

HTV

HALF YEARLY EXAMINATION - 2022 MATHEMATICS

10 - Std

Time : 3.00 hrs.

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Marks : 100

PART - I

(i) Answer all the questions. Choose the most appropriate answer from the given four alternatives and write the option code and the corresponding answer.

- If $n(A \times B) = 6$ and $B = \{1, 3\}$ then $n(B)$ is
a) 1 b) 2 c) 3 d) 6 14 X 1 = 14
- If $f: A \rightarrow B$ is a bijective function and if $n(B) = 7$, then $n(A)$ is equal to
a) 7 b) 49 c) 1 d) 14
- 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 3, x, 6.75 are in G.P. then x is
a) 3 b) 2.5 c) 1.5 d) 4.5
- 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
- Transpose of a column matrix is
a) Unit matrix b) Diagonal matrix c) Column matrix d) Row matrix
- If $\triangle ABC$ is an isosceles triangle with $\angle C = 90^\circ$ and $AC = 5\text{cm}$, then AB is
a) 2.5cm b) 5cm c) 10cm d) $5\sqrt{2}\text{cm}$
- The area of triangle formed by the points $(-5, 0)$, $(0, -5)$ and $(5, 0)$ is
a) 0 sq. units b) 25 sq. units c) 5 sq. units d) non of these
- The point of intersection of the straight lines $y = 0$ and $x = -2$
a) $(0, -2)$ b) $(-2, 0)$ c) $(0, 4)$ d) $(2, 0)$
- If $\sin \theta = \cos \theta$, then $2 \tan^2 \theta + \sin^2 \theta - 1$ is equal to
a) $-\frac{3}{2}$ b) $\frac{3}{2}$ c) $\frac{2}{3}$ d) $-\frac{2}{3}$
- The height of a right circular cone whose radius is 5cm and slant height is 13cm will be
a) 12 cm b) 10 cm c) 13 cm d) 5 cm
- 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
- The range of the data 8, 8, 8, 8, 8, 8 is
a) 0 b) 1 c) 8 d) 3
- Which of the following is incorrect?
a) $P(A) > 1$ b) $0 \leq P(A) \leq 1$ c) $P(\phi) = 0$ d) $P(A) + P(\bar{A}) = 1$

PART - II

10 X 2 = 20

Note : Answer any 10 questions. Question No. 28 is compulsory.

- Let $A = \{1, 2, 3\}$ and $B = \{x/x \text{ is prime number less than } 10\}$ Find $A \times B$ and $B \times A$.
- Let $A = \{-1, 1\}$ and $B = \{0, 2\}$. If the function $f: A \rightarrow B$ defined by $f(x) = ax + b$ is an onto function? Find a and b.
- If $13824 = 2^a \times 3^b$ then find a and b.
- Find the number of terms in the A.P. 3, 6, 9, 12, 111.

19. Find the excluded values : $\frac{y}{y^2 - 25}$. 20. $A = \begin{bmatrix} 5 & 2 & 2 \\ -\sqrt{7} & 0.7 & \frac{5}{2} \\ 8 & 3 & 1 \end{bmatrix}$ then verify $(A^T)^T = A$.

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21. What length of ladder is needed to reach a height of 7 feet along the wall when the base of the ladder is 4 feet from the wall? Round off your answer to the next tenth place.
22. The line through the points $(-2, a)$ and $(9, 3)$ has slope $-\frac{1}{2}$. Find the value of a .
23. Show that the straight line $2x + 3y - 8 = 0$ and $4x + 6y + 18 = 0$ are parallel.
24. 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.
25. If the base area of a hemispherical solid is 1386 sq. metres, then find its total surface area?
26. If the range and the smallest value of a set of data are 36.8 and 13.4 respectively, then find the largest value.
27. Two coins are tossed together. What is the probability of getting different face of the coins?
28. The volume of the sphere is numerically equal to its surface area. Find its diameter.

PART - III**10 X 5 = 50****Note : Answer any 10 questions. Question No. 42 is compulsory.**

29. Let $A = \{x \in W/x < 2\}$, $B = \{x \in N / 1 < x \leq 4\}$ and $C = \{3, 5\}$. Verify that $A \times (B \cup C) = (A \times B) \cup (A \times C)$.
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. In an A.P sum of four consecutive terms is 28 and the sum of their squares is 276. Find the four number.
32. Rekha has 15 square colour papers of sizes 10cm, 11cm, 12cm, 24cm. How much area can be decorated with these colour papers?
33. Find the square root of $64x^4 - 16x^3 + 17x^2 - 2x + 1$.
34. If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$ show that $A^2 - 5A + 7I_2 = 0$.
35. State and prove Thales theorem.
36. Find the area of the quadrilateral formed by the points $(8, 6)$, $(5, 11)$, $(-5, 12)$ and $(-4, 3)$.
37. You are downloading a song. The percent y (in decimal form) of mega bytes remaining to get downloaded in x seconds is given by $y = -0.1x + 1$. i) find the total MB of the song.
ii) after how many seconds will 75% of the song gets down loaded?
iii) after how many seconds the song will be downloaded completely?
38. From the top of a 12m 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.
39. If the radii of the circular ends of a frustum which is 45cm high are 28cm, 7cm find the volume of the frustum.
40. A conical flask is full of water. The flask has base radius r units and height h units, the water is poured into a cylindrical flask of base radius xr units. Find the height of water in the cylindrical flask.
41. Two dice are rolled once. Find the probability of getting an even number on the first die or a total of face sum 8.
42. A chess board contains 64 equal squares and the area of each square is 6.25cm^2 . A border around the board is 2cm wide. Find the length of the side of the chess board.

PART - IV**2 x 8 = 16****Note : Answer all the questions.**

43. a) Take a point which is 11cm away from the centre of the circle of radius 4cm and draw the two tangents to the circle from that point. Also measure the lengths of the tangents. **(OR)**
b) Construct a triangle ΔPQR such that $QR = 5$ cm, $\angle P = 30^\circ$ and the altitude from P to QR is of length 4.2cm.
44. a) A school announces that for a certain competitions, the cash prize will be distributed for all the participants equally as show below

No. of participants (x)	2	4	6	8	10
Amount for each participants in Rs. (y)	180	90	60	45	36

 i) Find the constant of variation. ii) Graph the above data and hence, find how much will each participant get if the number of participants are 12. **(OR)**
b) Draw the graph of $y = x^2 + x - 2$ and hence solve $x^2 + x - 2 = 0$.

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