PAPER 1
CLASS 9

General Instructions:

1. This question paper contains 38 questions.
2. This question paper is divided into 5 sections A, B, C, D and E.
3. In Section A, Questions 1 – 18 are multiple choice questions (MCQs) and question number 19 and 20 are Assertion – Reason based questions of 1 mark each.
4. In Section B, Questions 21 – 25 are very short answer (VSA) type questions, carrying 02 marks each.
5. In Section C, Questions 26 – 31 are short answer (SA) type questions, carrying 03 marks each.
6. In Section D, Questions 32 – 35 are long answer (LA) type questions, carrying 05 marks each.
7. In Section E, Question number 36 – 38 are case study based questions, carrying 4 marks each with sub parts of the values 1, 1 and 2 marks each respectively.
8. All questions are compulsory. However, an internal choice in 2 questions of Section B, 2 questions of Section C and 2 questions of Section D has been provided. An internal choice has been provided in all the 2 marks questions of Section E.
9. Draw neat and clean figures wherever required.
10. Take $\pi = \frac{22}{7}$, wherever required if not stated.
11. Use of calculators is not allowed.

Section – A

Section A consists of 20 questions of 1 mark each.

1. Every rational number is:

a. a natural number
b. an integer
c. a real number
d. a whole number

2. Decimal representation of a rational number cannot be:

a. terminating
b. non – terminating
c. non – terminating repeating
d. non – terminating non – repeating

3. The difference between the maximum and minimum values of the given set of observations is called:

a. mean
b. class interval
c. class mark
d. range

4. $\left(\sqrt{\sqrt[3]{2^2}}\right)^{\frac{1}{4}}$ equals:

a. $2^{-\frac{3}{12}}$ b. 2^{-12} c. $2^{\frac{1}{12}}$ d. 2^{12}

5. Volume of a cuboid is given by the polynomial $p(x) = 3x^2 - 27$. The possible dimensions of the cuboid are:

a. 3, 3, 3
b. 3, $(x-3), (x+3)$
c. 3, $x^2, 27x$
d. 3, $x^2, -27x$

6. $\sqrt{2}$ is a polynomial of degree:

a. 2 b. 0 c. 1 d. $\frac{1}{2}$

7. The linear equation $3x - y = x - 1$ has:

a. a unique solution
b. two solutions
c. infinitely many solutions
d. no solution

8. One of the solutions of the linear equation $y = 2x$ is:

a. $(2, 1)$ b. $(2, -1)$ c. $\left(-\frac{3}{2}, 3\right)$ d. $\left(\frac{3}{2}, 3\right)$

9. If one of the angles of a triangle is $130°$, then the angle between the bisectors of the other two angles can be:

a. $50°$ b. $65°$ c. $145°$ d. $155°$

10. It is given that $\Delta ABC \cong \Delta FDE$ and AB = 5 cm, $\angle B = 40°$ and $\angle A = 80°$, then which of the following is true?

a. DF = 5 cm, $\angle F = 60°$

b. DF = 5 cm, $\angle E = 60°$
c. DE = 5 cm, $\angle E = 80°$
d. FD = 5 cm, $\angle D = 80°$

11. If a linear equation has solutions $(-2, 2), (0, 0), (5, -5)$, then the equation is:

a. $x - y = 0$
b. $x + 2y = 0$
c. $2x - y = 0$
d. $x + y = 0$

12. Which of the following statements is true?

a. axioms and postulates are same
b. few mathematical statements are termed as axioms and others are postulates
c. postulates are the assumptions used specifically for geometry and axioms are the assumptions used throughout mathematics
d. postulates are the assumption used throughout mathematics and axioms are the assumptions used specifically for geometry

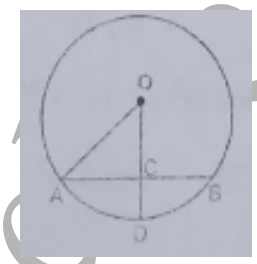
13. If the diagonals of a quadrilateral are perpendicular bisectors of each other, then it is a:

a. rhombus b. parallelogram c. trapezium d. kite

14. Find the value of k, if $x = 1, y = 2$ is a solution of the equation $2x + 3y = k$.

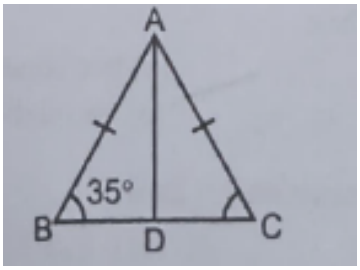
a. 6 b. 7 c. 8 d. 9

15. If OA = 5 cm, AB = 8 cm and OD is perpendicular to AB, then CD is equal to:



a. 2 cm b. 3 cm c. 4 cm d. 5 cm

16. In the figure given below, if AD is the median, then the measure of $\angle BAD$ is:



a. 35° b. 70° c. 110° d. 55°

17. Which of these statements do not satisfy Euclid's axiom?
a. Things which are equal to the same thing are equal to one another
b. If equals are added to equals, the wholes are equal
c. If equals are subtracted from equals, the remainders are equal
d. The whole is lesser than the part

18. Area of canvas required for a conical tent whose height is 12 m and the radius of the base 3.5 m is:
a. 137.5 sq. m b. 147.5 sq. m c. 237.5 sq. m d. 247.5 sq. m

Directions: In question number 19 and 20, a statement of Assertion (A) is followed by a statement of Reason (R).
Choose the correct option.
a. Both assertion (A) and reason (R) are true, and reason (R) is the correct explanation of assertion (A).
b. Both assertion (A) and reason (R) are true, and reason (R) is not the correct explanation of assertion (A).
c. Assertion (A) is true, but reason (R) is false.
d. Assertion (A) is false, but reason (R) is true.

19. Assertion (A): The relation between the surface area S and volume V is $S^3 = 36V^2$.
Reason (R): The volume and surface area of a sphere are related to each other by radius.

20. Assertion (A): Euclid's fifth postulate imply the existence of parallel lines.
Reason (R): If the sum of the interior angles will be equal to the sum of two right angles, then two lines will not meet each other on either sides and therefore will be parallel to each other.

Section – B

Section B consists of 5 questions of 2 marks each.

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

OR

Find the value of x for which $\left(\frac{3}{4}\right)^6 \times \left(\frac{16}{9}\right)^5 = \left(\frac{4}{3}\right)^{x+2}$

22. Using a suitable identity, factorise $(2x - 5y)^3 - (2x + 5y)^3$

OR

Factorise: $5\sqrt{5}x^2 + 30x + 8\sqrt{5}$

23. If $x^2 + \frac{1}{x^2} = 18$, then find the value of $x - \frac{1}{x}$.

OR

If $p(x) = x^2 - 4x + 3$, evluate $p(2) - p(-1) + p\left(-\frac{1}{2}\right)$.

24. Express $0.\overline{54}$ in the form $\frac{p}{q}$, where p and q are integers and $q \neq 0$

25. At what point does the linear equation $2x + 3y = 9$ meet a line which is parallel to the $y - axis$, at 4 units from the origin on the right side of the $x - axis$?

Section – C

Section C consists of 6 questions of 3 marks each.

26. If $a = 7 - 4\sqrt{3}$, then find the value of $\sqrt{a} + \frac{1}{\sqrt{a}}$

27. Find the value of $x^3 + y^3 + z^3 - 3xyz$, if $x^2 + y^2 + z^2 = 83$ and $x + y + z = 15$.

OR

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

28. A right angled triangle with sides 6 cm, 8 cm and 10 cm is revolved around side 8 cm. Find the curved surface area of the cone obtained.

OR

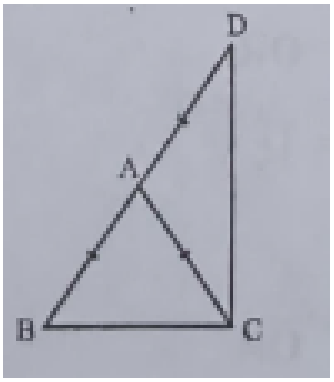
The radius and slant height of a cone are in the ratio 3 : 5. If its curved surface area is 2310 cm^2, then find its radius, height and slant height. $\left(Take\ \pi = \frac{22}{7}\right)$

29. There is a slide in a park. One of its side walls has been painted in some colour with a message "KEEP THE PARK GREEN AND CLEAN". If the sides of the wall are 15 m, 11 m and 6 m, find the area painted in colour.

OR

A rhombus shaped field has green grass for cows to graze. If each side of the rhombus is 30 m and its longer diagonal is 48 m, how much area of the grass field will be grazed by the cows?

30. ΔABC is an isosceles triangle in which AB = AC. Side BA is produced to point D such that AD = AB. Show that ∠BCD is a right angle.



OR

AB is a line segment and P is its midpoint. D and E are points on the same side of AB such that $\angle BAD = \angle ABE$ and $\angle EPA = \angle DPB$. Show that:

(i) $\Delta DAP \cong \Delta EBP$

(ii) AD = BE

31. The diameter of a metallic ball is 4.2 cm. What is the mass of the ball, if the density of the metal is 8.9 g per cm^3?

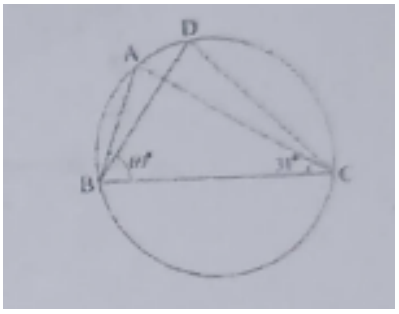
Find the total surface area of a hemisphere of radius 10 cm. ($Use\ \pi = 3.14$)

Section – D

Section D consists of 4 questions of 5 marks each.

32. If the diagonals of a cyclic quadrilateral are the diameters of the circle through the vertices of the quadrilateral, prove that it is a rectangle.

In the given figure, $\angle ABC = 60°, \angle ACB = 31°$, find the value of $\angle BDC$.

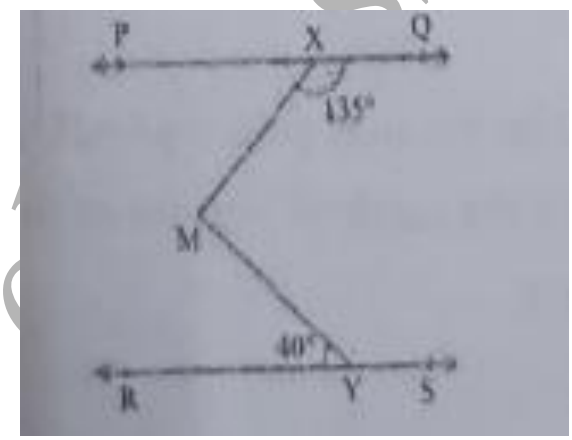


33. A random survey of the number of children of various age groups playing in a park was found as follows:

Age (in years)	Number of children
1 – 2	5
2 – 3	3
3 – 5	6
5 – 7	12
7 – 10	9
10 – 15	10
15 – 17	4

Draw a histogram and corresponding frequency polygon to represent the above data.

34. In the given figure, if PQ || RS, $\angle MXQ = 135°$ and $\angle MYR = 40°$, find the value of $\angle XMY$.



35. Find the value of m and n so that the polynomial $p(x) = x^3 - 6x^2 + mx - n$ is exactly divisible by $(x - 1)$ as well as $(x - 2)$.

OR

Factorise the following expressions using suitable identity. Also mention the identity used in each case.

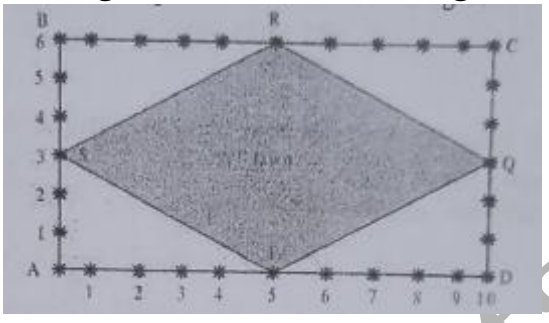
(i) $(x-2y)^3+(2y-3z)^3+(3z-x)^3$

(ii) $27y^3+125z^3$

Section – E

Section E consists of 3 case study based questions of 4 marks each.

36. The class IX students of a secondary school in Krishinagar have been allotted a rectangular plot for their gardening activity. Saplings of Gulmohar are planted on the boundary at 1 m from each other. There is a lawn PQRS in the ground as shown in the given figure.



(i) What are the coordinates of C, taking A as the origin?

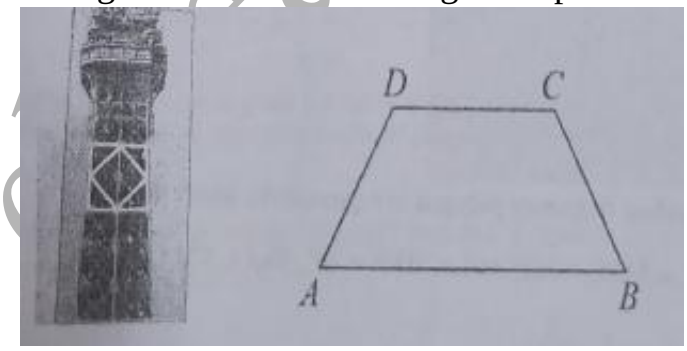
(ii) What are the coordinates of R, taking A as the origin?

(iii) Find the length of the side of the lawn.

OR

What is the shape and the area of the lawn?

37. Eiffel Tower in Paris is an architectural wonder of the world. It uses an arrangement of criss crossing X shaped becomes known as truss.



ABCD is a trapezium in which AB || DC. Let P, Q, R and S be the mid – points of AB, BC, CD and DA respectively. Refer the given geometric description of the marked portion of the picture of the top of the Eiffel Tower and answer the following questions:

(i) What type of quadrilateral is PQRS?

(ii) In quadrilateral PQRS, if PQ = QR, then what type of quadrilateral is PQRS?

(iii) In trapezium ABCD, if AD = BC, then prove that $\angle A = \angle B$.

OR

In trapezium ABCD, if AD = BC, then prove that $\angle C = \angle D$.

38. Once four friends Rahul, Arun, Ajay and Vijay went for a picnic to a hill station. Due to peak season, they did not get a proper hotel in the city. The weather was fine, so they decided to make a conical tent inside a park. They were carrying 300 sq. m of cloth with them. They made a conical tent with a height of 10 m and diameter of base 14 m. The remaining cloth was used for the floor.

(i) What is the slant height of the tent?

(ii) How much cloth was used for the floor?

(iii) What was the volume of the tent?

OR

What was the total surface area of the tent?