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| <b>MATHEMATICS</b> | <b>HALF YEARLY PRACTICE PAPER</b> |
| <b>CLASS - IX</b>  |                                   |

**TIME : 3 HRS.**

**MAX. MARKS : 80**

**GENERAL INSTRUCTIONS :**

- » All questions are compulsory.
- » The question paper consists of 38 questions divided into five section A, B, C, D and E.
- » Section A contains multiple choice questions (Q.1 to Q.20) of one mark, only the correct option is to be written in your answer sheet.

Section B contains short answer type questions (Q.21 to Q.25) carrying two marks each.

Section C contains short answer type questions (Q.26 to Q.31) carrying three marks each.

Section D contains long answer type questions (Q.32 to Q.35) carrying five marks each.

Section E has 3 case based integrated units of assessment 4 marks each with sub-parts of the values of 1, 1 and 2 marks each respectively.

- » All Questions are compulsory. However, an internal choice in 2 Qs of 5 marks, 2 Qs of 3 marks and 2 Questions of 2 marks has been provided. An internal choice has been provided in the 2 marks questions of Section E
- » There is no overall choice. However, internal choice may be provided. You have to attempt only one of the alternatives in all such questions.
- » Use of calculators and cell-phones are not permitted in the Examination Hall.

**SECTION-A**

1. If  $x = 7 + 4\sqrt{3}$  and  $xy = 1$ , then  $\frac{1}{x^2} + \frac{1}{y^2} =$ 

(1) 194
(2) 134
(3)  $\frac{1}{49}$ 
(4) 64
2.  $\pi$  is
 

(1) a rational number
(2) an integer

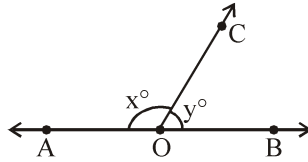
(3) an irrational number
(4) a whole number
3. The simplest rationalisation factor of  $(2\sqrt{2} - \sqrt{3})$  is
 

(1)  $\sqrt{2} + \sqrt{3}$ 
(2)  $2\sqrt{2} + \sqrt{3}$ 
(3)  $2\sqrt{2} + 3$ 
(4)  $\sqrt{2} - \sqrt{3}$
4. Which of the following is a polynomial?
 

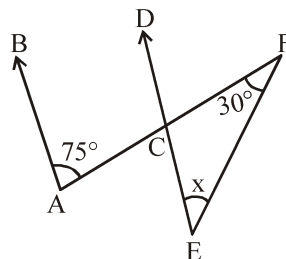
(i)  $x^2 - 5x + 4\sqrt{x} + 3$   
 (ii)  $x^{3/2} - x + x^{1/2} + 1$   
 (iii)  $\sqrt{x} + \frac{1}{\sqrt{x}}$   
 (iv)  $\sqrt{2}x^2 - 3\sqrt{3}x + \sqrt{6}$

(1) (iv) only
(2) (ii) only
(3) (i) and (iv)
(4) (ii) and (iii)

5. The remainder when  $x^4 + 8x + 5$  is divided by  $x + 4$  is  
 (1) 229 (2) 134 (3) -229 (4) -234
6. In figure, ray OC stands on the line AB and  $x : y = 5 : 4$ . Find  $\angle AOC$ .



- (1)  $100^\circ$  (2)  $80^\circ$  (3)  $50^\circ$  (4)  $40^\circ$
7. The point (0, 3) is located at  
 (1) 1<sup>st</sup> quadrant (2) 2<sup>nd</sup> quadrant (3) On X-axis (4) On Y-axis
8. The perpendicular distance of the point P(-2, -3) from the y-axis is (in units)  
 (1) 3 (2) -2 (3) 2 (4) -3
9. The area of an isosceles triangle having base 2 cm and the length of one of the equal sides 4 cm is  
 (1)  $\sqrt{30} \text{ cm}^2$  (2)  $5\sqrt{3} \text{ cm}^2$  (3)  $\sqrt{15} \text{ cm}^2$  (4)  $2\sqrt{5} \text{ cm}^2$
10. Euclid stated that things which are equal to the same thing are equal to one another in the form of :  
 (1) Axiom 1 (2) Axiom 2 (3) Axiom 3 (4) Axiom 4
11. The angle which is five times of its complementary angle is  
 (1)  $15^\circ$  (2)  $30^\circ$  (3)  $75^\circ$  (4)  $60^\circ$
12. The value of  $\frac{\sqrt{32} + \sqrt{48}}{\sqrt{8} + \sqrt{12}}$  is equal to  
 (1) 1 (2) 2 (3) 3 (4) 4
13. The polynomials  $ax^2 + 3x^2 - 3$  and  $2x^3 - 5x + a$  when divided by  $(x - 4)$  leaves remainders  $R_1$  and  $R_2$  respectively then value of a if  $2R_1 - R_2 = 0$ , is  
 (1)  $\frac{17}{31}$  (2)  $\frac{18}{31}$  (3) 2 (4) 4
14. The value of  $\sqrt[4]{(81)^{-2}}$  is  
 (1)  $3^2$  (2)  $\frac{1}{9}$  (3) 3 (4)  $\frac{1}{3}$
15. The perimeter of an equilateral triangle is 60 m. Find its area.  
 (1)  $100 \text{ m}^2$  (2)  $100\sqrt{3} \text{ m}^2$  (3)  $150 \text{ m}^2$  (4)  $240 \text{ m}^2$
16. In the given figure,  $AB \parallel CD$  then find the value of x.



- (1)  $20^\circ$  (2)  $105^\circ$  (3)  $45^\circ$  (4)  $110^\circ$

17. If the bisector of the angle A of  $\triangle ABC$  is perpendicular to the base BC of the triangle then the triangle ABC is

- (1) Isosceles (2) Obtuse Angled (3) Equilateral (4) Scalene

18. How many straight lines can be drawn through two given points.

- (1) 0 (2) 1 (3) 2 (4) Infinite many

19. **Assertion (A) :** The area of an isosceles triangle having base = 8 cm and each of the equal sides = 5 cm is  $12 \text{ cm}^2$ .

**Reason (R) :** The area of an isosceles triangle having each of the equal sides as a and base = b is

$$\frac{1}{4}b\sqrt{4a^2 - b^2}.$$

- (1) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).  
 (2) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).  
 (3) Assertion (A) is true but Reason (R) is false.  
 (4) Assertion (A) is false but Reason (R) is true.

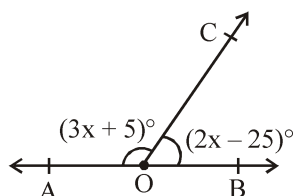
20. **Assertion (A) :**  $\sqrt{3}$  is an irrational number.

**Reason (R) :** The sum of a rational number and an irrational number is an irrational number.

- (1) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).  
 (2) Both Assertion (A) and Reason (R) are true but Reason (R) is not the correct explanation of Assertion (A).  
 (3) Assertion (A) is true but Reason (R) is false.  
 (4) Assertion (A) is false but Reason (R) is true.

### SECTION-B

21. In the adjoining figure, what value of x will make AOB a straight line?

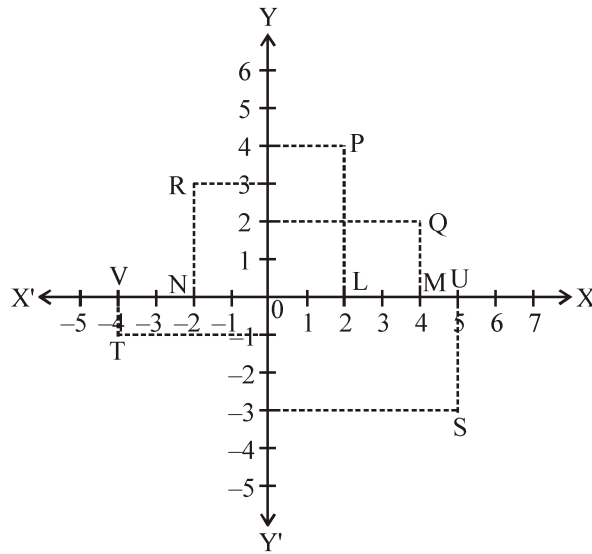


22. Simplify :  $(3\sqrt{5} - 5\sqrt{2})(4\sqrt{5} + 3\sqrt{2})$

**OR**

Simplify :  $\frac{1}{(27)^{\frac{-1}{3}}} + \frac{1}{(625)^{\frac{-1}{4}}}$

23. Write down the coordinates of each of the points P, Q, R, S and T as shown in the following figure.

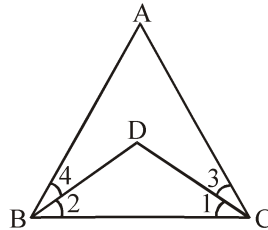


24. Factorise :  $a^3 - 2\sqrt{2}b^3$

**OR**

Factorise :  $x^4 + x^2y^2 + y^4$

25. In the given figure, we have  $\angle ABC = \angle ACB$ ,  $\angle 4 = \angle 3$ . Show that  $\angle 1 = \angle 2$ .



**SECTION-C**

26. Find five rational numbers between  $\frac{5}{6}$  and  $\frac{8}{9}$ .

**OR**

Locate  $\sqrt{4.7}$  on the number line.

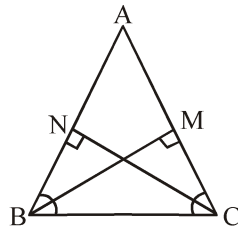
27. Factorise the polynomial :  $64a^3 - 27b^3 - 144a^2b + 108ab^2$ .

**OR**

Factorise :  $x^3 - 23x^2 + 142x - 120$  by factor theorem.

28.  $\triangle ABC$  is an isosceles triangle in which  $AB = AC$ . Side BA is produced to D such that  $AD = AB$ . Show that  $\angle BCD$  is a right angle.

29. In the adjoining figure,  $AB = AC$ . Prove that  $BM = CN$ .



30. Name the quadrant in which the following points lie :
- $A(2, 9)$
  - $B(-3, 5)$
  - $C(-4, -7)$
  - $D(3, -2)$
31. Solve the equation  $u - 5 = 15$  and state the axiom that you use here.

**SECTION-D**

32. If each side of a triangle is doubled, then find the ratio of area of new triangle thus formed and the given triangle.

**OR**

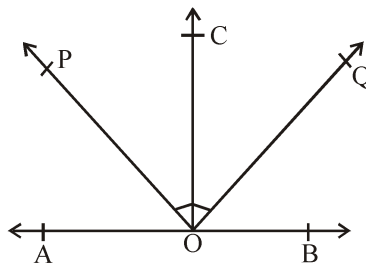
Two sides of a triangular field are 85 m and 154 m in length and its perimeter is 324 m. Find the area of the field.

33. If  $a = \frac{\sqrt{2}+1}{\sqrt{2}-1}$  and  $b = \frac{\sqrt{2}-1}{\sqrt{2}+1}$ , then find the value of  $a^2 + b^2 - 4ab$ .
34.  $2x^3 + 4x^2 - 7ax - 5$  and  $2x^3 + ax^2 - 6x + 3$  are polynomials which on dividing by  $(x + 1)$  and  $(x - 1)$  leaves remainders  $y$  and  $z$ , respectively, if  $y - 3z = 16$  then find  $a$ .

**OR**

Prove that  $(a+b+c)^3 - a^3 - b^3 - c^3 = 3(a+b)(b+c)(c+a)$

35. In figure given below,  $OP$  bisects  $\angle AOC$ ,  $OQ$  bisects  $\angle BOC$  and  $OP \perp OQ$ . Show that point  $A$ ,  $O$  and  $B$  are collinear.



**SECTION-E**

**36. Case Study-1**

An object which is thrown or projected into the air, subject to only the acceleration of gravity is called a projectile, and its path is called its trajectory. This curved path was shown by Galileo to be a parabola. Parabola is represented by a polynomial. If the polynomial to represent the distance covered is

$P(x) = -3x^2 + 24x + 12$ , where  $x$  represents seconds.

- (i) What is the degree of the polynomial? (1)  
 (ii) Find the height of the projectile 5 seconds after its launch (2)

**OR**

- Find the height of the projectile 4 seconds after its launch (2)  
 (iii) If equation of parabola is given by  $p(x) = 3x^2 - 2x - 4$  then find value of  $p(2)$  is (1)

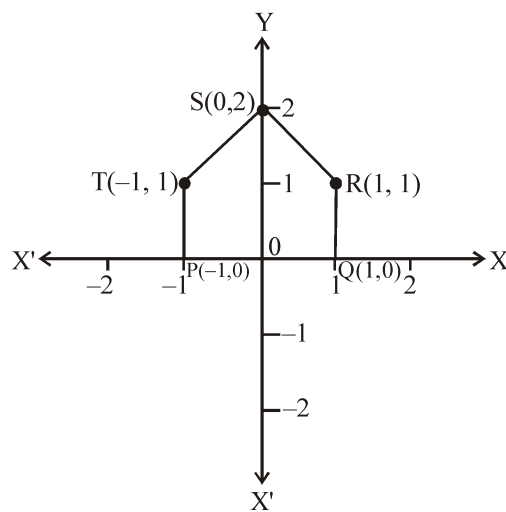
**37. Case Study-2**

Read the following text and answer the following questions on the basis of the same :

Sohan draws a gate of a temple PQRST on the graph paper.

He has following points :

$(-1,0), (1,0), (1,1), (-1, 1)$  and  $(0,2)$



- (i) Name the closed figure obtained. (1)  
 (ii) In which quadrant  $(-1, 1)$  lies ? (1)  
 (iii) Write the point that lies on Y-axis. (2)

**OR**

Write the coordinates of points of closed figure formed lying on X-axis. (2)

**38. Case Study-3**

Read the following text and answer the following questions on the basis of the same :

Isosceles triangles were used to construct a bridge in which the base (unequal side) of an isosceles triangle is 4 cm and its perimeter is 20 cm.



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|--|-----|
| (i) What is the length of equal sides?                     | (1) |
| (ii) What is the semi perimeter of the isosceles triangle? | (1) |
| (iii) What is the area of isosceles triangle?              | (2) |

**OR**

If the sides of a triangle are in the ratio 3 : 5 : 7 and its perimeter is 300 m. Find its area. (2)

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