U.C. MATH BOWL 2018

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. Suppose you use each of the digits $\{2, 3, 4, 6, 7, 8\}$ exactly once to write two three-digit numbers S and T so that $S - T$ is positive and as small as possible. What is $S - T$?

2. On a card there are three statements listed:

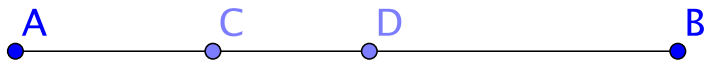
   1 This list has exactly one false statement.

   2 This list has exactly two false statements.

   3 This list has exactly three false statements.

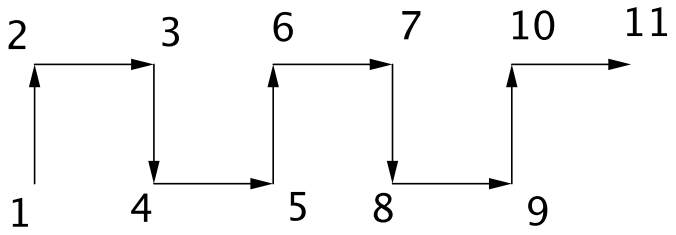
   How many true statements are there on the card?

3. The segment AB with length 10 is divided by points C and D arranged as in the figure.



   The points C and D are placed in such a way that $2(|AC| + |DB|) = 3|CD|$. How long is CD?

4. If the pattern shown in the picture is continued, in what direction does the arrow from 1000 to 1001 point?



5. Tyler and Jesse each have a collection of candy. Tyler said to Jesse, "If you give me one piece of candy then we'll have the same number." Jesse replied, "but if you give me one piece then I'll have twice as many as you." How many pieces of candy do Tyler and Jesse have?

U.C. MATH BOWL 2018

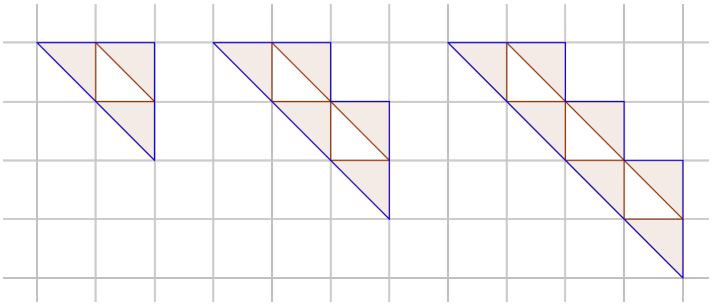
LEVEL III — Session 2

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. How many 3 digit numbers have the property that the sum of their digits is 24?

2. The picture below shows the first three figures in a growing triangle pattern. The grid squares in the figure have side length 1 and so their diagonals have length $\sqrt{2}$.

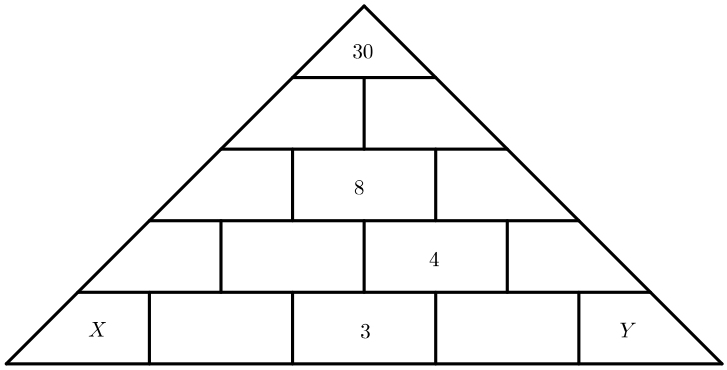


   If the pattern continues growing in the same way, what will be the outer perimeter (shown in a different shade) of the 10th figure? What will be the outer perimeter of the Nth figure?

3. Challoney cleared out her inventory of fewer than 500 chocolate bars by putting them on sale for some whole number of cents less than their original price of 50 cents each. She sold everything for \$31.93. What was the new price?

4. A $3 \times 3 \times 3$ inch wooden cube is painted blue on four of its faces and is then cut into 27 unit cubes. Suppose you pick one of these cubes at random and roll it like a die. What is the chance that a blue face shows up on this roll?

5. In the triangle shown the boxes are to be filled in with numbers so that the number in each box is the sum of the numbers in the two boxes below it.



   What can you say about X and Y?