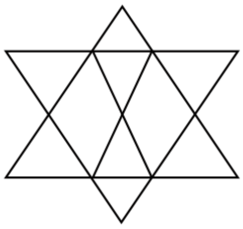
2019 NMOS Question

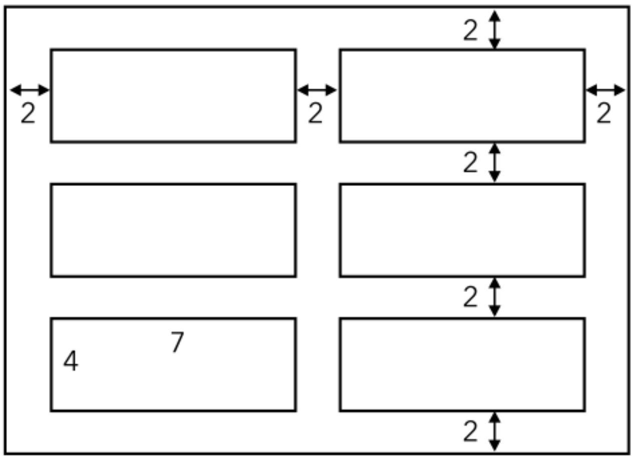
1. Evaluate $\frac{2019+4567\times7890}{4568\times7890-5871}$.

2. How many triangles are there in the figure below?



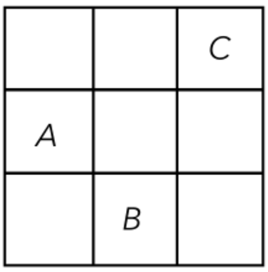
3. Ian wanted to finish reading a book in 4 days. He completed reading 40% of the book on the 1st day. He read 20% of the remaining pages on the 2nd day. On the 3rd day, he read three times the number of pages he read on the 2nd day. Find the number of pages Ian read on the last day as a percentage of what he read on the 1st day. (For example, if your answer is 10%, shade the answer as "10%".)

4. Emma has three rows of two 7-feet by 4-feet flower beds in her garden. The beds are separated and surrounded by 2-feet-wide walkways, as shown in the diagram. What is the total area of the walkways, in square feet?

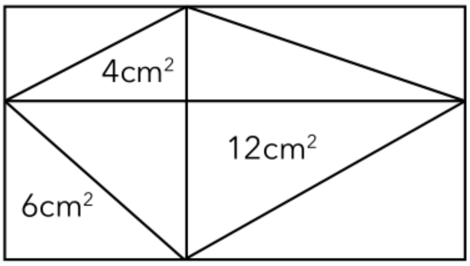


5. When Paul was 7 years old, his mother was 37 years old. Now his mother is 4 times as old as Paul. How old is his mother now?

6. Fill in the following 3×3 array with whole numbers, such that the average of the three numbers in each row, column or diagonal is the same. Given that $A=2019$ and $B=9201$, find the value of *C*.



7. The rectangle shown is separated into eight right-angled triangles by line segments. The areas of three of the triangles are indicated in the figure. What is the area (in cm^2) of the entire rectangle?



8. Mary forgot to bring her math textbook when she went to school. Her father found out 18 minutes after Mary left the house, and he immediately cycled after her to give her the textbook. After they met, Mary continued to walk to school, and her father cycled back home. They reached their destinations at the same time. Given that the average speed of her father is 5 times that of Mary, how long does it take (in minutes) for Mary to walk to school from home?

9. Study the following pattern:

$1+2+1=4$

$1+2+3+2+1=9$

$1+2+3+4+3+2+1=16$

$1+2+3+4+5+4+3+2+1=25$

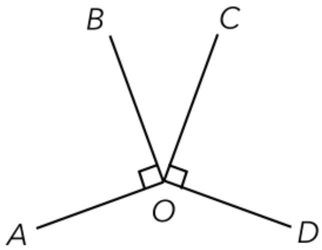
Find the sum of $10+11+12+\cdots+36+37+36+\cdots+12+11+10$.

10. Mrs. Tan places 50 candies inside a jar. Andy, Benjamin and Cheryl each takes a number of candies.
Andy: If Benjamin gives two candies to me, I will have eight more candies than Cheryl.
Benjamin: If I give all of my candies to Cheryl, Cheryl and Andy will have the same number of candies.
Cheryl: I have less candies than Benjamin.
If all of them are telling the truth, find the smallest possible number of remaining candies inside the jar.

11. There are 30 questions in a mathematics contest. 6 marks will be awarded for each correct answer. 4 marks will be deducted for each wrong answer. All the questions must be answered. If Brandon scores 100 marks in the mathematics contest, how many questions does he answer correctly?

12. A prime number is a whole number greater than 1 whose only factors are 1 and itself. For example, 2, 3, 5, 7 and 11 are prime numbers. If 110 is written as a sum of 11 prime numbers, what is the largest possible value of the largest prime number?

13. In the following figure, both $\angle AOB$ and $\angle COD$ are right angles. Obtuse $\angle AOD$ is greater than obtuse $\angle AOC$ by 20°. Find acute $\angle BOC$ (in degrees).



14. Car X travels from Town A to Town B at a constant speed. 30 minutes after Car X leaves Town A, Car Y also leaves Town A at the same speed as Car X, and travels towards Town B along the same route. A truck travels from Town B to Town A along the same route at a constant speed 4 km/h faster than both Car X and Car Y. After the truck passes by Car X, it passes by Car Y 14 minutes later. Find the speed of the truck in km/h.

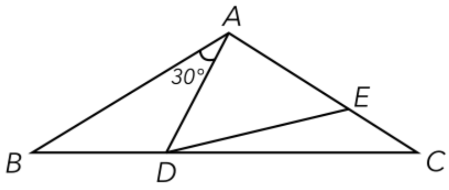
15. Lucky Machine is a special game in a theme park. Anyone who pays a ticket of \$25 will get the remaining amount of money in his/her wallet doubled. Jimmy wants to play this game repeatedly, hoping to earn a large sum of money. However, after playing the game five times, he has only \$18 left in his wallet and cannot continue. How much money, in dollars, was there in Jimmy's wallet before he started this game?

16. Daniel read a book. On the first day, he read 5 pages in 5 minutes. On the second day, he read 6 pages in 10 minutes. On the third day, he read 7 pages in 15 minutes. Each day thereafter, Daniel read one more page and he spent five more minutes than he did in the previous day. When Daniel completed reading this 396-page book, how long (in hours) did Daniel spend in total?

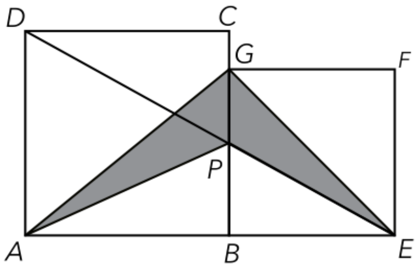
17. Given numbers A and B, the operator $*$ is defined as $A*B=5A+3B$. For example, $3*4=5\times3+3\times4=27$.

If $a*9=37$, what is the value of $\frac{1}{5}*(a*\frac{1}{3})$?

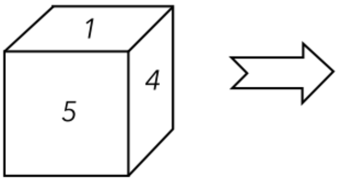
18. In the figure below, $\triangle ABC$ is an isosceles triangle with $AB=AC$, $\angle BAD=30°$ and $AE=AD$. Find $\angle CDE$ (in degrees).



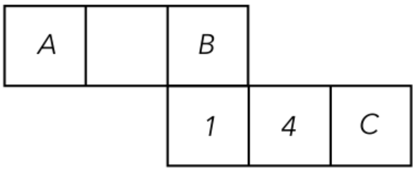
19. In the following figure, the length of the side of square *ABCD* is 16cm, and the length of the side of square *BEFG* is 12cm. *DE* intersects *BC* at point *P*. Find the area (in cm^2) of the shaded region *APEG*.



20. In the following cube, each of the faces is assigned with a different number from 1 to 6. Tom worked out a net of this cube based on his view of the only 3 numbers. Find the largest possible value of the 3-digit number $\overline{ABC}$.
[If *A* is 1, *B* is 2 and *C* is 3, then answer is the 3-digit number 123.]



Tom's view

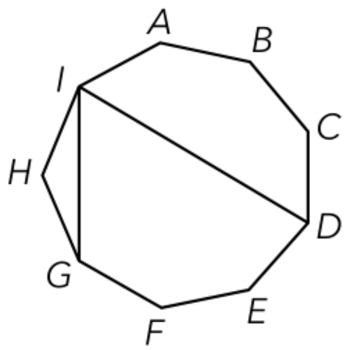


Net of the cube

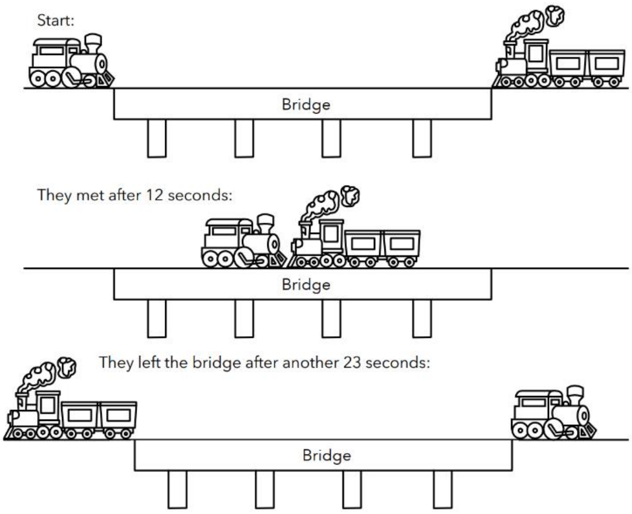
21. A coin box contained some twenty-cent and fifty-cent coins in the ratio of $3:4$. Alice removed 13 fifty-cent coins and added 20 twenty-cent coins. In the end, the amount of money made up of twenty-cent coins is twice the amount of money made up of fifty-cent coins. Find the total number of coins Alice had at first.

22. $\overline{NUS}$ and $\overline{SUN}$ are two 3-digit numbers. Each of the letters N, U and S represents a different one of digits from 0 to 9. Given that $\overline{NUS} \times \overline{SUN} = 53703$, find the value of $\overline{NUS} + \overline{SUN}$.

23. In the following diagram, *ABCDEFGHI* is a regular nine-sided polygon with *AB* = *BC* = *CD* = *DE* = *EF* = *FG* = *GH* = *HI* = *IA*. Find $\angle GID$ (in degrees).



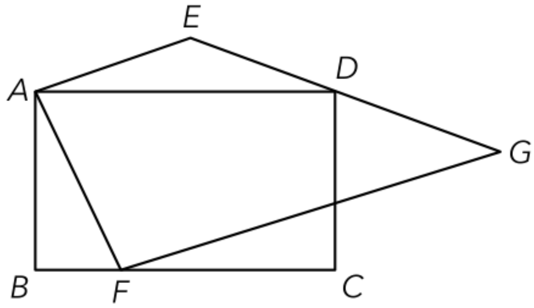
24. While Train X was crossing a bridge from end A to end B, Train Y was crossing the bridge from end B to end A. They started travelling from their end at the same time and each of them travelled at a same constant speed along the bridge. They took 12 seconds to meet each other on the bridge. Then each of them took 23 seconds to leave the bridge. Given that the bridge is 492 meters long, what is the total length (in metres) of Train X and Train Y?



25. A and B are two different prime numbers, such that $A+B=680$ and $A\times B$ is a 4-digit number. Find the largest possible value of the product $A\times B$.

26. A palindrome is a whole number that remains the same when its digits are reversed. For example, 7887, 12521 and 60906 are palindromes. Find the number of 4-digit palindromes which are multiples of 7. (For example, 7007 is a palindrome which is a multiple of 7.)

27. In the figure below, the area of the rectangle *ABCD* is 704cm^2. *AEGF* is a trapezium with *AE* parallel to *FG*. *P*oint *F* is on *BC* and *D* is the midpoint of *EG*. Find the area of the trapezium *AEGF*.



28. Consider the following pattern:

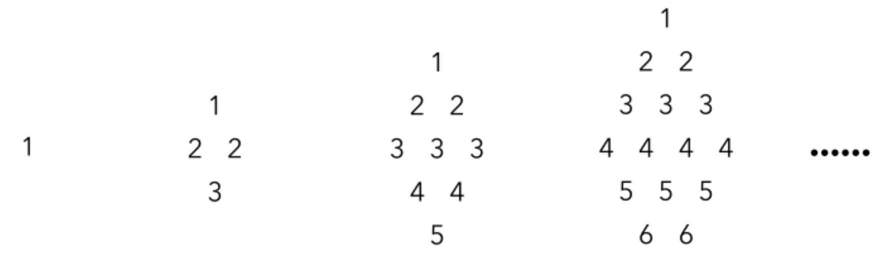
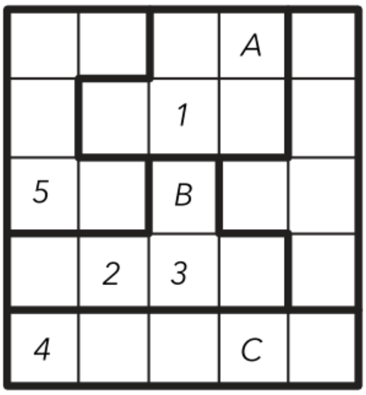


Figure 1 Figure 2 Figure 3 Figure 4

Find the **sum** of all the whole numbers in Figure 19.

29. The numbers 1, 2, 3, 4 and 5 are filled in the following 5×5 square grid, such that each number appears only once in each row, in each column and in each region bounded by bold lines. Find the three-digit number $\overline{ABC}$.
[If A is 1, B is 2 and C is 3, then the answer is the 3-digit number 123.]



30. There are 30 students in Mr. Lim's class. 12 students obtained Distinction in English, 10 students obtained Distinction in Mathematics, and 17 students obtained Distinction in Science. Find the largest possible number of students who did not obtain Distinction in any of the three subjects.