CREST EduFund Mental Maths Olympiad (CEMMO)
Sample Paper

Pattern and Marking Scheme				
Grade	**Topic/Section**	**No. of Questions**	**Marks per Question**	**Total Marks**
Grade 8	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 $\frac{1}{3}$ 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. Solve: $7^2 + 8^2 - 11^2$

    a. 12   b. -7
    c. -8   d. 5

2. What is the square root of 1156?

    a. 32   b. 34
    c. 36   d. 38

3. Find the cube root of 1728?

    a. 8   b. 9
    c. 11   d. 12

4. If the ratio of three numbers is 2 : 3 : 5 and their product is 2700, what is the smallest of the three numbers?

    a. 180   b. 270
    c. 450   d. 530

5. A clothing store has a total of 250 shirts in stock. If they sold 60% of the shirts, how many shirts are still left in the store?

    a. 60   b. 08
    c. 100   d. 120

6. What will come in place of question mark (?) in the number series?
1, 9, 25, 49, 81, ?

    a. 99   b. 121
    c. 144   d. 169

7. Sofia got 80, 85, 90, 75, and 70 marks in her five subjects. What is her average marks?

    a. 80 marks   b. 85 marks
    c. 90 marks   d. 95 marks

8. A train travels at a speed of 80 km/h for 2 hours and then at a speed of 60 km/h for the next 3 hours. What is the average speed of the train for the entire journey?

    a. 52 km/h   b. 58 km/h
    c. 62 km/h   d. 68 km/h

9. A pizza has a radius of 28 cm. What is the area of the pizza?

a. 2356 cm^2

b. 2464 cm^2

c. 2686 cm^2

d. 2844 cm^2

10. A circular garden has a diameter of 14 meters. What is the area of the garden?

a. 152 m^2

b. 154 m^2

c. 156 m^2

d. 158 m^2

11. Solve: $26^8 / 28^5 + 14^2$

a. 21675

b. 21900

c. 22148

d. 23878

12. Simplify: $19^2 \times 19^0 + 12$

a. 374

b. 376

c. 378

d. 380

13. Express the following number in usual form.
2.42665 x 10^6

a. 2426650

b. 242655

c. 2426.55

d. 242.655

14. What is the highest common factor of 45, 75, and 135?

a. 5

b. 10

c. 15

d. 25

15. What is the term used to describe a pair of angles that add up to 180°?

a. Complementary angles

b. Supplementary angles

c. Corresponding angles

d. Alternate angles

16. What is the rational number between 1/3 and 1/2?

a. 1/3

b. 2/3

c. 3/8

d. 9/8

17. What is a rational number between 0.2 and 0.3?

a. 1/3

b. 1/4

c. 2/4

d. 3/5

18. Find the value:

$$\frac{x}{2} + \frac{x}{3} + \frac{x}{4}$$

a. $\dfrac{17x}{12}$ b. $\dfrac{17x}{8}$

c. $\dfrac{13x}{8}$ d. $\dfrac{13x}{12}$

19. Simplify the expression:
(4x - 3y) - (2x + 5y)

a. 2x - 8y   b. 3x -7y
c. 2y -3x   d. 3y -7x

20. If 2x + 9 = 47, Find x:

a. 16   b. 14
c. 17   d. 19

21. Umex has three boxes of different fruits. A weighs 5 kg more than box B and box weighs 10 kg more that box B. The total weight of three boxes is 48 kg. How many kg does box A weighs?

a. 8 kg   b. 4 kg
c. 16 kg   d. 11 kg

22. Find the value of x:

$$\frac{3}{4x - 5} = \frac{7}{2x + 3}$$

a. 3   b. 4
c. 5   d. 2

23. Find the square of 24.

a. 647   b. 625
c. 336   d. 576

24. How much is $25^2 - 23^2$?

a. 96   b. 104
c. 89   d. 101

25. What will be the positive value of x, when $4(x + 9)^2 = 676$?

a. 6

b. 8

c. 12

d. 4

26. Find: $\left(\sqrt{4900} \div 10\right)^2 =$ _____.

a. 70

b. 4900

c. 7

d. 49

27. Find the value of: $\sqrt{0.0081}$

a. 0.09

b. 0.9

c. 0.009

d. 0.03

28. What is $11^3 - 10^3$?

a. 221

b. 281

c. 381

d. 331

29. What will be the next number in the given series?
64, 125, 216, _____

a. 343

b. 256

c. 512

d. 296

30. Find the value of x:
$(216)^x = 6^8$

a. 4

b. 5

c. 7

d. 9

31. Find the cube root of −1728.

a. -14

b. -11

c. -13

d. -12

32. Fill in the blank:
The minimum number of digits in the cube of a 4-digit number is _____.

a. 9

b. 8

c. 10

d. 11

33. Find the ratio of speed of a car and truck travelling 150 km in 3 hours and 120 km in 4 hours respectively.

a. 4 : 5

b. 7 : 3

c. 5 : 3

d. 3 : 7

34. What must be multiplied by each of the numbers 5, 9, 7, and 12 to obtain the proportion numbers?

a. 3

b. 5

c. 4

d. 7

35. If a box contains 12 items and 3 of them are defective, what percentage of the items are defective?

a. 25%

b. 18%

c. 17%

d. 20%

36. A shopkeeper bought a watch for $600 and sold it for $800. What is his profit or loss?

a. $100 loss

b. $200 profit

c. $200 loss

d. $100 profit

37. A man bought a bicycle for $80 and sold it for $100. What is the profit percentage?

a. 25%

b. 10%

c. 55%

d. 40%

38. Fill in the blank:

$$\mathrm{S.P.} = \frac{100 + \mathrm{Profit\%}}{\underline{\quad\quad}} \times \mathrm{C.P.}$$

a. Loss

b. 100

c. Profit%

d. Profit

39. Anni has taken a loan of $9000 at a simple interest rate of 12% per annum for 4 years. Calculate the simple interest she will have to pay.

a. $4,230

b. $4,106

c. $4,016

d. $4,320

40. If father is twice as old as his son and also 29 years older than his son. What is the age of father?

a. 58 years

b. 48 years

c. 53 years

d. 47 years

41. The age of father is 30 years more than that of his son. 5 years hence father's age will be thrice of his son's age, find son present ages.

a. 12 years

b. 10 years

c. 15 years

d. 40 years

42. 30 persons can complete a piece of work in 18 days. How many more persons needed if the work is to be completed in 12 days?

a. 12
b. 24
c. 15
d. 13

43. 16 persons need 56 kg of rice in 1 week. How much rice will be needed by 24 persons in four weeks?

a. 336 kg
b. 324 kg
c. 431 kg
d. 423 kg

44. The marks obtained by ten students in Mathematics in the annual examination are as follows: 76, 61, 87, 56, 42, 64, 73, 68, 50, 73.
What is their average marks in mathematics?

a. 45
b. 35
c. 65
d. 64

45. James, Nike and Scott started a business in partnership by investing in the ratio of 6 : 5 : 8 respectively. At the end of the year, they earned a profit of $83,600. What will be Scott's share?

a. 4 : 5
b. 3 : 1
c. 2 : 7
d. 5 : 3

46. Raxon started a business by investing $45,000. 6 months later joined him with $30,000. In what ratio should the earned profit be distributed at the end of the year?

a. $24,700
b. $39,290
c. $32,895
d. $35,200

47. Find the missing number:
1, 3, 6, 10, 15, ?

a. 21
b. 19
c. 17
d. 20

48. Find the missing number:
4, 9, 16, 25, ?

a. 30
b. 28
c. 36
d. 32

49. A bus travels at a speed of 80 km/h and covers a distance of 200 km. How long does the journey take?

a. 3.3 hrs

b. 5.3 hrs

c. 2.5 hrs

d. 3.5 hrs

50. In the given figure, PQRS is a trapezium. PQ|| RS and PS = QR. What are the values of x° and y°?
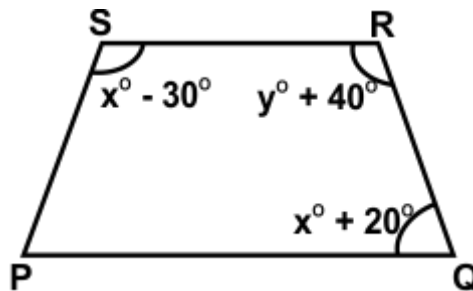
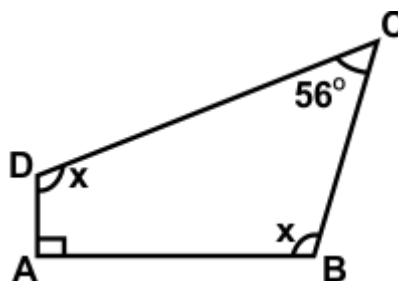a. 115°, 38°

b. 85°, 35°

c. 95°, 35°

d. 95°, 25°

51. In a trapezium, the sum of the lengths of the parallel sides is 32 cm and the area of the trapezium is 128 cm^2. Calculate the distance between the parallel sides.
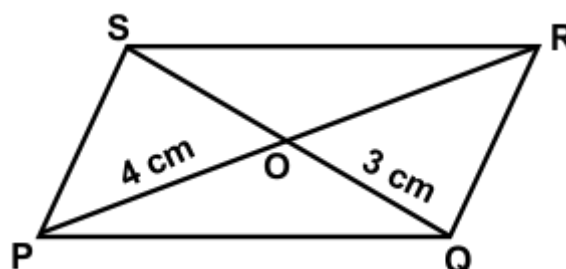
a. 9 cm

b. 8 cm

c. 11 cm

d. 12 cm

52. ABCD is a quadrilateral, Find x:

a. 110°

b. 105°

c. 115°

d. 107°

53. PQRS is a rhombus. If PO = 4 cm and OQ = 3 cm then what is PR + SQ?

a. 14 cm

b. 19 cm

c. 12 cm

d. 11 cm

54. What is the total surface area of a solid hemisphere whose curved surface area is 416 cm²?

    a. 624 cm²
    b. 636 cm²
    c. 611 cm²
    d. 644 cm²

55. Two cubes each of 10 cm edge are joined end-to-end. Calculate the surface area of the resulting cuboid.

    a. 100 cm²
    b. 1000 cm²
    c. 10 cm²
    d. 10000 cm²

56. The surface of two hemisphere in the ratio 4 : 16. What is the ratio of their radii?

    a. 3 : 6
    b. 4 : 3
    c. 5 : 4
    d. 2 : 4

57. Volume of a cube is 1331 cm³. What is the length of each side?

    a. 13 cm
    b. 8 cm
    c. 11 cm
    d. 14 cm

58. Find the volume of a cylinder whose base area is 154 cm² and the curved surface area is 440 cm².

    a. 1540 cm³
    b. 1740 cm³
    c. 1530 cm³
    d. 1760 cm³

59. Find the next term in the alphanumeric series:
Z1A, X2D, V6G, T21J, R88M, P445P, ?

    a. T2676N
    b. T2670N
    c. N2676S
    d. N2676T

60. Find the term which does not fit into the series given below:
G4T, J10R, M20P, P43N

    a. G4T
    b. J10R
    c. M20P
    d. P43N

61. If x stands for -, / stands for +, + stands for / and - stands for x, which one of the following equations is correct?

    a. 15 - 5/5 x 20 + 10 = 6
    b. 3/7 - 5 x 10 + 3 = 10
    c. 8/10 - 3 + 5 x 6 = 8
    d. 6 x 2 + 3/12 - 3 = 15

62. Which number is divisible by both 2 and 3?
12345, 24680, 20304, 8007, 8642

a. 12345
b. 8007
c. 20304
d. 8642

63. Which number is divisible by 12?
248632, 532878, 904672, 135792, 68176

a. 135792
b. 532878
c. 248632
d. 68176

64. Which number is divisible by 16?
46412892, 17427894, 7823682, 501008

a. 7823682
b. 501008
c. 46412892
d. 17427894

65. Sam spends 1/4 portion of a day studying at school, 1/12 portion playing out, 1/3 portion studying at home, in the remaining time, he does other work and takes rest. What portion of the day does he spend studying and playing?

a. 3/3 portion
b. 4/3 portion
c. 2/3 portion
d. 1/3 portion

66. 1/5 portion of a bamboo is in mud, 2/5 portion is in water and the remaining portion is above water. What portion is above water?

a. 2/5 portion
b. 3/4 portion
c. 1/2 portion
d. 3/7 portion

67. The graph shows analysis of first five overs of a team in a T-20 match. Study it and answer the question:
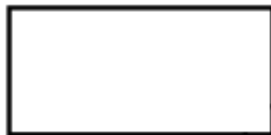When the first wicket was down, what was the score?
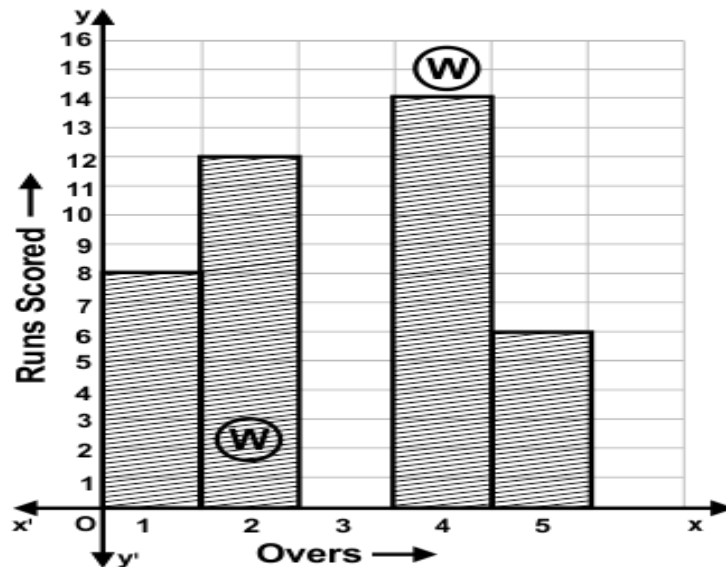
a. 12

b. 2

c. 8

d. 10

68. Given below is the line graph, which shows the height of Nathan during his ages. Answer the question based on a line graph.

During which year did Nathan grow the most?

Nathan's Growth
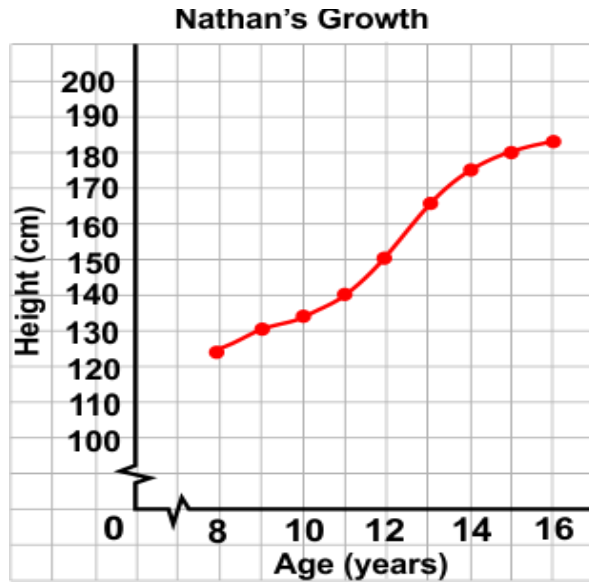
a. 14 - 16

b. 12 - 14

c. 8 - 10

d. 10 - 12

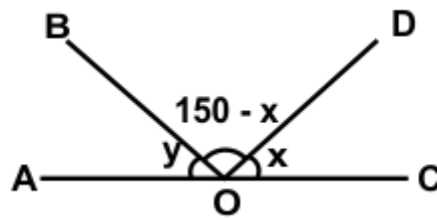**69.** In the given rectangle, state the number of lines of symmetry.

a. 2

b. 4

c. 6

d. 3

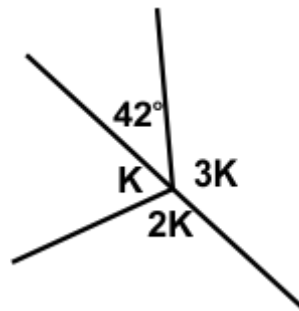**70.** Find the number of lines of symmetry in the given figure:

a. 1

b. 0

c. 3

d. 4

71. Find y in the given figure.

   a. 60º   b. 30º
   c. 45º   d. 55º

72. Find K in the given figure.

   a. 32º   b. 65º
   c. 47º   d. 53º

73. Evaluate:
(−1) × (−2) × (−3) × (−4) × (−5)

   a. -120   b. -140
   c. -100   d. 80

74. Determine the integer when it is divided by (−9), the answer is 23.

   a. -198   b. -207
   c. -177   d. -210

75. Solve for "x":
69.69 − 51.54 + 73.64 = x + 32.42

   a. 56.14   b. 57.12
   c. 59.37   d. 52.42

76. Solve: $\sqrt{52 \times 27 \div 6 + 26 - 4} = ?$

   a. 20   b. 23
   c. 25   d. 21

77. Solve: $1\frac{1}{4} + 1\frac{5}{9} \times 1\frac{5}{8} \div 6\frac{1}{2} = ?$

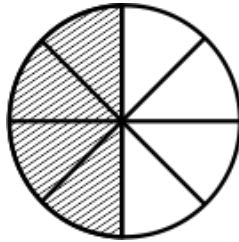   a. $1\frac{23}{36}$ b. $2\frac{3}{4}$

    c. $1\frac{21}{36}$ d. $2\frac{24}{36}$

78. Express the figure given below as a rational number.

    a. $\frac{12}{8}$ b. $\frac{4}{8}$

    c. $\frac{6}{8}$ d. 1

79. The sum of two rational numbers is –8. If one of the numbers is $\frac{-21}{8}$. Find the other number.

    a. $\frac{-43}{8}$ b. $\frac{-25}{8}$

    c. $\frac{-37}{8}$ d. $\frac{-53}{8}$

80. The product of two rational numbers is $\frac{15}{11}$. If one rational number is $\frac{5}{9}$ then find the other.

a. $\frac{29}{11}$	b. $\frac{27}{11}$
c. $\frac{24}{11}$	d. $\frac{23}{11}$

81. A circular swimming pool has a circumference of 66 meters. What is the area of the pool?

    a. 574 m^2 b. 592 m^2
    c. 601 m^2 d. 616 m^2

82. Evaluate: $(9^3 - 6^3) \times (3/5)^{-3}$

    a. 2265   b. 2375
    c. 2475   d. 2585

83. Simplify the expression:
(14x - 3y) (2x + 25y) - (-45x + 21y)

    a. $32x^2 - 84y^2 + 339xy - 11y$ b. $28x^2 - 75y^2 + 389xy - 21y$
    c. $13x^2 - 44y^2 + 239xy - 51y$ d. $23x^2 - 44y^2 + 321xy - 23y$

84. Find the value of x.

$$\frac{4+x}{3} + \frac{7}{4} = \frac{3-x}{2} + \frac{5}{4}$$

    a. 3/5   b. -2/5
    c. -7/5   d. 8/5

85. Find: $\sqrt{16} \times \sqrt{49} \times \sqrt{121}$

    a. 197   b. 308
    c. 279   d. 348

86. Find: $\sqrt{\sqrt[3]{343} \times \sqrt{784}} =$ _____

    a. 18   b. 14
    c. 19   d. 12

87. The price of a computer is $48,000. The sales tax charged was 4%, what is the amount to be paid by Mr. Jordan?

    a. $42,099   b. $47,970
    c. $49,920   d. $49,862

88. If a dress is priced at $60 and is on sale for 20% off, how much will the dress cost?

    a. $26   b. $32
   c. $34   d. $48

89. If you deposit $1000 in a savings account with an interest rate of 2% per year, how much will you have in the account after 2 years?

a. 1822.2
b. 1040.4
c. 1038.2
d. 103.82

90. Average of marks obtained by 105 candidates in a certain examination is 25. If the average marks of passed candidates is 29 and that of the failed candidates is 10, what is number of candidates who passed the examination?

a. 82.9
b. 80
c. 85
d. 88.34

91. If 14 meters is covered by a man in 1 sec then in 4 hours 60 minutes how many kilometers will be covered by him?

a. 43.2 km/sec
b. 53.2 km/sec
c. 40.8 km/sec
d. 32.5 km/sec

92. PQRS is a parallelogram. If PS = 10 cm and ∠SPQ = 30° and the area of the parallelogram is $55\sqrt{3}$ cm^2, then find the length of PQ (in cm).

a. $9\sqrt{3}$
b. $12\sqrt{3}$
c. $11\sqrt{3}$
d. $15\sqrt{3}$

93. Volume of a metal sphere is 38808 cm^3. Find the surface area of sphere.

a. 4558 cm^2
b. 5836 cm^2
c. 5544 cm^2
d. 4544 cm^2

94. Find the volume of a sphere whose radius is 8 cm.

a. 557.6 cm^3
b. 458.83 cm^3
c. 386.6 cm^3
d. 523.6 cm^3

95. If L denotes /, M denotes x, P denotes + and Q denotes -, then which of the following statements is true?

a. 32 P 8 L 16 Q 4 = 3/2
b. 6 M 18 Q 26 L 13 P 7= 173/13
c. 11 M 34 L 17 Q 8 L 3 = 38/3
d. 9 P 9 L 9 Q 9 M 9 = -72

96. What is the least multiple of 7, which when divided by 2, 3, 4, 5 and 6, leaves the remainders 1, 2, 3, 4, 5 respectively?

a. 116
b. 119
c. 124
d. 134

97. The given histogram shows the height of 42 students in the class.
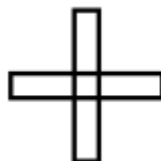Study carefully and answer the questions:
i. How many students are having height equal to 155 or less?
ii. How many students have height equal to 160 or more?
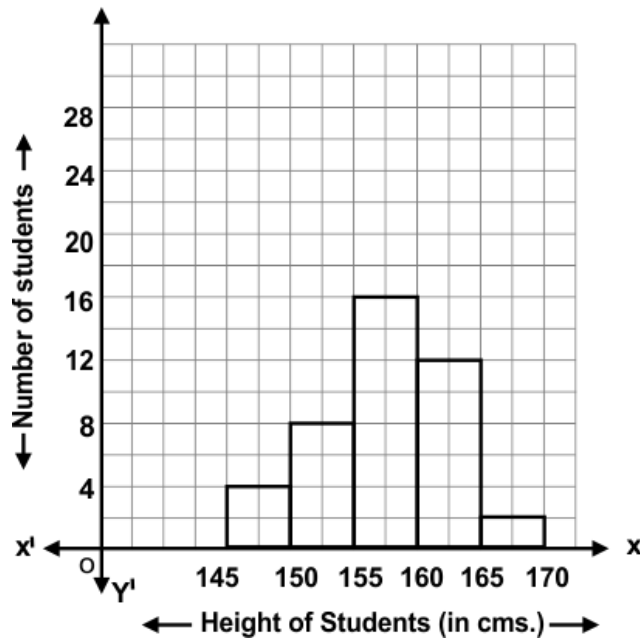
a. i - 14, ii - 12
b. i - 12, ii - 28
c. i - 12, ii - 14
d. i - 4, ii – 2

98. In the given figure, find the:
i. Order of rotational symmetry.
Ii. Degree measure of the angle of rotation.

a. i - 4, ii – 90°
b. i - 3, ii – 90°
c. i - 3, ii – 360°
d. i - 4, ii – 360°

99. The table gives the percentage of marks obtained by seven students in six different subjects in an examination. Study the table and answer the question based on it. The number in the brackets represents maximum marks in that subject.
Find the number of students who obtained 60% or above marks in all subjects.

Students	Subject (Maximum Marks)					
	Maths (150)	Chemistry (130)	Physics (120)	Geography (100)	History (60)	Computer Science (40)
Jix	90	50	90	60	70	80
Max	100	80	80	40	80	70
Sem	90	60	70	70	90	70
Gils	80	65	80	80	60	60
Morrin	80	65	85	95	50	90
Karl	70	75	65	85	40	60
Leo	65	35	50	77	80	80

a. 1

b. 2

c. 2

d. 4

100. The difference between one-fourth of a number and one-seventh of the same number is 24. Identify the number.

a. 210

b. 242

c. 231

d. 224

Answer Key

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