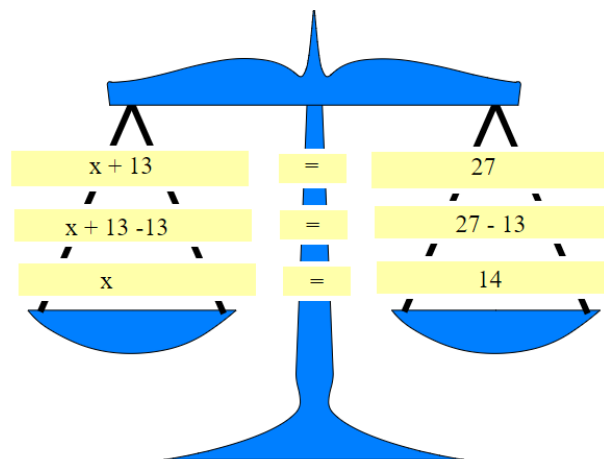


Solving Equations

Unit One



Name: _____ Period: _____

Lesson #1 Solving One and Two Step Equations

An _____ is a mathematical sentence that contains a _____.

One step equations are easily solved mentally, by using _____.

When we use inverses we are also using mathematical properties:

The _____ is used when we add a number to both sides of an equation.

The _____ is used when we subtract a number from both sides of an equation.

The _____ is used when we multiply each side of the equation by the reciprocal of a number to isolate the variable.

Examples:

1. $5x = 30$

2. $\frac{a}{15} = 4$

3. $a + 8 = 13$

4. $\frac{72}{d} = 8$

5. $18 - z = 12$

6. $\frac{3}{4}x = 24$

Try on your own:

7. $12 - d = 9$

8. $3x = 18$

9. $4 = \frac{t}{9}$

10. $\frac{56}{d} = 14$

11. $z + 15 = 1$

12. $\frac{2}{3}x = 16$

Examples:

13. $5x - 2 = 13$

14. $4 = \frac{1}{6}n + 11$

15. $-16 = 6a - 4$

16. $1 + \frac{2}{3}b = -13$

Try on your own:

17. $4 - 8x = 20$

18. $-2 = \frac{1}{4}n - 10$

19. $3x - 28 = -7$

20. $9 + \frac{2}{5}b = 27$

HW #1 Solving One and Two Step Equations

Show work to solve each of the following.

1. $\frac{2}{3}x = 28$

2. $\frac{3}{4}x = 36$

3. $\frac{3}{2}x = 15$

4. $\frac{5}{6}x = 55$

5. $15 - 2x = -9$

6. $38 = 20 - 6x$

7. $\frac{1}{3}x - 18 = -9$

8. $56 - \frac{1}{2}x = 40$

Lesson #2 Translating Verbal Expressions

In order to translate a verbal expression, you must be familiar with the vocabulary words that represent each operation.

Words that represent each operation:

Addition

Subtraction

Multiplication

Division

Translate and solve each of the following:

1. A number increased by 8 is 23.
2. Twenty - five is ten less than a number.
3. The quotient of 56 and a number is 7.
4. 15 dollars per hour for a total of 60 dollars.

5. Half the number of students is 12.

6. 5 times the number of weeks in school is 200.

7. The product of a number and -3 decreased by 12 is 18.

8. If 17 is decreased by twice a number, the result is 5.

9. One – ninth of a number increased by 5 is 8.

10. Six less than three halves of a number is -30.

11. She paid three – quarters of the price of a new laptop and used a \$10 off coupon for a total \$398. What was the original price?

12. He ordered 4 new tires for his truck and paid \$96 for installation for a total of \$384. How much did each tire cost?

HW #2 Variables and Equations

Translate and Solve each of the following problems.

1. When 12 is added to the product of a number and -8 the result is 68.
2. Half a number decreased by 54 is equal to -18.
3. Twenty – six more than the triple of a number is eleven.
4. Eighteen less than three quarters of a number is 0.
5. At the end of the summer a pool company sold all their pools for three – fifths of their original price and offered installation for \$250. One costumers total cost was \$1,330. What was the original price of the pool she purchased?

HW #3 Using Equations to Solve a Problem

Write a two step equation that models each scenario below and use it to solve the problem.

1. The Keesler's took out a 0% interest loan to purchase a new camper. They put \$2,400 down and have to pay \$160 a month until they pay off a total of \$12,000. How many months do they have to pay for camper? How many years?
2. Emily was given \$750 for high school graduation. She opened a savings account and plans to add \$125 per week. How many weeks will it take her to save \$3,000?
3. Lindsay just bought a new MP3 player and purchased a Music Download program online. The program has a start up fee of \$40 and charges \$0.50 per song downloaded. If Lindsay spends \$100, how many songs did she download?

Lesson #4 Using the Distributive Property to Solve Equations

Steps:

1. Distribute the number outside of the parenthesis to each number inside the parenthesis, _____.
2. Use _____ to combine the _____ and the answer.
3. Use inverse operations to combine the _____ and the answer.
4. _____ your work!

Examples:

1. $2(x - 1) = 12$

2. $-3(n - 5) = 36$

3. $60 = 4(2x + 3)$

4. $42 = 3(4n + 2)$

5. $-5(2x + 1) = -45$

6. $-6(-3x - 2) = 48$

7. $\frac{1}{3}(18x - 45) = -75$

8. $147 = -\frac{3}{4}(20x - 36)$

Use the distributive property to solve each word problem below:

9. Twice the sum of a number and 15 is equivalent to -24. Find the number.

10. Half the difference of a number and 18 is equivalent to -25. Find the number.

HW #4: Using the Distributive Property to Solve Equations

Solve.

1. $64 = -4(2x - 6)$

2. $\frac{1}{2}(16x - 58) = -77$

Write an equation using the Distributive Property, then solve.

3. Three times the sum of a number and 24 is equivalent to 12. Find the number.

4. One third the difference of a number and 33 is equivalent to -15.

Lesson #5 Using the Distributive Property to Solve Word Problems

1. A quarter of the sum of a number and 40 is equivalent to 17. Find the number.
2. Three quarters of the difference of a number and 28 is equivalent to 15. Find the number.
3. A one - day pass to an amusement park costs \$40 plus an additional fee for parking per person. If fifteen people attend the park the total cost is \$675, find the price per person for parking.
4. A volleyball uniform costs \$15 for the shirt, \$10 for the pants and x dollars for the socks. If a coach has 12 players and spends a total amount of \$396 before taxes, find how much each pair of socks cost.

Lesson #6 Solving Equations by Combining Like Terms

Procedure:

1. _____ if necessary.
2. Combine all _____ and _____.
3. Use inverse operations to combine the _____ and the answer.
4. Use inverse operations to combine the _____ and the answer.

Examples:

1. $2x + 6 - 5x - 10 = 11$

2. $12x - 10 - 5x + 8 = 54$

3. $-\frac{5}{2}x + 18 + \frac{3}{4}x - 26 = 55$

4. $3x + 5(x - 2) = 14$

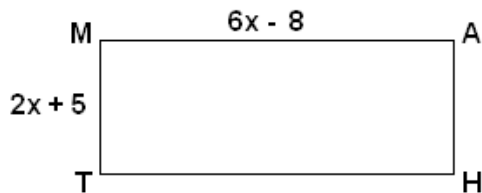
5. $5x - 4(2x + 3) = -30$

6. $\frac{4}{5}x + 12 - \frac{7}{15}(x + 60) = 30$

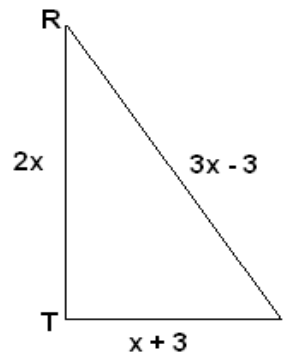
Perimeter is the distance _____ a shape. To find the perimeter _____ all the sides.

Given the perimeter find the lengths of each side in the shapes below.

7. Perimeter is 74 cm.



8. Perimeter is 36 ft.



HW #6 Solving Equations by Combining Like Terms

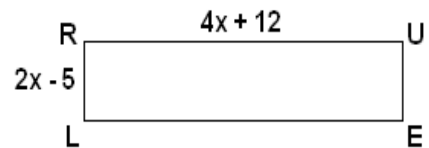
Solve.

1. $6x + 8 - 10x + 4 = 32$

2. $-5x + 3 + 8x - 9 = -18$

3. $-\frac{3}{2}x + 15 + \frac{7}{4}x - 27 = 6$

4. The perimeter of the rectangle below is 62 inches. Determine the value of x and the length of each side.



HW #7: Perimeter Problems

Create an equation to find the missing number and the dimensions of each shape below.

1. The length of a rectangle is 12 less than one and a half times its width. Its perimeter is 56 centimeters, find the length and width.
2. The width of a rectangle is three more than half the length. Its perimeter is 78 centimeters, find the length and width.
3. The length of a rectangle is nine less than four times the width. Its perimeter is 92 inches, find the length and width.

4. Amanda has 350 dollars less than twice the amount of money Paul has. The sum of their accounts is \$2,650, find how much money they each have saved.
5. The Junior and Senior classes fundraised for a local charity. The seniors fundraised \$360 less than twice the Juniors. The difference between the amount each raised is \$500. How much did each raise?
6. Jenna and Michael are both fundraising for a local charity. Michael raised seventy-five dollars less than three times the amount of money Jenna raised. Together they were able to donate \$645. How much money did they each raise?

6. Find two consecutive even integers that have a sum of -34 .

7. Find two consecutive integers that have a sum of -25 .

8. Find three consecutive even integers that have an average of 80 .

9. Find four consecutive odd integers that have an average of 96 .

10. Four siblings have consecutive odd ages. If the sum of their ages is 24 . Find each of their ages.

Lesson #10 Variables on Both Sides of the Equations

Procedure:

1. Use _____ to combine like terms on _____ of the equal sign.
2. Use inverse operations to _____.

Examples:

1. $6x - 12 = 2x$

2. $8x = 4x + 8$

3. $-\frac{1}{2}x - 18 = \frac{1}{4}x$

4. $9x - 3 = 7x + 5$

$$5. -2x - 8 = 10 - 5x$$

$$6. \frac{3}{4}x + 16 = 2 - \frac{1}{8}x$$

$$7. 7x + 16 = 3x$$

$$8. 3x - 12 = 9x$$

$$9. 3x + 4.5 = 7.2 - 6x$$

$$10. 16 - \frac{3}{4}x = 20 - \frac{1}{2}x$$

HW #10 Solving Equations with Variables on Each Side

Solve for the variable in each equation below.

1. $14n = 18 + 12n$

2. $27x - 6 = 14x + 7$

3. $\frac{3}{4}y - 6 = \frac{1}{4}y + 10$

Lesson #11 Variables on Both Sides Continued

Solve for the variable in each equation below.

1. $27 - 5x = 4x$

2. $6x - 48 = 10x$

3. $\frac{1}{3}x + 5 = \frac{2}{3}x$

4. $\frac{1}{2}x - 6 = \frac{5}{8}x$

5. $7x - 18 = 4x + 54$

6. $-3x + 52 = 5x - 4$

$$7. 85 - 9x = 17 - 26x$$

$$8. -\frac{3}{4}x + 16 = -\frac{1}{2}x + 20$$

$$9. -\frac{9}{10}x - 14 = \frac{2}{5}x + 12$$

$$10. \frac{1}{2}(6x - 18) = 5x + 21$$

HW #11 Variables on Both Sides Continued

Solve for the variable in each equation below.

1. $3x - 28 = 7x$

2. $\frac{2}{3}x + 12 = \frac{3}{2}x - 18$

3. $\frac{7}{4}x - 26 = \frac{3}{2}\left(\frac{1}{4}x + 12\right)$

4. \$4.40 less than the cost of six baseballs is equal to the cost of three baseballs increased by \$4.60. Find the cost of each baseball.
5. Emily's Great Aunt Grace is six times her age. If you subtract twenty – eight from Aunt Grace's age and add eleven to three times Emily's age their ages are the same. Find their ages.
6. Julia's saving account is one and a half times greater than Jacob's account. If you add \$485 to Jacob's account and subtract \$115 from Julia's their balances are the same. How much money is in each of their accounts?

Lesson #13: Classification of Solutions

There are three classifications of solutions to equations:

one solution, no solution, or infinitely many solutions.

Equations with _____ will, after being simplified, have coefficients of x that are the same on both sides of the equal sign and constants that are different.

Examples: _____

Equations with _____ will, after being simplified, have coefficients of x and constants that are the same on both sides of the equal sign.

Examples: _____

Solve each of the following equations for x and classify as having only one, none or infinitely many solutions.

1. $7x - 3 = 5x + 5$

2. $7x - 3 = 7x + 5$

3. $7x - 3 = -3 + 7x$

4. $-8x + 15 = 15 - 8x$

5. $-8x + 15 = 8x - 15$

6. $15 - 8x = 8x - 15$

Determine what kind of solution(s) you expect the following linear equations to have. Transform the equation into a simpler form if necessary.

7. $11x - 2x + 15 = 8 + 7 + 9x$

8. $3(x - 14) + 1 = -4x + 5$

9. $-3x + 32 - 7x = -2(5x + 10)$

10. $\frac{1}{2}(8x + 26) = 13 + 4x$

11. $5 - \frac{3}{2}x = 9 - \frac{1}{4}(6x + 16)$

12. $\frac{3}{4}x - 9 = 12 + \frac{2}{3}\left(\frac{9}{8}x - 3\right)$

13. $\frac{1}{3}(15x - 12) = \frac{5}{2}(10 - 2x)$

14. $\frac{7}{8}x + 10 - \frac{1}{4}x = 5\left(\frac{1}{8}x + 2\right)$

HW #13: Classification of Solutions

Explain what kind of solution(s) you expect the following linear equations to have and why. Transform the equation into a simpler form if necessary.

1. $18x + \frac{1}{2} = 6(3x + 25)$

2. $8 - 9x = 15x + 7 + 3x$

3. $5(9 + x) = 5x + 45$

4. $\frac{5}{6}x - 8 = 18 + \frac{4}{3}\left(\frac{1}{2}x - 6\right)$

5. $\frac{2}{9}(27x - 72) = -4\left(24 - \frac{1}{18}x\right)$

6. $\frac{3}{2}x + 15 - \frac{1}{2}x = 2\left(\frac{1}{2}x + 5\right)$

Lesson #14 Classifications of Solutions

Simplify the equations below to determine if they have one solution, no solution, or infinite solutions. Solve the ones with you one solution completely.

1. $12x - 8 = 3(4x + 2)$

2. $\frac{1}{2}(16x + 6) = 3 + 8x$

3. $\frac{1}{4}(24x - 8) = 8x + 1$

4. $20 - 2(5x + 4) = 12 - 10x$

5. $-3(5x - 9) + 4 = 5x - 11 + 3x$

6. $-18\left(\frac{1}{3}x - 2\right) = -6x + 36$

7. $3x + 19 - 7x = 9 - 4x$

8. $15 + \frac{2}{3}(6x - 15) = 4x$

Lesson #15 Equation Review

1. Amelia was given \$150 in gifts for her 14th birthday. She plans to open a savings account and add \$40 per week. How long will it take her to save \$430?
2. Mrs. Heart is pet sitting. She charges \$35 per day for dogs and cats. One day she had three cats and earned \$175. How many dogs did she pet sit that day?
3. Four consecutive even integers have a sum of 84. What are the four integers?
4. Three fifths of a number decreased by one is equivalent to the same number increased by seven. Find the number.

5. Without solving completely, identify which of the following equations has a unique solution, no solution, or infinitely many solutions.

a. $\frac{1}{3}(18x - 24) = 6x - 8$

b. $-x + 3 = 8x + 4 - 7x$

c. $-4(2x - 1) = 2x + 5 - 8x$

6. The perimeter of a rectangle is 82 inches. Its length is seven less than half its width. Find the dimensions of the rectangle.

7. Solve: $\frac{2}{3}(15x - 24) - 6x = 9x - 1$

8. $\frac{2}{3}(5x - 45) = 30 - \frac{5}{4}(x - 4)$