U.C. MATH BOWL 2024

LEVEL III — Session 1

Instructions: Write your answers in the blue book provided. Remember that even correct answers without explanation may not receive much credit and that partially correct answers that show careful thinking and are well explained may receive many points.

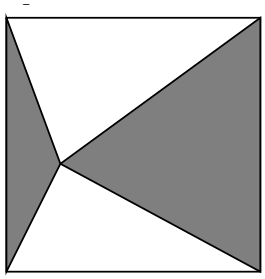
Have Fun!

1. If A and B are integers that satisfy $10 < A < 20$ and $-6 < B < 8$ how big, and how small, can $A - B$ be?

2. Using the numbers $1, 2, \cdots, 9$ each exactly once fill in the 3×3 grid so that the sums of the row and columns are the numbers indicated in the margins of the table.

			15
			10
			20
6	21	18	+

3. The figure shows a rectangle with two shaded triangular regions with a common vertex and whose sides are sides of the rectangle. What fraction of the area of the rectangle is shaded? How do you know?



4. You come across a flock of birds and ask their fearless leader how many birds there are? The fearless leader says "Us, another flock of our size, a flock of half our size, a flock of quarter of our size, and you would make 100 in all." How many birds are there in the flock?

5. People are walking their dogs in a small park. In all there are 40 heads in the park and 124 legs. How many people and dogs are there?

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LEVEL III — Session 2

Instructions: Write your answers in the blue book provided. Remember that even correct answers without explanation may not receive much credit and that partially correct answers that show careful thinking and are well explained may receive many points.

Have Fun!

1. As shown in the first row, add operation signs $+ - \times \div$ and parentheses as needed to make a true equation of each of the rows.

$$\begin{array}{ccccccc} 5 & -(5 & \div 5) & -(5 & \div 5)) & = 3 \\ 5 & 5 & 5 & 5 & 5 & = 5 \\ 5 & 5 & 5 & 5 & 5 & = 6 \\ 5 & 5 & 5 & 5 & 5 & = 30 \\ & 5 & 5 & 5 & 5 & = 55 \\ 5 & 5 & 5 & 5 & 5 & = 55 \end{array}$$

2. Fill in the squares of the grid with 9 consecutive integers so that the products of the rows and columns are the numbers indicated in the margin of the table.

			0
			42
			20
0	12	-15	*

3. Peter was 10 the day before yesterday. Next year, he'll be 13. Explain how this is possible.

4. What is the percentage change in the area of a rectangle if one of its sides is increased by 20%, while the other side is decreased by 20%?

5. Can you divide the numbers from 1 to 10 into two groups so the sums of the numbers in the two groups is the same? Show how to do this or explain why it can't be done.