

# ACCELERATED MATHEMATICS

## CHAPTER 4

### EQUATIONS

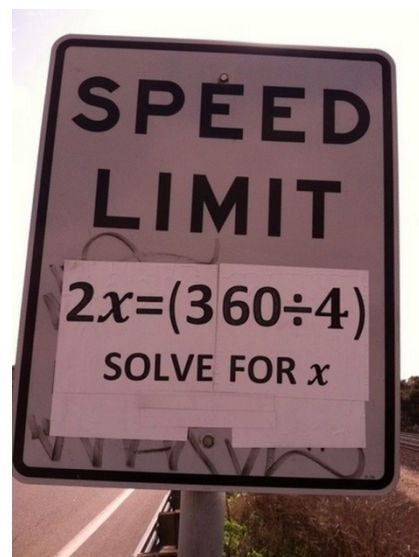
#### TOPICS COVERED:

- Understanding simple equations
- Hands-on equations
- Solving equations mentally
- One-step equations
- Two-step equations
- Simplifying equations and combining like terms
- Distributive property
- Equations with variables on both sides

$$y + 2 = y$$

**90% of math  
graduates can't  
solve this equation**

YOU KNOW, I DON'T  
THINK MATH IS A SCIENCE.  
I THINK IT'S A RELIGION.  
ALL THESE EQUATIONS  
ARE LIKE MIRACLES. YOU  
TAKE TWO NUMBERS AND WHEN  
YOU ADD THEM, THEY MAGICALLY  
BECOME ONE *NEW* NUMBER!  
NO ONE CAN SAY HOW IT  
HAPPENS. YOU EITHER BELIEVE  
IT OR YOU DON'T.



## **“WHEN WILL I EVER USE THIS IN REAL LIFE?”**

Honestly, you may never end up using this again in life.

Almost all the math that most people need in life, they learn before they get to Algebra. But one thing you need to understand is that we don't study upper-level math because we will be using it every day.

You don't study World War II or the Civil War because you will grow up and be in a war. You study the reasons people go to war, and the outcomes of war, to learn how to prevent war.

You learn how to diagram a sentence in English so that you have a better grasp of proper writing skills.

Will you ever dissect a frog again? Probably not, but you do it in school to have a better understanding of the muscular, respiratory, and circulatory systems and how they work. By understanding how they work in a frog, you understand how they work in a human.

You study math to learn how to think. Being able to think through problems and decide on solutions to the problem is what you learn from math.

We use math because we are able to get immediate feedback to determine if our thought process was correct (did you solve the problem correctly?). We continue to study higher levels of math to challenge our thinking and to become more efficient problem solvers.

Will you ever use this again in life? I don't know, and you don't either. Who knows what you will do when you graduate from college, but why limit your options?

















One thing is guaranteed: You will have to solve problems your entire life. Not necessarily math problems, but life problems. Some will be simple and some will be difficult.













You may already be prepared to handle simple ones, but my goal is to prepare you for the harder problems you will face in life. I hope to teach you the thinking skills you will need to approach those problems with confidence and solve them.

Now go back to your desk and learn to think.

(Taken from the Star-Telegram, December 24, 2002, Michael Yelvington, Grapevine HS)

Each type of fruit represents a different single digit (0-9). Using what you know about the number system, determine the value of each fruit. Two fruits next to each other indicate a two digit number (not multiplication).

 $+$  <hr style="width: 50%; margin: 0 auto;"/> 	 $\times$  <hr style="width: 50%; margin: 0 auto;"/> 	 $+$  $+$  <hr style="width: 50%; margin: 0 auto;"/> 	 $-$  <hr style="width: 50%; margin: 0 auto;"/> 	 $+$  <hr style="width: 50%; margin: 0 auto;"/> 
--	---	--	--	--

 $\times$  <hr style="width: 50%; margin: 0 auto;"/> 	 $\times$  <hr style="width: 50%; margin: 0 auto;"/> 	 <hr style="width: 50%; margin: 0 auto;"/> $=$  	 <hr style="width: 50%; margin: 0 auto;"/> $=$  
--	--	--	---

What single-digit number do  $\square$  and  $\triangle$  each represent in the expressions below?

$$\square + \square = \triangle \times \triangle$$

$$\square + \square + \square + \square = \square \times \triangle$$

What single-digit numbers do  $\square$ ,  $\triangle$ , and  $\bigcirc$  represent in the expression below?

$$\square - \triangle = 3$$

$$\bigcirc \times \triangle = 30$$

$$\bigcirc + \triangle + \square = 20$$

**Equations Vocabulary**

<b>Coefficient</b>	A coefficient is the number that you multiply a variable by.	$4x = 12$ 4 is the coefficient
<b>Variable</b>	A variable is a letter that stands for an unknown amount.	$4x = 12$ x is the variable
<b>Constant</b>	A constant is a number that is all by itself (it is not multiplied or divided by a variable).	$4x = 12$ 12 is the constant
<b>Term</b>	A term is one of the quantities connected by an addition or subtraction sign in an equation. A term is a number, a variable, or the product or quotient of a number and a variable.	$4x = 12$ $4x$ is the term
<b>Like terms</b>	Two terms are called like terms if they have the same variables with the same exponents.	$4x + 3x = 7x$ $4x$ and $3x$ are like terms
<b>Unlike terms</b>	Terms that are not like. They have either different variables or different exponents or both.	$4x^2 + 4x + 3$ $4x^2$ , $4x$ , and 3 are all unlike terms

1.	a, b, c, and d each represent a different value. If $a = 2$ , find $b$ , $c$ , and $d$ .  $a + b = c$ $a - c = d$ $a + b = 5$	
2.	a, b, c, and d each represent a different value. If $a = -1$ , find $b$ , $c$ , and $d$ .  $a + b = c$ $b + b = d$ $c - a = -a$	
3.	a, b, c, and d each represent a different value. If $a = 4$ , find $b$ , $c$ , and $d$ .  $a + c = b$ $b - a = c$ $cd = -d$ $d + d = a$	

## My Guide to Solving Equations

---

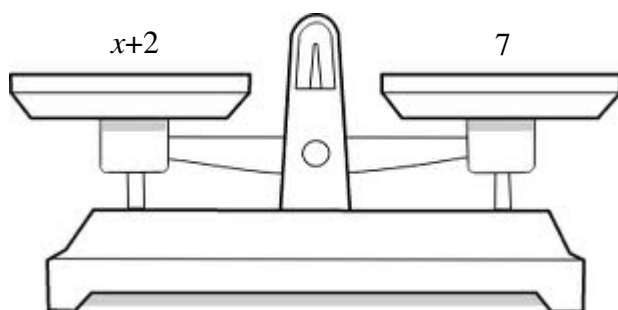
Example 1:  $x+2=7$

What are you trying to solve for? You are trying to solve for  $x$ .

How do you solve for  $x$ ?

You need to get  $x$  all by itself on one side of the equation.

Think of an equation as a balance or a scale.



Since an equation means both sides are equal, that means the scale is balanced. The left side equals the right side. You need to keep the scale balanced at all times.

That means whatever you do to one side of the scale (say subtract 2 on the left), I need to do the same on the right side. Subtracting 2 on both sides keeps the scale balanced.

## How To Show My Work

Showing your work in a particular way is very important in our equation unit.

Example 1:

Think:

What do I need to do to get  $x$  all alone?  
This is called **isolating the variable**. Since someone added 3, you will need to subtract 3.

$$\begin{array}{r} x + 3 = -4 \\ -3 \quad -3 \\ \hline x = -7 \end{array}$$

Draw this vertical line to separate the left and right sides of the scale.

Since you subtracted 3 on the left, you need to subtract 3 on the right to stay balanced.

## How To Check My Work

Start with the original equation.

$$x + 3 = -4$$

Plug in what you believe the answer is.

$$-7 + 3 = -4$$

Solve the left side.

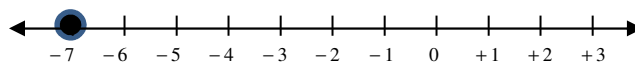
$$-4 = -4$$



Since  $-4 = -4$  you have balanced your scale. Therefore your answer is correct and  $x = -7$ .

## How To Graph My Answer

Place a solid dot on the number line at the location of your answer.



### Solving Equation Examples

Example 1:

How do you undo subtracting 7?  
You need to add 7 to both sides.

$$\begin{array}{r|l} x - 7 & = -12 \\ +7 & +7 \\ \hline x & = -5 \end{array}$$

Have you noticed that the equal signs fall right on the line each time?

Check

$$\begin{array}{l} x - 7 = -12 \\ -5 - 7 = -12 \\ -12 = -12 \end{array} \quad \checkmark$$

Example 2:

How do you undo add -10?  
You can either subtract -10 or add 10. Subtracting a negative is the same as adding a positive.

$$\begin{array}{r|l} x + -10 & = 6 \\ --10 & --10 \\ \hline x & = 16 \end{array} \qquad \begin{array}{r|l} x + -10 & = 6 \\ +10 & +10 \\ \hline x & = 16 \end{array}$$

Check

$$\begin{array}{l} x + -10 = 6 \\ 16 + -10 = 6 \\ 6 = 6 \end{array} \quad \checkmark$$

### Solving Multiplication and Division Equations


Example 1:  $-6x = -42$

How do you undo a multiply by -6?  
You need to divide both sides by -6.

$$\begin{array}{r|l} -6x & -42 \\ -6 & -6 \\ \hline x & 7 \end{array}$$

Remember that we use this sign to show division. Please do not use the elementary school division signs.

Check


$$\begin{aligned} -6x &= -42 \\ -6(7) &= -42 \\ -42 &= -42 \end{aligned}$$


Example 2:  $\frac{x}{-5} = 12$

How do you undo a divide by -5?  
You need to multiply by -5. What do you multiply by -5? You are multiplying the  $x$  by -5 so write it next to the  $x$ .

$$\begin{array}{r|l} -5 \cdot \frac{x}{-5} & 12 \cdot -5 \\ \hline x & -60 \end{array}$$

Check

$$\begin{aligned} \frac{x}{-5} &= 12 \\ \frac{-60}{-5} &= 12 \\ 12 &= 12 \end{aligned}$$




## Solving One-Step Word Problems

Example: Mrs. Fauatea has an IQ of 208. This is 94 higher than the IQ of Lady Gaga. What is Lady Gaga's IQ?

STEP 1: Define a variable. What is the unknown? What are you trying to solve for in the problem?

$$g = \text{Lady Gaga's IQ}$$

STEP 2: Write the equation to be solved.

We know Lady Gaga's IQ + 94 = Mrs. Fauatea's IQ

Therefore, the equation is  $g + 94 = 208$

Note that the variable should not be all by itself (isolated) in the original equation. If it is you have already started solving the equation.

STEP 3: Solve.

$$\begin{array}{r} g + 94 = 208 \\ -94 \quad | \quad -94 \\ \hline g = 114 \end{array}$$

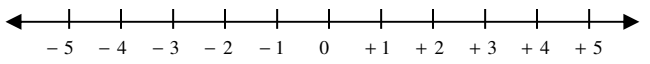
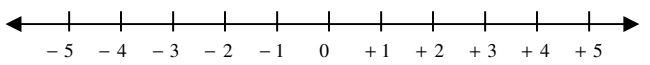
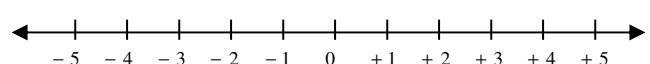
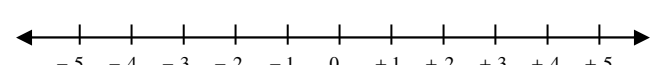
Lady Gaga's IQ is 114.

STEP 4: Check.

$$\begin{array}{l} g + 94 = 208 \\ 114 + 94 = 208 \\ 208 = 208 \end{array} \quad \checkmark$$

**Solve each problem showing all steps on a separate sheet of paper. Check your solution showing all steps. Graph solutions when provided a number line.**

1.	$x - 35 = 62$		2.	$y + 16 = 47$	
3.	$22 = c - 12$		4.	$-34 = d + -16$	
5.	$\frac{n}{5} = -40$		6.	$s + 71 = 56$	
7.	$2.17 + k = 4.19$		8.	$r - 18 = 36$	
9.	$h - 3.7 = 6.8$		10.	$\frac{m}{18} = -39$	
11.	$8.34x = 25.02$		12.	$-3.4t = 8.5$	

13.	$28 = -7f$		
14.	$14 = y - (-13)$		
15.	$n - 13 = -11$		
16.	$m - (-14) = 17$		

**Define a variable. Then write an equation for each problem, solve and check. The variable should not be all by itself in the original equation. Show all work on a separate sheet of paper.**

17.	The Sears Tower in Chicago has a height of 1,454 ft. This is 408 ft taller than the Chrysler Building in New York City. What is the height of the Chrysler Building?
18.	The population of Los Angeles in 1990 was about 1.7 times the population of Chicago. The population for Los Angeles was 11.9 million. What was the population of Chicago?
19.	Chris spends one-fourth of his monthly income on car insurance. His monthly car insurance is \$105. What is his monthly income?
20.	One-third of the problems on the next math test are multiple choice. The test contains 12 multiple-choice problems. How many problems are on the test?
21.	The total bill for a DVD is \$25.44 including tax. The tax is \$1.44. What is the marked price of the disk?



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

Score : \_\_\_\_\_

Teacher : \_\_\_\_\_

Date : \_\_\_\_\_

---

## Solve the Equations

1)  $-11 = 3 + x$

6)  $-33 = -3y$

2)  $-2d = 24$

7)  $12 = 5 + k$

3)  $f - 5 = -4$

8)  $13 = \frac{r}{5}$

4)  $-6b = 78$

9)  $12 = s - 7$

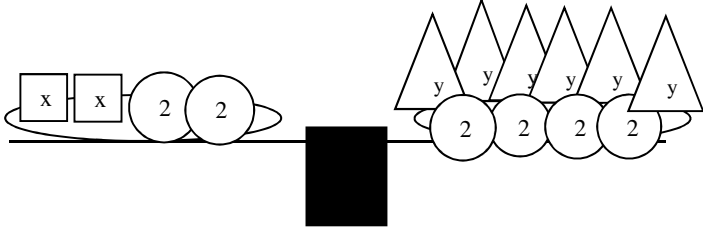
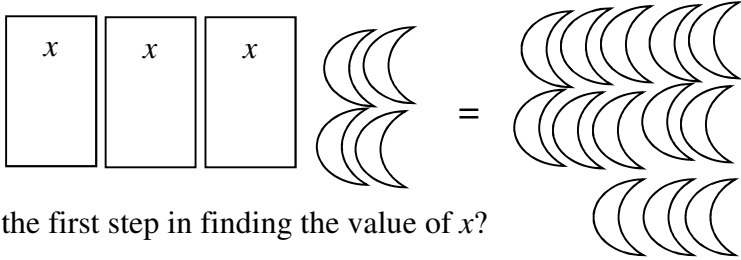
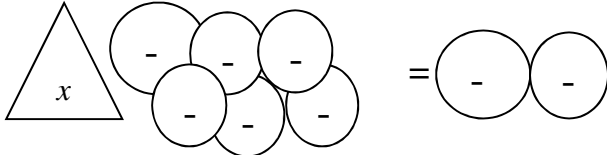
5)  $\frac{h}{3} = 9$

10)  $-12 = 2n$



**Define a variable. Then write an equation for each problem, solve and check. The variable should not be all by itself in the original equation. Show all work on a separate sheet of paper.**

1.	There are 6 peaches in each container. How many containers are needed to have exactly 78 peaches?
2.	You are 3 inches taller than you were last year. Last year you were 60 inches tall. How tall are you now?
3.	A prime rib dinner at a restaurant costs \$21.95. A chicken dinner is \$7 cheaper. What is the cost of the chicken dinner?
4.	Students were getting ready to play a game. After dividing the students into 6 even groups, there were 14 students in each group. How many total students were there?

5.	<p>The model represents the equation <math>2x + 4 = 6y + 8</math>. What is the value of <math>x</math>?</p>  <p>A. <math>x = 3y</math>      B. <math>x = 4y + 4</math>      C. <math>x = 3y + 4</math>      D. <math>x = 3y + 2</math></p>
6.	<p>The model below represents the equation <math>3x + 4 = 13</math>.</p>  <p>What is the first step in finding the value of <math>x</math>?</p> <p>A. Divide the bananas equally among the 3 cups.          B. Add 13 bananas to each side of the model.          C. Add 4 bananas to each side of the model.          D. Subtract 4 bananas from each side of the model.</p>
7.	<p>The model represents the equation <math>x - 6 = -2</math>.</p>  <p>What is the value of <math>x</math>?</p>



### Solving Two-Step Equations

What if the equation has more than one operation? For example,  $5x + 2 = -18$

How do you know which operation to undo first? Since you will be UNDOING the operations to solve for  $x$ , you need to work BACKWARDS through the order of operations.


G ↑  
E  
MD  
AS

Remember G stands for any grouping symbols, including parentheses.

You want to undo any addition and subtraction first. Then undo any multiplying and dividing.


Example 1:

$$\begin{array}{r|l} 5x + 2 & = -18 \\ -2 & -2 \\ \hline 5x & = -20 \\ \hline 5 & 5 \\ \hline x & = -4 \end{array}$$

$$\begin{aligned} 5x + 2 &= -18 \\ 5 \bullet -4 + 2 &= -18 \\ -20 + 2 &= -18 \\ -18 &= -18 \end{aligned}$$


Example 2:

$$\begin{array}{r|l} \frac{x}{-4} - 7 & = -13 \\ +7 & +7 \\ \hline -4 \bullet \frac{x}{-4} & = -6 \bullet -4 \\ \hline x & = 24 \end{array}$$

$$\begin{aligned} \frac{x}{-4} - 7 &= -13 \\ \frac{24}{-4} - 7 &= -13 \\ -6 - 7 &= -13 \\ -13 &= -13 \end{aligned}$$


Notice in the checks you now work forward through PEMDAS because you know all the numbers.

Example

$$8x + 3 = 35$$

What are we trying to solve for?  $x$

So we need to get  $x$  on one side of the equation all by itself. How?

We must undo both the multiplication and the addition. Since we are undoing each operation, we work backwards through the order of operations: subtract first, then divide.

$$8x + 3 = 35$$

$$-3 = -3$$

$$\frac{8x}{8} = \frac{32}{8}$$

$$x = 4$$

To check the solution, plug the answer back into the original equation.

$$8x + 3 = 35$$

$$8(4) + 3 = 35$$

$$32 + 3 = 35$$

$$35 = 35 \checkmark$$

**Solve each problem showing all steps on a separate sheet of paper. Check your solution showing all steps. Write only your solution in the box on this page.**

1.	$2y - 9 = 9$		2.	$6a + 12 = 42$	
3.	$\frac{b}{4} - 2 = 8$		4.	$\frac{w+5}{2} = 10$	
5.	$-6c - 5 = -215$		6.	$-17 = \frac{n}{4} - 13$	
7.	$10 = 6 + \frac{t}{8}$		8.	$-30 = -37 + \frac{b}{15}$	
9.	$4 = \frac{s}{5} - 16$		10.	$7z - 9.4 = 11.6$	
11.	$4g + 0.7 = 36.7$		12.	$2y - 3 = 9$	
13.	$16 = \frac{-6+c}{-3}$		14.	$\frac{f-6}{5} = 3.2$	
15.	$9 + \frac{r}{5} = 15$		16.	$\frac{s}{3} - 7 = 7$	
17.	$0.4m - 2.7 = 11.7$		18.	$0.93 = 0.15 + 0.3w$	
19.	$\frac{a - (-3)}{3} = 10$		20.	$\frac{s-8}{-8} = -1$	
21.	$8y + 4.6 = -68.2$		22.	$-10f - 0.5 = 22.5$	





**Examples #1 and #2:**

$\frac{x}{2} + 3 = 21$ $\quad -3 \quad -3$ $2 \cdot \frac{x}{2} = 18 \cdot 2$ $x = 36$	$\frac{x+3}{2} = 21$ $2 \cdot \frac{x+3}{2} = 21 \cdot 2$ $x+3 = 42$ $\quad -3 \quad -3$ $x = 39$
--	---

**Solve each problem showing all steps on a separate sheet of paper. Check your solution showing all steps. Write only your solution in the box on this page. Simplify all fractions.**

1.	$1.2n + 3.6 = 14.4$		2.	$29 = \frac{b}{-4} + 15$	
3.	$25 = \frac{n}{-6} + (-19)$		4.	$375 = 14x + (-17)$	
5.	$12 + \frac{-v}{5} = -3$		6.	$9 = 14 + \frac{m}{2}$	
7.	$\frac{z+11}{6} = -49$		8.	$\frac{t+(-2)}{3} = -5$	
9.	$\frac{5+r}{-2} = -6$		10.	$\frac{36}{x} - 8 = -2$	
11.	$\frac{1}{2}x - \frac{1}{4} = 2\frac{1}{3}$		12.	$1\frac{1}{2}x - 2.2 = -6\frac{1}{3}$	
13.	$-\frac{2}{5}x + -3\frac{1}{4} = -4\frac{1}{2}$		14.	$\frac{b+3}{4} = 5$	
15.	$-\frac{3}{4}x + 3\frac{1}{2} = -10$		16.	$(x-0.5)^2 = 9$	
17.	$-x - 8.7 = -11.35$		18.	$\frac{2}{3}x - 3.2 = -8.1$	
19.	$\frac{2x+0.8}{5} = 2\frac{1}{3}$		20.	$3\frac{1}{2}x - \frac{1}{3} = 8\frac{2}{3}$	
21.	$1.2x - \frac{1}{4} = -2\frac{1}{2}$		22.	$-3\frac{2}{5}x + 4\frac{1}{2} = -6\frac{1}{4}$	



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

Score : \_\_\_\_\_

Teacher : \_\_\_\_\_

Date : \_\_\_\_\_

## Solve the Equations

Round your answers to the nearest hundredth if needed.

1)  $25 - 17b = -13$

6)  $-18 + \frac{5}{7}d = -10$

2)  $\frac{n-5}{-4} = 9$

7)  $\frac{9-h}{8} = -24$

3)  $\frac{f-18}{7} = -6$

8)  $\frac{14+y}{26} = -18$

4)  $\frac{r+10}{8} = 12$

9)  $\frac{3}{7}z + 16 = -11$

5)  $\frac{a+24}{-26} = 8$

10)  $-8k - 16 = -29$



## Two-Step Equations

**Solve each equation.**

1)  $6 = \frac{a}{4} + 2$

2)  $-6 + \frac{x}{4} = -5$

3)  $9x - 7 = -7$

4)  $0 = 4 + \frac{n}{5}$

5)  $-4 = \frac{r}{20} - 5$

6)  $-1 = \frac{5 + x}{6}$

7)  $\frac{v + 9}{3} = 8$

8)  $2(n + 5) = -2$

9)  $-9x + 1 = -80$

10)  $-6 = \frac{n}{2} - 10$

11)  $-2 = 2 + \frac{v}{4}$

12)  $144 = -12(x + 5)$

**Define a variable and write an equation for each situation. On a separate sheet of paper solve the equation showing all steps and check your work.**

1.	Find a number such that three times the number increased by 7 is 52.
2.	Five times a number decreased by 11 is 19. Find the number.
3.	Thirteen more than four times a number is -91. Find the number.
4.	Find a number such that seven less than twice the number is 43.
5.	On Thursday, 0.8 (or 80%) of the school's student population came to school. Thirty of those students went on a field trip. If there were 66 people in school after the students left for their field trip, how many students are enrolled at the school?
6.	Four friends ordered some food at a restaurant. They each paid an equal amount of the bill. Then they each contributed \$0.85 to the tip. The total bill, including tip, was \$26.00. What was each person's share of the bill, not including the tip?
7.	Allie added 12 gallons of water to her aquarium. This was six gallons less than twice as much as she added last week. How much water did she add last week?
8.	Ethan spent \$544 on lumber and other supplies. The lumber cost \$34 a yard. The cost of his other supplies was \$102. How many yards of lumber did he buy?
9.	Michael drove 56 miles to get to his sister's house. He arrived at his destination 1.4 hours after he began the trip. What was his average speed per hour while he was driving? (Distance = Speed x Time)
10.	The difference between three times a number and 11 is 10.
11.	One more than the difference between 18 and seven times a number is -9.
12.	Over the weekend Kyle spent two hours on an assignment and he spent equal amounts of time studying for 4 exams for a total of 16 hours. How much time did he spend studying for each exam?
13.	Laura is making a patio in her backyard using paving stones. She buys 44 paving stones and a flowerpot worth \$7 for a total of \$73. How much did each paving stone cost?
14.	Lady Gaga decides to record a new album. She can spend \$8,000 for studio time to record. The studio charges \$425 to reserve the space and \$75 per hour. Solve the equation $75h + 425 = 8000$ to find the amount of hours Lady Gaga can afford to spend in the recording studio.



**Define a variable and write an equation for each situation. On a separate sheet of paper solve the equation showing all steps and check your work.**

1.	331 students went on a field trip. Six buses were filled and 7 students traveled in cars. How many students were in each bus?
2.	Ally had \$24 to spend on seven pencils. After buying them she had \$10. How much did each pencil cost?
3.	You bought a magazine for \$5 and four erasers. You spent a total of \$25. How much did each eraser cost?
4.	Maria had some boxes and then bought seven more boxes. A week later half of all her boxes were destroyed in a fire. There are now only 22 boxes left. With how many boxes did she start?
5.	Chris won 40 super bouncy balls playing horseshoes. Later he gave two to each of his friends. He only has 8 remaining. How many friends does he have?
6.	Fred spent half his weekly allowance playing mini-golf. To earn more money his parents let him wash the car for \$4. What is his weekly allowance if he ended with \$12?
7.	In one season Ana ran 18 races. This was four fewer races than twice the number of races Kelly ran. How many races did Kelly run?
8.	Carlos is building a screen door. The height of the door is 1 foot more than twice its width. What is the width of the door if it is 7 feet high?
9.	Ella swims four times a week at the pool. She swims the same number of laps on Monday, Wednesday, and Friday, and 15 laps on Saturday. She swims a total of 51 laps each week. How many laps does she swim on Monday?
10.	While at the music store Drew bought 5 CDs, all at the same price. The tax on his purchase was \$6 and the total was \$61. What was the price of each CD?
11.	Stuart charged \$5.00 for every ticket sold to his rock concert. The venue he was playing at gave him \$100 to play there. If Stuart made \$200 on his first night how many tickets did he sell?
12.	Teddy rented a bike for \$10.00 an hour. The bike store also charged him an additional \$25 insurance fee. If he was charged a total of \$125, how many hours did he rent the bike?





**Define a variable and write an equation for each situation. On a separate sheet of paper solve the equation showing all steps and check your work.**

1.	MJ designs clothes for women. She charges \$500 per evening gown plus \$50 an hour for tailoring. How long did she spend tailoring an evening gown if she was paid \$850 for the gown?
2.	If Blockbuster charges \$4.50 to rent a movie for one week and \$0.30 for every day it is late after that, how late was Ben's movie if he paid a total of \$7.50 for the movie?
3.	Matt's father is 45. He is 15 years older than twice Matt's age. How old is Matt?
4.	Your dad took you shopping for some new clothes this past weekend. He purchased \$265 worth of jeans and shirts. He bought \$115 in jeans and the shirts cost \$25 each. How many shirts did he buy?
5.	Scott bought three bags of candy with a total of 300 pieces. He plans to keep 27 pieces and then divide all the candy evenly among seven friends. How many pieces did each friend receive?
6.	Anne earned \$3 an hour baby-sitting, and \$4 an hour working in the garden. Last week she did baby-sitting for 5 hours and garden work for 3 hours. How much more money does she need to buy a game that costs \$35?
7.	Tom divided \$360 among his six children for them to use for Christmas gifts. His daughter Kate added \$20 to her portion, then used the money to buy 16 gifts that each cost the same amount. What was the price of each of Kate's gifts?

You do not need to write an equation for #8-12 below.

Mr. Mangham is throwing a birthday party for Mrs. Shabanaj. He wants to send out invitations to the guests. He found a company that will sell a 10 pack of personalized invitations for \$6 each, plus a \$5 shipping fee for the entire order.

8.	What is the cost of the order if he buys three 10-packs of invitations?
9.	What is the cost of the order if he buys five 10-packs of invitations?
10.	Write an algebraic expression that represents the total cost of any order. Let $p$ represent the number of 10-pack invitations that were ordered.
11.	How many 10-packs were ordered if the total cost of the order was \$53?
12.	How many 10-packs were ordered if the total cost of the order was \$29?
13.	Write an equation to describe this situation. Let $p$ represent the number of 10-packs of invitations ordered and $c$ represent the total cost of the order.



## My Guide to Solving Equations

---

### Like & Unlike Terms

You can combine LIKE terms.

You cannot combine UNLIKE terms.

In the real world if you have 6 grapes, 5 apples, and 12 grapes, you could combine all your grapes together.

$$6 \text{ grapes} + 12 \text{ grapes} = 18 \text{ grapes}$$

Grapes and apples are unlike so you can't combine them (unless you are making fruit salad 😊.)

How do you know if there are like terms in an equation or expression?

LIKE TERMS have the **same variables** with exactly the **same exponents**.

$$5x + 3x = 8x \quad \longleftarrow \text{ Like terms}$$

$$6x^2 + 4x^2 = 10x^2 \quad \longleftarrow \text{ Like terms}$$

$$2xy + 6xy = 8xy \quad \longleftarrow \text{ Like terms}$$

$$5x + 2y \quad \longleftarrow \text{ Unlike terms}$$

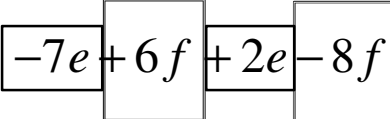
$$6x + 3xy \quad \longleftarrow \text{ Unlike terms}$$

$$3x + 2x^2 \quad \longleftarrow \text{ Unlike terms}$$

## Like & Unlike Terms

How To Solve Difficult Problems with Like & Unlike Terms

Method 1: Identify all like terms (including the operation)

$$-7e + 6f + 2e - 8f$$


The diagram shows the expression  $-7e + 6f + 2e - 8f$  with four boxes drawn around the terms. The first box is around  $-7e$ , the second around  $6f$ , the third around  $2e$ , and the fourth around  $-8f$ . The boxes are arranged in a row, with the plus signs between them.

$$-7e + 2e = -5e$$

$$+6f - 8f = -2f$$

Therefore the answer is

$$-5e + -2f$$

Method 2: If the negatives give you difficulty, you may want to make everything addition before starting.

$$\begin{array}{r} -3 - 4g - 17 - 8g \\ -3 + -4g + -17 + -8g \\ \hline -20 + -12g \end{array}$$

Terms are **like terms** if they have exactly the same variable factors. You can combine like terms by adding coefficients.

Examples:  $x$  and  $6x$  are like terms. Together they combine to  $7x$ .  
 $y$  and  $y^2$  are not like terms.  
 $xy$  and  $x$  are not like terms.  
 $3x^2$  and  $6x^2$  are like terms. Together they combine to  $9x^2$ .

Example #2: Simplify the expression  $3x - 2 + y - x - 6 - 8y + 5$ .

Terms with  $x$ :  $3x - 1x = 2x$   
 Terms with  $y$ :  $1y - 8y = -7y$   
 Constant terms:  $-2 - 6 + 5 = -3$

The simplified expression is  $2x - 7y - 3$ .

**Can the expression be simplified? Where possible, write the simplified expression.**

1.	2 apples + 3 oranges + 4 apples	
2.	4 dimes + 20 pennies + 8 dimes + 5 pennies	
3.	walking 2 blocks north, 3 blocks west, 5 blocks north, 4 blocks west	
4.	6 yes votes and 15 yes votes and 11 no votes and 10 yes votes and 23 no votes	
5.	9 hamburgers and 3 pizzas and 12 hot dogs	
6.	a walk of 2 steps right, 12 steps forward, 9 steps left, 4 steps back, and 1 step right	
7.	a rise of 3 feet, a fall of 2 feet, a rise of 10 feet, a rise of 5 feet, and a fall of 8 feet	

**Can the expression be simplified? Where possible, write the simplified expression.**

8.	$4a + 7 + 2a$		9.	$3w + 12 + 10w + 5$	
10.	$5c - 8 + 9c + 3$		11.	$12r - 6 - 7r - 3$	
12.	$2d - 5 + 4d + 7 - d + 3$		13.	$6a + 4 + 3a$	
14.	$4m + 3 + 6m - 8$		15.	$7y + 8x + 9y - 5x$	
16.	$2x + 3y + 5xy$		17.	$3 + 2c - 4c - 9 + 11c - 3$	

**Simplify.**

1.	$-8a + (-5a)$		2.	$5x - 12x$	
3.	$-b + 15b$		4.	$7y - (-y)$	
5.	$-3a - (-7a)$		6.	$-8n - (-8n)$	

**Combine like terms to simplify each expression.**

7.	$7c - c - c$		8.	$3m - 7m - m$	
9.	$9 - y - 7 - 3y$		10.	$5a - a + 4a$	
11.	$-7 + 4x + 3 - x$		12.	$-2b - 7 + b$	
13.	$k - 4 - 2k^2 + 8k$		14.	$6 - z - 4z + 5$	
15.	$-4x - y + 4x + y$		16.	$-3k^2 - 2m + 2k^2 + m$	
17.	$8a - 10 - 7a + 4$		18.	$-3r + 5t^2 - r - 4t$	
19.	$-a + 5.2b + 3a + 3.8b - 10b$		20.	$7c - 4d - 6c + 3d - c$	
21.	$3x^4 + 5x^4$		22.	$-y + 2y + 3 + 2x$	
23.	$5x + 2x + 6x^2 + x^2$		24.	$1 + 6m - 2m + 12$	
25.	$6s - 3s + 6 - 2$		26.	$7y - 6 - x + 2 - 3x$	
27.	$8 + 3x^2 + 7 + 2x^2$		28.	$6m - 19 + 27 - 11n + 4m - 11n$	
29.	$9b^2 + 20b - 8b^2$		30.	$-2 + 5g - 4h + 3h + 4 + 7g$	

**Solve and check each equation showing all work on a separate sheet of paper.**

31.	$n + 4n - 11 = 19$		32.	$9 - y + 6y = -6$	
33.	$60 - 12b + 12 = 0$		34.	$g + 8g - 19 = -1$	
35.	$6x + 7 - x = 2$		36.	$2c + 7.5c = 57$	
37.	$a + a + 5 + a + 3 = 50$		38.	$x + 2x + 3x - 7 = -25$	

## Distributive Property

The day after a test I **distribute** the tests back to the class. They all start together with me and I pass them back so each student receives their test.



Tests start together and end up spread out everywhere.

Numbers can be distributed as well.




Example:  $5 \cdot (7+8)$  is equal to  $5 \cdot (7+8) = 5 \cdot 7 + 5 \cdot 8$





Notice that the answer is 75 whether you solve the original expression or the expression after you have distributed.

This is called distributing the 5. You multiply the 5 times the 7 AND the 5 times the 8.

If you only worked with numbers it probably would not make sense to distribute very often. Using the order of operations would usually be faster. However, what about variables?

**THE DISTRIBUTIVE PROPERTY**

 (  +  )

  +  

**USING THE DISTRIBUTIVE PROPERTY...**

$5(m \times 12)$

$5(m) + 5(12) = 5 \times m + 5 \times 12$

$5m + 60$

*one combos meal*

$$3 \left( 2 \text{ 🌮} + \text{ 🥤} \right) = 6 \text{ 🌮} + 3 \text{ 🥤}$$
$$3(2t + d) = 6t + 3d$$



### Distributive Property

Example 1:

$$\begin{aligned}
 & \overbrace{7(2x + 3)} \\
 & 7 \cdot 2x + 7 \cdot 3 \\
 & 14x + 21
 \end{aligned}$$

What is being distributed?  
The 7. I draw rainbows to show it being distributed to every term in the parentheses.

Example 2:

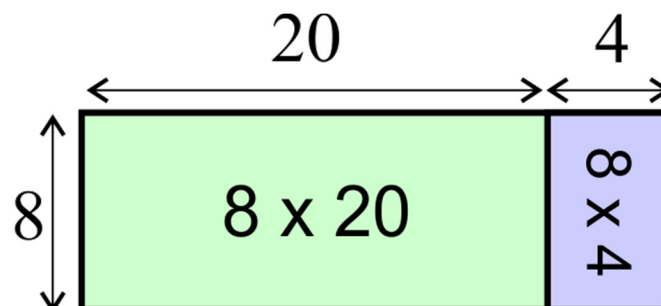
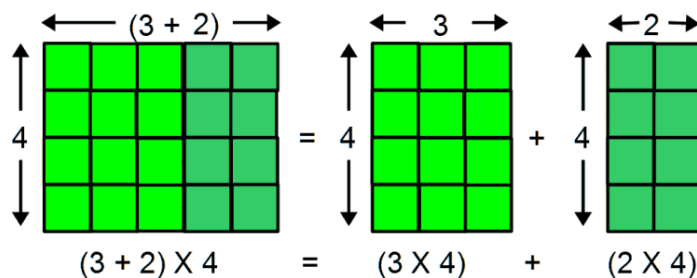
$$\begin{aligned}
 & \overbrace{-6(3x - 7)} \\
 & -6 \cdot 3x + -6 \cdot -7 \\
 & -18x + 42
 \end{aligned}$$

Here we are distributing -6. Be careful and notice that the answer is plus 42.

Example 3:

$$\begin{aligned}
 & \overbrace{-4(5x - 6)} \quad \overbrace{-3(2x + 2)} \\
 & -4(5x - 6) + -3(2x + 2) \\
 & -20x + 24 + -6x + -6 \\
 & -26x + 18
 \end{aligned}$$

Notice that we are distributing a negative 3 to the second parentheses. After distributing you combine all like terms.



<p><b>Distributive Property</b></p>	<p>The sum of two addends multiplied by a number is the sum of the product of each addend and the number.</p>	<p><math>4 \cdot (7 + 2) = 4 \cdot 7 + 4 \cdot 2</math></p>
-------------------------------------	---	---

**THE DISTRIBUTIVE PROPERTY**

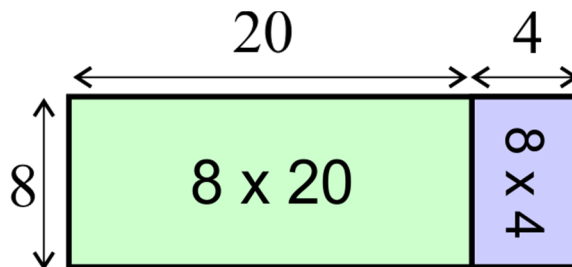
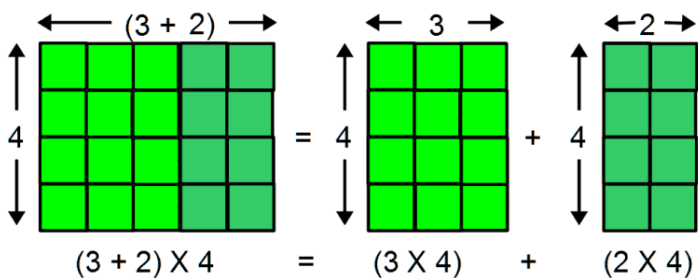
$m + 12 = 2m + 24$

**USING THE DISTRIBUTIVE PROPERTY...**

$5(m + 12)$   
 $5(m) + 5(12) = 5 \times m + 5 \times 12$   
 $5m + 60$

*one combo meal*

$3(2t + d) = 6t + 3d$



**Simplify using the distributive property. Show all work on a separate sheet of paper.**

1.	$8(x-2)$	2.	$-12(y+4)$	3.	$-6(-2x+5)$
4.	$3x+2x+4x$	5.	$2y-3(y+4)$	6.	$3(x-2)+4(x-3)$
7.	$x-5(x-1)$	8.	$-3(2r-1)+r$	9.	$-6(y+4)-2y$
10.	$8a-(2a-3)$	11.	$4+5(2x-1)$	12.	$3(5n-8)-2(3n-7)$

13.	$9(2y-3)-6y+2(y+5)$	14.	$6(3a+5)-3+5a-(4a-3)-7$
15.	$4(2x-6y)-8(x-2y)$	16.	$3+2(y+x)-7(2+2x)-12$
17.	$5(3x-7)-4(2x-12)$	18.	$8(4x-5y)-10(x-3y)$



**Solve and check each equation showing all work on a separate sheet of paper.**

1.	$-2(a - 7) = 16$		2.	$-5(b + 2) = 30$	
3.	$2(c - 3) - c = 9$		4.	$-2(d - 3) + d = 12$	
5.	$-2(3 - 2g) + 4g = 10$		6.	$23 = 12 - (6 + k)$	

**Define a variable. Write and solve an equation. Show all work on a separate sheet of paper.**

7.	A printer wants to center a 6-in. wide column of text on a page that is 8.5 in. wide. If the margins on the two sides are even, how wide should each margin be?
8.	The ages of four cousins are consecutive integers. The sum of their ages is 26. How old is each of the cousins?
9.	The perimeter of a square and an equilateral triangle add up to 77 cm. Both figures have sides of the same length. What is the perimeter of each shape?

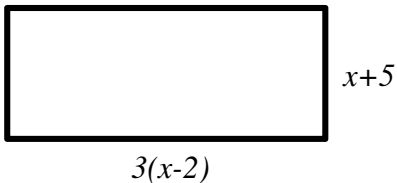
**Define a variable and write an equation for each situation. On a separate sheet of paper solve the equation showing all steps. You can check your answer if you wish.**

**All equations are to be solved using a single variable and one equation.**

10.	The sum of three consecutive numbers is 72. What is the smallest of these numbers?
11.	The sum of three consecutive even numbers is 48. What is the smallest of these numbers?
12.	Last summer Gary trained 32 more dogs than Zina. Together they trained 126 dogs. How many dogs did Gary train?
13.	Julius sold five times as many computers as Sam sold last year. In total they sold 78 computers. How many computers did Julius sell?
14.	Andre hit four more home runs than twice the number of home runs Larry hit. Together they hit 10 home runs. How many home runs did Andre hit?
15.	A rectangle has a width of 6 inches and a perimeter of 26 inches. What is the length of the rectangle?



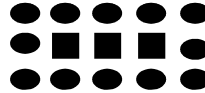
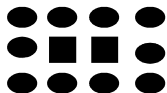
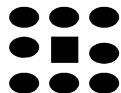
**Define a variable and write an equation for each situation. On a separate sheet of paper solve the equation showing all steps. All equations are to be solved using a single variable and one equation.**

1.	The length of a rectangle is four times its width. Its perimeter is 90m. Find its dimensions.
2.	The total cost of a suit and a coat is \$291. The coat cost twice as much as the suit. How much did the coat cost?
3.	The perimeter of a triangle is 51 cm. The lengths of its sides are consecutive odd integers. Find the lengths of all three sides.
4.	Taylor is making a poster that is 26 inches wide. If he were to cut 2 inches off the width of the poster, the width would equal 0.75 (or 75%) times the length. How long is the poster?
5.	Sixth-tenths (0.6) of the students in the school ordered pizza for lunch yesterday. Half (0.5) of the rest ordered hamburgers. One hundred and thirty-five students ordered hamburgers. How many students were in school yesterday?
6.	A table top is rectangular. The table’s length is 60 cm more than its width. The perimeter of the table is 240 cm. Find the length and width of the table.
7.	CD’s and DVD’s are on sale for the same price. You buy 4 CD’s and 2 DVD’s. You also buy a computer game that costs \$16. The total bill is \$82. How much does each CD cost?
8.	Bill bought 10 lb of peanuts and cashews for his party. The cashews cost \$7/lb and the peanuts \$3/lb. Bill spent a total of \$54. How many pounds of each did he buy?
9.	Marissa buys a bunch of bananas for \$0.35 per pound and a frozen pizza for \$4.99. The total amount for his purchase was \$6.04, without tax. How many pounds of bananas did Marissa buy?
10.	A taxi charges you \$1.50 plus \$0.60 per minute for a trip to the airport. The distance to the airport is 10 miles and the total charge is \$13.50. How many minutes did the ride to the airport take?
11.	Write an expression for the perimeter of the rectangle. Do not write or solve an equation.
	
12.	A stop sign is in the shape of an octagon with each side the same length. If the length of one side is $2a + 1$ and the perimeter is 104 units, solve for $a$ .
13.	One bag of trail mix has 3 ounces of raisins and some peanuts. Rob buys 6 bags of trail mix and has 48 ounces of trail mix altogether. How many ounces of peanuts are in each bag of trail mix?
14.	There are three brothers, John, Fred, and Tom. Fred is twice the age of John. Tom is 4 years younger than John. The sum of their ages is 20. What is the age of each brother?



(Taken from *The Language of Algebra*)

1. A restaurant serves a buffet along a row of square tables. The row of square tables is surrounded by round tables for diners.



Write two equations that tell how many round tables,  $t$ , there are for a buffet of length  $b$ .

--	--

Determine whether or not the following expressions are equivalent. Remember that two equivalent expressions will give identical results no matter what values are chosen for the variables.

2.	$x + y = y + x$		3.	$3(a + b) = 3a + 3b$	
4.	$m - n = n - m$		5.	$3x + 8x = 11x$	
6.	$9y - 14y = -5y$		7.	$a - a = 0$	
8.	$\frac{1}{2}x = \frac{x}{2}$		9.	$ab = ba$	
10.	$5 - x = x - 5$		11.	$7(a - b) = 7a - 7b$	
12.	$2x + 3y = 5x$		13.	$3(a + b) = 3a + b$	
14.	$2x - y = y - 2x$		15.	$5(a - b) = 5a - 5b$	
16.	$x - 2y = -2y + x$		17.	$6(a + b) + a = 7a + 6b$	
18.	$\frac{1}{3}x = \frac{1}{3x}$		19.	$\frac{x}{y} = \frac{y}{x}$	

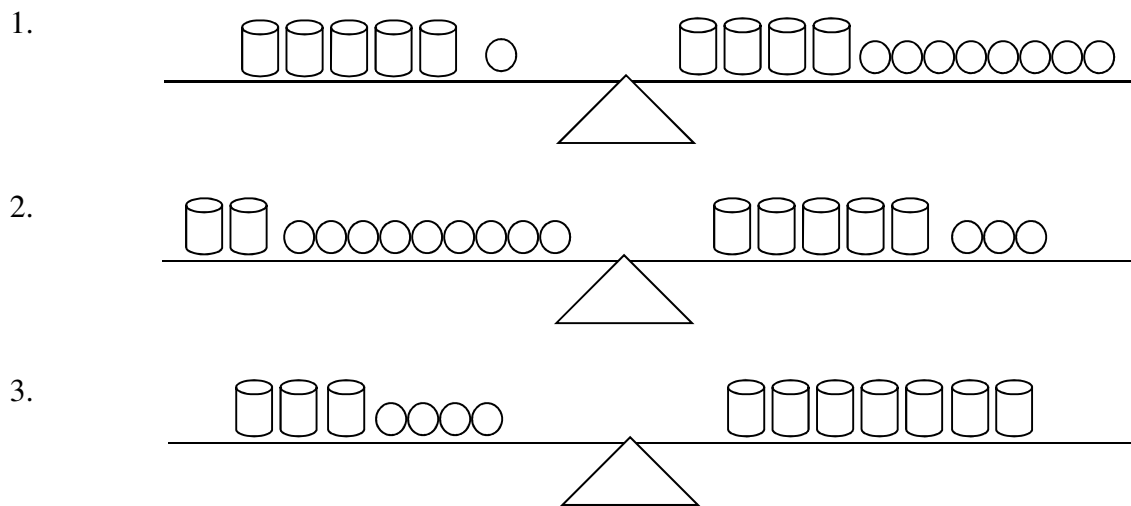
20.	Which expressions are equivalent to the expression $2a + 5(b - a)$ ? a. $2a + 5(a - b)$ c. $5b - 3a$ b. $a + 5b$ d. $-3a + 5b$	
21.	Which expressions are equivalent to the expression $2(x - y)$ ? a. $2y - 2x$ c. $2x - 2y$ b. $2x - y$ d. $x + x - 2y$	
22.	Which expressions are equivalent to the expression $3x + 2y - x$ ? a. $2x + 2y$ c. $2y + 2x$ b. $2(x + y)$ d. $4x$	





(Taken from *The Language of Algebra*)

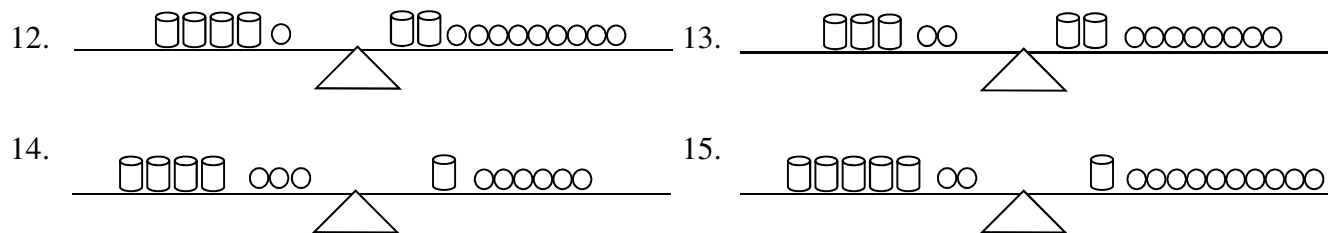
Each picture shows a perfectly balanced scale. The cups contain an unknown number of marbles. In each picture, each cup contains the same number of marbles. Determine how many marbles a cup contains in each picture.



Solve each equation by translating each equation into a balance picture and then find the number of marbles each cup must contain.

4.	$2x + 6 = 3x + 2$		5.	$8y + 2 = 2y + 14$	
6.	$25 = 7 + 3s$		7.	$5m + 3 = 3m + 7$	
8.	$3m + 9 = 5m + 3$		9.	$4x + 3 = 2x + 9$	
10.	$5y + 1 = 4y + 10$		11.	$3x + 8 = 4x + 1$	

Figure out how many marbles a cup contains.

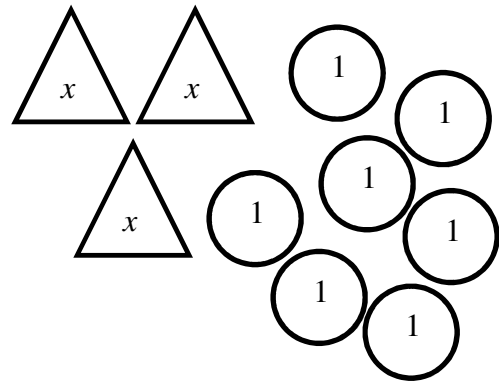
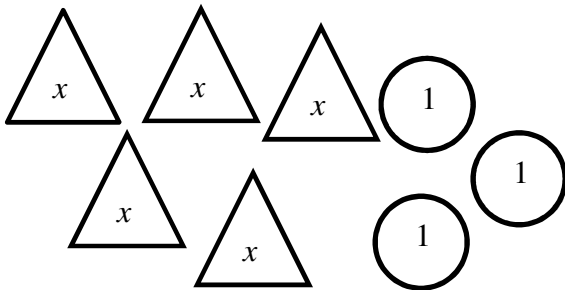


Solve and check each equation showing all work on a separate sheet of paper.

16.	$2y + 8 = 5y + 2$		17.	$3r + 13 = 7r + 1$	
18.	$5t - 7 = t + 9$		19.	$x + 9 = 3x - 1$	

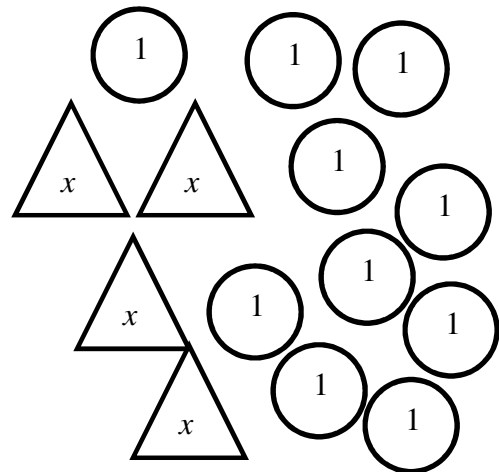
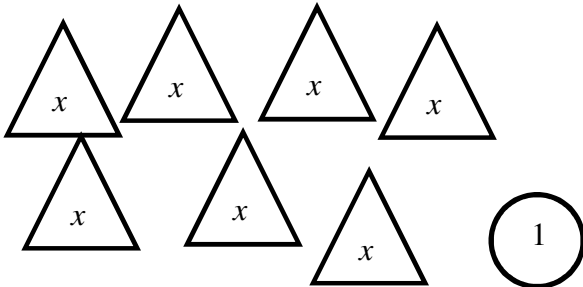


The equation  $5x + 3 = 3x + 7$  is modeled below.



What value of  $x$  makes the equation true?

The equation  $7x + 1 = 4x + 10$  is modeled below.



What value of  $x$  makes the equation true?



When an equation has the variable on each side, the first step is to write an equivalent equation with the variable on just one side.

**Example:**

$$4b - 25 = 7b + 50$$

$$\begin{array}{r} -4b \quad -4b \\ -25 = 3b + 50 \\ -50 \quad -50 \\ \hline -75 = 3b \\ \frac{-75}{3} = \frac{3b}{3} \\ -25 = b \end{array}$$

**Check:**

$$4b - 25 = 7b + 50$$

$$4(-25) - 25 = 7(-25) + 50$$

$$-100 - 25 = -175 + 50$$

$$-125 = -125 \checkmark$$

**Solve and check each equation showing all work and answers on a separate sheet of paper.**

1.	$4a + 26 = 50 + 6a$	2.	$2r + 36 = 6r - 12$	3.	$8x = 5x + 12$
4.	$4(b + 24) = 16b + 60$	5.	$x + 21 = -x + 87$	6.	$-6r = 10 - 4r$
7.	$4(c - 7) = -5c + 53$	8.	$8v + 5 = 7v - 21$	9.	$\frac{1}{4}p - 8 = \frac{3}{4}p + 13$
10.	$6n - 42 = 4n$	11.	$12 - 6r = 2r + 36$	12.	$6 + 10y = 8y + 12$
13.	$5y = 2y - 12$	14.	$9 + 3k = 2k - 12$	15.	$5a - 3 = 7a + 7 + 3a$
16.	$7 + 6z = 8z - 13$	17.	$2k - 5.5 = 7k + 17$	18.	$7n - 9 = 3n + 19$
19.	$2(x + 4) = 6x$	20.	$3 + 2(k + 1) = 6 + 3k$	21.	$5 - x = x + 9$
22.	$\frac{g - 2}{5} = \frac{g + 4}{7}$	23.	$3 + 7(2m - 1) = 12 + 16m$	24.	$\frac{u}{0.3} = 4u + 6.28$
25.	$3(z - 2) + 6 = 5(z + 4)$	26.	$0.3x - 15 = 0.2x - 5$	27.	$7r + 5 = 8(r + 2) - 2r$

**On a separate sheet of paper, define a variable, write an equation, and solve each problem.**

28.	Brenna bought a group of 10 tickets. Rachel spent \$28 more than Brenna to buy 14 tickets. What was the price of each ticket?
29.	A minivan traveling at 50 mi/h and a motorcycle traveling at 60 mi/h cover the same distance. It takes the minivan 1 hour longer to make the trip. How many hours did it take for the motorcycle to make the trip?



1.	Container A and container B have leaks. Container A has 800 ml of water, and is leaking 6 ml per minute. Container B has 1000 ml, and is leaking 10 ml per minute. How many minutes, $m$ , will it take for the two containers to have the same amount of water?
2.	Tim is choosing between two cell phone plans that offer the same amount of free minutes. Cingular's plan charges \$39.99 per month with additional minutes costing \$0.45. Verizon's plan costs \$44.99 with additional minutes at \$0.40. How many additional minutes, $a$ , will it take for the two plans to cost the same?
3.	The cost to purchase a song from iTunes is \$0.99 per song. To purchase a song from Napster, you must be a member. The Napster membership fee is \$10. In addition, each purchased song costs \$0.89. How many downloaded songs, $d$ , must be purchased for the monthly price of Napster to be the same as iTunes?
4.	Container A has 200 L of water, and is being filled at a rate of 6 liters per minute. Container B has 500 L of water, and is being drained at 6 liters per minute. How many minutes, $m$ , will it take for the two containers to have the same amount of water?
5.	UPS charges \$7 for the first pound, and \$0.20 for each additional pound. FedEx charges \$5 for the first pound and \$0.30 for each additional pound. How many pounds, $p$ , will it take for UPS and FedEx to cost the same?
6.	A twelve inch candle and an 18 inch candle are lit at 6pm. The 12-in. candle burns 0.5 inches every hour. The 18 inch candle burns two inches every hour. At what time will the two candles be the same height? Let $h$ represent the number of hours.
7.	Bill weighs 120 pounds and is gaining ten pounds each month. Phil weighs 150 pounds and is gaining 4 pounds each month. How many months, $m$ , will it take for Bill to weigh the same as Phil?
8.	A full 355 mL can of Coke is leaking at a rate of 5 mL per minute into an empty can. How long will it take for the two cans to have the same amount of Coke?
9.	On Saturday, you bowl at Mar Vista Bowl, where renting shoes costs \$2 and each game bowled is \$3.50. On Sunday, you bowl at Pinz where the shoe rental is \$5 and each game bowled is \$3.25. If you spent the same amount each day, how many games, $g$ , were bowled?
10.	At one store a trophy costs \$12.50. Engraving costs \$0.40 per letter. At another store, the same trophy costs \$14.75. Engraving costs \$0.25. How many letters, $e$ , must be engraved for the costs to be the same?
11.	Pierre is twice as old as Sunny. Twenty years ago, Pierre was three times as old as Sunny. How old will Pierre be in 5 years?
12.	On 1/1, Dakota decides to drink 1 bottle of Dr. Pepper every day of the year. Each day he drinks 12 ounces. After noticing that he is thirsty at the end of the day, he eventually switches to drinking 20 ounces each day. At the end of the year, he found that he drank the same amount of DP from 12 oz. bottles as he drank from 20 oz. bottles. Which day did he make the change?





1.	Lenny makes \$55,000 and is getting annual raises of \$2,500. Karl makes \$62,000, with annual raises of \$2,000. How many years, $y$ , will it take for Lenny and Karl to make the same salary?
2.	In 1987, 34.7 million households owned a dog, and 27.7 million owned a cat. Since then, dog ownership has decreased by 0.025 million households per year, and cat ownership has increased by 0.375 million households per year. How many years, $y$ , will it take for them to be equal?
3.	In 2000, Ohio's population was 11.4 million and increasing by 0.5 million each year. Michigan's population was 9.9 million, increasing by 0.6 million each year. When will the two states have the same population? Let $y$ represent the number of years.
4.	Prestige Car Rentals charges \$44 per day plus 6¢ per mile to rent a mid-sized vehicle. Gateway Auto charges \$35 per day plus 9¢ per mile for the same car. For what number of miles will both companies charge the same price?
5.	Nilda has \$250 in her savings account. She plans to save \$15 per week from her salary. Iona has only \$200 in her account but can save \$20 a week from her paycheck. How many weeks will it take before the amount in each savings account is the same?
6.	A sales person in a stereo store is given a choice of two different compensation plans. One plan offers a weekly salary of \$250 plus a commission of \$25 for each stereo sold. The other plan offers no salary but pays \$50 commission on each stereo sold. How many stereos must the sales person sell to make the same amount of money under both plans?
7.	Suppose a video store charges nonmembers \$4 to rent each video. A store membership cost \$21 and members pay only \$2.50 to rent each video. For what number of videos is the cost the same?
8.	Suppose your club is selling candles to raise money. It costs \$100 to rent a booth from which to sell the candles. If the candles cost your club \$1 each and are sold for \$5 each, how many candles must be sold to equal your expenses?
9.	A hairdresser is considering ordering a certain shampoo. Company A charges \$4 per 8-oz bottle plus a \$10 handling fee per order. Company B charges \$3 per 8-oz bottle plus a \$25 handling fee per order. How many bottles must the hairdresser buy to justify using Company B?
10.	One telephone company charges \$16.95 per month and \$0.05 per minute for local calls. Another company charges \$22.95 per month and \$0.02 per minute for local calls. For what number of minutes of local calls per month is the cost of the plans the same?
11.	One health club charges a \$44 sign-up fee and \$30 per month. Another health club charges a \$99 sign-up fee and \$25 per month. For what number of months is the cost the same?
12.	Ben's father is 4 times old as Ben. 4 years ago, he was 5 times as old as Ben. How old is Ben?
13.	Elliot is $\frac{2}{3}$ as old as Dana. In 6 years, Elliot will be $\frac{3}{4}$ as old as Dana. How old is Dana now?



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

Score : \_\_\_\_\_

Teacher : \_\_\_\_\_

Date : \_\_\_\_\_

## Solve the Equations

Round your answers to the nearest hundredth if needed.

1)  $3(4x - 8) = -5x - 4$

6)  $-6 - 5x + 4 - 5x = 8 - 3x$

2)  $8(x + 9) + 5(x + 6) = 2x - 2$

7)  $-5x + 2(3 + 5x) = 2x + 4x$

3)  $8(-3 + 2x) = 3(2x + 5)$

8)  $-3x - 2 = 7 + 6x$

4)  $-6 - 3x - 8 + 9 = 2x - -3$

9)  $7 - 3x = -2(x - 4)$

5)  $5x + 2x + 4 = -4x - 5$

10)  $3 + 4x = 6 - 6(-5 - 5x)$



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

Date: \_\_\_\_\_ Score: \_\_\_\_\_

# Multi-Step Equations Worksheet

Solve each equation.

1  $\frac{3}{4}x - 7 = 8$

2  $-6 = \frac{c}{-4} + 12$

3  $6 - \frac{3}{4}k = -4$

4  $\frac{v+8}{-2} = 5$

5  $3.2e + 2.6 = -23$

6  $18 = 5x + 3 + 10x$

7  $-7 - 2x = 7(x + 8)$

8  $9x - 4(-x + 7) = -16 + 9x$

9  $-8(3r - 2) = -8r + 40$

10  $10(-2 - 5n) = -30 + 10n$

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

Score : \_\_\_\_\_

Teacher : \_\_\_\_\_

Date : \_\_\_\_\_

---

## Solve the Equations

Round your answers to the nearest hundredth if needed.

1)  $-25 = 9 + 7(d - 4)$

6)  $8(1 + 7h) = -16$

2)  $-4s + 9 - 8 = 22$

7)  $16 + 7x = -5(9x + 6)$

3)  $-35 = -9(6r - 3)$

8)  $9c + 4 - 6c = -19$

4)  $-7 - 8(1 + 5v) = -20$

9)  $-7(8 - 5y) = -33$

5)  $-3(9k - 5) = -18$

10)  $24 = 8f - 3f$



## Multi-Step Equations Dice Game

---

Directions:

- The younger player (Player A) goes first. Roll the two dice and find the two squares on the board which correspond to the numbers on the dice.

For example, if you roll a 2 and a 3:

Player A does Row 2, Column 3

Player B does Column 3, Row 2

- Player A and B should get the same answer. If not, work together to identify any mistakes.
- Player B then rolls the dice and follows the same procedure.
- Work together to fill the entire board.
- Show all your work in your math spiral or composition book.

		Partner A					
		1	2	3	4	5	6
<b>Partner B</b>	1	$\frac{x}{4} - 8 = 9$ $2x - 6 = -14$	$-8(6a + 2) = 80$	$-3x + 13 + 8x = -42$	$2k + 1 = k - 5$	$x + 3 = 2x$	$-5m - 3 = 2m - 10$
	2	$-5(5a + 1) = 45$	$-4x + 5 = -27$ $\frac{x}{-2} - 7 = -11$	$-4(3x + 2) = -20$	$17 + 7n - 4n = -13$	$48 = -3a + 15a$	$-3a - 6 = a + 30$
	3	$-9x - 12 + 7x = 10$	$5(7x + 2) = 45$	$\frac{x}{-3} + 4 = 5$ $-7x + 6 = 27$	$3(y - 3) = -15$	$-7c - 9 + 5c + 6 = 7$	$8x - 40 = 4x - 12$
	4	$2k - 1 = 3k + 5$	$-4 + 6n - 8n = 16$	$-2(y - 5) = 14$	$3n - 6 = 30$ $-8 + \frac{n}{6} = -6$	$-3(2k - 2) = 12$	$4c - 8 - c = 7$
	5	$-3x - 1 = -4 - 2x$	$-24 = a - 7a$	$6c + 4 - 3c + 2 = -9$	$3(5k + 8) = 9$	$10 + \frac{a}{2} = 17$ $-4a + 13 = -43$	$6(x - 6) = -18$
	6	$-m - 3 = -5m + 1$	$-4a + 7 = -7a - 20$	$4x - 17 = -2x + 25$	$c + 4 - 6c = -21$	$8(x + 6) = 72$	$6 - 2x = 38$ $\frac{x}{-8} - 5 = -3$



