



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					
Grand Total		100		360					

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

- a. Integers and rational numbers
- b. Simplification

Algebra

- a. Polynomials
- b. Quadratic equations

Comparing Quantities

- a. Time and distance
- b. Simple interest
- c. Compound interest
- d. Profit and loss
- e. Problems on ages
- f. Time and work
- g. Boats and streams
- h. Average and Percentage
- i. Partnership
- j. 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. $3\sqrt{25}$

b. 25

c. √5

d. $3\sqrt{5}$

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. 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

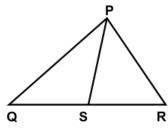
d. -6, 4

10. Find two values of x which satisfy the quadra	tic equation $x^2 - 64 = 0$?
a. 64 c. ±12	b. 16 d. ±8
11. What are the two roots of the equation (x + 5	$)^2 - 36 = 0$?
a. 1, -11 c7, 3	b. 2, 15 d. 8, -9
12. Sum of the two numbers is 273. If first number number.	er is 2/5 of the second number. Find the second
a. 158 c. 187	b. 195 d. 221
13. A man travelled a certain distance by train at12 km/h. The whole journey took 9 hours. Fir	
a. 60 km c. 58 km	b. 40 km d. 72 km
14. Walking 4/5 of his usual speed, a man is 16 r cover that distance.	minutes late. Find the usual time taken by him to
a. 48 minc. 64 min	b. 37 min d. 84 min
15. A person takes 20 h to travel a certain distantime 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	ears 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 suc years is equal to that on another part at 9% for	ch a way that the interest on one part at 20% for 5 or 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 price?	per cent markup is 30%. What is the marked
a. \$470 c. \$380	b. \$390 d. \$420

19	A shopkeeper expects a profit of 50% on his c was his profit?	ost	price. In a week, his sale was \$15000. Wha
	a. \$5,000 c. \$6,870		\$15,000 \$9,790
20	. Five years ago, the average age of P and Q w is 20 years. What would be the age of R after		
	a. 20 yearsc. 15 years		30 years 45 years
21	Jack is 15 years elder than Richard. If 5 years find Jack's present age.	ago	o, Jack was 3 times as old as Richard, then
	a. 30 yearsc. 20 years		25 years 10 years
22	. The ratio of the present ages of Peter and Tor was 3 : 2. Find the present age of Peter.	n is	8:7. Five years ago, the ratio of their ages
	a. 8 yearsc. 11 years	b. d.	9 years 16 years
23	. Two pipes can fill a tank in 18 min and 24 min. After how many minutes should the first pipe b min?		
	a. 8 c. 9	b. d.	
24	Either 8 men or 17 women can paint a wall in a paint three such walls by 12 men and 24 wom		• •
	a. 21 daysc. 34 days		18 days 27 days
25	. A man rows with a speed of 8 km/h in still wate stream is 4 km/h.	er. F	Find the downstream, if the speed of the
	a. 16 km/h c. 14 km/h	b. d.	18 km/h 12 km/h
26	. A boat can cover 48 km downstream in 3 h. It speed of the boat in still water (in km/h)?	can	cover 40 km upstream in 4 h. What is the
	a. 13 km/hc. 14 km/h	b. d.	15 km/h 12 km/h

27.		ruit seller bought a basket containing 2050 containing 2050 contains a contain rule of oranges were rotten?	ran	ges out of which 41 oranges were rotten.
		6% 2%		7% 3%
28.		e population of the town is 352800. If it incre be its population for 2 years hence? Also, fi		•
		336757 367565		388962 347688
29.	yea	a school, the average age of students is 6 years. If the average age of the combined grough the number of students is:		
		153 214		323 396
30.		xon and Sam started a business initially with offits at the end of year are \$74500, what is R		•
		\$35,500 \$21,980		\$28,800 \$38,920
31.		starts a business with \$24,000/- and later B j B join if the profit is distributed in an equal r		•
	a. c.		b. d.	
32.		shopkeeper marks his goods 20% above C.F net loss?	P. bı	ut allows a 30% discount for cash. What is
		20% 13%		17% 16%
33.	As	single discount, equivalent to a successive d	isco	ount of 40% and 30% is:
		37% 52%		58% 38%
34.	Wh	nat is the measure of the angle if its supplem	ent	ary angle measures 98°?
		82° 88°		78° 98°

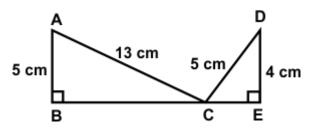
35. In a $\triangle PQR$, PS = SR = SQ and $\angle PRS$ = 55°. Find $\angle SQP$.



- a. 25°
- c. 35°

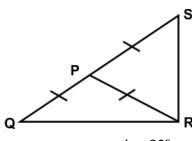
- b. 55°
- d. 45°
- 36. Angles of a linear pair are in the ratio 8:1. What is the degree of measure of both angles?
 - a. 90° and 230°
 - c. 80° and 40°

- b. 160° and 20°
- d. 110° and 40°
- **37.** \triangle ABC and \triangle DEC are the right triangles with \angle B = \angle E = 90°, find BE.



- a. 20 cm
- c. 11 cm

- b. 18 cm
- d. 15 cm
- **38.** In the given figure, PQ = PR = PS. Find $\angle QRS$.

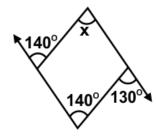


- a. 49°
- c. 76°

- b. 90°
- d. 110°
- **39.** An equilateral triangle is cut up into smaller equilateral triangles with sides 1/6 of the original. Find the number of triangles thus formed.
 - a. 43
 - c. 36

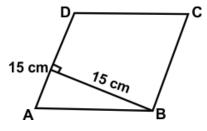
- b. 29
- d. 20

40. Find x in the given figure:



- a. 130°
- c. 142°

- b. 135°
- d. 145°
- 41. In the figure given below, find the area of the parallelogram.



- a. 245 cm²
- c. 225 cm²

- b. 212 cm²
- d. 255 cm²
- 42. How many tangents are there in all in this figure?



- a. 2
- c. 4

- b. 0
- d. 1
- **43.** What is the type of angle formed in a Minor segment of a circle?
 - a. Straight angle

b. Complete angle

c. Obtuse angle

- d. Right angle
- 44. If a square is inscribed in a circle, find the ratio of the area of the circle and the square.
 - a. $\pi:2$
 - c. 2:1

- b. π:1
- d. 2:5
- 45. If a = 12 cm, b = 13 cm, c = 15 cm, what is the semi-perimeter of the triangle?
 - a. 16 cm

b. 22 cm

c. 26 cm

d. 20 cm

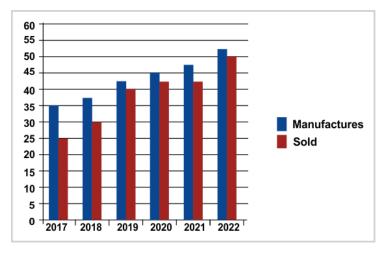
46. Find the area of a triangle whose two sides ar perimeter is 42 cm.	e 16 cm and 12 cm respectively and the
a. 21√5 c. 21√15	b. 7√21d. 7√3
47. A bicycle wheel makes 10 revolutions in movi 22/7)	ng 880 m. Find the diameter of the wheel. (π =
a. 32 cm c. 40 cm	b. 36 cm d. 28 cm
48. Two-circle touch internally. The sum of their a centre is 6 cm. Then, what are the radii of the	
a. 10 cm, 4 cmc. 12 cm, 8 cm	b. 15 cm, 6 cmd. 16 cm, 6 cm
49. What will be the area of a circle with a circum	ference equal to 88 cm?
 a. 512 cm² c. 616 cm² 	 b. 622 cm² d. 578 cm²
50. What will be the volume of tank whose length	is 10 m, breadth 8 m and height 6 m?
 a. 540 m³ c. 370 m³ 	 b. 480 m³ d. 520 m³
51. An underground water tank is in the shape of	a cube of side 7 m. What will be its volume?
 a. 343 m³ c. 245 m³ 	 b. 535 m³ d. 143 m³
52. What is the number of solid spheres of radius sphere of radius 2 cm?	1/2 cm, which may be formed from a solid
a. 45 c. 34	b. 56 d. 64
53. The base radius of a cylinder is 20 cm and its cm ² .	height is 10 cm. Find its curved surface area in
 a. 1180 cm² c. 1260 cm² 	 b. 1280 cm² d. 1200 cm²
54. Find curved and total surface area of a conica	Il flask of radius 6 cm and height 8 cm.
a. 60π, 96πc. 47π, 53π	b. 86π, 66πd. 37π, 76π

55.		e angle of elevation of the top of a tower from the foot of the tower, is 30°. Find the heig		•
	a.	10√3	b.	60√3
	c.	2√3	d.	20√3
56 .		observer 1.5 m tall is 37.5 m away from a comney from her eyes is 45°. What is the heig		
	a.	39 m	b.	32 m
	C.	28 m	d.	31 m
57 .		nd the next number in the sequence: 1, 2, 3, 5, 8, 13, ?		
	a.	15	b.	17
	c.	19	d.	21
58.	So	lve: 3/5th of 24% of 500 – 32 = ?		
	a.	38	b.	40
	C.	64	d.	48
5 9.		lve: 01 × 198 ÷ 49 – 1399 + 3878 = ?		
	a.	6000	b.	8700
	C.	8900	d.	4700
60 .		lve: c 256 × ? = 82 × 102 × 2		
	a.	25	b.	43
	c.	65	d.	37
61.	pre	w many such vowels are there in the below eceded by a consonant and immediately follow R 1 5 H * M T E 3 B \$ V N 4 K A 8 W I 6 2	owe	d by a number?
	a.	2	b.	3
	C.	1	d.	4
62 .		nich of the following digit will be sixth to the lead to 5 4 7 2 8 4 5 7 1 9 6 5 2 4 1 4 5 8 2 4 3 9		
	a.	1	b.	3
	c.		d.	

63.	hig	n each number, first and last digits are interd hest number? 7 831 389 425 598	char	nged, which of the following will be the
		425		598 389
	C.	831	u.	369
		nich number is divisible by 18? 3893, 238768, 926568, 273638		
	a.	273638	b.	238768
	C.	926568	d.	383893
	If the	he number 87215X6 is completely divisible l X.	by 1	1, then the smallest whole number in place
	a.	3	b.	2
	c.	5	d.	4
		nich number is divisible by 17? 5213, 324256, 648723, 957508		
	a.	957508	b.	648723
	C.	324256	d.	665213
		nat is the mean of the test score for a class of 74, 75, 89, 76 and 97?	of st	rudents whose scores are 86, 94, 70, 81,
	a.	83.4	b.	84.6
	C.	86	d.	86.4
68.		nat is the value of x, if the median of the followard x ,	owin	g data is 27.5?
	a.	23	b.	25
	C.	27	d.	29

- 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?



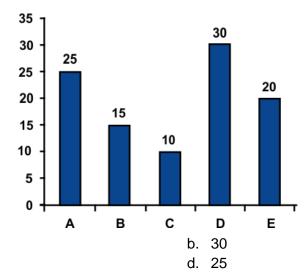
a. 26000

b. 25000

c. 35500

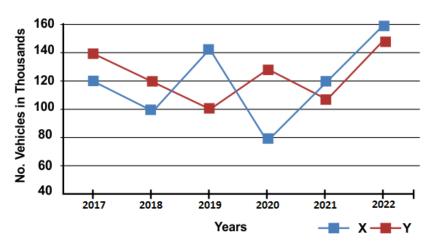
d. 15000

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

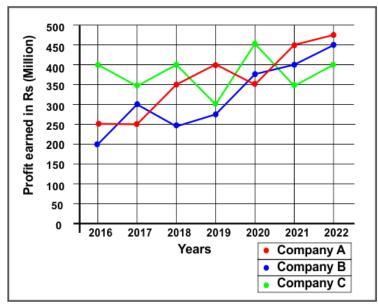
71. Study the line graph and find the number of vehicles manufactured by company X in 2022.



- a. 120000
- c. 160000

- b. 140000
- d. 100000

72. The graph below shows the profit earned by three companies over the years (in \$10 million) What was the average profit earned by all three companies in the year 2021?



- a. \$4 billion
- c. \$2 billion

- b. \$3 billion
- d. \$8 billion

73. A coin is tossed twice. Find the probability of getting both tails.

a. 1/3

b. 1/2

c. 1/4

d. 3/5

74. A coin is tossed once, find the probability of getting 'Head'.

a. 2/4

b. 4/6

c. 1/4

d. 1/2

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

a. 4/13

b. 4/9

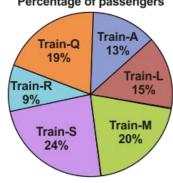
c. 3/13

d. 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
- c. 1355

- b. 1671
- 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 ₁	S ₂	S ₃	S ₄
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
- c. 1051

- b. 1001
- 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} X (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:

8/5

- a. 1.6
- c. 1.676767.....

- b. 1.2657
- d. 1.868686......

83. Solve the following equation.

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

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

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

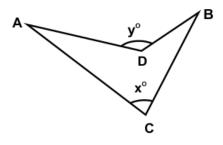
a. \$1,680

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° and x° .



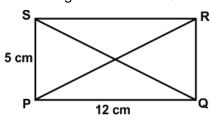
a. 65°

b. 70°

c. 80°

d. 45°

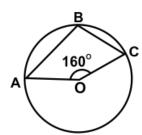
90. In the given figure, PQRS is a rectangle. Find PR + QS.



- a. 32 cm
- c. 44 cm

- b. 26 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 $\angle ABC$?



c. 160°

d. 90°

92. Find the area of the triangular field of sides 55 m, 60 m and 65 m. Also, find the cost of laying the grass in the triangular field at the rate of \$12 per m².

c. 1500.5 m², \$17,278

d. 1480.5 m², \$18,669

93. Three metal cubes with edges 6 cm, 8 cm and 10 cm respectively are melted together and formed into a single cube. Find the side of the resulting cube.

a. 11 cm

b. 12 cm

c. 15 cm

d. 17 cm

94. From the top of a 5 m high building, the angle of elevation of the top of a cable tower is 60° and the angle of depression of its foot is 45°. Determine the height of the tower.

a.
$$7(\sqrt{3}+1)$$
 m

b. $5(\sqrt{2+1})$ m

c.
$$7(\sqrt{2+1})$$
 m

d. $5(\sqrt{3}+1)$ m

95. If x and y are the two digits of the number 883xy such that this number is divisible by 80, then x + y = ?

a. 4

b. 5

c. 2

d. 6

96. The mean of 11 observations is 50. If the mean of first Six observations is 49 and that of last six observations is 52, then find sixth observation.

a. 56

b. 58

c. 60

d. 62

97. Evaluate:

$$(2^6 \div 2^3)^{-1/3}$$

a. 1

b. 2/3

c. 1/2

d. 1/3

98. Study the information carefully and answer the question given beside. Out of 200 people who attended an office party 100 had Ice-cream, 120 had cold drink, 80 had cake and 10 had none of these three. 100 people had exactly one of three items. How many people had exactly two of the three items?

a. 80

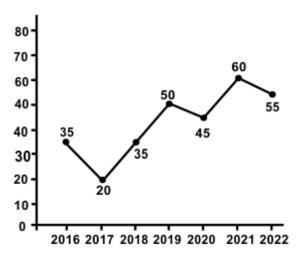
b. 90

c. 70

d. 65

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
- c. 2019

- b. 2022
- d. 2020

100. Factorise:

$$x^4 - 2x^2y^2 + y^4$$

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

Answer Key

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