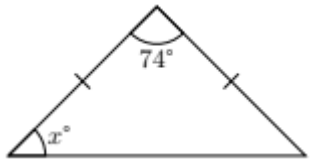
Student Name: _____

Please write your name on *every* page.

## 3 Section C

**C1**

What is the value of angle x° in this diagram?




Answer to C1: _____

**C2**

An arithmetic sequence of numbers is as follows: 1, 7, 13, 19, ... where each pair of consecutive numbers has a common difference. What is the 8th number in this sequence?

Answer to C2: _____

**C3**

A 6-sided die is rolled twice. What is the probability of getting the same number on the top face both times (as a reduced fraction)?

Answer to C3: _____

**C4**

The Fibonacci sequence is the sequence $1, 1, 2, 3, 5, 8, \cdots$ where each term after the first two is the sum of the previous two terms. What is the tenth term in the sequence?

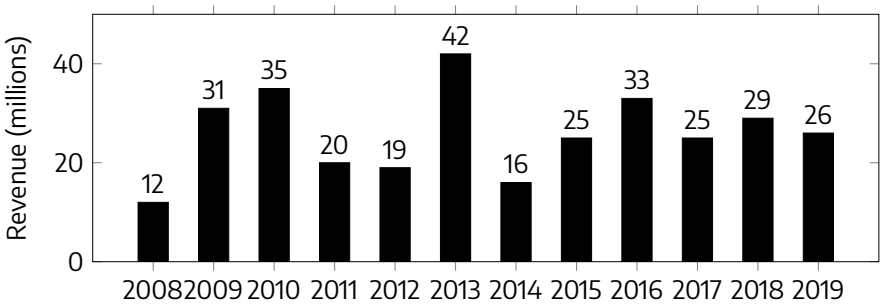
Answer to C4: _____

Student Name: _____

Please write your name on *every* page.

**C5**

The Dedekind Company produced a graph of its yearly revenues in millions of dollars from 2008 to 2019. The three year mean revenue of a company is the company's average revenue over three consecutive years. From the data below, which three consecutive years from 2008 to 2019 had the highest three year mean revenue? (Write the answer as three consecutive year numbers, separated by commas.)




Answer to C5: _____

**C6**

A magic square is a grid with the property that every row, column, and main diagonal sums to the same value. Find the value of x in the partially constructed magic square below.

| | | | |
|---|---|---|---|
| 16 | 3 | | 13 |
| 5 | | 11 | x |
| 9 | | 7 | 12 |
| 4 | 15 | | |

Answer to C6: _____

Student Name: _____

Please write your name on *every* page.

**C7**

A machine called Algo takes a number as an input and uses a procedure to convert that number into a different number, which the machine produces as output. The procedure is as follows for one conversion:

1. Add 4 to the input number.
2. Multiply the number in the previous step by 2.
3. Take the square root of the number obtained in the previous step. If the result is not an integer, round that number down to the nearest integer.

For instance, Algo will produce 5 as an output if the number 9 was taken as input ($9 \rightarrow 13 \rightarrow 26 \rightarrow 5$). If you let Algo run for more than one conversion, it will take the output from the previous conversion as input for the next conversion (e.g. 9 as input - first conversion: $9 \rightarrow 5$; second conversion: $5 \rightarrow 4$). If you gave Algo the number 15 as an initial input and let it run for 3 conversions, what will be its final output?

Answer to C7: _____

**C8**

Normally, the expression $5 \times 4 + 3 \times 2 - 1$ is evaluated using the usual order of operations, giving an answer of 25. If instead, the operations can be evaluated in any order, what is the largest possible value of the expression? (for example, if we evaluate operations from left to right, the value becomes $20 + 3 \times 2 - 1 = 23 \times 2 - 1 = 46 - 1 = 45$).

Answer to C8: _____