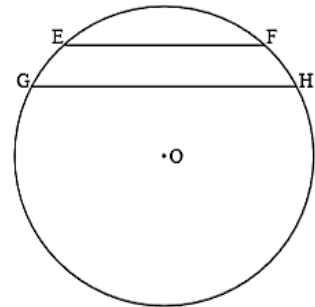
11)

In the adjoining figure circle with Centre Q touches the sides of $\angle MPN$ at M and N. If $\angle MPN = 40^\circ$, find measure of $\angle MQN$.



12)

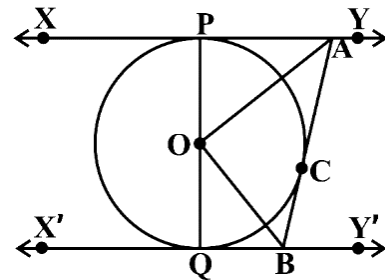
In the figure if O is the center of the circle and two chords of the circle EF and GH are parallel to each other. Show that $\angle EOG \cong \angle FOH$



Q. 7. Solve the following sub-questions. (4 marks question)

1)

In the figure segment PQ is the diameter of the circle with center O. The tangent to the circle drawn from point C on it, intersects the tangents drawn from points P and Q at points A and B respectively, prove that $\angle AOC = 90^\circ$

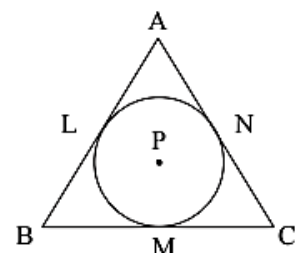


2) The chords AB and CD of the circle intersect at point M in the interior of the same circle then prove that $CM \times BD = BM \times AC$.

3)

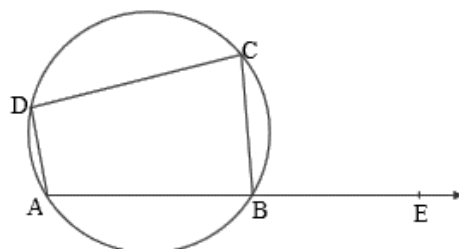
A circle with centre P is inscribed in the $\triangle ABC$. Side AB, side BC and side AC touches the circle at points L, M and N respectively. Radius of the circle is r.

Prove that : $A(\triangle ABC) = \frac{1}{2}(AB + BC + AC) \times r$



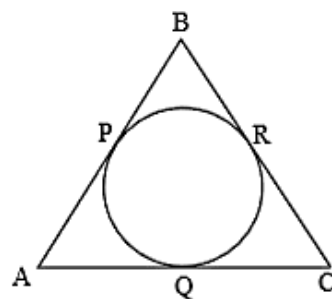
4)

In the figure $\square ABCD$ is a cyclic quadrilateral. If $m(\text{arc } ABC) = 230^\circ$. then find $\angle ABC$, $\angle CDA$, $\angle CBE$

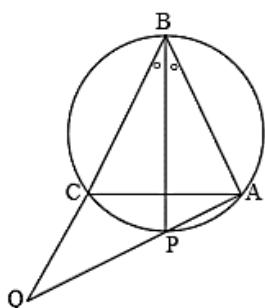


5)

The figure $\triangle ABC$ is an isosceles triangle with a perimeter of 44 cm. The sides AB and BC are congruent and the length of the base AC is 12 cm. If a circle touches all three sides as shown in the figure, then find the length of the tangent segment drawn to the circle from the point B



6)

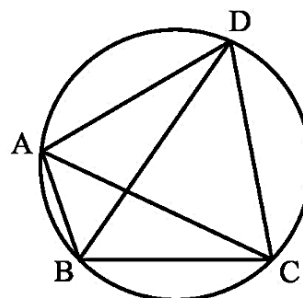


In the figure $\triangle ABC$ is an equilateral triangle. The angle bisector of $\angle B$ will intersect the circumcircle $\triangle ABC$ at point P.

Then prove that : $CQ = CA$.

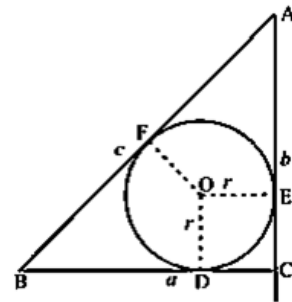
7)

In the figure quadrilateral ABCD is cyclic, If $m(\text{arc } BC) = 90^\circ$ and $\angle DBC = 55^\circ$. Then find the measure of $\angle BCD$.



- 8) Given : A circle inscribed in a right angled $\triangle ABC$. If $\angle ACB = 90^\circ$ and the radius of the circle is r .

To prove : $2r = a + b - c$



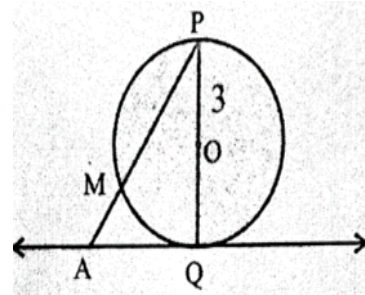
- 9) In a circle with centre P , chord AB is parallel to a tangent and intersects the radius drawn from the point of contact to its midpoint. If $AB = 16\sqrt{3}$ then find the radius of the circle.

- 10) In the figure, O is the center of the circle.

Line AQ is a tangent. If $OP = 3$

$m(\text{arc } PM) = 120^\circ$

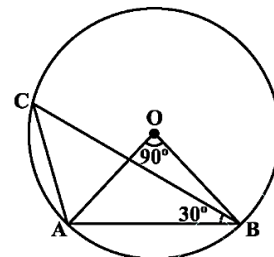
then find the length of AP ?



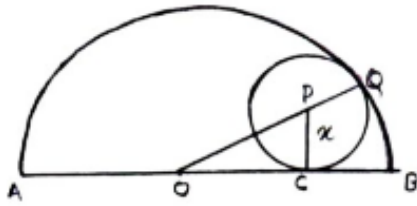
Q. 8. Solve the following sub-questions (3 marks each)

- 1) In the figure, O is the centre of the circle and $\angle AOB = 90^\circ$, $\angle ABC = 30^\circ$

Then find $\angle CAB$?



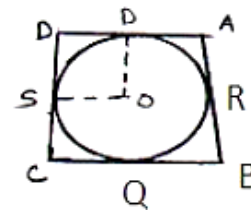
2)



In the figure a circle with center P touches the semicircle at points Q and C having center O. if diameter $AB = 10$, $AC = 6$ then find the radius x of the smaller circle?

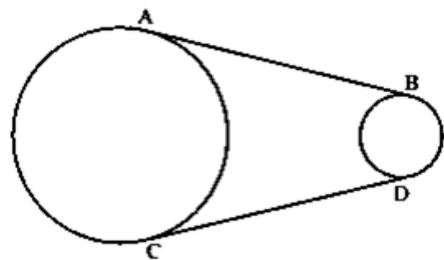
3)

In the figure a circle touches all the sides of quadrilateral ABCD from the inside. The center of the circle is O. If $AD \perp DC$ and $BC = 38$, $QB = 27$, $DC = 25$ then find the radius of the circle?



4)

If AB and CD are the common tangents in the circles of two unequal (different) radii then show that $\text{seg } AB \cong \text{seg } CD$



5) Circles with centres A, B and C touch each other externally. If $AB = 36$, $BC = 32$, $CA = 30$, then find the radii of each circle.

4. Geometric Constructions

Question 1) (A) choose the correct alternative answer for each of the following sub question. Write the correct alphabet.

1) number of tangents can be drawn to a circle from the point on the circle.

A) 3 B) 2 C) 1 D) 0

2) The tangents drawn at the end of a diameter of a circle are.....

A) Perpendicular B) parallel C) congruent D) can't say

3) $\triangle LMN \sim \triangle HIJ$ and $\frac{LM}{HI} = \frac{2}{3}$ then

A) $\triangle LMN$ is a smaller triangle.

B) $\triangle HIJ$ is a smaller triangle.

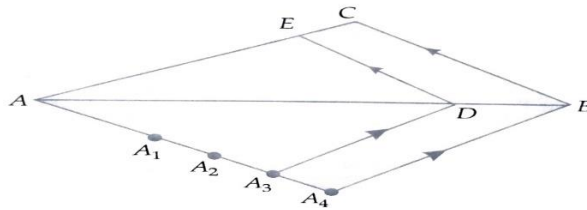
C) Both triangles are congruent.

D) Can't say.

4) number of tangents can be drawn to a circle from the point outside the circle.

A) 2 B) 1 C) one and only one D) 0

5)



In the figure $\Delta ABC \sim \Delta ADE$ then the ratio of their corresponding sides is -----.

A) $\frac{3}{1}$

B) $\frac{1}{3}$

C) $\frac{3}{4}$

D) $\frac{4}{3}$

6) Which theorem is used while constructing a tangent to the circle by using center of a circle?

A) tangent - radius theorem.

B) Converse of tangent - radius theorem.

C) Pythagoras theorem

D) Converse of Pythagoras theorem.

7) $\Delta PQR \sim \Delta ABC$, $\frac{PR}{AC} = \frac{5}{7}$ then

A) ΔABC is greater.

B) ΔPQR is greater.

C) Both triangles are congruent.

D) Can't say.

8) $\triangle ABC \sim \triangle AQR$. $\frac{AB}{AQ} = \frac{7}{5}$ then which of the following option is true.

A) A-Q-B B) A-B-Q C) A-C-B D) A-R-B

Question 1 (B) solve the following examples (1 mark each)

- 1) Construct $\angle ABC = 60^\circ$ and bisect it.
- 2) Construct $\angle PQR = 115^\circ$ and divide it into two equal parts.
- 3) Draw Seg AB of length 9.7cm. Take point P on it such that AP = 3.5 cm and A-P-B. Construct perpendicular to seg AB from point P.
- 4) Draw seg AB of length 4.5 cm and draw its perpendicular bisector.
- 5) Draw seg AB of length 9 cm and divide it in the ratio 3:2.
- 6) Draw a circle of radius 3 cm and draw a tangent to the circle from point P on the circle.

Question 2) (A) Solve the following examples as per the instructions given in the activity. (2 marks each)

- 1) Draw a circle and take any point P on the circle. Draw ray OP



Draw perpendicular to ray OP from point P.

2) Draw a circle with center O and radius 3cm



Take any point P on the circle.



Draw ray OP.



Draw perpendicular to ray OP from point P

1) To draw tangents to the circle from the end points of the diameter of the circle.

Construct a circle with center O. Draw any diameter AB of it.



Draw ray OA and OB



Construct perpendicular to ray OA from point A



Construct perpendicular to Ray OB from point B

Question 2) (B) Solve the following examples (2 marks each)

- 1) Draw a circle of radius 3.4 cm take any point P on it. Draw tangent to the circle from point P.
- 2) Draw a circle of radius 4.2 cm take any point M on it. Draw tangent to the circle from point M.
- 3) Draw a circle of radius 3 cm. Take any point K on it. Draw a tangent to the circle from point K without using center of the circle.
- 4) Draw a circle of radius 3.4 cm. Draw a chord MN 5.7 cm long in a circle. Draw a tangent to the circle from point M and point N.
- 5) Draw a circle of 4.2 cm. Draw a tangent to the point P on the circle without using the center of the circle.
- 6) Draw a circle with a diameter AB of length 6 cm. Draw a tangent to the circle from the endpoints of the diameter.
- 7) Draw seg AB = 6.8 cm. Draw a circle with diameter AB. Draw points C on the circle apart from A and B. Draw line AC and line CB Write the measure of angle ACB .

Question 3) (A) Do the activity as per the given instructions. (3 marks each)

1) Complete the following activity to draw tangents to the circle.

- a) Draw a circle with radius 3.3 cm and center O. Draw chord PQ of length 6.6cm..
Draw ray OP and ray OQ.
- b) Draw a line perpendicular to the ray OP from P.

c) Draw a line perpendicular to the ray OQ from Q.

2) Draw a circle with center O. Draw an arc AB of 100° measure.

Perform the following steps to draw tangents to the circle from point A and B.

a) Draw a circle with any radius and center P.

b) Take any point A on the circle.

c) Draw ray PB such $\angle APB = 100^\circ$.

d) Draw perpendicular to ray PA from point A.

e) Draw perpendicular to ray PB from point B.

3) Do the following activity to draw tangents to the circle without using center of the circle.

a) Draw a circle with radius 3.5 cm and take any point C on it.

b) Draw chord CB and an inscribed angle CAB

c) With the center A and any convenient radius draw an arc intersecting the sides of angle BAC in points M and N.

d) Using the same radius draw and center C, draw an arc intersecting the chord CB at point R.

e) Taking the radius equal to $d(MN)$ and center R, draw an arc intersecting the arc drawn in the previous step. Let D be the point of intersection of these arcs. Draw line CD. Line CD is the required tangent to the circle.

Question 3 B) Solve the following examples (3 marks each):

1) $\triangle ABC \sim \triangle PBQ$, In $\triangle ABC$, $AB = 3$ cm, $\angle B = 90^\circ$, $BC = 4$ cm.

Ratio of the corresponding sides of two triangles is 7:4. Then construct

$\triangle ABC$ and $\triangle PBQ$

2) $\triangle RHP \sim \triangle NED$, In $\triangle NED$, $NE = 7$ cm, $\angle D = 30^\circ$, $\angle N = 20^\circ$ and $\frac{HP}{ED} = \frac{4}{5}$. Then

construct $\triangle RHP$ and $\triangle NED$.

3) $\triangle PQR \sim \triangle ABC$, In $\triangle PQR$ $PQ = 3.6$ cm, $QR = 4$ cm, $PR = 4.2$ cm ratio of the corresponding sides of triangle is 3:4 then construct $\triangle PQR$ and $\triangle ABC$.

4) Construct an equilateral $\triangle ABC$ with side 5 cm. $\triangle ABC \sim \triangle LMN$, ratio the corresponding sides of triangle is 6:7 then construct $\triangle LMN$ and $\triangle ABC$

5) Draw a circle with center O and radius 3.4. Draw a chord MN of length 5.7 cm in a circle. Draw a tangent to the circle from point M and N.

6) Draw a circle with center O and radius 3.6 cm. draw a tangent to the circle from point B at a distance of 7.2 cm from the center of the circle.

7) Draw a circle with center C and radius 3.2 cm. Draw a tangent to the circle from point P at a distance of 7.5 cm from the center of the circle.

8) Draw a circle with a radius of 3.5 cm. Take the point K anywhere on the circle. Draw a tangent to the circle from K (without using the center of the circle).

9) Draw a circle of radius 4.2 cm. Draw arc PQ measuring 120°
Draw a tangent to the circle from point P and point Q.

10) Draw a circle of radius 4.2 cm. Draw a tangent to the circle from a point 7 cm away from the center of the circle.

11) Draw a circle of radius 3 cm and draw chord XY 5 cm long. Draw the tangent of the circle passing through point X and point Y (without using the center of the circle).

Question 4) solve the following examples. (4 marks each)

1) $\triangle AMT \sim \triangle AHE$, In $\triangle AMT$, $AM = 6.3$ cm

$\angle MAT = 120^\circ$, $AT = 4.9$ cm, $\frac{AM}{HA} = \frac{7}{5}$ then construct $\triangle AMT$ and $\triangle AHE$.

2) $\triangle RHP \sim \triangle NED$, In $\triangle NED$, $NE = 7$ cm. $\angle D = 30^\circ$, $\angle N = 20^\circ$, $\frac{HP}{ED} = \frac{4}{5}$ then construct $\triangle RHP$ and $\triangle NED$.

3) $\triangle ABC \sim \triangle PBR$, $BC = 8$ cm, $AC = 10$ cm, $\angle B = 90^\circ$,

$\frac{BC}{BR} = \frac{5}{4}$ then construct $\triangle ABC$ and $\triangle PBR$

4) $\triangle AMT \sim \triangle AHE$, In $\triangle AMT$ $AM=6.3$ cm, $\angle TAM=50^\circ$, $AT=5.6$ cm, $\frac{AM}{AH}=\frac{7}{5}$, then construct $\triangle AMT$ and $\triangle AHE$.

5) Draw a circle with radius 3.3cm. Draw a chord PQ of length 6.6cm .

Draw tangents to the circle at points P and Q. Write your observation about the tangents.

6) Draw a circle with center O and radius 3 cm. Take the point P and the point Q at a distance of 7 cm from the center of the circle on the opposite side of the circle at the intersection passing through the center of the circle Draw a tangent to the circle from the point P and the point Q.

Question 5) Solve the following examples (3 marks each)

1) Draw a circle with radius 4cm and construct two tangents to a circle such that when those two tangents intersect each other outside the circle they make an angle of 60° with each other.

2) $AB = 6$ cm, $\angle BAQ = 50^\circ$. Draw a circle passing through A and B so that AQ is the tangent to the circle.

3) Draw a circle with radius 3 cm. Construct a square such that each of its side will touch the circle from outside.

4) Take points P and Q on the same side of line AB Draw a circle passing through point P and point Q so that it touches line AB.

5) Draw any circle with radius greater than 1.8 cm and less than 3 cm.

Draw a chord AB 3.6 cm long in this circle. Tangent to the circle passing through A and B without using the center of the circle

6) Draw a circle with center O and radius 3 cm. Take point P outside the circle such that $d(O, P) = 4.5$ cm. Draw tangents to the circle from point P.

7) Draw a circle with center O and radius 2.8 cm. Take point P in the exterior of a circle such that tangents PA and PB drawn from point P make an angle $\angle APB$ of measure 70° .

8) Point P is at a distance of 6 cm from line AB. Draw a circle of radius 4cm passing through point P so that line AB is the tangent to the circle.

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Coordinate Geometry

Q. 1 A) MCQ

- 1) Point P is midpoint of segment AB where A(- 4,2) and B(6,2) then the coordinates of P are -----
- A) (-1, 2) B) (1, 2) C) (1, - 2) D) (-1, - 2)
- 2) The distance between Point P (2 , 2) and Q (5, x) is 5 cm then the value of x = -----
- A) 2 B) 6 C) 3 D) 1
- 3) The distance between points P (-1 , 1) and Q(5, -7) is -----..
- A) 11 cm B) 10 cm C) 5 cm D) 7 cm
- 4) If the length of the segment joining point L (x , 7) and point M(1, 15) is 10 cm then the value of x is -----
- A) 7 B) 7 or -5 C) - 1 D) 1
- 5) Find distance between point A (-3 , 4) and origin O.
- A) 7 cm B) 10 cm C) 5 cm D) -5 cm
- 6) If point P (1 , 1) divide segment joining point A and point B (-1 , -1) in the ratio 5 : 2 then the coordinates of A are -----
- A)(3 ,3) B)(6, 6) C)(2, 2) D)(1, 1)
- 7) If segment AB is parallel Y-axis and coordinates of A are (1, 3) then the coordinates of B are -----
- A)(3 ,1) B)(5, 3) C)(3, 0) D)(1, -3)
- 8) If point P is midpoint of segment joining point A (-4, 2) and point B(6, 2) then the coordinates of P are -----
- A)(-1, 2) B)(1 , 2) C)(1 , -2) D) (-1, - 2)

9) If point P divides segment AB in the ratio 1:3 where A(-5, 3) and B(3, -5) then the coordinates of P are -----

- A)(-2, -2) B)(-1, -1) C)(-3, 1) D)(1, -3)

10) If the sum of x-coordinates of the vertices of a triangle is 12 and the sum of Y-coordinates is 9 then the coordinates of centroid are -----

- A)(12, 9) B)(9, 12) C)(4, 3) D)(3, 4)

Q. 1 B. Solve the following (1 mark each)

- 1) Find the coordinates of the point of intersection of the graph of the equation $X = 2$ and $y = -3$.
- 2) Find distance between point A (7, 5) and B (2, 5).
- 3) The coordinates of diameter AB of a circle are A (2, 7) and B (4, 5) then find the coordinates of the centre.
- 4) Write the X-coordinate and Y-coordinate of point P(-5, 4).
- 5) What are the coordinates of origin?
- 6) Find distance of point A(6, 8) from origin:
- 7) Find coordinates of midpoint joining (-2, 6) and (8, 2)
- 8) Find the coordinates of centroid of a triangle whose vertices are (4, 7), (8, 4) and (7, 11).
- 9) Find distance between point O(0, 0) and B (-5, 12).
- 10) Find coordinates of midpoint of point (0, 2) and (12, 14).

Q. 2 A) Complete the activity (each of 2 mark)

- 1) Find distance between point Q (3, -7) and point R (3, 3)

Solution: Suppose Q (x_1, y_1) and point R (x_2, y_2)

$$x_1 = 3, y_1 = -7 \quad \text{and} \quad x_2 = 3, y_2 = 3$$

Using distance formula,

$$d(Q, R) = \sqrt{\boxed{}}$$

$$\therefore d(Q, R) = \sqrt{\boxed{}} 100$$

$$\therefore d(Q, R) = \sqrt{\boxed{}}$$

$$\therefore d(Q, R) = \boxed{}$$

2) Find distance between point A(-1, 1) and point B (5, -7) :

Solution : - Suppose A(x_1 , y_1) and B(x_2 , y_2)

$$X_1 = -1, y_1 = 1 \quad \text{and} \quad x_2 = 5, y_2 = -7$$

Using distance formula,

$$d(A, B) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$\therefore d(A, B) = \sqrt{\boxed{} + ((-7) - \boxed{})^2}$$

$$\therefore d(A, B) = \sqrt{\boxed{}}$$

$$\therefore d(A, B) = \boxed{}$$

3) Find coordinates of the midpoint of a segment joining point A(-1, 1) and point B(5, -7).

Solution: - Suppose A(x_1 , y_1) and B(x_2 , y_2)

$$X_1 = -1, y_1 = 1 \quad \text{and} \quad x_2 = 5, y_2 = -7$$

Using midpoint formula,

$$\therefore \text{Coordinates of midpoint of segment AB} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) = \left(\frac{\boxed{}}{2}, \frac{\boxed{}}{2} \right)$$

$$\therefore \text{Coordinates of the midpoint} = \left(\frac{4}{2}, \frac{\boxed{}}{2} \right)$$

$$\therefore \text{Coordinates of the midpoint} = (2, \boxed{})$$

- 4) The coordinates of the vertices of a triangle ABC are A (-7, 6), B(2, -2) and C(8, 5) find coordinates of its centroid.

Solution : - Suppose A(x_1 , y_1) and B(x_2 , y_2) and C (x_3 , y_3)

$$X_1 = -7, y_1 = 6 \text{ and } x_2 = 2, y_2 = -2 \text{ and } x_3 = 8, y_3 = 5$$

Using Centroid formula

$\therefore$ Coordinates of the centroid of a triangle

$$ABC = \left(\frac{x_1 + x_2 + x_3}{3}, \frac{y_1 + y_2 + y_3}{3} \right) = \left(\frac{\boxed{}}{3}, \frac{\boxed{}}{3} \right)$$

$\therefore$ Coordinates of the centroid of a triangle ABC = $\left(\frac{3}{3}, \boxed{} \right)$

$\therefore$ Coordinates of the centroid of a triangle ABC = $\left(1, \boxed{} \right)$

Q. 2 Solve (Each of 2 marks)

- 1) The point Q divides segment joining A (3, 5) and B (7, 9) in the ratio 2 : 3. Find the X-coordinate of Q.
- 2) If the distance between point L (x, 7) and point M (1, 15) is 10 then find the value of X.
- 3) Find the coordinates of midpoint of segment joining (22, 20) and (0, 16)
- 4) Find distance CD where C(-3a, a), D(a, -2a).
- 5) Show that the point(11, -2) is equidistant from (4, -3) and (6, 3).

Q. 3 A) Complete the activity (Each of 3 marks)

- 1) If the point P (6,7) divides the segment joining A (8, 9) and B(1, 2) in some ratio. Find that ratio.

Solution : Point P divides segment AB in the ratio m : n.

$$A (8, 9) = (x_1, y_1), B (1, 2) = (x_2, y_2) \text{ and } P (6, 7) = (x, y)$$

Using Section formula of internal division,

$$\therefore 7 = \frac{m(\text{ }) + n(9)}{m+n}$$

$$\therefore 7m + 7n = \text{ } + 9n$$

$$\therefore 7m - \text{ } = 9n - \text{ }$$

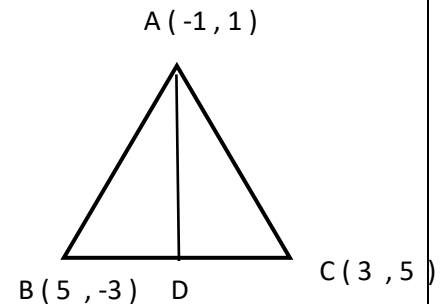
$$\therefore \text{ } = 2n$$

$$\therefore \frac{m}{n} = \text{ }$$

- 1) From the figure given alongside find the length of the median AD of triangle ABC .

Complete the activity.

Solution :- Here A (-1 , 1), B(5, -3), C (3, 5) and suppose D (x,y) are coordinates of point D.



Using midpoint formula,

$$X = \frac{5+3}{2}$$

$$y = \frac{-3+5}{2}$$

$$\therefore x = \text{ }$$

$$\therefore y = \text{ }$$

Using distance formula,

$$\therefore AD = \sqrt{(4 - \text{ })^2 + (1 - 1)^2}$$

$$\therefore AD = \sqrt{(\text{ })^2 + (0)^2}$$

$$\therefore AD = \sqrt{\text{ }}$$

$$\therefore \text{The length of median AD} = \text{ }$$

Q. 3 B) Solve the following (Each of 3 marks)

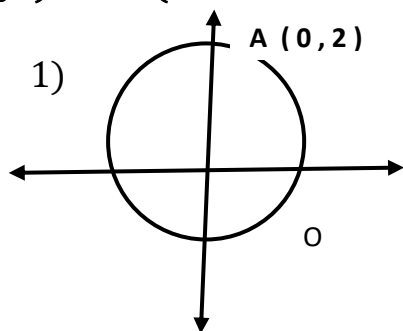
- 1) Show that P(-2 , 2), Q (2, 2) and R (2, 7) are vertices of a right angled triangle.
- 2) Show that the point (0 , 9) is equidistant from the points (-4,1) and (4 , 1).

- 3) Point $P(-4, 6)$ divides point $A(-6, 10)$ and $B(m, n)$ in the ratio $2:1$ then find the coordinates of point B .

Q. 4 Solve (Each of 4 marks)

- 1) Show that points $A(-4, -7)$, $B(-1, 2)$, $C(8, 5)$ and $D(5, -4)$ are the vertices of a parallelogram $ABCD$.
- 2) Show that the points $(0, -1)$, $(8, 3)$, $(6, 7)$ and $(-2, 3)$ are vertices of a rectangle.
- 3) Show that the points $(2, 0)$, $(-2, 0)$ and $(0, 2)$ are vertices of a triangle. State the type of triangle with reason.
- 4) If $A(5, 4)$, $B(-3, -2)$ and $C(1, -8)$ are the vertices of a ΔABC . Segment AD is median. Find the length of seg AD :
- 5) Show that $A(1, 2)$, $(1, 6)$, $C(1 + 2\sqrt{3}, 4)$ are vertices of an equilateral triangle.

Q.5) Solve (Each of 3 marks)



Seg OA is the radius of a circle with centre O .

The coordinates of point A is $(0, 2)$ then

decide whether the point $B(1, 2)$ is on the circle?

- 2) Find the ratio in which Y -axis divides the point $A(3, 5)$ and point $B(-6, 7)$. Find the coordinates of that point.
- 3) The points $(7, -6)$, $(2, K)$ and $(h, 18)$ are the vertices of triangle. If $(1, 5)$ are the coordinates of centroid. Find the value of h and k .
- 4) Using distance formula decide whether the points $(4, 3)$, $(5, 1)$ and $(1, 9)$ are collinear or not?

Trigonometry

Que.) 1 A) .Choose the correct alternative from those given below each question : (1 mark for each MCQ)

1. $\cos \theta \cdot \sec \theta = ?$

- A) 1 B) 0 C) $\frac{1}{2}$ D) $\sqrt{2}$

2. $\sec 60^\circ = ?$

- A) $\frac{1}{2}$ B) 2 C) $\frac{2}{\sqrt{3}}$ D) $\sqrt{2}$

3. $1 + \cot^2 \theta = ?$

- A) $\tan^2 \theta$
 $\cos^2 \theta$ B) $\sec^2 \theta$ C) $\operatorname{cosec}^2 \theta$ D)

4. $\cot \theta \cdot \tan \theta = ?$

- A) 1 B) 0 C) 2 D) $\sqrt{2}$

5. $\sec^2 \theta - \tan^2 \theta = ?$

- A) 0 B) 1 C) 2 D) $\sqrt{2}$

6. $\sin^2 \theta + \sin^2 (90^\circ - \theta) = ?$

- A) 0 B) 1 C) 2 D) $\sqrt{2}$

7. $\frac{1 + \cot^2 A}{1 + \tan^2 A} = ?$

- A) $\tan^2 \theta$ B) $\sec^2 \theta$ C) $\operatorname{cosec}^2 \theta$ D) $\cot^2 \theta$

8. $\sin \theta = \frac{1}{2}$ then $\theta = ?$

- A) 30° B) 45° C) 60° D) 90°

9. $\tan (90-\theta) = ?$

- A) $\sin \theta$ B) $\cos \theta$ C) $\cot \theta$ D) $\tan \theta$

10. $\cos 45^0 = ?$

- A) $\sin 45^0$ B) $\sec 45^0$ C) $\cot 45^0$ D) $\tan 45^0$

11. If $\sin \theta = \frac{3}{5}$ then $\cos \theta = ?$

- A) $\frac{5}{3}$ B) $\frac{3}{5}$ C) $\frac{4}{5}$ D) $\frac{5}{4}$

12. Which is not correct formula ?

A) $1 + \tan^2 \theta = \sec^2 \theta$

B) $1 + \sec^2 \theta = \tan^2 \theta$

C) $\operatorname{cosec}^2 \theta - \cot^2 \theta = 1$

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

13. If $\angle A = 30^0$ then $\tan 2A = ?$

- A) 1 B) 0 C) $\frac{1}{\sqrt{3}}$ D) $\sqrt{3}$

Que.) 1 B). Solve the following questions : (1 mark each)

1. $\frac{1 - \tan^2 45^0}{1 + \tan^2 45^0} = ?$

2. If $\tan \theta = \frac{13}{12}$ then $\cot \theta = ?$

3. Prove that $\operatorname{cosec} \theta \times \sqrt{1 - \cos^2 \theta} = 1$.

4. If $\tan \theta = 1$ then $\sin \theta \cdot \cos \theta = ?$

5. If $2 \sin \theta = 3 \cos \theta$ then $\tan \theta = ?$

6. If $\cot (90 - A) = 1$ then $\angle A = ?$

7. If $1 - \cos^2 \theta = \frac{1}{4}$ then $\theta = ?$

8. Prove that $\frac{\cos (90 - A)}{\sin A} = \frac{\sin (90 - A)}{\cos A}$.

9. If $\tan \theta \times \boxed{} = \sin \theta$ then $\boxed{} = ?$

10. $(\sec \theta + \tan \theta) \cdot (\sec \theta - \tan \theta) = ?$

11. $\frac{\sin 75^\circ}{\cos 15^\circ} = ?$

Que.) 2 A). Complete the following activities (2 marks each)

*** (Write complete answers, don't just fill the boxes)**

1. Prove that $\cos^2 \theta \cdot (1 + \tan^2 \theta) = 1$. Complete the activity given below.

$$\begin{aligned}
 \text{Activity } \Rightarrow \text{ L . H . S. } &= \boxed{} \\
 &= \cos^2 \theta \times \boxed{} \dots (1 + \tan^2 \theta = \boxed{}) \\
 &= (\cos \theta \times \boxed{})^2 \\
 &= 1^2 \\
 &= 1 \\
 &= \text{R .H .S.}
 \end{aligned}$$

2. $\frac{5}{\sin^2 \theta} - 5 \cot^2 \theta$, Complete the activity given below.

$$\text{Activity } \Rightarrow \frac{5}{\sin^2 \theta} - 5 \cot^2 \theta$$

$$= \boxed{} \left(\frac{1}{\sin^2 \theta} - \cot^2 \theta \right)$$

$$= 5 \left(\boxed{} - \cot^2 \theta \right) \quad \dots\dots\dots \left(\frac{1}{\sin^2 \theta} = \boxed{} \right)$$

)

$$= 5 (1)$$

$$= \boxed{}$$

3. If $\sec \theta + \tan \theta = \sqrt{3}$. Complete the activity to find the value of $\sec \theta - \tan \theta$

Activity $\Rightarrow \boxed{} = 1 + \tan^2 \theta \dots\dots\dots$ (Fundamental trigonometric identity)

$$\boxed{} - \tan^2 \theta = 1$$

$$(\sec \theta + \tan \theta) \cdot (\sec \theta - \tan \theta) = \boxed{}$$

$$\sqrt{3} \cdot (\sec \theta - \tan \theta) = 1$$

$$(\sec \theta - \tan \theta) = \boxed{}$$

4. If $\tan \theta = \frac{9}{40}$. Complete the activity to find the value of $\sec \theta$.

Activity $\Rightarrow \sec^2 \theta = 1 + \boxed{} \dots\dots\dots$ (Fundamental trigonometric identity)

$$\sec^2 \theta = 1 + \boxed{}^2$$

$$\sec^2 \theta = 1 + \boxed{}$$

$$\sec \theta = \boxed{}$$

Que.) 2 B). Solve the following questions : (2 marks each)

1. If $\cos \theta = \frac{24}{25}$ then $\sin \theta = ?$

2. Prove that $\frac{\sin^2 \theta}{\cos \theta} + \cos \theta = \sec \theta$.
3. Prove that $\frac{1}{\operatorname{cosec} \theta - \cot \theta} = \operatorname{cosec} \theta + \cot \theta$.
4. If $\cos (45^\circ + x) = \sin 30^\circ$ then $x = ?$
5. If $\tan \theta + \cot \theta = 2$ then $\tan^2 \theta + \cot^2 \theta = ?$
6. Prove that $\sec^2 \theta + \operatorname{cosec}^2 \theta = \sec^2 \theta \times \operatorname{cosec}^2 \theta$.
7. Prove that $\cot^2 \theta \times \sec^2 \theta = \cot^2 \theta + 1$.
8. If $3 \sin \theta = 4 \cos \theta$ then $\sec \theta = ?$
9. If $\sin 3A = \cos 6A$ then $\angle A = ?$
10. Prove that $\sec^2 \theta - \cos^2 \theta = \tan^2 \theta + \sin^2 \theta$.
11. Prove that $\frac{\tan A}{\cot A} = \frac{\sec^2 A}{\operatorname{cosec}^2 A}$.
12. Prove that $\frac{\sin \theta + \tan \theta}{\cos \theta} = \tan \theta (1 + \sec \theta)$.
13. Prove that $\frac{\cos^2 \theta}{\sin \theta} + \sin \theta = \operatorname{cosec} \theta$.
14. Prove that $\frac{\cos \theta}{1 + \sin \theta} = \frac{1 - \sin \theta}{\cos \theta}$.

Que.) 3 A). Complete the following activities (3 marks each)

*** (Write complete answers, don't just fill the boxes)**

1. $\sin^4 A - \cos^4 A = 1 - 2\cos^2 A$, For proof of this complete the activity given below.

Activity $\Rightarrow$ L . H . S. =

= $(\sin^2 A + \cos^2 A)$ ()

= 1 () ($\sin^2 A +$ = 1)

$$= \boxed{} - \cos^2 A \dots\dots\dots (\sin^2 A = 1 - \cos^2 A)$$

$$= \boxed{}$$

$$= \text{R. H. S.}$$

2. $\tan^2 \theta - \sin^2 \theta = \tan^2 \theta \times \sin^2 \theta$.For proof of this complete the activity given below.

$$\text{Activity} \Rightarrow \text{L. H. S.} = \boxed{}$$

$$= \boxed{} \left(1 - \frac{\sin^2 \theta}{\tan^2 \theta} \right)$$

$$= \tan^2 \theta \left(1 - \frac{\boxed{}}{\frac{\sin^2 \theta}{\cos^2 \theta}} \right)$$

$$= \tan^2 \theta \left(1 - \frac{\sin^2 \theta}{1} \times \frac{\cos^2 \theta}{\boxed{}} \right)$$

$$= \tan^2 \theta \left(1 - \boxed{} \right)$$

$$= \tan^2 \theta \times \boxed{} \dots\dots\dots (1 - \cos^2 \theta = \sin^2 \theta)$$

$$= \text{R. H. S.}$$

3. If $\tan \theta = \frac{7}{24}$ then To find value of $\cos \theta$ complete the activity given below.

Activity $\Rightarrow \sec^2 \theta = 1 + \boxed{} \dots\dots\dots (\text{Fundamental tri. identity})$

$$\sec^2 \theta = 1 + \boxed{}^2$$

$$\sec^2 \theta = 1 + \frac{\boxed{}}{576}$$

$$\sec^2 \theta = \frac{\boxed{}}{576}$$

$$\sec \theta = \boxed{}$$

$$\cos \theta = \boxed{} \dots\dots\dots (\cos \theta = \frac{1}{\sec \theta})$$

4. To prove $\cot \theta + \tan \theta = \operatorname{cosec} \theta \times \sec \theta$. Complete the activity given below.

$$\text{Activity} \Rightarrow \text{L . H . S.} = \boxed{}$$

$$= \frac{\boxed{}}{\sin \theta} = \frac{\sin \theta}{\cos \theta}$$

$$= \frac{\cos^2 \theta + \sin^2 \theta}{\boxed{}}$$

$$= \frac{1}{\sin \theta \cdot \cos \theta} \dots\dots\dots (\cos^2 \theta + \sin^2 \theta = \boxed{})$$

$$= \frac{1}{\sin \theta} \times \frac{1}{\boxed{}}$$

$$= \boxed{}$$

$$= \text{R. H. S.}$$

Que.) 3 B). Solve the following questions : (3 marks each)

1. If $\sec \theta = \frac{41}{40}$ then find values of $\sin \theta$, $\cot \theta$, $\operatorname{cosec} \theta$.

2. If $5 \sec \theta - 12 \operatorname{cosec} \theta = 0$ then find values of $\sin \theta$, $\sec \theta$.

3. Prove that $\frac{\tan (90-\theta) + \cot (90-\theta)}{\operatorname{cosec} \theta} = \sec A$.

4. Prove that $\cot^2 \theta - \tan^2 \theta = \operatorname{cosec}^2 \theta - \sec^2 \theta$.

5. Prove that $\frac{1+\sin \theta}{1-\sin \theta} = (\sec \theta + \tan \theta)^2$.

6. Prove that $\frac{\sin \theta}{\sec \theta + 1} + \frac{\sin \theta}{\sec \theta - 1} = 2 \cot \theta$.

7. Prove that $\frac{\sec A}{\tan A + \cot A} = \sin A$.

8. Prove that $\frac{\sin \theta + \operatorname{cosec} \theta}{\sin \theta} = 2 + \cot^2 \theta$.

9. Prove that $\frac{\cot A}{1-\cot A} + \frac{\tan A}{1-\tan A} = -1$.

10. Prove that $\sqrt{\frac{1+\cos A}{1-\cos A}} = \operatorname{cosec} A + \cot A$.

11. Prove that $\sin^4 A - \cos^4 A = 1 - 2\cos^2 A$.

12. Prove that $\sec^2 \theta - \cos^2 \theta = \tan^2 \theta + \sin^2 \theta$.

13. Prove that $\operatorname{cosec} \theta - \cot \theta = \frac{\sin \theta}{1 + \cos \theta}$.

14. In $\triangle ABC$, $\cos C = \frac{12}{13}$ and $BC = 24$ then $AC = ?$

15. Prove that $\frac{1 + \sec A}{\sec A} = \frac{\sin^2 A}{1 - \cos A}$.

16. If $\sin A = \frac{3}{5}$ then show that $4 \tan A + 3 \cot A = 6 \cos A$

17. Prove that $\frac{1 + \sin B}{\cos B} + \frac{\cos B}{1 + \sin B} = 2 \sec B$.

Que. 4 Solve the following questions : (Challenging questions, 4 marks each)

1. Prove that

$$\sin^2 A \cdot \tan A + \cos^2 A \cdot \cot A + 2 \sin A \cdot \cos A = \tan A + \cot A$$

2. Prove that $\sec^2 A - \operatorname{cosec}^2 A = \frac{2\sin^2 A - 1}{\sin^2 A \cdot \cos^2 A}$.

3. Prove that $\frac{\cot A + \operatorname{cosec} A - 1}{\cot A - \operatorname{cosec} A + 1} = \frac{1 + \cos A}{\sin A}$.

4. Prove that $\sin \theta (1 - \tan \theta) - \cos \theta (1 - \cot \theta) = \operatorname{cosec} \theta - \sec \theta$

5. If $\cos A = \frac{2\sqrt{m}}{m+1}$ then Prove that $\operatorname{cosec} A = \frac{m+1}{m-1}$.

6. If $\sec A = x + \frac{1}{4x}$ then show that $\sec A + \tan A = 2x$ or $\frac{1}{2x}$.

7. In ΔABC , $\sqrt{2} AC = BC$, $\sin A = 1$, $\sin^2 A + \sin^2 B + \sin^2 C = 2$ then $\angle A = ?$ $\angle B = ?$ $\angle C = ?$

8. Prove that $\sin^6 A + \cos^6 A = 1 - 3 \sin^2 A \cdot \cos^2 A$.

9. Prove that $2(\sin^6 A + \cos^6 A) - 3(\sin^4 A + \cos^4 A) + 1 = 0$.

10. Prove that $\frac{\cot A}{1 - \tan A} + \frac{\tan A}{1 - \cot A} = 1 + \tan A + \cot A = \sec A \cdot \operatorname{cosec} A + 1$

Que. 5 Solve the following questions : (Creative questions, 3 marks each)

1. If $3 \sin A + 5 \cos A = 5$ then show that $5 \sin A - 3 \cos A = \pm 3$.

2. If $\cos A + \cos^2 A = 1$ then $\sin^2 A + \sin^4 A = ?$

3. If $\operatorname{cosec} A - \sin A = p$ आणि $\sec A - \cos A = q$ then prove that

$$(p^2 q)^{\frac{2}{3}} + (pq^2)^{\frac{2}{3}} = 1$$

4. Show that $\tan 7^\circ \times \tan 23^\circ \times \tan 60^\circ \times \tan 67^\circ \times \tan 83^\circ = \sqrt{3}$.

5. If $\sin \theta + \cos \theta = \sqrt{3}$ then show that $\tan \theta + \cot \theta = 1$.

6. If $\tan \theta - \sin^2 \theta = \cos^2 \theta$ then show that $\sin^2 \theta = \frac{1}{2}$.

7. Prove that

$$(1 - \cos^2 A) \cdot \sec^2 B + \tan^2 B (1 - \sin^2 A) = \sin^2 A + \tan^2 B$$