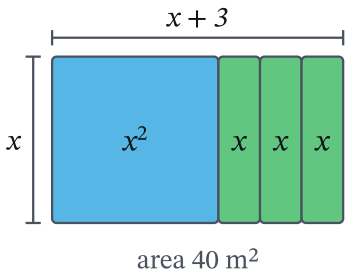
Name _____ Date _____

When the Unknown Is Squared

Example



A rectangular garden is **3 m longer than it is wide**, and its area is **40 m²**. How wide is it?

The width is x and the length is $x + 3$. The area is $x(x + 3) = x^2 + 3x$, so

$$x^2 + 3x = 40$$

The unknown is **squared**. We cannot solve this equation like a linear one, by getting x on its own.

1 ON YOUR OWN Guess systematically. Complete the table and find the width for which the area is 40 m². What are the sides of the garden?

width x	length $x + 3$	area $x^2 + 3x$
3		
4		
5		
6		
7		

Sides of the garden: _____ and _____

2 ON YOUR OWN Work out $x^2 + 3x$ for $x = -8$. What do you notice? Can the width of the garden be -8 m?

$(-8)^2 + 3 \times (-8) =$ _____

3 ON YOUR OWN Is the given number a solution of the equation? Check by substituting.

$x^2 = 2x + 8$	$x = 4$ **yes** / **no**	$x = -2$ **yes** / **no**	$x = 2$ **yes** / **no**
$x^2 + 5x = 0$	$x = 0$ **yes** / **no**	$x = -5$ **yes** / **no**	$x = 5$ **yes** / **no**

Names (pair) _____ Date _____

Remember

A **solution** of an equation is a number that gives a true equality when put in place of x. When the unknown is squared, an equation can have **two solutions**. At the end, check whether each solution makes sense in the problem: a length cannot be negative.

4 IN PAIRS Write an equation. Do not solve it yet.

a) The product of two consecutive whole numbers is 56. The smaller number is x.

b) A rectangle with perimeter 20 cm has area 24 cm². One side is x.

c) If we make the side of a square 2 cm longer, its area is 81 cm². The side is x.

5 IN PAIRS Solve a) and b) by guessing. Why do both solutions in b) give the same rectangle?

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On the **Equation** mat, build $x^2 + 2x = 8$ and try to get x on its own. Why does it not work as it does for a linear equation? Check by substituting that $x = 2$ is a solution.

★ ON YOUR OWN **Exit card.** The square of a number equals three times the number. Write an equation and find both solutions.