

## MATHEMATICS CLASS IX

Time Allowed: 3 hours

Maximum Marks: 80

## General Instructions:

This question paper is divided in to three sections Section A, Section B, Section C.

Attempt all questions

## Section A

1.  $\pi$  is [1]
  - a) a rational number
  - b) an integer
  - c) an irrational number
  - d) a whole number
2. If 'm' is a positive integer which is not a perfect square, then  $\sqrt{m}$  is [1]
  - a) an irrational number
  - b) a natural number
  - c) an integer
  - d) a rational number
3. Factorise:  $x^2 - (a + b)x + ab$  [1]
4. Is it polynomial or not? Give reason:  $p(x) = \frac{(x-1)(x-3)}{x}$  [1]
5. The distance of the point P (4, 3) from the origin is [1]
  - a) 3
  - b) 5
  - c) 7
  - d) 4
6. The co-ordinates of a point above the x-axis lying on y-axis at a distance of 4 units are [1]
  - a) (0, -4)
  - b) (4, 0)
  - c) (0, 4)
  - d) (-4, 0)
7. The value of k if  $x = 3$  and  $y = -2$  is a solution of the equation  $2x - 13y = k$  is [1]
  - a) 31
  - b) 23
  - c) 32
  - d) 30
8. The linear equation  $3x - y = x - 1$  has : [1]
  - a) A unique solution
  - b) Two solutions
  - c) No solution
  - d) Infinitely many solutions
9. Given four distinct points in a plane. How many line segments can be drawn using them when no three of them are collinear? [1]
  - a) 8
  - b) 4
  - c) 6
  - d) 1

OR

The number of planes passing through 3 noncollinear points is

a) 1

b) 4

c) 3

d) 2

10. Check whether (0, 6) is the solution of the equation  $2x - y = 6$  or not. [1]

11. If  $\pi x + 3y = 25$  and  $y = 1$ , then find x. [1]

12.  [1]

In the above quadrilateral ACBD, we have  $AC = AD$  and  $AB$  bisect the  $\angle A$ . Which of the following is true?

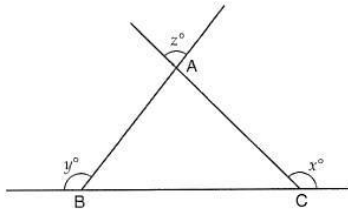
a)  $\triangle ABC \cong \triangle ABD$

b)  $\angle C = \angle D$

c) All are true

d)  $BC = BD$

13. In figure, what is  $z$  in terms of  $x$  and  $y$ ? [1]



a)  $x + y - 180^\circ$

b)  $x + y + 180^\circ$

c)  $x + y + 360^\circ$

d)  $180^\circ - (x + y)$

14. If the degree measures of the angles of quadrilateral are  $4x$ ,  $7x$ ,  $9x$  and  $10x$ , what is the sum of the measures of the smallest angle and largest angle? [1]

a)  $150^\circ$

b)  $180^\circ$

c)  $168^\circ$

d)  $140^\circ$

OR

Diagonals necessarily bisect opposite angles in a

a) isosceles trapezium

b) rectangle

c) parallelogram

d) square

15. Can all the four angles of a quadrilateral be obtuse angles? Give reason for your answer. [1]

16. The value of 'x' in  $3 + 2^x = (64)^{\frac{1}{2}} + (27)^{\frac{1}{3}}$  is [1]

a) 14

b) 8

c) 5

d) 3

17. If  $\frac{3-\sqrt{5}}{3+2\sqrt{5}} = a\sqrt{5} - \frac{19}{11}b$ , then the value of  $b$  is [1]

a) 3

b) 1

c) -1

d) 2

18. The value of  $(a^2 - b^2)^3 + (b^2 - c^2)^3 + (c^2 - a^2)^3$  is [1]

a)  $3(a + b)(b + c)(c + a)(a - b)(b - c)(c - a)$

b)  $3(a - b)(b - c)(c - a)$

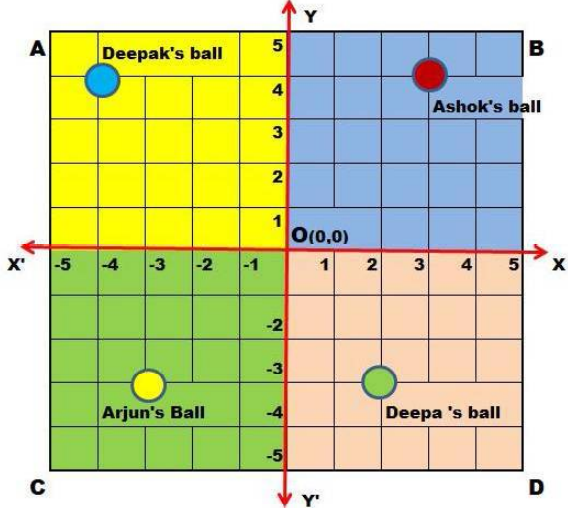
c)  $3(a + b)(b + c)(c + a)$

d) none of these

19. The value of  $\frac{(a^2-b^2)^3+(b^2-c^2)^3+(c^2-a^2)^3}{(a-b)^3+(b-c)^3+(c-a)^3}$  is [1]
- a)  $3(a-b)(b-c)(c-a)$       b)  $(a+b)(b+c)(c+a)$
- c)  $3(a+b)(b+c)(c+a)(a-b)(b-c)(c-a)$       d) none of these
20. If the point P lies in between M and N, C is the mid-point of MP then [1]
- a)  $MC + CN = MN$       b)  $CP + CN = MN$
- c)  $MC + PN = MN$       d)  $MP + CP = MN$

**SECTION B-CASE STUDY**

21. Read the Source/Text given below and answer the questions: [5]

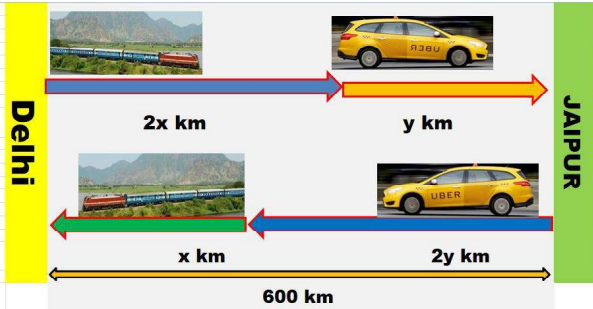


There is a square park ABCD in the middle of Saket colony in Delhi. Four children Deepak, Ashok, Arjun and Deepa went to play with their balls. The colour of the ball of Ashok, Deepak, Arjun and Deepa are red, blue, yellow and green respectively.

All four children roll their ball from centre point O in the direction of **YOY**, **X'OY**, **X'OY'** and **XOY'**. Their balls stopped as shown in the above image.

Answer the following questions:

- i. What are the coordinates of the ball of Ashok?
  - ii. What are the coordinates of the ball of Deepa?
  - iii. What the line XOY' is called?
  - iv. What the point O (0,0) is called?
  - v. What is the ordinate of the ball of Arjun?
22. Read the Source/Text given below and answer the questions: [4]



Ajay lives in Delhi, The city of Ajay's father in laws residence is at Jaipur is 600 km from Delhi. Ajay used to travel this 600 km partly by train and partly by car.

He used to buy cheap items from Delhi and sale at Jaipur and also buying cheap items from Jaipur and sale at Delhi.

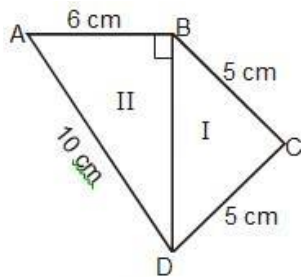
Once From **Delhi to Jaipur** in forward journey he covered  $2x$  km by train and the rest  $y$  km by taxi. But, while returning he did not get a reservation from Jaipur in the train. So first  $2y$  km he had to travel by taxi and the rest  $x$  km by Train. From Delhi to Jaipur he took 8 hrs but in returning it took 10 hrs.

- i. Find the value of  $x$  and  $y$ .
- ii. In Delhi to Jaipur journey how much distance did he travel by train?
- iii. How much distance did he travel by train in both side journey?
- iv. how much distance did he travel by taxi in both side journey?

23. Read the Source/Text given below and answer any four questions: [4]



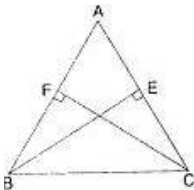
Chocolate is in the form of a quadrilateral with sides 6 cm and 10 cm, 5 cm and 5 cm(as shown in the figure) is cut into two parts on one of its diagonal by a lady. Part-I is given to her maid and part II is equally divided among a driver and gardener.



- i. Find the Length of  $BD$
- ii. Find the Area of  $\triangle ABD$
- iii. The sum of all the angles of a quadrilateral is equal to.....
- iv. A diagonal of a parallelogram divides it into two congruent..... or Each angle of the rectangle is.....

**SECTION C**

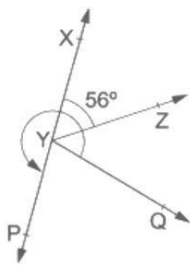
24. The angles of a quadrilateral are in the ratio 3:5:9:13. Find all the angles of the quadrilateral. [2]
25.  $ABC$  is a right-angled triangle in which  $\angle A = 90^\circ$  and  $AB = AC$ . Find  $\angle B$  and  $\angle C$ . [2]
26.  $ABC$  is a triangle in which altitudes  $BE$  and  $CF$  to sides  $AC$  and  $AB$  are equal. Show that  $\triangle ABE \cong \triangle ACF$ ,  $AB = AC$  i.e.  $\triangle ABC$  is an isosceles triangle. [2]



27. Prove that the sum of all the angles of a quadrilateral is  $360^\circ$ . [2]

OR

In the given figure,  $\angle XYZ = 56^\circ$  and  $XY$  is produced to a point  $P$ . if ray  $YQ$  bisects  $\angle ZYP$ , find  $\angle XYQ$  and reflex  $\angle QYP$ .

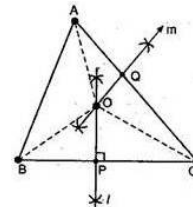


28. In which quadrant will the point lie, if : [2]
- The y-coordinate is 3 and the x-coordinate is -4?
  - The x-coordinate is -5 and the y-coordinate is -3?
  - The y-coordinate is 4 and the x-coordinate is 5?
  - The y-coordinate is 4 and the x-coordinate is -4?
29. Find the values of a and b  $\frac{7+\sqrt{5}}{7-\sqrt{5}} - \frac{7-\sqrt{5}}{7+\sqrt{5}} = a + \frac{7}{11}\sqrt{5}b$  [3]
30. Using identity  $(a + b)^3 = a^3 + b^3 + 3ab(a + b)$  derive the formula  $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$  [3]
31. ABC is a triangle right angled at C. A line through the mid-point M of hypotenuse AB and parallel to BC intersects AC at D. Then prove that, [3]
- D is the midpoint AC
  - MD is perpendicular to AC
  - $CM = AM = \frac{1}{2} AB$

OR

Prove that the bisector of the angles of a parallelogram enclose a rectangle.

32. Show that the line segments joining the mid-points of opposite sides of a quadrilateral bisect each other [3]
33. In a huge park, people are concentrated at three points (See figure). [5]
- A: where there are different slides and swings for children.
- B: near which a man-made lake is situated.
- C: which is near to a large parking and exit.
- Where should an ice cream parlour be set up so that maximum number of persons can approach it?
34. If the bisector of an angle of a triangle bisects the opposite side, prove that the triangle is isosceles. [5]



- ABCD is a rhombus and P, Q, R, and S are the mid-Points of the sides AB, BC, CD and DA respectively. Show that quadrilateral PQRS is a rectangle.
35. Find five different solutions of the equation:  $3y = 4x$  [5]
36. If two lines intersect prove that the vertically opposite angles are equal [5]
- OR
- $\triangle ABC$  and  $\triangle DBC$  are two triangles on the same base BC such that A and D lie on the opposite sides of BC,  $AB = AC$  and  $DB = DC$ . Show that AD is the perpendicular bisector of BC.

37. Prove that if in two triangles , two angles and the included side of one triangle are equal to two angles and the included side of the other triangle , then two triangles are congruent.

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