

COMMON FIRST REVISION TEST – 2023

Standard X

Reg.No.: 103181

MATHEMATICS

Time: 3.00 hrs.

Part - I

Marks: 100

14 x 1 = 14

I. Choose the correct answer:

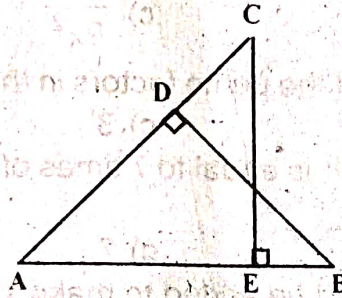
- If the ordered pairs $(a+2, 4)$ and $(5, 2a+b)$ are equal then (a, b) is
a) $(2, -2)$ b) $(5, 1)$ c) $(2, 3)$ d) $(3, -2)$
- If $f(x) = 2x^2$ and $g(x) = \frac{1}{3x}$, then $f \circ g$ is
a) $\frac{3}{2x^2}$ b) $\frac{2}{3x^2}$ c) $\frac{2}{9x^2}$ d) $\frac{1}{6x^2}$
- The sum of the exponents of the prime factors in the prime factorization of 1729 is
a) 1 b) 2 c) 3 d) 4
- If 6 times of 6th term of an A.P is equal to 7 times of the 7th term, then the 13th term of the A.P is
a) 0 b) 6 c) 7 d) 13
- Which of the following should be added to make $x^4 + 64$ a perfect square?
a) $4x^2$ b) $16x^2$ c) $8x^2$ d) $-8x^2$
- If number of columns and rows are not equal in a matrix then it is said to be a
a) diagonal matrix b) rectangular matrix
c) square matrix d) identity matrix
- In a $\triangle ABC$, AD is the bisector of $\angle BAC$. If $AB = 8$ cm, $BD = 6$ cm and $DC = 3$ cm. The length of the side AC is
a) 6 cm b) 4 cm c) 3 cm d) 8 cm
- The fourth vertex of a parallelogram ABCD whose three vertices are $A(-2, 5)$, $B(6, 7)$, $C(8, 3)$
a) $(0, 1)$ b) $(0, -1)$ c) $(-1, 0)$ d) $(1, 0)$
- The equation of a line passing through the origin and perpendicular to the line $7x - 3y + 4 = 0$ is
a) $7x - 3y + 4 = 0$ b) $3x - 7y + 4 = 0$ c) $3x + 7y = 0$ d) $7x - 3y = 0$
- The angle of elevation of a cloud from a point h metres above a lake is β . The angle of depression of its reflection in the lake is 45° . The height of location of the cloud from the lake is
a) $\frac{h(1 + \tan \beta)}{1 - \tan \beta}$ b) $\frac{h(1 - \tan \beta)}{1 + \tan \beta}$ c) $h \tan(45^\circ - \beta)$ d) none of these
- The total surface area of a hemi-sphere is how much times the square of its radius
a) π b) 4π c) 3π d) 2π
- Find the slant height if the frustum of height 15 cm and having its diameters as 24 cm and 8 cm.
a) 17 cm b) 16 cm c) 9 cm d) 7 cm
- Variance of first 20 natural numbers is
a) 32.25 b) 44.25 c) 33.25 d) 30
- In a family of 3 children the probability of having atleast one boy is
a) $\frac{1}{3}$ b) $\frac{2}{3}$ c) $\frac{1}{8}$ d) $\frac{7}{8}$

Part - II

II. Answer any 10 questions: (Q.No.28 is compulsory)

10 x 2 = 20

15. Let $A = \{1, 2, 3, 4, \dots, 45\}$ and R be the relation defined as "is a square of" on A . Write R as a subset of $A \times A$. Also, find the domain and range of R .
16. Define "onto function".
17. What is the time 100 hours after 7 a.m.?
18. Find the sum $3 + 1 + \frac{1}{3} + \dots \infty$
19. if α and β are the roots of $x^2 + 7x + 10 = 0$, find the value of $\alpha^2 + \beta^2$.
20. In the figure, if $BD \perp AC$ and $CE \perp AB$, prove that $\triangle AEC \sim \triangle ADB$.



21. A cat is located at the point $(-6, -4)$ in xy plane. A bottle of milk is kept at $(5, 11)$. The cat wish to consume the milk travelling through shortest possible distance. Find the equation of the path it needs to take its milk.
22. Find the angle of elevation of the top of a tower from a point on the ground, which is 30 m away from the foot of a tower of height $10\sqrt{3}$ m.
23. A player sitting on the top of a tower of height 20 m observes the angle of depression of a ball lying on the ground is 60° . Find the distance between the foot of the tower and the ball. ($\sqrt{3} = 1.732$).
24. If the ratio of the radii of two spheres is $4 : 7$, find the ratio of their volumes.
25. A cone of height 24 cm is made up of modelling clay. A child reshapes it in the form of a cylinder of same radius as cone. Find the height of the cylinder.
26. The range of a set of data is 13.67 and the largest value is 70.08. Find the smallest value.
27. If A is an event of a random experiment such that $P(A) : P(\bar{A}) = 17 : 15$ and $n(S) = 640$ then find $P(\bar{A})$.

28. $A = \begin{pmatrix} 8 & 3 & 2 \\ 5 & 9 & 1 \end{pmatrix}$, $B = \begin{pmatrix} 1 & -1 \\ 3 & 0 \end{pmatrix}$. Find if $A + B$ exists.

Part - III

III. Answer any 10 questions: (Q.No.42 is compulsory)

10 x 5 = 50

29. If the function $f : \mathbb{R} \rightarrow \mathbb{R}$ is defined by
$$f(x) = \begin{cases} 2x + 7 & \text{if } x < -2 \\ x^2 - 2 & \text{if } -2 \leq x < 3 \\ 3x - 2 & \text{if } x \geq 3 \end{cases}$$

then the values of (i) $f(4) + 2f(1)$ (ii) $\frac{f(1) - 3f(4)}{f(-3)}$



(3)

X Mathematics

30. The sum of first n , $2n$ and $3n$ terms of an A.P are S_1 , S_2 and S_3 respectively.

Prove that $S_3 = 3(S_2 - S_1)$

31. The product of three consecutive terms of a G.P is 1 and their sum is $\frac{39}{10}$. Find the three terms.

32. Find the GCD of the polynomials $x^4 + 3x^3 - x - 3$ and $x^3 + x^2 - 5x + 3$

33. Simplify : $\frac{1}{x^2 - 5x + 6} + \frac{1}{x^2 - 3x + 2} - \frac{1}{x^2 - 8x + 15}$

34. Given that $A = \begin{pmatrix} 1 & 3 \\ 5 & -1 \end{pmatrix}$, $B = \begin{pmatrix} 1 & -1 & 2 \\ 3 & 5 & 2 \end{pmatrix}$, $C = \begin{pmatrix} 1 & 3 & 2 \\ -4 & 1 & 3 \end{pmatrix}$,

verify that $A(B + C) = AB + AC$

35. Show that in a triangle, the medians are concurrent.

36. A triangular shaped glass with vertices at $A(-5, -4)$, $B(1, 6)$ and $C(7, -4)$ has to be painted. If one bucket of paint covers 6 sq.ft, how many buckets of paint will be required to paint the whole glass, if only one coat of paint is applied.

37. Without using Pythagoras theorem, show that the points $(1, -4)$, $(2, -3)$ and $(4, -7)$ form a right angled triangle.

38. If $\sqrt{3} \sin \theta - \cos \theta = 0$, then show that $\tan 3\theta = \frac{3 \tan \theta - \tan^3 \theta}{1 - 3 \tan^2 \theta}$

39. The radius of a conical tent is 7 cm and the height is 24 m. Calculate the length of the canvas used to make the tent if the width of the rectangular Canvas is 4 m.

40. Find the coefficient of variation 24, 26, 33, 37, 29, 31

41. Two dice are rolled once. find the probability of getting an even number on the first die or total of face sum 8.

42. Given that $A = \{x / x \text{ is a prime factor of } 42\}$, $B = \{x / 0 \leq x < 2, x \in W\}$, $C = \{1, 4, 5\}$. Verify that the distributive property of cartesian product over union.

Part - IV

IV. Answer both the questions choosing either of the alternatives: $2 \times 8 = 16$

43. a) Construct a triangle similar to a given triangle ABC with its sides equal to $\frac{6}{5}$ of the corresponding sides of the triangle ABC. (scale factor $\frac{6}{5} > 1$)

(OR)

- b) Construct a ΔPQR in which $QR = 5$ cm, $\angle P = 40^\circ$ and the median PG from P to QR is 4.4 cm. Find the length of the altitude from P to QR .

44. a) Nishanth is the winner in a Marathon race of 12 km distance. He ran at the uniform speed of 12 km/hr and reached the destination in 1 hour. He was followed by Aradhana, Ponmozhi, Jeyanth, Sathya and Swetha with their respective speed of 6 km/hr, 4 km/hr, 3 km/hr and 2 km/hr. And, they covered the distance in 2 hrs, 3 hrs, 4 hrs and 6 hrs respectively.

Draw the speed-time graph and use it to find the time taken to Kaushik with his speed of 2.4 km/hr.

(OR)

- b) Draw the graph of $y = x^2 + 3x + 2$ and use it to solve $x^2 + 2x + 1 = 0$