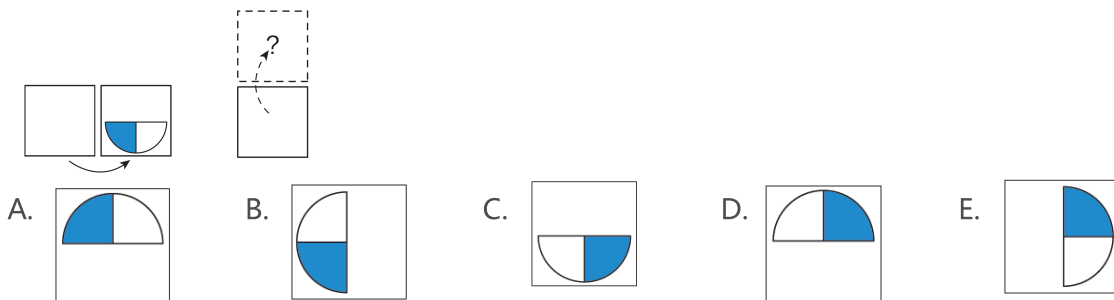


MK Level 3-4 Collection of Common Mistakes in 4 & 5 Point Questions

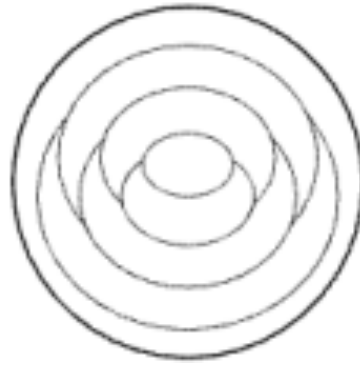
Past Competition Questions

4 points

- 1 Having turned a card over around its right side, we see what is drawn in the figure. What shall we see if we return this card over around its upper side?

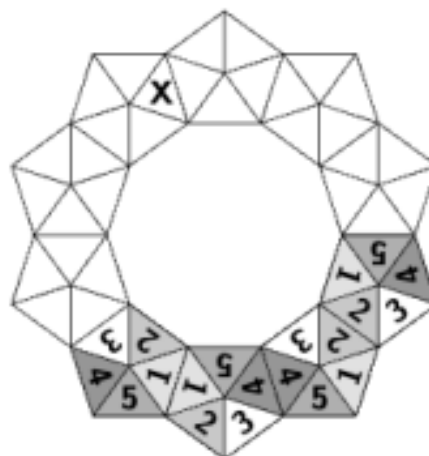


- 2 Cindy colors each region on the pattern red, blue, or yellow. She colors regions that touch each other with different colors. She colors the outer ring (region) of the pattern red. How many regions does Cindy color red? (MK 2020 Levels 3 and 4 Problem 9)



- A. 1 B. 2 C. 3 D. 4 E. 5

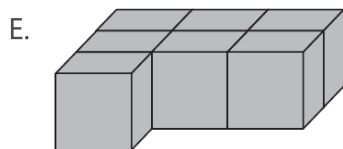
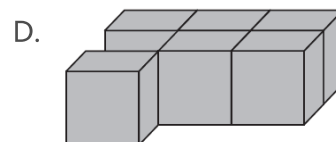
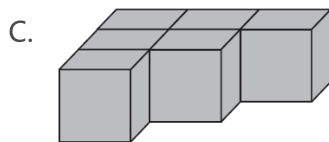
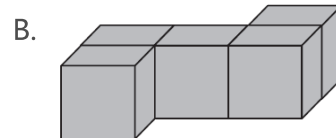
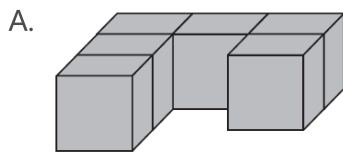
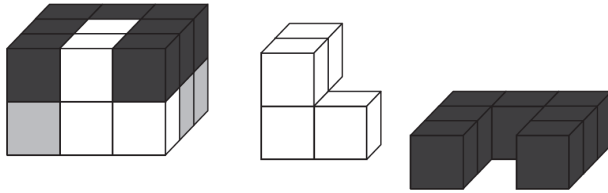
- 3 Amelie wants to build a crown using 10 copies of this token: . When two tokens share a side, the corresponding numbers match. Four tokens have already been placed. Which number goes in the triangle marked with an X? (MK 2020 Levels 3 and 4 Problem 15)



- A. 1 B. 2 C. 3 D. 4 E. 5

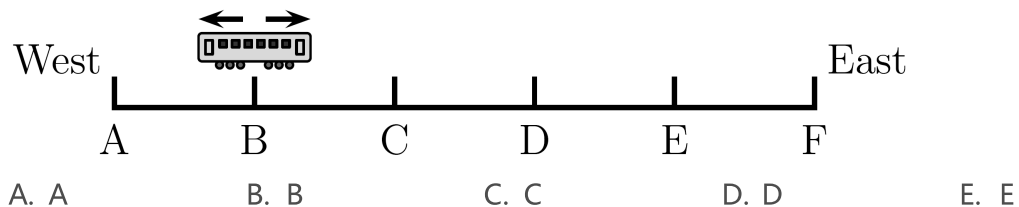
- 4 18 cubes are coloured white or grey or black and are arranged as shown. The figures on the right show the white and the black parts. Which of the following is the grey part?

(US 2021 Math kangaroo Problems, Level 3-4, Question #10)



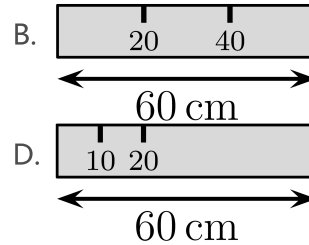
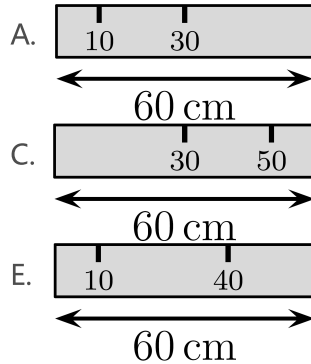
- 5 The Metro line has 6 stations, A, B, C, D, E, and F. The train stops at every station. When it reaches one of the two end stations, it changes its direction. The train driver started driving at station B and her first stop was station C. Which station will be her 96th stop?

(US 2023 Math Kangaroo Problem, Level 3-4, #14)

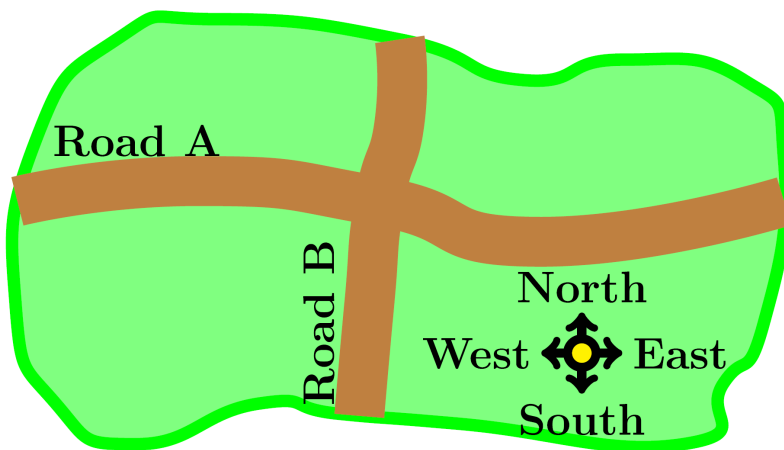


- 6 Ali has a 60 cm ruler. Unfortunately, some of the markings have faded away. He is able to measure any of the lengths 10, 20, 30, 40, 50 and 60 cm using his ruler only once.

Which is Ali's ruler?



- 7 There are 7 houses north of *Road A*, 8 houses east of *Road B* and 5 houses south of *Road A*. How many houses are west of *Road B*?

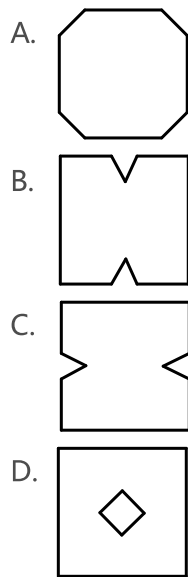
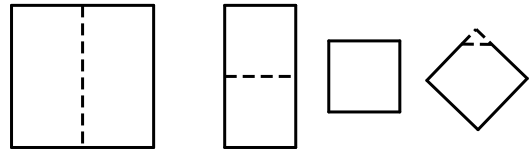


- A. 4 B. 5 C. 6 D. 7 E. 8

5 points

8 (US 2007 Math kangaroo Problems, Level 3 – 4, Question #24)

A square sheet of paper is folded twice so that a square is created again. In that square one of the corners is cut off (see the picture). Which of the pictures below does not represent this sheet of paper once it is unfolded? ()



E. Each of the pictures A, B, C, D can represent this unfolded sheet of paper

9 (US 2011 Math kangaroo Problems, Level 3 – 4, Question #21)

Olga has three cards, as shown in the picture. Using them, she can form different numbers, for example 989, 986, 866, and so on. How many different 3 digit numbers can she form using these three cards? ()



A. 4

B. 6

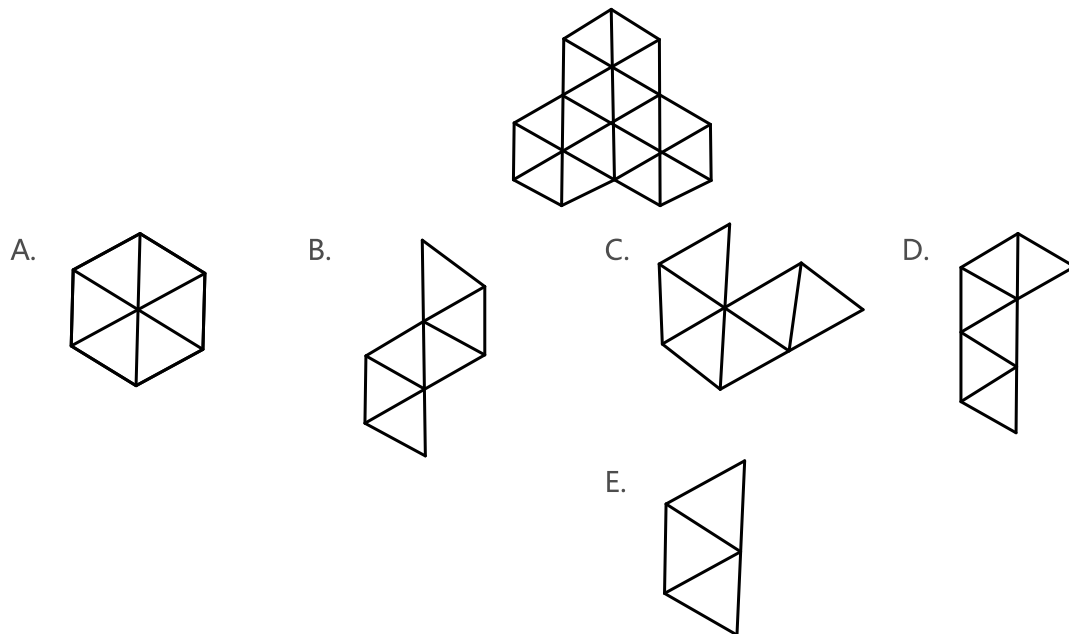
C. 8

D. 9

E. 12

10 (US 2011 Math kangaroo Problems, Level 3 – 4, Question #22)

Andrea formed the ornament shown in the picture by using several identical pieces. The pieces cannot overlap or cover each other. Which of the following pieces could not have been used by Andrea to create the ornament? ()



11 Basil has several domino tiles drawn in the figure. He wants to arrange them in a line according to the following "domino rule" : in any two neighbouring tiles, the neighbouring squares must have the same number of points. What is the largest number of tiles he can arrange in this way?

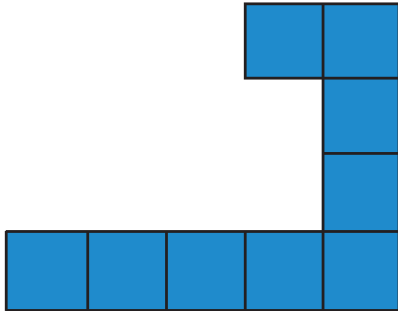
(US 2013 Math kangaroo Problems, Level 3-4, Question #18)



A. 3 B. 4 C. 5 D. 6 E. 7

- 12 Beatrice has a lot of pieces like the blue one in the picture. At least how many of these blue pieces do you need to make a blue square?

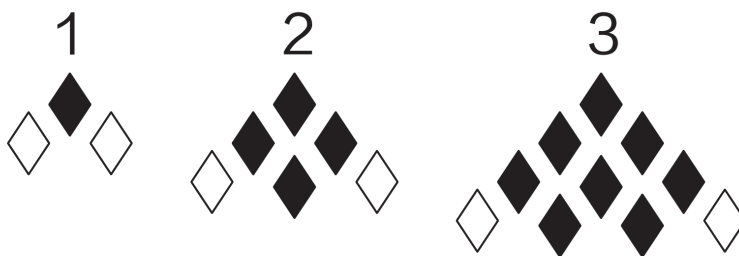
(US 2013 Math kangaroo Problems, Level 3-4, Question #20)



- A. 3 B. 4 C. 6 D. 8 E. 16

- 13 A sequence of triangles of diamonds is made. The first three stages are shown. In each stage a line of diamonds is added. In the bottom line the outer diamonds are white. All other diamonds in the triangle are black. How many black diamonds has the figure in stage 6?

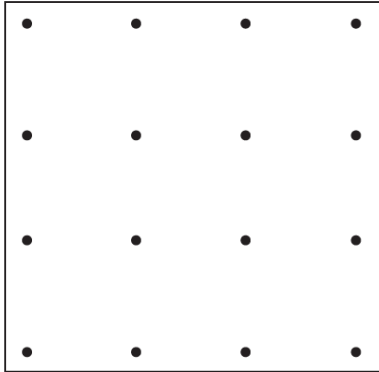
(US 2014 Math kangaroo Problems, Level 3-4, Question #17)



- A. 19 B. 21 C. 26 D. 28 E. 34

- 14 The figure shows a dotted sheet. Both horizontally and vertically the distance from one point to the next is equal. How many squares with different area is it possible to make, using four of these points?

(US 2015 Math kangaroo Problems, Level 3-4, Question #19)



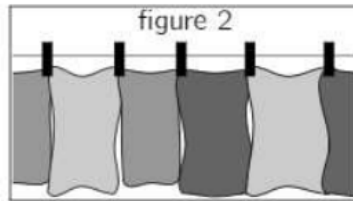
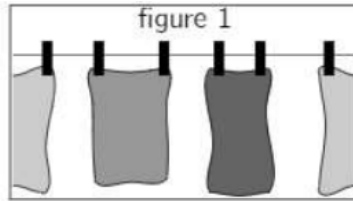
- A. 2 B. 3 C. 4 D. 5 E. 6

- 15 The pages of a book are numbered 1, 2, 3, 4, 5 and so on. The digit 5 appears exactly 16 times. What is the maximum number of pages this book could have?

(US 2019 Math kangaroo Problems, Level 3-4, Question #19)

- A. 49 B. 64 C. 66 D. 74 E. 80

- 16 Emil started to hang up towels using two pegs for each towel as shown in figure 1. He realized that he would not have enough pegs and began to hang up the towels as shown in figure 2. Altogether, he hung up 35 towels and used 58 pegs. How many towels did Emil hang up in the way shown in figure 1? (2019 Math Kangaroo Problem, Level 3-4, Question #24)

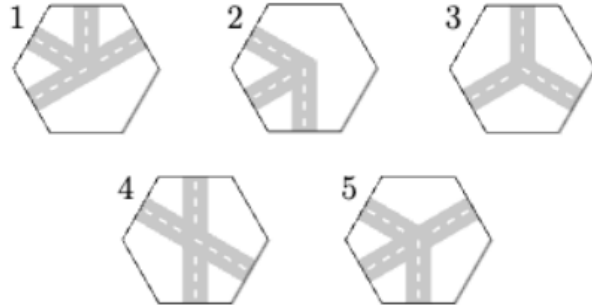
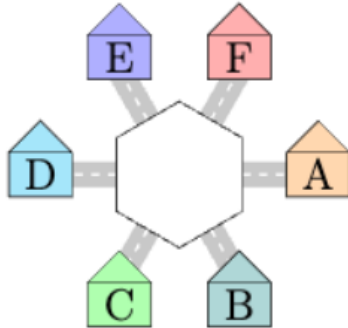


- A. 12 B. 13 C. 21 D. 22 E. 23

- 17 Ann replaces letters in the calculation **KAN+GA-ROO** with some of the numbers from 1 to 9 and then calculates the result. The same letters are replaced by the same numbers and different letters by different numbers. What is the largest possible result she can get? (MK 2020 Levels 3 and 4 Problem 24)

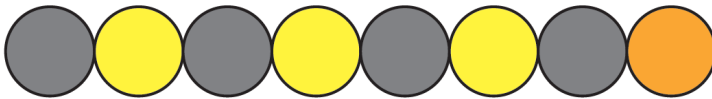
- A. 925 B. 933 C. 939 D. 942 E. 948

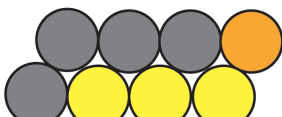
- 18 Alma wants to put one of the pieces shown in the middle of the picture so that a child in A is able to travel to B and to E, but not to D. She can rotate the pieces. Which two pieces could she use? (MK 2022 Grades 3 and 4 Problem 20)



- A. 1 and 2 B. 2 and 3 C. 1 and 4 D. 4 and 5 E. 1 and 5

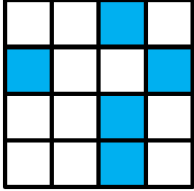
- 19 The small caterpillar shown in the picture curls up to sleep. What might that look like? (US 2022 Math kangaroo Problems, Level 3-4, Question #23)

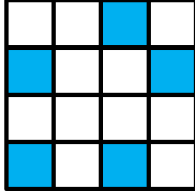


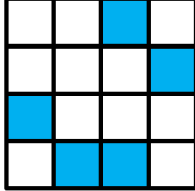
- A. 
- B. 
- C. 
- D. 
- E. 

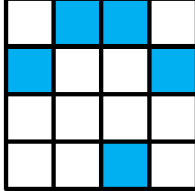
- 20 Maria has shaded exactly 5 cells in a 4×4 grid. She challenges 5 of her friends to guess which cells she has shaded. The grids they have drawn are shown below. Maria looks at them and says: "One of you is right and each of the rest of you has four cells correct,"
- Which is the correct answer?

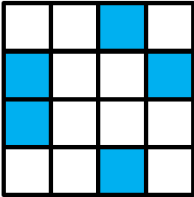
(US 2023 Math Kangaroo Problem, Level 3-4, #24)

A. 

B. 

C. 

D. 

E. 

- 21 Else has two machines. When she puts a square sheet of paper in machine R, it turns the paper 90° clockwise, as shown in the picture. When she puts the paper in machine S, it stamps the paper with a ♣.



In which order are the machines used to produce the result shown?



A. SRR

B. RSR

C. RSS

D. RRS

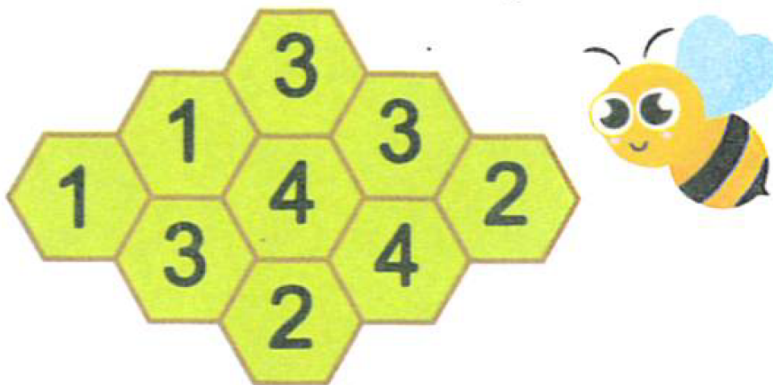
E. SRS

- 22 A student has 3 cards with numbers on them. Their sum is 782. Unfortunately, a worm ate part of each card. What is the sum of the 3 missing digits?



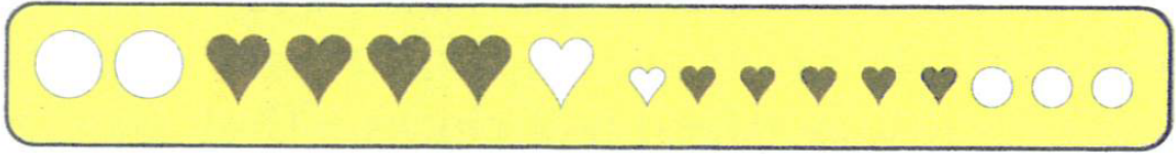
- A. 8 B. 9 C. 10 D. 11 E. 12

- 23 The figure below shows a honeycomb with 9 cells. There is honey in some cells. The number in each cell shows how many neighboring cells contain honey. Neighboring cells have a side in common. How many cells contain honey?



- A. 4 B. 5 C. 6 D. 7 E. 8

- 24 Three girls, one after another, take some cookies from the tray shown.



One of the girls takes all the heart-shaped cookies available on the tray. Another girl takes all the white cookies available on the tray. Another girl takes all the large cookies available on the tray. However, they do not necessarily take the cookies in this order.

One girl takes 3 cookies, one takes 6 cookies, and One takes 7 cookies. Which of the following sets of cookies does one of these girls take?

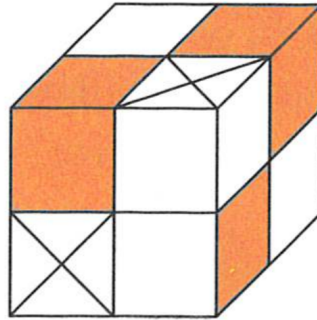
(US 2024 Math Kangaroo Problem, Level 3-4, #23)

- A. 
- B. 
- C. 
- D. 
- E. 

25 There are 2 types of blocks:



A small cube can be made using 4 white blocks or using 1 white and 1 red block. The large cube shown in the picture is made of small cubes. What is the smallest number of white blocks needed to make the large cube?



A. 8

B. 11

C. 13

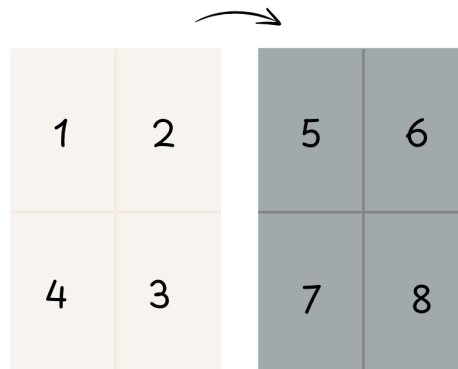
D. 14

E. 23

Mock Test Questions

4 points

- 26 Jason writes the numbers 1 to 4 on a sheet of paper. Then he flips the sheet and writes the numbers 5 to 8, as shown.



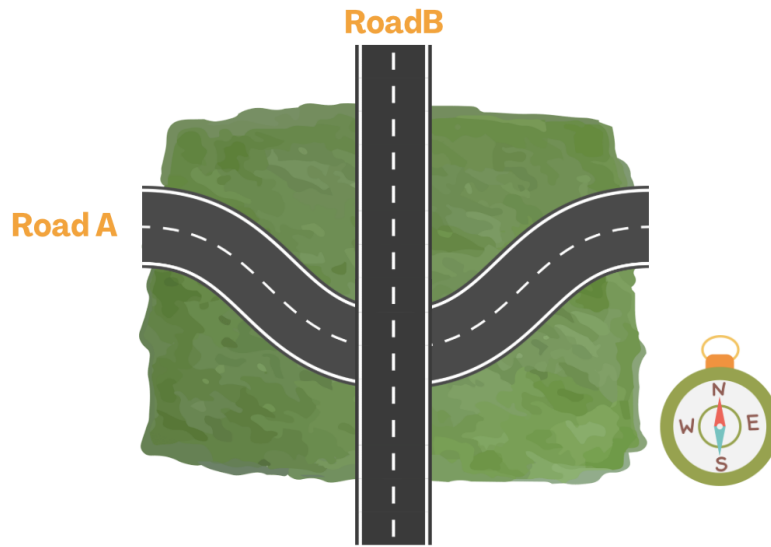
After that, he cuts the sheet into 4 rectangular cards and puts them in a row.



What is the sum of the numbers represented by the question marks?

- A. 3 B. 4 C. 5 D. 6 E. 7
- 27 Peter is reading a book with 311 pages. He remembers that the sum of the page numbers of the last two pages he finished reading the previous day is 141. If he plans to read 40 pages per day for the remaining pages, how many days will it take him to finish the book?
- A. 4 B. 5 C. 6 D. 7 E. 8

- 28 There are 7 houses north of Road *A*, 6 houses east of Road *B* and 8 houses south of Road *A*. How many houses are west of Road *B*?



- A. 6 B. 7 C. 8 D. 9 E. 10

- 29 A group of animals is standing in a line.

First, the zoo manager removes the third animal from the left.

Then, the zoo manager moves the sixth animal to the second spot from the left.

After that, the zoo manager removes the fourth animal from the left.

Finally, the zoo manager removes the third animal from the left.

What is the animal that is now in the fifth place?

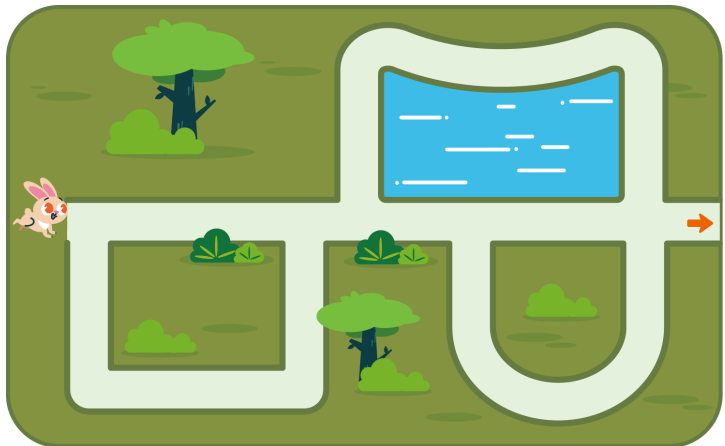


- A.  B.  C.  D.  E. 

30 Amy, Fiona, Jesse, Luca, and Frank are playing a counting game. Amy starts by saying **1**, then Fiona says **2**, Jesse follows with **3**, then Luca **4**, and Frank is the last. The person who reaches **8** or a multiple of **8** will stay silent. In this pattern, who will say **17**?

- A. Amy B. Fiona C. Jesse D. Luca E. Frank

31 The rabbit wants to escape from the maze. How many different paths can the rabbit take without passing through the same crossroad more than once?



- A. 2 B. 4 C. 5 D. 6 E. 7

5 points

32 In the following calculations, the same digits are hidden under the same figures.

Different digits are hidden under different figures.

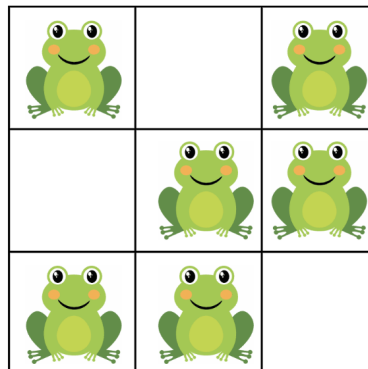
$$\begin{array}{c} \triangle + \triangle = \square \text{ } \bigcirc \\ \square \square + \square \square = \bigcirc \bigcirc \end{array}$$

What is the value of $\triangle \times \square \times \bigcirc$?

- A. 12 B. 15 C. 18 D. 28 E. 30

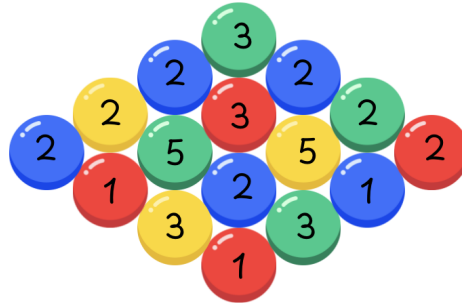
33 There are exactly 2 frogs in each row and each column. The frogs decide that 2 of them will jump to a neighboring empty cell at the same time. Neighboring cells have a side in common. Afterwards, there still will be exactly 2 frogs in each row and in each column.

In how many ways can the frogs do this?



- A. 1 B. 2 C. 3 D. 4 E. 5

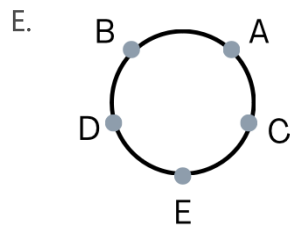
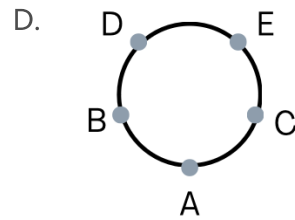
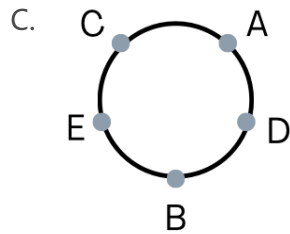
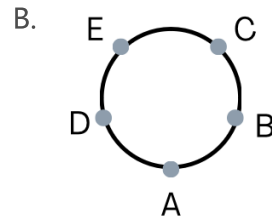
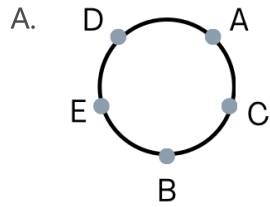
- 34 The figure below shows 16 balls and some of them has water in it. The number on each ball shows how many neighboring balls contain water. Neighboring balls are the six balls around the center ball. How many balls contain water?



- A. 6 B. 7 C. 8 D. 9 E. 10

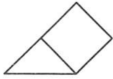
35 There are five friends: A, B, C, D, and E. They were playing outside in a circle. After playing, E said, "A was standing next to B, and either C or D was on B's left." D said, "B was standing to the left of C, and I (D) was next to C." But both E and D remembered it wrong.

Can you figure out how they were really standing? Which order is correct?



36

white

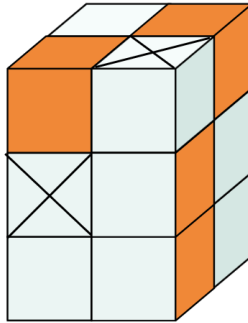


and orange



A small cube can be made using 4 white blocks or using 1 white and 1 orange block.

The large cube shown in the picture is made of small cubes. What is the smallest number of white blocks needed to make the large cube?



- A. 8 B. 12 C. 14 D. 18 E. 23

37

- 1 ten-dollar bill
3 five-dollar bills
15 one-dollar bills

He wants to buy a backpack that costs 16 dollars. How many different ways can Ethan pay exactly 16 dollars using these bills?

- A. 1 B. 2 C. 3 D. 4 E. 5

- 38 Write each of the numbers 0, 1, 2, 3, 4, 5, and 6 in the squares, each number can only use once to make the subtraction below correct. Which digit will be in the blue square?

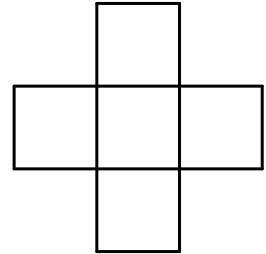
$$\begin{array}{r}
 \square \square \square \\
 - \quad \square \square \\
 \hline
 \square \square
 \end{array}$$

- A. 2 B. 3 C. 4 D. 5 E. 6

- 39 Levi and 51 classmates went to the park to go boating. They rented a total of 11 boats, with each large boat seating 6 people and each small boat seating 4 people. How many small boats did they rent?

- A. 4 B. 5 C. 6 D. 7 E. 8

- 40 The numbers 3, 4, 6, 7, and 8 are written in the squares of a cross (see the figure on the right) so that the sum of the numbers in the row is equal to the sum of the numbers in the column. Which number can be written in the center square of the cross?



- A. only 3 B. only 6 C. only 7 D. 6 or 7
E. 6 or 8

- 41 Tommy is investigating a murder case. Here are the statements made by each suspect:

A said, "C is the murderer, and I am not the murderer."

B said, "D is innocent."

C said, "I am not the murderer, and E is lying."

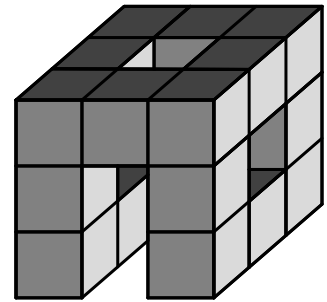
D said, "B is telling the truth."

E said, "A is innocent."

After further investigation, Tommy concluded that only one of them is lying, and only one of them is the murderer. So, who is the murderer?

- A. A B. B C. C D. D E. E

- 42 As shown in the figure, a cube with a given edge length of 3 has holes drilled through it in 3 directions, with the holes passing through the entire large cube. Afterward, the exposed outer surfaces of this three-dimensional shape are painted red. The shape is then cut into smaller cubes with a specified edge length. How many of these smaller cubes have exactly 4 face painted red? ?



- A. 10 B. 11 C. 12 D. 13 E. 14

- 43 Amelia and other 16 children are playing together. They need to be divided into groups of either 2 or 3. What is the minimum number of groups with 2 children?

- A. 2 B. 3 C. 4 D. 1 E. 5

- 44 Amanda, Lucy, and Jennie are participating in a competition as a team. They need to answer 3 questions in order. However, Amanda does not answer the first question, Lucy does not answer the second question, and Jennie does not answer the third question. How many different orders can they follow to answer the questions?

A. 2 B. 3 C. 4 D. 5 E. 6

- 45 Fill the $\bigcirc$ with the numbers 1 to 8. To keep the following six equations true, which number should be filled in $\triangle$?

$$\begin{array}{ccc}
 \bigcirc & + & \bigcirc = \bigcirc \\
 + & & + \\
 \bigcirc & + & \bigcirc = \bigcirc \\
 || & & || \\
 \bigcirc & + & \bigcirc = \triangle
 \end{array}$$

A. 8 B. 10 C. 12 D. 14 E. 16

46



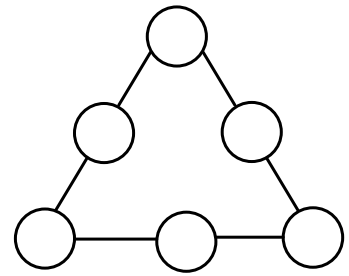
D

- E. It is not determined.

47

- ### E. MDCL

- 48 Fill the numbers 1 to 6 into the 6 circles in the figure below, so that the sum of the 3 numbers on each side of the triangle is equal. What is the largest sum?

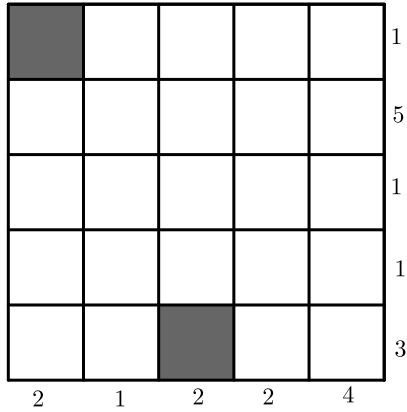


- A. 7 B. 9 C. 11 D. 12 E. 15

- 49 Four friends go to a pizzeria and order a total of 17 slices of pizza. Each friend eats at least 1 slice, and no two friends eat the same number of slices. Three of them ate 11 slices in total, and one of them ate exactly 3 slices. How many slices did the friend who ate the most eat?

- A. 4 B. 5 C. 6 D. 7 E. 8

- 50 Emma colors cells in the grid to make a snake. (2 cells are already colored.) Each number outside the grid shows how many cells in that row or column are colored. Which of the followings shows the way the third row is colored?



- A.

--	--	--	--	--
- C.

--	--	--	--	--
- E.

--	--	--	--	--

- B.

- D.

--	--	--	--	--

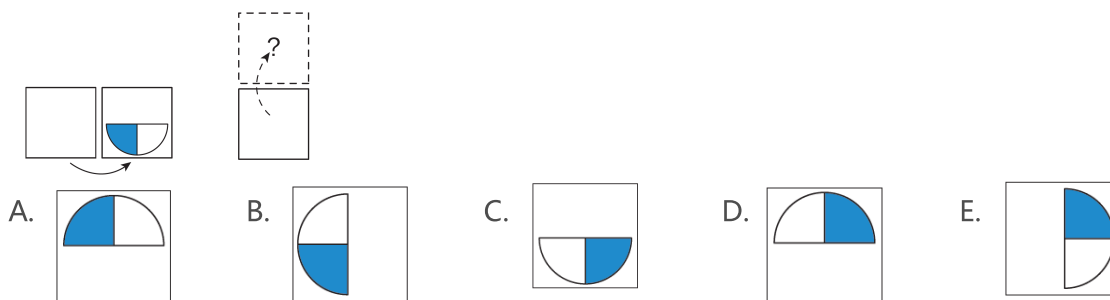
MK Level 3-4 Collection of Common Mistakes in 4 & 5 Point Questions

Past Competition Questions

4 points

- 1 Having turned a card over around its right side, we see what is drawn in the figure. What shall we see if we turn this card over around its upper side?

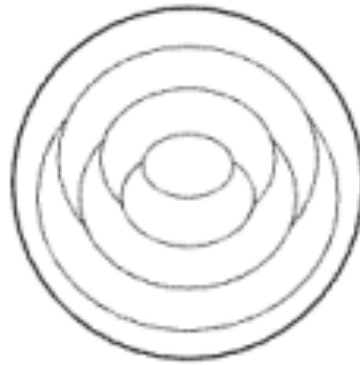
(US 2016 Math kangaroo Problems, Level 3-4, Question #14)



Answer D

Solution **【Resolution】** By turning the card over around its right side, we can deduce that the original figure should be a downward semicircle, with white section on the left and blue section on the right. Therefore, the figure obtained by turning the card over around its upper side should be a semicircle upward, with white section on the left and blue section on the right. The correct answer is D.

- 2 Cindy colors each region on the pattern red, blue, or yellow. She colors regions that touch each other with different colors. She colors the outer ring (region) of the pattern red. How many regions does Cindy color red? (MK 2020 Levels 3 and 4 Problem 9)



- A. 1 B. 2 C. 3 D. 4 E. 5

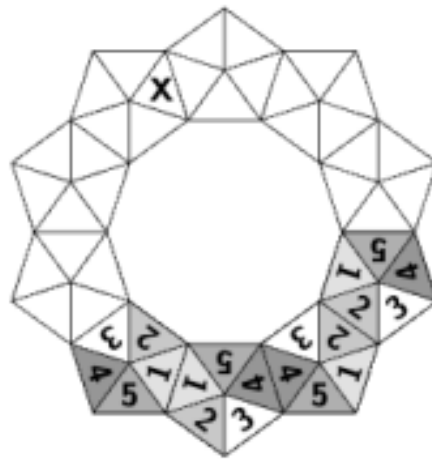
Answer C

Solution Since the outer region is red, the following two going towards the center are blue and yellow. The next would have to be red again, followed by blue and yellow. The center piece would be red again. This gives us three pieces colored red, and no areas of red touch. Notice that blue and yellow are interchangeable colors.



3

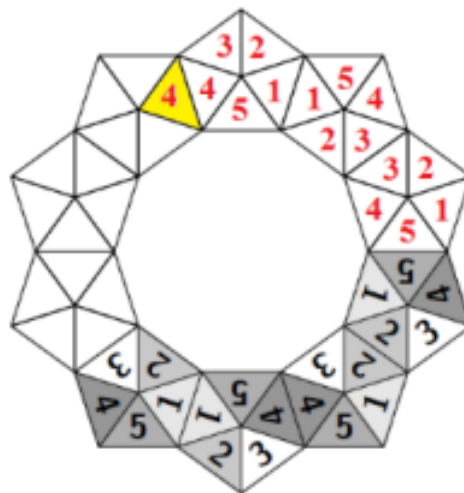
Amelie wants to build a crown using 10 copies of this token: . When two tokens share a side, the corresponding numbers match. Four tokens have already been placed. Which number goes in the triangle marked with an **X**? (MK 2020 Levels 3 and 4 Problem 15)



- A. 1 B. 2 C. 3 D. 4 E. 5

Answer D

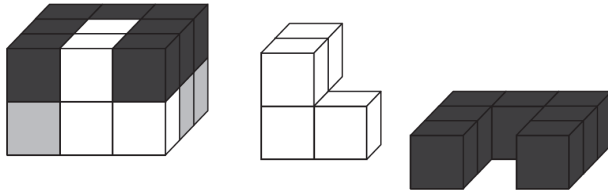
Solution Notice that the token is divided into five equal triangles. The numbers on the token are written in the counterclockwise ways, from 1 to 5. Following the pattern that the parts of the token touching have the same number and the numbers on each token's triangle are written in the counterclockwise manner we would receive the following pattern:



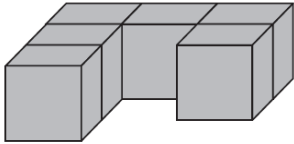
Number 4 would go on the triangle marked with an X, here, highlighted in yellow.

- 4 18 cubes are coloured white or grey or black and are arranged as shown. The figures on the right show the white and the black parts. Which of the following is the grey part?

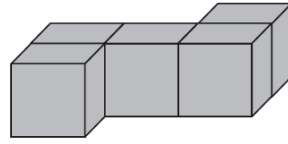
(US 2021 Math kangaroo Problems, Level 3-4, Question #10)



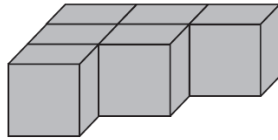
A.



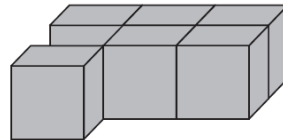
B.



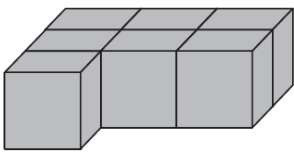
C.



D.

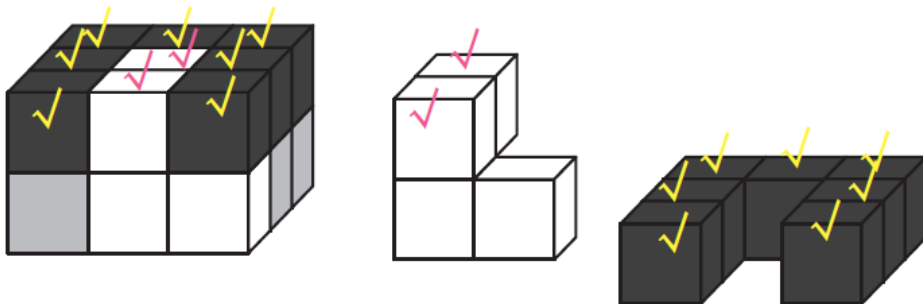


E.



Answer E

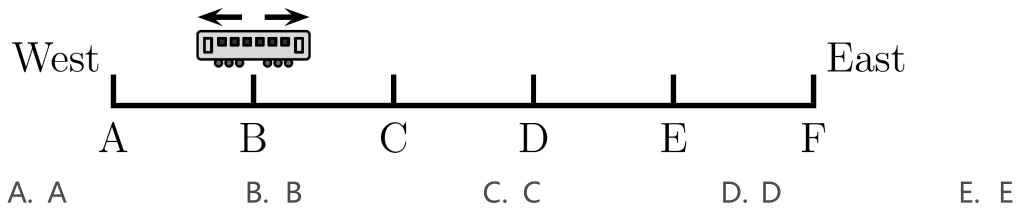
Solution



【Resolution】 The upper layer consists of 2 white pieces and 7 black pieces, which can be put together by the existing black and white pieces. The lower layer is only 2 white pieces currently, which should be in the lower right corner, so other 7 pieces should be grey except for the 2 white pieces in the lower right corner. The correct answer is E.

5

The Metro line has 6 stations, A, B, C, D, E, and F. The train stops at every station. When it reaches one of the two end stations, it changes its direction. The train driver started driving at station B and her first stop was station C. Which station will be her 96th stop?
(US 2023 Math Kangaroo Problem, Level 3-4, #14)



Answer D

Solution The subway passes through the stations in the following order:

1 2 3 4 5 6 7 8 9 10
C、D、E、F、E、D、C、B、A、B、C、D、E、F……

After observation, it is found that these stations have a periodic phenomenon. Every 10 stations is a cycle. $96 \div 10 = 9$ (groups) ... 6 (stations). So the 96th station is D station. The correct answer is D.

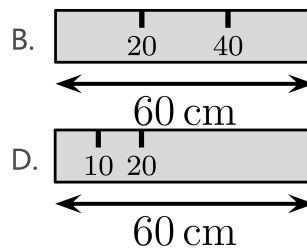
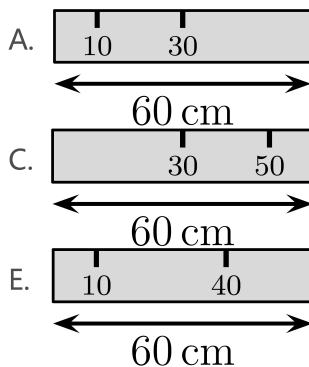
地铁依次经过的站点为：

1 2 3 4 5 6 7 8 9 10
C、D、E、F、E、D、C、B、A、B、C、D、E、F……

经过观察发现，这些站点呈周期现象，每10个站点为一个周期。 $96 \div 10 = 9$ （组）……6（站），所以第96站为D站，正确答案为D。

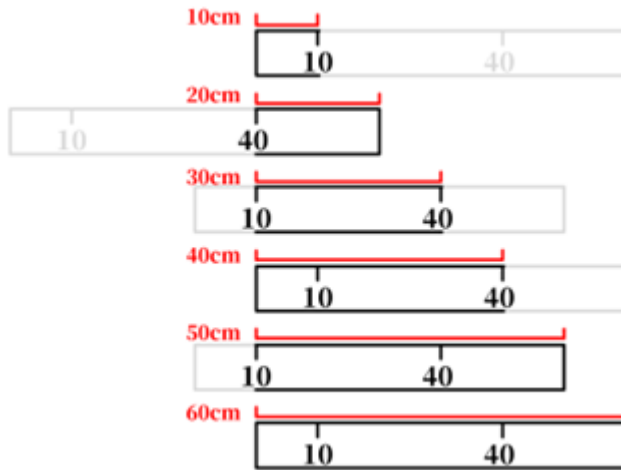
- 6 Ali has a 60 cm ruler. Unfortunately, some of the markings have faded away. He is able to measure any of the lengths 10, 20, 30, 40, 50 and 60 cm using his ruler only once.

Which is Ali's ruler?



Answer E

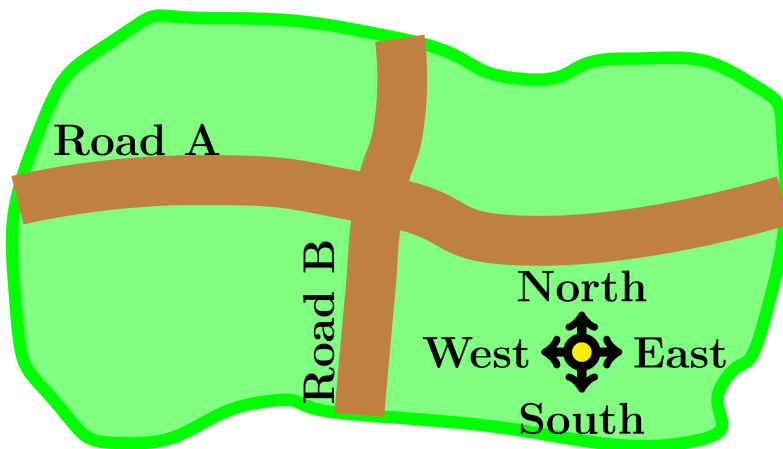
Solution



The ruler in option E can measure any length of 10, 20, 30, 40, 50 and 60 cm, as shown in the figure. The correct answer is E.

选项E中的尺子可以测出10、20、30、40、50和60cm中的任意长度，如图所示。正确答案为E。

- 7 There are 7 houses north of *Road A*, 8 houses east of *Road B* and 5 houses south of *Road A*. How many houses are west of *Road B*?



- A. 4 B. 5 C. 6 D. 7 E. 8

Answer A

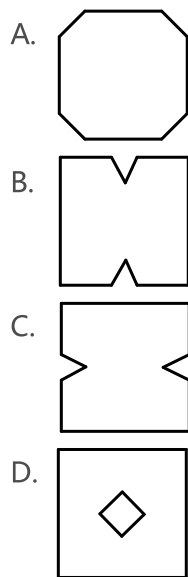
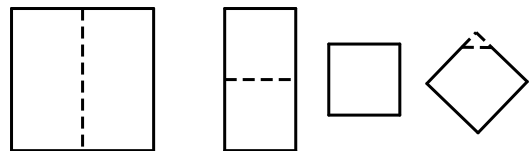
Solution According to the question, Road A's south and north sides include all the houses, and Road B's east and west sides also include all the houses. All the houses have $7 + 5 = 12$ (buildings), so the houses on the west side of Road B have $12 - 8 = 4$ (buildings). The correct answer is A.

根据题意，路A的南、北面包括了所有的房屋，路B的东、西面也包括了所有的房屋。所有的房屋有 $7 + 5 = 12$ （栋），所以路B西面的房屋有 $12 - 8 = 4$ （栋）。正确答案为A。

5 points

8 (US 2007 Math kangaroo Problems, Level 3 – 4, Question #24)

A square sheet of paper is folded twice so that a square is created again. In that square one of the corners is cut off (see the picture). Which of the pictures below does not represent this sheet of paper once it is unfolded? ()



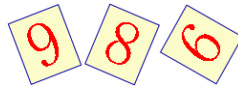
E. Each of the pictures A, B, C, D can represent this unfolded sheet of paper

Answer E

Solution N/A.

9 (US 2011 Math kangaroo Problems, Level 3 – 4, Question #21)

Olga has three cards, as shown in the picture. Using them, she can form different numbers, for example **989**, **986**, **866**, and so on. How many different **3** digit numbers can she form using these three cards? ()



A. 4

B. 6

C. 8

D. 9

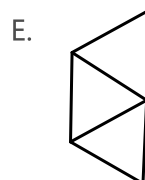
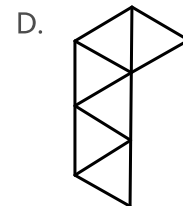
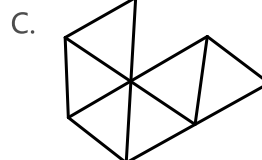
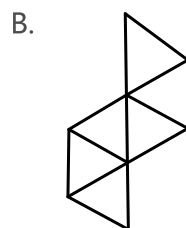
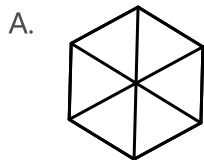
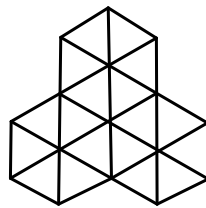
E. 12

Answer E

Solution N/A .

10 (US 2011 Math kangaroo Problems, Level 3 – 4, Question #22)

Andrea formed the ornament shown in the picture by using several identical pieces. The pieces cannot overlap or cover each other. Which of the following pieces could not have been used by Andrea to create the ornament? ()

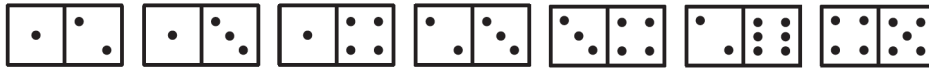


Answer D

Solution N/A .

- 11 Basil has several domino tiles drawn in the figure. He wants to arrange them in a line according to the following "domino rule" : in any two neighbouring tiles, the neighbouring squares must have the same number of points. What is the largest number of tiles he can arrange in this way?

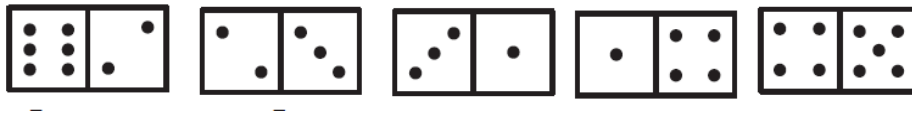
(US 2013 Math kangaroo Problems, Level 3-4, Question #18)



- A. 3 B. 4 C. 5 D. 6 E. 7

Answer C

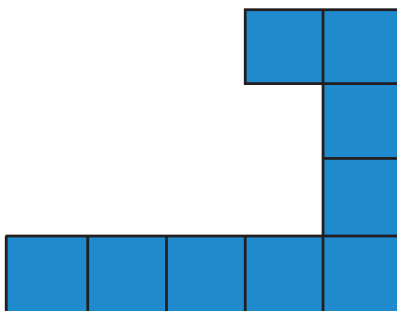
Solution



【Resolution】 The dominoes are arranged according to the question. Up to 5 dominoes are used in the solutions that meet the requirements of the question. One of them is shown in the figure. The correct answer is C.

- 12 Beatrice has a lot of pieces like the blue one in the picture. At least how many of these blue pieces do you need to make a blue square?

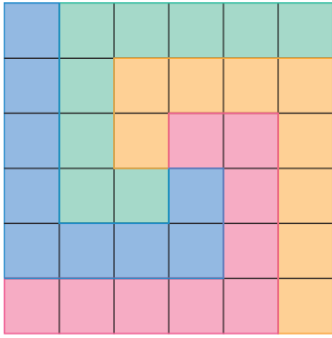
(US 2013 Math kangaroo Problems, Level 3-4, Question #20)



- A. 3 B. 4 C. 6 D. 8 E. 16

Answer B

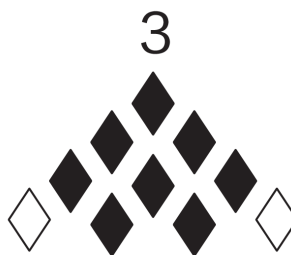
Solution



【Resolution】 A piece of paper has 9 pieces. If you want to form a square, the total number of pieces must be a square number. We find that $9 \times 4 = 36$ meets the requirement, so we try 4 pieces first and find that we can construct them. The correct answer is B.

- 13 A sequence of triangles of diamonds is made. The first three stages are shown. In each stage a line of diamonds is added. In the bottom line the outer diamonds are white. All other diamonds in the triangle are black. How many black diamonds has the figure in stage 6?

(US 2014 Math kangaroo Problems, Level 3-4, Question #17)



A. 19

B. 21

C. 26

D. 28

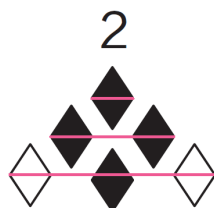
E. 34

Answer C

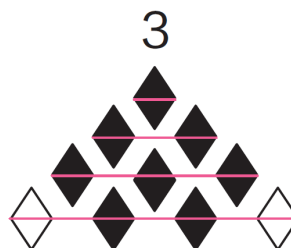
Solution



$$1+2$$



$$1+2+3$$

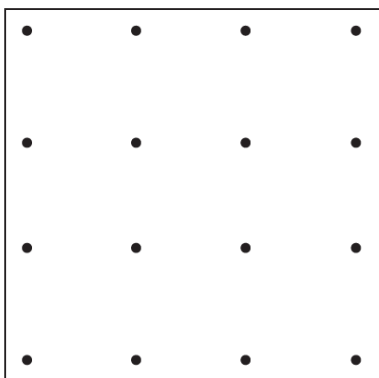


$$1+2+3+4$$

【Resolution】 Figure 1 has $1+2$ diamonds, Figure 2 has $1+2+3$ diamonds, Figure 3 has $1+2+3+4$ diamonds $\cdots$ So Figure 6 should have $1+2+3+4+5+6+7=28$ diamonds, two of which are white, 26 of which are black, so the correct answer is C.

- 14 The figure shows a dotted sheet. Both horizontally and vertically the distance from one point to the next is equal. How many squares with different area is it possible to make, using four of these points?

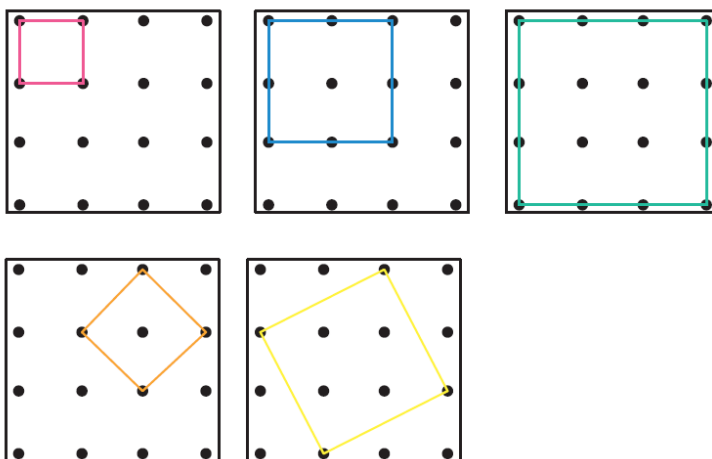
(US 2015 Math kangaroo Problems, Level 3-4, Question #19)



- A. 2 B. 3 C. 4 D. 5 E. 6

Answer D

Solution



【Resolution】 As shown in the figure, there are 5 squares with different areas in total. So the correct answer is D.

- 15 The pages of a book are numbered 1, 2, 3, 4, 5 and so on. The digit 5 appears exactly 16 times. What is the maximum number of pages this book could have?

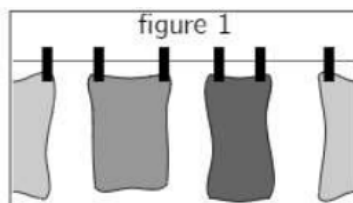
(US 2019 Math kangaroo Problems, Level 3-4, Question #19)

A. 49 B. 64 C. 66 D. 74 E. 80

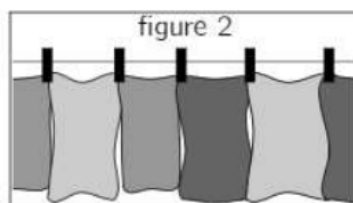
Answer B

Solution 【Resolution】 This is a page number problem. Enumerate the number of pages with the number "5" in turn: 5, 15, 25, 35, 45, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 65, 75... The 16th number "5" is on page 59 and the 17th number "5" is on page 65, so the maximum number of pages in the book is 64. (Attention: there are two "5" on page 55.) The correct answer is B.

- 16 Emil started to hang up towels using two pegs for each towel as shown in figure 1. He realized that he would not have enough pegs and began to hang up the towels as shown in figure 2. Altogether, he hung up 35 towels and used 58 pegs. How many towels did Emil hang up in the way shown in figure 1? (2019 Math Kangaroo Problem,



Level 3-4, Question #24)



A. 12 B. 13 C. 21 D. 22 E. 23

Answer D

Solution Hanging the towels as in figure 1, the numbers of pegs used will be twice the number of towels. Hanging the towels as in figure 2, the number of pegs will be by 1

more than the number of towels.

Analyzing the five answers the following can be observed:

(A) **12** is not the correct answer. It is because **12** towels would be hung as in figure 1, which would use **24** pegs. $35 - 12 = 23$ towels would be hang as in figure 2, which would use **24** pegs. $24 + 23 = 47$ and not the desired **58** pegs.

(B) **13** is not the correct answer. It is because **13** towels would be hung as in figure 1, which would use **26** pegs. $35 - 13 = 22$ towels would be hang as in figure 2, which would use **23** pegs. $26 + 23 = 49$ and not the desired **58** pegs.

(C) **21** is not the correct answer. It is because **21** towels would be hung as in figure 1, which would use **42** pegs. $35 - 21 = 14$ towels would be hang as in figure 2, which would use **15** pegs. $42 + 15 = 57$ and not the desired **58** pegs.

(D) **22** is the correct answer. It is because **22** towels would be hung as in figure 1, which would use **44** pegs. $35 - 22 = 13$ towels would be hang as in figure 2, which would use **14** pegs. $44 + 14 = 58$ pegs, which is the desired number of pegs.

(E) **23** is not the correct answer. It is because **23** towels would be hung as in figure 1, which would use **46** pegs. $35 - 23 = 22$ towels would be hang as in figure 2, which would use **23** pegs. $46 + 23 = 69$ and not the desired **58** pegs.

17 Ann replaces letters in the calculation **KAN+GA-ROO** with some of the numbers from 1 to 9 and then calculates the result. The same letters are replaced by the same numbers and different letters by different numbers. What is the largest possible result she can get? (MK 2020 Levels 3 and 4 Problem 24)

A. 925

B. 933

C. 939

D. 942

E. 948

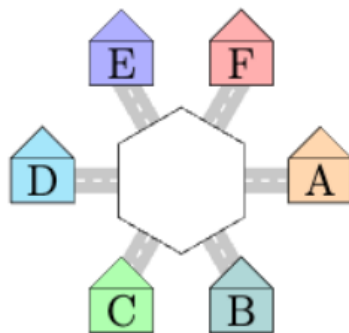
Answer D

Solution In order to achieve the largest possible result the number **ROO** that is subtracted should be as small as possible, which makes **ROO = 122**. From the numbers **KAN** and **GA** added, the only hundreds digit is **K** so it should be the largest possible, which

results in $K = 9$. The next largest numbers are the tens digits A and G so they should be either $A = 8$ and $G = 7$ or the other way round $A = 7$ and $G = 8$. It can be decided later which one is the correct one. Next, there are two ones digits left to assign a number to: N and A . The second one is A for which at this stage there are two choices. For N the largest available number left should be assigned, which results in $N = 6$. Using these conclusions we have two options: a) $KAN + GA = 986 + 78 = 1064$ and b) $KAN + GA = 976 + 87 = 1063$. The first number is better because is larger. The final possible result that Ann can get is expressed with

$$KAN + GA - ROO = 986 + 78 - 122 = 942.$$

- 18 Alma wants to put one of the pieces shown in the middle of the picture so that a child in A is able to travel to B and to E , but not to D . She can rotate the pieces. Which two pieces could she use? (MK 2022 Grades 3 and 4 Problem 20)



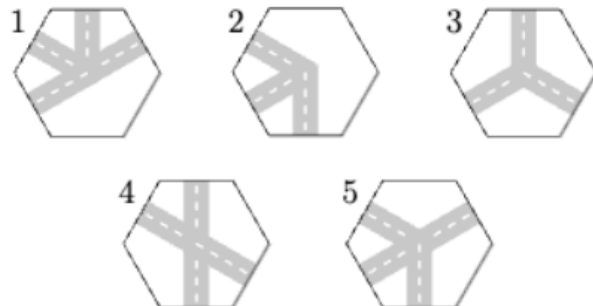
A. 1 and 2

B. 2 and 3

C. 1 and 4

D. 4 and 5

E. 1 and 5



Answer E

Solution Since E and B are across from each other, the pieces need to have a straight road so these two houses are connected to the middle. A is counterclockwise from B , so there also needs to be a road just counterclockwise from the straight segment. However, that road cannot continue straight, because D cannot be connected. The tile below shows in black the roads that need to be there, and in red the one that cannot. Any other road segments on the tile don't matter.

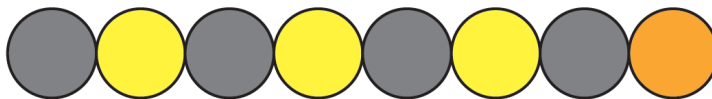


The pictures below show the pieces rotated so that one of the paths starts at **A**. Only pieces **1** and **5** have the required roads to **B** and **E** without having a road to **D**.



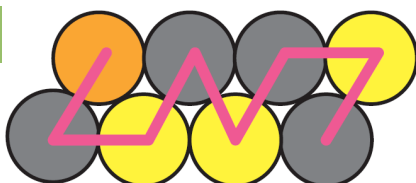
19 The small caterpillar shown in the picture curls up to sleep. What might that look like?

(US 2022 Math kangaroo Problems, Level 3-4, Question #23)



Answer **A**

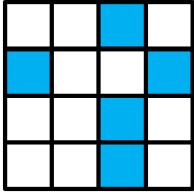
Solution

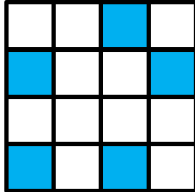


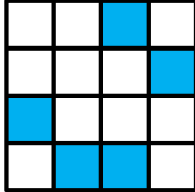
【Resolution】 Start from the orange one, in either direction, the sequence must be orange-black-yellow-black-yellow... Only Option A meets the requirement. So the correct answer is A.

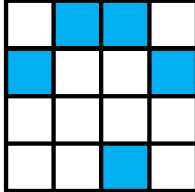
- 20 Maria has shaded exactly 5 cells in a 4×4 grid. She challenges 5 of her friends to guess which cells she has shaded. The grids they have drawn are shown below. Maria looks at them and says: "One of you is right and each of the rest of you has four cells correct," Which is the correct answer?

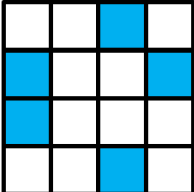
(US 2023 Math Kangaroo Problem, Level 3-4, #24)

A. 

B. 

C. 

D. 

E. 

Answer E

Solution If Grid A is all correct, Grid C only has 3 shaded cells correct, which is inconsistent with the problem statement.

If Grid B is all correct, Grid C only has 3 shaded cells correct, which is inconsistent with the problem statement.

If Grid C is all correct, Grid A only has 3 shaded cells correct, which is inconsistent with the problem statement.

If Grid D is all correct, Grid C only has 3 shaded cells correct, which is inconsistent with the problem statement.

If Grid E is all correct, Grids A, B, C and D all have 4 shaded cells correct, which is consistent with the problem statement.

The correct answer is E.

如果网格A全对，网格C只对了3个阴影单元格，与题意不符；

如果网格B全对，网格C只对了3个阴影单元格，与题意不符；

如果网格C全对，网格A只对了3个阴影单元格，与题意不符；

如果网格D全对，网格C只对了3个阴影单元格，与题意不符；

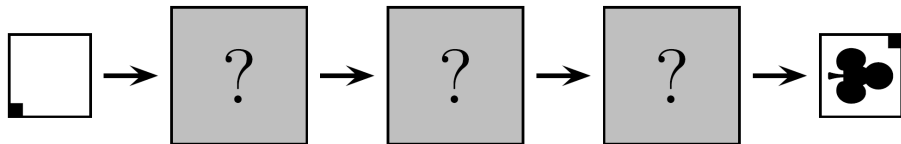
如果网格**E**全对，网格**A**、**B**、**C**、**D**都对了4个阴影单元格，符合题意。

正确答案为**E**。

- 21 Else has two machines. When she puts a square sheet of paper in machine R, it turns the paper 90° clockwise, as shown in the picture. When she puts the paper in machine S, it stamps the paper with a ♣.



In which order are the machines used to produce the result shown?



A. SRR

B. RSR

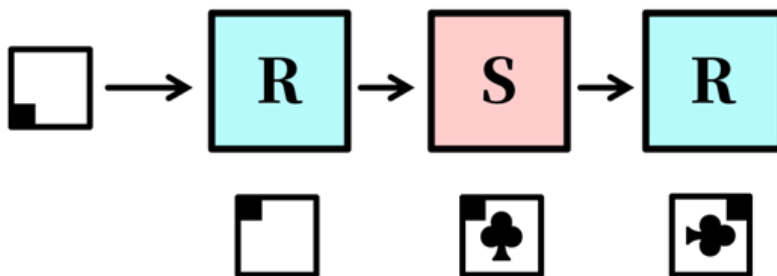
C. RSS

D. RRS

E. SRS

Answer B

Solution



First observe the square sheet of paper. From start to finish, it rotated clockwise 2 times by 90 degrees, meaning the square sheet of paper went through Machine R twice. Then observe the final shape of the paper. It has a “♣” pattern but is rotated clockwise by 90 degrees. We can infer that the second machine is Machine S. So the order of the machines is R, S, R, as shown in the figure. The correct answer is B.

先观察方形纸片，从开始到结束，顺时针旋转了2次90度，即方形纸片经过了两次机器**R**。再观察最后的形纸片，有“♣”图案，但是被顺时针旋转了90度，可以推出第2台机器为机器**S**。所以机器的顺序是**R**、**S**、**R**，如图所示。正确答案为**B**。

- 22 A student has 3 cards with numbers on them. Their sum is 782. Unfortunately, a worm ate part of each card. What is the sum of the 3 missing digits?



- A. 8 B. 9 C. 10 D. 11 E. 12

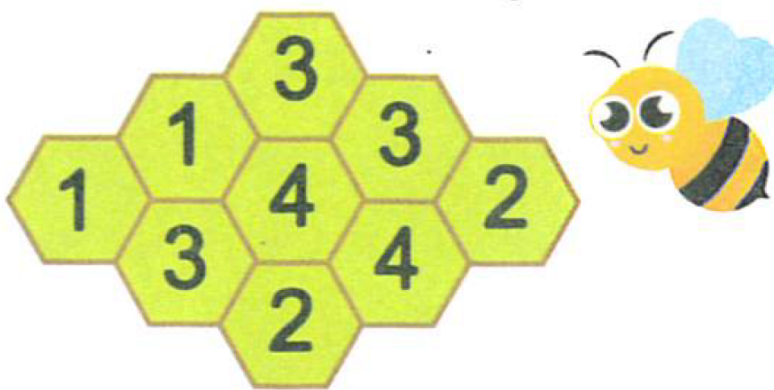
Answer D

Solution As shown in the figure, the sum of these three missing numbers is $6 + 5 = 11$, so the answer is D.

如图所示，所以这3个丢失的数字的和为 $6 + 5 = 11$ ，答案为D。

$$\begin{array}{r}
 2 \square 3 \\
 1 \square 4 \\
 + 4 1 \square \\
 \hline
 7 8 2
 \end{array}
 \rightarrow
 \begin{array}{r}
 2 \overset{1}{\square} 3 \\
 1 \overset{1}{\square} 4 \\
 + 4 1 \square \\
 \hline
 7 8 2
 \end{array}$$

- 23 The figure below shows a honeycomb with 9 cells. There is honey in some cells. The number in each cell shows how many neighboring cells contain honey. Neighboring cells have a side in common. How many cells contain honey?



- A. 4 B. 5 C. 6 D. 7 E. 8

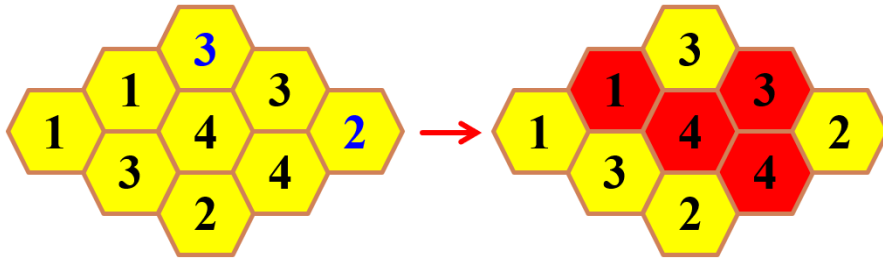
Answer C

Solution

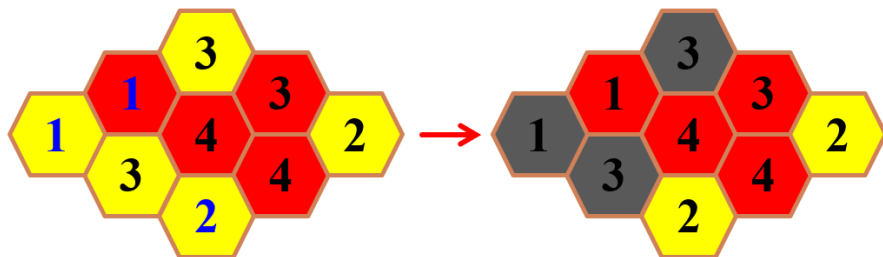
As shown in the figure, the numbers marked in blue are clues for each step of reasoning; the cells marked in red are confirmed to have honey; the cells marked in gray are confirmed to have no honey. The final inference is that 6 cells have honey. The answer is C.

如图所示，标记为蓝色的数字为每一步推理的线索；标记为红色的`cells`为确认有蜂蜜的`cells`；标记为灰色的`cells`为确认没有蜂蜜的`cells`。最终推理为6个`cells`有蜂蜜，答案为C。

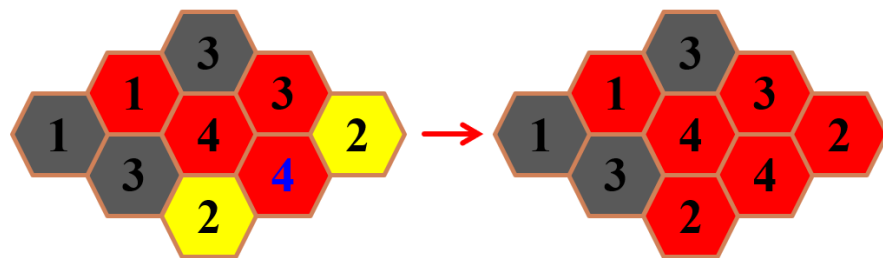
Step1:



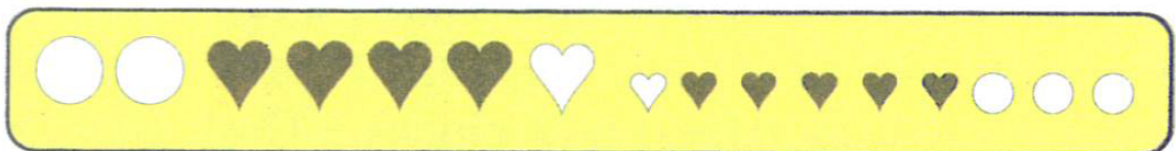
Step2:



Step3:



24 Three girls, one after another, take some cookies from the tray shown.



One of the girls takes all the heart-shaped cookies available on the tray. Another girl takes all the white cookies available on the tray. Another girl takes all the large cookies available on the tray. However, they do not necessarily take the cookies in this order.

One girl takes 3 cookies, one takes 6 cookies, and One takes 7 cookies. Which of the following sets of cookies does one of these girls take?

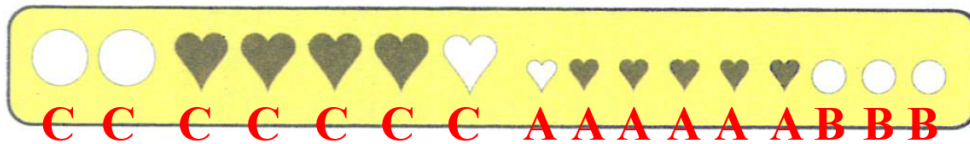
(US 2024 Math Kangaroo Problem, Level 3-4, #23)

- A. 
- B. 
- C. 
- D. 
- E. 

Answer E

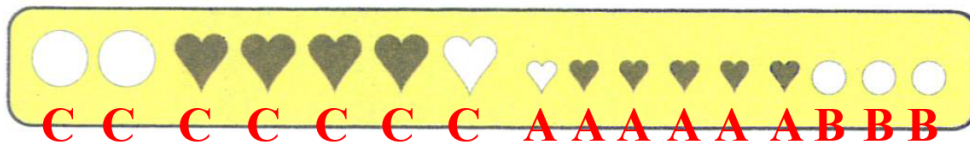
Solution Mark the girl who took the heart-shaped cookies as A, the girl who took the white cookies as B, and the girl who took the large cookies as C. Through trial and error, combined with the number of cookies they each got, which are 3, 6, and 7 respectively, we first find out the order in which they took the cookies, which should be: C-A-B.

As shown in the figure below.



The answer is E.

把拿走 *heart - shaped* cookies 的女孩标记为 *A*，拿走 *white* cookies 的女孩标记为 *B*，拿走 *large* cookies 的女孩标记为 *C*。通过尝试，结合她们拿到的 *cookies* 的数量分别为 3，6，7 个，先找出她们拿 *cookies* 的顺序，应该为：C-A-B。如图所示。

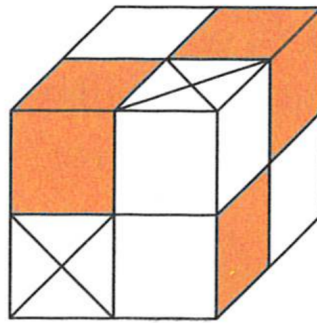


答案为 E。

There are 2 types of blocks:



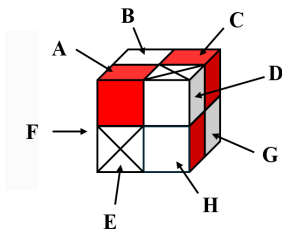
A small cube can be made using 4 white blocks or using 1 white and 1 red block. The large cube shown in the picture is made of small cubes. What is the smallest number of white blocks needed to make the large cube?



- A. 8 B. 11 C. 13 D. 14 E. 23

Answer D

Solution We divide the large cube into 8 small cubes for analysis one by one, and mark them as A, B, C, D, E, F, G, H. As shown in the figure:



Cube A has at least 1 white block.

Cube B has at least 1 white block.

Cube C has at least 1 white block.

Cube D has 4 white blocks.

Cube E has 4 white blocks.

Cube F has at least 1 white block.

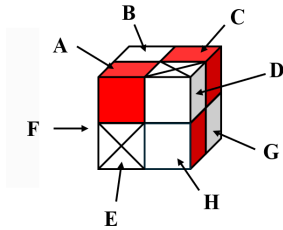
Cube G has at least 1 white block.

Cube H has at least 1 white block.

In total, there are at least $1+1+1+4+4+1+1+1=14$ white blocks.

The answer is D.

我们将 *large* cube 分成 8 个 *small* cube 逐一分析，并标记它们为 *A*, *B*, *C*, *D*, *E*, *F*, *G*, *H*。如图所示：



Cube A 至少有 1 个 *white* block.

Cube B 至少有 1 个 *white* block.

Cube C 至少有 1 个 *white* block.

Cube D 有 4 个 *white* block.

Cube E 有 4 个 *white* block.

Cube F 至少有 1 个 *white* block.

Cube G 至少有 1 个 *white* block.

Cube H 至少有 1 个 *white* block.

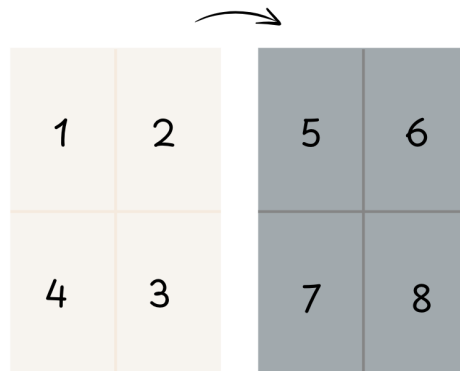
总共至少有 $1 + 1 + 1 + 4 + 4 + 1 + 1 + 1 = 14$ 个 *white* blocks .

答案为 *D* .

Mock Test Questions

4 points

- 26 Jason writes the numbers 1 to 4 on a sheet of paper. Then he flips the sheet and writes the numbers 5 to 8, as shown.



After that, he cuts the sheet into 4 rectangular cards and puts them in a row.

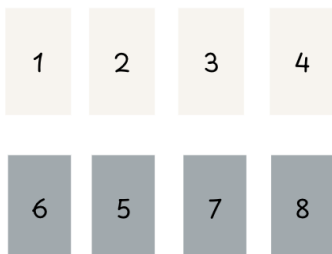


What is the sum of the numbers represented by the question marks?

- A. 3 B. 4 C. 5 D. 6 E. 7

Answer D

Solution The corresponding numbers of front and back page are show in the picture.



So the four rectangle cards in a row are



The sum of two quetsion mark is $2 + 4 = 6$.

- 27 Peter is reading a book with 311 pages. He remembers that the sum of the page numbers of the last two pages he finished reading the previous day is 141. If he plans to

read 40 pages per day for the remaining pages, how many days will it take him to finish the book?

- A. 4 B. 5 C. 6 D. 7 E. 8

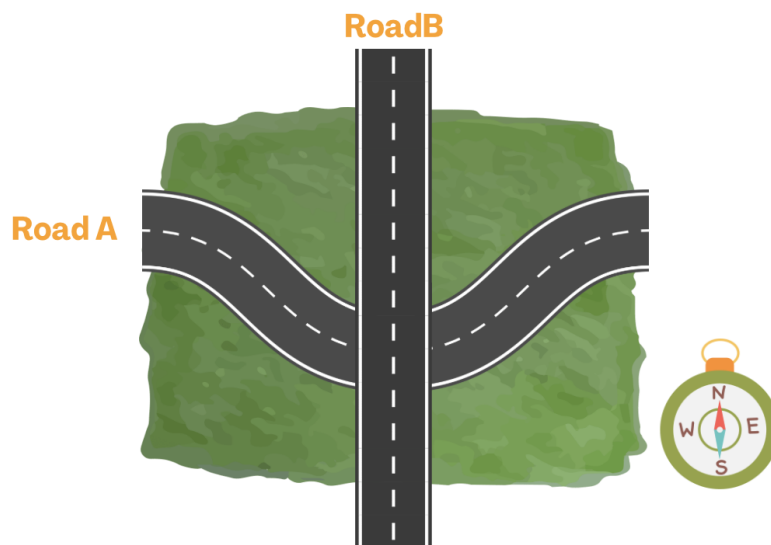
Answer C

Solution $(141 - 1) \div 2 = 70$ (pages), so Peter finished reading up to page 71.

$$(311 - 71) \div 40 = 6 \text{ (days)}.$$

Therefore, it will take him 6 more days to finish the book.

- 28 There are 7 houses north of Road *A*, 6 houses east of Road *B* and 8 houses south of Road *A*. How many houses are west of Road *B*?



- A. 6 B. 7 C. 8 D. 9 E. 10

Answer D

Solution According to the question, Road *A*'s south and north sides include all the houses, and Road *B*'s east and west sides also include all the houses. All the houses have $7 + 8 = 15$ (buildings), so the houses on the west side of Road *B* have 15-

6=9(buildings). The correct answer is D

29 A group of animals is standing in a line.

First, the zoo manager removes the third animal from the left.

Then, the zoo manager moves the sixth animal to the second spot from the left.

After that, the zoo manager removes the fourth animal from the left.

Finally, the zoo manager removes the third animal from the left.

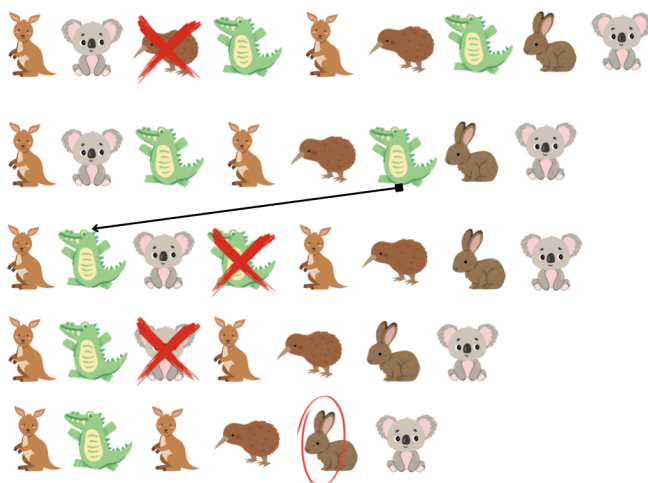
What is the animal that is now in the fifth place?



- A.  B.  C.  D.  E. 

Answer B

Solution



30 Amy, Fiona, Jesse, Luca, and Frank are playing a counting game. Amy starts by saying 1, then Fiona says 2, Jesse follows with 3, then Luca 4, and Frank is the last. The person who

reaches 8 or a multiple of 8 will stay silent. In this pattern, who will say 17?

- A. Amy B. Fiona C. Jesse D. Luca E. Frank

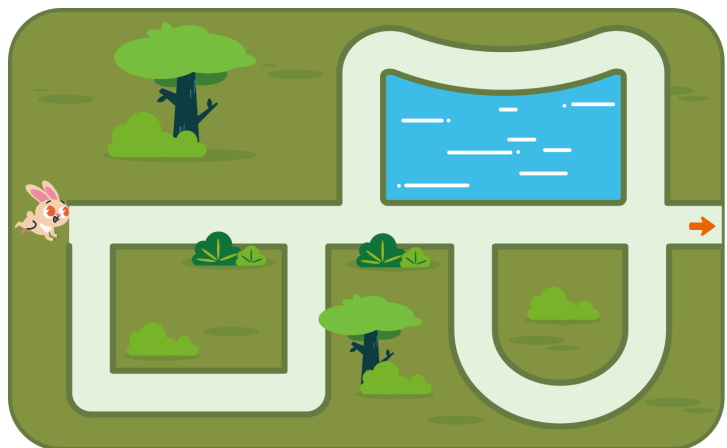
Answer B

Solution Follow the pattern

$$17 \div 5 = 3 R 2$$

So, Fiona will say 17

- 31 The rabbit wants to escape from the maze. How many different paths can the rabbit take without passing through the same crossroad more than once?



- A. 2 B. 4 C. 5 D. 6 E. 7

Answer D

Solution $2 \times 3 = 6$

5 points

32

In the following calculations, the same digits are hidden under the same figures.
Different digits are hidden under different figures.

$$\begin{array}{r} \triangle + \triangle = \square \bigcirc \\ \square \square + \square \square = \bigcirc \bigcirc \end{array}$$

What is the value of $\triangle \times \square \times \bigcirc$?

- A. 12 B. 15 C. 18 D. 28 E. 30

Answer A

Solution The sum of two one-digit numbers is less than 20. It can be inferred that the rectangle represents 1. Try one by one, the following equations meet the requirements:

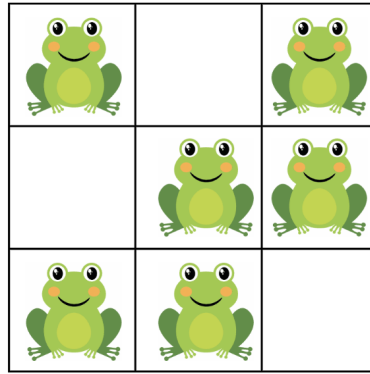
$$6 + 6 = 12$$

$$11 + 11 = 22$$

$$\begin{array}{r} \triangle 6 + \triangle 6 = \square 2 \\ \square 1 \square 1 + \square 1 \square 1 = \bigcirc 2 \bigcirc 2 \end{array}$$

So $\triangle \times \square \times \bigcirc = 6 \times 1 \times 2 = 12$.

- 33 There are exactly 2 frogs in each row and each column. The frogs decide that 2 of them will jump to a neighboring empty cell at the same time. Neighboring cells have a side in common. Afterwards, there still will be exactly 2 frogs in each row and in each column. In how many ways can the frogs do this?



A. 1

B. 2

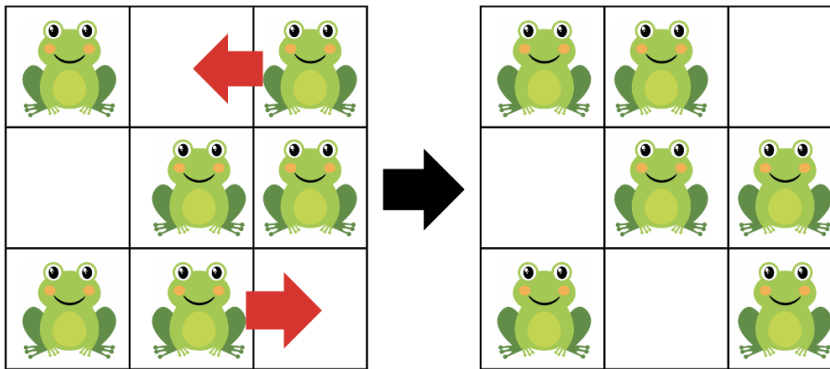
C. 3

D. 4

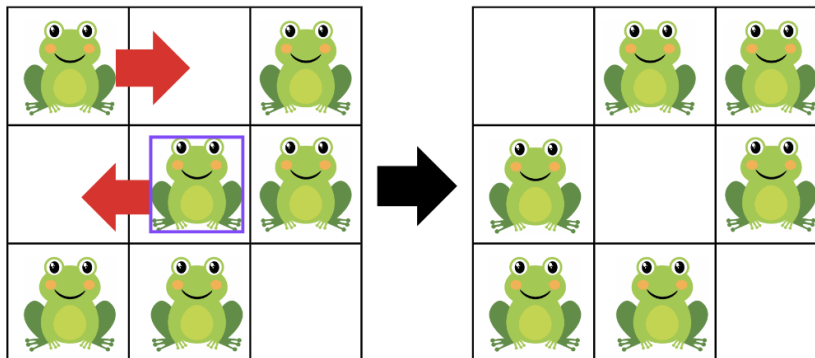
E. 5

Answer D

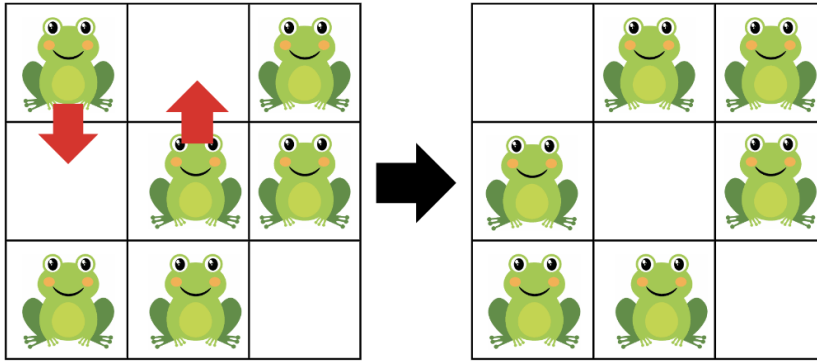
Solution 1.



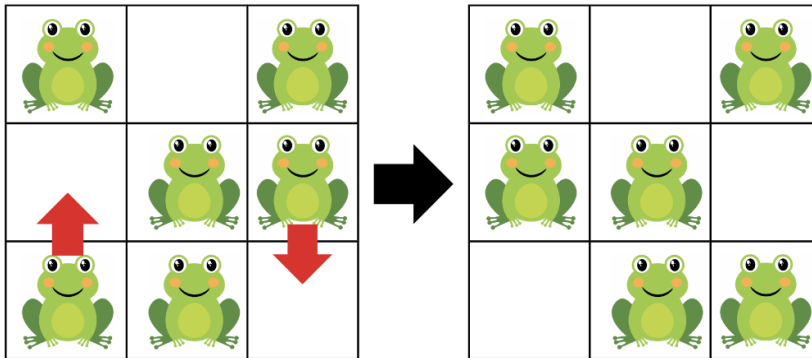
2.



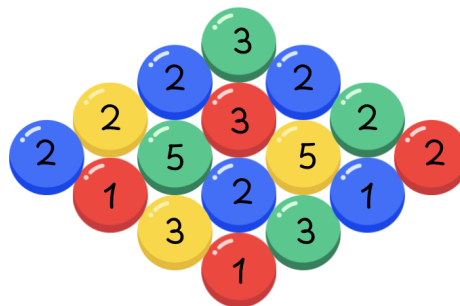
3.



4.



- 34 The figure below shows 16 balls and some of them has water in it. The number on each ball shows how many neighboring balls contain water. Neighboring balls are the six balls around the center ball. How many balls contain water?



- A. 6 B. 7 C. 8 D. 9 E. 10

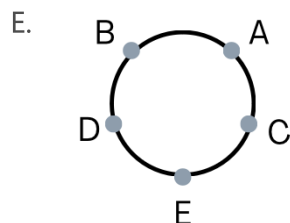
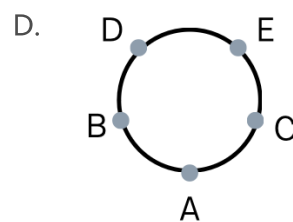
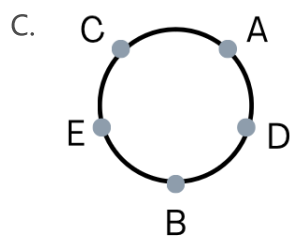
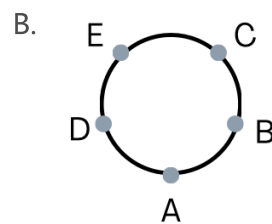
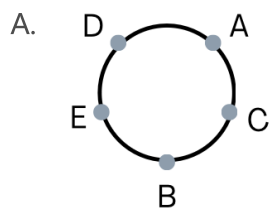
Answer D

Solution Starting from corners and then mark the ball containing water with ✓ and not containing water with ×.



35 There are five friends: A, B, C, D, and E. They were playing outside in a circle. After playing, E said, "A was standing next to B, and either C or D was on B's left." D said, "B was standing to the left of C, and I (D) was next to C." But both E and D remembered it wrong.

Can you figure out how they were really standing? Which order is correct?

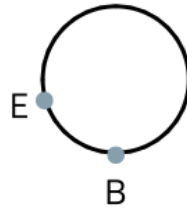


Answer C

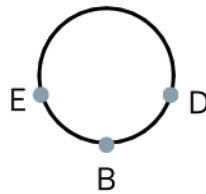
Solution

Since none of their statements were correct, we can deduce the following from E and D' s recollections:

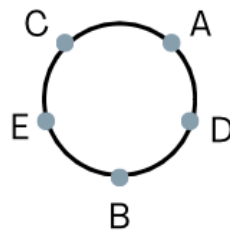
As shown in Diagram ①, A is not sitting next to B (either on B' s left or right), and C and D are not on B' s right. This means that only E can be sitting to B' s left.



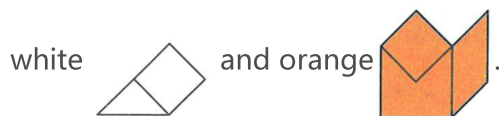
As shown in Diagram ②, B is not sitting to the left of C, meaning C is not on B' s right. A is also not sitting next to B, so only D can be sitting to B' s right.



As shown in Diagram ③, D recalled: "I was sitting next to C," but this was incorrect. Therefore, D must be sitting next to A, and C must be sitting between E and A.

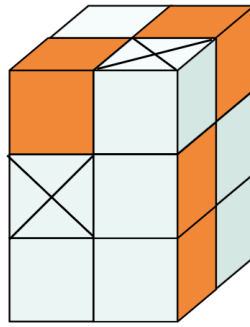


36 There are 2 types of blocks:



A small cube can be made using 4 white blocks or using 1 white and 1 orange block.

The large cube shown in the picture is made of small cubes. What is the smallest number of white blocks needed to make the large cube?



A. 8

B. 12

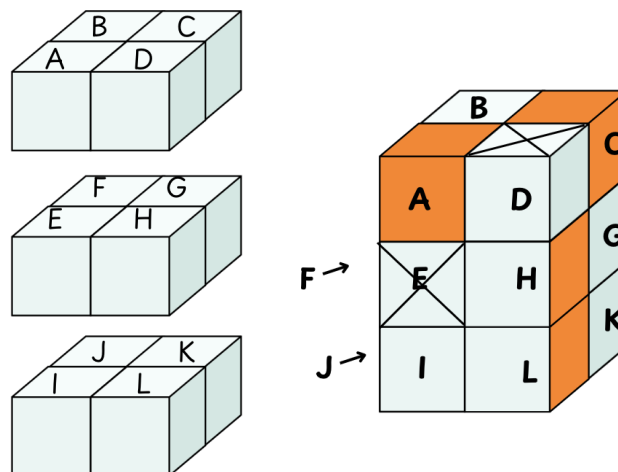
C. 14

D. 18

E. 23

Answer D

Solution We divide the large cube into 12 small cubes for analysis one by one, and mark them as A, B, C, D, E, F, G, H, I, J, K, and L. As shown in the figure:



Cube A has at least 1 white block.

Cube B has at least 1 white block.

Cube C has at least 1 white block.

Cube D has 4 white blocks.

Cube E has 4 white blocks.

Cube F has at least 1 white block.

Cube G has at least 1 white block.

Cube H has at least 1 white block.

Cube I has at least 1 white block.

Cube J has at least 1 white block.

Cube K has at least 1 white block.

Cube L has at least 1 white block.

In total, there are at least $1+1+1+4+4+1+1+1+1+1+1+1=18$ white blocks.

37 Ethan has the following in his wallet:

1 ten-dollar bill

3 five-dollar bills

15 one-dollar bills

He wants to buy a backpack that costs 16 dollars. How many different ways can Ethan pay exactly 16 dollars using these bills?

A. 1

B. 2

C. 3

D. 4

E. 5

Answer E

Solution Ethan has 5 different ways to pay exactly 16 dollars:

0 ten-dollar bills, 1 five-dollar bill, and 11 one-dollar bills.

0 ten-dollar bills, 2 five-dollar bills, and 6 one-dollar bills.

0 ten-dollar bills, 3 five-dollar bills, and 1 one-dollar bill.

1 ten-dollar bill, 0 five-dollar bills, and 6 one-dollar bills.

1 ten-dollar bill, 1 five-dollar bill, and 1 one-dollar bill.

38 Write each of the numbers 0, 1, 2, 3, 4, 5, and 6 in the squares, each number can only use once to make the subtraction below correct. Which digit will be in the blue square?

- A. 2 B. 3 C. 4 D. 5 E. 6

Answer D

Solution

$$\begin{array}{r}
 105 \\
 - 63 \\
 \hline
 42
 \end{array}$$

39 Levi and 51 classmates went to the park to go boating. They rented a total of 11 boats, with each large boat seating 6 people and each small boat seating 4 people. How many small boats did they rent?

- A. 4 B. 5 C. 6 D. 7 E. 8

Answer D

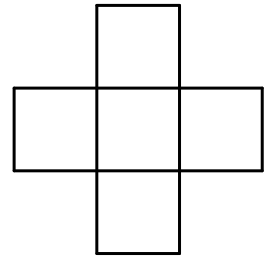
Solution If we assume all boat are small: $4 \times 11 = 44$ people

Difference: $52 - 44 = 8$

$8 \div 2 = 4$ large boat

$11 - 4 = 7$ small boat

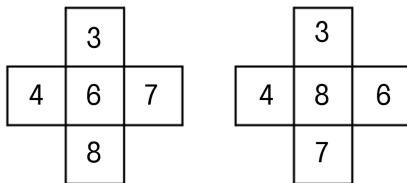
The numbers 3, 4, 6, 7, and 8 are written in the squares of a cross (see the figure on the right) so that the sum of the numbers in the row is equal to the sum of the numbers in the column. Which number can be written in the center square of the cross?



- A. only 3 B. only 6 C. only 7 D. 6 or 7
E. 6 or 8

Answer E

Solution



41 Tommy is investigating a murder case. Here are the statements made by each suspect:

A said, "C is the murderer, and I am not the murderer."

B said, "D is innocent."

C said, "I am not the murderer, and E is lying."

D said, "B is telling the truth."

E said, "A is innocent."

After further investigation, Tommy concluded that only one of them is lying, and only one of them is the murderer. So, who is the murderer?

- A. A B. B C. C D. D E. E

Answer C

Solution **C is the liar and murderer.**

A's statement ("C is the murderer, and I am not the murderer") is completely true.

Since **C** is the murderer, **A** is telling the truth, and **A** is not the murderer.

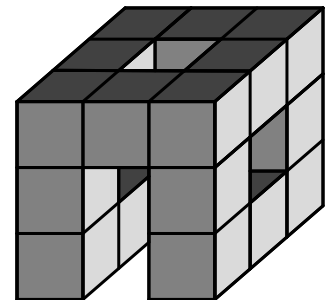
B's statement ("D is innocent") is true because only **C** is the murderer, meaning **D** is innocent.

C's statement ("I am not the murderer, and E is lying") is false, which is expected since **C** is the liar. This means **E** is not lying.

D's statement ("B is telling the truth") is true because **B's** statement is correct.

E's statement ("A is innocent") is also true because **A** is not the murderer.

42 As shown in the figure, a cube with a given edge length of 3 has holes drilled through it in 3 directions, with the holes passing through the entire large cube. Afterward, the exposed outer surfaces of this three-dimensional shape are painted red. The shape is then cut into smaller cubes with a specified edge length. How many of these smaller cubes have exactly 4 face painted red? ?



A. 10

B. 11

C. 12

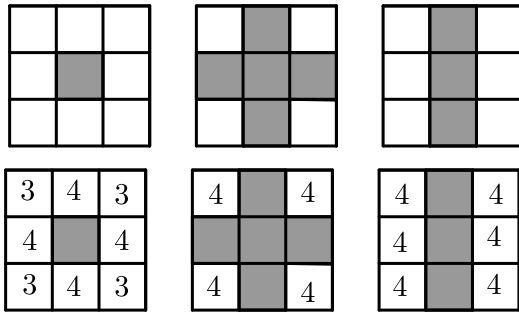
D. 13

E. 14

Answer E

Solution By directly observing the 3D figure, we can see that the center blocks of the 4 edges on the top layer, 4 blocks in the middle layer, and 6 blocks on the bottom layer meet the requirements (having exactly one face painted red). Therefore, the answer is:

$$4 + 4 + 6 = 14$$



43 Amelia and other 16 children are playing together. They need to be divided into groups of either 2 or 3. What is the minimum number of groups with 2 children?

- A. 2 B. 3 C. 4 D. 1 E. 5

Answer D

Solution There are 17 children in total. If we want to find the minimum number of group with 2. We can first define that all of them are organized in group with 3. $17 \div 3 = 5R2$. We find that the remainder is 2. Which means, we can make 5 groups with 3 people and 1 group with 2.

44 Amanda, Lucy, and Jennie are participating in a competition as a team. They need to answer 3 questions in order. However, Amanda does not answer the first question, Lucy does not answer the second question, and Jennie does not answer the third question. How many different orders can they follow to answer the questions?

- A. 2 B. 3 C. 4 D. 5 E. 6

Answer A

Solution There are 2 orders:

- 1 Lucy, Jennie, Amanda.

2 Jennie, Amanda, Lucy.

- 45 Fill the $\bigcirc$ with the numbers 1 to 8. To keep the following six equations true, which number should be filled in $\triangle$?

$$\begin{array}{ccc}
 \bigcirc & + & \bigcirc = \bigcirc \\
 + & + & + \\
 \bigcirc & + & \bigcirc = \bigcirc \\
 || & || & || \\
 \bigcirc & + & \bigcirc = \triangle
 \end{array}$$

- A. 8 B. 10 C. 12 D. 14 E. 16

Answer C

Solution Since $1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 = 36$, the sum of those numbers values three times of the $\triangle$, So $\triangle = 36 \div 3 = 12$

- 46 Peter is playing a ball-throwing game with four baskets: *A*, *B*, *C*, and *D*. Peter starts from basket *A* and throws the ball in the order of *A*, *B*, *C*, *D*. After throwing a ball into basket *D*, Peter immediately returns to basket *C*, then *B*, and then *A*, before moving back to basket *B*... Following this pattern, which basket will receive the 53rd ball thrown by Peter?



A


$$B$$

$$C$$

$$D$$

- A. Basket $\mathcal{A}$
- B. Basket $\mathcal{B}$
- C. Basket $\mathcal{C}$
- D. Basket $\mathcal{D}$
- E. It is not determined.

Answer C

Solution A, B, C, D, C , and B forms a group repeating.

$$53 \div 6 = 8R5$$

47 The ancient Romans used Roman numerals. We still use them today. **I = 1, V = 5, X = 10, L = 50, C = 100, D = 500, M = 1000.** Dennis was born in the year **MMXV**. His sister Judy is five years younger than him. In which year was Judy born?

- A. MMX
C. MML
E. MDCL
- B. MMXVIII
D. MMXX

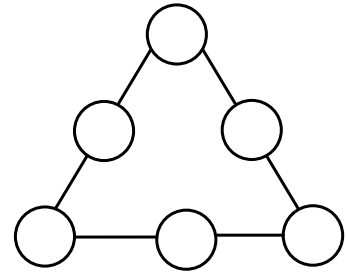
Answer D

Solution $1000 + 1000 + 10 + 5 = 2015$

$$2015 + 5 = 2020$$

MMXX = 2020

Fill the numbers 1 to 6 into the 6 circles in the figure below, so that the sum of the 3 numbers on each side of the triangle is equal. What is the largest sum?



A. 7

B. 9

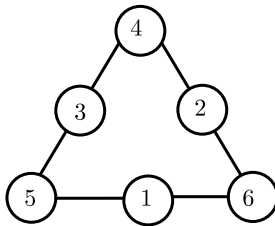
C. 11

D. 12

E. 15

Answer D

Solution The numbers at the corners should be as large as possible. The largest sum is 12.



49 Four friends go to a pizzeria and order a total of 17 slices of pizza. Each friend eats at least 1 slice, and no two friends eat the same number of slices. Three of them ate 11 slices in total, and one of them ate exactly 3 slices. How many slices did the friend who ate the most eat?

A. 4

B. 5

C. 6

D. 7

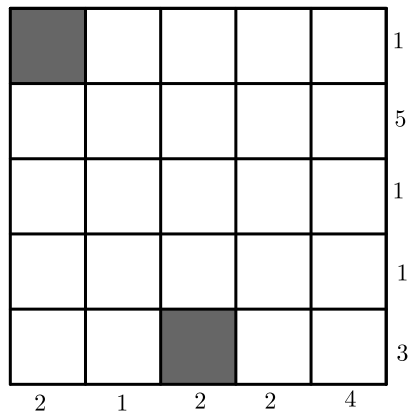
E. 8

Answer D

Solution Since three of them ate 17 slices, the other one ate $17 - 11 = 6$ slices. One of them ate exactly 3 slices, and another two ate $11 - 4 = 8$ slices. Since no two of them ate the same number of slices, the other two must ate 1 and 7 slices, respectively. The

friend who ate the most ate 7 slices.

- 50 Emma colors cells in the grid to make a snake. (2 cells are already colored.) Each number outside the grid shows how many cells in that row or column are colored. Which of the followings shows the way the third row is colored?



- A.

--	--	--	--	--
- C.

--	--	--	--	--
- E.

--	--	--	--	--

- B.

--	--	--	--	--
- D.

--	--	--	--	--

Answer E

Solution The snake is as shown below.

