



## CREST Mental Maths Olympiad (CMMO)

# Sample Paper

## Pattern and Marking Scheme

Grade	Topic/Section	No. of Questions	Marks per Question	Total Marks
Grade 9	Basique	80	3	240
	Avance	20	6	120
<b>Grand Total</b>		<b>100</b>		<b>360</b>

The total duration of the exam is 60 minutes.

**Note:** For every incorrect answer, there's a penalty of 1/3rd of the total marks allotted to that question.

## Syllabus

### Number System

- Integers and rational numbers
- Simplification

### Algebra

- Polynomials
- Quadratic equations

### Comparing Quantities

- Time and distance
- Simple interest
- Compound interest
- Profit and loss
- Problems on ages
- Time and work
- Boats and streams
- Average and Percentage
- Partnership
- Ratio and proportion

## Geometry

- a. Lines and angles

## Mensuration

- a. Surface area of cube
- b. Surface area of cuboid
- c. Surface area of cylinder
- d. Surface area of cone, etc.
- e. Volume of cube
- f. Volume of cuboid
- g. Volume of cylinder
- h. Volume of cone, etc.
- i. Heights and distance
- j. Area of a quadrilateral, Area of triangle & Area related to circles

## Playing with Numbers

- a. Number series
- b. Alphanumeric series
- c. Tests of divisibility
- d. Exponents
- e. Factorisation

## Data Handling

- a. Statistics
- b. Probability
- c. Data interpretation

For more details visit: <https://www.crestolympiads.com/mental-maths-mmo>

## Basique (Each Question is 3 Marks)

1. Express 3.14 into mixed fraction.

a.  $3\frac{27}{99}$

b.  $3\frac{11}{99}$

c.  $3\frac{14}{99}$

d.  $6\frac{9}{99}$

2. Find the value of  $(125)^{2/9}$ .

a.  $\sqrt[3]{25}$

b. 25

c.  $\sqrt{5}$

d.  $\sqrt[3]{5}$

3. Find the result of subtracting the sum of all integers between 10 and 20 from the sum of all integers from 10 to 20.

a. 40

b. 46

c. 32

d. 30

4. Express 2.7777..... in the form of p/q.

a.  $29/9$

b.  $23/9$

c.  $25/9$

d.  $21/9$

5. Which of the following is a non-terminating decimal?

a.  $65/100$

b.  $2/9$

c.  $32/10$

d.  $66/8$

6. What is the decimal representation of  $1/3$ ?

a. 0.3

b. 0.33

c. 0.333

d.  $0.\overline{333}$

7. What is the coefficient of  $x^2$  in the polynomial  $P(x) = 3x^3 + 10(x - x^2) - 5x^2 - 2$ ?

a. -14

b. -15

c. -12

d. -19

8. What is the product of Zero's polynomials  $(x + 8)(x - 10)$ ?

a. -80

b. -45

c. -76

d. -95

9. What are the two roots of the equation  $(x + 4)(x - 5) = 0$ ?

a. 4, 5

b. 6, 4

c. -4, 5

d. -6, 4

10. Find two values of  $x$  which satisfy the quadratic equation  $x^2 - 64 = 0$ ?
- a. 64  
c.  $\pm 12$
- b. 16  
d.  $\pm 8$
11. What are the two roots of the equation  $(x + 5)^2 - 36 = 0$ ?
- a. 1, -11  
c. -7, 3
- b. 2, 15  
d. 8, -9
12. Sum of the two numbers is 273. If first number is  $\frac{2}{5}$  of the second number. Find the second number.
- a. 158  
c. 187
- b. 195  
d. 221
13. A man travelled a certain distance by train at a rate of 15 km/h and walked back at the rate of 12 km/h. The whole journey took 9 hours. Find the distance he travelled.
- a. 60 km  
c. 58 km
- b. 40 km  
d. 72 km
14. Walking  $\frac{4}{5}$  of his usual speed, a man is 16 minutes late. Find the usual time taken by him to cover that distance.
- a. 48 min  
c. 64 min
- b. 37 min  
d. 84 min
15. A person takes 20 h to travel a certain distance. If his speed is increased by 25%, then what time will he take to travel the same distance?
- a. 20 hrs  
c. 11 hrs
- b. 16 hrs  
d. 18 hrs
16. A sum of money becomes four times in 20 years at simple interest. Find the rate of interest.
- a. 22%  
c. 15%
- b. 23%  
d. 8%
17. A sum of \$7700 is lent out in two parts in such a way that the interest on one part at 20% for 5 years is equal to that on another part at 9% for 6 years. Find the second part of the sum.
- a. \$5,000  
c. \$5,689
- b. \$2,349  
d. \$4,698
18. If the cost price of an article is \$300 and the per cent markup is 30%. What is the marked price?
- a. \$470  
c. \$380
- b. \$390  
d. \$420

19. A shopkeeper expects a profit of 50% on his cost price. In a week, his sale was \$15000. What was his profit?
- a. \$5,000  
b. \$15,000  
c. \$6,870  
d. \$9,790
20. Five years ago, the average age of P and Q was 15 years. Now, average age of P, Q and R is 20 years. What would be the age of R after 10 years?
- a. 20 years  
b. 30 years  
c. 15 years  
d. 45 years
21. Jack is 15 years elder than Richard. If 5 years ago, Jack was 3 times as old as Richard, then find Jack's present age.
- a. 30 years  
b. 25 years  
c. 20 years  
d. 10 years
22. The ratio of the present ages of Peter and Tom is 8 : 7. Five years ago, the ratio of their ages was 3 : 2. Find the present age of Peter.
- a. 8 years  
b. 9 years  
c. 11 years  
d. 16 years
23. Two pipes can fill a tank in 18 min and 24 min, respectively. Both are opened simultaneously. After how many minutes should the first pipe be closed so that the tank becomes full in 16 min?
- a. 8  
b. 7  
c. 9  
d. 6
24. Either 8 men or 17 women can paint a wall in 33 days. Find the number of days required to paint three such walls by 12 men and 24 women working at the same rate.
- a. 21 days  
b. 18 days  
c. 34 days  
d. 27 days
25. A man rows with a speed of 8 km/h in still water. Find the downstream, if the speed of the stream is 4 km/h.
- a. 16 km/h  
b. 18 km/h  
c. 14 km/h  
d. 12 km/h
26. A boat can cover 48 km downstream in 3 h. It can cover 40 km upstream in 4 h. What is the speed of the boat in still water (in km/h)?
- a. 13 km/h  
b. 15 km/h  
c. 14 km/h  
d. 12 km/h











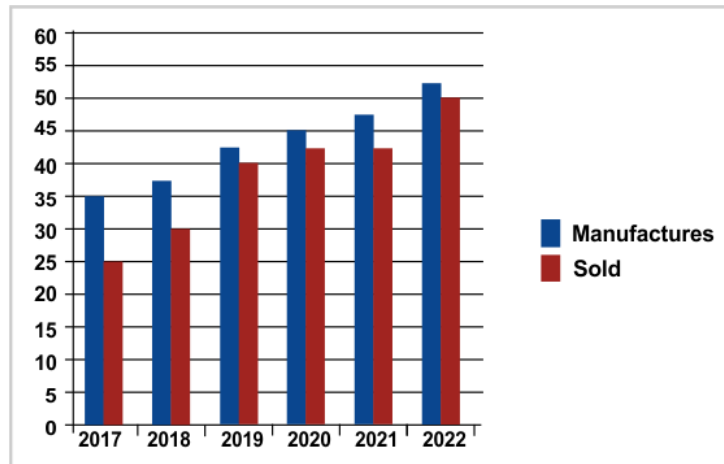




69. Study the graph carefully and answer the question.

The bar graph gives the number of products manufactured and sold by a company over the years (in thousands).

What is the difference in the number of products sold by the company in the year 2022 and 2017?

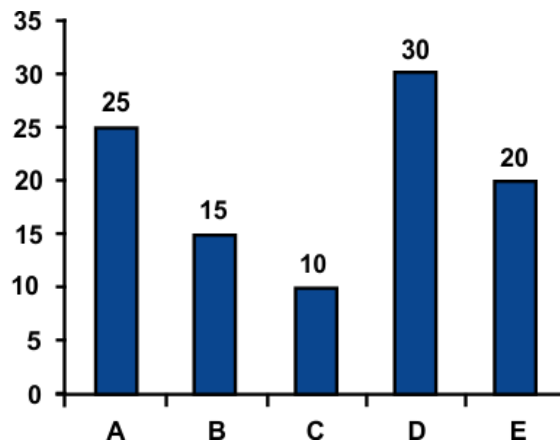


- a. 26000
- c. 35500

- b. 25000
- d. 15000

70. The graph shows the percentage break-up of sales of units of different products in 2018.

Find out the difference between the product A and C together and product B and D together?



- a. 10
- c. 15

- b. 30
- d. 25



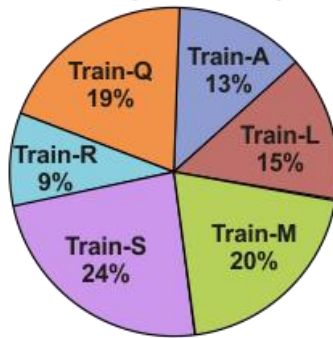
75. In a pack of 52 cards, what is the probability of getting a face card?

- a.  $\frac{4}{13}$
- b.  $\frac{4}{9}$
- c.  $\frac{3}{13}$
- d.  $\frac{3}{8}$

76. Study the pie-chart carefully to answer the question:

What was the approximate average number of passengers in Train-S, Train-M and Train-L together?

Total number of passengers = 8500  
Percentage of passengers



- a. 1467
- b. 1671
- c. 1355
- d. 1456

77. Study the following table to answer the given question?

In City E, a number of Specialist officers is approximately what percent of that officer?

Center/Post	Officer	Clerk	Field Officer	Supervisor	Specialist
City A	2000	5000	50	2050	750
City B	15000	17000	160	11000	750
City C	17000	19500	70	7000	900
City D	3500	20000	300	90000	1150
City E	14900	17650	70	1300	1200
City F	11360	15300	30	1500	650
City G	9000	11000	95	1650	500

- a. 8%
- b. 7%
- c. 4%
- d. 2%

78. A class consists of 4 students and the marks obtained by them in Physics, Chemistry, Mathematics are given in the following table.

Study the table carefully and answer the question.

Find the average score in Physics by the students in the class.

Students → Subjects ↓	S <sub>1</sub>	S <sub>2</sub>	S <sub>3</sub>	S <sub>4</sub>
Physics	60	50	70	75
Chemistry	70	45	60	80
Mathematics	80	55	55	75

a.  $45\frac{4}{7}$  marks

b.  $37\frac{6}{13}$  marks

c.  $63\frac{3}{4}$  marks

d.  $83\frac{7}{9}$  marks

79. Solve:

$$(16 \times 64) + 3^3$$

a. 994

b. 1001

c. 1051

d. 1130

80. Factorise:

$$(x^2 - x)^2 - 8(x^2 - x) + 12$$

a.  $(x - 1)(x - 2)(x + 1)(x + 2)$

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

c.  $(x - 1)(x - 2)(x - 3)(x - 2)$

d.  $(x + 1)(x - 2)(x - 3)(x + 2)$

## Avance (Each Question is 6 Marks)

81. What is the value of  $(625)^{0.24} \times (625)^{0.01}$ ?

a. 4

b. 5

c. 25

d. 16

82. Write the decimal expansion of the following number which have terminating decimal expansion:

$$\frac{8}{5}$$

a. 1.6

b. 1.2657

c. 1.676767.....

d. 1.868686.....

83. Solve the following equation.

$$x + 2 = \frac{2x-8}{x+5} - \frac{5x+9}{x+5}$$

a.  $x^2 + 7x + 10 = 0$

b.  $x^2 + 10x + 27 = 0$

c.  $x^2 + 7x + 4x + 10 = 0$

d.  $3x^2 + 3x + 17 = 0$

84. Robert invested an amount of \$10000 at compound interest rate of 10% per annum for a period of three years. How much amount will Robert get after 3 years?

a. \$12,709

b. \$46,912

c. \$15,498

d. \$13,310

85. The cost of an article including the sales tax is \$616. The rate of sales tax is 10%, if the shopkeeper has made a profit of 12%, then find the cost price of the article.

a. \$128

b. \$400

c. \$880

d. \$500

86. A man can row 14 km/h in still water. When the stream is running at 2 km/h, it takes him 7 hours to row to a place and to come back. How far is the place?

- a. 27 km  
b. 48 km  
c. 38 km  
d. 39 km

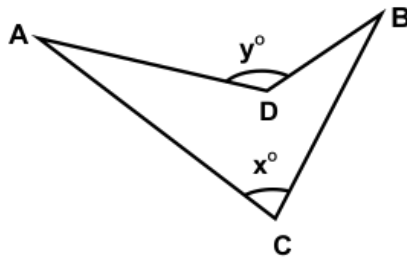
87. A starts a business with \$4000 and B joins him after 3 months with \$16000. Find the ratio of their profits at the end of year.

- a. 1 : 1  
b. 3 : 7  
c. 2 : 5  
d. 1 : 3

88. The marked price on an item was \$3000 but the shopkeeper offered a double discount of 30% and 20%. How much did he finally sell the item?

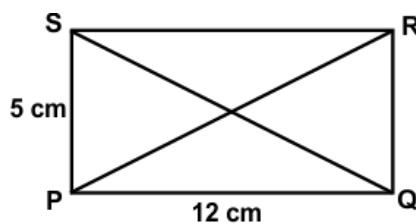
- a. \$1,680  
b. \$1,430  
c. \$1,270  
d. \$1,580

89. In the given figure,  $\angle DAC = 30^\circ$ ,  $\angle CBD = 40^\circ$ ,  $\angle ADB = y^\circ$  and  $\angle ACB = x^\circ$ . Find the difference between angles  $y^\circ$  and  $x^\circ$ .



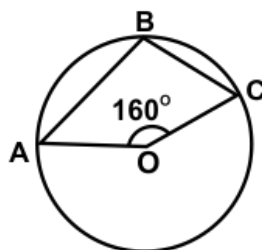
- a.  $65^\circ$   
b.  $70^\circ$   
c.  $80^\circ$   
d.  $45^\circ$

90. In the given figure, PQRS is a rectangle. Find  $PR + QS$ .



- a. 32 cm  
b. 26 cm  
c. 44 cm  
d. 36 cm

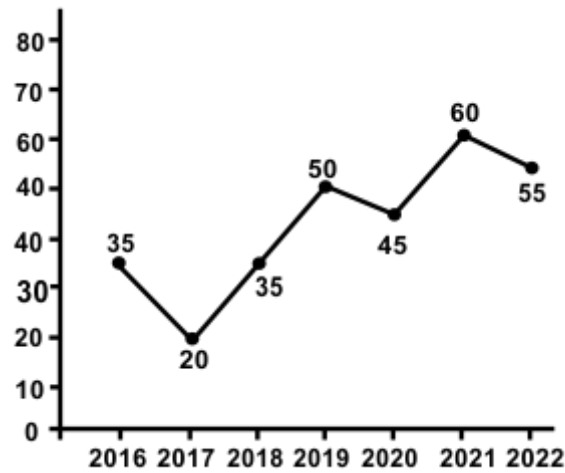
91. In the given figure, 'O' is the centre of the circle and  $\angle AOC = 160^\circ$ . What is the measure of  $\angle ABC$ ?







99. The graph shows the percentage net profit of a certain company during the given period. Study it carefully and answer the question.  
During which years the ratio of percentage net profit earned to that in the previous year was the minimum?



- a. 2017  
b. 2022  
c. 2019  
d. 2020

100. Factorise:  
 $x^4 - 2x^2y^2 + y^4$

- a.  $(y)(x + y)(x + y)(2x)$   
b.  $(2x + y)(x - y)(x + y)(2x)$   
c.  $(2x + y)(x + y)(x - y)(2x - y)$   
d.  $(x - y)(x + y)(x - y)(x + y)$

## Answer Key

1.	c	2.	a	3.	d	4.	c	5.	b	6.	d	7.	b
8.	a	9.	c	10.	d	11.	a	12.	b	13.	a	14.	c
15.	d	16.	c	17.	a	18.	b	19.	a	20.	b	21.	c
22.	a	23.	d	24.	c	25.	d	26.	a	27.	c	28.	b
29.	d	30.	a	31.	c	32.	d	33.	b	34.	a	35.	c
36.	b	37.	d	38.	b	39.	c	40.	a	41.	c	42.	d
43.	c	44.	a	45.	d	46.	c	47.	d	48.	a	49.	c
50.	b	51.	a	52.	d	53.	c	54.	a	55.	d	56.	a
57.	d	58.	b	59.	c	60.	a	61.	b	62.	c	63.	d
64.	c	65.	b	66.	a	67.	a	68.	b	69.	b	70.	a
71.	c	72.	a	73.	c	74.	d	75.	c	76.	b	77.	a
78.	c	79.	c	80.	d	81.	b	82.	a	83.	b	84.	d
85.	d	86.	b	87.	d	88.	a	89.	b	90.	b	91.	b
92.	b	93.	b	94.	d	95.	c	96.	a	97.	c	98.	c
99.	a	100.	d										