

Unit 7 Lesson 20: Rational and Irrational Solutions

1 Rational or Irrational? (Warm up)

Student Task Statement

Numbers like -1.7 , $\sqrt{16}$, and $\frac{5}{3}$ are known as *rational numbers*.

Numbers like $\sqrt{12}$ and $\sqrt{\frac{5}{9}}$ are known as *irrational numbers*.

Here is a list of numbers. Sort them into rational and irrational.

97 -8.2 $\sqrt{5}$ $-\frac{3}{7}$ $\sqrt{100}$ $\sqrt{\frac{9}{4}}$ $-\sqrt{18}$

2 Suspected Irrational Solutions

Student Task Statement

1. Graph each quadratic equation using graphing technology. Identify the zeros of the function that the graph represents, and say whether you think they might be rational or irrational. Be prepared to explain your reasoning.

equations	zeros	rational or irrational?
$y = x^2 - 8$		
$y = (x - 5)^2 - 1$		
$y = (x - 7)^2 - 2$		
$y = \left(\frac{x}{4}\right)^2 - 5$		

2. Find exact solutions (not approximate solutions) to each equation and show your reasoning. Then, say whether you think each solution is rational or irrational. Be prepared to explain your reasoning.

a. $x^2 - 8 = 0$

b. $(x - 5)^2 = 1$

c. $(x - 7)^2 = 2$

d. $\left(\frac{x}{4}\right)^2 - 5 = 0$

3 Experimenting with Rational and Irrational Numbers

Student Task Statement

Here is a list of numbers:

$$2 \quad 3 \quad \frac{1}{3} \quad 0 \quad \sqrt{2} \quad \sqrt{3} \quad -\sqrt{3} \quad \frac{1}{\sqrt{3}}$$

Here are some statements about the sums and products of numbers. For each statement, decide whether it is *always* true, true for *some* numbers but not others, or *never* true.

1. Sums:

- The sum of two rational numbers is rational.
- The sum of a rational number and an irrational number is irrational.
- The sum of two irrational numbers is irrational.

2. Products:

- The product of two rational numbers is rational.
- The product of a rational number and an irrational number is irrational.
- The product of two irrational numbers is irrational.

Experiment with sums and products of two numbers in the given list to help you decide.