7.EE Ticket to Ride

Alignments to Content Standards: 7.EE.A.2

Task

Malia is at an amusement park. She bought 14 tickets, and each ride requires 2 tickets.

a. Write an expression that gives the number of tickets Malia has left in terms of x, the number of rides she has already gone on. Find at least one other expression that is equivalent to it.

b. $14 - 2x$ represents the number of tickets Malia has left after she has gone on x rides. How can each of the following numbers and expressions be interpreted in terms of tickets and rides?

$$14$$

$$-2$$

$$2x$$

c. $2(7 - x)$ also represents the number of tickets Malia has left after she has gone on x rides. How can each of the following numbers and expressions be interpreted in terms of tickets and rides?

$$7$$

$$(7 - x)$$

$$2$$

IM Commentary

The purpose of this instructional task is to illustrate how different, but equivalent, algebraic expressions can reveal different information about a situation represented by those expressions. This task can be used to motivate working with equivalent expressions, which is an important skill for solving linear equations and interpreting them in contexts. The task also helps lay the foundation for students' understanding of the different forms of linear equations they will encounter in 8th grade. In part (b), the task asks students to interpret pieces of the expression that arise by parsing the expression from different algebraic perspectives. In particular, it requires students to think about the difference between interpreting $-2x$ as -2 times x vs. subtracting $2x$ from 14. Note that the meaning of the 2 in the expression $2(7 - x)$ is slightly different than the meaning given in the problem statement because of the role it plays in the expression. The class will probably need to have a whole-group conversation to grasp this subtlety.

The Standards for Mathematical Practice focus on the nature of the learning experiences by attending to the thinking processes and habits of mind that students need to develop in order to attain a deep and flexible understanding of mathematics. Certain tasks lend themselves to the demonstration of specific practices by students. The practices that are observable during exploration of a task depend on how instruction unfolds in the classroom. While it is possible that tasks may be connected to several practices, the commentary will spotlight one practice connection in depth. Possible secondary practice connections may be discussed but not in the same degree of detail.

This task helps illustrate Mathematical Practice 7, Look for and make use of structure. As students work with equivalent expressions in this task, they interpret what these different numbers and expressions mean in terms of the context. For example, 14 – 2x and 2 (7 –x) are equivalent expressions but in terms of the problem, these expressions reveal very different information about tickets and rides. Students are engaged in connecting the real life context to the structure of the mathematics.

Edit this solution
Solution

a. Here are some possible expressions:

2

$$14 - 2x$$

$$2(7 - x)$$

$$14 - x - x$$

$$10 - 2x + 4$$

$$-2x + 14$$

b. In the expression $14 - 2x$, the 14 represents the number of tickets Malia started with since the value of the expression is 14 when $x = 0$. The -2 represents the number of tickets she spends per ride. $2x$ represents the number of tickets she has to subtract from her initial amount after riding x rides.

c. In the expression $2(7 - x)$, the 7 represents the total number of rides Malia can go on. $(7 - x)$ represents the number of rides she has left and the 2 represents the number of tickets required for each ride Malia has left.