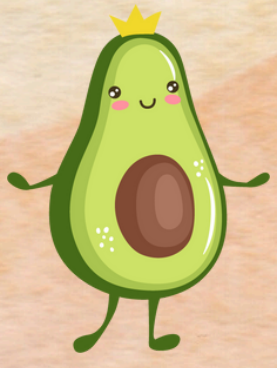
avocado lab
math & science

NMOS 2025
QUESTIONS



A Small Favour

Hi from Avocado Lab — a proudly small, Singaporean-owned centre.
We make these neat, watermark-free question & solution sets that are released for free so more kids can learn without barriers.

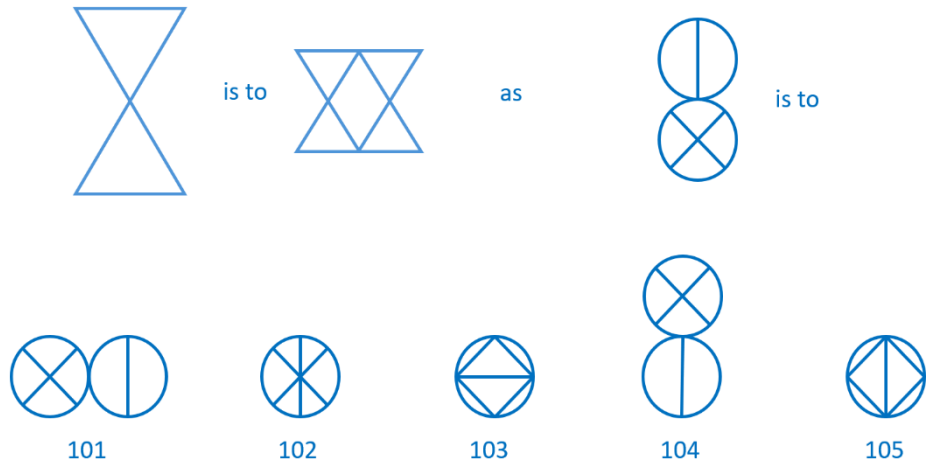
Truth be told, we don't have the deep pockets of giant overseas centres — just a big love for nurturing young minds in a safe, balanced way.

We're even flattered that some folks have copied (and re-sold!) our work. If you're one of them, could you do us a small kindness? Please keep our names, logos and pictures intact.

It's a simple gesture that helps keep small, passionate educators like us in the game and lets us continue making quality learning accessible to all.

Questions 1 to 10 are worth 1 mark each

1. Evaluate $(20 + 2 \times 5 + 2) \div (40 \div 8 - 3)$

2. 

Choose the option that you think is correct and shade the corresponding number as your answer.

3. Adam, Ben and Clarence shared some candies. The number of candies each boy has is in the ratio 3 : 7 : 9 respectively and the average number of candies each has is 38. How many candies does Ben have?

4. Sarah cycled from her home to the park at an average speed of 12 km/h. If her average speed for the entire trip (going to the park and back without stopping) was 16 km/h, what was her average speed (in km/h) on the way back?

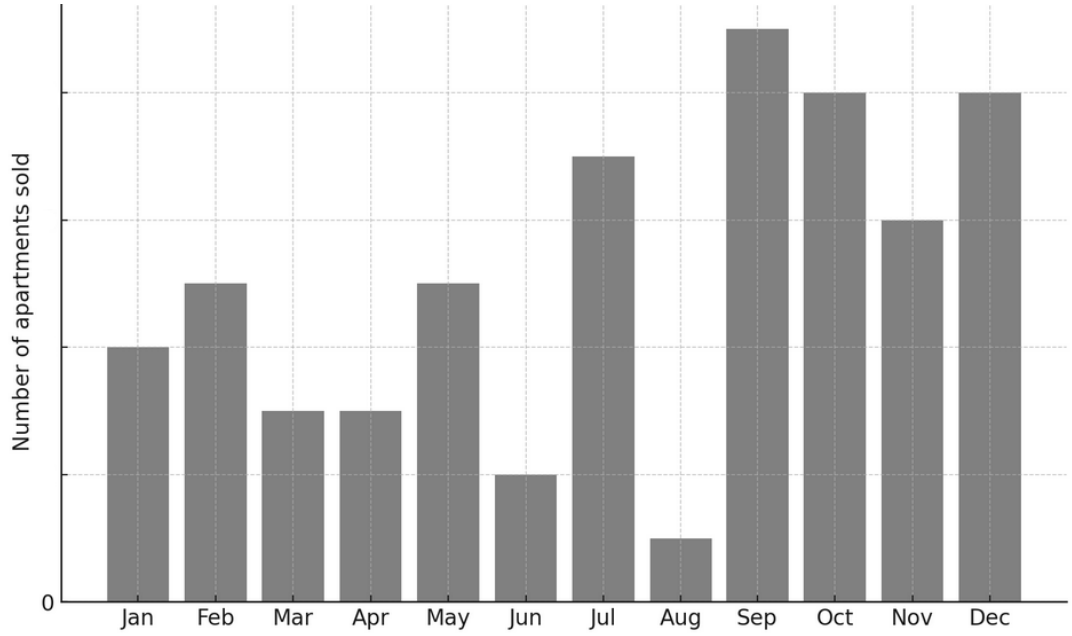
5. It is known that the whole number in each box below is the same.

$$(\square+\square) + (\square-\square) + (\square\times\square) + (\square\div\square) = 2025$$

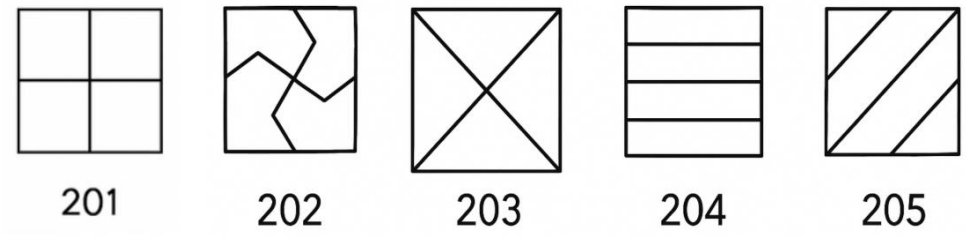
What is the whole number?

6. The following diagram shows the number of apartments sold by a real estate company in each month last year. In January, February and March, a total of 84 apartments were sold.

What is the total number of apartments sold in October, November and December?



7. Which is the odd one out?

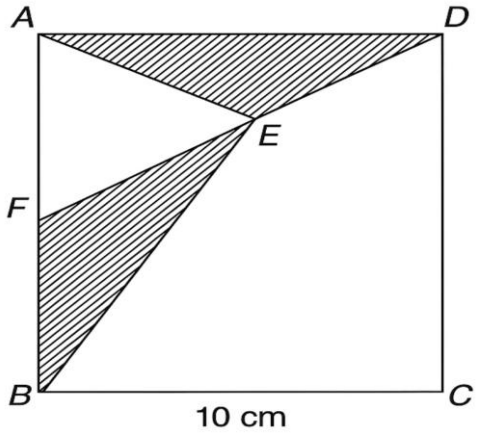


Choose the option that you think is correct and shade the corresponding number as your answer.

8. Aminah had some buttons, while Benjamin, Chen Wei, Deepa, and Ethan had none initially. She gave half of her buttons to Benjamin. Benjamin then passed a third of the buttons he received to Chen Wei and later gave a quarter of his remaining buttons to Deepa.

   Meanwhile, Aminah gave a fifth of the buttons she had left to Ethan. What is the minimum number of buttons that Aminah has now?

9. The figure shows a square ABCD with side length 10 cm. F is a point on AB, and E is the midpoint of DF. Find the sum of the areas (in cm²) of triangles ADE and BEF.



10. A school lecture theatre has ten rows of seats. The details are given below.

Row	A	B	C	D	E	F	G	H	I	J
No. of seats	10	12	10	12	10	10	11	12	14	15

k students are seated in the lecture theatre. It is found that no two rows contain the same number of students. What is the largest possible value of *k?*

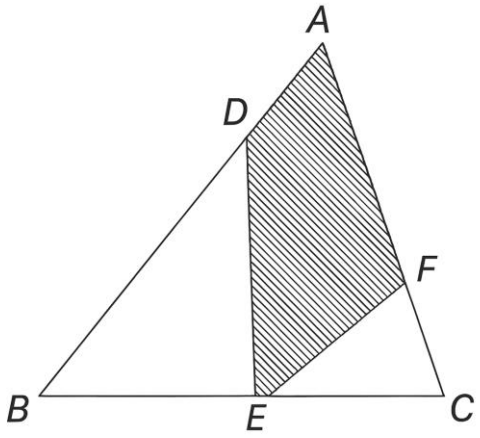
Questions 11 to 20 are worth 2 marks each

11. The sum of three numbers is 94. If the ratio of the first number to the second number is 1 :3 and that of the second number to the third number is 5:9. What is the second number?

12. There were 1000 apples and oranges in a supermarket warehouse. When more apples and oranges were added to the warehouse, the number of oranges increased by 20% and the number of apples increased by 50%.

    Given that there were 120 more oranges than apples in the end, how many apples were added to the warehouse?

13. In triangle ABC shown below, D, E and F are points on AB, BC and AC respectively. It is given that BD = 3DA, BE = EC, and AF = 2FC. If the area of triangle ABC is 96 cm², find the area (in cm²) of the quadrilateral ADEF.



14. Let us think of a whole number satisfying all the following conditions:

- when divided by 8, it gives a remainder of 1;
- when divided by 5, it gives a remainder of 2;
- when divided by 6, it gives a remainder of 3.

What is the largest such number that is less than 2025?

15. Tom sits for a series of tests. In his second last test, he scores 89, which increases his average scores from 78 to 79. If Tom aims to achieve an average score of 80, what is the score he must obtain in the last test?

16. Each ☐ is to be filled with a different prime number chosen from the first 10 prime numbers (2, 3, 5, 7, 11, 13, 17, 19, 23, 29). Exactly 7 prime numbers are used in the numerator and 3 prime numbers in the denominator.

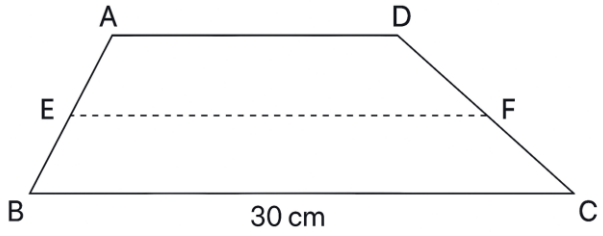
    The goal is to make the expression an integer.

$$X = \frac{\square + \square + \square + \square + \square + \square - \square}{\square + \square + \square}$$

    What is the maximum possible value of *X*?

17. 25% of A's money is equal to 40% of B's money. 30% of A's money is equal to 40% of B's and C's money. Given that A has $210 more than C, how much money (in $) does B have?

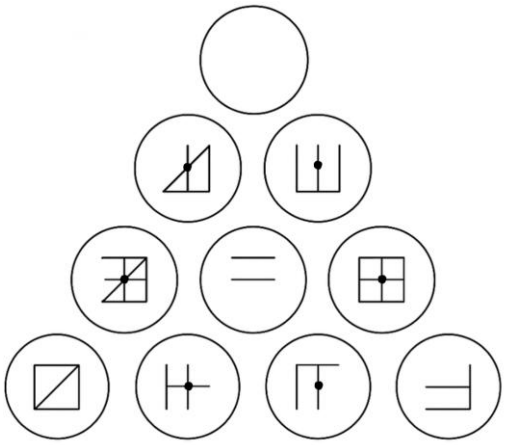
18. The figure shows a trapezium *ABCD* with *AD* parallel to *BC.* The points *E* and *F* are the midpoints of *AB* and *DC* respectively. It is given that *BC* = 30 cm and the perimeter of trapezium *BCFE* is 62 cm. Find the perimeter (in cm) of trapezium *ABCD.*



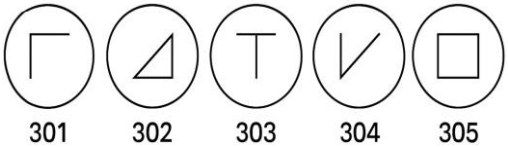
19. Arjun walks around a circular track at a constant speed, while Bryan runs at 7 times Arjun's speed. Both start moving from the same point at the same time in **opposite** directions.

    How many times would Bryan have met Arjun after Arjun starts moving and completes one lap? Assume both maintain their speeds.

20.



What of the following fits into the blank circle at the top of the pyramid?



Choose the option that you think is correct and shade the corresponding number as your answer.

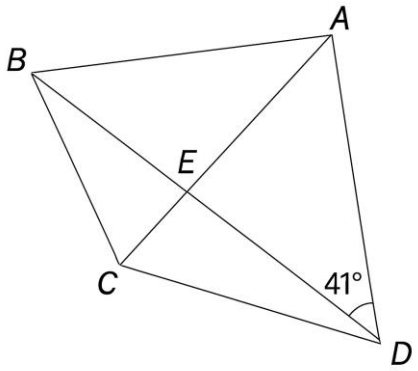
Questions 21 to 30 are worth 3 marks each

21. At a charity fair, there were two kinds of notebooks sold, with one kind of notebook selling for \$4, and the other kind of notebook selling for \$5.

    At the end of the fair, \$231 was collected from the sale of the notebooks. How many different possible combinations of notebooks sold are there?

22. In the quadrilateral ABCD shown below, the diagonals AC and BD intersect at E. It is given that $AB = AC = AD$ and $\angle ADB = 41°$.

    Find $\angle BCD$ in degrees.



23. Lina and Royce had a total of 400 pencils. First, Lina gave 60% of her pencils to Royce. Then, based on the total number of pencils Royce had after receiving Lina's pencils, he gave 25% of that amount to Lina. In the end, Lina had 127 pencils. How many pencils did Royce have at first?

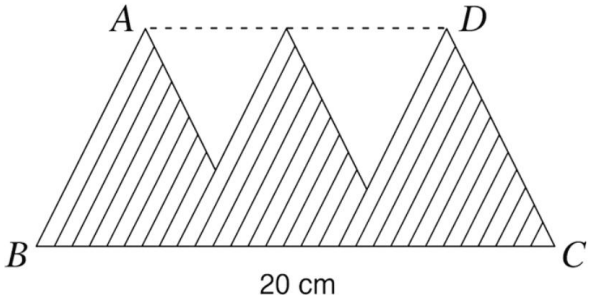
24. Three numbers a , b and c is such that $a + b : b + c : a + c$ is in the ratio 8 : 13 : 15 .

    If the sum of the three numbers is 9, find the value of c.

25. In the first hour of a children's art exhibition, there were 155 children. In the second hour, 20% of the boys left the exhibition and the number of girls increased by 30%. Thereafter, there were 159 children in the exhibition.

    How many boys were there at the exhibition in the first hour?

26. In a trapezium $ABCD$, AD is parallel to BC, BC= 20 cm and $\angle ABC = \angle DCB = 60°$. Two equilateral triangles, where the sum of their bases is equal to AD, are cut out from the side AD of the trapezium as shown below.



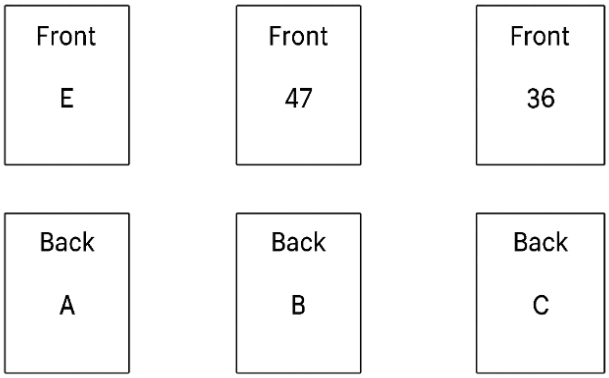
    Find the perimeter (in cm) of the remaining figure.

27. Three different whole numbers add up to 182 and multiply to 74 088. One of the numbers, when squared, is equal to the result of multiplying the other two numbers. What is the smallest number?

28. Clarence wrote 6 different numbers on each side of 3 cards and 2 of the numbers are as shown. The sum of the two numbers on each card are equal.

    The three numbers A, B, C are prime numbers, and **E is an even number between the other two shown numbers.**

    What is the sum of all possible values of A?



29. There are 66 students in the school orchestra, among whom 60 can play piano, 58 can play violin, 55 can play flute, and 50 can play trumpet. It is known that k students can play all these four musical instruments. Find the minimum value of k.

30. A health centre with a capacity of 300 patients employs 10 senior doctors and 20 junior doctors. Each senior doctor can look after 25 patients every day, and each junior doctor can look after 20 patients every day.

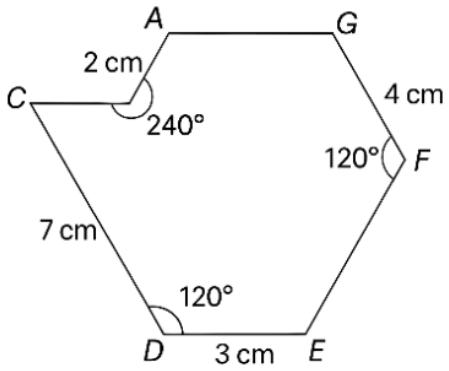
    In any consecutive seven days, a senior doctor needs to take at least 2 days rest while a junior doctor needs at least 1 day rest. During the pandemic, the health centre is expanded to receive 800 patients, and it always operates in full capacity. Hence, the health centre hires another x senior doctors and y junior doctors to complete the task.

    Find the minimum value of $x + y$.

Questions 31 to 35 are worth 4 marks each

31. In the 7-sided figure $ABCDEFG$ shown below, AG is parallel to both CB and DE, CD is parallel to GF and AB is parallel to FE.

The lengths of AB, DE, FG and CD are 2 cm, 3 cm, 4 cm and 7 cm respectively. It is also given that reflex $\angle ABC = 240°$ and $\angle CDE = \angle EFG = 120°$.

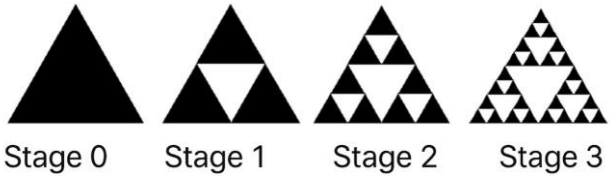


Find the perimeter (in cm) of the figure $ABCDEFG$.

32. The Sierpinski triangle is a self-similar fractal. It consists of an equilateral triangle, with smaller equilateral triangles recursively removed from its remaining area.

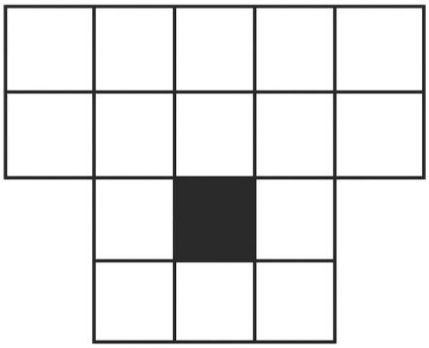
    To move from one stage to the next, divide every black triangle into four smaller equilateral triangles of the same size and remove the central triangle.

    See the diagram below showing the different stages of the Sierpinski triangle.



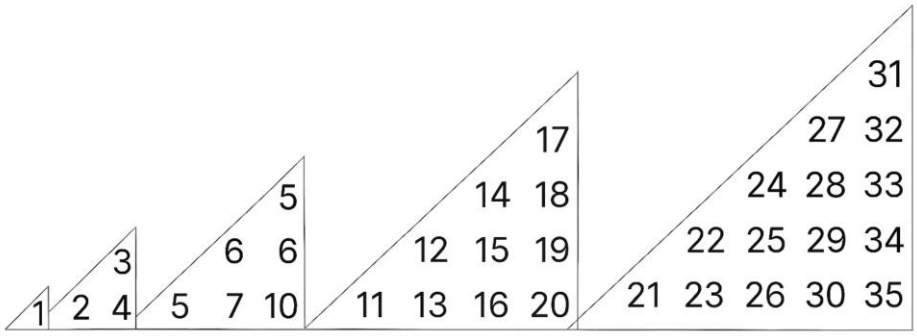
    Let B and W be respectively the number of black and white triangles in the Stage 7 Sierpinski triangle. Find the value of $B - W$

33. The diagram consists of 15 squares after the removal of a black square, as shown.



How many different rectangles that do not contain the black square can be formed using only these 15 squares?

34. The n^{th} triangular number is the sum of the first n natural numbers. A pattern is formed by arranging consecutive numbers into growing triangular shapes. The first triangle contains 1, the second contains 2, 3, 4, the third contains 5, 6, 7, 8, 9, 10, and so on.



This pattern continues with each new triangle having one more row than the previous. What is the first four-digit number in the bottom row that starts with 2?

35. Five soccer teams A, B, C, D and E participate in a round-robin tournament, i.e., every two teams play exactly one match. The winner gains 3 points, and the loser gains 0 points.

    If the two teams draw, each team gains 1 point. It is known that the final scores of all the teams are mutually distinct, and the total score of all the teams is 24 points.

    Team A is the Champion, but it is defeated at least once. Team B is ranked second, and it is never defeated.

    Suppose Team A scores x points and the bottom team scores y points. Find the minimal possible value of $x^2 - y^2$.

NMOS 2025 Answers

Question	Mark	Correct Answer	My Answer	Score
1	1	16		
2	1	102		
3	1	42		
4	1	24		
5	1	44		
6	1	154		
7	1	202 or 205		
8	1	24		
9	1	25		
10	1	97		
11	2	30		
12	2	200		
13	2	44		
14	2	1977		
15	2	91		
16	2	2		
17	2	150		
18	2	64		
19	2	8		
20	2	304		
21	3	11		
22	3	131		
23	3	310		
24	3	5		
25	3	85		
26	3	60		
27	3	14		
28	3	26		
29	3	25		
30	3	16		
31	4	27		
32	4	1094		
33	4	63		
34	4	2002		
35	4	45		