Junior Maths Mastery Challenge 2024

Paper D

Student Name: _____

Student No.: _____

DO NOT OPEN THIS BOOKLET UNTIL INSTRUCTED.

Read the instructions on the **answer sheet** and fill in your **name**, **school** and **other information**.

Record your answers in your **answer sheet**.

You have **1 hour 30 minutes** to answer all 25 questions.

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Junior Maths Mastery Challenge (2024)

100

Paper D

Section A (70 marks)

Questions 1 to 10 carry 3 marks each.

1. Find the missing number in the number pattern below.

3, 5, 8, 13, 21, 34, _____, 89, …

(A) 47 (B) 52 (C) 55

(D) 76 (E) 85

2. Given that 1 + 2 + 3 + 4 + … + X = 105, find the value Number X represents.

(A) 11 (B) 12 (C) 13

(D) 14 (E) 15

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3. 123 and 321 are two different numbers that are mirror images of each other. How many such different pairs of 3-digit numbers give a sum of 888?

(A) 3 (B) 4 (C) 5

(D) 6 (E) None of the above

4. The symbols (♦, ☼, ⌘) below represent different numbers.

♦ + ☼ = 85
♦ + ⌘ = 69
☼ + ⌘ = 80

Find the number ☼ represents.

(A) 32 (B) 37 (C) 42

(D) 48 (E) 64

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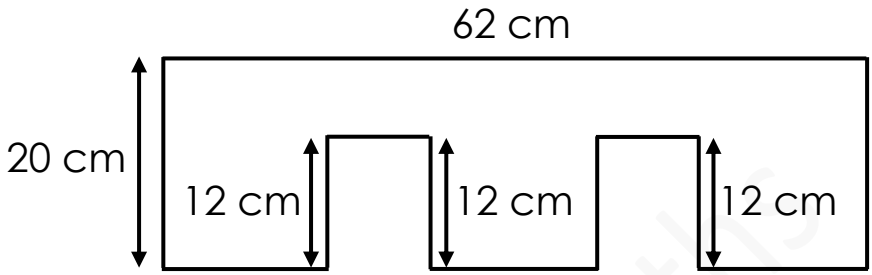
5. The lines of the figure below are joined at right angles. Find the perimeter of the figure.



(A) 164 cm (B) 188 cm (C) 200 cm

(D) 212 cm (E) None of the above

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6. A whole number P is divided by 6. Then, 6 is subtracted from the quotient. The result is multiplied by 6.
Then, 6 is added to the product. The final value is 30.
Which of the following is a possible value of Number P?

(A) 64 (B) 66 (C) 68
(D) 70 (E) 72

7. If Janet gave each pupil 3 sweets, she would have 8 sweets left. If she wanted to give each pupil 5 sweets instead, she would be short of 14 sweets. How many sweets did Janet have?

(A) 40 (B) 41 (C) 42
(D) 43 (E) None of the above

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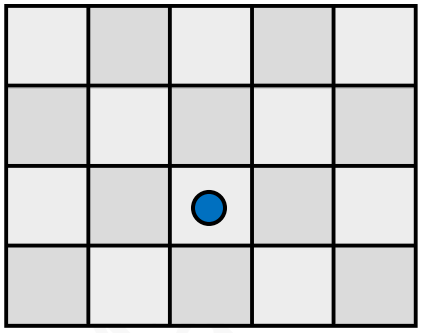
8. The diagram shows a blue counter on a 4×5 grid made up of small squares. How many squares contain the counter?



(A) 12 (B) 13 (C) 14

(D) 15 (E) 16

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9. A prime number is a whole number that has exactly two factors, 1 and itself.

   For example, 2, 3, 5, 7, 11, … are prime numbers.

   The sum of two prime numbers is 36. Find the smallest possible product of the two prime numbers.

   (A) 36 (B) 68 (C) 99

   (D) 155 (E) 323

10. The greatest factor of any number is the number itself. How many numbers have 25 as their second greatest factor?

    (A) 3 (B) 4 (C) 5

    (D) 24 (E) None of the above

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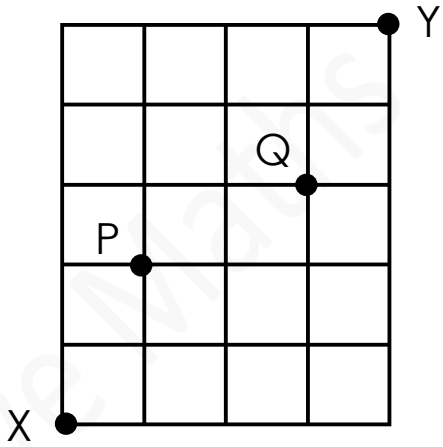
Questions 11 to 20 carry 4 marks each.

11. The lines on the diagram show the paths from Point X to Point Y. Joe wants to take the shortest path from Point X to Point Y, passing through points P and Q. How many different ways are there?



(A) 9 (B) 12 (C) 15

(D) 27 (E) None of the above

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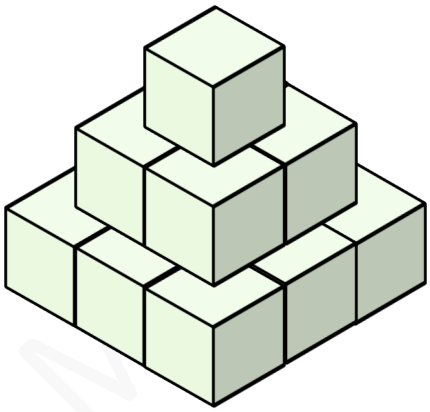
12. The solid below is made up of 14 cubes. The area of each face of a cube is 1 cm^2. Find the total area of the visible faces of the cubes from the top and the sides.



(A) 30 cm^2 (B) 33 cm^2 (C) 38 cm^2

(D) 47 cm^2 (E) None of the above

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13. Find the number of consecutive digit 1s in the following product.

$$\underbrace{888\ldots888}_{\text{2024 digit 8s}} \times \underbrace{999\ldots999}_{\text{2024 digit 9s}}$$

(A) 1011 (B) 1012 (C) 2023

(D) 2024 (E) None of the above

14. In a book, the digit '0' appears 35 times in total in its page numbers. What is its last page number?

(A) 125 (B) 199 (C) 209

(D) 302 (E) None of the above

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15. In the 3 × 3 magic square below, the sum of the numbers in each row and column is the same. Find the sum of the numbers represented by the letters A to D.

A	18	B
44	C	25
14	D	31

(A) 153 (B) 157 (C) 161

(D) 165 (E) None of the above

16. Jason spent $5 more than half of the amount he had on a bag. He then spent $5 more than half of the remaining amount on a wallet. He had $56 left. How much money did he have at first?

(A) $244 (B) $249 (C) $254

(D) $259 (E) None of the above

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17. The figures below are made up of identical squares.

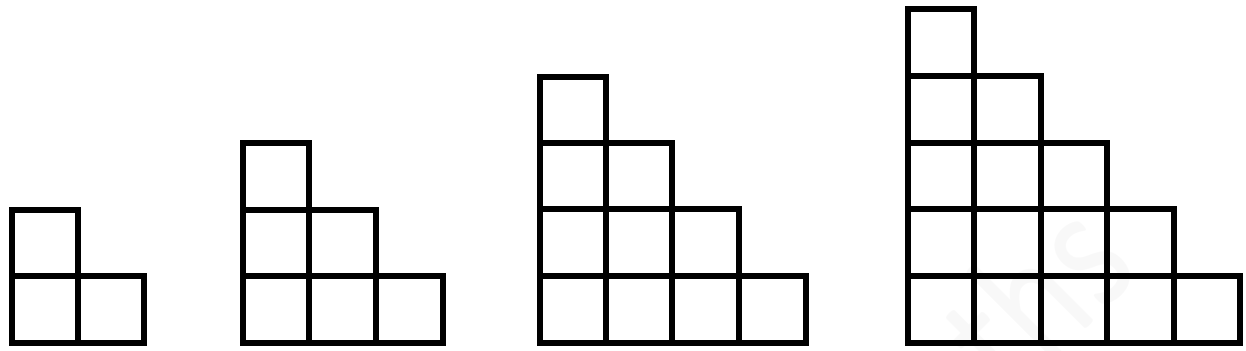

Figure 1 Figure 2 Figure 3 Figure 4

Figure 1 has a perimeter of 4 centimetres. Find the perimeter of Figure 25.

(A) 48 cm (B) 50 cm (C) 52 cm

(D) 54 cm (E) None of the above

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18. A number when divided by 3 gives a remainder of 2. When the same number is divided by 4, it gives a remainder of 1. What is the remainder when the same number is divided by 12?

(A) 0 (B) 3 (C) 5

(D) 7 (E) None of the above

19. Alice, Bob, Chris and Dan are crossing a bridge made of wooden planks. All of them start on the 1st plank. Alice jumps 2 planks at a time. Bob jumps 3 planks at a time. Chris jumps 4 planks at a time. Dan jumps 5 planks at a time. Only the 1st and the last plank have everyone's footprints. How many planks are only stepped on by 1 of them?

(A) 12 (B) 16 (C) 18

(D) 20 (E) 27

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20. Two representatives are chosen from each of 5 classes to attend some courses. Each course is attended by one representative from each class. The table shows the attendees for the four courses.

Course	Attendees
Performing Arts	Ali, Betty, Cheryl, Don, Helen
Robotics	Ali, Betty, Don, Emma, Ivan
Codes Everywhere	Cheryl, Emma, Faizal, Gary, Joe
Genes and Genetics	Ali, Faizal, Gary, Helen, Ivan

Which of the following statements is **true**?

(A) Betty and Joe are in the same class.
(B) Helen and Joe are in the same class.
(C) Cheryl and Ivan are in the same class.
(D) Ivan and Joe are in the same class.
(E) None of the above

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Section B (30 marks)

Questions 21 to 25 carry 6 marks each.

21. Ash, Ben and Charles each makes a guess for the 3-digit password of a locker.

    Ash: The number is 375.

    Ben: The number is 278.

    Charles: The number is 369.

    Each boy has exactly one correct digit in the correct place. The correct digit each boy has is different. What is the password of the locker?

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22. In the following cryptarithm, each letter represents a different digit.

$$\begin{array}{cccccc} & M & A & T & H \\ + & M & A & T & H \\ \hline I & S & F & U & N \end{array}$$

Find the greatest possible 5-digit number ISFUN.

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23. There were 30 questions in a Mathematics quiz.
4 marks were awarded for each correct answer.
2 marks were deducted for each incorrect answer.
1 mark was deducted for each unattempted question.
Joe obtained 105 marks and Alice obtained 109 marks.
Tom obtained more marks than Joe but fewer marks than Alice. How many questions did Tom answer incorrectly?

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24. In Mathematics, we have the following.

$1^2 = 1 \times 1 = 1$
$2^2 = 2 \times 2 = 4$
$3^2 = 3 \times 3 = 9$
⋮

Using the above, we can observe the following pattern.

$2^2 = 1^2 + 3$
$3^2 = 2^2 + 5$
$4^2 = 3^2 + 7$
$5^2 = 4^2 + 9$
⋮

$17^2 = P^2 + Q$

P and Q are whole numbers. Find the value of the sum of P and Q.

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25. Numbers are arranged in a pattern as shown below.
In which row and column will the number 99 appear?

		Column					
		1	**2**	**3**	**4**	**5**	**...**
Row	**1**	0	1	4	9	16	...
	2	3	2	5	10	17	...
	3	8	7	6	11	18	...
	4	15	14	13	12	19	...
	5	24	23	22	21	20	...
	...	...	...	...	...	...	...

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