

# Rational Irrational Numbers Worksheet Answer Key PDF

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## Part 1: Building a Foundation

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**Which of the following numbers is a rational number?**

undefined.  $\sqrt{2}$

undefined.  $\pi$

**undefined. 0.75 ✓**

undefined.  $e$

The correct answer is 0.75, as it can be expressed as a fraction ( $\frac{3}{4}$ ).

**Select all the characteristics of irrational numbers:**

undefined. Can be expressed as a fraction

**undefined. Non-repeating decimal ✓**

**undefined. Non-terminating decimal ✓**

undefined. Can be a whole number

Irrational numbers are characterized by being non-repeating and non-terminating decimals.

**Explain why the number  $\frac{1}{3}$  is considered a rational number.**

**$\frac{1}{3}$  is considered a rational number because it can be expressed as a fraction of two integers.**

**List two examples of rational numbers and two examples of irrational numbers.**

1. Rational Number 1

**$\frac{1}{2}$**

2. Rational Number 2

**3**

3. Irrational Number 1

$\sqrt{2}$

4. Irrational Number 2

$\pi$

Examples of rational numbers include  $\frac{1}{2}$  and 3. Examples of irrational numbers include  $\sqrt{2}$  and  $\pi$ .

**Which of the following numbers has a terminating decimal representation?**

undefined.  $\frac{1}{3}$

**undefined.  $\frac{1}{4}$  ✓**

undefined.  $\sqrt{3}$

undefined.  $\pi$

The correct answer is  $\frac{1}{4}$ , as it has a terminating decimal representation of 0.25.

## Part 2: Understanding and Interpretation

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**Which statement best describes the decimal expansion of a rational number?**

undefined. It is always non-terminating and non-repeating.

undefined. It is always non-terminating and repeating.

**undefined. It can be either terminating or repeating. ✓**

undefined. It is always terminating.

The correct answer is that it can be either terminating or repeating.

**Which of the following are true about the sum of a rational and an irrational number?**

undefined. It is always rational.

**undefined. It is always irrational. ✓**

**undefined. It can be rational if the rational number is zero. ✓**

undefined. It can be irrational if the irrational number is zero.

The sum of a rational and an irrational number is always irrational.

**Describe the difference between rational and irrational numbers using their decimal expansions.**

Rational numbers have decimal expansions that are either terminating or repeating, while irrational numbers have non-terminating and non-repeating decimal expansions.

### Part 3: Application and Analysis

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If  $x$  is a rational number and  $y$  is an irrational number, which of the following expressions is irrational?

undefined.  $x + y$  ✓

undefined.  $x - x$

undefined.  $x/y$ , where  $y \neq 0$

undefined.  $x * 0$

The correct answer is  $x + y$ , as the sum of a rational and an irrational number is always irrational.

Identify which of the following operations will result in a rational number:

undefined.  $\sqrt{4} + \sqrt{9}$  ✓

undefined.  $\pi - 3$

undefined.  $2/3 * 3/2$  ✓

undefined.  $\sqrt{2} * \sqrt{2}$  ✓

The operations that result in a rational number include  $\sqrt{4} + \sqrt{9}$  and  $2/3 * 3/2$ .

Provide a real-world example where distinguishing between rational and irrational numbers is important. Explain why.

An example could be measuring lengths in construction, where precise measurements (rational) are crucial, while approximations (irrational) may lead to errors.

### Part 4: Evaluation and Creation

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Analyze the following statement: "The product of two irrational numbers is always irrational." Which of the following is true?

undefined. Always true

undefined. Always false

**undefined. Sometimes true, sometimes false ✓**

undefined. True only if both numbers are non-zero

The correct answer is sometimes true, sometimes false, as the product can be rational in certain cases.

**Evaluate the following scenario: If a number has a repeating decimal, is it always rational?**

**undefined. Yes, because repeating decimals can be expressed as fractions. ✓**

undefined. No, because repeating decimals can be irrational.

undefined. Yes, but only if the repeating pattern is finite.

undefined. No, because not all repeating decimals are rational.

The correct answer is yes, because repeating decimals can be expressed as fractions.

**Create a list of numbers that includes both rational and irrational numbers. Which of the following numbers could be included?**

undefined. 0.1010010001...

**undefined. 1.41421356... ✓**

**undefined.  $\frac{3}{7}$  ✓**

**undefined. 5.5 ✓**

The numbers that could be included are 1.41421356... (irrational),  $\frac{3}{7}$  (rational), and 5.5 (rational).

**Propose a method to approximate an irrational number using rational numbers. Explain the steps and reasoning behind your method.**

**One method is to use continued fractions or decimal approximations to get closer to the irrational number.**