Section C

C1
Lupo tosses 2 fair coins. What is the probability that he gets no heads?

Solution. The probability of getting tails the first toss is $\frac{1}{2}$. Then there is another, independent $\frac{1}{2}$ probability of getting tails the second toss. Hence the total probability is

$$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$$

Answer to C1: $\frac{1}{4}$

C2
Three pirates find treasure. The first pirate takes 2 gold coins and one third of the rest. The second pirate takes 1 gold coin and two thirds of the rest. The last pirate takes the remaining 3 gold coins. How big was the treasure?

Solution. Working backward, we start with 3 gold coins, multiply by 3 to get 9, then add 1 to get 10, then multiply by $\frac{3}{2}$ to get 15, then add 2 to get 17.

Answer to C2: 17

C3
How many positive whole numbers are factors of 56? (That is, how many positive whole numbers divide evenly into 56?)

Solution. The factors of 56 are 1, 2, 4, 7, 8, 14, 28, and 56. There are 8.

Answer to C3: 8

C4
Alice is 10 years old, Bob is 3 years old, and Cameron is 1 year old. In how many years will the sum of Bob's and Cameron's ages equal Alice's age?

Solution. The sum of Bob's and Cameron's ages increases by 2 every year, whereas Alice's age increases only by 1. So it will take 6 years for Bob and Cameron to catch up.

Answer to C4: 6

C5
A bucket of water weighs 13 kg in total. After pouring out half of the water, the bucket and the water now weigh 8 kg in total. How much does the bucket weigh?

Solution. Half of the water weighed 5 kg, so all the water weighed 10 kg. So the bucket weighed 3 kg.

Answer to C5: 3

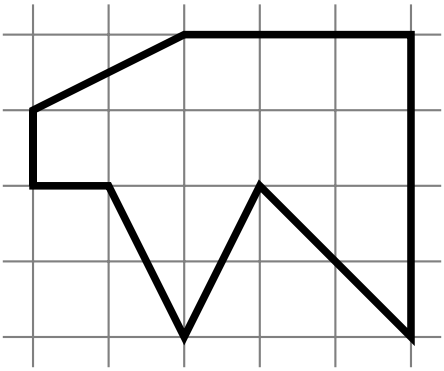
C6
How many odd perfect squares are there between 50 and 10000?

Note: A perfect square is a number that can be written as the product of an integer with itself. For example, 25 is a perfect square because $25 = 5^2 = 5 \times 5$.

Solution. Odd perfect squares are exactly the squares of odd numbers. The smallest odd perfect square in this range is $9^2 = 81$, and the largest is $99^2 = 9801$. Between 9 and 99, including both 9 and 99, there are 46 odd numbers, hence there are 46 odd perfect squares in this range.

Answer to C6: 46

C7
If each grid cell has area 1, what is the area of the following figure?



Solution. All of the squares are either completely filled in, completely not filled in, half filled in, quarter filled in, or three-quarters filled in. Adding up the squares gives a total area of 13.

Answer to C7: 13

C8

Sophie got her test results back for English, Math, Chemistry, and French tests. Her overall average on the four tests is 93. The average on her English and Math tests is 95. She scored 6 marks higher on the Chemistry test than the French test. What did she score on the Chemistry test?

Solution. Since 95 and 91 average to 93, the average on the Chemistry and French tests is 91. Then her Chemistry mark is 3 higher than 91, hence 94.

Answer to C8: 94