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Sector 15, Noida

CLASS 10 - MATHEMATICS

10th basic paper 1

Time Allowed: 3 hours

Maximum Marks: 80

General Instructions:

1. All questions are compulsory
2. The question paper consists of 40 questions divided into four sections A, B, C & D.
3. Section A comprises of 20 questions of 1 mark each. Section B comprises of 6 questions of 2 marks each. Section C comprises of 8 questions of 3 marks each. Section D comprises 6 questions of 4 marks each.
4. There is no overall choice. However internal choices have been provided in two questions of 1 mark each, two questions of 2 marks each, three questions of 3 marks each and three questions of 4 marks each. You have to attempt only one of the alternatives in all such questions.
5. Use of calculators is not permitted.

Section A

1. If two positive integers 'm' and 'n' can be expressed as $m = x^2y^5$ and $n = x^3y^2$, where 'x' and 'y' are prime numbers, then HCF(m, n) = [1]

a) x^2y^2	b) x^2y^3
c) x^3y^2	d) x^3y^3

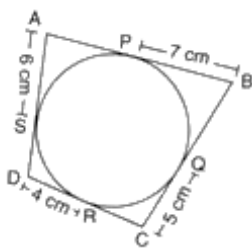
2. The decimal expansion of 'π': [1]

a) is non-terminating and non-recurring	b) is terminating
c) does not exist	d) is non-terminating and recurring

3. Any _____ is of the form $4q + 1$ or $4q + 3$ for some integer 'q'. [1]

a) positive even integer	b) positive odd integer
c) prime number	d) composite number

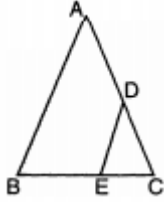
4. In the given figure, the perimeter of ABCD is [1]



- | | |
|----------|----------|
| a) 44 cm | b) 36 cm |
| c) 40 cm | d) 48 cm |

5. The wickets taken by a bowler in 10 cricket matches are 2, 6, 4, 5, 0, 3, 1, 3, 2, 3. The median of the data is [1]
- a) 3 b) 1
c) 2.5 d) 2
6. From a well-shuffled pack of 52 cards, one card is drawn at random. The probability of getting a face card is [1]
- a) $\frac{4}{13}$ b) $\frac{3}{13}$
c) $\frac{2}{13}$ d) $\frac{6}{13}$
7. The degree of a biquadratic polynomial is [1]
- a) 2 b) 4
c) 3 d) 1
8. The degree of the polynomial $5x^3 - 3x^2 - x + \sqrt{2}$ is [1]
- a) 2 b) 3
c) 1 d) 0
9. Radius of circumcircle of a triangle ABC is $5\sqrt{10}$ units. If point P is equidistant from A (1, 3), B (-3, 5) and C(5, -1), then AP = [1]
- a) $5\sqrt{10}$ units b) 25 units
c) $5\sqrt{5}$ units d) 5 units
10. If the co-ordinates of a point are (-5, 11), then its abscissa is [1]
- a) -5 b) 11
c) 5 d) -11
11. Fill in the blanks: [1]
Coordinates of the mid-point of the line segment joining the points A(x_1 , y_1) and B(x_2 , y_2) are given by _____.
12. Fill in the blanks: [1]
If $am = bl$, then the pair of linear equations $ax + by = c$ and $lx + my = n$ has _____ solutions.
OR
- Fill in the blanks:
If a pair of linear equation is consistent, then the lines will be _____.
13. Fill in the blanks: [1]
The ratio of the sides of a right triangle with respect to its acute angles, are called _____.
14. Fill in the blanks: [1]
If A and B are acute angles and $\sin A = \cos B$, then the value of (A + B) is _____.
15. Fill in the blanks: [1]
All _____ triangles are similar.
16. Evaluate $\frac{\sin 30^\circ}{\sin 45^\circ} + \frac{\tan 45^\circ}{\sec 60^\circ} - \frac{\sin 60^\circ}{\cot 45^\circ} - \frac{\cos 30^\circ}{\sin 90^\circ}$. [1]
- OR
- In a triangle ABC, write $\cos\left(\frac{B+C}{2}\right)$ in terms of angle A.

17. The radius of a circle is 50 cm. If the radius is decreased by 50% then find the percentage decrease in its area. [1]
18. A card is drawn at random from a well shuffled deck of 52 cards. Find the probability of getting a club. [1]
19. In the figure of $\triangle ABC$, the points D and E are on the sides CA, CB respectively such that $DE \parallel AB$, $AD = 2x$, $DC = x + 3$, $BE = 2x - 1$ and $CE = x$. Then, find x. [1]



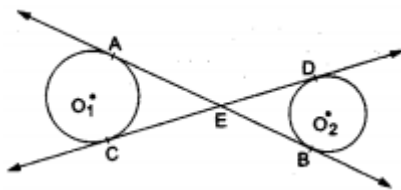
20. Find the value of x for which the numbers $(5x+2)$, $(4x-1)$ and $(x+2)$ are in AP. [1]

Section B

21. A group consists of 12 persons of which 3 are extremely patient, other 6 are extremely honest and rest are extremely kind. A person from the group is selected at random. Assuming that each person is equally likely to be selected, find the probability that selected person is extremely kind. Which of the above values do you prefer more? [2]
22. Gopi buys a fish from a shop for his aquarium. The shopkeeper takes out one fish at random from a tank containing 5 male fish and 8 female fish. What is the probability that the fish taken out is a male fish? [2]

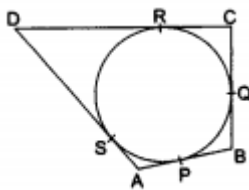


23. In the given figure, common tangents AB and CD to the two circles with centres O_1 and O_2 intersect at E. Prove that $AB = CD$. [2]



OR

A quadrilateral ABCD is drawn to circumscribe a circle, as shown in the figure. Prove that $AB + CD = AD + BC$.



24. If $\sqrt{2}\sin\theta = 1$, find the value of $\sec^2\theta - \operatorname{cosec}^2\theta$. [2]

OR

If $\sin(A + B) = 1$ and $\sin(A - B) = \frac{1}{2}$, $0 \leq A + B = 90^\circ$ and $A > B$, then find A and B.

25. The minute hand of a clock is 15 cm long. Calculate the area swept by it in 20 minutes. [Take π [2]

= 3.14.]

26. Read the following passage and answer the question that follows: [2]

A teacher told 10 students to write a polynomial on the blackboard. Students wrote the following polynomials:

(i) $x^2 + 2$	(vi) $x - 3$
(ii) $2x + 3$	(vii) $x^4 + x^2 + 1$
(iii) $x^3 + x^2 + 1$	(viii) $x^2 + 2x + 1$
(iv) $x^3 + 2x^2 + 1$	(ix) $2x^3 - x^2$
(v) $x^2 - 2x + 1$	(x) $x^4 - 1$

- How many students wrote cubic polynomial.
- Divide the polynomial $(x^2 + 2x + 1)$ by $(x + 1)$.

Section C

27. Divide the polynomial $u(x) = 9x^4 - 4x^2 + 4$ by the polynomial $v(x) = 3x^2 + x - 1$. Also, find the quotient and remainder. [3]

28. Draw tangents from an external point P to a circle of radius 4 cm without using the centre. [3]

OR

Construct a $\triangle ABC$ in which $BC = 8$ cm, $\angle B = 45^\circ$ and $\angle C = 30^\circ$. Construct another triangle, similar to $\triangle ABC$ such that its sides are $\frac{3}{4}$ of corresponding sides of $\triangle ABC$.

29. A toy is in the form of a cone of radius 3.5 cm mounted on a hemisphere of the same radius. [3]
The total height of the toy is 15.5 cm. Find the total surface area of the toy.

30. If $\sec\theta + \tan\theta = p$, show that $\frac{p^2-1}{p^2+1} = \sin\theta$ [3]

OR

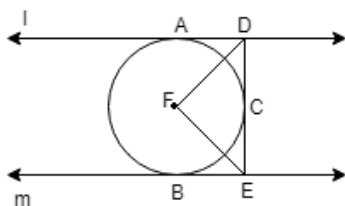
If $\sec\theta + \tan\theta = p$, prove that $\tan\theta = \frac{1}{2}\left(p - \frac{1}{p}\right)$

31. On morning walk, three persons step off together and their steps measure 40 cm, 42 cm and 45 cm, respectively. What is the minimum distance each should walk so that each can cover the same distance in complete steps? [3]

OR

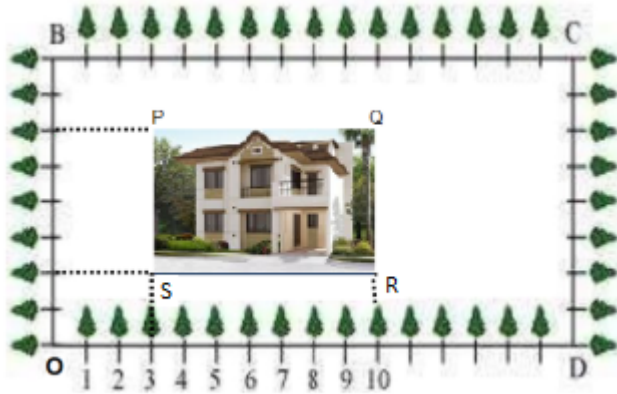
If d is the HCF of 30 and 72, find the values of x and y satisfying $d = 30x + 72y$

32. In Fig. 1 and m are two parallel tangents at A and B. The tangent at C makes an intercept DE [3]
between l and m. Prove that $\angle DFE = 90^\circ$.



33. In Green Park, New Delhi Ramesh is having a rectangular plot ABCD as shown in the following [3]
figure. Sapling of Gulmohar is planted on the boundary at a distance of 1m from each other.
In the plot, Ramesh builds his house in the rectangular area PQRS. In the remaining part of

plot, Ramesh wants to plant grass.



- i. Find the coordinates of vertices P, Q, R and S of rectangle PQRS.
 - ii. Find the coordinates of mid-point of diagonal QS.
 - iii. What is the area of rectangle PQRS?
34. Draw the graphs of the pair of linear equations $x - y + 2 = 0$ and $4x - y - 4 = 0$. Calculate the area [3] of the triangle formed by the lines so drawn and the x-axis.

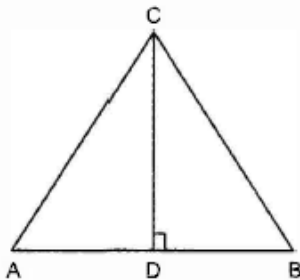
Section D

35. The product of Tanay's age (in years) five years ago and his age ten years later is 16. [4] Determine Tanay's present age.
36. In a school, students decided to plant trees in and around the school to reduce air pollution. It [4] was decided that the number of trees that each section of each class will plant will be double of the class in which they are studying. If there are 1 to 12 classes in the school and each class has two sections, find how many trees were planted by students. Which value is shown in the question?

OR

If along a road lies an odd number of stones placed at intervals of 10 metres. These stones have to be assembled around the middle stone. A person can carry only one stone at a time. A man carried the job with one of the end stones by carrying them in succession. In carrying all the stones he covered a distance of 3 km. Find the number of stones?

37. The shadow of a tower, when the angle of elevation of the sun is 45° , is found to be 10 metres [4] longer than when the angle of elevation is 60° . Find the height of the tower. [Given $\sqrt{3} = 1.732$.]
38. In Fig. $\angle ACB = 90^\circ$ and $CD \perp AB$. Prove that $\frac{CB^2}{CA^2} = \frac{BD}{AD}$. [4]



OR

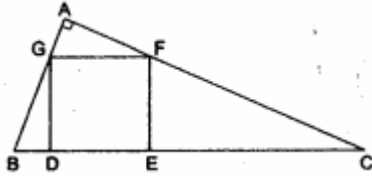
In the given figure, DEFG is a square and $\angle BAC = 90^\circ$. Prove that

- i. $\triangle AGF \sim \triangle DBG$

ii. $\triangle AGF \sim \triangle EFC$

iii. $\triangle DBG \sim \triangle EFC$

iv. $DE^2 = BD \times EC$



39. Water in a canal, 30 dm wide and 12 dm deep is flowing with velocity of 10km/hr. How much area will it irrigate in 30 minutes, if 8 cm of standing water is required for irrigation? [4]

OR

Find the number of solid spheres of diameter 6 cm can be made by melting a solid metallic cylinder of height 45 cm and diameter 4 cm.

40. Find the median of the following data by making a 'less than ogive'. [4]

Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60	60 - 70	70 - 80	80 - 90	90 - 100
Number of students	5	3	4	3	3	4	7	9	7	8