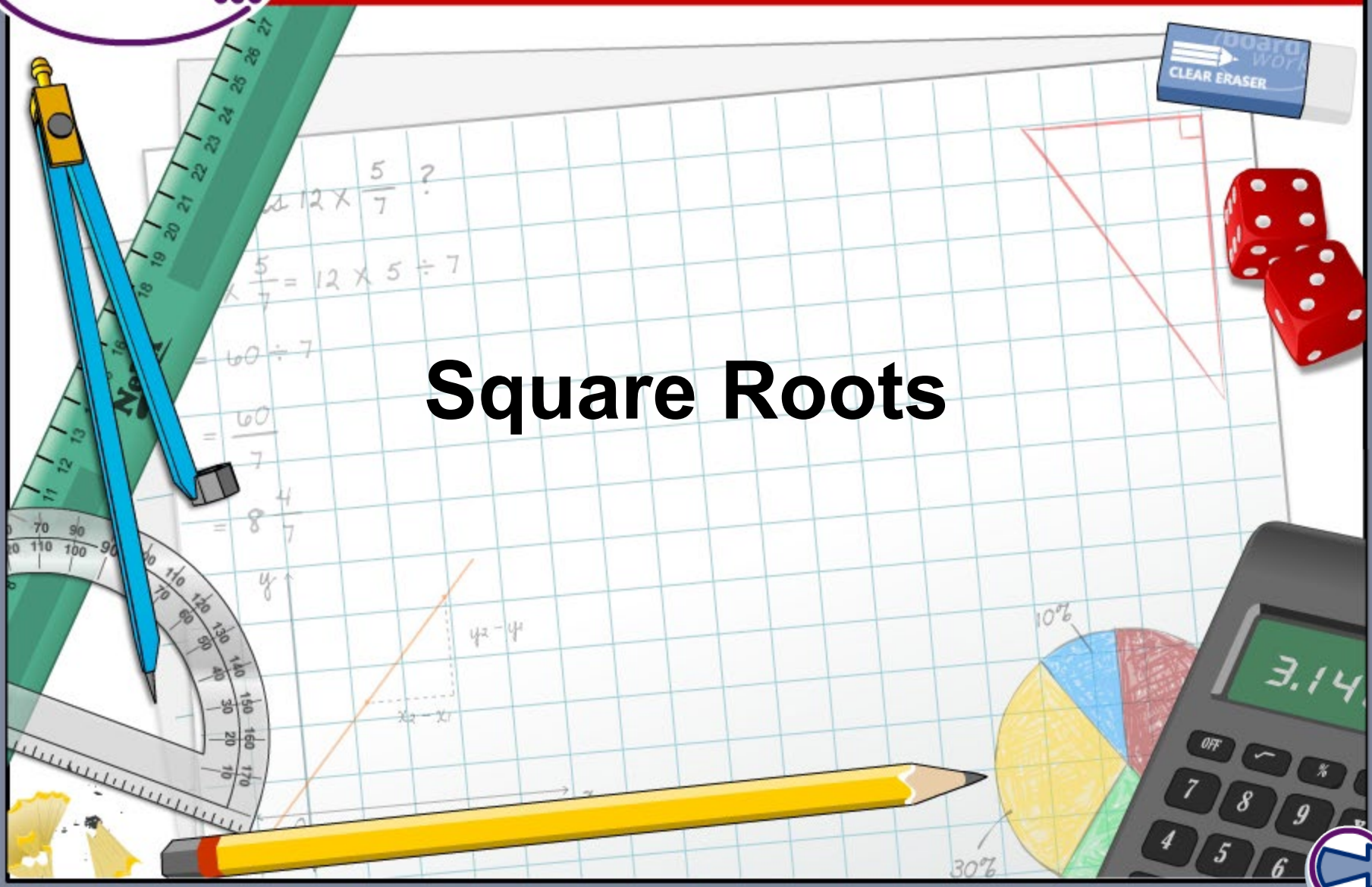



# Square Roots

# Information

## Common core icons

This icon indicates a slide where the Standards for Mathematical Practice are being developed. Details of these are given in the Notes field.


Slides containing examples of mathematical modeling are marked with this stamp.

This icon indicates an opportunity for discussion or group work.

The **Standards for Mathematical Practice** outlined in the Common Core State Standards for Mathematics describe varieties of expertise that mathematics educators at all levels should seek to develop in their students.

These are:

**1) Make sense of problems and persevere in solving them.**

**2) Reason abstractly and quantitatively.**

**3) Construct viable arguments and critique the reasoning of others.**

**4) Model with mathematics.**

**5) Use appropriate tools strategically.**

**6) Attend to precision.**

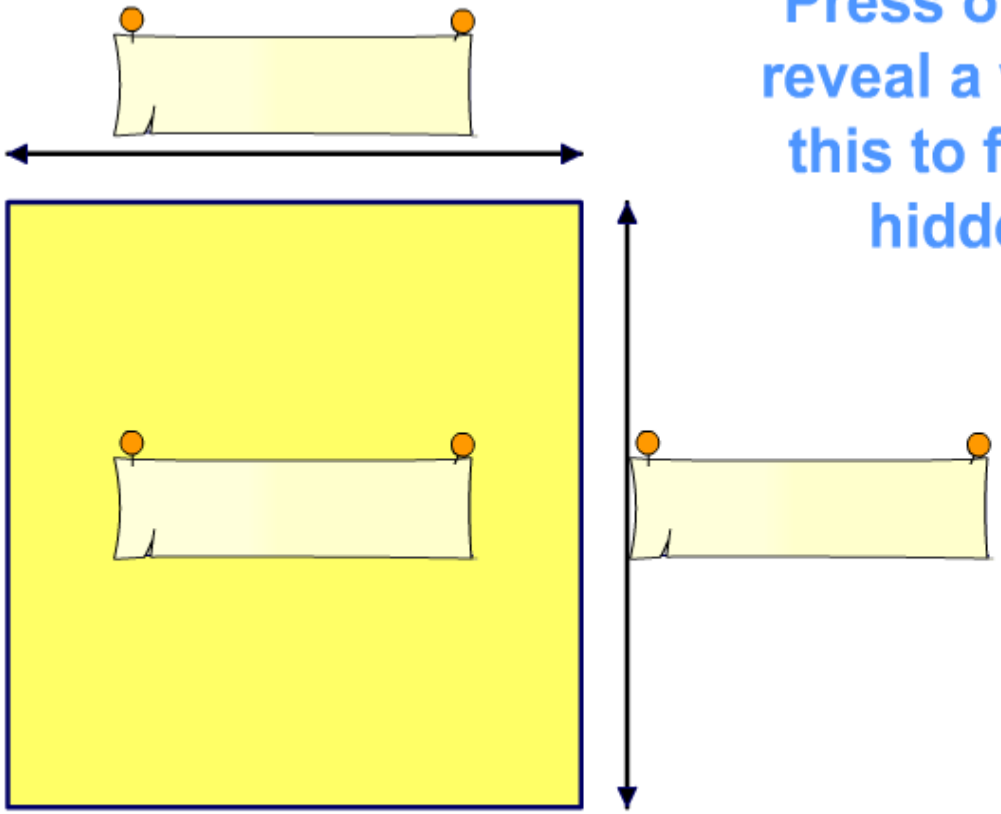
**7) Look for and make use of structure.**

**8) Look for and express regularity in repeated reasoning.**

This icon indicates that the slide contains activities created in Flash. These activities are not editable.

This icon indicates teacher's notes in the Notes field.

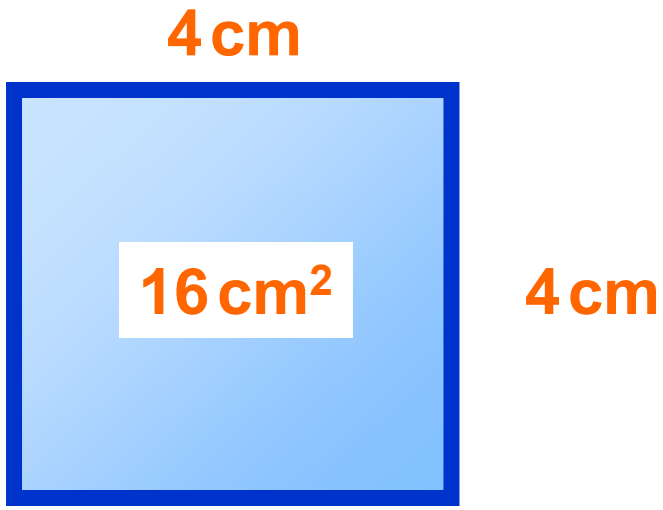
# Find the missing values



Press on a notelet to reveal a value and use this to figure out the hidden values.

# Square roots

**What can you say about the relationship between the area of a square and the length of its sides?**

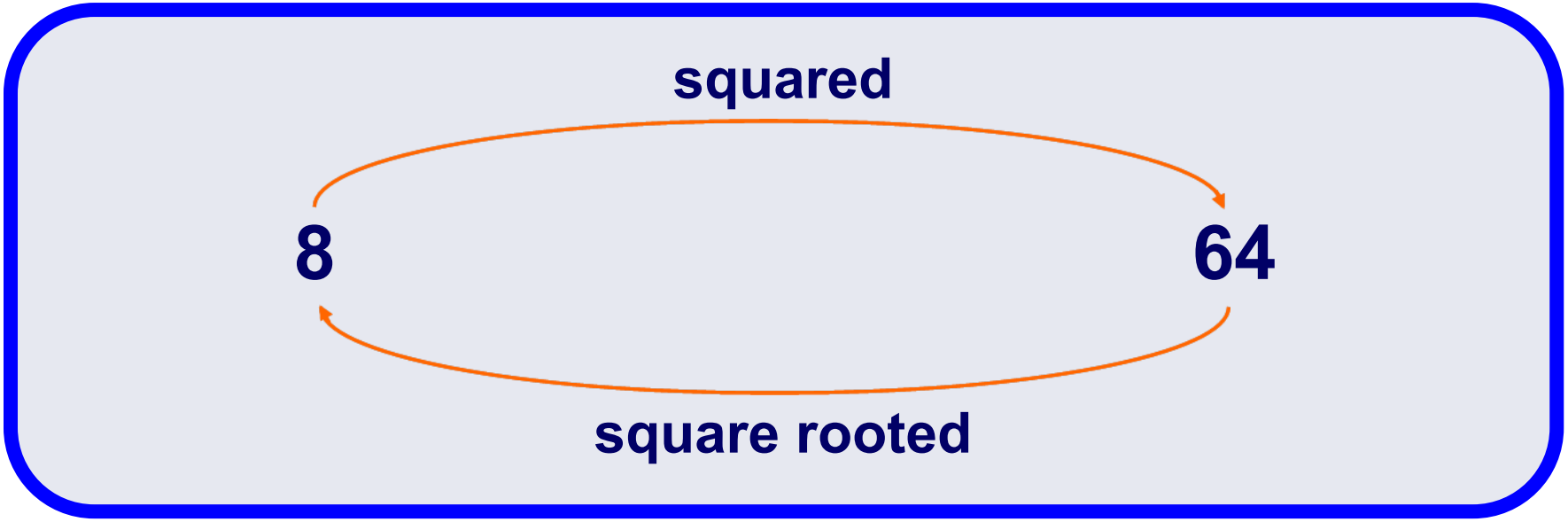



Area of a square = length of one side$^2$

A number that is multiplied by itself to form a product is the **square root** of that product.

# Square vs. square root

Finding the **square root** is the inverse of finding the square:




We write:

$$\sqrt{64} = 8$$

The square root of 64 is 8.

# Applying square roots

Competitive gymnasts perform on square spring floors, which are specially designed to provide extra bounce.

**The International Federation of Gymnastics requires all competition floors to have an area of 144 $m^2$. What is the length of one of the floor's sides?**

$\sqrt{144} = 12$

Each side of the spring floor is 12 m long.

# Perfect squares

$\sqrt{1}$

7

If the square root of a number is an integer, we call that number a **perfect square**. Can you match the following perfect squares to their square roots?

Press start to begin.

start

$\sqrt{25}$

6

$\sqrt{49}$

3

S

# Negative square roots

**9 × 9 = 81. Does any other number multiplied by itself equal 81?**

$9 \times 9 = 81$ **and** $-9 \times -9 = 81$

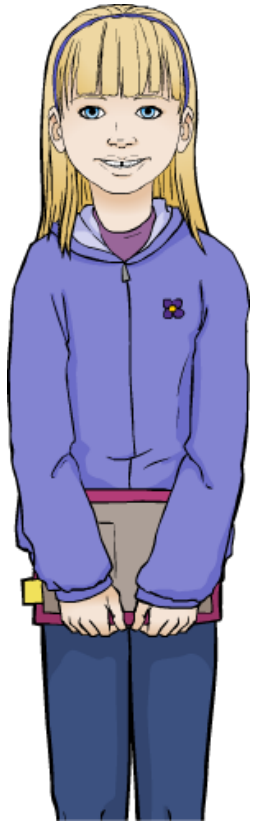
Therefore, the square root of 81 is 9 or –9.

When we use the √ symbol, we usually mean the positive square root.

We can also write ±√ to mean both the positive and the negative square root.

The equation $x^2 = 81$ has two solutions:

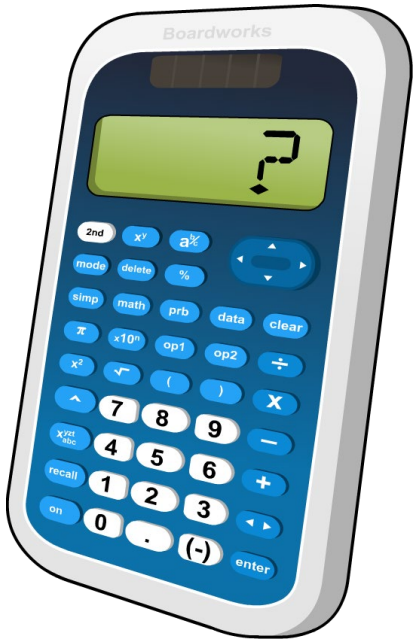
$x = 9$ **or** $x = -9$.



# Irrational numbers

If a number cannot be written as a product or quotient of two square numbers, then its square root cannot be found exactly.

Use the $\sqrt{}$ key on your calculator to find $\sqrt{2}$.




The calculator shows this as 1.414213562.

This is an approximation to 9 decimal places.

The number of digits after the decimal point is infinite, and the digits do not repeat.

This means that the square root of 2 is an **irrational number**.

# Square root calculations

## Simplify the following expressions.

| | | |
|---|---|---|
| 1. | $\sqrt{\frac{16}{4}}$ | ? W |
| 2. | $\sqrt{25} - 3$ | ? W |
| 3. | $2\sqrt{49} - 4$ | ? W |
| 4. | $\sqrt{31 + 33}$ | ? W |
| 5. | $\sqrt{16}\sqrt{36}$ | ? W |

# Brain stretch

There are some tricks we can use to find the square roots of big numbers.

Press **start** to begin.

start