Illustrative Mathematics

6.EE Distance to School

Alignment 1: 6.EE.2

Grade	6
Domain	EE: Expressions and Equations
Cluster	Apply and extend previous understandings of arithmetic to algebraic expressions.
Standard	Write, read, and evaluate expressions in which letters stand for numbers.

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Some of the students at Kahlo Middle School like to ride their bikes to and from school. They always ride unless it rains.

Let d be the distance in miles from a student's home to the school. Write two different expressions that represent how far a student travels by bike in a four week period if there is one rainy day each week.

Commentary:

This task asks students to find equivalent expressions by visualizing a familiar activity involving distance. The given solution shows some possible equivalent expressions, but there are many variations possible.

Solution: Addition versus Multiplication

The distance to school, and therefore home, is d. Thus, the student rides $(d+d)$ miles in one day. Equivalently, she rides $(2d)$ miles in one day.

Repeatedly adding the distance traveled in one day for each school day of the week, we find that in one week the student travels $(2d+2d+2d+2d+2d)$ miles. Equivalently, she travels $5(2d)$ or $(10d)$ miles in a normal, rain free week.

Expression 1

We know that she travels $(10d)$ miles in a normal rain free week. In a 4 week period she would normally ride $(10d+10d+10d+10d)$ miles, but we need to subtract the miles for the rainy days. For each rain day we have to subtract $2d$ miles. Therefore, she traveled $(10d+10d+10d+10d-2d-2d-2d-2d)$ or $(10d+10d+10d+10d-(2d+2d+2d+2d))$. Equivalently we can write $4(10d)-4(2d)=(40d-8d)$.

Expression 2

If we decide to combine the rainy day miles with the weekly miles traveled ahead of time then the expression for one school week with one rain day looks like $(10d-2d)$ or $(8d)$ and the four week total is $(8d+8d+8d+8d)$. Equivalently we can write $4(8d)$.

The equivalent expressions will vary greatly. Comparing the cases above we see that $(40d-8d)$ and $4(8d)$ represent the same distance traveled and therefore are equivalent expressions.