8th All India RPS OLYMPIAD

Online & Offline Mega Event

QUESTION PAPER (PHASE – I)

CLASS - IX

RPS MATHS LEAGUE

Q1. If $x < 1$, $y < -1$, then $(x - 1, y - 3)$ lies in

(A) Q_4 (B) Q_3 (C) Q_1 (D) Q_2

Q2. The line segment joining the points A(2, –2) and B(–7, 4) is trisected at the points P and Q (P is nearer to A). If coordinates of P and Q are (a, 0) and (–4, b) respectively, then the values of a and b are respectively

(A) 1 and 2 (B) –1 and 2 (C) 1 and –2 (D) –1 and –2

Q3. Co-ordinates of a point on y-axis which is equidistant from the points (6, 5) and (–4, 3) are

(A) (9, 0) (B) (0, 9) (C) (3, 2) (D) (0, 0)

Q4. If A(–5, 4), B(4, 4), C(4, 0) and D(–5, 0), then find the ratio of area of parts of ABCD in quadrant I and quadrant II.

(A) 5 : 4 (B) 4 : 5 (C) 1 : 1 (D) 2 : 3

Q5. When the polynomial $p(x) = ax^2 + bx + c$ is divided by $(x - 1)$ and $(x + 1)$, the remainders obtained are 6 and 10 respectively. If the value of $p(x)$ at $x = 0$ is 5, then $2a - 2b + 3c$ is equal to

(A) 21 (B) 40 (C) 20 (D) 25

Q6. When $p(x)$ is divided by $ax - b$, then the remainder is

(A) $p(\frac{a}{b})$ (B) $p(\frac{b}{a})$ (C) $p(\frac{-a}{b})$ (D) $p(\frac{-b}{a})$

Q7. If $f(x) = 3x^3 + 3\sqrt{3}x^2 + (3\sqrt{3} + 2)x - 14$ is divided by $\sqrt{3}x + 1$, then the remainder is

(A) –24 (B) 13 (C) –17 (D) 21

Q8. Vikas has ₹$(x^3 + 2ax + b)$, with this money he can buy exactly $(x - 1)$ jeans or $(x + 1)$ shirts with no money left. How much money does Vikas have, if $x = 4$?

(A) ₹ 80 (B) ₹ 120 (C) ₹ 30 (D) ₹ 60

Q9. The irrational number between 2 and $\sqrt{5}$ is

(A) $2\sqrt{5}$ (B) $2\sqrt{\sqrt{5}}$ (C) $(10)^{1/2}$ (D) $\sqrt{2\sqrt{5}}$

Q10. If $a = \sqrt{11 + 6\sqrt{2}}$, then the value of $a + a^{-1}$ is

(A) $\frac{23 + 5\sqrt{2}}{11}$ (B) $\frac{24 - 6\sqrt{2}}{7}$ (C) $\frac{24 + 6\sqrt{2}}{7}$ (D) $\frac{23 - 5\sqrt{2}}{11}$

Q11. Which of the following rational numbers has greatest denominator in simplest form ?

(A) $0.\overline{7}$ (B) $0.91\overline{6}$ (C) $0.3\overline{8}$ (D) $0.\overline{45}$

Q12. The distance of a point from a line is the length of the perpendicular from the point to the line –

(A) True (B) False

(C) Can not be obtained (D) None of these

Q13. For every line 'l' and a point P not lying on it, the number of lines that passes through P and parallel to 'l' are

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

Q14. Mr. Singhania and Ms. Gupta both invested equal amount of money in a project. If both of them made a profit of ₹ 167500 in the first month, then which of the following is correct about their total amount after one month?

(A) Mr. Singhania has more amount as compared to Ms. Gupta.

(B) Ms. Gupta has more amount as compared to Mr. Singhania.

(C) Both of them have equal amount.

(D) None of these

Q15. If ABCD is a parallelogram and E, F are the centroids of Δ s ABD and BCD respectively, then EF equals –

(A) AE (B) BE (C) CE (D) DE

Q16. Two supplymentry angles whose measures are a and b are such that 2a – 3b = 60° then find $\frac{4a}{5b}$, if they form a linear pair

(A) 1.6 (B) 2 (C) 3.1 (D) 4.5

Q17. If each exterior angle of a regular polygon is 18°. Find the number of sides of the polygon-

(A) 10 (B) 15 (C) 20 (D) 8

Q18. Let a, b, c are sides of triangle. Which of the following cannot be true.

(A) a = 2.1, b = 3.1, c = 4.1 (B) a = 6, b = 7, c = 8

(C) a = 4, b = 5, c = 9 (D) a = 6, b = 8, c = 10

Q19. The value of $\log_7\left(\log_7\left(7^{\frac{7}{8}}\right)\right)$ simplifies to :

(A) $\frac{7}{8}$ (B) $1-\log_7(8)$ (C) 0 (D) $-\frac{1}{8}$

Q20. If $\log_{10}(2) = 0.3010$, then value of $\log_{10} 8$ is :

(A) 0.6030 (B) 0.9030 (C) 0.9010 (D) 0.3090

Q21. If $\log_3 (x^4 - x^3) - \log_3 (x - 1) = 3$ then x is equal to ?

(A) 1 (B) 6 (C) 3 (D) 9

Q22. If the sides of a ΔABC are 6, 4, 8 then the length of smallest altitude is :

(A) $\frac{\sqrt{15}}{2}$ (B) $\sqrt{15}$ (C) $\frac{3}{2}\sqrt{15}$ (D) $\frac{3}{4}\sqrt{15}$

Q23. A circle is inscribed in a triangle ABC with right angle at A. The length of the two sides containing the right angle are 6 cm and 8 cm respectively. The radius of the circle is:

(A) 2 cm (B) 6 cm (C) 8 cm (D) 10 cm

Q24. A right triangle has hypotenuse of length p cm and one side of length q cm. If

(p – q) = 1, then the length of third side is:

(A) 2q + 1 (B) $\sqrt{2q+1}$ (C) 2p + 1 (D) $\sqrt{2p+1}$

Q25. ΔABC is an isosceles triangle in which AB = AC. If the side BA is produced to D such that AD = AB, then ∠BCD is :

(A) 30° (B) 45° (C) 60° (D) 90°

Q26. ABCD is a parallelogram and AP and CQ are the perpendiculars from A and C on its diagonal BD, respectively. Then AP is equal to :

(A) DP (B) CQ (C) PQ (D) AB

Q27. LMNO is a trapezium with LM || NO. If P and Q are the mid-points of LO and MN respectively and LM = 5 cm and ON = 10 cm, then PQ =

(A) 2.5 cm (B) 5 cm (C) 7.5 cm (D) 15 cm

Q28. The short diagonal of a rhombus is equal to its side, then the value of angle opposite to its longer diagonal is

(A) 30° (B) 60° (C) 90° (D) 120°

Q29. Choose the correct figure that has all the following properties.

(A) Both the diagonals are congruent

(B) It is called as rectangle

(C) The perimeter of the figure is four times its length or breadth

(D) It is a rhombus

(A) Rhombus (B) Rectangle (C) Trapezium (D) Square

Q30. Let A = {1, 2, {3, 4}, 5}. What is the cardinality of the power set of A, denoted as n(P(A))?

(A) 8 (B) 32 (C) 16 (D) 64

Q31. If A and B and C are sets such that A ∪ B = A ∪ C and A ∩ B = A ∩ C, which of the following relations must hold true?

(A) A = B (B) B ⊆ C (C) A ⊆ B ∩ C (D) B = C

Q32. Using the sports survey data from the previous question (n(C) = 50, n(F) = 40, n(B) = 30, pairwise intersections are 15, 10, 5, and all three = 5), how many students play exactly two of the three sports?

(A) 10 (B) 15 (C) 20 (D) 30

Q33. If the difference between the probability of success and failure of an event is $\frac{1}{4}$, then the probability of failure of the event is

(A) $\frac{7}{12}$ (B) $\frac{3}{4}$ (C) $\frac{3}{8}$ (D) $\frac{5}{4}$

Q34. One box contains four cards numbered 1, 3, 5 and 7 and another box contains four cards numbered as 2, 4, 6 and 8. One card is drawn from each box at random. The probability that the product of the numbers so drawn is more than 14 is:

(A) $\frac{1}{2}$ (B) $\frac{7}{10}$ (C) $\frac{7}{8}$ (D) $\frac{5}{8}$

Q35. If two dice are thrown together, the probability that the difference of the numbers appearing on them is a prime number:

(A) $\frac{2}{9}$ (B) $\frac{4}{9}$ (C) $\frac{5}{12}$ (D) $\frac{17}{36}$

Q36. The sides of a triangular field are 325 m, 300 m and 125 m. If its area is (10000K + 750) m^2, then find the value of K.

(A) 2.8 (B) 1.8 (C) 1.4 (D) 2.4

Q37. The radius of a circle is 18 cm and the angle subtended by an arc of this circle at the centre is 40°. Find the length of this arc.

(A) π cm (B) 2π cm (C) 3π cm (D) 4π cm

Q38. A circle is drawn on a diagonal of a rectangle 8 cm × 6 cm. If the diagonal of the rectangle is the diameter of the circle, then the radius of the circle is _____ cm.

(A) 5 (B) 7 (C) 6 (D) 9

Q39. Two circles touch externally. The difference of their areas is 132 sq. cm and the distance between their centres is 14 cm. If the radius of smaller circle is $\frac{11}{k}$, then find value of 10k.

(A) 12 (B) 20 (C) 15 (D) 18

Q40. If each side of a newly formed triangle is five times the original triangle, then find the ratio of areas of new triangle formed to the original triangle.

(A) 25 : 1 (B) 5 : 1 (C) 1 : 25 (D) 1 : 5

Q41. If one side of an isosceles triangle inscribed in a circle passes through the centre of a circle with radius $\frac{p}{4}$ then perimeter of a triangle is _____.

(A) $\frac{p(\sqrt{2}+1)}{2}$ (B) $\frac{p(\sqrt{2}-1)}{4}$ (C) $\frac{p(2\sqrt{2}-1)}{6}$ (D) $\frac{p(\sqrt{2}-2)}{2}$

Q42. Gita spent ₹ $\left(x^3+\frac{1}{x^3}\right)$ on shopping. Her friend Tina wanted to know the amount spent by her. Gita did not disclose the amount but she gave a clue that $\left(x+\frac{1}{x}\right)$ = ₹ 8. Find the amount spent by Gita.

(A) ₹ 570 (B) ₹ 488 (C) ₹ 166 (D) ₹ 278

Q43. If $xy(x-y) = 2$, then the value of $\frac{8}{x^3y^3}-x^3+y^3$ is

(A) 0 (B) –6 (C) 3 (D) –3

Q44. If a + b + c = 0, then the value of $\frac{a^2}{a^2-bc}+\frac{b^2}{b^2-ca}+\frac{c^2}{c^2-ab}$ is

(A) 1 (B) 2 (C) 3 (D) None

Q45. Let p = $\frac{1-m^2}{(1+mn)^2-(m+n)^2}$, then p $(1-n^2)$ is equal to –

(A) m^2 (B) n^2 (C) 1 (D) None

Q46. The length of the minute hand of a clock is 14 cm. Find the area swept by the minute hand from 10:00 a.m. to 10:35 a.m.

(A) 366.23 cm^2 (B) 359.33 cm^2 (C) 348 cm^2 (D) 46.12 cm^2

Q47. In a circle with centre O, if the distances of chords AB, PQ and LM from centre O is 9 cm, 8.3 cm and 7 cm respectively, then which of the following is correct about their lengths?

(A) AB > PQ > LM (B) AB = PQ = LM (C) LM > PQ > AB (D) Can't say

Q48. A circle C is drawn inside a square S so that the four sides of S are tangents to C. An equilateral triangle T is drawn inside C with its vertices on C. If the area of S is k times the area of T, then the value of k is

(A) $\frac{16}{3\sqrt{3}}$ (B) $\frac{16}{\sqrt{3}}$ (C) $\frac{32}{3\sqrt{3}}$ (D) $\frac{32}{\sqrt{3}}$

Q49. Let AP be a diameter of a circle of radius r and PT be the tangent to the circle at the point P such that the line AT intersects the circle, at B. If PT = 8 units and BT = 4 units, then r is equal to

(A) $4\sqrt{3}$ units (B) 4 units (C) $\frac{4}{\sqrt{3}}$ units (D) $2\sqrt{3}$ units

Q50. Two circles, both of radii 'a' touch each other and each of them, touches internally a circle of radius 2a. Then the radius of the circle which touches all the three circles is:

(A) $\frac{1}{2}$ a (B) $\frac{2}{3}$ a (C) $\frac{3}{4}$ a (D) a

Q51. If the sum of first m terms of an A.P. is $2m^2 + 3m$, then what is its second term?

(A) 9 (B) 10 (C) 11 (D) 12

Q52. Find the 9th term and the general term of the progression $\frac{1}{4}, -\frac{1}{2}, 1, -2, \ldots$

(A) 64, $(-1)^{n-1}\ 2^{n-3}$ (B) 63, $(-1)^{n-1}\ 2^{n-2}$ (C) 62, $(-1)^{n-2}\ 2^{n-3}$ (D) 61, $(-2)^{n-1}\ 2^{n-3}$

Q53. In a G.P., the 3rd term is 24 and the 6th term is 192. Find the 10th term.

(A) 3076 (B) 3071 (C) 3072 (D) 3074

Q54. If *d* is the common difference of an A.P. whose k^{th} term is a_k, then $a_{k+1} - a_k$ is equal to

(A) 2*d* (B) *d* (C) 2 (D) 1

Q55. If a clock strikes once at 1 O'clock, twice at 2 O'clock, thrice at 3 O'clock and so on, and again once at 1 O'clock and so on, then how many times will the bell be struck in the course of 2 days?

(A) 156 (B) 312 (C) 78 (D) 288

Q56. 10^{th} term of sequence $\sqrt{2}$, $\sqrt{8}$, $\sqrt{18}$, $\sqrt{32}$ is ……..

(A) $\sqrt{120}$ (B) $\sqrt{400}$ (C) $\sqrt{260}$ (D) $\sqrt{200}$

Q57. The graphs of the equations $6x - 2y + 9 = 0$ and $3x - y + 12 = 0$ are two lines which are

(A) Coincident (B) Parallel

(C) Intersecting exactly at one point (D) Perpendicular to each other

Q58. The graph of the linear equation $2x - y - 8 = 0$ cuts the X-axis at point (p, q) and Y-axis at point (r, s). Find the value of $(p + q + r + s)^2$.

(A) 64 (B) 36 (C) 144 (D) 16

Q59. When the positions of the digits of a two digit number are interchanged, then the number is decreased by 9. If x and y represent the units and tens digits respectively of the original number, then which of the following equations will represent above statement?

(A) $x + y - 1 = 0$ (B) $2x + 3y - 5 = 0$

(C) $x - y + 1 = 0$ (D) $2x - 3y + 5 = 0$

Q60. A part of monthly expenses of a family on milk is fixed which is ₹ 700 and remaining varies with quantity of milk taken extra at the rate of ₹ 25 per litre. Taking quantity of milk required extra as x litres and total expenditure on milk as ₹ y, write a linear equation from the above information.

(A) $-25x + y = 700$ (B) $20x + y = 500$

(C) $20x + 10y = 300$ (D) $x + 25y = 900$