

## Just in Time Quick Check

### Standard of Learning 7.PFA.3

#### **Strand:** Patterns, Functions, and Algebra

#### **Standard of Learning 7.PFA.3**

**The student will write and solve two-step linear equations in one variable, including problems in context, that require the solution of a two-step linear equation in one variable.**

*Students will demonstrate the following Knowledge and Skills:*

- a) Represent and solve two-step linear equations in one variable using a variety of concrete materials and pictorial representations.
- b) Apply properties of real numbers and properties of equality to solve two-step linear equations in one variable. Coefficients and numeric terms will be rational.
- c) Confirm algebraic solutions to linear equations in one variable.
- d) Write a two-step linear equation in one variable to represent a verbal situation, including those in context.
- e) Create a verbal situation in context given a two-step linear equation in one variable.
- f) Solve problems in context that require the solution of a two-step linear equation.

#### Just in Time Quick Check

#### Just in Time Quick Check Teacher Notes

**Supporting and Prerequisite SOL:** 6.PFA.3

### Just in Time Quick Check 7.PFA.3

1. Solve for  $x$ .

a)  $2x - 4 = -20$

b)  $\frac{1}{2}x + 10 = 36$

c)  $\frac{x+5}{6} = 2$

2. Write each verbal sentence as an algebraic equation.

a) *The product of three and a number plus five is 20.*

b) *Nine less than a number is four.*

3. George and Sarah each solved the same equation. Their work is shown below.

<p><u>George's Work</u></p> $4x - \frac{3}{4} = 9$ $4x - \frac{3}{4} + \frac{3}{4} = 9 + \frac{3}{4}$ $4x = 9\frac{3}{4}$ $4x \div 4 = 9\frac{3}{4} \div 4$ $x = \frac{39}{16}$
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<p><u>Sarah's Work</u></p> $4x - \frac{3}{4} = 9$ $4x - \frac{3}{4} \cdot \frac{4}{3} = 9 \cdot \frac{4}{3}$ $4x = 12$ $4x \div 4 = 12 \div 4$ $x = 3$
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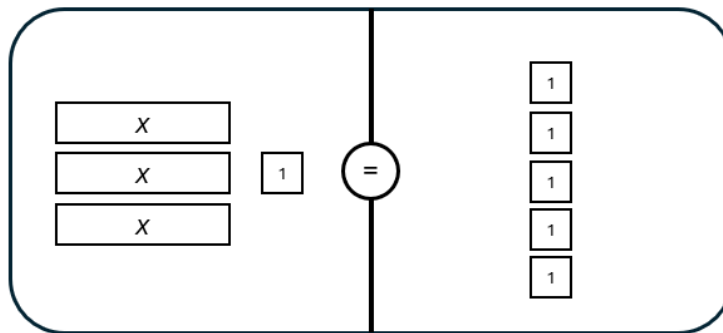
Who solved the equation correctly? Explain how you know.

4. Write and solve an equation to represent each situation.

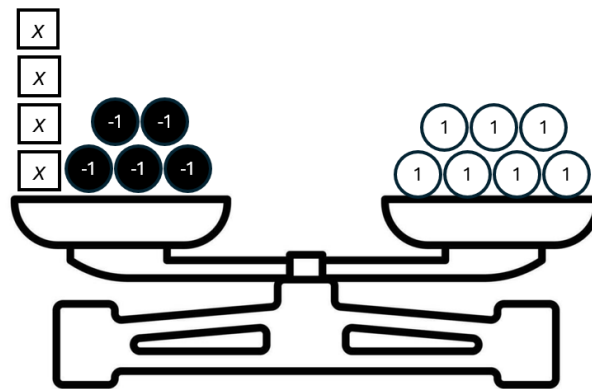
a) Emma earns \$10 per hour baby-sitting. One weekend she also received a \$15 tip. If she earned \$75 total that weekend, how many hours did she baby-sit?

b) Ben spent \$22 at the fair. He paid an \$8 entrance fee and bought ride tickets at a cost of \$2 each. How many ride tickets did he buy?

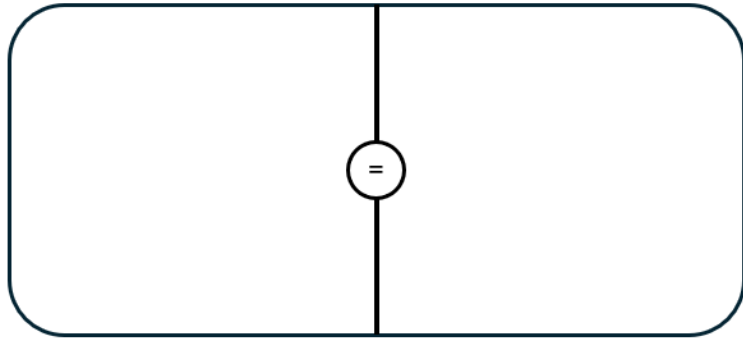
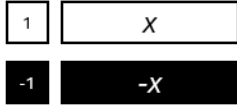
5. The algebra tiles below represent an equation. Write an equation for this model and solve for  $x$ .



6. The balance scale represents an equation. Write an equation for this model and solve for  $x$ .



7. Use the algebra tile work mat below to draw a representation for  $8 = 2x - 4$ .



### 7.PFA.3 Just in Time Quick Check Teacher Notes

#### Common Errors/Misconceptions and their Possible Indications

1. Solve for  $x$ .

a)  $2x - 4 = -20$

*Students may incorrectly apply inverse operations resulting in a solution of  $-12$  or  $-24$  if the student does not divide by 2. This error may indicate a misunderstanding in applying inverse operations to solve a two-step equation. Students may benefit from additional practice with one-step equations. Students may also benefit from practice modeling equations with concrete manipulatives such as algebra tiles.*

b)  $\frac{1}{2}x + 10 = 36$

*After subtracting 10 from both sides, students may incorrectly divide both sides by 2 instead of multiplying by 2. Students may benefit from additional practice with solving one-step equations involving fractional coefficients. Additional practice dividing fractions may help students recognize that a fraction multiplied by its reciprocal will result in a product of one.*

c)  $\frac{x+5}{6} = 2$

*Students may incorrectly subtract five from both sides of the equation first, resulting in an incorrect solution of  $x = -18$ . This error indicates a misconception that  $\frac{x+5}{6} = 2$  is the same as  $\frac{x}{6} + 5 = 2$ . Students may need additional instruction and practice with solving equations that include an expression involving addition or subtraction divided by a constant (implied parentheses).*

2. Write each verbal sentence as an algebraic equation.

a) *The product of three and a number plus five is 20.*

*A common error students may make is to translate the meaning of product as a sum resulting in an incorrect answer of  $3 + x + 5 = 20$ . This error may indicate a learning gap in operational vocabulary. Students may benefit from additional practice with one-step equations or expressions with variables. It may also be helpful to practice numerical expressions or equations where students can reach an answer mentally and then verify with their algebraic equation.*

b) *Nine less than a number is four.*

*Students may incorrectly write the answer as  $9 - x = 4$ . This indicates that students understand that "less than" represents subtraction but do not make the connection of reversing the order of the expression on the left side of the equation or may not understand that subtraction is not commutative. Students may benefit from a review of the concept of subtraction, particularly that it is not commutative. Additional practice with non-variable equations that students can solve mentally may be helpful as well.*

3. George and Sarah each solved the same equation. Their work is shown below.

George's Work

$$4x - \frac{3}{4} = 9$$
$$4x - \frac{3}{4} + \frac{3}{4} = 9 + \frac{3}{4}$$
$$4x = 9\frac{3}{4}$$
$$4x \div 4 = 9\frac{3}{4} \div 4$$
$$x = \frac{39}{16}$$

Sarah's Work

$$4x - \frac{3}{4} = 9$$
$$4x - \frac{3}{4} \cdot \frac{4}{3} = 9 \cdot \frac{4}{3}$$
$$4x = 12$$
$$4x \div 4 = 12 \div 4$$
$$x = 3$$

Who solved the equation correctly? Explain how you know.

*A common error students may make is to multiply the fractional constant by its reciprocal, resulting in incorrectly identifying Sarah as correct. This indicates confusion in applying inverse operations with fractional coefficients and fractional constants. Students may benefit from additional practice in solving one- and two-step equations involving fractional coefficients and constants. Students may also benefit from practice confirming algebraic solutions to linear equations in one variable.*

4. Write and solve an equation to represent each situation.

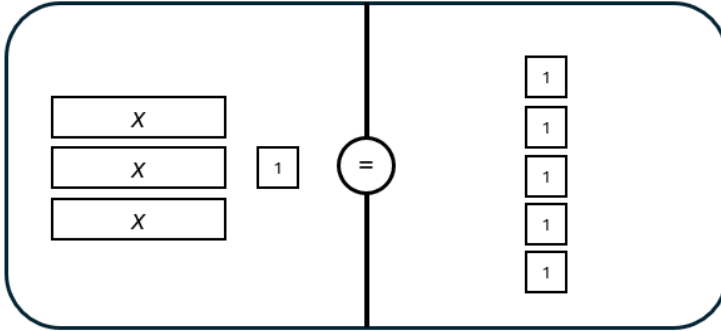
- a) Emma earns \$10 per hour baby-sitting. One weekend she also received a \$15 tip. If she earned \$75 total that weekend, how many hours did she baby-sit?

*A common error students may make is confusing the coefficient with the constant, resulting in the incorrect equation of  $15x + 10 = 75$ . Students making this error may benefit from noting the key ideas from the problem and clearly labeling what each value represents: \$10 per hour, \$15 tip, \$75 total.*

- b) Ben spent \$22 at the fair. He paid an \$8 entrance fee and bought ride tickets at a cost of \$2 each. How many ride tickets did he buy?

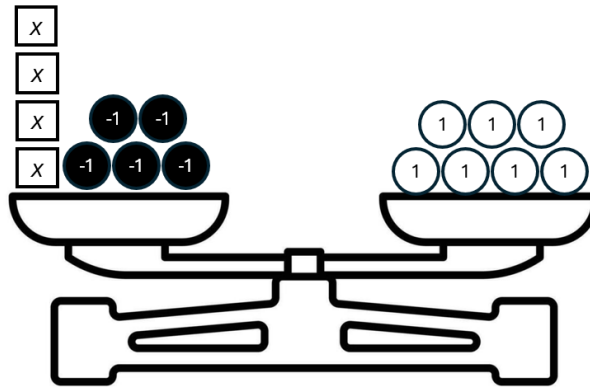
*A common error students may make is ignoring the \$8 entrance fee and believing that the \$22 reflects only the amount spent on tickets. Students making this error may incorrectly write  $2x = 22$  and determine that Ben bought 11 tickets. Students making this error would benefit from experiences restating the contextual situation and describing each of the key ideas from the problem to a partner.*

5. The algebra tiles below represent an equation. Write an equation for this model and solve for  $x$ .



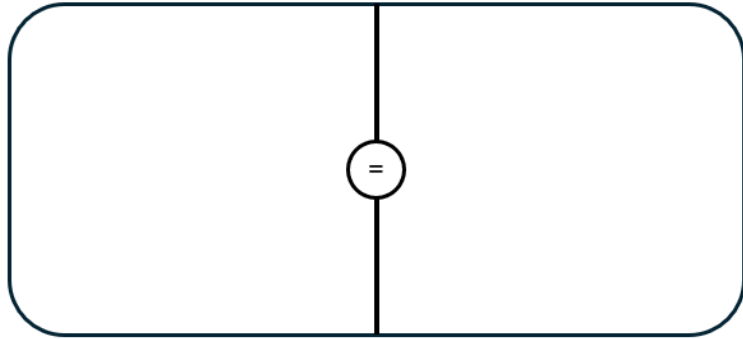
*A common error students may make is to incorrectly write an expression rather than an equation resulting in  $3x + 1 + 5$ . This error indicates that the student is not making the connection between pictorial and symbolic representations of equations.*

6. The balance scale represents an equation. Write an equation for this model and solve for  $x$ .



*A common error students may make is to translate the model as  $4x + 5 = 7$ . This indicates a misunderstanding of negative numbers and how they are represented. Students may benefit from exposure to different visual representations of equations including pictorial representations including colored tiles, balance scales, and algebra tiles. There are also many online interactive tools that may be helpful in building conceptual understanding.*

7. Use the algebra tile work mat below to draw a representation for  $8 = 2x - 4$ .



*A common error students may make is to represent the coefficient separately from the variable, using two squares to represent 2 and only one x, thus representing the equation as  $8 = 2 + x - 4$ . This indicates a misunderstanding of the multiplicative nature of coefficients. Students would benefit from additional experiences modeling and solving equations with a variety of representations.*