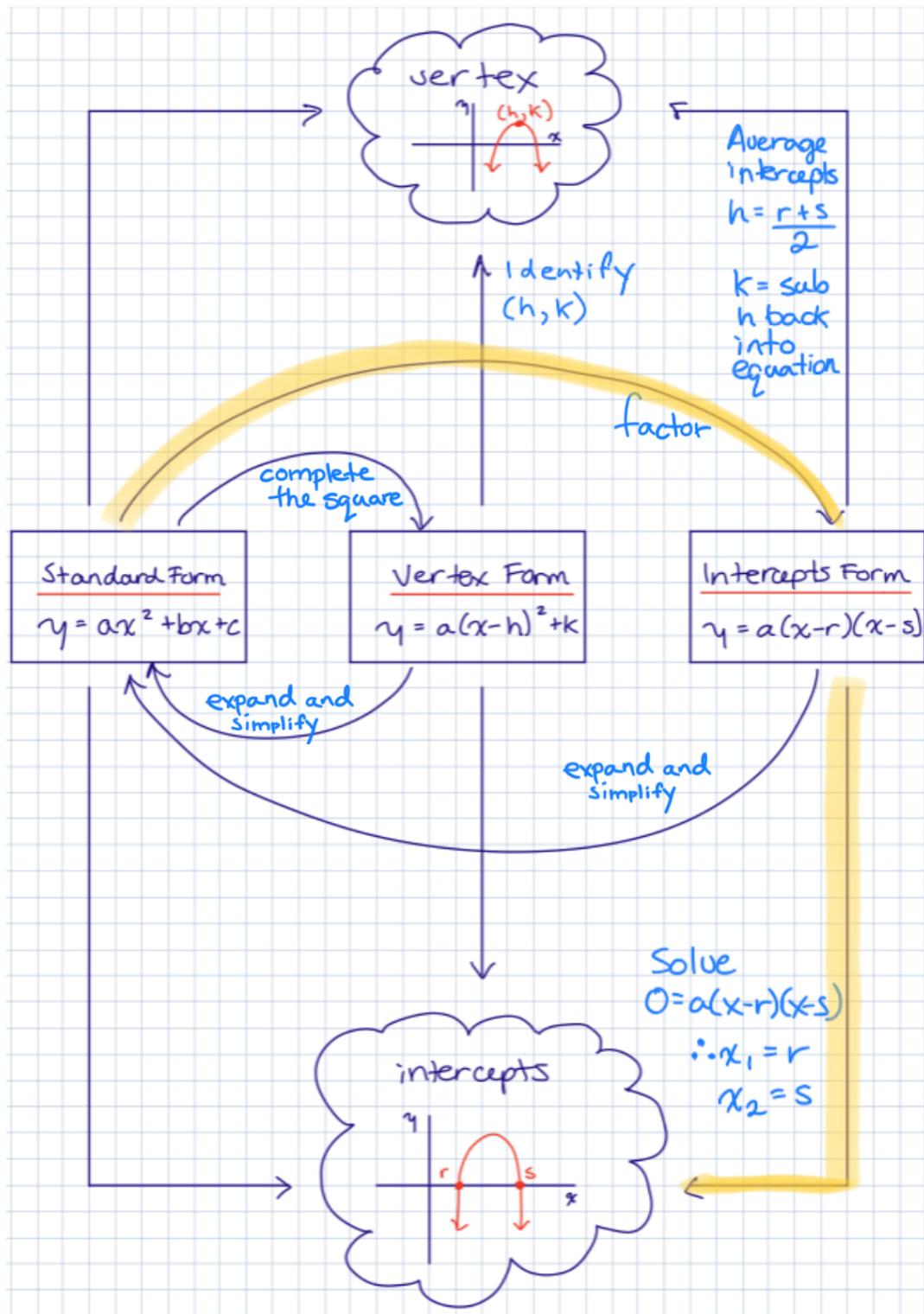


Solving Quadratic Equations by Factoring

Quadratic Relations Concept Map



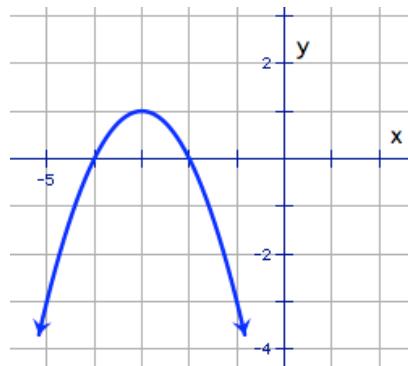
Introduction

The flight path of a toy rocket, a ball, or any projectile can be predicted using a quadratic model. This model can also be used to determine when and where a projectile will land (the x -axis is generally used to represent the ground).

In these cases... to find where something lands... we then care about what the x -intercepts are... that is, where a parabola touches the x -axis.

“Solving quadratic equations” just means to find the x -intercepts of the parabola.

You can find the x -intercepts of a parabola by graphing. What are the x -intercepts of the parabola shown at right?



Graphing takes time, however... factoring to solve quadratic equations is another method that can be used.

Solving Quadratic Equations

First, what is the y value for any point on the x -axis? That is, an x -intercept has what y value?

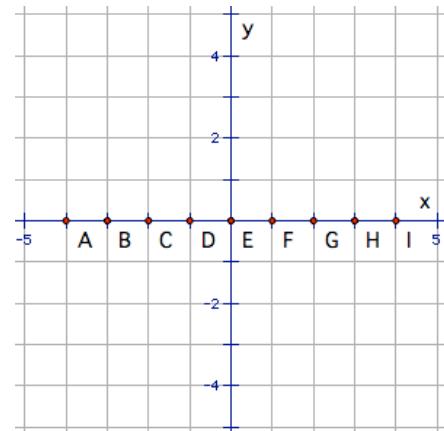
Consider points A through I shown to the right.

The y value for any point on the x -axis is: _____

Now, before we look at solving quadratic equations, let's briefly revisit linear equations.

How would you find the x -intercept of the linear equation $y = 2x - 4$?

Sub $y = 0$ and solve:



So, the x -intercept of the linear equation is:

Solving a quadratic equation is no different.

What are the x -intercepts of $y = x^2 - 6x + 8$? We sub in $y = 0$ and solve:

$$0 = x^2 - 6x + 8 \quad \text{Now at this point, it is hard to see what the value(s) of } x \text{ are.}$$
$$0 = (x - 4)(x - 2) \quad \text{So, we factor the right side.}$$

Now we can see the solutions for x . The x -intercepts are $x = 4$ or $x = 2$.

How did we get this? $x = 4$ is one value that makes the equation $0 = (x - 4)(x - 2)$ true. For example:

$x = 2$ is the other value that makes the equation “true”...

Example 1

Solve each quadratic equation, by factoring.

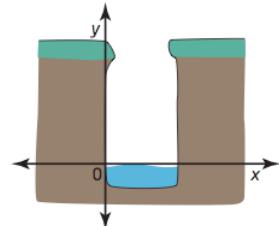
a) $0 = x^2 - x - 6$ We factor the right side...

b) $2x^2 + 4x = 0$ We can common factor...

c) $5x^2 + 19x - 4 = 0$ Complex trinomial...

Example 2

The path of a stone thrown into a ravine is modelled by the quadratic relation $y = -x^2 + 5x + 84$, where x represents the distance, in metres, travelled horizontally and y represents the height, in metres, above the surface of the river at the bottom of the ravine. How far does the stone travel horizontally before it hits the water?

**Opportunity to Learn**

Complete all questions in the provided handout that accompanies this lesson.