

Grade 6 Target F

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[Content Domain: Expressions and Equation](#)

[Target F \[m\]: 6.EE.B Reason about and solve one-variable equations and inequalities.](#)

[Standards included in Target F: 6.EE.B, 6.EE.B.5, 6.EE.B.6, 6.EE.B.7, 6.EE.B.8](#)

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Content Domain: Expressions and Equation

Target F [m]: 6.EE.B Reason about and solve one-variable equations and inequalities.

Standards included in Target F: 6.EE.B, 6.EE.B.5, 6.EE.B.6, 6.EE.B.7, 6.EE.B.8

6.EE.B Reason about and solve one-variable equations and inequalities.

6.EE.B.5 Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.

6.EE.B.6 Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

6.EE.B.7 Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q , and x are all nonnegative rational numbers.

6.EE.B.8 Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

Vertical Alignment

Related Grade 5 standards

5.OA.A Write and interpret numerical expressions.

5.OA.A.2 Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. For example, express the calculation “add 8 and 7, then multiply by 2” as $2 \times (8 + 7)$. Recognize that $3 \times (18932 + 921)$ is three times as large as $18932 + 921$, without having to calculate the indicated sum or product

Related Grade 7 Standards

7.EE.B Solve real-life and mathematical problems using numerical and algebraic expressions and equations.

7.EE.B.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. For example: If a woman making \$25 an hour gets a 10% raise, she will make an additional $\frac{1}{10}$ of her salary an hour, or \$2.50, for a new salary of \$27.50. If you want to place a towel bar $9\frac{3}{4}$ inches long in the center of a door that is $27\frac{1}{2}$ inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.

7.EE.B.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.

a. Solve real-world problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p , q , and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?

b. Solve real-world problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p , q , and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem. For example: As a salesperson, you are paid \$50 per week plus \$3 per sale. This week you want your pay to be at least \$100. Write an inequality for the number of sales you need to make, and describe the solutions.

Achievement Level Descriptors

Level 1 Students should be able to use substitution to determine when a given number makes an equation or inequality true.

Level 2 Students should be able to solve one-variable equations and inequalities of the form $x + p = \leq/\geq/> q$ or $px = \leq/\geq/> q$, where p and q are nonnegative rational numbers. They should

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be able to identify and use variables when writing equations.

Level 3 Students should be able to write one-variable equations and inequalities of the form $x + p = \leq/\geq/</> q$ or $px = \leq/\geq/</> q$, where p and q are nonnegative rational numbers. They should be able to reason about and solve equations and inequalities by writing and graphing their solutions on a number line.

Level 4 Students should be able to solve equations and inequalities of the form $x + p = \leq/\geq/</> q$ or $px = \leq/\geq/</> q$, where p and q are rational numbers. They should be able to write and graph solutions on the number line.

Evidence Required

1. The student uses substitution in one-variable equations and inequalities.
2. The student writes one-variable equations and inequalities and solves one-variable equations in real-world and mathematical problems.
3. The student represents solutions of inequalities in real-world and mathematical problems on a number line.

Vocabulary

variable, equation, inequality, solution, solution set

Response Types

Multiple Choice, single correct response; Multiple Choice, multiple correct response; Drag and Drop; Equation/Numeric; Matching Tables

Materials

None

Attributes

p , q , and x must all represent nonnegative rational numbers when solving equations of the form $x + p = q$ and $px = q$

Claim 1: Concepts and Procedures (DOK 1, 2) Question Banks

Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.

Claim 1 6.EE.B.5 DOK Level 1

Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.

Evidence Required

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The student writes or identifies a numerical expression that records a calculation represented with words.

Question Type 1: Select all equations that have $x = 3$ as a solution.

- A. $x + 7 = 10$
- B. $3 + x = 3$
- C. $x \cdot 3 = 1$
- D. $4 \cdot x = 12$

Answer Choices: Answer choices will be equations in the form $x + p = q$ or $px = q$, in which p and q must represent nonnegative rational numbers. Distractors will include confusing addition, subtraction, multiplication, or division, computation errors, and/or incorrect substitution. At least two equations must be correct.

Rubric: (1 point) Student selects all the correct equations (e.g., A and D).

Response Type: Multiple Choice, multiple correct response

Claim 1 6.EE.B.5 DOK Level 2

Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.

Evidence Required

The student uses substitution in one-variable equations and inequalities.

Question Type 1: The student is presented with a solution set and one inequality per answer choice.

1. Select **all** inequalities that include 0 in the solution set.

- A. $x > -4.24$
- B. $x < -5.5$
- C. $x > -5.13$
- D. $x < 4.5$

2. Select **all** inequalities that include all numbers less than -6 in the solution set.

- A. $x > -4.24$
- B. $x < -5.5$
- C. $x > -5.13$
- D. $x < 4.5$

Answer Choices: Answer choices will be inequalities in the form $x > c$ or $x < c$. Distractors will include misinterpreting the inequality symbols and/or not all the values in a given set satisfy the inequality. At least two inequalities must be correct.

Rubric: (1 point) Student selects all the correct inequalities (e.g., A,C,D; B,D).

Question Type 2: The student is presented with a one-variable inequality.

1. Select all the values that satisfy the inequality $x < 7 \frac{1}{2}$.

A. $x = -8$

B. $x = -7$

C. $x = 7$

D. $x = 8$

Rubric: (1 point) Student selects all the correct sets of numbers (e.g., A, B and C).

Response Type: Multiple Choice, multiple correct response

Claim 1 6.EE.B.5 DOK Level 2

Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true

Evidence Required

The student uses substitution in one-variable equations and inequalities.

Question Type 1: Consider the inequality $x > 7$.

Determine whether each value of x makes this inequality true. Select Yes or No for each value.

x	Yes	No
22		
-7		
13		
5		
-39		

Rubric: (1 point) Student correctly determines whether all five values make the inequality true (e.g., Y, N, Y, N, N).

Response Type: Matching Tables

Claim 1 6.EE.B.8 DOK Level 1

Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

Evidence Required

The student writes one-variable equations and inequalities and solves one-variable equations in real-world and mathematical problems

Question Type 1: John is planning to put a rectangular pool in his backyard. The length (l) of the pool must be greater than 24 feet and the width (w) must be less than 14 feet.

Select the pair of inequalities that models the possible measurements for each dimension.

- A. $l > 14$ and $w < 24$
- B. $l > 24$ and $w < 14$
- C. $24 > l$ and $14 > w$
- D. $24 < l$ and $14 < w$

Answer Choices: Each answer choice will be two inequalities in the form $x > c$, $x < c$, $c > x$, or $c < x$. Distractors will include misinterpreting the inequality symbols and/or incorrect placement of variable and numerical terms.

Rubric: (1 point) Student selects the correct inequality pair (e.g., B).

Response Type: Multiple Choice, single correct response

Claim 1 6.EE.B.7 DOK Level 2

Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q and x are all nonnegative rational numbers.

Evidence Required

The student writes one-variable equations and inequalities and solves one-variable equations in real-world and mathematical problems..

Question Type 1: Julia has some peaches. She gathers 6 more peaches. She now has 58 peaches.

Part A: In the first box, enter an equation to represent the number of peaches, p , that Julia has before she gathers 6 more peaches.

Part B: In the second box, enter the number of peaches represented by p in this situation.

Rubric: (2 points) Student enters the correct equation (e.g., $p + 6 = 58$) and the correct solution (e.g., 52). (1 point) Student enters the correct equation or the correct solution.

Response Type: Equation/Numeric (2 response boxes)

Claim 1 6.EE.B.7 DOK Level 1

Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p , q and x are all nonnegative rational numbers.

Evidence Required

The student writes one-variable equations and inequalities and solves one-variable equations in real-world and mathematical problems.

Question Type 1: The student is presented with an equation in a mathematical context.

Example Stem: The sum of 32 and n is equal to 59.13.

Enter the equation described in the sentence.

Rubric: (1 point) Student enters a correct equation (e.g., $32+n=59.13$ or equivalent).

Response Type: Equation/Numeric

TM2d Stimulus: The student is presented with an equation containing an unknown variable.

Example Stem: Enter the value of y that makes the given equation true. $y + 3\frac{2}{9} = 5\frac{5}{6}$.

Rubric: (1 point) Student enters the correct value (e.g., $2\frac{11}{18}$). Response Type: Equation/Numeric

Claim 1 6.EE.B.8 DOK Level 1

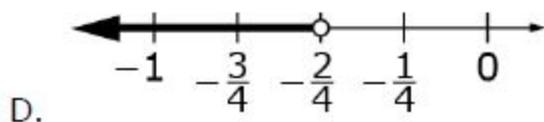
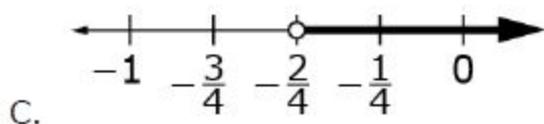
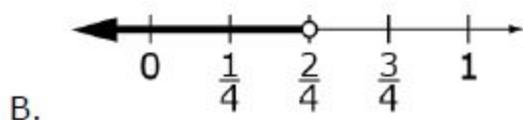
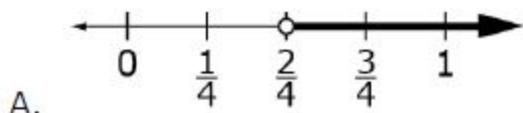
Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

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Evidence Required

The student represents solutions of inequalities in real-world and mathematical problems on a number line.

Question Type 1: Select the number line that represents all solutions of $x < -\frac{2}{4}$.



Rubric: (1 point) Student selects the correct number line (e.g., D).

Response Type: Multiple Choice, single correct response

Claim 1 6.EE.B.8 DOK Level 2

Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

Evidence Required

The student represents solutions of inequalities in real-world and mathematical problems on a number line.

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Question Type 1: The freezing point of water is 0 degrees Celsius.

Part A
All temperatures below freezing.

$t \square 0$

Part B

← -5 -4 -3 -2 -1 0 1 2 3 4 5 →

Part A: Drag the correct symbol into the box to create an inequality that describes all temperatures (t) below freezing.

Part B: Drag the correct ray to the number line to represent all temperatures, t , that are below freezing, in degrees Celsius.

Interaction: Students given Delete tool as well as the following:

Part A • Students use the drag-and-drop tool to place an inequality symbol in the open box.

Part B • Students use the drag-and-drop tool to place a ray on the number line. • Snap-to feature used at each tick mark on the number line.

Rubric: (1 point) Student places the correct inequality symbol in the box and places the correct ray at the proper location on the number line.

Response Type: Drag and Drop

Claim 2 Problem Solving Question Banks

[Claim Descriptors and Targets](#)

Students can solve a range of complex well-posed problems in pure and applied mathematics, making productive use of knowledge and problem-solving strategies.

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Example 1

Sierra's bought a bag of rice and some tomatoes. The corner of her of her receipt got torn. The torn receipt is shown.

Write an equation that can be solved to determine the cost, x , of the bag of rice.

Enter your equation in the response box.

Rice	
Tomatoes	3.87
Tax	<u>0.47</u>
Total	7.23

Rubric: (1 point) The student enters a correct equation in the response box (e.g., $x+3.87+0.47=7.23$).

Response Type: Equation/Numeric

Claim 3 Communicating Reasoning Question Banks

[Claim Descriptors and Targets](#)

Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.

Example 1

Emma was solving the equation $t - 4 = 16$. She said, "I'm looking for a number t that is 4 less than 16. So $t = 12$."

Which statement best describes the flaw in Emma's reasoning?

- A. Emma's answer is right but she should just subtract 4 from both sides of the equation.

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- B. Emma's answer is wrong but she thought about the equation correctly.
- C. Emma is confused about which number the 4 is being subtracted from.
- D. Emma should subtract the 16 from the 4 instead of 4 from the 16.

Rubric: (1 point) The student selects the correct analysis of the flaw in reasoning (C).

Response Type: Multiple choice, single correct response

Claim 4 Modeling and Data Analysis Question Banks

[Claim Descriptors and Targets](#)

Students can analyze complex, real-world scenarios and can construct and use mathematical models to interpret and solve problems.

Example 1

- Mrs. Jonas, her son Cody, and her daughter Laura drove from home to Cody's tennis practice.
- Mrs. Jonas then drove Laura to her soccer game and stayed to watch.
- After the game, mother and daughter picked up Cody from the tennis courts on the way home.
- Once home, Mrs. Jonas saw that they had driven 15 miles that day.

Mrs. Jonas took the shortest routes to and from each destination.

The figure shows the location of the Jonas family home, the tennis courts, and the soccer field.

The gridlines in the figure represent the streets, and all distances between cross streets are approximately the same.

Part A:

Write an equation that can be used to find the distance, d , between the tennis courts and home. Enter your answer in the first response box.

Part B:

What is the distance, in miles, between home and the tennis courts?

Enter your answer in the second response box.



Rubric: (2 points) Student correctly answers both parts ($10d = 15$, or $d + 4d + 4d + d = 15$ or equivalent equation for Part A; 1.5 or $1\frac{1}{2}$ for Part B)

(1 point) Student correctly answers only one part.

Response Type: Equation/Numeric (Note: Label the two response boxes "Part A" and "Part B.")