

BRILLIANT GROUP OF INSTITUTIONS DOHA, QATAR

Pre-Board Examination 2017-18

Class-X

Mathematics

Time allowed: 3 Hours

Max. Marks: 80

General Instructions:

- (i) All questions are compulsory.
- (ii) The question paper consists of 30 questions divided into four sections A, B, C and D.
- (iii) Section A contains 6 questions of 1 mark each. Section B contains 6 questions of 2 marks each. Section C contains 10 questions of 3 marks each. Section D contains 8 questions of 4 marks each.
- (iv) There is no overall choice. However, an internal choice has been provided in four 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.
- (v) Use of calculators is not permitted.

Section A

(Question numbers 1 to 6 carry 1 mark each)

1. The roots of the quadratic equation: $kx^2 + 4x + 1 = 0$ are real and equal, then find k .
2. If $\frac{129}{2000} = \frac{129}{2^m \times 5^n}$, then find the values of m and n .
3. If the 5th term of an AP is 9 and 9th term of the same AP is 5, then find the common difference.
4. A vertical pole of length 6 m casts a shadow 4 m long on the ground and at the same time a tower casts a shadow 28 m long. Find the height of the tower.
5. Find the length of the line AB formed by joining two points $A(\cos\theta, 0)$ and $B(0, \sin\theta)$.
6. Evaluate: $\sin^2 A + \cos^2 A + \cot^2 A$.

Section B

(Question numbers 7 to 12 carry 2 marks each)

7. Two unbiased coins are tossed simultaneously. Find the probability of getting
 - (i) two heads
 - (ii) one head
 - (iii) at most one head
 - (iv) at least one head
8. Given that $\text{HCF}(306, 657) = 9$, find $\text{LCM}(306, 657)$.
9. Which terms of the A.P. 8, 14, 20, 26, ... will be 72 more than its 41st term.
10. Point $M(11, y)$ lies on the line segment joining the points $P(15, 5)$, $Q(9, 20)$. Find the ratio in which point M divides the line segment PQ and also find the value of 'y'.

11. A bag contains 5 red balls and some blue balls. If the probability of drawing a blue ball is double that of a red ball, find the number of blue balls in the bag
12. A lending library has a fixed charge for the first three days and an additional charge for each day thereafter. Saritha paid Rs 27 for a book kept for seven days, while Susy paid Rs 21 for the book she kept for five days. Find the fixed charge and the charge for each extra day.

Section C

(Question numbers 13 to 22 carry 3 marks each)

13. Prove that the square of any positive integer is of the form $4m$ or $4m + 1$.
14. Points P, Q, R and S divide the line segment joining the points A(1, 2) and B(6, 7) in 5 equal parts. Find the coordinates of the points P, Q and R.

OR

If the point (x, y) is equidistant from the points $(a+b, b-a)$ and $(a-b, a+b)$, prove that $bx = ay$.

15. A metallic bucket, open at the top, of height 24 cm is in the form of the frustum of a cone, the radii of whose lower and upper circular ends are 7 cm and 14 cm respectively, find:
 - (i) the volume of water which can completely fill the bucket.
 - (ii) the area of the metal sheet used to make the bucket. [use $\pi = \frac{22}{7}$].

OR

Water in a canal, 6 m wide and 1.5 m deep, is flowing with a speed of 10 km/h. How much area will it irrigate in 30 minutes, if 8 cm of standing water is needed?

16. State and prove converse of Pythagoras theorem.

OR

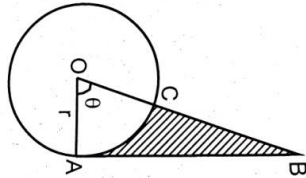
State and prove Basic Proportionality Theorem.

17. Divide $3x^2 - x^3 - 3x + 5$ by $(x - 1 - x^2)$ and verify the division algorithm.
18. Solve the following graphically and find the co-ordinates of the points where the lines meet the axis denoted: $2x - 5y + 4 = 0$, $2x + y - 8 = 0$ (x-axis)
19. Prove that the intercept of a tangent between two parallel tangents to a circle subtends a right angle triangle at the centre.
20. A student noted the number of cars passing through a spot on a road for 100 periods each of 3 minutes and summarized it in the table given below. Find the mode of the data
Number of cars: 0 – 10 10 – 20 20 – 30 30 – 40 40 – 50 50 – 60 60 – 70 70 – 80
Frequency: 7 14 13 12 20 11 15 8

21. The given figure, shows a sector of a circle of centre O, containing an angle θ° . Prove that:

i) perimeter of the shaded region is $r \left(\tan \theta + \sec \theta + \frac{\pi \theta}{180^\circ} - 1 \right)$.

ii) Area of the shaded region is $\frac{r^2}{2} \left(\tan \theta - \frac{\pi \theta}{180^\circ} \right)$



22. Evaluate: $\frac{\operatorname{cosec}^2 61 - \tan^2 29 + 2 \sin 30}{\operatorname{cosec}^2 A - \tan^2 (90 - A) + \tan^2 45} + \frac{3 \cot 11 \cdot \cot 21 \cdot \cot 31 \cdot \cot 59 \cdot \cot 69 \cdot \cot 79}{2(\sin^2 21 + \sin^2 69) - (\cos^2 41 + \cos^2 49)}$.

OR

If $x = \tan A + \sin A$ and $y = \tan A - \sin A$, then prove that: $\left(\frac{x+y}{x-y} \right)^2 - \left(\frac{x+y}{2} \right)^2 = 1$.

Section D

(Question numbers 23 to 30 carry 4 marks each)

23. In a flight of 2,800km, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 100km/h and time increased by 30 minutes. Find the original duration of the flight.

OR

Solve: $5^{(x+1)} + 5^{(2-x)} = 5^3 + 1$.

24. An A.P consists of 21 terms. The sum of the three terms in the middle is 129 and of the last three terms is 237. Find the A.P.

25. If $\operatorname{cosec} \theta = x + \frac{1}{4x}$, prove that: $\operatorname{cosec} \theta - \cot \theta = 2x$ or $\frac{1}{2x}$.

26. If the median of the following data is 32.5, find the missing frequencies

Class interval	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	Total
Frequency	f_1	5	9	12	f_2	3	2	40

OR

The mean of the following distribution is 27, find the value of p

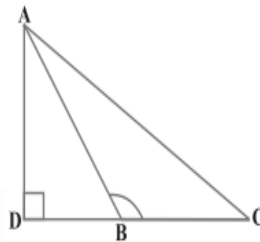
Class	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50
Frequency	8	p	12	13	10

27. Let ABC be a right triangle in which $AB = 6$ cm, $BC = 8$ cm and $\angle B = 90^\circ$. BD is the perpendicular from B on AC. The circle through B, C, D is drawn. Construct the tangents from A to this circle. Write the steps of construction.

28. In an equilateral triangle ABC, D is a point on side BC such that $BD = \frac{1}{3}BC$. Prove that:
 $9AD^2 = 7AB^2$.

OR

In Figure, ABC is a triangle in which $\angle ABC > 90^\circ$ and $AD \perp CB$ produced. Prove that:
 $AC^2 = AB^2 + BC^2 + 2 BC \cdot BD$.



29. **A farmer wants to dig a well either in the form of cuboid of dimensions (1m x 1m x 7m) or in the form of cylinder of diameter 1 meter and height 7m. The rate to dig the well is Rs. 50/m³. Find the cost to dig both wells. The farmer decides to dig the cylindrical well. By his decision which value is depicted?**
30. A straight highway leads to the foot of a tower. A man standing at the top of the tower observes a car at an angle of depression of 30° , which is approaching the foot of the tower with a uniform speed. Six seconds later, the angle of depression of the car is found to be 60° . Find the time taken by the car to reach the foot of the tower from this point.

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