

Solving One-Step Equations

Objectives:

...to solve one-step equations involving whole numbers

Assessment Anchor:



7.D.2.1 – Select and/or use appropriate strategies to solve or represent number sentences.

Vocabulary alert!!

EQUATION – a mathematical sentence that uses an equals (=) sign to indicate that the side to the left of the equals sign has the same value as the side to the right of the equals sign

INVERSE OPERATIONS – operations that undo each other

NOTES

***EQUATIONS ARE LIKE BALANCED SEE-SAWS...AND MUST REMAIN BALANCED!!

To solve a one-step equation:

1. Locate the variable in the equation
2. Use the inverse (opposite) operation on both sides of the equation
3. Show your answer



“For every equation from this day forward, I agree to write down what I’m doing to both sides!”

Solving One-Step Equations

EXAMPLES

1) $x - 7 = 15$

.....original problem

$$\begin{array}{r} \textcircled{x} - 7 = 15 \\ + 7 \quad + 7 \\ \hline \end{array}$$

.....locate the variable term

.....add 7 to both sides

$$\textcircled{x = 22}$$

.....show final answer!

2) $x + 10 = 57$

.....original problem

$$\begin{array}{r} \textcircled{x} + 10 = 57 \\ - 10 \quad - 10 \\ \hline \end{array}$$

.....locate the variable term

.....subtract 10 from both sides

$$\textcircled{x = 47}$$

.....show final answer!

3) $8y = 72$

.....original problem

$$\begin{array}{r} \textcircled{8y} = 72 \\ 8 \quad 8 \end{array}$$

.....locate the variable term

.....divide by 8 on both sides

$$\textcircled{y = 9}$$

.....show final answer!

4) $13 = \frac{k}{4}$

.....original problem

$$4 \times 13 = \frac{\textcircled{k}}{4} \times 4$$

.....locate the variable term, and then
multiply both sides by 4

$$\textcircled{52 = k}$$

.....show final answer!

Solving One-Step Equations

5) $x + 13 = 19$

9) $46 = y - 20$

6) $x - 10 = 22$

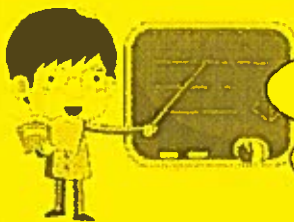
10) $41 = k + 18$

7) $\frac{w}{7} = 14$

11) $3k = 126$

8) $135 = 5m$

12) $22 = \frac{f}{6}$



“Knowing to use inverse operations, and to write it down on both sides...that’s our main goal here. It’s just as important as calculating the right answer... maybe even MORE important.”

Name : _____

Score : _____

One-Step Equations: Integers

Mixed Operations Level 1: S1

Solve each equation.

1) $10 = z + 6$

2) $8y = 48$

3) $q - 12 = 1$

4) $18 = \frac{a}{2}$

5) $\frac{r}{3} = 7$

6) $11 = m - 4$

7) $t - 19 = 2$

8) $1 + s = 3$

9) $24 = 4c$

10) $\frac{v}{5} = 9$

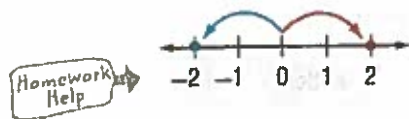
Extra Practice

Find the opposite of each integer.

24. -2 2

25. 15 _____

26. 42 _____



Find the opposite of the opposite of each integer.

27. 9 _____

28. 0 _____

29. -8 _____

Evaluate each expression.

30. $|18| =$ _____

31. $|0| =$ _____

32. $|25|$ _____

33. $|2| + |-13| =$ _____

34. $|-20| - |17| =$ _____

35. $|-16| - |5| =$ _____

36. The balance of Bryce's account is \$16. Jada's account is \$5 overdrawn. What is the difference between their account balances?

37. A football team lost 3 yards on their first play and 6 yards on their second play. How many total yards did they lose?

38. The table shows the lowest elevations for several states. Is the absolute value of the lowest elevation of California greater than or less than the absolute value of the lowest elevation of Illinois?

State	Lowest Elevation (ft)
Oklahoma	289
Illinois	279
Kentucky	257
California	-282

Reason Abstractly Evaluate each expression.

39. $-|-10| =$ _____

40. $|13 - 6| =$ _____



Test Practice

41. If $x = -1$ and $y = -2$, then which of the following statements is true?

- (A) $|x| > 1$
- (B) $|x| < |y|$
- (C) $|y| < 1$
- (D) $|y| < x$

42. Refer to the number line below. Which point represents the number with the greatest absolute value?



- (F) point M
- (G) point F
- (H) point C
- (I) point T

45. **Short Response** The table shows the freezing point of different liquids. What liquid's freezing point has the greatest absolute value?

Liquid	Freezing Point ($^{\circ}$ F)
Water	32
Acetic Acid	62
Linseed Oil	-4
Acetone	-94



Review

Fill in each with $>$, $<$, or $=$ to make a true statement. 4.NBT.2

46. 69.23 69.25

47. 171.10 171.09

48. 47.74 47.740

49. Part of a sauce recipe is shown. If all the ingredients are mixed together, how much sauce will be made? 5.NF.1

50. Caroline's soccer practice starts at quarter after 4 P.M. and ends at 5 P.M. How many minutes does her soccer practice last? 4.MD.2

6 teaspoons Worcestershire Sauce
$1\frac{1}{2}$ teaspoons seasoned salt
$\frac{1}{2}$ teaspoon onion powder
$\frac{3}{4}$ teaspoon garlic powder

43. A video game has different point values associated with different actions. The table shows some of the actions. Which action has associated points with the greatest absolute value?

Action	Points
collect gem	+5
fall in water	-10
build bridge	+12
climb tree	-15

- (A) collect gem
- (B) fall in water
- (C) build bridge
- (D) climb tree

44. Which expression has the greatest value?

- (F) $|-25|$
- (G) $|-16|$
- (H) $|18|$
- (I) $|22|$

Name: _____

One-Step Equations Study Guide

One-step equations are solved using only one step! All you need to know are the following:

Operations: Addition, subtraction, multiplication and division can be seen in a one-step equation.

Inverse Operations: These are the opposite operations that undo the operation that is taking place in the one-step equation.

Operation	Inverse Operation
Addition	Subtraction
Subtraction	Addition
Multiplication	Division
Division	Multiplication

Examples of the operation we will see...

Expression → Operation → Inverse Operation

$x + 8$ → Addition → Subtraction

$x - 8$ → Subtraction → Addition

$\frac{x}{4}$ → Division → Multiplication

$3x$ → Multiplication → Division

One-step equations can be solved very easily if you ask yourself the following questions:

1. Read the equation out loud or in your head.
2. Determine the operation taking place.
3. Figure out what the inverse operation is.
4. Use the inverse operation to solve.
5. CHECK YOUR ANSWER!

Let's look at an example while using the 5 steps above...

$$2x = 10$$

1. "Two times a number equals ten." Here you should read the question out loud to figure out what is happening in the equation.
2. The operation taking place is multiplication. I know this because we see "2x" which means two times the variable.
3. Since our operation is multiplication our inverse operation is division.

4. Since we are multiplying by 2 in the equation we need to divide both sides by 2. This means we divide by 2 on both sides of the equal side. 2 divided by 2 gives us 1 so we are left with x . On the other side of the equal sign we have 10 divided by 2 which gives us 5. So, $x = 5$.
5. Now we need to check our answer to make sure we are right. If we plug 5 back in the equation, we see that we have $2(5) = 10$ which gives us $10 = 10$. So we know we were right!

Now it is time for you to practice...

1. $5x = 20$

2. $7x = 28$

3. $x + 9 = 18$

4. $x + 2 = 7$

5. $\frac{x}{4} = 10$

6. $\frac{x}{3} = 12$

7. $x - 7 = 14$

8. $x - 8 = 12$

Notes Chapter 5: Lesson 1

Equations

An **equation** is a mathematical sentence showing two expressions are equal. An equation contains an **equal sign**, $=$. Some equations contain variables. When you replace a variable with a value that results in a true sentence, you **solve** the equation. The value for the variable is the solution of the equation.

Example 1

Solve $14 - p = 6$ using guess, check, and revise.

Guess the value of p , then check it.

Try 7.

$$14 - p = 6$$

$$14 - 7 \neq 6$$

revise

Try 6.

$$14 - p = 6$$

$$14 - 6 \neq 6$$

revise

Try 8.

$$14 - p = 6$$

$$14 - 8 = 6$$

yes

The solution is 8 because replacing p with 8 results in a true sentence.

Example 2

Solve $15 \div m = 5$ mentally.

$$15 \div m = 5$$

Think 15 divided by what number is 5?

$$15 \div 3 = 5$$

You know that $15 \div 3 = 5$.

$$5 = 5$$

The solution is 3.

Exercises

Identify the solution of each equation from the list given (use your calculator).

1. $h + 19 = 56$; 36, 37, 38

2. $31 + x = 42$; 9, 10, 11

3. $k - 4 = 13$; 16, 17, 18

4. $34 - b = 17$; 16, 17, 18

5. $5w = 30$; 5, 6, 7

6. $63 = 7k$; 7, 8, 9

7. $36 \div s = 9$; 4, 5, 6

8. $x \div 3 = 8$; 23, 24, 25

Solve each equation mentally.

9. $j + 3 = 9$

10. $14 + n = 19$

11. $23 + x = 29$

12. $31 - h = 24$

13. $m - 5 = 11$

14. $3m = 27$

15. $56 = 7b$

16. $14 \div f = 2$

17. $j \div 8 = 4$

Name: _____

Score: _____

15) $p - (9 - (m + q))$; use $m = 4$, $p = 5$, and $q = 3$

16) $(a^2 - b) \div 6$; use $a = 5$, and $b = 1$

17) $(6 + h^2 - j) \div 2$; use $h = 6$, and $j = 4$

18) $y - (4 - x - y \div 2)$; use $x = 3$, and $y = 2$

19) $x^3 \div 3 - y$; use $x = 3$, and $y = 1$

20) $(p + q)^2 - (5 - 5)$; use $p = 1$, and $q = 1$

21) $12k - h^2$; use $h = 2$, and $k = 3$

22) $y \div 5 + 1 + x \div 6$; use $x = 6$, and $y = 5$

23) $6 \div 6 + z + x - y$; use $x = 2$, $y = 5$, and $z = 6$

24) $y - z + xz \div 6$; use $x = 3$, $y = 4$, and $z = 4$

25) $\frac{y}{2} + x + 4 + z + y$; use $x = 7$, $y = 2$, and $z = 4$

26) $c \times \frac{bc}{4} - (7 - a)$; use $a = 4$, $b = 8$, and $c = 5$

(Remember PEMDAS)



Name _____ Class _____ Date _____

1 $7y - y = 30$

2 $6 + 8y = 86$

3 $5y + 2y + 10y = 51$

4 $4y + 4 - 9y = -46$

5 $4 + y6 = 78$

6 $1y + 5y - 7 = 35$

7 $4y + 2y + 5y = 110$

8 $2y - 9 = -3$

9 $9y + 9 = 72$

10 $7y + 10 - 7y = 10$



ANSWER KEY

1 $7y - y = 30$
 $y = 5$

2 $6 + 8y = 86$
 $y = 10$

3 $5y + 2y + 10y = 51$
 $y = 3$

4 $4y + 4 - 9y = -46$
 $y = 10$

5 $4 + y6 = 78$
 $y = 9$

6 $1y + 5y - 7 = 35$
 $y = 7$

7 $4y + 2y + 5y = 110$
 $y = 10$

8 $2y - 9 = -3$
 $y = 3$

9 $9y + 9 = 72$
 $y = 7$

10 $7y + 10 - 7y = 10$
 $y = 7$

Tue

Name _____

Date 12-9-19

Chapter 4 – Lesson 9: Equivalent Expressions/ Simplifying Expressions

Review

Commutative property: The order in which numbers are added or multiplied does not change the sum or the product

$a + b = b + a$ or $a \cdot b = b \cdot a$

Associative property: The way in which numbers are grouped does not change the sum or the product

$(a + b) + c = a + (b + c)$ or $(a \cdot b) \cdot c = a \cdot (b \cdot c)$

• A term is each part of an expression that is separated by a plus or a minus. ex. $3x + 2y + 4$ 3 terms

• When a term contains a number and a variable, the number is called the coefficient. ex. $3x$ 3 is the coefficient

• A term without a variable is called a constant - doesn't change ex. $2y - 4$ constant

• like terms contain the same variables. ex. $3x, x, 7x, 10x$

$3x + 7 - x$

 $2x + 7$

Terms: $3x, 7, x$ 3 terms
Coefficient: 3
Constant: 7
Like terms: $3x$ and x

$$3x + 2x + 4y \quad x = \text{😊} \quad y = \text{♥}$$



Example 1:

Simplify the expression $16 + (v + 4)$

$$\begin{aligned}
 16 + (v + 4) &= 16 + (4 + v) && \text{-----} \rightarrow \text{commutative property} && v + 4 = 4 + v \\
 &= (16 + 4) + v && \text{-----} \rightarrow \text{associative property} \\
 &= 20 + v && \text{-----} \rightarrow \text{add}
 \end{aligned}$$

So, $16 + (v + 4)$ in simplified form is $20 + v$

Example 2:

Simplify the expression $3x + (6y + 2x)$

$$\begin{aligned}
 3x + (6y + 2x) &= 3x + (2x + 6y) && \text{-----} \rightarrow \text{commutative property} && 6y + 2x = 2x + 6y \\
 &= (3x + 2x) + 6y && \text{-----} \rightarrow \text{associative property} \\
 &= 5x + 6y && \text{-----} \rightarrow \text{combine like terms}
 \end{aligned}$$

So, $3x + (6y + 2x)$ in simplified form is $5x + 6y$

Practice problems

Simplify each expression. Justify each step.

1. $(5) + x + (3)$

[Redacted]

2. $(6) + (x + 4)$

[Redacted]

3. $(b + 10) + 15$

[Redacted]

4. $8x + 5 + 2x$

[Redacted]

5. $(12 + 2u) + 3$

[Redacted]

6. $11p + 8 + 7p$

[Redacted]

7. $9x + (4z + 3x)$

[Redacted]

8. $(8z + 12x) + (2z + 7x)$

[Redacted]

9. $5y + 4z + 7y$

[Redacted]

the tropical ocean. The tropical ocean is the largest body of water on the planet, covering about 60% of the Earth's surface. It is characterized by warm temperatures, high evaporation rates, and a strong influence on the global climate system.

The tropical ocean is a complex system with many different components. It includes the surface ocean, the thermocline, and the deep ocean. Each of these components plays a role in the overall circulation and climate of the tropical ocean.

The surface ocean is the layer of water closest to the atmosphere. It is characterized by warm temperatures and high evaporation rates. The surface ocean is the primary source of heat for the atmosphere, and it plays a key role in the global energy balance.

The thermocline is the layer of water below the surface ocean. It is characterized by a sharp temperature gradient. The thermocline acts as a barrier between the surface and deep ocean, and it plays a key role in the circulation of the tropical ocean.

The deep ocean is the layer of water below the thermocline. It is characterized by cold temperatures and high pressure. The deep ocean is the primary source of heat for the atmosphere, and it plays a key role in the global energy balance.

The tropical ocean is a dynamic system with many different processes. It includes the circulation of water, the exchange of heat and momentum with the atmosphere, and the transport of nutrients and other substances. These processes are all interconnected and play a key role in the overall functioning of the tropical ocean.

The tropical ocean is a complex system with many different components. It includes the surface ocean, the thermocline, and the deep ocean. Each of these components plays a role in the overall circulation and climate of the tropical ocean.

The surface ocean is the layer of water closest to the atmosphere. It is characterized by warm temperatures and high evaporation rates. The surface ocean is the primary source of heat for the atmosphere, and it plays a key role in the global energy balance.

The thermocline is the layer of water below the surface ocean. It is characterized by a sharp temperature gradient. The thermocline acts as a barrier between the surface and deep ocean, and it plays a key role in the circulation of the tropical ocean.

The deep ocean is the layer of water below the thermocline. It is characterized by cold temperatures and high pressure. The deep ocean is the primary source of heat for the atmosphere, and it plays a key role in the global energy balance.

The tropical ocean is a dynamic system with many different processes. It includes the circulation of water, the exchange of heat and momentum with the atmosphere, and the transport of nutrients and other substances. These processes are all interconnected and play a key role in the overall functioning of the tropical ocean.

The tropical ocean is a complex system with many different components. It includes the surface ocean, the thermocline, and the deep ocean. Each of these components plays a role in the overall circulation and climate of the tropical ocean.

The surface ocean is the layer of water closest to the atmosphere. It is characterized by warm temperatures and high evaporation rates. The surface ocean is the primary source of heat for the atmosphere, and it plays a key role in the global energy balance.

The thermocline is the layer of water below the surface ocean. It is characterized by a sharp temperature gradient. The thermocline acts as a barrier between the surface and deep ocean, and it plays a key role in the circulation of the tropical ocean.

The deep ocean is the layer of water below the thermocline. It is characterized by cold temperatures and high pressure. The deep ocean is the primary source of heat for the atmosphere, and it plays a key role in the global energy balance.

The tropical ocean is a dynamic system with many different processes. It includes the circulation of water, the exchange of heat and momentum with the atmosphere, and the transport of nutrients and other substances. These processes are all interconnected and play a key role in the overall functioning of the tropical ocean.

The tropical ocean is a complex system with many different components. It includes the surface ocean, the thermocline, and the deep ocean. Each of these components plays a role in the overall circulation and climate of the tropical ocean.

The surface ocean is the layer of water closest to the atmosphere. It is characterized by warm temperatures and high evaporation rates. The surface ocean is the primary source of heat for the atmosphere, and it plays a key role in the global energy balance.

The thermocline is the layer of water below the surface ocean. It is characterized by a sharp temperature gradient. The thermocline acts as a barrier between the surface and deep ocean, and it plays a key role in the circulation of the tropical ocean.

The deep ocean is the layer of water below the thermocline. It is characterized by cold temperatures and high pressure. The deep ocean is the primary source of heat for the atmosphere, and it plays a key role in the global energy balance.

The tropical ocean is a dynamic system with many different processes. It includes the circulation of water, the exchange of heat and momentum with the atmosphere, and the transport of nutrients and other substances. These processes are all interconnected and play a key role in the overall functioning of the tropical ocean.

The tropical ocean is a complex system with many different components. It includes the surface ocean, the thermocline, and the deep ocean. Each of these components plays a role in the overall circulation and climate of the tropical ocean.

The surface ocean is the layer of water closest to the atmosphere. It is characterized by warm temperatures and high evaporation rates. The surface ocean is the primary source of heat for the atmosphere, and it plays a key role in the global energy balance.

The thermocline is the layer of water below the surface ocean. It is characterized by a sharp temperature gradient. The thermocline acts as a barrier between the surface and deep ocean, and it plays a key role in the circulation of the tropical ocean.

Name _____ Period _____

December 4, 2019

Quiz Review – Integers, Rational Numbers, Absolute Value, Coordinate Graphing

- 1) The coldest temperature James ever recorded at his house was 16 degrees below zero.

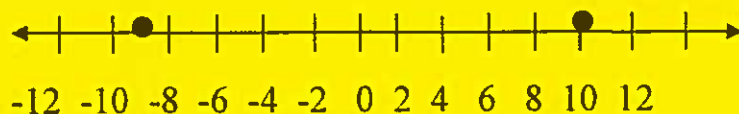
Which number represents this temperature?

- a) 16
- b) -16
- c) 0
- d) 1.6

- 2) What is the opposite of -8.

- a) 8
- b) 8.1
- c) -8
- d) $\frac{1}{8}$

- 3) Which inequality is shown by the points on this number line? _____



- a) $10 > 9$
- b) $-9 < 10$
- c) $-9 > 10$
- d) None of the above

4) Dan ran 6.25 miles. Joe ran $6\frac{1}{2}$ miles.

Who ran further? *Show your work to justify your answer.*

- a) Joe
- b) Dan

5) Sea Level is represented by which integer?

- a) -1
- b) 1
- c) 0
- d) None of the above

6) Seneca lost \$45.

Which is the correct integer?

- a) 0.45
- b) 4.5
- c) -45
- d) 45

7) Which of the following is the opposite of the opposite of 5? _____

- a) 0
- b) 5
- c) -5
- d) 10

8) Evaluate. $|12| + |-6|$

- a) 18
- b) -18
- c) 6
- d) -6

9) Amy is building a house. The basement floor is at -13 feet. The roof of the house is above the ground at 25 feet. Write an inequality to compare the heights.

10) Order the set $\{-7, 5, 2, -9, 1, 0\}$ from *greatest to least*.

11) Write each fraction as a decimal.

$$\frac{1}{2} =$$

$$\frac{1}{4} =$$

$$\frac{3}{4} =$$

12) Compare $>$, $<$ or $=$.

$$-16 \bigcirc -15$$

$$-0.86 \bigcirc -\frac{3}{4}$$

$$|-13| \bigcirc 13$$

13) Which statement is *false*? _____

a) $4 > -3$

b) $1\frac{1}{5} > -1\frac{4}{5}$

c) $\frac{3}{4} = -0.75$

d) $1.5 > \frac{10}{9}$

14) The Grinch's homeroom raised \$1,259 for the local Elves' charity.
Find the opposite of the opposite of this integer.

- a) -1,259
- b) 1,259
- c) 9,521
- d) $\frac{1}{1,259}$

15) The temperatures recorded for the week were as follows:

-2, 32, -4, 13, -10, 14, 29

List them in order from *coldest to warmest*.

16) To find the *Absolute Value* of a number means to see, _____

- a) how far a number is from 100 on a number line
- b) how far a number is from 0 on a number line
- c) how far a number is from one on a number line
- d) how far a number is from -1 on a number line

17) The absolute value of $|-8|$ is _____

- a) -8
- b) $\frac{1}{8}$
- c) 8.1
- d) 8

18) Fill in the with $<$, $>$, or $=$ to. _____

-9.25 9.25

- a) $>$
- b) $<$
- c) $=$

19) Megan was playing a game. She lost 10 points at the start of the game, but then she gained 22 points on her next turn. What is Megan's score?

- a) 32 points
- b) -22 points
- c) 4 points
- d) 12 points

Answer: _____

20) Which of the following does not mean "positive"? _____

- a) loss
- b) increase
- c) found
- d) gain

21) Yesterday, the low temperature for was -1°F . Today, the temperature is 7°F . What is the difference between these two temperatures?

- a) 6°F
- b) -6°F
- c) 8°F
- d) -8°F

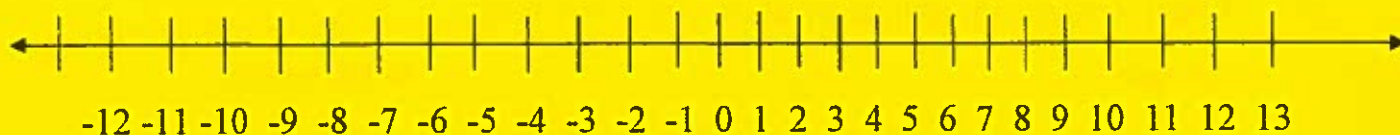
Answer: _____

22) Is zero a) Negative, b) Positive, or c) Neither? _____

23) Which of the following is true about the opposite of 0? _____

- a) Zero has no opposite.
- b) Zero is its own opposite
- c) Zero has a lot of opposites.
- d) Zero is not a number, so it has no opposites.

24) Using the line below, create a number line from -12 to 12. .



- a) Label -12 with the letter M.
- b) Label the opposite of M with a T.
- c) Label an integer between -10 and -8 with an A.
- d) Label the opposite of A with an N.
- e) Label the opposite of the opposite of -5 with the letter G.
- f) Label the integer -3 with the letter N
- g) Label the opposite of 0 with the letter I.
- h) Label the opposite of -1 with F
- i) Label the opposite of N (*from letter f*) with C.
- j) Label an integer between 5 and 9 with the letter E.
- k) Label the integer 2 with the letter I.
- l) Complete this sentence with the word you created above:

Math class is _____! :)

- 25) What is the coordinate point for the origin? _____
- 26) What axis is horizontal? _____
- 27) What axis is vertical? _____
- 28) A coordinate plane is made up of 4 boxes that are called
_____.
- 29) When locating coordinate points in one of the four _____,
you use _____ to tell which
_____ they are in.
- 30) The point $(-4,5)$ will be in which _____? _____
- 31) Coordinate points that are in _____ are both
positive.
- 32) To plot the coordinate point $(5, -3)$, you would
- a) go left 5 spaces and up 3 spaces
 - b) go right 5 spaces and up 3 spaces
 - c) go right 5 spaces and down 3 spaces
 - d) go left 5 spaces and down 3 spaces