Unit 2 Lesson 6: Equivalent Equations

1 Two Expressions (Warm up)

Student Task Statement

Your teacher will assign you one of these expressions:

$$\frac{n^2 - 9}{2(4 - 3)} \qquad \text{or} \qquad (n + 3) \cdot \frac{n - 3}{8 - 3 \cdot 2}$$

Evaluate your expression when n is:

1. 5

2. 7

3. 13

4. -1

2 Much Ado about Ages

Student Task Statement

1. Write as many equations as possible that could represent the relationship between the ages of the two children in each family described. Be prepared to explain what each part of your equation represents.

   a. In Family A, the youngest child is 7 years younger than the oldest, who is 18.

   b. In Family B, the middle child is 5 years older than the youngest child.

2. Tyler thinks that the relationship between the ages of the children in Family B can be described with $2m - 2y = 10$, where m is the age of the middle child and y is the age of the youngest. Explain why Tyler is right.

3. Are any of these equations **equivalent** to one another? If so, which ones? Explain your reasoning.

$3a + 6 = 15$ $\qquad\qquad$ $3a = 9$ $\qquad\qquad$ $a + 2 = 5$ $\qquad\qquad$ $\frac{1}{3}a = 1$

3 What's Acceptable?

Student Task Statement

Noah is buying a pair of jeans and using a coupon for 10% off. The total price is $56.70, which includes $2.70 in sales tax. Noah's purchase can be modeled by the equation:

$$x - 0.1x + 2.70 = 56.70$$

1. Discuss with a partner:

    a. What does the solution to the equation mean in this situation?

    b. How can you verify that 70 is not a solution but 60 is the solution?

2. Here are some equations that are related to $x - 0.1x + 2.70 = 56.70$. Each equation is a result of performing one or more moves on that original equation. Each can also be interpreted in terms of Noah's purchase.

For each equation, determine either what move was made or how the equation could be interpreted. (Some examples are given here.) Then, check if 60 is the solution of the equation.

Equation A $100x - 10x + 270 = 5,670$

- What was done?

- Interpretation?   [The price is expressed in cents instead of dollars.]

- Same solution?

Equation B $x - 0.1x = 54$

- What was done?   [Subtract 2.70 from both sides of the equation.]

- Interpretation?

- Same solution?

Equation C $0.9x + 2.70 = 56.70$

- What was done?

- Interpretation?   [10% off means paying 90% of the original price. 90% of the original price plus sales tax is $56.70.]

- Same solution?

3. Here are some other equations. For each equation, determine what move was made or how the equation could be interpreted. Then, check if 60 is the solution to the equation.

Equation D $\qquad$ $x - 0.1x = 56.70$

- What was done?

- Interpretation? [The price after using the coupon for 10% off and before sales tax is $56.70.]

- Same solution?

Equation E $\qquad$ $x - 0.1x = 59.40$

- What was done? [Subtract 2.70 from the left and add 2.70 to the right.]

- Interpretation?

- Same solution?

Equation F $\qquad$ $2(x - 0.1x + 2.70) = 56.70$

- What was done?

- Interpretation? [The price of 2 pairs of jeans, after using the coupon for 10% off and paying sales tax, is $56.70.]

- Same solution?

4. Which of the six equations are equivalent to the original equation? Be prepared to explain how you know.