

## Objective 25

Identify rational or irrational numbers

### Vocab:

**Rational Number:** Number that can be expressed at the ratio of two numbers, a terminating decimal, or a repeating decimal

**Irrational Number:** Number that cannot be expressed at the ratio of two numbers, a terminating decimal, or a repeating decimal. A non-terminating decimal.

Example 1: Identify the following numbers as rational or irrational

$$\sqrt{25}, \frac{1}{3}, 7.\overline{85}$$

Step 1: Examine  $\sqrt{25}$  and determine if it is rational or irrational

$\sqrt{25}$  can be simplified to 5, which can be written as a ratio of  $\frac{5}{1}$ .  
Therefore it is rational.

Step 2: Examine  $\frac{1}{3}$  and determine if it is rational or irrational

$\frac{1}{3}$  is a ratio and therefore it is rational.

Step 3: Examine  $7.\overline{85}$  and determine if it is rational or irrational

$7.\overline{85}$  is a repeating decimal and therefore is rational.

Answer is all are rational

Example 2: Identify the following numbers as rational or irrational

$$\sqrt{89}, 4\pi, \sqrt{55}$$

Step 1: Examine  $\sqrt{89}$  and determine if it is rational or irrational

$\sqrt{89} = 9.433981132066 \dots$  The decimal form does not appear to repeat or terminate, therefore it is irrational.

Step 2: Examine  $4\pi$  and determine if it is rational or irrational

$4\pi = 12.5663706144 \dots$  The decimal form does not appear to repeat or terminate, therefore it is irrational.

Step 3: Examine  $\sqrt{55}$  and determine if it is rational or irrational

$\sqrt{55} = 7.4161984871 \dots$  The decimal form does not appear to repeat or terminate, therefore it is irrational.

Answer is all are irrational

Guided Practice:

Rational or Irrational and why.

$$4\pi$$

$$\sqrt{27}$$

$$\frac{3}{89}$$

$$\sqrt{81}$$

**Practice:** Determine if the following numbers are rational or irrational and why. *Show your work!*

- $7\pi$
- $1.\overline{9}$
- $\sqrt{49}$
- $\frac{3}{111}$
- $\sqrt{39}$
- $\frac{7}{12}$
- $7.16\pi$
- 0

**Additional Help:**

[www.mathwarehouse.com/arithmetics/numbers/rational-and-irrational-numbers-with-examples.php](http://www.mathwarehouse.com/arithmetics/numbers/rational-and-irrational-numbers-with-examples.php)