Student Name: _____

Please write your name on *every* page.

4 Section D

D1
How many three-digit numbers have all three digits different?

Answer to D1: _____

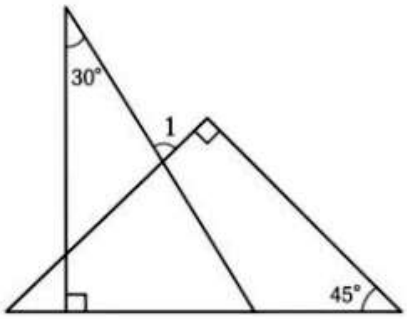
D2
Four triangles all stand on the same base of 10 cm. The top corner of each triangle lies on a straight line parallel to the base, 6 cm above it. What is the total area of the triangles in cm^2?

Answer to D2: _____

D3
A sequence begins with 1, and alternates going up by 6 and then 7. For example, the first ten terms of the sequence are $1, 7, 14, 20, 27, 33, 40, 46, 53,$ and 59. What is the 2026th term in the sequence?

Answer to D3: _____

D4
Two triangles are arranged as shown in the figure, find the measure of angle 1.



Answer to D4: _____

Student Name: _____

Please write your name on *every* page.

D5

What is the sum of all odd numbers between 0 and 100?

Answer to D5: _____

D6

The number 2026 is called a *semiprime number* since it is the product of two prime numbers (2 and 1013). Also, $2026 + 1 = 2027$ is a prime number. Find the smallest n above 2026 such that n is a semiprime number and $n + 1$ is a prime number.

Answer to D6: _____

D7

There is a machine that takes an input number and returns an output number. It can either multiply the input by 2 or itself. It can then take this output as an input to the machine again, and so forth. If a positive integer X is inputted into the machine, and after some number of iterations (at least one), the number 2026^2 is produced, what is the sum of all possible X?

Answer to D7: _____

D8

Alice and Bob each start with the numbers from 1 to 5 on their own board. Each of them repeatedly erases two numbers a and b and writes down $a + b + ab$, until one number remains. Alice and Bob may make different choices along the way. What is the greatest possible difference between Alice's final number and Bob's final number?

Answer to D8: _____