

Student Name: \_\_\_\_\_  
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## 1 Section A

### A1

If the last time that the Nine Chapters contest was held was in 2019, and the current edition (right now) is being held in 2022, how many years has it been since the last Nine Chapters contest was held?

**Solution.** To find the number of years between 2019 and 2022, subtract the smaller of these from the larger. Thus  $2022 - 2019 = 3$  years.

Answer to A1: 3

### A2

A piano has 88 keys on it, each of which is either black or white. If it has 52 white keys, how many black keys does it have?

**Solution.** If there are 88 keys and 52 are white, then there are  $88 - 52 = 36$  black keys.

Answer to A2: 36

### A3

A die contains the numbers from 1 to 6 on its faces. What is the sum of the numbers on the die?

**Solution.** Adding the numbers from 1 to 6 together gives  $1 + 2 + 3 + 4 + 5 + 6 = 21$ .

Answer to A3: 21

### A4

Rachelle wants to make s'mores. Each s'more consists of two crackers, a piece of chocolate and a marshmallow. If Rachelle has 23 crackers, 13 pieces of chocolate, and 15 marshmallows, what is the maximum number of s'mores she can make?

**Solution.** Each s'more requires 2 crackers, and since she has 23 crackers, Rachelle has enough crackers to make  $23/2$  rounded down, which is 11, s'mores. Since she has enough chocolate for 13 s'mores and enough marshmallows for 15 s'mores, the crackers are the limiting ingredient. Thus she can make at most 11 s'mores.

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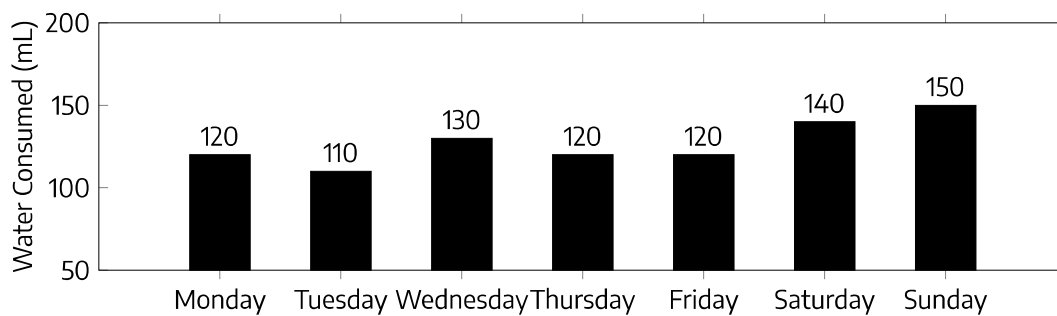
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Answer to A4: 11

**A5**

A pet cat named Bertie has his water-drinking habits tracked over the course of a week, as shown in the graph below. The *range* of a set of data is the difference between the highest and lowest entries. What is the range of Bertie’s water consumption (in mL) for the week?



**Solution.** To find the range we need the highest and lowest values in the graph. The highest is 150 and the lowest is 110, so the range is their difference,  $150 - 110 = 40$ .

Answer to A5: 40

**A6**

A chef is cooking pierogis. The recipe calls for the chef to cook one side of the pierogis for 5 minutes, then flip them, cook for 10 minutes, flip them once more, and cook for 3 more minutes. If the chef cooks two batches of pierogis, one after the other, how long does it take?

**Solution.** A single batch takes  $5 + 10 + 3 = 18$  minutes to make. To make two batches in a row, it takes  $2 \times 18 = 36$  minutes.

Answer to A6: 36

**A7**

If the letters in the word ADDITION are sorted into alphabetical order, how many remain in the same place?

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**Solution.** In the alphabet, we have that  $A < D < I < N < O < T$ . So in alphabetical order the letters are ADDIINOT. To see how many are unchanged, we may line up the two strings to compare them.

ADDITION  
ADDIINOT

We can clearly see that there are 5 letters in the same place, namely the A, the two D's, the first I, and the O.

Answer to A7: 5

### A8

In 2022 the first Monday in December is on the 5th. If December has 31 days, on what day is the last Monday in December?

**Solution.** Every 7 days, starting on the 5th, will be a Monday. Counting up by sevens, we have that the 5th, 12th, 19th, 26th, and 33rd are all Mondays. But December has only 31 days, so the last one does not count, and so the last Monday is the 26th.

Answer to A8: 26th