Math 9 Chapter 6: Solving Equations



Learning Outcomes:

* Solving algebraic equations requiring multiple steps
* Solving algebraic equations involving rational numbers
* Solving inequalities
* Graphing inequalities

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**6.1 Solving Equations & Isolating the Variable**

To solve an equation, the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ must be isolated.

When solving, we can use the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to isolate the \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**\*\*\*Whatever you do to one side of the equation you \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\*\*\***

Examples:

A: Addition & Subtraction

1. x + 4 = 10
2. x + 17 = 23
3. 5 = p + 11
4. z – 3 = 10
5. x – 4 = -10
6. 12 = m – 45

B: Multiply & Divide

1. 4y = -8
2. = -9
3. x = 21
4. -6x = 54

**6.1 Solving Simple Equations**

**Worksheet**

**A.** Solve for the variable by adding or subtracting:

1. 

2. 

3. 

4. 

5. 

6. 

7. 

8. 

9. 

10. 

11. 

12. 

13. 

14. 

15. 

16. 

17. 

18. 

**B.** Solve for the variable by multiplying or dividing:

1. 

2. 

3. 

4. 

5. 

6. 

7. 

8. 

9. 

10. 

11. 

12. 

13. 

14. 

15. 

16. 

17. 

18. 

**6.2 Solving Equations Requiring Several Steps**

Many equations require more than one step to isolate the variable.

To solve these equations, isolate the term with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ first.

Examples:

1. -5w + 9 = 24
2. 5n – 8 = 12
3. 0 = 7p – 35
4. 9p – 2 = 6
5. -1 = -7 – 0.3t
6. 4x + =
7. 4y + = 3
8. 3(x – 4) = -6

\*\*\*6.1 - 6.2 Quiz next class

* 1. **Solving Equations Requiring Several Steps**

**Worksheet**

1. Solve for the variable.
2. Collect like terms and solve for the variable.
3. Solve for the variable. Expand first.

**6.3 Solving Equations by Combining Terms**

To solve an equation, it is necessary to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ on one side of the equation. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are combined and any \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ must also be combined.

Examples:

1. 6x – 5 = 2x + 7
2. 6x + 7 = -2x – 5
3. -4m + 2 = 6m + 12
4. 4x – 3 = 2x – 3
5. 5(y – 1) = 7(3 + y)
6. 5(2w – 3) = -2(3w + 2) + 5
7. 3(y – 1) – 5y = 2y – (y – 2)

**6.3 Solving Equations by Combining Terms**

**Worksheet**

1. Solve.
2. Expand first, then solve.

**6.4 Solving Equations with Fractional Coefficients**

When an equation contains fractions, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_ by a \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the fractions. This allows us to obtain an equivalent equation without fractions.

Examples:

1. =
2. – 3 = a +
3. - = – n
4. = 4 -
5. - = *x*
6. (2 – *x*) + = (*x* + 7)

\*\*\*6.3 – 6.4 Quiz next class

**6.4 Solving Equations with Fractional Coefficients**

**Worksheet**

A. Solve for the variable.

1. 

2. 

3. 

4. 

5. 

6. 

7. 

8. 

9. 

10. 

B. Solve.

1. 

2. 

3. 

4. 

5. 

6. 

7. 

8. 

9. 

10. 

**6.3 – 6.4 Review**

1.  2. 

3.  4. 

5.  6. 

7.  8. 

9.  10. - = +

**6.5 Introduction to Inequalities**

We use an \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to model a situation that can be described by a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ instead of just one.

Inequality Signs:

Examples:

1. a is less than 3
2. d is greater than or equal to -5.4
3. Contest entrants must be at least 18 years old (a = age)
4. Scientists have identified over 400 species of dinosaurs ( )

Inequality Solutions:

Is each number a solution of the inequality b ≥ -4?

1. -8
2. -3.5
3. -4
4. -4.5
5. 0

Use a number line:

Graphing Inequalities:

Graph each inequality on a number line and write three possible solutions.

1. t > -5
2. -2 ≥ x
3. 0.5 ≤ a
4. p <

**6.5 Introduction to Inequalities**

**Worksheet**

Graph each inequality **AND** give 3 possible solutions for each.

1. 

2. 

3. 

4. 

5. 

6. 

7. 

8. 

9. 

10. 

11. 

12. 

13. 

14. 

15. 

16. 

17. Use a symbol to write an inequality that corresponds to each statement:

a) A number between 0 and 4999 b) A number more than 5000

c) x is less than -2 c) p is greater than or equal to 6

d) y is negative e) m is positive

f) A coffee maker can hold no more than 12 cups of water

g) You must be at least 16 years old to obtain a learner’s permit

h) The maximum seating capacity of a school bus is 48 students

i) Over 2500 people participate in the charity bike-a-thon each year

18. Is each inequality true or false?

a) 5 < 8 b) 5 ≤ 5

c) -5 < -8 d) 0 ≥ -5

e) 5 < -8 f) 5.01 < 5.1

g) 5 < 5 h) 1/5 < 1/8

19. Is each number a solution of x < -2?

a) 0 b) -3

c) -6.8 d) -2

e) -2.001 e) -1/2

**6.6 Solving Inequalities: Addition & Subtraction**

To solve an inequality, we use the same strategy as for solving an equation. We isolate the variable by adding or subtracting from each side of the inequality.

Compare the following solutions:

x + 3 = 5 x + 3 < 5

Examples: Solve the inequality and graph the solution

1. 6 ≤ x – 4
2. 3x > 2x + 12
3. 3.5 < x + 2.4
4. x + 1 < 4
5. -13 x – 11

**6.7 Solving Inequalities: Multiplying & Dividing**

When we multiply or divide by a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ we must \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the inequality sign.

Proof: Consider the inequality

-1 < 2

To make the inequality true, we must \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Examples: Solve and graph

1. -5s ≤ 25
2. -4y > 12
3. 3x < 5x + 12
4. 3y + 8 ≥ 17

\*\*\*6.6-6.7 Quiz next class

**6.6 – 6.7 Solving Inequalities**

**Worksheet**

1. Solve and graph.
2. Solve and graph.
3. Solve and graph.

**6.6 – 6.7 Linear Solving Inequalities**

**Extra Worksheet**

1. Solve. Justify your work and show a graphical representation of your answer as well.

1.  2. 

3.  4. 

5.  6. 

7.  8. 

9.  10. 

11.  12. 

13.  14. 

15.  16. 

B. For the following questions, write the inequality represented by each number line:

17. 

18. 

19. 

20. 

21. A business must choose a company to print a promotional brochure.

 Company A charges $900 plus $0.50 per copy

 Company B charges $1500 plus $0.38 per copy

1. How many brochures must be printed for company A to be less expensive?
2. How many brochures must be printed fro company B to be less expensive?

**Chapter 6 Solving Equations**

**Review**

1. Solve.

2) Solve.

3) Solve. Collect like terms first.

4) Solve.

1. Solve *and* graph.