Read the problem twice. Focus on what you are asked to find. Think about what is equal to what. Translate to an equation and solve. Check.

Intermediate algebra
Class notes
Problem Solving with Quadratic Equations (section 13.7)

Worksheet: Story Problem Pieces

The purpose of this worksheet is to practice using algebraic notation to represent real world ideas. For instance, if *w* is the width of a rectangle, and the length is twice the width, give an expression for the length. Some of us have trouble with this. However at the same time, if I told you the width was 5 inches and the length is twice the width, you could tell me the length is "2 times 5" or 10. This worksheet investigates several phrases you might encounter by first using actual numbers and then substituting the variables.

We will do many examples here. Remember to use algebra to express each part. Then think about how the parts are related to form the equation.

expl 1a: A rectangle's width is 4 inches less than its length. If its length is 10 inches, what is its width?

expl 1b: A rectangle's width is 4 inches less than its length. If we let x represent the length, give an expression for its width.

What did you do to get the width when the length was 10? Do the same thing here to x.

expl 2a: Two unknown numbers are consecutive even integers. If the smaller number is 10, what is the larger number?

Integers: {… -3, -2, -1, 0, 1, 2, 3 …}
Even Integers: {… -4, -2, 0, 2, 4, 6 …}

expl 2b: Two unknown numbers are consecutive even integers. If the smaller number is represented by x, give an expression for the larger number.

expl 3: A rectangle's length is three less than twice its width. If we let w represent the width, find an expression for the length.

w = width
"twice the width" = ?
3 less than that = ?

Perimeter and Area Formulas:

Become familiar with the formulas for perimeter and area of various shapes. Fill in the following formulas. Use A for area, P for perimeter, and C for circumference.

Area of a rectangle with width w and length l:

Perimeter of a rectangle with width w and length l:

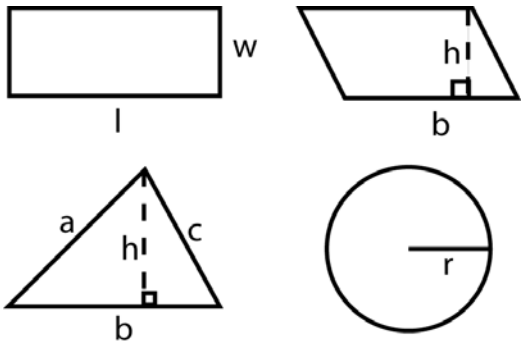
Area of a triangle with base b and height h:

Perimeter of a triangle with sides a, b, and c:

Circumference of a circle with radius r:

Area of a circle with radius r:

Area of a parallelogram with height h and base b:



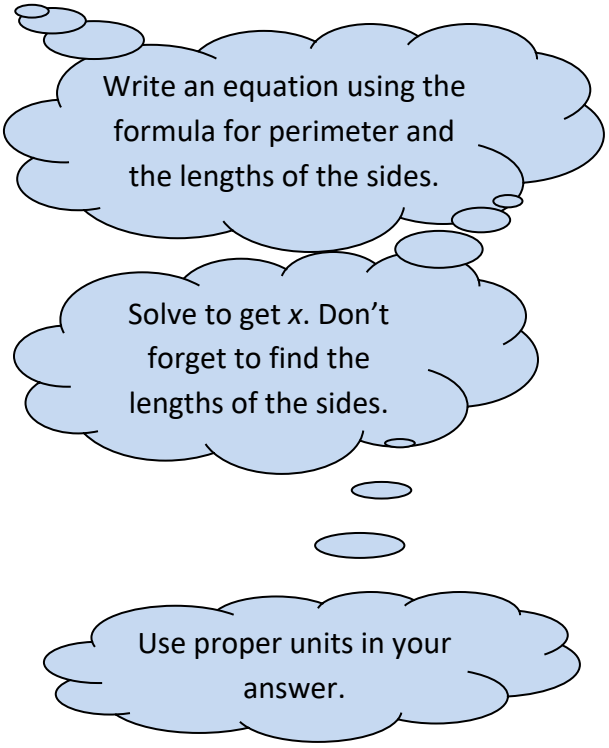
expl 4: A rectangle's width is 4 inches less than its length. Its area is 12 square inches. Find the length and width of the rectangle.

Use algebra even if you can work it out with your number sense!

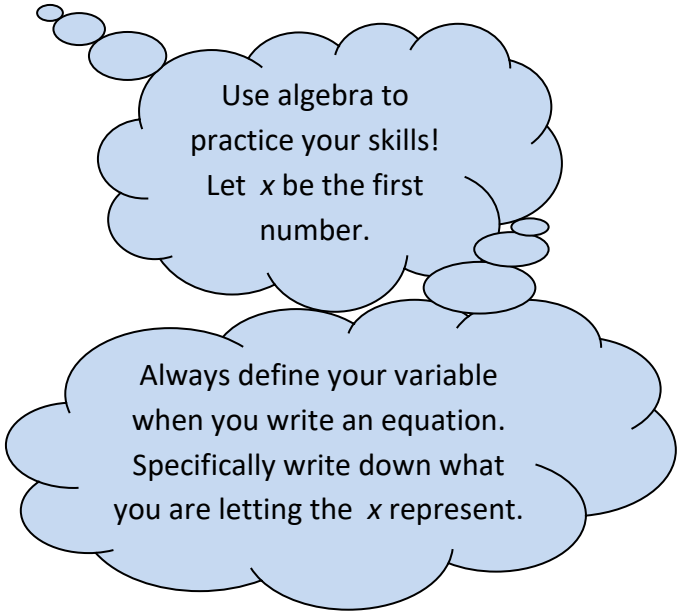
Let l = length. Express width in terms of l.

How does A = l · w help?

expl 5: A triangle has sides of lengths $x^2 - 3$, $x^2 - 2x + 2$, and $x + 2$. Its perimeter is 29 centimeters. Find the lengths of the sides.



expl 6: Two consecutive integers have a product of 210. Find the numbers.

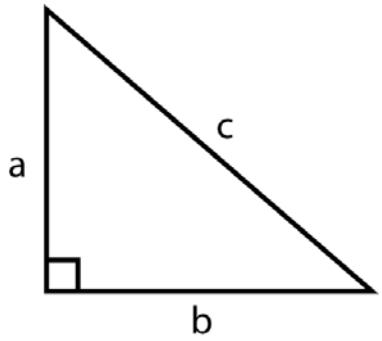


Pythagorean Theorem:

Recall that the sides of a right triangle are related by the Pythagorean Theorem.

The sum of the squares of the two legs (the sides that make the right angle) is equal to the square of the hypotenuse (the side opposite the right angle).

Use the picture to write the familiar Pythagorean Theorem equation.



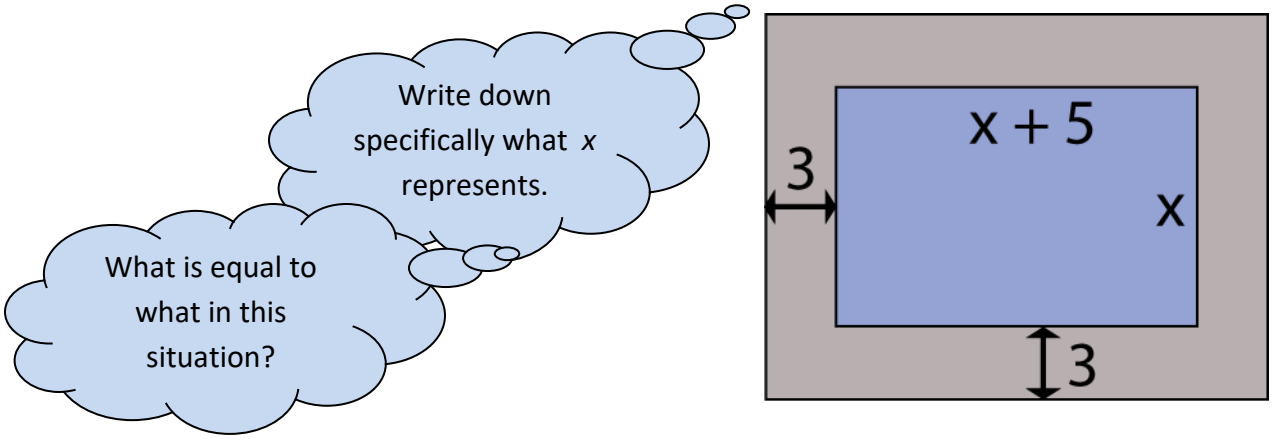
expl 7: Find the lengths of the right triangle whose shorter leg is 5 inches less than the longer leg and whose hypotenuse is five inches more than the longer leg.

Draw a picture. Let x represent the length of the *longer* leg.

expl 8: The square of a number plus eleven times that number is 42. Find the number.

Use algebra. Guessing will likely find just one of the two possible answers.

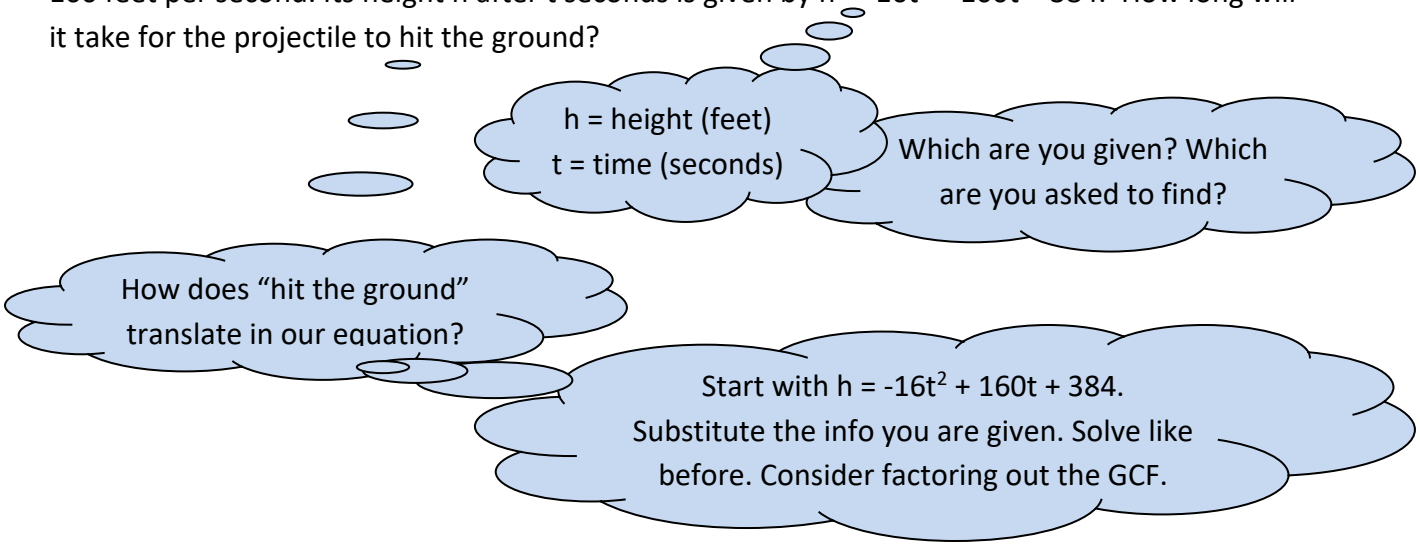
expl 9: A pool is surrounded on all sides by a sidewalk that is 3 feet wide. The length of the pool is 5 feet longer than its width. The area of the pool and sidewalk is 186 more square feet than the area of the pool alone. Find the dimensions of the pool. The pool is pictured below.



Using Formulas:

You will encounter problems where you are given a formula that shows the relationship between two variables (instead of having to create it yourself). The most important part is keeping straight what the variables represent and knowing which you are given and which you are asked to find.

expl 10: A projectile is launched from the top of a building 384 feet tall with an initial velocity of 160 feet per second. Its height h after t seconds is given by $h = -16t^2 + 160t + 384$. How long will it take for the projectile to hit the ground?



Story problems can be tricky. Think of them as puzzles that you piece together step by step. Go slow, write down what you know, and try to connect what you know to make one equation with just one variable. Remember, so far we only know one way to solve equations, by getting 0 on one side and factoring. Later, we will learn other ways.