Mindbenz Olympiad of Mathematics (MOM)

Sample Paper

Grade - 8

Maximum Marks: 60 Time Allowed – 55 Minutes

Section: A Fundamental Check (10 Questions × 1 mark = 10 marks)

1. **If $3^x - 3^{x-1} = 18$, what is the value of x^x?**

   a) 4
   b) 9
   c) 27
   d) 256

2. **A shopkeeper marks his goods at 40% above the cost price and allows a discount of 25%. His gain percentage is:**

   a) 5%
   b) 10%
   c) 15%
   d) 20%

3. **The sum of the interior angles of a regular polygon is 1440°. The number of sides of the polygon is:**

   a) 8
   b) 10
   c) 12
   d) 9

4. **A number is increased by 30% and then decreased by 30%. The net change in the number is:**

   a) 9% increase
   b) 9% decrease
   c) No change
   d) 6% decrease

5. **The smallest number by which 1944 must be multiplied so that the product is a perfect cube is:**

a) 2
b) 3
c) 6
d) 4

6. In a parallelogram PQRS, if ∠P = (3x - 15)° and ∠Q = (2x + 25)°, then the value of x is:

a) 34
b) 35
c) 36
d) 40

7. A tap can fill a tank in 8 hours and another tap can empty it in 16 hours. If both taps are opened simultaneously, the time (in hours) to fill the tank is:

a) 8
b) 10
c) 16
d) 24

8. The value of $\sqrt{(10 + \sqrt{(25 + \sqrt{(108 + \sqrt{(154 + \sqrt{225})})})}}$ is:

a) 4
b) 6
c) 8
d) 10

9. If a + b + c = 0, then the value of (a2/bc)+(b2/ca)+(c2/ab) is:

a) 1
b) 0
c) -1
d) 3

10. A single card is drawn from a well-shuffled deck of 52 cards. What is the probability of getting a face card of a red suit?

a) 3/26
b) 3/13
c) 1/26
d) 1/13

Section: B Application Zone (10 Questions × 1 mark = 10 marks)

11. **The difference between the compound interest (compounded annually) and simple interest on a certain sum for 2 years at 15% per annum is ₹180. The sum is:**

    a) **₹7,500**
    b) **₹8,000**
    c) **₹6,000**
    d) **₹7,000**

12. **A and B together can do a piece of work in 12 days, B and C together in 15 days, and C and A together in 20 days. In how many days1 can A alone do the work?**

    a) **25 days**
    b) **28 days**
    c) **30 days**
    d) **32 days**

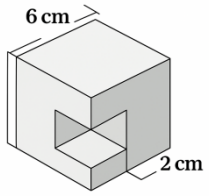
13. **The sides of a triangular field are in the ratio 5:12:13 and its perimeter is 300 m. The area of the field is:**

    a) **3000 m²**
    b) **2500 m²**
    c) **3500 m²**
    d) **3750 m²**

14. **A trader sells two articles for ₹8400 each, making a profit of 20% on the first article and a loss of 20% on the second article. The net profit or loss on the whole transaction is:**

    a) **4% loss**
    b) **4% gain**
    c) **5% loss**
    d) **No profit, no loss**

15. **A cube with a side length of 6 cm has a smaller cube with a side length of 2 cm removed from one of its corners.**



    What is the total surface area of the remaining solid?

    a) **216 cm²**
    b) **212 cm²**
    c) **208 cm²**
    d) **200 cm²**

16. If $x = (\sqrt{5} - 2)/(\sqrt{5} + 2)$, then the value of $x + 1/x$ is:

a) 18
b) $4\sqrt{5}$
c) -18
d) $-4\sqrt{5}$

17. The digits of a two-digit number are in the ratio of 1:2. If the number obtained by interchanging the digits is 27 more than the original number, the original number is:

a) 46
b) 69
c) 36
d) 63

18. In a rhombus ABCD, the diagonal AC is equal to one of its sides. The measure of ∠ABC is:

a) 60°
b) 90°
c) 120°
d) 150°

19. A train running at 7/11 of its own speed reaches a place in 22 hours. How much time could be saved if the train ran at its own speed?

a) 7 hours
b) 8 hours
c) 14 hours
d) 16 hours

20. A number N = 897324P64 is divisible by 8. Which of the following can be the value of P?

a) 2
b) 7
c) 1
d) 9

Section: C Maths Mastery (20 Questions × 2 mark = 40 marks)

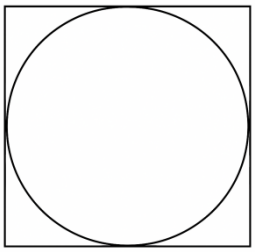
21. A sum of money amounts to ₹4,840 in 2 years and to ₹5,324 in 3 years at compound interest compounded annually. A student calculates the simple interest on this sum for 4 years at the same rate. What will be the result?

a) ₹1,600
b) ₹1,500
c) ₹1,200
d) ₹1,800

22. A cylindrical container of radius 6 cm and height 15 cm is filled with ice cream. The entire ice cream is to be distributed to 10 children in equal cones with hemispherical tops. If the height of the conical portion is four times the radius of its base, find the radius of the ice2 cream cone.

a) 2 cm
b) 3 cm
c) 4 cm
d) 5 cm

23. A circle is inscribed inside a square.



What is the ratio of the area of the circle to the area of the square?

a) 1/2
b) 2/3
c) π/4
d) 3/4

24. A number is chosen at random from the first 200 natural numbers. The probability that the number is divisible by 3 or 7 is:

a) 22/75
b) 23/75
c) 85/200
d) 86/200

25. If $x^2+1/x^2=7$, find the value of x^3-1/x^3, given that $x > 1$.

a) $8\sqrt{5}$
b) 18
c) $6\sqrt{5}$
d) 15

26. In an election between two candidates, 10% of the voters did not cast their vote and 60 votes were declared invalid. The successful candidate got 308 votes more than his rival. If the successful candidate secured 47% of the total votes on the voter list, what is the number of votes polled by the defeated candidate?

a) 2356
b) 2606
c) 2972
d) 2136

27. A tank has a leak which would empty it in 8 hours. A tap is turned on which admits 6 liters a minute into the tank, and it is now emptied in 12 hours. How many liters does the tank hold?

a) 8640 liters
b) 8520 liters
c) 8290 liters
d) 8450 liters

28. The coordinates of the vertices of a quadrilateral PQRS are P(-2, 5), Q(7, 8), R(4, -3), and S(-1, -6). What is the area of this quadrilateral?

a) 74 sq. units
b) 80 sq. units
c) 82 sq. units
d) 84 sq. units

29. A number of the form $10n-1$ is always divisible by 11 if:

a) n is any integer
b) n is an odd integer
c) n is an even integer
d) n is a prime number

30. A straight line passes through the points (-4, 10) and (6, -5).
Find the equation of the line perpendicular to this line that passes through the point (2, 3).

a) $y = (2/3)x + 5/3$
b) $y = (-2/3)x + 5$
c) $y = (3/2)x - 4$
d) $y = (-3/2)x + 6$

31. A solid metallic sphere of radius 8 cm is melted and recast into a number of smaller conical toys, each of radius 4 cm and height 8 cm. The number of toys so formed is:

a) 12
b) 16
c) 24

d) 32

32. If $x = \sqrt[3]{(2+\sqrt{3})}$, the value of x^3+1/x^3 is:

a) 2
b) 4
c) 8
d) 1

33. A two-digit number is such that the product of the digits is 14. If 45 is added to the number, its digits are reversed. Find the number.

a) 27
b) 72
c) 35
d) 53

34. A, B, and C enter into a partnership. A invests 3 times as much as B invests and B invests two-thirds of what C invests. At the end of the year, the4 profit earned is ₹6600. What is the share5 of B?

a) ₹1200
b) ₹1500
c) ₹1800
d) ₹2000

35. The angle of elevation of the top of a tower from a point on the ground, which is 30 m away from the foot of the tower, is 30°. The height of the tower is:

a)6 30 m
b) $10\sqrt{3}$ m
c) $15\sqrt{3}$ m
d) 15 m

36. 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.

a)7 5
b) 10
c) 15
d) 20

37. The last digit of the number $(795-358)^2$ is:

a) 0
b) 4
c) 6
d) 9

38. A shopkeeper marks the price of a product 50% above its cost price. He then offers a 20% discount on the marked price. After selling the product, he realizes that he could have made ₹240 more if he had not given the discount.

    What was the original cost price of the product?

    a) ₹800
    b) ₹900
    c) ₹1000
    d) ₹1200

39. If x = 4ab/(a+b), find the value of (x+2a)/(x-2a) + (x+2b)/(x-2b).

    a) 1
    b) 2
    c) 3
    d) 4

40. A company offers three types of successive discounts: (I) 25% and 15%, (II) 30% and 10%, (III) 35% and 5%. Which offer is the best for a customer?

    a) Offer I
    b) Offer II
    c) Offer III
    d) All are equally good

Answer Key

Section A:

1. (c) 27
2. (a) 5%
3. (b) 10
4. (b) 9% decrease
5. (b) 3
6. (a) 34
7. (c) 16 hours
8. (a) 4
9. (D) 3
10. (a) 3/26

Section B:

11. (b) ₹8 000
12. (c) 30 days
13. (a) 3000 m^2
14. (a) 4% loss
15. (a) 216 cm^2
16. (a) 18
17. (c) 36
18. (a) 60°
19. (b) 8 hours
20. (a) P = 2

Section C:

21. (a) ₹1 600
22. (b) 3 cm
23. (c) π/4
24. (c) 85/200
25. (a) $8\sqrt{5}$
26. (b) 2606
27. (a) 8640 L
28. (a) 74 sq units
29. (c) n even
30. (a) y = (2/3)x + 5/3
31. (b) 16 toys
32. (b) 4
33. (a) 27
34. (a) ₹1 200
35. (b) $10\sqrt{3}$ m
36. (b) 10 balls
37. (d) 9
38. (a) ₹800
39. (b) 2
40. (c) Offer III

