Grade 7


## CREST Mental Maths Olympiad (CMMO) Sample Paper

| Pattern and Marking Scheme |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
| Grade | Topic/Section | No. of <br> Questions | Marks per <br> Question | Total <br> Marks |
| Grade 7 | Basique | 80 | 3 | 240 |
|  | Avance | 20 | 6 | 120 |
| Grand Total |  | $\mathbf{1 0 0}$ |  | $\mathbf{3 6 0}$ |

The total duration of the exam is 60 minutes.
Note: For every incorrect answer, there's a penalty of $\frac{1}{3}$ rd of the total marks allotted to that question.

## Syllabus

## Number System

a. Integers
b. Rational number and its properties

## Algebra

a. Algebraic expressions
b. Simple equations

## Square and Square Roots

a. Square of a number
b. Square roots
c. Square roots of decimals

## Cube and Cube Roots

a. Cube of a number
b. Cube roots

## Comparing Quantities

a. Ratio and proportion
b. Percentage
c. Profit and loss
d. Simple interest
e. Compound interest
f. Problems on ages
g. Time and work
h. Average
i. Partnership
j. Time and distance

## Mensuration

a. Area of Shapes (Trapezium, General quadrilateral \& Circle)
b. Surface area of cube
c. Surface area of cuboid
d. Surface area of cylinder
e. Surface area of cone, etc.
f. Volume of cube
g. Volume of cuboid
h. Volume of cylinder
i. Volume of cone, etc.

## Playing with Numbers

a. Exponents
b. Mathematical reasoning
c. Tests of divisibility
d. H.C.F and L.C.M
e. Numbers pattern

## Data Handling and Symmetry

a. Bar graph
b. Line graph
c. Symmetry

## Geometry

a. Lines and angles

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

## Basique (Each Question is 3 Marks)

1. What is the measurement of the side of a square coffee table that has an area of 196 inches ${ }^{2}$ ?
a. 12 inches
b. 14 inches
c. 16 inches
d. 18 inches
2. What is the length of one side of a square desktop with an area of 324 square inches?
a. 18 inches
b. 20 inches
c. 22 inches
d. 24 inches
3. What is the cube root of 729 ?
a. 7
b. 8
c. 9
d. 11
4. In a certain school, there are 240 boys and 360 girls. What is the ratio of boys to girls?
a. $1: 3$
b. $2: 3$
c. $3: 4$
d. 1:2
5. After starting to write 24 pages, Ashu completed $25 \%$ of his work by evening. How many pages does he still need to write?
a. 12 pages
b. 14 pages
c. 16 pages
d. 18 pages
6. What will come in place of question mark (?) in the number series?
$8,9,20,63,256,1285$, ?
a. 7345
b. 7456
c. 7716
d. 7834
7. What is the average of $122,128,146,124,136,142$ ?
a. 128
b. 133
c. 139
d. 145
8. A car is traveling at a speed of $50 \mathrm{~km} / \mathrm{h}$. How long will it take to cover a distance of 400 km ?
a. 6 hours
b. 7 hours
c. 8 hours
d. 9 hours
9. A jeep has wheels of diameter 140 m . How many revolutions can the wheel complete in 40 minutes if the jeep is travelling at a speed of $220 \mathrm{~m} / \mathrm{s}$ ?
a. 1200
b. 1300
c. 1400
d. 1500
10. A wall clock has its minute hand of length 21 cm . What area will it swept in covering 30 minutes?
a. $678 \mathrm{~cm}^{2}$
b. $693 \mathrm{~cm}^{2}$
c. $711 \mathrm{~cm}^{2}$
d. $727 \mathrm{~cm}^{2}$
11. Simplify: $12 \times 12^{2}-3^{2}$
a. 136
b. -1367
c. 1687
d. 1719
12. Solve: $(9+4)^{2}+6^{5} / 36^{2}$
a. 175
b. 185
c. 1187
d. 1346
13. Solve: $9^{3} \times 9+11^{7} / 11^{4}$
a. 6860
b. 7892
c. 8142
d. 9273
14. If the ratio of two numbers $A$ and $B$ is $5: 6$ and their LCM is 480 , what is their HCF?
a. 12
b. 14
c. 16
d. 18
15. If the supplement of an angle is equal to three times its complement, what is the measure of the angle?
a. $45^{\circ}$
b. $50^{\circ}$
c. $55^{\circ}$
d. $60^{\circ}$
16. Find a rational number between $2 / 3$ and $3 / 4$.
a. $87 / 110$
b. $91 / 110$
c. $87 / 120$
d. $91 / 120$
17. Find a rational number between $-3 / 4$ and $5 / 6$.
a. 6/24
b. $5 / 28$
c. $9 / 29$
d. $2 / 5$
18. Form an equation:

5 added to twice a number is 135 .
a. $2 x+135=5$
b. $2 x+5=135$
c. $5 x+135=2$
d. $2 x=5+135$
19. Identify the coefficients of $3 x^{2}$ in the algebraic expression: $3 x^{2}-2 z y$
a. 3-2z
b. $3 x^{2}$
c. $-2 z y$
d. 3-2zy
20. If $x=3$ and $y=5$, find $x^{2}+y^{2}$.
a. 34
b. 36
c. 29
d. 30
21. Find the value of $m$ :
$24(m+12)=144$
a. 8
b. -8
c. 6
d. -6
22. John's father's age is 5 years more than three times John's age. Find John's age, if his father is 44 years old.
a. 14
b. 12
c. 13
d. 16
23. Find: $\sqrt[3]{729}$
a. 0.3
b. -0.03
c. -0.09
d. -0.9
24. Solve: $(8 \times 16)^{3}$
a. $2^{21}$
b. $2^{23}$
c. $2^{22}$
d. $2^{19}$
25. Solve: $(0.3)^{3}$
a. 0.027
b. 0.09
c. 0.00027
d. 0.27
26. Which of the following numbers are not a perfect cube?
a. 216
b. 512
c. 1331
d. 1521
27. Solve: $11^{3}+\left(-8^{3}\right)$
a. 719
b. 819
c. 619
d. 919
28. The cost of 6 pens is $\$ 72$. What would be the cost of 10 such pens?
a. $\$ 130$
b. $\$ 120$
c. $\$ 140$
d. $\$ 90$
29. In a mixture of 60 L , the ratio of milk and water is $7: 3$. How many litres of milk are there in the mixture?
a. 20 L
b. 36 L
c. 6 L
d. 42 L
30. How many boys are there in the class if there are 40 students and $70 \%$ of them are girls?
a. 12
b. 14
c. 16
d. 10
31. $A$ and $B$ invest in a business in the ratio of $3: 5$. How much does $A$ invest if $B$ invests \$12,000?
a. $\$ 7,550$
b. $\$ 7,200$
c. $\$ 7,000$
d. $\$ 7,050$
32. Two people invested $\$ 15000$ and $\$ 25000$ respectively to start a business. They decided to share the profits in the ratio of their investments. If their profit is $\$ 12000$, how much does $2^{\text {nd }}$ person get?
a. $\$ 7,500$
b. $\$ 7,550$
c. $\$ 7,600$
d. $\$ 7,450$
33. A train travels a distance of 360 km at a speed of $60 \mathrm{~km} / \mathrm{h}$. How much time does the train need to travel this distance?
a. 3 hrs
b. 4 hrs
c. 5 hrs
d. 6 hrs
34. A shopkeeper bought a watch for $\$ 40$ and sold it for $\$ 60$. What is his profit?
a. $\$ 62$
b. $\$ 14$
c. $\$ 36$
d. $\$ 20$
35. A shopkeeper bought a book for $\$ 150$ and sold it for $\$ 200$. What is his profit or loss?
a. $\$ 50$ profit
b. $\$ 10$ loss
c. $\$ 55$ profit
d. $\$ 40$ loss
36. A person borrows $\$ 5000$ at an interest rate of $7 \%$ for 3 years. What would be the simple interest amount?
a. $\$ 1,120$
b. $\$ 1,050$
c. $\$ 1,120$
d. $\$ 1,150$
37. If you deposit $\$ 1000$ in a savings account that pays $3 \%$ interest per year, how much will be in the account after 5 years?
a. $\$ 1,159.27$
b. $\$ 1,623.23$
c. $\$ 1,352.20$
d. $\$ 1,131.10$
38. The sum of the present ages of Jack and John is double the difference between their present ages. Four years ago, this ratio was one and a half times. Find the ratio of their ages after 12 years.
a. $5: 4$
b. $5: 9$
c. $4: 5$
d. $9: 5$
39. A father is 3 times as old as his son. After 5 years, the father will be two and a half times as old as his son. Find the present age of the father.
a. 15
b. 30
c. 45
d. 20
40. A family of 8 persons has food for 26 days. After 5 days, 1 person went away. How many days will the remaining food last?
a. 36
b. 24
c. 35
d. 28
41. 200 persons are needed to excavate a pond in 25 days. How many additional persons are needed if the pond is to be excavated in 20 days?
a. 50
b. 42
c. 22
d. 34
42. The average age of 24 men and 1 woman is equal to 35 years. If 1 woman left, the average becomes 34 years. Find the age of woman who left the class.
a. 69
b. 24
c. 59
d. 60
43. Find the missing number in the given pattern:
$1+3=31$
$4+6=64$
$7+9=97$
$10+12=$ ?
a. 1220
b. 1012
c. 1210
d. 1020
44. Find the missing number:
$2,3,4,9,8,27,16,(?)$
a. 32
b. 81
c. 54
d. 49
45. If the parallel sides have lengths 5 cm and 9 cm , and the height is 8 cm , the area would be:
a. $40 \mathrm{~cm}^{2}$
b. $72 \mathrm{~cm}^{2}$
c. $56 \mathrm{~cm}^{2}$
d. $45 \mathrm{~cm}^{2}$
46. If the parallel sides have lengths 8 cm and 12 cm , and the height is 5 cm , the area would be:
a. $65 \mathrm{~cm}^{2}$
b. $96 \mathrm{~cm}^{2}$
c. $40 \mathrm{~cm}^{2}$
d. $50 \mathrm{~cm}^{2}$
47. $A B C D$ is a quadrilateral. Find $x$.

a. $120^{\circ}$
b. $96^{\circ}$
c. $120^{\circ}$
d. $110^{\circ}$
48. Find the area of an equilateral triangle (approx.) with side length $s=6 \mathrm{~cm}$.
a. $14 \mathrm{~cm}^{2}$
b. $15 \mathrm{~cm}^{2}$
c. $16 \mathrm{~cm}^{2}$
d. $18 \mathrm{~cm}^{2}$
49. If the surface area of a cube is $150 \mathrm{~cm}^{2}$, what is its side length?
a. 4 cm
b. 5 cm
c. 8 cm
d. 6 cm
50. What is the surface area of a cylinder with a height of 7 cm and a diameter of 10 cm ?
a. $372 \mathrm{~cm}^{2}$
b. $379 \mathrm{~cm}^{2}$
c. $377 \mathrm{~cm}^{2}$
d. $370 \mathrm{~cm}^{2}$
51. What is the surface area of a sphere with a radius of 5 cm (approx.)?
a. $312 \mathrm{~cm}^{2}$
b. $318 \mathrm{~cm}^{2}$
c. $314 \mathrm{~cm}^{2}$
d. $320 \mathrm{~cm}^{2}$
52. Find the volume of a hemisphere with a radius of 5 cm (approx.).
a. $262 \mathrm{~cm}^{3}$
b. $242 \mathrm{~cm}^{3}$
c. $226 \mathrm{~cm}^{3}$
d. $224 \mathrm{~cm}^{3}$
53. Find the height of the cylinder whose volume is $275 \mathrm{~cm}^{3}$ and base area is $25 \mathrm{~cm}^{2}$.
a. 15 cm
b. 11 cm
c. 13 cm
d. 16 cm
54. Which two signs should to interchanged to make the equation below true?
$21 \div 3 \times 2-8+5=8$
a. - and +
b. $x$ and /
c. / and +
d. - and /
55. If $11 \times 13 \times 15=246,16 \times 17 \times 18=789$, then $22 \times 23 \times 24=$ ?
a. 465
b. 432
c. 234
d. 345
56. Find the missing number.

| 4 |  |  |  |
| :---: | :---: | :---: | ---: |
| 7 | 4 | 5 |  |
| 7 | 45 | 59 | 8 |
| 10 | $?$ | 75 | 9 |
|  | 7 | 6 |  |

a. 90
b. 91
c. 93
d. 95
57. Which number is divisible by 11 ?

82513, 42165, 12547, 34255, 86394
a. 12547
b. 86394
c. 82513
d. 34255
58. Which number is divisible by 12 ?

34452, 32452, 21436, 56596
a. 32452
b. 34452
c. 21436
d. 56596
59. Which of the following pairs are divisible by 8 ? $(3476,458),(1548,684),(1656,456),(2641,3652)$
a. $(2641,3652)$
b. $(1548,684)$
c. $(3476,458)$
d. $(1656,456)$
60. At intervals of $2,4,6,8,10$, and 12 seconds, six bells start tolling simultaneously. How many times do they ring in unison in a 30 -minute period?
a. 13
b. 14
c. 17
d. 15
61. What is the greatest number which divides 639, 1065 and 1491 exactly?
a. 214
b. 217
c. 213
d. 208
62. The bar graph shows the population of a country in various census (in million). In which year there was maximum population?

a. 2019
b. 2022
c. 2020
d. 2018
63. The line shows the annual food grain production from 2016 to 2022 . Refer to the graph \& answer the question based on line graph as given below.
Which year's production, on average, was equivalent to that of 2019 and 2021?

a. 2016
b. 2017
c. 2019
d. 2018
64. Find the number of lines of symmetry in the given figure.

a. 2
b. 3
c. 4
d. 1
65. In the given figure, find the order of rotational symmetry.

a. One
b. Two
c. Four
d. Six
66. Two supplementary angles are in the ratio $3: 7$, find the angles.
a. 52,121
b. 42,128
c. 54,126
d. 48,132
67. I || m and t is a transversal, find x .

a. $120^{\circ}$
b. $124^{\circ}$
c. $138^{\circ}$
d. $110^{\circ}$
68. Subtract: $(-6 \times 12+13)-(10 \times 13-23)$
a. 166
b. -166
c. 107
d. -59
69. Solve: $(-8)$ * $[(-2)+7]=$ $\qquad$
a. -16
b. -72
c. -20
d. -40
70. Solve: $(-11)$ * $(-47)+(-23)$ * $(-10)$
a. 647
b. -747
c. 747
d. -647
71. Fill in the blank:
$(-45)+(-42)=(-42)+$ $\qquad$
a. -45
b. 45
c. 87
d. -87
72. Solve: $3 / 7+(-6 / 11)+(-8 / 21)+(5 / 22)$
a. $-135 / 362$
b. $125 / 362$
c. $-125 / 462$
d. 135/462
73. Ramsin camera was loaded with a new roll of film. The film can take 36 snaps. During the class picnic, he took 20 pictures. What fraction of the roll can still be used to take snaps?
a. $2 / 3$
b. $5 / 9$
c. $14 / 5$
d. $8 / 7$
74. A designer needs $3 / 5$ th of a metre of cloth to make a fancy dress for children taking part in a dance performance. If 200 children are taking part, how much cloth will the designer need?
a. 180
b. 200
c. 1400
d. 120
75. Solve:
$0.3 \times 3 \frac{1}{3}=$ $\qquad$
a. 12
b. 5
c. 3
d. 1
76. Find: $\left(11^{2}\right)-\left(9^{2}\right)+\left(18^{2}\right)$
a. 342
b. 364
c. 324
d. 346
77. Find: $\left(4^{2}\right)^{2}-17^{*} 8+14^{2}$
a. 392
b. 342
c. 256
d. 316
78. What is the missing digit in $(37)^{2}=136$ ?
a. 8
b. 9
c. 7
d. 4
79. Find the square root of 17.64 .
a. 3.2
b. 4.2
c. 4.4
d. 3.5
80. Find: $\sqrt{1024}-\sqrt{900}$
a. 2
b. 6
c. 3
d. 4

## Avance (Each Question is 6 Marks)

81. The diameter of the driving wheel of a lorry is 95 cm . How many revolution per minute must the wheel make in order to keep a speed of $75 \mathrm{~km} / \mathrm{h}$ approximately?
a. 201
b. 204
c. 209
d. 215
82. $(52)^{x-3}=\left((5)^{3}\right)^{123}$ find value of $x$.
a. 1
b. 2
c. 3
d. 4
83. Write the expression for the following:

A man has $\$ x$ with him. He gave half to his wife, $1 / 3^{\text {rd }}$ to his son and rest of $\$ 1500$ to his daughter.
a. $\frac{x}{3}+\frac{x}{3}+1500=\frac{x}{3}$
b. $\frac{x}{3}+\frac{x}{2}+1500=\frac{x}{3}$
с. $\frac{x}{2}+\frac{x}{3}+1500=x$
d. $\frac{x}{3}+\frac{x}{2}+1500=\frac{x}{2}$
84. What should be added to twice the rational number $-7 / 3$ to get $3 / 7$ ?
a. $21 / 21$
b. $101 / 21$
c. $110 / 21$
d. $107 / 21$

85 . Find the cube root of 13824.
a. 22
b. 26
c. 24
d. 23
86. A bicycle travels a distance of 20 km in 1 hour. How long will it take to travel a distance of 80 km at the same speed?
a. 7 hrs
b. 3 hrs
c. 4 hrs
d. 1 hrs
87. If a shirt costs $\$ 30$ and is on sale for $20 \%$ off, how much does it cost?
a. $\$ 37$
b. $\$ 35$
c. $\$ 24$
d. $\$ 77$
88. A book costs $\$ 20$ and is on sale for $25 \%$ off. How much will the book cost during the sale?
a. $\$ 14$
b. $\$ 34$
c. $\$ 15$
d. $\$ 16$
89. What is the compound interest on a principal of $\$ 10,000$ at a rate of $8 \%$ per annum for 3 years, compounded annually?
a. $\$ 2,199$
b. $\$ 2,179.82$
c. $\$ 2,590.25$
d. $\$ 2,597.12$
90. The average marks obtained by 125 students in an exam is 29 . If the average marks of passed students is 36 and that of failed students is 11 . Find the number of failed students.
a. 67
b. 55
c. 96
d. 35
91. $A B C D$ is a quadrilateral. Find $x$.

a. $85^{\circ}$
b. $110^{\circ}$
c. $105^{\circ}$
d. $100^{\circ}$
92. What is the surface area of a cuboid with length 4 cm , width 3 cm , and height 2 cm ?
a. $54 \mathrm{~cm}^{2}$
b. $51 \mathrm{~cm}^{2}$
c. $48 \mathrm{~cm}^{2}$
d. $52 \mathrm{~cm}^{2}$
93. A lodge is in the form of a cuboid of measures $60 \mathrm{~m} \times 40 \mathrm{~m} \times 30 \mathrm{~m}$. How many cuboidal boxes can be stored in it if the volume of one box is $0.08 \mathrm{~m}^{3}$ ?
a. 60000
b. 40000
c. 80000
d. 90000
94. What would come at the place of "?" in the following figure?

## 64 (100) 144 <br> 4 (?) 36

a. 16
b. 25
c. 5
d. 12
95. What is the least perfect cube, which is divisible by $2,3,4$ and 6 ?
a. 216
b. 512
c. 236
d. 552
96. Study the graph carefully and answer the question given below (Profit is taken as the \% of expenditure.)
What would be the ratio of Company B's 2020 income to that of Company A's 2017 income?
Income of two plastic manufacturing companies A \& B over the years (Ten Thousand)

a. $3: 5$
b. $4: 5$
c. $2: 3$
d. $3: 2$
97. How many lines of symmetry are there in the given figure?
a. three
b. two
c. one
d. none
98. Read the histogram and answer the questions.
a. What is the number of students in the marks group of 50-60?
b. In which group the number of students are maximum?
a. $a-10, b-40-50$
b. $a-8, b-60-70$
c. $a-8, b-10-20$
d. $a-5, b-60-70$
99. A lift descends into a mine shaft at the rate of $6 \mathrm{~m} / \mathrm{min}$. If the descent starts from 10 m above the ground level, how long will it take to reach -350 m ?
a. 2 hrs
b. 3 hrs
c. 4 hrs
d. 1 hr
100.Find the least number that must be subtracted from 5607 so as to get a perfect square.
a. 166
b. 156
c. 131
d. 143

Answer Key

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

