

COMMON FIRST REVISION TEST - 2020

KA Reg.No.: 107

Standard X
MATHEMATICS
Part - I

Time: 3.00 hours. Marks: 100
14 x 1 = 14

I. Choose the correct answer:

- If $n(A) = p$, $n(B) = q$, then the total number of relations that exists between A and B is
 a) p^q b) 2^{p+q} c) 2^{pq} d) q^p
- If $n(A \times B) = 6$ and $A = \{1, 3\}$, then $n(B)$ is
 a) 1 b) 2 c) 3 d) 6
- If t_n is the n^{th} term of an A.P, then the value of $t_{n+1} - t_{n-1}$ is
 a) d b) 2d c) 3d d) 4d
- The sum of the exponents of the prime factors in the prime factorization of 1729 is
 a) 1 b) 2 c) 3 d) 4
- If $x-6$ is the HCF of $x^2 - 2x - 24$ and $x^2 - kx - 6$ then the value of k is
 a) 3 b) 5 c) 6 d) 8
- Graph of a linear polynomial is a
 a) straight line b) circle c) parabola d) hyperbola
- If A is a 2×3 matrix and B is a 3×4 matrix, how many columns does AB have
 a) 3 b) 4 c) 2 d) 5
- In the adjacent figure $\angle BAC = 90^\circ$ and $AD \perp BC$, then
 a) $BD \cdot CD = BC^2$ b) $AB \cdot AC = BC^2$
 c) $BD \cdot CD = AD^2$ d) $AB \cdot AC = AD^2$

- A man walks near a wall, such that the distance between him and the wall is 10 units. Consider the wall to be the Y-axis. The path travelled by the man is
 a) $x = 10$ b) $y = 10$ c) $x = 0$ d) $y = 0$
- If $x = a \tan \theta$ and $y = b \sec \theta$, then
 a) $\frac{y^2}{b^2} - \frac{x^2}{a^2} = 1$ b) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ c) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ d) $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 0$
- The curved surface area of a right circular cone of height 15 cm and base diameter 16 cm is
 a) $60 \pi \text{ cm}^2$ b) $68 \pi \text{ cm}^2$ c) $120 \pi \text{ cm}^2$ d) $136 \pi \text{ cm}^2$
- The ratio of the volumes of a cylinder, a cone and a sphere, if each has the same diameter and same height is
 a) 1 : 2 : 3 b) 2 : 1 : 3 c) 1 : 3 : 2 d) 3 : 1 : 2
- If the standard deviation of x, y, z is p, then the standard deviation of $3x + 5, 3y + 5, 3z + 5$ is
 a) $3p + 5$ b) $3p$ c) $p + 5$ d) $9p + 15$
- Which of the following is incorrect?
 a) $P(A) > 1$ b) $0 \leq P(A) \leq 1$ c) $P(\phi) = 0$ d) $P(A) + P(\bar{A}) = 1$

(2) X Maths

Part - II

II. Answer any 10 questions: (Ques.No.28 is compulsory) 10 x 2 = 20

15. The Cartesian product $A \times A$ has 9 elements among which $(-1, 0)$ and $(0, 1)$ are found. Find the set A and the remaining elements of $A \times A$.

16. Represent the function $f(x) = \sqrt{2x^2 - 5x + 3}$ as a composition of two functions.

17. Compute x such that $10^4 \equiv x \pmod{19}$

18. Find the 8th term of the G.P. 9, 3, 1,

19. Find the excluded values of the expression $\frac{x^2+6x+8}{x^2+x-2}$

20. If the difference between a number and its reciprocal is $\frac{24}{5}$, find the number.

21. If $A = \begin{pmatrix} 0 & 4 & 9 \\ 8 & 3 & 7 \end{pmatrix}$, $B = \begin{pmatrix} 7 & 3 & 8 \\ 1 & 4 & 9 \end{pmatrix}$, find the value of $3A - 9B$

22. Find the length of the tangent drawn from a point whose distance from the centre of a circle is 5 cm and radius of the circle is 3 cm.

23. In a garden containing several trees, three particular trees P, Q, R are located in the following way $BP = 2$ m, $CQ = 3$ m, $RA = 10$ m, $PC = 6$ m, $QA = 5$ m, $RB = 2$ m where A, B, C are points such that P lies on BC, Q lies on AC, R lies on AB. Check whether the trees P, Q, R lie on a same straight line.

24. The hill in the form of a right triangle has its foot at $(19, 3)$. The inclination of the hill to the ground is 45° . Find the equation of the hill joining the foot and top.

25. From the top of a rock $50\sqrt{3}$ m high, the angle of depression of a car on the ground is observed to be 30° . Find the distance of the car from the rock.

26. If the total surface area of a cone of radius 7cm is 704 cm^2 , then find its slant height.

27. Find the volume of a cylinder whose height is 2 m and whose base area is 250 m^2 .

28. If a, b, c are in A.P, prove that $(a - c)^2 = 4(b^2 - ac)$

Part - III

III. Answer any 10 questions: (Ques.No.42 is compulsory) 10 x 5 = 50

29. The function 't' which maps temperature in celcius (C) into temperature in Farenheit (F) is defined by $t(C) = F$ where $F = \frac{9}{5}C + 32$, find (i) $t(0)$ (ii) $t(28)$ (iii) $t(-10)$
(iv) the value of C when $t(C) = 212$
(v) The temperature when the celcius value is equal to the Farenheit value.

30. If $f(x) = 2x + 3$, $g(x) = 1 - 2x$ and $h(x) = 3x$. Prove that $f \circ (g \circ h) = (f \circ g) \circ h$

31. Prove that $2^n + 6 \times 9^n$ is always divisible by 7 for any positive integer n.

32. If $S_n = (x + y) + (x^2 + xy + y^2) + (x^3 + x^2y + xy^2 + y^3) + \dots$ n terms, then prove that

$$(x - y) S_n = \left[\frac{x^2(x^n - 1)}{x - 1} - \frac{y^2(y^n - 1)}{y - 1} \right]$$

33. Find the GCD of $6x^3 - 30x^2 + 60x - 48$ and $3x^3 - 12x^2 + 21x - 18$

Handwritten notes and calculations:
 For Q29: $10 \times 5 = 50$
 For Q30: $f \circ (g \circ h) = f(3(1 - 2x) + 3) = f(3 - 6x + 3) = f(6 - 6x) = 2(6 - 6x) + 3 = 12 - 12x + 3 = 15 - 12x$
 $(f \circ g) \circ h = (f \circ g)(3x) = f(1 - 2(3x) + 3) = f(1 - 6x + 3) = f(4 - 6x) = 2(4 - 6x) + 3 = 8 - 12x + 3 = 11 - 12x$
 For Q31: $2^n + 6 \times 9^n \pmod{7}$
 $2 \pmod{7} = 2$
 $6 \pmod{7} = 6$
 $9 \pmod{7} = 2$
 $2^n + 6 \times 2^n \pmod{7} = 2^n(1 + 6) \pmod{7} = 2^n \times 7 \pmod{7} = 0 \pmod{7}$
 For Q32: $(x - y) S_n = \frac{x^2(x^n - 1)}{x - 1} - \frac{y^2(y^n - 1)}{y - 1}$
 $\frac{x^2(x^n - 1)}{x - 1} = \frac{x^2(x^n - 1)(x + 1)}{(x - 1)(x + 1)} = \frac{x^2(x^n - 1)(x + 1)}{x^2 - 1}$
 $\frac{y^2(y^n - 1)}{y - 1} = \frac{y^2(y^n - 1)(y + 1)}{(y - 1)(y + 1)} = \frac{y^2(y^n - 1)(y + 1)}{y^2 - 1}$
 For Q33: $6x^3 - 30x^2 + 60x - 48$ and $3x^3 - 12x^2 + 21x - 18$
 GCD is $3(x^2 - 10x + 16)$

(3)

X Maths

34. If $\frac{1}{x^4} - \frac{6}{x^3} + \frac{13}{x^2} + \frac{m}{x} + n$ is a perfect square, find the values of m and n.
35. State and prove Basic proportionality theorem.
36. From a top of a 12 m high building, the angle of elevation of the top of a cable tower is 60° and the angle of depression of its-foot is 30° . Determine the height of the tower.
37. From the solid cylinder whose height is 2.4 cm and diameter 1.4 cm, a conical cavity of the same height and base is hollowed out. Find the total surface area of the remaining solid.
38. Water is flowing at the rate of 15 km per hour through a pipe of diameter 14 cm into a rectangular tank which is 50 m long and 44 m wide. Find the time in which the level of water in the tanks will rise by 21 cm.
39. Find the coefficient of variation of 24, 26, 33, 37, 29, 31
40. A card is drawn from a pack of 52 cards, find the probability of getting a king or a heart or a red card.
41. If $\sin\theta + \cos\theta = p$ and $\sec\theta + \operatorname{cosec}\theta = q$, then prove that $q(p^2 - 1) = 2p$
42. If $A = \begin{pmatrix} 5 & 2 & 9 \\ 1 & 2 & 8 \end{pmatrix}$, $B = \begin{pmatrix} 1 & 7 \\ 1 & 2 \\ 5 & -1 \end{pmatrix}$, verify that $(AB)^T = B^T A^T$

22/5/12

Part - IV

Note: Answer both questions choosing either of the alternatives:

2 x 8 = 16

43. a) A passenger train takes 1 hour more than an express train to travel a distance of 240 km from Chennai to Virudhachalam. The speed of passenger train is less than that of an express train by 20 km per our. Find the average speed of both the trains.
- (or)
- b) Draw the graph of $y = x^2 - 5x - 6$ and hence solve $x^2 - 5x - 14 = 0$
44. a) To get from point A to point B you must avoid walking through a pond. You must walk 34 m south and 41 m east. To the nearest meter, how many meter would he saved if it were possible to make a way through the pond?
- (or)
- b) Draw a triangle ABC of BC = 8 cm, $\angle A = 60^\circ$ and the bisector of $\angle A$ meets BC at D such that BD = 6 cm.

