APEEJAY COMMON ANNUAL EXAMINATION
SESSION 2023-24

SUBJECT: MATHEMATICS(041)   **CLASS IX**
TIME: 3 Hours   **M.Marks:80**

General Instructions:

1. This question paper has 5 Sections and contains 7 printed pages.
2. Section A has 20 multiple-choice questions carrying 1 mark each.
3. Section B has 5 very short answer questions carrying 2 marks each.
4. Section C has 6 short answer questions carrying 3 marks each.
5. Section D has 4 long answer questions carrying 5 marks each.
6. Section E has 3 case based integrated units of assessment (4 marks each) with sub-parts of values of 1, 1 and 2 marks each respectively.
7. All questions are compulsory. However, internal choices have been provided.
8. Draw neat figures wherever required. Take $\pi = 22/7$ wherever required if not stated.

SECTION – A

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. $(\sqrt{\sqrt[3]{2^2}})^{1/4}$ equals
   (a) $2^{\frac{-1}{12}}$ (b) 2^{-12} (c) $2^{\frac{1}{12}}$ (d) 2^{12}

5. Volume of a cuboid is given by 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) ½

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) $(-\frac{3}{2}, 3)$ (d) $(\frac{3}{2}, 3)$

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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 $\triangle ABC \cong \triangle FDE$ 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 assumptions used throughout mathematics and 'axioms' are the assumptions used specifically for geometry

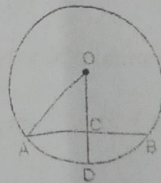13. If the diagonals of a quadrilateral are perpendicular bisectors of each other, then it is a

(a) rhombus   (b) parallelogram   (c) trapezium   (d) kite

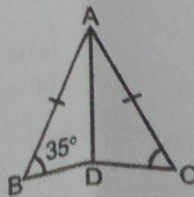14. Find the value of k, if $x = 1$, $y = 2$ is a solution of the equation $2x + 3y = k$.

(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) $55°$

2

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

ASSERTION & REASONING QUESTIONS

The following questions consist of two statements – **Assertion (A)&Reason (R).**
Answer the questions selecting the appropriate option given below.
a) Both A and R are true,R is the correct explanation for A
b) Both A and R are true, R is not the correct explanation for A
c) A is true but R is false
d) A is false but R is true

19. **Assertion:** The relation between the Surface area S and Volume V is: $S^3 = 36\pi V^2$.
   Reason: The volume and surface area of a sphere are related to each other by radius.
   a) Both Assertion and reason are correct and reason is correct explanation for Assertion
   b) Both Assertion and reason are correct but reason is not correct explanation for Assertion
   c) Assertion is correct but reason is false
   d) Both Assertion and reason are false

20. **Assertion**: Euclid's fifth postulate imply the existence of parallel lines.
   Reason: If the sum of the interior angles will be equal to sum of the two right angles, then two lines will not meet each other on either sides and therefore they will be parallel to each other.
   a) Both Assertion and reason are correct and reason is correct explanation for Assertion
   b) Both Assertion and reason are correct but reason is not correct explanation for Assertion
   c) Assertion is correct but reason is false
   d) Both Assertion and reason are false

SECTION – B

21. Simplify the following:
   $(3\sqrt{5} - 5\sqrt{2})(4\sqrt{5} + 3\sqrt{2})$ $30 - 11\sqrt{10}$

   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 suitable identity factorize:
   $(2x-5y)^3 - (2x+5y)^3$

   OR

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

3

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

OR

If $p(x) = x^2 - 4x + 3$, evaluate: $p(2) - p(-1) + p(-\frac{1}{2})$. $-\dfrac{15}{4}$

24. Express $0\cdot\overline{54}$ in the form p/q, where p and q are integers and $q \neq 0$. $\dfrac{6}{11}$

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? 0.33

SECTION – C

26. If $a = 7 - 4\sqrt{3}$, then find the value of $\sqrt{a} + \dfrac{1}{\sqrt{a}}$. $\sqrt{14}$

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

$1245 - 15(xy+yz+zx)$

OR

Factorize: $x^3 - 23x^2 + 142x - 120$

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

OR

The radius and slant height of a cone are in ratio 3:5. If its curved surface area is 2310 cm², then find its radius, height and slant height. (Take $\pi = \dfrac{22}{7}$).

$21 \qquad 28 \qquad 35$

29. There is a slide on 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 6m, find the area painted in colour. $20\sqrt{2}$
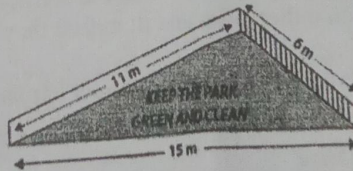

OR

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 grass field will be grazed by the cows?

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


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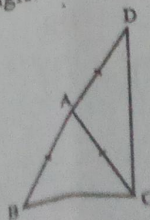
OR

AB is a line segment and P is its mid-point. D and E are points on the same side of AB such that ∠BAD = ∠ABE and ∠EPA = ∠DPB. Show that (i) △DAP ≅ △EBP (ii) AD = BE
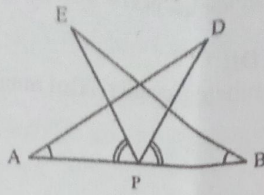
31. (i) The diameter of a metallic ball is 4.2 cm. What is the mass of the ball, if the density of the metal is 8.9 g per cm^3?

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

SECTION – D

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

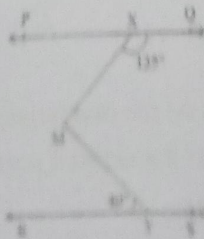(ii) In the given figure ∠ABC=69°., ∠ACB=31°.Find ∠BDC.
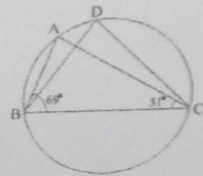
33. A random survey of the number of children of various age groups playing in a park was found as follows:

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 fig, if PQ ∥ RS, ∠MXQ = 135° and ∠MYR = 40°, find ∠XMY.

5

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 $(x-2)$. 11, 6

OR

Factorize 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

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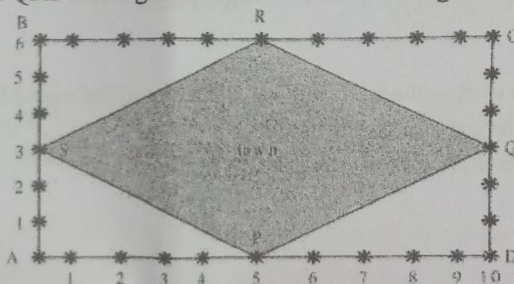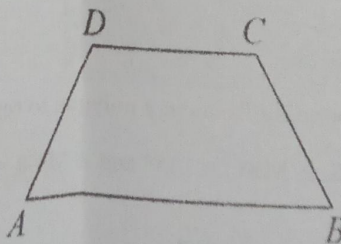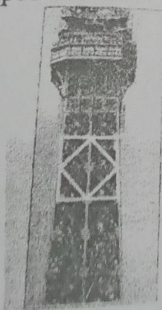

a) What are the coordinates of C, taking A as origin? (10,6)
b) What are the coordinates of R, taking A as origin? (5,6)
c) Find the length of the side of lawn.

OR

What is the shape and the area of the lawn? Rhombus

37. Eiffel Tower in Paris is an architectural wonder of the world. It uses an arrangement of criss-crossing X shaped beams 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:

a) What type of quadrilateral is PQRS? //gm

b) In quadrilateral PQRS, if PQ = QR, then what type of quadrilateral is PQRS? Rhombus

c) 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 cloth with them. They made the conical tent with a height of 10m and a diameter of 14m. The remaining cloth was used for the floor.

a) What is the slant height of the tent? $\sqrt{149}$

b) How much cloth was used for the floor? /54

c) What was the volume of the tent?
513.33

OR

What was the total surface area of the tent?