

Maths 10th Public Exam Question Paper 2015

MARCH – 2015
MATHS

Time Allowed: 2^{1/2} Hours

Maximum Marks: 100
15 x 1 = 15

SECTION - I

Note: i) Answer all the 15 questions.

ii) Choose the correct answer in each question. Each of the questions contains four options with just one correct option.

1.

If $f : A \rightarrow B$ is a bijective function and if $n(A) = 5$, then $n(B)$ is equal to :

- (a) 10 (b) 4 (c) 5 (d) 25

2.

The next term of $\frac{1}{20}$ in the sequence $\frac{1}{2}, \frac{1}{6}, \frac{1}{12}, \frac{1}{20}, \dots$ is :

- (a) $\frac{1}{24}$ (b) $\frac{1}{22}$ (c) $\frac{1}{30}$ (d) $\frac{1}{18}$

3.

The common ratio of the G.P. a^{m-n}, a^m, a^{m+n} is :

- (a) a^m (b) a^{-m} (c) a^n (d) a^{-n}

4.

The remainder when $x^2 - 2x + 7$ is divided by $x + 4$ is :

- (a) 28 (b) 29 (c) 30 (d) 31

5.

If $b = a + c$ and the equation $ax^2 + bx + c = 0$ has equal roots then :

- (a) $a = c$ (b) $a = -c$ (c) $a = 2c$ (d) $a = -2c$

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6.

If $\begin{pmatrix} 3x+7 & 5 \\ y+1 & 2-3x \end{pmatrix} = \begin{pmatrix} 1 & y-2 \\ 8 & 8 \end{pmatrix}$, then the values of x and y respectively are :

- (a) $-2, 7$ (b) $-\frac{1}{3}, 7$ (c) $-\frac{1}{3}, -\frac{2}{3}$ (d) $2, -7$

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7.

The centroid of the triangle with vertices at $(-2, -5)$, $(-2, 12)$ and $(10, -1)$ is :

- (a) $(6, 6)$ (b) $(4, 4)$ (c) $(3, 3)$ (d) $(2, 2)$

8.

The value of k if the straight lines $3x + 6y + 7 = 0$ and $2x + ky = 5$ are perpendicular is :

- (a) 1 (b) -1 (c) 2 (d) $\frac{1}{2}$

9.

If the sides of two similar triangles are in the ratio $2 : 3$, then their areas are in the ratio :

- (a) $9 : 4$ (b) $4 : 9$ (c) $2 : 3$ (d) $3 : 2$

10.

If the tangents PA and PB from an external point P to a circle with centre O are inclined to each other at an angle of 40° then $\angle POA =$

- (a) 70° (b) 80° (c) 50° (d) 60°

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11.

If $x = a \sec\theta$, $y = b \tan\theta$, then the value of $\frac{x^2}{a^2} - \frac{y^2}{b^2} =$:

- (a) 1 (b) -1 (c) $\tan^2\theta$ (d) $\operatorname{cosec}^2\theta$

12.

$(\cos^2\theta - 1)(\cot^2\theta + 1) + 1 =$

- (a) 1 (b) -1 (c) 2 (d) 0

13.

The ratios of the respective heights and the respective radii of two cylinders are $1 : 2$ and $2 : 1$ respectively. Then their respective volumes are in the ratio :

- (a) $4 : 1$ (b) $1 : 4$ (c) $2 : 1$ (d) $1 : 2$

14.

The variance of 10, 10, 10, 10, 10, is :

- (a) 10 (b) $\sqrt{10}$ (c) 0 (d) 5

15.

Probability of getting 3 heads and 3 tails in tossing a coin 3 times is :

- (a) $\frac{1}{8}$ (b) $\frac{1}{4}$ (c) $\frac{3}{8}$ (d) $\frac{1}{2}$

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SECTION - II

10 x 2 = 20

Note: i) Answer 10 questions in all.

ii) Question No. 30 is compulsory. Select any 9 questions from the first 14 questions.

iii) Each question carries two marks.

Draw venn diagram $A \cup (B \cap C)$.

16.

17.

Let $A = \{1, 2, 3, 4, 5\}$ $B = \mathbb{N}$ and $f : A \rightarrow B$ be defined by $f(x) = x^2$. Find the range of f . Identify the type of function.

18.

Find the first term and common difference of the A.P. $\frac{1}{2}, \frac{5}{6}, \frac{7}{6}, \frac{3}{2}, \dots, \frac{17}{6}$

Simplify $\frac{5x+20}{7x+28}$.

19.

20.

If α and β are the roots of $3x^2 - 5x + 2 = 0$, then find the value of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$.

21.

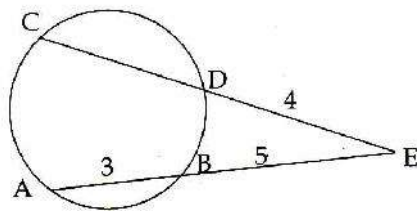
If $A = \begin{pmatrix} 8 & 5 & 2 \\ 1 & -3 & 4 \end{pmatrix}$ then find A^T and $(A^T)^T$.

22. If $A = \begin{pmatrix} 2 & 3 \\ -9 & 5 \end{pmatrix} - \begin{pmatrix} 1 & 5 \\ 7 & -1 \end{pmatrix}$ then find the additive inverse of A.

23. The centre of a circle is at $(-6, 4)$. If one end of a diameter of the circle is at the origin, then find the other end.

24. $4x - 2y + 1 = 0$.
Find the slope and y -intercept of the line whose equation is $4x - 2y + 1 = 0$.

In the figure find CD.



25.

26. A ramp for unloading a moving truck has an angle of elevation of 30° . If the top of the ramp is 0.9 m. above the ground level, then find the length of the ramp.

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27. If the circumference of the base of a solid right circular cylinder is 154 cm and its height is 16 cm, find its curved surface area.

28. Find the range and the coefficient of range of 43, 24, 38, 56, 22, 39, 45 .

29. A bag contains 6 white balls numbered from 1 to 6 and 4 red balls numbered from 7 to 10.
A ball is drawn at random. Find the probability of getting :
(i) an even numbered ball.
(ii) a white ball.

30.

(a) Prove the following identity.

$$\sqrt{\sec^2\theta + \operatorname{cosec}^2\theta} = \tan\theta + \cot\theta.$$

OR

(b) The thickness of a hemispherical bowl is 0.25 cm. The inner radius of the bowl is 5 cm. Find the outer curved surface area of the bowl (Take $\pi = \frac{22}{7}$).

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SECTION - III

9 x 5 = 45

Note: i) Answer 9 questions in all.

ii) Question No. 45 is compulsory. Select any 8 questions from the first 14 questions.

iii) Each question carries five marks.

31.

Use venn diagrams to verify De Morgan's law of complementation $(A \cup B)' = A' \cap B'$.

32.

Let $A = \{4, 6, 8, 10\}$ and $B = \{3, 4, 5, 6, 7\}$ and $f : A \rightarrow B$ be defined by

$$f(x) = \frac{1}{2}x + 1, \text{ then represent } f \text{ by :}$$

- (i) an arrow diagram
- (ii) a set of ordered pairs and
- (iii) a table

Find the sum of first n terms of the series $6 + 66 + 666 + \dots$

33.

34.

The sum of four consecutive terms of an A. P. is 20 and the sum of their squares is 120. Find those numbers.

Factorize.

$$x^3 - 7x + 6$$

35.

Find the square root of :

$$4 + 25x^2 - 12x - 24x^3 + 16x^4$$

36.

37.

If $A = \begin{pmatrix} 5 & 2 \\ 7 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} 2 & -1 \\ -1 & 1 \end{pmatrix}$ verify that $(AB)^T = B^T A^T$.

38.

Prove that $(0, 5)$, $(-2, -2)$, $(5, 0)$ and $(7, 7)$ are the vertices of a rhombus.

39.

If all sides of a parallelogram touch a circle, show that the parallelogram is a rhombus.

40.

If $\tan\theta + \sin\theta = m$, $\tan\theta - \sin\theta = n$ and $m \neq n$, then show that $m^2 - n^2 = 4\sqrt{mn}$.

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41.

A sector containing an angle of 120° is cut off from a circle of radius 21 cm. and folded into a cone by joining the radii. Find the curved surface area of the cone. $\left(\pi = \frac{22}{7}\right)$

42.

An iron right circular cone of diameter 8 cm. and height 12 cm. is melted and recast into spherical lead shots each of radius 4 mm. How many lead shots can be made ?

43.

The following table shows the marks obtained by 48 students in a quiz competition in mathematics. Calculate the standard deviation.

Data x	6	7	8	9	10	11	12
Frequency f	3	6	9	13	8	5	4

44.

The probability that a new car will get an award for its design is 0.25, the probability that it will get an award for efficient use of fuel is 0.35 and the probability that it will get both the awards is 0.15. Find the probability that :

- (i) it will get at least one of the two awards.
- (ii) it will get only one of the awards.

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45.

- (a) Find the L.C.M. [Least Common Multiple] of the following :
 $x^3 + y^3, x^3 - y^3, x^4 + x^2y^2 + y^4$.

OR

- (b) Find the equation of the line whose gradient is $\frac{3}{2}$ and which passes through P, where P divides the line segment joining A(-2, 6) and B(3, -4) in the ratio 2 : 3 internally.

SECTION - IV

2 x 10 = 20

- Note: i) This section contains two questions, each with two alternatives.
ii) Answer both the questions choosing either of the alternatives.
iii) Each question carries ten marks.

46.

- (a) Draw a circle of diameter 10 cm. From a point P, 13 cm. away from its centre, draw the two tangents PA and PB to the circle and measure their lengths.

OR

- (b) Construct a ΔABC in which the base $BC = 5$ cm, $\angle BAC = 40^\circ$ and the median from A to BC is 6 cm. Also measure the length of the altitude from A.

47.

- (a) Draw the graph of $y = x^2 + 2x - 3$ and hence find the roots of $x^2 - x - 6 = 0$.

OR

- (b) A bank gives 10% S.I (Simple Interest) on deposits for senior citizens. Draw the graph for the relation between the sum deposited and the interest earned for one year.

Hence find

- (i) The interest on the deposit of ₹ 650
- (ii) The amount to be deposited to earn an interest of ₹ 45.