GLOBAL MATH OLYMPIAD

Past Papers Archive

Compiled from GMO past editions — Seed through Scholar Level

www.mindcarver.com | info@mindcarver.com | +92 313 4506115

MIND CARVER

GLOBAL MATH OLYMPIAD — PAST PAPERS ARCHIVE

Achiever Level

Grades 9–10

Past Paper — For Reference & Practice

www.mindcarver.com | info@mindcarver.com | +92 313 4506115

1 Basic Problems (1 Mark Each - 7 Marks)

1. If $x^4 = y^4$, what must be true?

   (a) $x = y$
   (b) $x \neq y$
   (c) $x = y$ or $x \neq y$
   (d) None of the above

2. Which of the following is an irrational number?

   (a) $\sqrt{16}$
   (b) $\frac{7}{8}$
   (c) π
   (d) -0.75

3. What is the reciprocal of $\cos(\theta)$?

   (a) $\sin(\theta)$
   (b) $\sec(\theta)$
   (c) $\cot(\theta)$
   (d) $\csc(\theta)$

4. Simplify: $1 - \cos^2(\theta)$

   (a) $\sin^2(\theta)$
   (b) $\tan^2(\theta)$
   (c) $\sec^2(\theta)$
   (d) 0

5. What is $\cot(45°)$?

   (a) 0
   (b) 1
   (c) $\sqrt{2}$
   (d) Undefined

6. A fair die is rolled. What is the probability of getting a multiple of 3?

   (a) $\frac{1}{3}$
   (b) $\frac{1}{2}$
   (c) $\frac{2}{3}$
   (d) $\frac{1}{6}$

7. Which is used to predict future trends?

   (a) Mean
   (b) Regression analysis
   (c) Bar graph
   (d) Median

2 Moderate Problems (2 Marks Each - 48 Marks)

8. The product of two irrational numbers is always:

   (a) Irrational
   (b) Rational
   (c) Integer
   (d) Not necessarily rational or irrational

9. A sum of Rs. 8,000 earns 6% simple interest annually. How much interest is earned in 4 years?

   (a) 1,920
   (b) 1,440
   (c) 2,400
   (d) 960

10. A principal amount is tripled in 10 years at simple interest. What is the annual rate?

(a) 10%
(b) 15%
(c) 20%
(d) 25%

11. If $f(x) = 2x^3 - x + 4$, find $f(2)$:

(a) 16
(b) 18
(c) 20
(d) 22

12. The product of the roots of $2x^2 - 5x + 3 = 0$ is:

(a) $\frac{3}{2}$
(b) $\frac{5}{2}$
(c) $\frac{2}{3}$
(d) $-\frac{3}{2}$

13. If $x - y = 7$ and $xy = 18$, find $x^2 + y^2$:

(a) 67
(b) 85
(c) 49
(d) 121

14. Factorize: $x^3 + 27$

(a) $(x + 3)(x^2 - 3x + 9)$
(b) $(x - 3)(x^2 + 3x + 9)$
(c) $(x + 3)^3$
(d) $(x - 3)^3$

15. The letters a and b are to be replaced by positive integers so that the equation is correct.

$$\frac{a}{7} = \frac{5}{b}$$

In how many different ways can this be done?

(a) 0
(b) 1
(c) 2
(d) 4

16. The graph of $y = -3x^2 + 2$ opens:

(a) Upward
(b) Downward
(c) To the right
(d) It is linear

17. I am less than my half and greater than my double. the sum of me and my square is zero. Who am I?

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

18. A triangle with sides 7, 24, 25 is classified as:

(a) Acute
(b) Right-angled
(c) Obtuse
(d) Equilateral

19. What is the midpoint between (4, -2) and (-6, 8)?

(a) $(-1, 3)$
(b) $(5, -5)$
(c) $(1, -3)$
(d) $(-2, 6)$

20. Two rectangles of 5 cm length and 2 cm width are joined together on the longer side. The perimeter of new rectangle is?

(a) 24 cm
(b) 28 cm
(c) 12 cm
(d) 20 cm

21. A satellite dish forms a parabola. If its equation is $y = 3x^2$, which way does it open?

(a) Left
(b) Right
(c) Upward
(d) Downward

22. A car's wheel has a radius of 35 cm. What distance does it cover in one full rotation?

(a) 70π cm
(b) 35π cm
(c) 105π cm
(d) 17.5π cm

23. A wire of length 95 m is cut into three pieces such that the length of each piece is 50% more than the previous piece. What is the length of the largest piece?

(a) 16 m
(b) 42 m
(c) 45 m
(d) 48 m

24. If $\cos(\theta) = \frac{5}{13}$, what is $\tan(\theta)$?

(a) $\frac{12}{5}$
(b) $\frac{5}{12}$
(c) $\frac{13}{5}$
(d) $\frac{5}{13}$

25. A box has 4 red, 5 green, and 6 blue marbles. Probability of drawing green is:

(a) $\frac{1}{3}$
(b) $\frac{1}{4}$
(c) $\frac{1}{5}$
(d) $\frac{5}{12}$

26. The ages of a family of five add up to 80. The two youngest are 6 and 8. What was the sum of the ages of the family seven years ago?

(a) 35
(b) 36
(c) 45
(d) 46

27. Predictive modeling is used in:

(a) Stock market analysis
(b) Weather forecasting
(c) Sports strategy
(d) All of the above

28. In triangle ABC, $\angle A = 30°$, $\angle B = 45°$, and side $a = 10$ cm. Find side b.

(a) $10\sqrt{2}$ cm
(b) $5\sqrt{6}$ cm
(c) $10\sqrt{3}$ cm
(d) 15 cm

29. How many 3-digit numbers can be formed using digits {1, 2, 3, 4} without repetition?

(a) 12 (b) 24 (c) 36 (d) 64

30. A shopkeeper buys 50 pens for Rs. 500 and sells them at Rs. 12 each. What is the profit percentage?

(a) 10% (b) 15% (c) 20% (d) 25%

31. Find determinant of $x^2 - 6x + 4$

(a) 30 (b) 24 (c) 45 (d) 20

3 Advanced Problems (5 Marks Each - 45 Marks)

32. Find the distance between points $A(1, 2, 3)$ and $B(4, 6, 8)$.

(a) $\sqrt{50}$ (b) $\sqrt{61}$ (c) $\sqrt{65}$ (d) $\sqrt{70}$

33. A loan of Rs. 40,000 compounds annually at 10% for 2 years. What is the total amount?

(a) Rs 48,400
(b) Rs 44,000
(c) Rs 52,000
(d) Rs 50,000

34. Simplify $\frac{x^2-4x+4}{x^2+x-6}$:

(a) $\frac{x+2}{x-3}$
(b) $\frac{x-2}{x+3}$
(c) $\frac{x-2}{x-3}$
(d) $\frac{x+2}{x+3}$

35. A trapezoid has bases of 8 cm and 12 cm, and height 5 cm. What is its area?

(a) 40 cm^2 (b) 50 cm^2 (c) 60 cm^2 (d) 70 cm^2

36. From a 30 m tower, the angle of depression to a car is 60°. How far is the car?

(a) $10\sqrt{3}$ m (b) 15 m (c) 20 m (d) 30 m

37. Two dice are rolled. Probability of getting a sum of 9 is:

(a) $\frac{1}{9}$ (b) $\frac{1}{6}$ (c) $\frac{1}{12}$ (d) $\frac{5}{36}$

38. A student has scores 72, 85, 90, 88. What score is needed on the fifth test for an 85 average?

(a) 90 (b) 85 (c) 95 (d) 100

39. In a right triangle, if $\tan(\theta) = \frac{5}{12}$, find the hypotenuse.

(a) 13 (b) 17 (c) 7 (d) 25

40. The median of data set 5, 9, 12, 15, x, 21 is 13. Find x.

(a) 10 (b) 13 (c) 14 (d) 16