



# M-CAT GRAND FINALE

## Sample Paper

(Based on the new exam pattern)



**TOTAL MARKS**  
**100**



**QUESTIONS**  
**50**



**DURATION**  
**60 mins**

### Instructions for Student:

- Read the question carefully before answering.
- Each question has 4 options (A, B, C & D).
- Choose one correct option as your answer from the 4 options.
- **New Exam Pattern:**
  1. Each question will carry 1, 2, or 4 marks, depending on its difficulty level.
  2. **Negative Marking:** Additional marks will be deducted for every incorrect answer (0.25 marks for a 1-mark question, 0.5 marks for a 2-mark question, and 1 mark for a 4-mark question).
  3. The Assessment Round score will be included in the Grand Finale score using a weighted average method. 30% of the Assessment Round and 70% of the Grand Finale score.
  4. New Method to Calculate Marks for Grand Finale Awards.

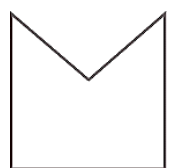
|                                     | Assessment Round        | Grand Finale            |
|-------------------------------------|-------------------------|-------------------------|
| Actual Marks                        | 60                      | 80                      |
| Weightage                           | 30%                     | 70%                     |
| Marks After Weighted Average Rule   | $60 \times 30/100 = 18$ | $80 \times 70/100 = 56$ |
| Final Marks for Grand Finale Awards | $18 + 56 = 74$          |                         |

- On the answer sheet blacken the correct option against the corresponding question number.
- **Use pencil to mark your answer.**
- If you wish to change your answer, erase the previous mark completely.

**All The Best !**

## SECTION 1: Concept Check

1. Find the value of  $t$  in the equation  $4t + 5 = -6t - 5$ . (1m)
- $t = 2$
  - $t = -2$
  - $t = -1$
  - $t = 1$
2. Which property does the following expression show? (1m)
- $$\frac{1}{5} \times \frac{2}{3} = \frac{2}{3} \times \frac{1}{5}$$
- Commutative property of multiplication
  - Commutative property of addition
  - Associative property of multiplication
  - Associative property of addition
3. If the diagonals of a quadrilateral bisect each other at right angle, then the polygon is known as \_\_\_\_\_. (1m)
- Kite
  - Parallelogram
  - Rhombus
  - Rectangle
4. If a number has 1 in its units place, then which of the following can be its square? (1m)
- 91
  - 144
  - 169
  - 121
5. If  $\frac{4}{5}$  of a number is 12 less than the original number, then what is the original number? (1m)
- 60
  - 40
  - 80
  - 120
6. Which of the following is equal to  $x^3(a - 2b) + x^2(a - 2b)$ ? (1m)
- $x^2(a - 2b)(x + 1)$
  - $(x^2 - 1)(a - 2b)$
  - $(x^2 + 1)(a - 2b)(x + 1)$
  - $x(a - 2b)(x - 1)$
7. The given figure can be classified under which of the following categories? (1m)
- Convex polygon
  - Concave polygon
  - Simple closed curve
  - Quadrilateral



8. What is the number of digits in the square root of 390625? (1m)

- a. 4
- b. 6
- c. 5
- d. 3

9. If  $n$  is a negative integer, then which of the following must always be a negative integer? (1m)

- a.  $n + 2$
- b.  $n^2 + 1$
- c.  $n^2 - 5$
- d.  $2n$

10. If the total of four consecutive odd numbers is 384, then what is the smallest number? (1m)

- a. 93
- b. 99
- c. 111
- d. 113

## SECTION 2: Applied Mathematics

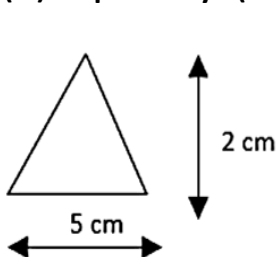
11. Simplify:  $\frac{7xp^2z - 35zxp^3q}{28xzp^2q}$  (2m)

- a.  $\frac{1-5q}{40q}$
- b.  $\frac{1-5q}{4q}$
- c.  $\frac{1-5pq}{4q}$
- d.  $\frac{1-5pq}{4p^2q}$

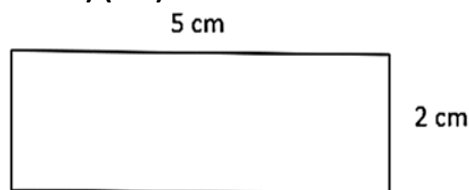
12. What is the value of  $\frac{2^{5001} + 2^{4999}}{2^{5000} - 2^{4998}}$ ? (2m)

- a. 2
- b.  $\frac{10}{3}$
- c.  $2^{2000} + 1$
- d. 10

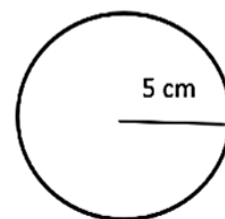
13. Which of the following options is CORRECT if  $a$ ,  $b$  and  $c$  are the areas of the given figures (i), (ii) and (iii) respectively? (Take  $\pi = 3.14$ ) (2m)



(i)



(ii)



(iii)

- a.  $a < b < c$
- b.  $a > b > c$
- c.  $a < b > c$
- d.  $b < c > a$

14. The sum of two expressions is  $x^3 - x^2 + 3x - 2$ . If one of them is  $x^2 + 5x - 6$ , then which of the following is the other expression? (2m)

- a.  $x^3 - 2x^2 - 2x - 4$
- b.  $x^3 + 3x^2 - 2x + 4$
- c.  $x^3 - 2x^2 - 2x + 4$
- d.  $-x^3 - 2x^2 - 2x - 4$

15. What is the result obtained when the additive inverse of  $\frac{4}{3}$  is subtracted from the multiplicative inverse of  $\frac{-5}{7} \times \frac{14}{15}$ ? (2m)

- a.  $\frac{2}{3}$
- b.  $-\frac{1}{6}$
- c.  $\frac{-3}{2}$
- d.  $\frac{3}{2}$

16. If  $x^2 + \frac{1}{x^2} = 7$ , then find the value of  $(x + \frac{1}{x})$ . (2m)

- a. 6
- b. 9
- c. 3
- d. 4

17. The perimeter of a triangular field is 144 m and the ratio of two of its sides is 3:4. If length of the third side of the field is 60 m, then what is the difference between the lengths of the remaining sides? (2m)

- a. 12 m
- b. 7 m
- c. 84 m
- d. 8 m

18. If  $\sqrt{1 - \frac{25}{169}} = 1 - \frac{x}{13}$ , then what is the value of x? (2m)

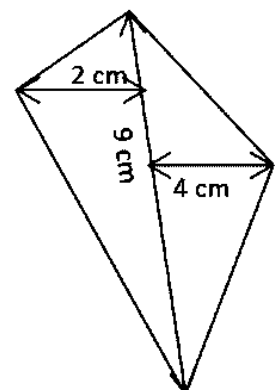
- a. 1
- b. 14
- c. 10
- d. 12

19. What is the quotient obtained if  $30a^3(50a^2 - 72)$  is divided by  $20a^3(5a + 6)$ ? (2m)

- a.  $2(5a + 6)$
- b.  $3(5a - 6)$
- c.  $3(5a + 6)$
- d. 3

20. Find the area of the given quadrilateral. (2m)

- a.  $26 \text{ cm}^2$
- b.  $27 \text{ cm}^2$
- c.  $29 \text{ cm}^2$
- d.  $25 \text{ cm}^2$



21. Simplify:  $\frac{2}{5} + \frac{8}{3} + \frac{-11}{15} + \frac{4}{5} + \frac{-2}{3}$  (2m)

a.  $\frac{37}{15}$

b.  $\frac{-37}{15}$

c.  $\frac{-36}{5}$

d.  $\frac{-38}{3}$

22. Simplify the given expression:  $\frac{1}{6}x + \frac{2}{5}xy - 13y - \frac{7}{5}xy + \frac{1}{6}x$  (2m)

a.  $\frac{1}{3}x - \frac{9}{5}xy - 13y$

b.  $\frac{1}{3}x + 1xy - 13y$

c.  $\frac{1}{3}x - 1xy - 13y$

d.  $-1xy - 13y$

23. Which of the following is the solution of the following equation? (2m)

$$\frac{a}{5} - \frac{2a}{3} + \frac{3a}{5} = 2$$

a. 5

b.  $-\frac{1}{5}$

c.  $-\frac{1}{3}$

d. 15

24. Factorize the given expression:  $2x^3 + 5x^2y - 12xy^2$  (2m)

a.  $x(x + 2y)(2x + 3y)$

b.  $x(x + 4y)(2x - 3y)$

c.  $x(x - 4y)(2x - 3y)$

d.  $x(x + 2y)(x - 3y)$

25. All sides of a four-sided polygon are equal in length and its diagonals bisect each other at  $90^\circ$ . What would be the angle between the two adjacent sides of the given polygon? (2m)

a. Exactly  $90^\circ$ b.  $90^\circ$  or any acute anglec.  $90^\circ$  or any obtuse angle

d. Can be any angle

### SECTION 3: Case-Based Mathematics

26. A baker sells 5000 pastries in a month. 5% of the sold pastries were chocolate and 1% were strawberry. What is the number of other pastries sold by the baker? (2m)

a. 2700

b. 3700

c. 4700

d. 5700

27. Kiran has ₹ 140 left after using 65% of the money he had. Find total amount of money that Kiran had before spending. (2m)

a. ₹ 100

b. ₹ 500

c. ₹ 350

d. ₹ 400

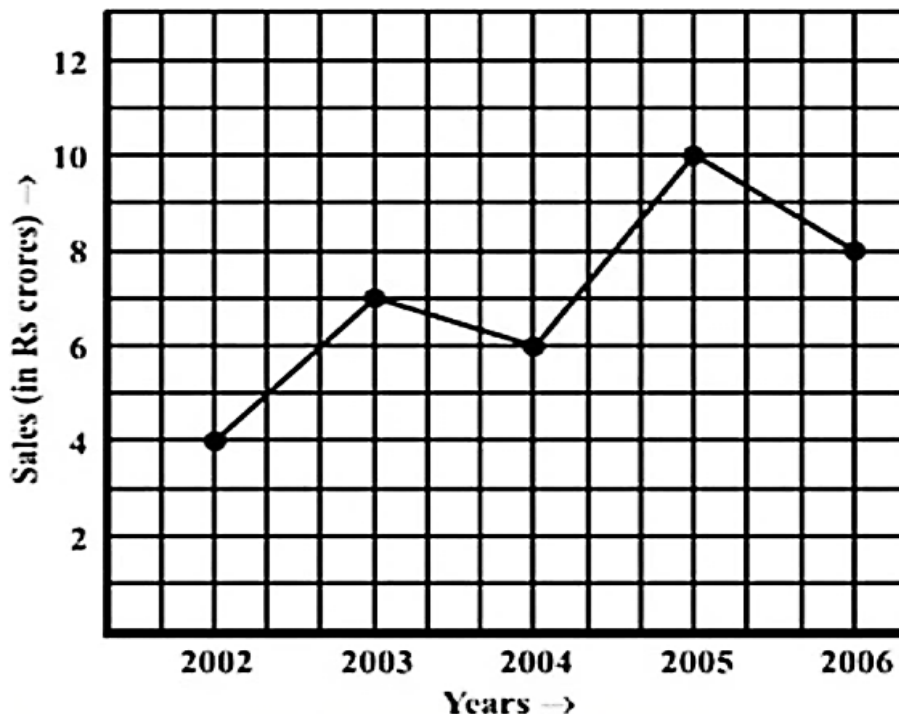
28. A shopkeeper has just enough money to buy 52 cycles worth ₹ 6300 each. If each cycle were to cost ₹ 252 more, then how many cycles, he will be able to buy with that amount of money? (2m)

- a. 40
- b. 30
- c. 50
- d. 20

29. What is the percentage of loss incurred if the amount of loss for selling 120 roses is equal to the cost price of 15 roses? (2m)

- a. 12.5%
- b. 13%
- c. 12.75%
- d. 13.5%

30. The following line graph shows the yearly sales for a manufacturing company: (2m)



In which year was there the greatest difference between the sales as compared to the previous year?

- a. Year 2003
- b. Year 2006
- c. Year 2005
- d. Year 2006

31. A children's library is moving to a new building. All the books have been packed into cartons measuring 40 cm × 30 cm × 30 cm. There are 2950 such cartons. The library has hired a moving company to transport the cartons to the new building. The interior dimensions of the storage area of the truck are 9 m × 3 m × 4 m. How many trips will the truck have to make to move all the cartons? (2m)

- a. 1
- b. 3
- c. 7
- d. 10

**32. A telescope magnifies a planet 40000 times, resulting in a diameter of 6 cm in the image. If the magnification is reduced to 20000 times, then what would be its diameter in the image? (2m)**

- a. 10 cm
- b. 12 cm
- c. 3 cm
- d. 2 cm

**33. A recipe for 20 rolls needs 5 tablespoons of butter. How many tablespoons of butter is needed for 12 rolls? (2m)**

- a. 6
- b. 7
- c. 7.5
- d. 3

**34. What is the Marked Price of an item bought for ₹ 900 after a discount of 10%? (2m)**

- a. ₹ 1100
- b. ₹ 1000
- c. ₹ 810
- d. ₹ 1200

**35. A cylindrical can has a diameter of 14 cm and a height of 18 cm. Find the volume of the can. If you have an empty jug with a capacity of 2.5 L, will the contents of the can fit in the jug? (2m)**

- a. Volume of can is 2772 cubic cm. No, the content will not fit in the jug.
- b. Volume of can is 2772 cubic cm. Yes, the content will fit in the jug.
- c. Volume of can is 3772 cubic cm. No, the content will not fit in the jug.
- d. Volume of can is 3772 cubic cm. Yes, the content will fit in the jug.

**36. Which is the most consumed beverage out of tea, coffee and milk, based on the list given below? tea, tea, coffee, milk, tea, milk, tea, coffee, tea, coffee, milk, tea (2m)**

- a. milk
- b. coffee
- c. tea
- d. tea and coffee

**37. Which of the following options shows the frequency distribution of number of visitors for India, Singapore, Malaysia and Australia? (2m)**

India, Australia, Singapore, Malaysia, Malaysia, Australia, India, Malaysia, Australia, Singapore, Australia, Australia, Singapore, Singapore, Australia, India, Malaysia, Singapore, Singapore, Malaysia, India.

a.

| Country   | Tally Marks |
|-----------|-------------|
| Australia |             |
| India     |             |
| Malaysia  |             |
| Singapore |             |

b.

| Country   | Tally Marks |
|-----------|-------------|
| Australia |             |
| India     |             |
| Malaysia  |             |
| Singapore |             |

| Country   | Tally Marks |
|-----------|-------------|
| Australia |             |
| India     |             |
| Malaysia  |             |
| Singapore |             |

c.

| Country   | Tally Marks |
|-----------|-------------|
| Australia |             |
| India     |             |
| Malaysia  |             |
| Singapore |             |

d.

38. A bag has 5 food items as shown below: (2m)

|           |            |           |               |            |
|-----------|------------|-----------|---------------|------------|
| Apple – 1 | Banana – 1 | Bread – 1 | Chocolate – 1 | Toffee – 1 |
|-----------|------------|-----------|---------------|------------|

What is the number of possible outcomes of one food item picked from the bag?

- a. 6
- b. 2
- c. 3
- d. 5

39. A student scored 12 marks more in Mathematics than in Science. If the total score was 86, how many marks did the student score in Mathematics? (2m)

- a. 37
- b. 43
- c. 49
- d. 52

40. Rahul and his family are travelling by bus to visit their grandparents. The bus travels at a constant speed throughout the journey. If the bus travels for 5 hours, it covers 40 km more than the distance it would cover in 3 hours at the same speed. What is the speed of the bus? (2m)

- a. 15 km/h
- b. 20 km/h
- c. 25 km/h
- d. 30 km/h

41. Raya has a cubical gift box with each side measuring 10 cm. She wants to pack these boxes into a larger rectangular storage carton measuring 40 cm × 30 cm × 20 cm. If the small boxes are arranged perfectly without any empty space, how many cubical gift boxes can Raya fit into the storage carton? (2m)

- a. 18
- b. 24
- c. 30
- d. 36

42. Meera is filling a water tank at a constant rate. She records the amount of water in the tank every 10 minutes. (2m)

|                |    |    |    |    |    |
|----------------|----|----|----|----|----|
| Time (minutes) | 0  | 10 | 20 | 30 | 40 |
| Water (litres) | 50 | 50 | 50 | 50 | 50 |

Meera plots the data on a graph, with time on the x-axis and amount of water on the y-axis.

What will be the shape of the graph?

- a. A straight line rising from left to right
- b. A straight line falling from left to right
- c. A horizontal straight line
- d. A curved line

Answer questions 43– 45 based on the information given below.

Emma is helping her teacher organize the annual Sports Day at Green Valley School. The students surveyed their classmates to find out which sport they liked the most.

The results are given below:

| Sports     | Number of Students |
|------------|--------------------|
| Cricket    | 24                 |
| Football   | 18                 |
| Basketball | 12                 |
| Badminton  | 6                  |
| Athletics  | 20                 |

She draws a pie chart to represent the data.

43. What will be the angle of the section of the pie chart representing Football? (2m)

- a.  $72^\circ$
- b.  $81^\circ$
- c.  $90^\circ$
- d.  $108^\circ$

44. Which sport will be represented by the smallest sector in Emma's pie chart? (2m)

- a. Basketball
- b. Badminton
- c. Football
- d. Athletics

45. Emma notices that the Cricket sector is larger than the Football sector. What is the difference between the angles of the two sectors? (2m)

- a.  $18^\circ$
- b.  $36^\circ$
- c.  $45^\circ$
- d.  $27^\circ$

#### SECTION 4: Challenger's Section

46. Read the following statements about exponents and powers: (4m)

A negative power represents the multiplicative inverse of the base raised to the positive opposite of the power.

The product of powers with the same exponent can be written as the power of the sum of their bases.

Any non-zero number raised to the power of 0 is equal to 1.

When dividing two powers with the same base, their exponents can be subtracted.

Which of the following statements are INCORRECT?

- a. 1 and 2 only
- b. 2 only
- c. 2 and 4 only
- d. 1 only

47. Arrange the following in descending order: (4m)

(i)  $2 \times 10^3 + 4 \times 10^2 + 8 \times 10^{-1} + 7 \times 10^{-2}$

(ii)  $2 \times 10^3 + 4 \times 10^2 + 7 \times 10^{-1} + 8 \times 10^{-2}$

(iii)  $4 \times 10^3 + 2 \times 10^2 + 7 \times 10^{-1} + 8 \times 10^{-2}$

(iv)  $4 \times 10^3 + 2 \times 10^2 + 8 \times 10^{-1} + 7 \times 10^{-2}$

- a. (iii) > (iv) > (i) > (ii)
- b. (iv) > (iii) > (ii) > (i)
- c. (iii) > (iv) > (ii) > (i)
- d. (iv) > (iii) > (i) > (ii)

48. Three angles of a quadrilateral are in the ratio 2:3:4. The fourth angle is  $30^\circ$  greater than the smallest angle. Which of the following statements are correct? (4m)

The largest angle is  $120^\circ$ .

2 angles of the quadrilateral are the same.

The smallest angle is  $30^\circ$ .

The quadrilateral is a rectangle.

- a. Only 1 and 2 are correct.
- b. Only 1 and 3 are correct.
- c. 1, 2 and 3 are correct.
- d. Only 3 and 4 are correct.

49. Read the following statements about factorisation. (4m)

Statement 1: Factors may be numbers, algebraic values, or algebraic expressions.

Statement 2: The common factor method is one of the methods used to factorize an expression.

Choose the correct option.

- a. Statement 1 is true and Statement 2 is false.
- b. Statement 1 is false and Statement 2 is true.
- c. Both Statement 1 and Statement 2 are true.
- d. Both Statement 1 and Statement 2 are false.

50. At a school book fair, Meera and Tara purchased some storybooks. (4m)

Meera purchased 8 more storybooks than Tara.

If Tara gave 2 of her storybooks to Meera, Meera would have twice as many storybooks as Tara.

Read the following statements carefully:

- I. The number of storybooks purchased by Tara is an even number.
- II. The difference between the number of storybooks purchased by Meera and Tara is 8.
- III. The total number of storybooks purchased by both friends is a multiple of 4.
- IV. Meera purchased fewer than 20 storybooks.

Which of the following is/are CORRECT?

- a. I and II only
- b. II and III only
- c. I, II and III only
- d. II, III and IV only

