



Fishtank Plus Feature Sample

Expanded Assessment Package

7th Grade Mathematics
Unit 4 - Equations and Inequalities

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Pre-Unit Assessment

7th Grade Mathematics
Unit 4 - Equations and Inequalities

Name: _____

Date: _____

1. Find the value of each expression below:

a. $-7 - 4$

b. $(-3)(-5)$

c. $-8.7 + 1.25$

d. $\frac{-24}{-6}$

e. $\frac{1}{3}(-6)$

2. Simplify the following expressions:

a. $2b - 5 + 10ab - 7b + 6$

b. $2(3x + 6)$

c. $\frac{1}{4}(8x - 36)$

3. Which equations below have a solution of $x=2$? Select **all** that apply.

A. $5x = 10$

B. $10 - x = 5$

C. $x + 5 = -7$

D. $\frac{1}{2}x = 1$

E. $\frac{x}{4} = 2$

4. Solve each equation below:

a. $x + 7 = 22$

b. $-4x = 52$

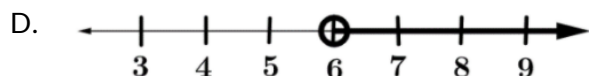
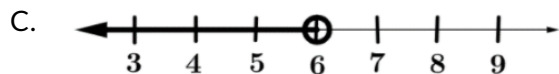
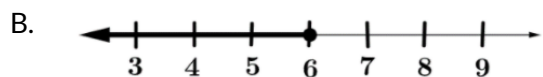
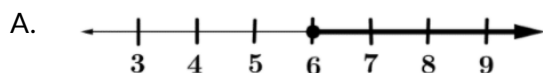
5. The ratio of male teachers to female teachers in a school is 1 to 5. If there are 60 female teachers, how many male teachers are there?

Draw a tape diagram and use it to show your answer.

6. You go out to dinner with Ben, Carla, and David. When the bill arrives, you decide to split the bill evenly. The total bill, including tip and tax, was \$96.

How much did you pay? Write an equation to represent the situation. Then find the solution.

7. Which of the following number lines represents the solution set $6 \leq x$?



Pre-Unit Assessment Answer Key & Teacher Guide

7th Grade Mathematics
Unit 4 - Equations and Inequalities

Teacher Answer Key & Guide

1. Find the value of each expression below:

a. $-7 - 4$

b. $(-3)(-5)$

c. $-8.7 + 1.25$

d. $\frac{-24}{-6}$

e. $\frac{1}{3}(-6)$

Solution:

a. -11

b. 15

c. -7.45

d. 4

e. -2

Operating with rational numbers (7.NS.A.1,7.NS.A.2)

In this unit, students encounter rational numbers in equations and inequalities in different forms, including decimals and fractions. Students will extend operations with rational numbers to solve equations and inequalities algebraically and in the process will need a strong grasp on working with signed rational numbers. Students will benefit from being able to quickly and accurately determine if a sum, difference, product, or quotient will be negative or positive based on the signs of the numbers involved to minimize errors.

Potential Course of Action

- This concept connects to many aspects of students' work in this unit. If needed, address the rules for performing operations with rational numbers in the beginning of the unit, and then as needed throughout.
- For example, include fluency practice with rational numbers, such as those above, in a warm up for Lesson 1 or Lesson 4, and as needed throughout the unit.

- Find problems and other resources in these Fishtank lessons:

| Lesson | Standards | Objective |
|---|--|---|
| Grade 7 Math, Unit 2, Lesson 10 | 7.NS.A.1.D | Add and subtract rational numbers efficiently using properties of operations. |
| Grade 7 Math, Unit 2, Lesson 13 | 7.NS.A.2.A 7.NS.A.2.C | Multiply signed rational numbers and interpret products in real-world contexts. |
| Grade 7 Math, Unit 2, Lesson 15 | 7.NS.A.2.B 7.NS.A.2.C | Divide signed rational numbers and interpret quotients in real-world contexts. |
| Grade 7 Math, Unit 2, Lesson 17 | 7.NS.A.2 7.NS.A.2.C | Multiply and divide with rational numbers using properties of operations. |
| Grade 7 Math, Unit 2, Lesson 11 | 7.NS.A.1 7.NS.A.1.A 7.NS.A.1.B 7.NS.A.1.C 7.NS.A.1.D | Add and subtract rational numbers using a variety of strategies. |

2. Simplify the following expressions:

a. $2b - 5 + 10ab - 7b + 6$

b. $2(3x + 6)$

c. $\frac{1}{4}(8x - 36)$

Solution:

a. $-5b + 10ab + 1$

b. $6x + 12$

c. $2x - 9$

Simplifying expressions (7.EE.A.1,6.EE.A.3)

In 6th grade and in Unit 3, students simplified algebraic expressions by combining like terms, using the distributive property, and applying properties of operations with rational numbers. In this unit, students will build on this work to solve algebraic equations and inequalities. In the process of solving equations and inequalities, students will simplify expressions to write more and more simple equivalent equations. The ability to accurately and efficiently simplify expressions will allow students to focus on the inverse operations they perform and to minimize errors along the way.

Potential Course of Action

- If needed, this concept should be addressed early in the unit before students solve equations in the form $px+q=r$ algebraically, in Lesson 4.
 - For example, include a couple of problems on simplifying expressions in a warm up for Lesson 4 or again later in the unit for Lessons 5 – 7, 9 – 11.

- Find problems and other resources in these Fishtank lessons:

| Lesson | Standards | Objective |
|---|----------------------|---|
| Grade 6 Math, Unit 5, Lesson 7 | 6.EE.A.3 6.EE.A.4 | Identify equivalent expressions (Part 1). |
| Grade 6 Math, Unit 5, Lesson 8 | 6.EE.A.3 6.EE.A.4 | Identify equivalent expressions (Part 2). |
| Grade 6 Math, Unit 5, Lesson 9 | 6.EE.A.3 | Write equivalent expressions using the distributive property (Part 1). |
| Grade 6 Math, Unit 5, Lesson 10 | 6.EE.A.3 | Write equivalent expressions using the distributive property (Part 2). |
| Grade 7 Math, Unit 3, Lesson 4 | 7.EE.A.1 | Expand and factor expressions with negative rational numbers. |
| Grade 7 Math, Unit 3, Lesson 5 | 7.EE.A.1 | Add and simplify expressions by combining like terms. |
| Grade 7 Math, Unit 3, Lesson 6 | 7.EE.A.1 | Subtract and simplify expressions. |
| Grade 7 Math, Unit 3, Lesson 7 | 7.EE.A.1 | Simplify expressions by combining like terms and using the distributive property and properties of operations (Part 1). |
| Grade 7 Math, Unit 3, Lesson 8 | 7.EE.A.1 | Simplify expressions by combining like terms and using the distributive property and properties of operations (Part 2). |

3. Which equations below have a solution of $x=2$? Select **all** that apply.

A. $5x = 10$

B. $10 - x = 5$

C. $x + 5 = -7$

D. $\frac{1}{2}x = 1$

E. $\frac{x}{4} = 2$

Solution:

A,D

Understanding solutions to an equation (6.EE.B.5)

In this problem, students are given a specific value for x , and they identify which equations have this value for a solution. While students *could* solve each equation, they could more efficiently substitute the value 2 in for x in each equation and see if it creates a true statement. This is a valuable tool to be able to check solutions throughout the unit. In this unit, students will solve equations of the forms $px + q = r$ and $p(x + q) = r$ and it will be important for them to have a conceptual understanding of what it means to be a solution to an equation.

Potential Course of Action

- If needed, this concept should be addressed early on in the unit and throughout the unit as a way to check a particular solution.
 - For example, include a couple of problems on testing or defining solutions during Lesson 1 and throughout the unit.
 - Note that Lesson 1 includes review of solving one-step equations.
- Find problems and other resources in these Fishtank lessons:

| Lesson | Standards | Objective |
|--|-----------|---|
| Grade 6 Math, Unit 6, Lesson 2 | 6.EE.B.5 | Define and identify solutions to equations. |

4. Solve each equation below:

a. $x + 7 = 22$

b. $-4x = 52$

Solution:

a. $x = 15$

b. $x = -13$

Solving one-step equations (6.EE.B.7)

In 6th grade, students solved one-step equations first by using diagrams and balances, and then generalized their actions to solve equations algebraically. Students should understand that in the process of solving for a variable, whatever is done to one side of the equation must also be done to the other side in order to maintain the balance and equality. In 7th grade, students will extend this work of maintaining a balance using inverse operations to solve two-step equations of the forms $px + q = r$ and $p(x + q) = r$.

Potential Course of Action

- If needed, this concept should be addressed before or during the first four lessons of the unit as students work towards solving two-step equations algebraically.
 - For example, include a couple of problems on solving one-step equations, similar to above, in a warm up for Lesson 1 or a homework for Lesson 3. Simple equations addressing specific misconceptions can be included as needed throughout the unit.
 - Note that Lesson 1 includes review of solving one-step equations.
- Find problems and other resources in these Fishtank lessons:

| Lesson | Standards | Objective |
|--|----------------------|---|
| Grade 6 Math, Unit 6, Lesson 4 | 6.EE.B.6 6.EE.B.7 | Solve one-step equations with addition and subtraction. |
| Grade 6 Math, Unit 6, Lesson 5 | 6.EE.B.6 6.EE.B.7 | Solve one-step equations with multiplication and division. |
| Grade 6 Math, Unit 6, Lesson 7 | 6.EE.B.6 6.EE.B.7 | Solve multi-part equations leading to the form $x + p = q$ and $px = q$. |

5. The ratio of male teachers to female teachers in a school is 1 to 5. If there are 60 female teachers, how many male teachers are there?

Draw a tape diagram and use it to show your answer.

Solution:

male: $\boxed{12}$
 female: $\boxed{12}\boxed{12}\boxed{12}\boxed{12}\boxed{12} = 60$
 12 male teachers

Using a tape diagram to solve problems (6.RP.A.3)

In 6th, students used tape diagrams to reason and solve real-world problems involving ratio and rate. In this unit, students will build upon their knowledge of tape diagrams to represent and write equations to model real-world situations. Students will understand how a tape diagram can be helpful to visualize a solution pathway for an equation.

Potential Course of Action

- If needed, this concept should be addressed early on in the unit before students use tape diagrams to model equations in Lesson 2.
 - For example, include a couple of problems on modeling situations using tape diagrams, similar to above, in a warm up for Lesson 2 or Homework for Lesson 1.
- Find problems and other resources in these Fishtank lessons:

| Lesson | Standards | Objective |
|---|----------------------|--|
| Grade 6 Math, Unit 1, Lesson 15 | 6.RP.A.1 6.RP.A.3 | Solve part:part ratio problems using tape diagrams. |
| Grade 6 Math, Unit 1, Lesson 16 | 6.RP.A.1 6.RP.A.3 | Solve part:whole ratio problems using tape diagrams. |
| Grade 6 Math, Unit 1, Lesson 17 | 6.RP.A.3 | Solve more complex ratio problems using tape diagrams. |
| Grade 6 Math, Unit 1, Lesson 18 | 6.RP.A.3 | Solve ratio problems using a variety of strategies, including reasoning about diagrams, double number lines, tables, and tape diagrams. Summarize strategies for solving ratio problems. |

6. You go out to dinner with Ben, Carla, and David. When the bill arrives, you decide to split the bill evenly. The total bill, including tip and tax, was \$96.

How much did you pay? Write an equation to represent the situation. Then find the solution.

Solution:

x = how much you pay

$$\begin{array}{r} 4x = 96 \\ \hline 4 \quad 4 \\ \hline \end{array}$$

$$x = 24$$

You pay \$24.

Constructing and solving one-step equations (6.EE.B.7)

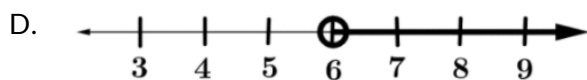
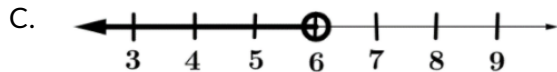
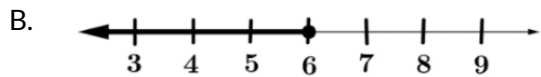
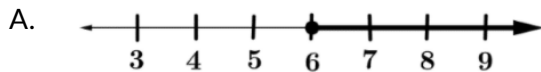
In 6th grade, students solved real-world problems by writing and solving one-step equations. In this unit, students will extend their understanding of one-step equations to continue to represent real-world situations algebraically in the forms $px + q = r$ and $p(x + q) = r$. Students will also reason through situations to determine when two cases are the same.

Potential Course of Action

- If needed, this concept should be addressed at some point before students write equations for real-world situations in Lessons 5 – 7.
 - For example, include a couple of problems on constructing one-step equations, similar to the one above, in a warm up for Lesson 5 or Homework for Lesson 4.
- Find problems and other resources in these Fishtank lessons:

| Lesson | Standards | Objective |
|--|----------------------|---|
| Grade 6 Math, Unit 6, Lesson 3 | 6.EE.B.6 6.EE.B.7 | Write equations for real-world situations. |
| Grade 6 Math, Unit 6, Lesson 7 | 6.EE.B.6 6.EE.B.7 | Solve multi-part equations leading to the form $x + p = q$ and $px = q$. |

7. Which of the following number lines represents the solution set $6 \leq x$?



Solution:

A

Graphing an inequality on a number line (6.EE.B.8)

In 6th grade, students represented solutions to inequalities of the form $x > c$ or $x < c$ on number line diagrams, which this problem reviews. In this unit, students write, solve, and model real-world situations with inequalities. Students should recognize that inequalities have infinitely many solutions, which can be represented on a number line diagram.

Potential Course of Action

- If needed, this concept should be addressed at some point before students begin to solve inequalities in Lesson 8.
 - For example, include a couple of problems on graphing all solutions to an inequality on a number line diagram, similar to above, in a warm up for Lesson 8.
- Find problems and other resources in these Fishtank lessons:

| Lesson | Standards | Objective |
|---|-----------|--|
| Grade 6 Math, Unit 6, Lesson 9 | 6.EE.B.8 | Write and graph inequalities for real-world conditions. (Part 1) |
| Grade 6 Math, Unit 6, Lesson 10 | 6.EE.B.8 | Write and graph inequalities for real-world conditions. (Part 2) |

Mid-Unit Assessment & Answer Key

7th Grade Mathematics
Unit 4 - Equations and Inequalities

Name: _____

Date: _____

For numbers 1-4, solve the equation, showing all work.

1. $\frac{1}{3} + x = \frac{1}{6}$

2. $0.4a + 1.2 = 3.6$

3. $\frac{1}{2}(n - 6) = 44$

4. $-8q + 16 = -16$

5. Ms. Jones asked students to solve the equation $10 - 2x = -18$. Allen shows the following work:

$$\begin{array}{l} \text{Step 1: } \begin{array}{r} 10 - 2x = -18 \\ +10 \qquad +10 \\ \hline \end{array} \\ \text{Step 2: } \begin{array}{r} -2x = -8 \\ -2 \quad -2 \\ \hline x = 4 \end{array} \end{array}$$

a. Identify and describe Allen's error.

b. Solve $10 - 2x = -18$.

6. A plumber costs a fixed fee of \$50 plus \$20 per hour. Ella has a clogged kitchen sink so she called the plumber. If the plumber charged Ella \$150, how many hours did it take the plumber to fix the kitchen sink?

7. Juan, Bob, and Ned run a marathon together as a team, a total of 26.2 miles. Bob runs eight-tenths of a mile less than three times the miles that Juan runs. Ned runs 2 miles more than Juan.

How many miles did Juan, Bob, and Ned each run? Use any strategy, such as a tape diagram or equation, to find your answer, showing your work clearly.

Answer Key

This Mid-Unit Assessment covers content from Lessons 1 – 7 of Unit 4.

| Question | Standard | Aspect of Rigor | Point Value | Correct Answer and Scoring Guidance |
|----------|------------------------|-----------------|-------------|--|
| 1 | 7.EE.B.4.A | P/F | 1 | $x = -\frac{1}{6}$ |
| 2 | 7.EE.B.4.A | P/F | 2 | $a = 6$ |
| 3 | 7.EE.B.4.A | P/F | 2 | $n = 94$ |
| 4 | 7.EE.B.4.A | P/F | 2 | $q = 4$ |
| 5a | 7.EE.B.4.A | C, P/F | 2 | <p>Allen made a mistake in step 1 using incorrect inverse operations. He added 10 to both sides, but $10+10=20$, not zero. He should have subtracted 10 from both sides.</p> <p>(Or equivalent)</p> <p>*See 2-point rubric on last page</p> |
| 5b | 7.EE.B.4.A | P/F | 2 | $x = 14$ |
| 6 | 7.EE.B.4.A | C, A | 2 | <p>5 hours</p> <p>*See 2-point rubric on last page</p> |
| 7 | 7.EE.B.3 7.EE.B.4.A | C, A | 3 | <p>Jun runs 5 miles</p> <p>Bob runs 14.2 miles</p> <p>Ned runs 7 miles</p> |

2-Point Rubric

| | |
|----------|---|
| 2 points | Student response demonstrates an exemplary understanding of the concepts in the task. The student correctly and completely answers all aspects of the prompt. |
| 1 point | Student response demonstrates a fair understanding of the concepts in the task. The student arrived at a partially acceptable conclusion, showing mixed evidence of understanding of the task, with some aspects of the task completed correctly, while others not. |
| 0 points | Student response contains insufficient evidence of an understanding of the concepts in the task. Work may be incorrect, unrelated, illogical, or a correct solution obtained by chance. |

Post-Unit Assessment Analysis

7th Grade Mathematics
Unit 4 - Equations and Inequalities

Name: _____ Date: _____

1. Ms. Gartland bought x number of shirts for the new members of her chorus. The cost for x number of shirts, including \$3.99 shipping, was \$77.49. Each shirt cost \$12.25. There was not sales tax on this purchase. Which equation could be used to find x ?

- a. $3.99(x + 12.25) = 77.49$
- b. $3.99x + 12.25 = 77.49$
- c. $12.25(x + 3.99) = 77.49$
- d. $12.25x + 3.99 = 77.49$

From EngageNY.org of the New York State Education Department. [Grade 7 Common Core Mathematics Test Released Questions June 2017](https://www.engageny.org/resource/grade-7-common-core-mathematics-test-released-questions-june-2017), Question #2. Internet. Available from <https://www.engageny.org/resource/grade-7-common-core-mathematics-test-released-questions-june-2017>; accessed January 15, 2019.

Solution:

D

Standard: 7.EE.4a

Aspect of Rigor: Application and Conceptual Understanding

Points: 1

Potential Rationales for Incorrect Answers

- a. Student chose an equation where they added the number of shirts, x , to the price of each shirt and then multiplied this quantity by the shipping cost.
- b. Student chose an equation where they multiplied the number of shirts, x , by the shipping cost and then added the cost of each shirt.
- c. Student chose an equation where they added the number of shirts, x , to the shipping cost and then multiplied this quantity by the cost of each shirt.
- d. Correct Answer.

Commentary

In this problem, students demonstrate their understanding of how to model a real-world problem using an equation. They must recognize that x represents the number of shirts and each shirt costs \$12.25, meaning 12.25 should be multiplied by x and then the one-time shipping cost should be added to find the total cost since this is a fixed cost. It may be valuable to look at student work and performance on constructing equations in related problems #3, 7, 8, 10.

2. Mike took a taxi from his home to the airport. The taxi driver charged an initial fee of \$6 plus \$3 per mile. The total fare was \$24, not including the tip. How many miles did Mike travel by taxi on his ride?
- a. 2
 - b. 6
 - c. 8
 - d. 10

From EngageNY.org of the New York State Education Department. [Grade 7 Common Core Mathematics Test Released Questions May 2016](https://www.engageny.org/resource/released-2016-3-8-ela-and-mathematics-state-test-questions/file/148611), Question #33. Internet. Available from <https://www.engageny.org/resource/released-2016-3-8-ela-and-mathematics-state-test-questions/file/148611>; accessed January 15, 2019.

Solution:

B

Standard: 7.EE.4a

Aspect of Rigor: Application and Procedural Skill and Fluency

Points: 1

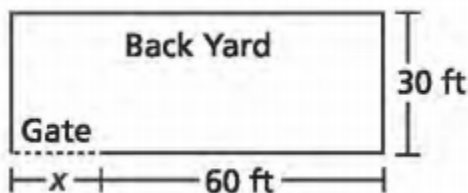
Potential Rationales for Incorrect Answers

- a. Student may have divided the total fare by the rate first, then subtracted the initial fee.
- b. Correct Answer.
- c. Student may have divided the total fare by the rate and ignored the initial fee.
- d. Student may have added the initial fee onto the total fare before dividing by the rate.

Commentary

In this problem, students are asked to answer a real-world problem. They must interpret the initial fee as a fixed cost and the cost per mile as a variable cost, which depends on the total number of miles Mike traveled by taxi. Students may write an equation, $6 + 3m = 24$, to represent and answer this problem and then correctly use inverse operations to solve for the total number of miles Mike traveled by taxi.

3. When Keisha installed a fence along the 200-foot perimeter of her rectangular back yard, she left an opening for a gate. In the diagram below, she used x to represent the length, in feet, of the gate.



What is the value of x ? Show your work.

From EngageNY.org of the New York State Education Department. [Grade 7 Common Core Mathematics Test Released Questions May 2016](https://www.engageny.org/resource/released-2016-3-8-ela-and-mathematics-state-test-questions/file/148611), Question #44. Internet. Available from <https://www.engageny.org/resource/released-2016-3-8-ela-and-mathematics-state-test-questions/file/148611>; accessed January 15, 2019. Modified by The Match Foundation, Inc.

Solution (2 pts):

$$\begin{aligned}
 200 &= 2(30) + 2(60 + x) \\
 200 &= 60 + 120 + 2x \\
 200 &= 180 + 2x \\
 -180 &\quad -180 \\
 \hline
 20 &= 2x \\
 \frac{2}{2} &\quad \frac{2}{2} \\
 10 &= x
 \end{aligned}$$

Partial Solution (1 pt):

In the solution below, the student made one error in the solution. The student distributed 2 to the first term in the parentheses, but did not distribute 2 to the second term, resulting in x instead of $2x$.

$$\begin{aligned}
 200 &= 2(30) + 2(60 + x) \\
 200 &= 60 + 120 + x \\
 200 &= 180 + x \\
 -180 &\quad -180 \\
 \hline
 20 &= x
 \end{aligned}$$

Incorrect Solution (0 pts):

In the solution below, the student incorrectly wrote an equation to represent the situation. The student did not demonstrate knowledge of the relationship between the perimeter and the side lengths of a rectangle.

$$\begin{aligned}
 200 &= 30 + 60 + x \\
 200 &= 90 + x \\
 -90 &\quad -90 \\
 \hline
 110 &= x
 \end{aligned}$$

Standard: 7.EE.4a

Aspect of Rigor: Application and Conceptual Understanding

Points: 2

Commentary

In this problem, students are asked to use their knowledge of perimeter to find the length of the gate, a missing dimension of the length of the backyard. Students first recognize that the length of the backyard can be described by the expression $60 + x$. Then, they can use their knowledge of perimeter to write an equation to describe this real-world problem. Students apply the distributive property, combine like terms, and use inverse operations to solve for x .

When looking at student work, distinguish between errors in computation and errors in approach. For example, did the students correctly write an equation to represent the perimeter, but made computation or solving errors? Or did the student incorrectly write an equation to represent the situation? Identify places where students make errors, as opposed to where student responses do not match with a correct response.

4. Solve the equation, showing all your work.

$$7n + 14 = -21$$

Question #13 in [Math Spring Operational 2016 Grade 7 Released Items](http://parcc-assessment.org/content/uploads/released_materials/05/Grade_07_Math_Item_Set.pdf) made available by [Partnership for Assessment of Readiness for College and Careers \(PARCC\)](http://parcc-assessment.org/content/uploads/released_materials/05/Grade_07_Math_Item_Set.pdf) at http://parcc-assessment.org/content/uploads/released_materials/05/Grade_07_Math_Item_Set.pdf. Copyright © 2017 All Rights Reserved. Accessed January 15, 2019. Modified by The Match Foundation, Inc.

Solution (2 pts):

$$\begin{array}{r} 7n + 14 = -21 \\ -14 \quad -14 \\ \hline 7n = -35 \quad n = -5 \\ \frac{7}{7} \quad \frac{-35}{7} \end{array}$$

Partial Solution (1 pt):

In the solution below, the student made one error in the solution. The student incorrectly combined -21 and -14 to get 35 instead of -35 .

$$\begin{array}{r} 7n + 14 = -21 \\ -14 \quad -14 \\ \hline 7n = 35 \quad n = 5 \\ \frac{7}{7} \quad \frac{35}{7} \end{array}$$

Incorrect Solution (0 pts):

In the solution below, the student made two errors and did not demonstrate an understanding of inverse operations. The student incorrectly added 14 to both sides of the equation and multiplied both sides by 7 to solve the equation.

$$\begin{array}{r} 7n + 14 = -21 \\ +14 \quad +14 \\ \hline 7n = -7 \\ \times 7 \quad \times 7 \\ \hline n = -49 \end{array}$$

Standard: 7.EE.4a

Aspect of Rigor: Procedural Skill and Fluency

Points: 2

Commentary

In this problem, students are assessed on their ability to solve an equation in the form $px + q = r$, demonstrating procedural fluency. Students must use inverse operations and follow the rules for computing with rational numbers.

When looking at student work, check to see how students combine -21 and -14 to ensure they are following the rules for computing with rational numbers. Identify places where students make errors, as opposed to where student responses do not match with a correct response.

5. Solve the equation, showing all your work.

$$\frac{1}{3}(x + 15) = 9$$

Solution (2 pts):

$$\begin{array}{r} \frac{1}{3}(x+15) = 9 \\ \frac{1}{3}x + 5 = 9 \\ -5 \quad -5 \\ \hline \frac{1}{3}x = 4 \\ \times 3 \quad \times 3 \\ \hline x = 12 \end{array}$$

Partial Solution (1 pt):

In the solution below, the student made one error. The student distributed $\frac{1}{3}$ to the first term in the parentheses, but did not distribute $\frac{1}{3}$ to the second term, resulting in 15 instead of 5.

$$\begin{array}{r} \frac{1}{3}(x+15) = 9 \\ \frac{1}{3}x + 15 = 9 \\ -15 \quad -15 \\ \hline \frac{1}{3}x = -6 \\ \times 3 \quad \times 3 \\ \hline x = -18 \end{array}$$

Incorrect Solution (0 pts):

In the solution below, the student made three errors. The student distributed $\frac{1}{3}$ to the first term in the parentheses, but did not distribute $\frac{1}{3}$ to the second term, resulting in 15 instead of 5. Then the student did not demonstrate an understanding of inverse operations by incorrectly adding 15 to both sides and multiplying both sides by $\frac{1}{3}$ to solve the equation.

$$\begin{array}{r} \frac{1}{3}(x+15) = 9 \\ \frac{1}{3}x + 15 = 9 \\ +15 \quad +15 \\ \hline \frac{1}{3}x = 24 \\ \times \frac{1}{3} \quad \times \frac{1}{3} \\ \hline x = 8 \end{array}$$

Standard: 7.EE.4a

Aspect of Rigor: Procedural Skill and Fluency

Points: 2

Commentary

In this problem, students are assessed on their ability to solve an equation in the form $p(x + q) = r$, where p is a fraction, demonstrating their procedural fluency. Students may first apply the distributive property and then use inverse operations to solve for x , or they may first multiply both sides of the equation by 3 and then use inverse operations to solve for x .

When looking at student work, check to see how the students applied the distributive property and used inverse operations. Identify places where students make errors, as opposed to where student responses do not match with a correct response.

6. Solve the equation, showing all your work.

$$-3(x - 2) = 6$$

Question #13 in [Math Spring Operational 2016 Grade 7 Released Items](http://parcc-assessment.org/content/uploads/released_materials/05/Grade_07_Math_Item_Set.pdf) made available by [Partnership for Assessment of Readiness for College and Careers \(PARCC\)](http://parcc-assessment.org/content/uploads/released_materials/05/Grade_07_Math_Item_Set.pdf) at http://parcc-assessment.org/content/uploads/released_materials/05/Grade_07_Math_Item_Set.pdf. Copyright © 2017 All Rights Reserved. Accessed January 15, 2019. Modified by The Match Foundation, Inc.

Solution (2 pts):

$$\begin{array}{r} -3(x-2) = 6 \\ -3x + 6 = 6 \\ \quad -6 \quad -6 \\ \hline -3x = 0 \\ \quad -3 \quad -3 \\ \hline x = 0 \end{array}$$

Partial Solution (1 pt):

In the solution below, the student made one error. The student distributed -3 to the first term in the parentheses, but did not distributive the negative value to the second term, resulting in -6 rather than positive 6.

$$\begin{array}{r} -3(x-2) = 6 \\ -3x - 6 = 6 \\ \quad +6 \quad +6 \\ \hline -3x = 12 \\ \quad -3 \quad -3 \\ \hline x = -4 \end{array}$$

Incorrect Solution (0 pts):

In the solution below, the student made two errors. The student subtracted 3 from both sides of the equation without realizing that the -3 was being multiplied by a sum in parentheses. Then the student subtracted 2 from both sides of the equation, demonstrating a lack of understanding of inverse operations.

$$\begin{array}{r} -3(x-2) = 6 \\ -3 \quad \quad -3 \\ \hline x - 2 = 3 \\ \quad -2 \quad -2 \\ \hline x = 1 \end{array}$$

Standard: 7.EE.4a

Aspect of Rigor: Procedural Skill and Fluency

Points: 2

Commentary

In this problem, students are assessed on their ability to solve an equation in the form $p(x + q) = r$, where p is a negative integer, demonstrating their procedural fluency. Students must correctly compute with rational numbers, apply the distributive property, and use inverse operations to solve for x . Students may first apply the distributive property and then use inverse operations to solve for x , or they may first divide both sides of the equation by -3 and then use inverse operations to solve for x .

When looking at student work, check to see how the student applied the distributive property and performed operations with positive and negative integers. Identify places where students make errors, as opposed to where student responses do not match with a correct response.

7. Peter hired a cleaning company to clean his house. The cleaning company charges a fixed fee of \$15 plus \$17 per hour to clean a house.
- Write an equation that can be used to determine, c , the total amount in dollars that the cleaning company charges to clean a house in h hours.
 - The cleaning company charged a total of \$83 to clean Peter's house. How many hours did it take to clean Peter's house?
 - A second cleaning company charges \$20 per hour to clean a house. The second company does **not** charge a fixed fee in addition to their hourly rate. For what number of hours is the total amount charged for cleaning a house the same for both companies? Show or explain how you got your answer.

Solution (5 pts):

$$\begin{array}{r} \text{b) } 83 = 15 + 17h \\ -15 \quad -15 \\ \hline 68 = 17h \\ \underline{17} \quad \underline{17} \\ 4 = h \\ 4 \text{ hours} \end{array}$$

Partial Solution for part b (1 pt):

b) $83 = 15 + 17h$
 $\begin{array}{r} 83 = 15 + 17h \\ -15 \quad -15 \\ \hline 68 = 17h \\ -17 \quad -17 \\ \hline 51 = h \end{array}$ 51 hours

Incorrect Solution for part b (0 pts):

b) $C = 15 + 17(83)$
 $C = 15 + 1411$
 $C = 1,426$ 1,426 hours

Partial Solution for part c (1 pt):

In the solution below, the student correctly created and applied a tape diagram to create an equation to describe the real-world problem. Then the student incorrectly solved the equation by subtracting 3 from both sides, not recognizing that 3 and h are multiplied and the inverse operation is division.

c)

$$3h = 15$$

$$\begin{array}{r} -3 \quad -3 \\ h = 12 \\ 12 \text{ hours} \end{array}$$

Incorrect Solution for part c (0 pts):

In the solution below, the student incorrectly approached the problem by not identifying the variable quantity of \$17 per hour to clean a house. Then the student incorrectly computed with rational numbers, $20 - 32 = 12$, rather than -12 .

c)

$$20 - (17 + 15)$$

$$20 - 32$$

$$12 \text{ hours}$$

Standard: 7.EE.4a, 7.EE.3

Aspect of Rigor: Application and Conceptual Understanding

Points: 5 (1 pt for part a, 2 pts for part b, 2 pts for part c)

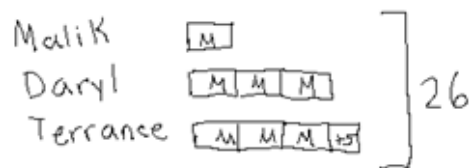
Commentary

This problem brings together several standards from the unit in one contextual situation. In part *a*, students must interpret the situation to write an equation in two variables. In solving part *b*, students may use the equation they write in part *a* to find how many hours it takes to clean Peter's house. In part *c*, students are asked to determine when two cleaning companies will charge the same amount to clean a house. Students can use a tape diagram to model the situation and then write an equation from their tape diagram.

When looking at student work, distinguish between errors in computation and errors in approach. For example, did the students correctly use a tape diagram to write an equation to describe this real-world problem, but made computation errors? Or did the student incorrectly model the real-world problem with a diagram and/or equation? There are multiple places where students may make an error; if a student makes an error in writing an equation to determine the total amount the cleaning company charges in part *a*, but completes the rest of the problem correctly using an incorrect equation, then ensure the student receives credit for correct work done.

8. There are three brothers in the Howard family, Daryl, Malik, and Terrance, whose ages add up to 26 years. Daryl is 3 times as old as Malik, and Terrance is 5 years older than Daryl. Use any strategy, such as a tape diagram or equation, to find the age of each brother. Show your work.

Solution (3 pts):



$$M + 3M + (3M + 5) = 26$$

$$\begin{array}{r} 7M + 5 = 26 \\ -5 \quad -5 \\ \hline 7M = 21 \\ \underline{7} \quad \underline{7} \\ M = 3 \end{array}$$

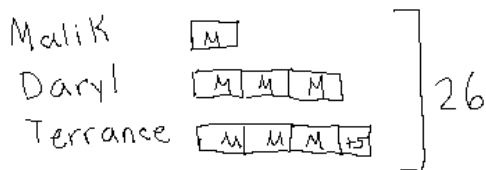
$$\begin{array}{l} \text{Daryl} = 3M \\ = 3(3) \\ = 9 \end{array}$$

$$\begin{array}{l} \text{Terrance} = 3M + 5 \\ = 3(3) + 5 \\ = 9 + 5 \\ = 14 \end{array}$$

Malik is 3 years old, Daryl is 9 years old and Terrance is 14 years old.

Partial Solution (2 pts):

In the solution below, the student correctly models the real-world problem using a tape diagram and finds Malik's and Daryl's age. Then the student incorrectly find Terrance's age.



$$M + 3M + (3M + 5) = 26$$

$$\begin{array}{r} 7M + 5 = 26 \\ -5 \quad -5 \\ \hline 7M = 21 \\ \underline{7} \quad \underline{7} \\ M = 3 \end{array}$$

$$\begin{array}{l} \text{Daryl} = 3M \\ = 3(3) \\ = 9 \end{array}$$

$$\begin{array}{l} \text{Terrance} = M + 5 \\ = 3 + 5 \\ = 8 \end{array}$$

Malik is 3 years old, Daryl is 9 years old and Terrance is 8 years old.

Partial Solution (1 pts):

In the solution below, the student did not account for Malik's age in the expression representing the sum of the ages. The student also did not fully answer the question and find the ages of all of the brothers.

$$\begin{array}{r}
 3m + 3m + 5 \\
 6m + 5 = 26 \\
 \underline{-5 \quad -5} \\
 6m = 21 \\
 \underline{6 \quad 6} \quad m = 3.5
 \end{array}$$

Incorrect Solution (0 pts):

In the solution below, the student only represented Terrance's age and did not account for Malik or Daryl. The student also did not fully answer the question and find the ages of all of the brothers.

$$\begin{array}{r}
 3m + 5 = 26 \\
 \underline{-5 \quad -5} \\
 3m = 21 \\
 \underline{3 \quad 3} \quad m = 7
 \end{array}$$

Standard: 7.EE.4a

Aspect of Rigor: Application and Conceptual Understanding

Points: 3

Commentary

In this problem, students interpret and solve a real-world problem using a tape diagram and/or an equation. They must interpret the relationship between the ages of Malik, Daryl, and Terrance, which students may choose to represent using a tape diagram and then model this situation using an equation. Then students must identify and combine like terms and use inverse operations to solve for Malik's age. Using Malik's age, students then find Daryl's and Terrance's age, which requires the students to substitute Malik's age into the expressions that represent Daryl's and Terrance's age.

When looking at student work, check to see if and how students represent each individual brother's age. The sum of the ages should reflect all three brothers' ages added together. Also check to see that students completely answer the question by finding the age of each brother, not just solving their equation or diagram for one brother's age.

9. There are 6 shipping boxes that each contain 36 lbs of merchandise from a toy store. Before the boxes are loaded onto a delivery truck, the same amount of additional merchandise is added to each box. The total weight of all of the boxes is 258 pounds. How much additional weight was added to each box?

Use any strategy, such as a tape diagram or equation, to find the amount of additional weight. Show your work.

Solution (3 pts):

$$\begin{array}{r}
 6(36+x) = 258 \\
 216 + 6x = 258 \\
 \underline{-216} \quad \underline{-216} \\
 6x = 42 \\
 \underline{\quad 6} \quad \underline{\quad 6} \\
 x = 7 \\
 7 \text{ pounds}
 \end{array}$$

Partial Solution (2 pts):

In the solution below, the student made one error. The student distributed 6 to the first term in the parentheses, but did not distribute 6 to the second term, resulting in x rather than $6x$.

$$\begin{array}{r}
 6(36+x) = 258 \\
 216 + x = 258 \\
 \underline{-216} \quad \underline{-216} \\
 x = 42 \\
 42 \text{ pounds}
 \end{array}$$

Partial Solution (1 pts):

In the solution below, the student correctly modeled the real-world problem using an equation, but incorrectly applied inverse operations to solve the equation, despite arriving at the correct value for x . The student subtracted 6 from both sides of the equation without realizing that the 6 was being multiplied by a sum in parentheses. The student also divided by 36 on both sides of the equation instead of subtracting both sides by 36.

$$\begin{array}{r}
 6(36+x) = 258 \\
 \underline{-6} \quad \underline{-6} \\
 36+x = 252 \\
 \underline{36} \quad \underline{36} \\
 x = 7 \\
 7 \text{ pounds}
 \end{array}$$

Incorrect Solution (0 pts):

In the solution below, the student incorrectly modeled the real-world problem. The student did not consider the fact that *each* shipping box already contained 36 pounds of merchandise and that additional merchandise was being added to *each* box, which caused the student to believe 36 pounds was a fixed value.

$$\begin{array}{r} 36 + 6x = 258 \\ - 36 \qquad - 36 \\ \hline 6x = 222 \\ \underline{6} \quad \underline{6} \\ x = 37 \\ 37 \text{ pounds} \end{array}$$

Standard: 7.EE.4a

Aspect of Rigor: Application and Conceptual Understanding

Points: 3

Commentary

In this problem, students interpret and solve a real-world problem leading to an equation in the form $p(x + r) = q$. The solution above highlights the use of an equation, where students interpret the weight of each box as $36 + x$, recognize that there are 6 such boxes each weighing $(36 + x)$ pounds leading them to the equation $6(36 + x) = 258$. Students may also use a different strategy, such as a tape diagram, to represent the same concepts. In finding the amount of additional weight, students must demonstrate accurate use of inverse operations.

When looking at student work, look closely at the steps students take throughout their work. As the partial solution worth 1 point demonstrates, students may still arrive at the correct value for the additional weight, despite demonstrating incorrect work.

10. A building code allows a maximum of 140 people in a meeting room. There is one large table in the room, along with some small tables. When filled, the large table seats 15 people, and the small tables each seat 5 people.

Which of the following can be used to find t , the **greatest** number of small tables that can be filled when the large table is also filled?

- a. $5t + 15 \geq 140$
- b. $5t + 15 \leq 140$
- c. $15t + 5 \geq 140$
- d. $15t + 5 \leq 140$

Question #8 in [Spring 2015 Grade 7 Mathematics Test](http://www.doe.mass.edu/mcas/2015/release/Gr7-Math.pdf) made available by the [Massachusetts Department of Elementary and Secondary Education](http://www.doe.mass.edu/mcas/2015/release/Gr7-Math.pdf) at <http://www.doe.mass.edu/mcas/2015/release/Gr7-Math.pdf>. © 2017 Commonwealth of Massachusetts. Accessed January 15, 2019.

Solution :

B

Standard: 7.EE.4b

Aspect of Rigor: Application and Conceptual Understanding

Points: 1

Potential Rationales for Incorrect Answers

- a. Student chose an inequality where the 140 people represented a minimum, not a maximum people in the room.
- b. Correct Answer.
- c. Student chose an inequality that could be used to find the number of *large* tables that could be filled, if one small table was filled and 140 was the minimum number of people in the room.
- d. Student chose an inequality that could be used to find the greatest number of *large* tables that could be filled, if one small table was filled and 140 was the maximum number of people in the room.

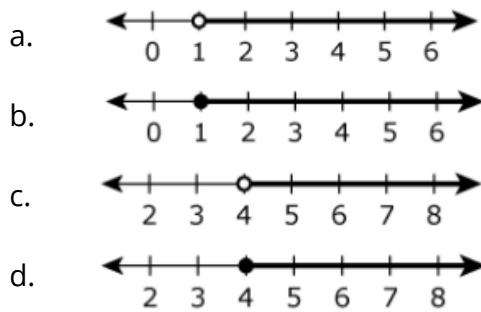
Commentary

In this problem, students demonstrate their ability to model a real-world problem using an inequality. They must recognize that t represents the greatest number of small tables that can be filled, which is unknown, and each small table seats 5 people, meaning 5 should be multiplied by t . Students must also recognize that there is one large table in the room that is full, which seats a total of 15 people, meaning 15 should be added to the total number of people at small tables, $5t$. Then, students must interpret the meaning of maximum to determine the inequality symbol, ≤ 140 , to be used in writing an inequality from this real-world problem. It may be valuable to look at student work and performance on writing inequalities in related problems #11, 14, and 15.

11. Frantz must buy a minimum of \$25 of art supplies to qualify for free shipping. He bought 10 tubes of paint and an easel.

- Each tube of paint cost the same amount.
- The easel cost \$15.

Which of the following number lines shows all the possible costs, in dollars, of one tube of paint if Frantz qualified for free shipping?



Question #3 in [Spring 2017 Grade 7 Mathematics Test](http://www.doe.mass.edu/mcas/2017/release/Gr7-Math.pdf) made available by the [Massachusetts Department of Elementary and Secondary Education](http://www.doe.mass.edu/mcas/2017/release/Gr7-Math.pdf) at <http://www.doe.mass.edu/mcas/2017/release/Gr7-Math.pdf>. © 2017 Commonwealth of Massachusetts. Accessed January 15, 2019.

Solution:

B

Standard: 7.EE.4b

Aspect of Rigor: Application and Conceptual Understanding

Points: 1

Potential Rationales for Incorrect Answers

- Student correctly determined the value of \$1 for each tube of paint, but did not indicate that the \$1 was included in the solution with a closed circle on the graph.
- Correct Answer.
- Student incorrectly determined that each tube of paint must cost more than \$4, possibly by combining \$25 and \$15 and dividing by the 10 tubes of paint.
- Student incorrectly determined that each tube of paint must cost at least \$4, possibly by combining \$25 and \$15 and dividing by the 10 tubes of paint.

Commentary

In this problem, students are asked to identify a graph that represents all of solutions to a real-world problem on a number line. Students must make sense of the situation and determine the minimum value of one tube of paint. They then must determine if this minimum value is included in the solution, indicating a closed circle on the graph, or not included, indicating an open circle. To gather more information, look at related problems #10 and #15.

12. Solve the inequality, showing all your work.

$$-4x + 2 \geq 20$$

Solution (2 pts):

$$\begin{array}{r} -4x + 2 \geq 20 \\ -2 \quad -2 \\ \hline -4x \geq 18 \\ -4 \quad -4 \\ \hline x \leq -\frac{9}{2} \end{array}$$

Partial Solution (1 pt):

In the solution below, the student made one error. The student correctly divided both sides of the inequality by -4 , but did not change the direction of the inequality symbol when doing so.

$$\begin{array}{r} -4x + 2 \geq 20 \\ -2 \quad -2 \\ \hline -4x \geq 18 \\ -4 \quad -4 \\ \hline x \geq -\frac{9}{2} \end{array}$$

Incorrect Solution (0 pts):

In the solution below, the student made two errors. The student incorrectly applied inverse operations to solve the inequality by adding 2 to both sides of the inequality and adding 4 to both sides of the inequality, instead of subtracting by 2 and dividing by -4 , respectively.

$$\begin{array}{r} -4x + 2 \geq 20 \\ +2 \quad +2 \\ \hline -4x \geq 22 \\ +4 \quad +4 \\ \hline x \geq 26 \end{array}$$

Standard: 7.EE.4b

Aspect of Rigor: Procedural Skill and Fluency

Points: 2

Commentary

In this problem, students are assessed on their ability to solve an inequality in the form $px + q \geq r$, where p is a negative integer, demonstrating procedural fluency. Students must use inverse operations, follow the rules for computing with rational numbers, and rewrite the inequality so that the coefficient of x is a positive integer.

When looking at student work, check to see how students organize their work and show each step. Identify places where students make errors, as opposed to where student responses do not match with a correct response.

13. Solve the inequality, showing all your work.

$$\frac{2}{3}(m - 21) < 84$$

Solution (2 pts):

$$\begin{array}{rcl} \frac{2}{3}(m-21) & < & 84 \\ \frac{2}{3}m - 14 & < & 84 \\ +14 & +14 & \\ \hline \frac{2}{3}m & < & 98 \\ \cdot \frac{3}{2} & \cdot \frac{3}{2} & \\ \hline m & < & 147 \end{array}$$

Partial Solution (1 pt):

In the solution below, the student made one error. The student distributed $\frac{2}{3}$ to the first term in the parentheses, but did not distribute $\frac{2}{3}$ to the second term, resulting in -21 instead of -14 .

$$\begin{array}{rcl} \frac{2}{3}(m-21) & < & 84 \\ \frac{2}{3}m - 21 & < & 84 \\ +21 & +21 & \\ \hline \frac{2}{3}m & < & 105 \\ \cdot \frac{3}{2} & \cdot \frac{3}{2} & \\ \hline m & < & 157.5 \end{array}$$

Incorrect Solution (0 pts):

In the solution below, the student did not follow the correct order when performing inverse operations, subtracting 21 rather than working with the factor $\frac{2}{3}$ first. The student also multiplied by $\frac{2}{3}$ later in the solution rather than dividing by it to create $1m$.

$$\begin{array}{rcl} \frac{2}{3}(m-21) & < & 84 \\ +21 & +21 & \\ \hline \frac{2}{3}m & < & 105 \\ \cdot \frac{2}{3} & \cdot \frac{2}{3} & \\ \hline m & < & 70 \end{array}$$

Standard: 7.EE.4b

Aspect of Rigor: Procedural Skill and Fluency

Points: 2

Commentary

In this problem, students are assessed on their ability to solve an inequality in the form $p(x + q) < r$, where p is a fraction, demonstrating procedural fluency. Students may first apply the distributive property and then inverse operations to solve for x , or they may multiply both sides of the inequality by $\frac{3}{2}$ and then use inverse operations to solve for x .

When looking at student work, check to see how the student applied the distributive property and used inverse operations. Identify places where students make errors, as opposed to where student responses do not match with a correct response.

14. Mr. Kim has 550 take-out boxes at his restaurant. He estimates that he will use 80 boxes per week. Mr. Kim wants to re-order more boxes when he has fewer than 100 left. After how many weeks should Mr. Kim re-order more take-out boxes? Write and solve an inequality.

Solution (3 pts):

$$\begin{array}{r}
 550 - 80x < 100 \\
 -550 \quad \quad -550 \\
 \hline
 -80x < -450 \\
 \hline
 -80 \quad \quad -80 \\
 x > 5.625 \\
 \text{After 6 weeks}
 \end{array}$$

Partial Solution (2 pts):

In the solution below, the student made one error. The student correctly divided both sides of the inequality by -80 , but did not change the direction of the inequality symbol when doing so, causing them to answer that Mr. Kim should re-order before 5 weeks.

$$\begin{array}{r}
 550 - 80x < 100 \\
 -550 \quad \quad -550 \\
 \hline
 -80x < -450 \\
 \hline
 -80 \quad \quad -80 \\
 x < 5.625 \\
 \text{Before 5 weeks}
 \end{array}$$

Partial Solution (1 pt):

In the solution below, the student correctly modeled the situation using an inequality but incorrectly applied inverse operations to solve the inequality by adding 550 to both sides of the inequality without realizing that the $80x$ was being subtracted from the 550 and not the other way around.

$$\begin{array}{r}
 550 - 80x < 100 \\
 +550 \quad \quad +550 \\
 \hline
 80x < 650 \\
 \hline
 80 \quad \quad 80 \\
 x < 8.125 \\
 \text{Before 8 weeks}
 \end{array}$$

Incorrect Solution (0 pts):

In the solution below, the student incorrectly modeled the situation. The student incorrectly used an equation to model the situation when the question specifically calls for an inequality, and the student did not represent the 80 boxes that are used each week as being subtracted from the initial 550 boxes in stock. In addition, the student incorrectly applied inverse operations to solve the inequality.

$$\begin{array}{r} 100x - 80 = 550 \\ - 80 \quad - 80 \\ \hline 100x = 470 \\ \frac{100}{100} \quad \frac{100}{100} \\ x = 4.7 \\ \text{After 5 weeks} \end{array}$$

Standard: 7.EE.4b

Aspect of Rigor: Application and Conceptual Understanding

Points: 3

Commentary

In this problem, students interpret and solve a real-world problem using an inequality in the form $px + q < r$. Students must interpret using 80 boxes per week as a variable term, which is subtracted from the starting value of 550 take-out boxes. Then students must interpret re-ordering boxes when Mr. Kim has fewer than 100 left to determine the inequality symbol, < 100 . When solving the inequality using inverse operations, students must rewrite the inequality so that the coefficient on x is a positive integer. Then students interpret the solution $x > 5.625$ as re-ordering take-out boxes after 6 weeks. Students may find the exact value of 5.625, but given that weeks are typically counted in whole numbers, Mr. Kim should re-order after 6 weeks. Full credit is allowed for the exact answer.

When looking at student work, distinguish between errors in computation and errors in approach. For incorrect answers, check to see if students demonstrate appropriate or correct approaches to the problem, but possibly have calculation errors, or if students compute accurately, though they do not demonstrate a correct approach.

15. Yolanda participated in a walkathon in which each kilometer walked raised \$10 for charity. Her goal was to raise more than \$300 on Saturday and Sunday. She raised \$50 on Saturday.

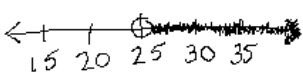
- Write and solve an inequality to determine the distances, in kilometers, that Yolanda could have walked on Sunday to reach her goal.
- Sketch a graph of your solution from part A.

From EngageNY.org of the New York State Education Department. [Grade 7 Common Core Mathematics Test Released Questions June 2017](https://www.engageny.org/resource/released-2017-3-8-ela-and-mathematics-state-test-questions/file/150396), Question #42. Internet. Available from <https://www.engageny.org/resource/released-2017-3-8-ela-and-mathematics-state-test-questions/file/150396>; accessed January 15, 2019. Modified by The Match Foundation, Inc.

Solution (4 pts):

$$\begin{array}{r}
 a) \quad 50 + 10x > 300 \\
 -50 \quad \quad -50 \\
 \hline
 10x > 250 \\
 \frac{10}{10} \quad \frac{10}{10} \\
 x > 25
 \end{array}$$

more than 25 Kilometers

b) 

Partial Solution for part a (1 pt):

In the solution below, the student correctly modeled the situation using an inequality but made one error when solving. The student incorrectly applied inverse operations by adding 50 to both sides of the inequality instead of subtracting 50.

$$\begin{array}{r}
 a) \quad 50 + 10x > 300 \\
 +50 \quad \quad +50 \\
 \hline
 10x > 350 \\
 \frac{10}{10} \quad \frac{10}{10} \\
 x > 35
 \end{array}$$

more than 35 Kilometers

Incorrect Solution for part a (0 pts):

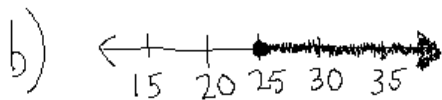
In the solution below, the student incorrectly modeled the situation. The student incorrectly used an equation to model the situation when the question specifically calls for an inequality and the student did not consider the fact that Yolanda already raised \$50, which is a fixed amount.

$$\begin{array}{r}
 50x + 10x = 300 \\
 60x = 300 \\
 \frac{60}{60} \quad \frac{60}{60} \\
 x = 50
 \end{array}$$

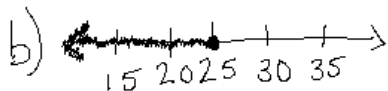
50 Kilometers

Partial Solutions for part b (1 pt):

In the solution below, the student incorrectly used a closed circle to show greater than.

**Incorrect Solution for part b (0 pts):**

In the solution below, the student made two errors. The student incorrectly used a closed circle to represent greater than and shaded to the left instead of right.



Standard: 7.EE.4b

Aspect of Rigor: Application and Conceptual Understanding

Points: 4 (2 pts each part)

Commentary

In this problem, students interpret, solve, and graph on a number line the solution to a real-world problem using an inequality in the form $px + q > r$. Students must interpret the \$50 Yolanda raised on Saturday as a fixed amount and the \$10 earned for each kilometer that Yolanda walks on Sunday as a variable amount. Then students must interpret Yolanda's goal of raising more than \$300 to determine the inequality symbol, > 300 . To solve the inequality, students must use inverse operations. In part *b*, students must graph their solution from part *a* on a number line using an open circle to represent that Yolanda needs to walk more than 25 kilometers to raise more than \$300. If students correctly graph an incorrect solution from part *a*, students should still get full credit for part *b*.

When looking at student work, distinguish between errors in computation and errors in approach. For incorrect answers, check to see if students demonstrate appropriate or correct approaches to the problem, but possibly have calculation errors, or if students compute accurately, though they do not demonstrate a correct approach.