

**Problem 1 – Solving a quadratic equation by completing the square**

The diagram on page 1.3 shows the plan for a trestle bridge. The upper part of each trestle is shaped like a parabola. In this activity, you will solve quadratic equations to answer questions about the bridge.

Let's take a closer look at curve described by one trestle section of the bridge. Graph the quadratic function $y = -x^2 + 8x - 15$, which models the curve of the trestle, on page 1.5. The x-axis represents ground level. Where does this bridge section meet ground level?

You could trace the graph to find the answer. Or you could obtain an exact answer by solving a related quadratic equation, $-x^2 + 8x - 15 = 0$.

Use the table below to record your work as you solve $-x^2 + 8x - 15 = 0$. Some steps have been completed for you.

	Algebra	Step
1.	$-x^2 + 8x - 15 = 0$	original problem
2.	$\frac{-x^2}{-1} + \frac{8x}{-1} - \frac{15}{-1} = \frac{0}{-1}$	divide both sides by $a = -1$
3.		simplify
4.		
5.		
6.		simplify
7.		write the trinomial as a perfect square
8.		set one side equal to 0

At this point, stop and wait for the rest of the class to resume the activity on the handheld. Follow along to check your work so far.



Bridge on the River Quad

Continue to solve the equation by isolating x .

Record your steps as before. Some steps have been completed for you.

	Algebra	Step
9.	$(x - 4)^2 - 1 = 0$	starting equation
10.		
11.		
12.		simplify
13.		break into two equations
14.		

Follow along as your teacher derives the quadratic formula.

Problem 2 – Using the quadratic formula

Solve each equation using the quadratic formula. You may need to simplify before applying the formula.

1. $-55x + 30 = 50x^2$

2. $x^2 + 2x + 1 = 0$

3. $6x^2 + x = 12$

4. $3x^2 = 2x + 5$

5. $-11x^2 + 4x + 7 = 0$

6. $-4x^2 + 16x = -28$

7. $2x^2 = -9x - 4$

8. $3x^2 + 8x - 11 = 0$

9. $-2x^2 - 5x + 9 = 0$