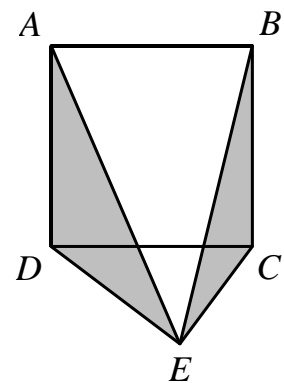


2017 NMOS Question

1. Given that $201\frac{1}{7} \div 8 = A + \frac{1}{7}$, find the value of A .

2. Beverly scored 90% for her English test. If 3 marks were added to her score, she will score 95%. What is the total mark for the English test?

3. In the following diagram, the area of the square $ABCD$ is 64 cm. The point E is an exterior point of the square $ABCD$. Find the area, in cm^2 , of the shaded area.



4. The following is a sequence of numbers:

1, 1, 2, 3, 5, 8, 3, 1, 4, 5,

Where the first two numbers are 1, and the subsequent numbers are obtained by taking the last digit of the sum of its two previous numbers. How many odd numbers are there among the first 200 numbers?

5. Suppose A , B and C are whole numbers such that $A \times B = 24$ and $B \times C = 52$. What is the smallest possible value of $A + C$?

6. Ashley and Betty are new friends.

Ashley: Hi Betty, when is your birthday?

Betty: My birthday is on 13th October.

Ashley: What day is your birthday this year?

Betty: I'm not sure, but I know there are 5 Saturdays and 4 Sundays in October this year.

Can you help Ashley to find the day of Betty's birthday this year?

[If your answer is Monday, then shade your answer as "1001";

If your answer is Tuesday, then shade your answer as "1002";

If your answer is Wednesday, then shade your answer as "1003";

If your answer is Thursday, then shade your answer as "1004";

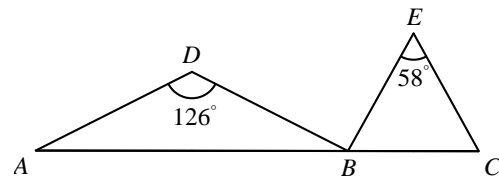
If your answer is Friday, then shade your answer as "1005";

If your answer is Saturday, then shade your answer as "1006";

If your answer is Sunday, then shade your answer as "1007".]

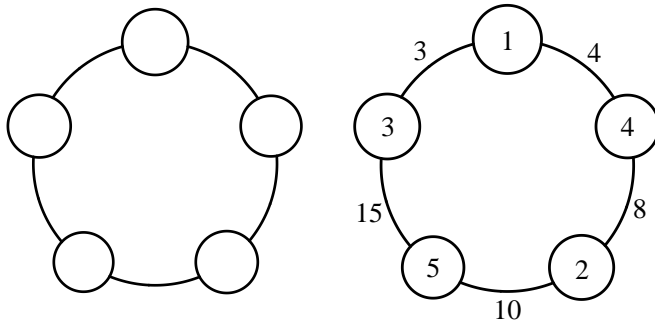
7. Suppose $1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} = \frac{A}{60}$. Find the value of A .

8. The following diagram shows two isosceles triangles ABD and BCE with $DA = DB$ and $EB = EC$. It is known that ABC is a straight line, $\angle ADB = 126^\circ$ and $\angle BEC = 58^\circ$. Find, in degrees, $\angle DBE$.



9. Miss Ng planned to distribute some candies among Ariel, Benedict and Cindy in the ratio $5:4:3$ on Children's Day. But she made a small calculation mistake, and the ratio became $7:6:5$ on the actual day. If one of the three children received 15 less candies than as planned, how many candies did Benedict receive on the actual day?

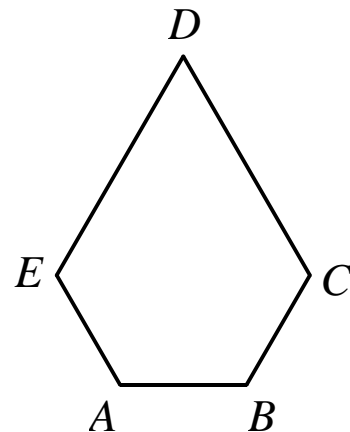
10. In the first diagram (on the left) below, fill up 1, 2, 3, 4 and 5 in the circles without repetition. Next, write down on each arc the product of the two adjacent numbers. Please refer to an example at the diagram on the right. The sum of the numbers on the arcs of this diagram is $3 + 4 + 8 + 10 + 15 = 40$.



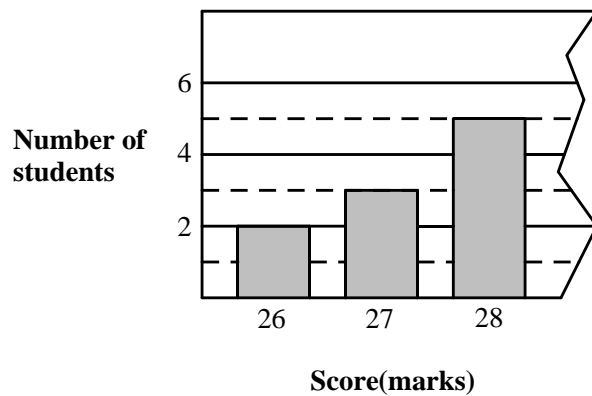
Find the largest possible sum of the numbers on the arcs.

11. Peter left home at 6:00 to walk to school. After reaching school, he spent 4 hours 30 minutes in school and then he walked back home. He reached home at 12:00 noon for lunch. If Peter walks to school at a speed of 100m per minute and walks back home at a speed of 80m per minute, find the distance, in metres, between his school and home.

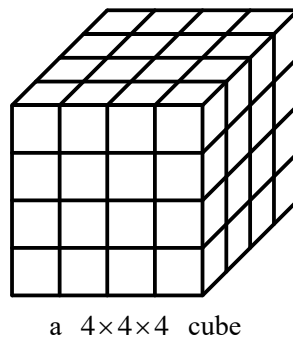
12. In the figure below, $\angle EAB = \angle CBA = 120^\circ$, $EA = AB = BC = 1$ and $DE = DC = 2$. Find, in degrees, $\angle EDC$.



13. Mr Lim made the following bar chart to analyse his class's performance in a math test. However, the chart was accidentally torn by his son. The full score of the test was 30 marks, and he remembered that the average score of the class was 29 marks. Find the number of students who scored full marks for the test.

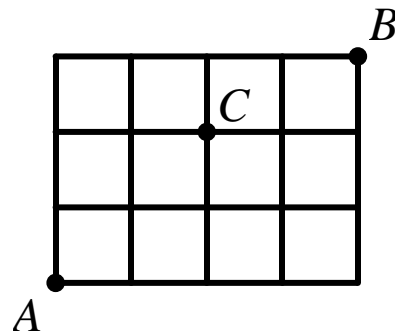


14. 64-unit blocks are put together to form a $4 \times 4 \times 4$ cube. Paint the surface of this cube. Now we remove those unit blocks with exactly one face painted and obtain a solid structure. Find the surface area, in cm^2 , of this structure. (Note that a unit block is $1 \times 1 \times 1 \text{ cm}^3$.)



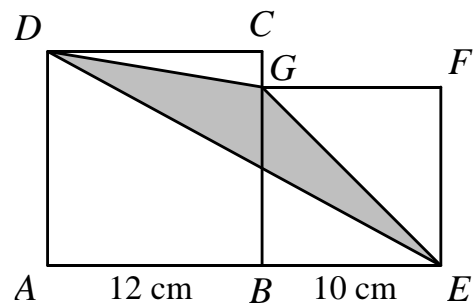
15. David and Emma are working as a pair to complete a Math Journal. Working alone, David and Emma each needs 10 days and 18 days respectively to complete the journal. In fact, David started to work alone for some days and then handed the work over to Emma. The journal was completed in 14 days altogether. How many days did Emma work on the journal?

16. A ladybug is moving from A to B along the lines as shown below. It can only move upwards or to the right, and it must pass by C . What is the total number of different paths from A to B ?



17. For a 2-digit number, if the sum of its digits plus the product of its digits is exactly equal to the 2-digit number itself, the number will be known as a 'crazy number'. For example, $39 = 3 + 9 + 3 \times 9$ is a 'crazy number'. How many 'crazy numbers' are there in total?

18. The following diagram shows two squares $ABCD$ and $BEFG$. The side length is 12 cm and 10 cm respectively. Find the area, in cm^2 of the shaded region.



19. Gerald had \$98 more than Ben at first. Gerald spent 45% more money than Ben. Given that Ben had \$82 more than Gerald in the end, find the amount of money, in \$, Gerald spent.

20. Each of the letters M , A , T and H represents a different one of the digits from 0 to 9 such that

$$\begin{array}{r}
 H \\
 T \ H \\
 A \ T \ H \\
 M \ A \ T \ H \\
 + \ 1 \ M \ A \ T \ H \\
 \hline
 2 \ M \ A \ T \ H
 \end{array}$$

Find the smallest possible 4-digit number “ $MATH$ ”.

21. In a certain class with even number of students,

- 30% of the girls wear glasses;
- Among those wearing glasses, 60% are boys.

What is the smallest possible total number of students in the class?

22. Benjamin has a square piece of paper. He cuts along the dotted lines shown in Figure 1 to get the shaded part and 8 identical isosceles triangles. Triangle PQR in Figure 2 is one such triangle with a perimeter of 16cm. The ratio of the perimeter of the square paper to the perimeter of the shaded part is $1 : 2$. Find the length, in cm, of PQ .

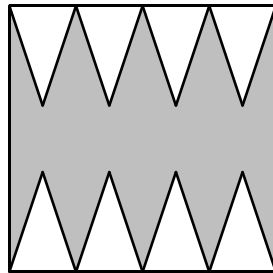


Figure 1

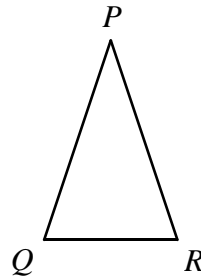
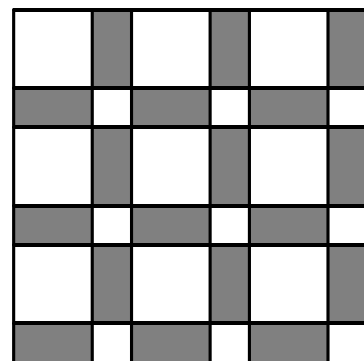


Figure 2

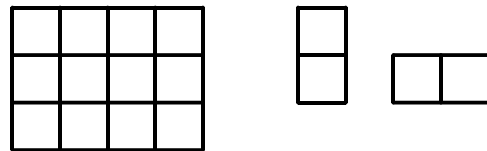
23. The ratio of the length of a rectangle to its width is $14 : 5$. If the length of the rectangle is decreased by 13 cm and the width is increased by 13 cm, the total area of the rectangle will be increased by 182 cm^2 . What is the original area, in cm^2 , of the rectangle?

24. In the diagram below, a square of 900 cm^2 is divided by horizontal and vertical stripes. All white parts are either large squares or small squares. It is known that the total area of small white squares and the total area of large white squares are in the ratio of $1 : 4$. Find the total area, in cm^2 , of the black region.

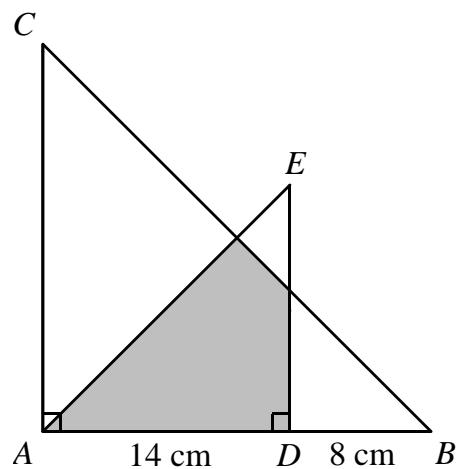


25. If M is subtracted from both the numerator and the denominator of the fraction $\frac{1687}{2017}$, the fraction will become $\frac{5}{6}$. Find the value of M .

26. Ashley wants to pave a 3×4 block (as shown below) with tiles of size 1×2 or 2×1 . Find the number of different tessellations.



27. The following diagram shows two isosceles right angled triangles ABC and ADE with $DA = DE$ and $AB = AC$. Given that $AD = 14$ cm and $DB = 8$ cm, find the area, in cm^2 , of the shaded region.



28. Study the following pattern:

Stage 1: $2 \times 1 = 2 = 1 \times 2$

Stage 2: $2 \times (1 + 2) = 6 = 2 \times 3$

Stage 3: $2 \times (1 + 2 + 3) = 12 = 3 \times 4$

Stage 4: $2 \times (1 + 2 + 3 + 4) = 20 = 4 \times 5$

Stage 5: $2 \times (1 + 2 + 3 + 4 + 5) = 30 = 5 \times 6$

Stage 5 is said to have common sum 5×6 , which is 30. On some stages, the common sum is a multiple of 88. Find the smallest stage number of such stages.

29. Peter and Jane were travelling towards each other from Town *A* and Town *B* respectively. Peter started travelling 1 hour earlier, and they met each other after Jane had been travelling for 4 hours. Peter was faster than Jane by 2 km per hour, and the location they met each other was 10 km away from the midpoint of the distance. Find the total distance, in km, between Town *A* and Town *B*.

30. A 4-digit number is formed by using the integers only once in the list

$$\{1, 3, 4, 6, 8, 9\}$$

For example, 1348, 3691 and 4896 are possible numbers but 1234 and 3344 are not. If the numbers are arranged from the smallest to the biggest, which position would the number 4386 be in?