

Write your questions here!

3.5 Variables on Both Sides

$$4x + 3 = 3x + 6$$

$$4x - 2 = 2x$$



$$5x + 4 = x + 3$$

To solve equations with variables on both sides, collect the variables on one side, and the constants (regular numbers) on the other.

CONCEPT SUMMARY

For Your Notebook

Steps for Solving Linear Equations

- STEP 1** Use the distributive property to remove any grouping symbols.
- STEP 2** Simplify the expression on each side of the equation.  CLT
- STEP 3** Use properties of equality to collect the variable terms on one side of the equation and the constant terms on the other side of the equation.
- STEP 4** Use properties of equality to solve for the variable.  Do and Undo Table
- STEP 5** Check your solution in the original equation.

$$2(x - 4) = -2x - 10$$

$$80n - 30n = -10(2 - 5n) - (n - 1)$$

$$4(n + .5) = 5(2n - 2)$$

Weird Stuff that can happen....

When every number is a solution of the equation, the equation is called an **identity**. These can be found when both sides of the equation equal each other.

If no number exists that is a solution of the equation, we say that the equation has **no solution**. These can be found when all of the variables cancel (on both sides) and only two different numbers are left, set equal to each other.

Identity

$$2(2x - 4) + 16 = 4(x + 2)$$

No Solution

$$-15y + 7y + 1 = 3 - 8y$$

You Try!

$$10(1 + 4m) = 4(3 + 10m)$$

$$4(x - 3) = -2(6 - 2x)$$

So if you are solving and each side is equal to each other, write **identity** !
If they are not equal (and the variables have cancelled out), write **no solution**.

Now, summarize
your notes here!



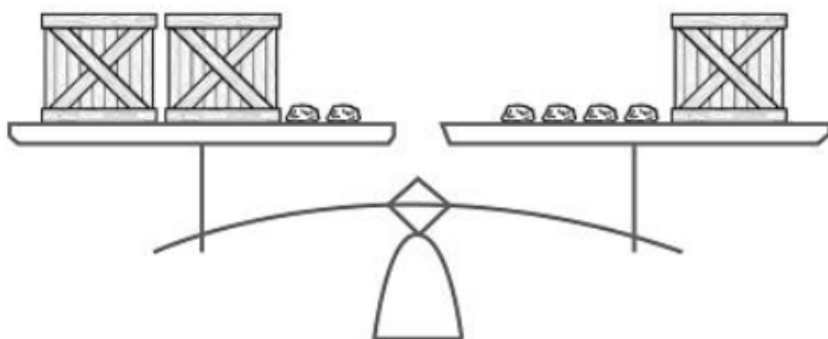
3.5 Variables on Both Sides Practice Problem Set

Geology Rocks Equations

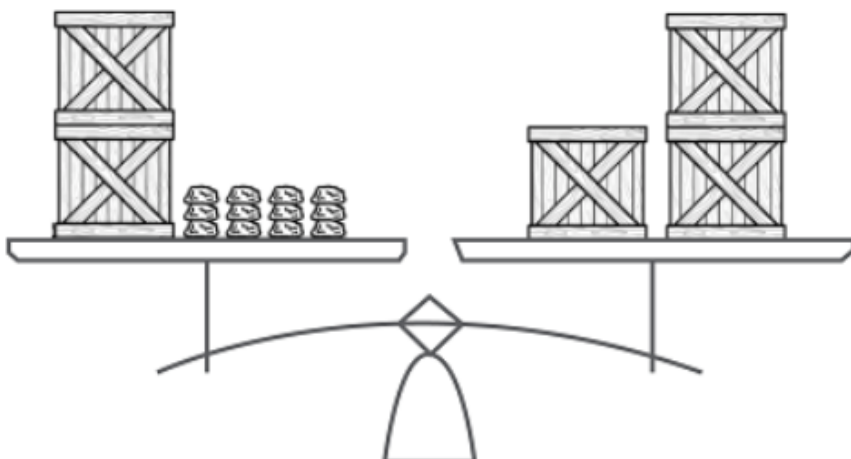
Mr. Anderson is a geologist and has a laboratory full of rocks. He knows that each rock weighs exactly one pound (+1), and he would like to figure out how many rocks are in each crate. To figure that out without opening the crates, Mr. Anderson places crates and rocks on a pan balance until they are balanced. Using his math skills, he is able to reason how many rocks are in each crate without having to look inside.

The following picture represents the first set of crates and rocks Mr. Anderson put on the balance. How many rocks are inside each crate?

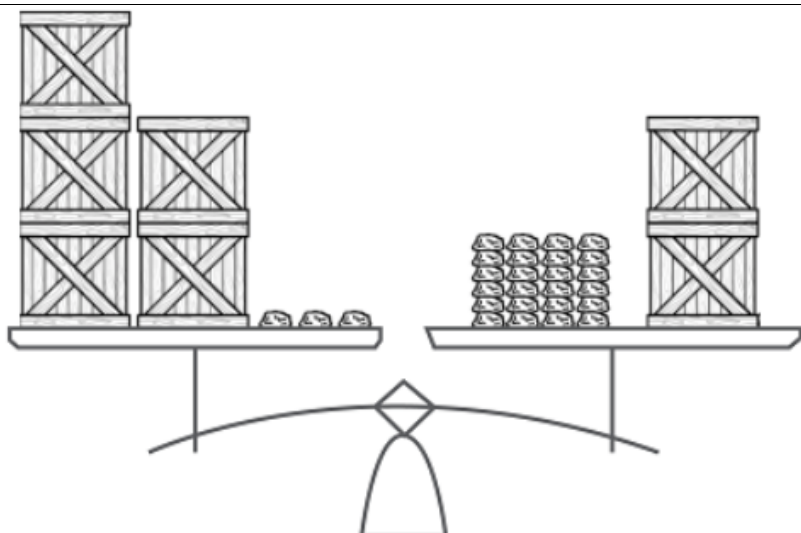
1.



2.



3.



Solve each equation.

1. $2x + 3 = x$

2. $7x - 9 = 4x$

3. $8x + 10 = 2x - 8$

4. $-2x + 3 = 17 + 9x$

5. $p - 4 = 12 - p$

6. $75 - 6x = 4x - 15$

7. $-14y - 6 - 2y = -8y - 9$

8. $20 - 10x = 50 + 6x + 10$

9. $6x = 3(2x + 5)$

10. $2(4x - 3) - 8 = 4 + 2x$
11.

12. $2(x + 1) = -4(x + 2) + 22$

13. $5 - 3(x - 4) = 20$
.

14.

$$-5(4x - 2) = -2(3 + 6x)$$

15.

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

16.

$$-5(4x - 2) = -2(3 + 6x)$$

17.

$$8(1 + 5x) + 5 = 13 + 5x$$

18.

$$-8(-8x - 6) = -6x - 22$$

SKILLZ REVIEW

1. Multiply:

$$\frac{3}{2} \cdot \frac{14}{15}$$

2. Evaluate if $x = -5$ and $y = -1$

$$-x - y$$

3. Simplify:

$$\frac{-2 - 35}{-4 + 5} + 36$$

4. Distribute:

$$-(-x - 1)$$

5. Simplify:

$$-x - (y - 3x)$$

6. Simplify

$$\frac{-6p + 15}{6}$$

7. Simplify

$$4\frac{2}{3} + \left(-3\frac{1}{6}\right)$$

Solve the following equations. Some equations will have a single answer, others will have no solution, and still others will have infinite solutions.

19. $2x - x + 7 = x + 3 + 4$

20. $\frac{1}{2}(2 - 4x) + 2x = 13$

21. $5(x + 2) - 3x = 2(x + 5)$

22. $4(x + 1) = 4(2 - x)$

23. $6(x + 1) + 5 = 13 - 2 + 6x$

24. $3x + 7x + 1 = 2(5x + 1)$

25. $-2(x + 1) = 2(x - 1)$

26. $12 + 2x - x = 9x + 6$

27. $\frac{3}{2}(2x + 6) = 3x + 9$

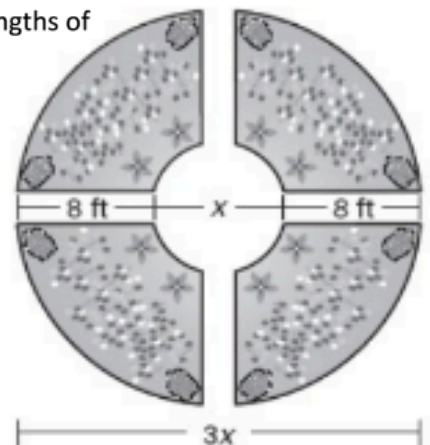
28. $10 + x = 5(\frac{1}{5}x + 2)$

29. $2(3x + 3) = 3(2x + 2)$

30. $4(x - 1) = \frac{1}{2}(x - 8)$

Write an equation and solve.

- | | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|
| 1. The product of number x and -6 is equal to the sum of the same number x and 21 . | 2. Ten more than 6 times a number is 4 less than 4 times the number. | 3. Two-thirds times a number plus 7 equals 7 minus the number. Find the number. |
| 4. Zoe is comparing two local yoga programs. Yoga-Weigh charges \$90 dollars a month and a registration fee of \$35. Essence of Yoga charges \$80 per month with a \$75 registration fee. After how many months will the two schools charge the same amount? | 5. You and a friend are discussing how many sections you've completed so far in Algebra I. You tell your friend "I've finished 3 times as many sections as you." Your friend replies, "You've only finished 4 more sections than I have". How many sections have you and your friend completed? | |
| 6. Rachael and Sabine belong to different local gyms. Rachael pays \$35 per month and a one-time registration fee of \$15. Sabine pays only \$25 per month but had to pay a \$75 registration fee. After how many months will Rachael and Sabine have spent the same amount on their gym memberships? | 7. Find the length of a rectangle, where the length is 5 units more than the width and the perimeter is 9 times the width. (Hint: Draw a picture) | |
4. **Dimensions of a Circular Flower Garden** A flower garden has the shape shown. The diameter of the outer circle is three times the diameter of the inner circle. The lengths of the walkways are 8 feet long. What is the diameter of the inner circle?



Distance Rate Time Applications

Example 1: "A helicopter travels to the East going 120 mph. Two hours later, it is determined that the helicopter will need to be escorted on its journey to the East. How long will it take an F-14, traveling at 900 mph to catch up with the helicopter?"

To help organize this information, it is best to use a table, like this one.

	Rate	Time	Distance
Helicopter			
F-14			

Example 2: "Maria left Juan's apartment at 5:00 pm. Juan came home and read a note, that detailed the route she was taking. If Juan leaves his apartment at 6:00 pm and follows the exact same route, when will Juan reach her if he is traveling at 15 mph and Maria is traveling at 10 mph?"

	Rate	Time	Distance
Juan			
Maria			

Example 3: Fran travels at 15 miles/hour and Dale travels at 57 miles/hour. They traveled in the same direction but Fran had a 3 hour head start.

How long will it take for Dale to catch up to Fran?

Example 4: Fran travels at 20 miles/hour and Eola travels at 28 miles/hour. They traveled in the same direction but Fran had a 1.5 hour head start.

How long will it take for Eola to catch up to Fran?

Create multi-step equations with the given number of solutions.

5. A single solution

6. Infinite solutions

7. No solution

8. A) THE MOVIE TEST

Browser tabs: (no subject) - murquhart@... x Tim Beer - The Movie Test x Daily Planners - Google Docs x

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Tim Beer
October 14, 2014 · 🌐

The Movie Test

Try this test. Scroll down and do the quiz as it instructs and find out what movie is your favorite. It really works! This amazing maths quiz can likely predict which of 18 films you would enjoy the most. Don't ask me how.

Pick a number from 1-9.

Multiply by 3.

Add 3.

Multiply by 3 again.

Now add the two digits together to find your predicted favorite movie in the list of 18 movies below.

Mine was "Star Wars" - exactly right! So be honest, and do it before you scroll down the list below. It is easy and it works.

Now look up your number in the list below...

1. Gone With The Wind
2. E.T.
3. Beverly Hills Cop
4. Star Wars
5. Forrest Gump
6. The Good, The Bad, and the Ugly
7. Jaws
8. Grease
9. Justin Bieber: Never Say Never
10. Casablanca
11. Jurassic Park
12. Shrek
13. Pirates of the Caribbean
14. Titanic
15. Raiders Of The Lost Ark
16. Home Alone
17. Mrs. Doubtfire
18. Toy Story

Scary isn't it.....

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8. B) What if you had picked a different number, would you get a different result?

C) What is the trick to the movie test?

Math Tricks

9. Think of a number, any positive integer (but keep it small so you can do computations in your head).

- I. Square it.
- II. Add the result to your original number.
- III. Divide by your original number.
- IV. Add, oh, how about 17.
- V. Subtract your original number.
- VI. Divide by 6.

The number you are thinking of now is 3!

A) How did I do this?

B) What type of equation is this?