7.EE Guess My Number

Alignments to Content Standards: 7.EE.B

Task

Laila tells Julius to pick a number between one and ten. “Add three to your number and multiply the sum by five,” she tells him. Next she says, “Now take that number and subtract seven from it and tell me the new number.” “Twenty-three,” Julius exclaims.

a. Write an expression that records the operations that Julius used.

b. What was Julius’ original number?

c. In the next round Leila is supposed to pick a number between 1 and 10 and follow the same instructions. She gives her final result as 108. Julius immediately replies: “Hey, you cheated!” What might he mean?

IM Commentary

This problem asks the students to represent a sequence of operations using an expression and then to write and solve simple equations. The problem is posed as a game and allows the students to visualize mathematical operations. It would make sense to actually play a similar game in pairs first and then ask the students to record the operations to figure out each other's numbers.

Some students will write

$$(x + 4) \cdot 5 - 7$$

Many students translate word problems literally and place numbers in the problem as they appear in the sentences/paragraph. This provides a good opportunity to talk

about the properties of operations and how they can be used to write the same expression in different ways.

The last part of the task in particular is meant to generate classroom discussion, and isn't meant for e.g. high-stakes assessment situations.

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Solution

a. The unknown variable here is Julius' original number. Let n be Julius' original number. We know from Laila's directions that first, Julius added three to his number:

$$n + 3$$

She then told him to multiply this sum by five:

$$5(n + 3)$$

Finally, she told him to subtract seven from this number:

$$5(n + 3) - 7$$

This is the expression that records the operations that Julius used.

b. Julius exclaims that his new number after performing Laila's instructions is twenty-three. So we set our expression from part (a) equal to 23 and solve for n, Julius' original number.

$$5(n + 3) - 7 = 23$$

$$5n + 15 = 30$$

$$5n = 15$$

$$n = 3$$

Thus, Julius' original number was three.

c. To find Laila's number we solve

$$5(n + 3) - 7 = 108.$$

We find $n = 20$. So Laila did not follow the instructions of using a number between 1 and 10.