In a sequence, the first number is 3, and the second number is 4. Starting from the third number, each number is the sum of the two numbers before it. When the 2021st number in the sequence is divided by 4, the remainder is _____

(1) $\left(0.8 + \dfrac{2}{9} \times 60\% \right) \times \dfrac{1}{2} =$ _____

Observe the pattern below and answer the questions.

(1) 200 is in row _____ , column _____ ,

(2) The number in row 40, column 3 is _____

(3) The sum of all the numbers in the first 9 rows is _____

2	4	6	8
10	12	14	16
18	20	22	24
26	28	30	32

Continuous odd numbers starting from 1 are arranged in the picture shown below.

(1) 101 is in row _____ , column _____ .

| 1	3	5	7	9	11	13
15	17	19	21	23	25	27.
29	31	33	35	37	39	41

(2) The number in row 21, column 3 is _____ .

79 is divided by an integer and gets the remainder 4. What are the possible values of the integer?

When divided by an integer larger than 1, both 55 and 37 get the same remainder. What are the possible values of the integer?

2

Among the natural numbers from 1 to 1000, there are _____ numbers which have odd numbers of factors; there are _____ numbers which have only 3 factors.

Ella has 6 beads in different colors. She wants to string them in a line. However, 3 of them must not be put adjacent to each other. There are _____ ways to string the beads.

A 6 × 4 grid is shown below.
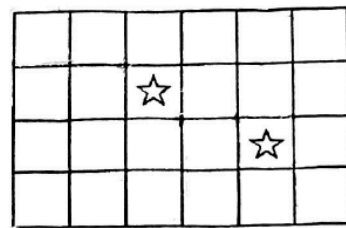
There are _____ rectangles with only one star inside.

Given the lengths of two sides of a right triangle, what is the square of the length of the third side?

(1) 8 cm, 15 cm

(2) 13 m, 19 m

Find the sum of the first 50 odd numbers.

$$\left(\frac{5}{12} + \frac{7}{32} + \frac{3}{17}\right) \times \left(\frac{7}{32} + \frac{3}{17} + \frac{4}{13}\right) - \left(\frac{5}{12} + \frac{7}{32} + \frac{3}{17} + \frac{4}{13}\right) \times \left(\frac{7}{32} + \frac{3}{17}\right)$$

$$\left(1 - \frac{1}{2}\right) \times \left(2 - \frac{2}{3}\right) \times \left(3 - \frac{3}{4}\right) \times \left(4 - \frac{4}{5}\right) \times \left(5 - \frac{5}{6}\right) \times \left(6 - \frac{6}{7}\right)$$
$$\times \left(7 - \frac{7}{8}\right) \times \left(8 - \frac{8}{9}\right) \times \left(9 - \frac{9}{10}\right) = \underline{\qquad} .$$

4

Continuous natural numbers starting from 1 are arranged in the picture shown below.

| 1	2	3	4	5	6
7		8		9	
10	11	12	13	14	15
	16		17		18

(1) ~~100 is in row _____ and column _____ .~~

(2) The number in row 50 and column 2 is _____

There are _____ different five-digit even numbers without repeating digits that can be formed by 0 ~ 6.

Use 4 different colors to fill in each of the rectangles in the picture shown below. Given that the adjacent rectangles cannot be of the same color, there are _____ different coloring options.
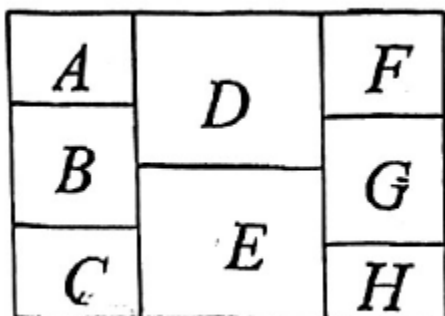
Use 3 different colors to fill in each of the rectangles in the picture shown below. Given that adjacent rectangles cannot be of the same color, there are _____ different coloring options.
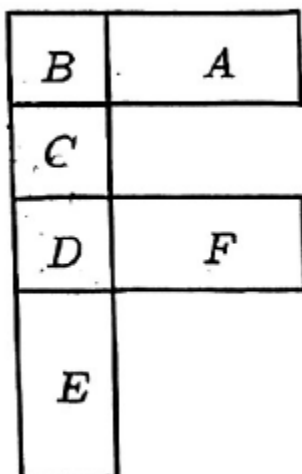

Lisa used 880 g of a container of sugar to bake a cake and $\frac{1}{10}$ of the remaining sugar to make cookies. She then had $\frac{3}{7}$ of the container of sugar left. How much sugar was in the container at first?

Mr. Strong started driving at 9:40 am, at an average speed of 60 km/h. Mr. Swift started driving from the same place at 10:10 am, using the same route. If Mr. Swift took 3 hours to catch up with Mr. Strong, at what average speed was Mr. Swift driving?

A truck covered the distance between 2 towns at an average speed of 50 mi/h. It moved at 65 mi/h for the first $\frac{2}{5}$ of the distance before the truck driver stopped for a $1\frac{1}{2}$ -hour break. After that, he continued driving for another 195 miles till he arrived at his destination. At what speed was the truck moving during the last 195 miles of the trip? Give your answer in mi/h.

Ted and Ben took part in the same race. When Ted won the race 25 minutes after it started, Ben had only run $\frac{5}{8}$ of the distance. Ben's average speed was 75 m/min slower than Ted's. What was Ted's average running speed in the race?

A pole has a length of 600 cm. Annic the Ant started at the left end of a pole at a speed of 15 cm/min and crawled 400 cm of its length. Bob the Beetle started at the right end of the same pole at a speed of 35 cm/min and crawled 450 cm of its length. After they arrive at the other end of the pole, they will turn back and walk toward each other. From now on, how many minutes does it take for them to meet each other again? (adapted from 2017 Math Kangaroo Problem, Level 7 − 8, Question #11)
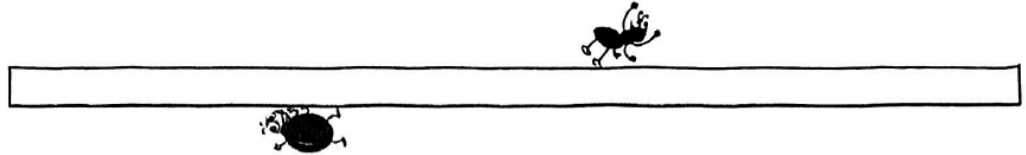
A. 10   B. 12   C. 15   D. 19   E. 21

At 8:45 am, a truck started moving at an average speed of 56 km/h. At 9:45 am, a car left the same place where the truck had started. After covering 280 km along the same route, the car caught up with the truck. If both vehicles continued moving from that point on, maintaining their respective speeds, how far apart would they be at 6:30 pm?

As shown, rectangle $ABCD$ has a dimension of 7×4 and rectangle $DEFG$ has a dimension of 10×2. Find the difference between the area of triangle BCO and that of triangle EFO.
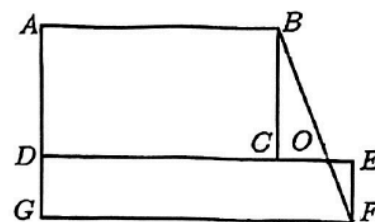
As shown, parallelogram $ABCD$ has a base $BC = 10$ cm and right triangle ECB has a side $EC = 8$ cm. Given the total areas of the shaded parts is 10 cm^2 larger than that of triangle EFG, the area of parallelogram $ABCD$ is _____ cm^2.
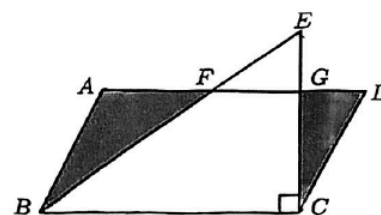
As picture shown below, $\angle AOB = 30°$. Inside the angle, there is a point P which makes $OP = 10$. Draw two points, Q and R, each on the two arms of the angle to make the perimeter of triangle PQR the least and find the least value of the perimeter. (Neither of the two points can overlap the point O.)
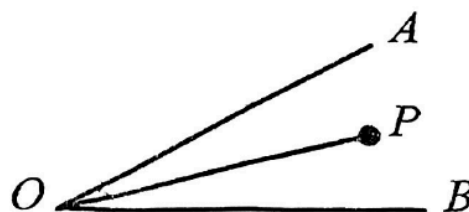
As shown below, triangle ABC is a right triangle with $\angle C = 30°$. Try to explain $2AB = AC$.
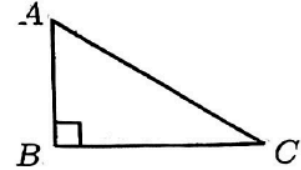
As shown in the figure below, the triangle ABC is an isosceles right triangle. P is a point outside the triangle such that $\angle BPC = 90°$. If the area of the quadrilateral $ABPC$ is 32, what is the length of AP?
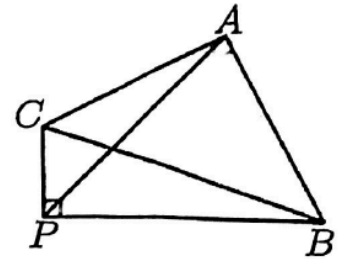
In a certain village, $\dfrac{2}{3}$ of the men married $\dfrac{3}{5}$ of the women. What fraction of the population in the village are married?

(Assume marriage of 1 male to 1 female, and no one is married to anyone living outside the village.)

Ben takes 6 days to renovate a room and James takes 15 days to renovate the same room. If James starts renovating the room first and leaves the rest of the renovation to be completed by Ben, they will take 9 days to complete renovating the room. At this rate, how many days will Ben take to complete the job?