Student Name: _____

Please write your name on *every* page.

3 Section C

C1
What is the minimum number of times that the number 3 has to be multiplied by itself to give a number above 100?

Answer to C1: _____

C2
A square with side length 9 has the same perimeter as an equilateral triangle with what side length?

Answer to C2: _____

C3
A square number is a number that can be written as a number times itself. For example, the current year 2025 is a square number since $2025 = 45 \times 45$. What is the first year after 2025 that will also be a square number?

Answer to C3: _____

C4
It's November, so the elves at the north pole are already busy creating toys for Santa Claus. One elf can make a toy in 30 minutes, but if two elves work together on the same toy, it only takes them 10 minutes. If three or more elves work on the same toy, then it takes 30 minutes again because there are too many of them close together. If there are 35 elves in the workshop, at most how many toys can they produce in 6 hours?

Answer to C4: _____

C5
Hornet has access to 18 pieces of silk. She can spend 9 pieces of silk to heal, 4 to weave a web, or 1 piece of silk to grab onto a ring. If the order of things she spends silk on does not matter, in how many ways can she spend all 18 pieces of her silk?

Student Name: _____

Please write your name on *every* page.

Answer to C5: _____

C6

A rectangle has an area 24, and its length and width are both positive integers. What is the sum of all possible values that the perimeter of such a rectangle could have?

Answer to C6: _____

C7

Kelly computes the sum of the remainders when 100 is divided by each number from 1 to 10. What is the remainder when this new number is divided by 7?

Answer to C7: _____

C8

Anna is playing a game with the following rules: starting with some number, if it is odd, multiply the number by 3 and then add 1. If instead it is even, divide the number by 2. She then repeats this process with the new number until she reaches the number 1, and notes how many steps it took. For example, starting with 10, she gets the numbers $5, 16, 8, 4, 2, 1$, meaning it took her 6 steps.

What is the maximum number of steps that a number from 1 to 20 takes?

Answer to C8: _____