# Rational Irrational Numbers Worksheet Questions and Answers PDF

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## Part 1: Building a Foundation

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

*Hint: Think about which number can be expressed as a fraction.*

- ◯ √2
- ◯ π
- ◯ **0.75 ✓**
- ◯ e

> The correct answer is 0.75, as it can be expressed as a fraction (3/4).

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

*Hint: Consider the properties that define irrational numbers.*

- ☐ Can be expressed as a fraction
- ☐ **Non-repeating decimal ✓**
- ☐ **Non-terminating decimal ✓**
- ☐ Can be a whole number

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

**Explain why the number 1/3 is considered a rational number.**

*Hint: Think about how 1/3 can be represented.*

**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.**

*Hint: Think of common numbers you encounter.*

1. Rational Number 1

1/2

2. Rational Number 2

3

3. Irrational Number 1

√2

4. Irrational Number 2

π

Examples of rational numbers include 1/2 and 3. Examples of irrational numbers include √2 and π.

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

*Hint: Consider which fractions can be expressed as terminating decimals.*

- ◯ 1/3
- ◯ **1/4 ✓**
- ◯ √3
- ◯ π

> The correct answer is 1/4, as it has a terminating decimal representation of 0.25.

## Part 2: Understanding and Interpretation

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

*Hint: Think about the patterns in decimal expansions.*

- ◯ It is always non-terminating and non-repeating.
- ◯ It is always non-terminating and repeating.
- ◯ **It can be either terminating or repeating. ✓**
- ◯ 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?**

*Hint: Consider the properties of sums involving different types of numbers.*

- ☐ It is always rational.
- ☐ **It is always irrational. ✓**
- ☐ **It can be rational if the rational number is zero. ✓**
- ☐ 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.**

*Hint: Think about how each type of number behaves in decimal form.*

**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

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

*Hint: Consider the operations involving rational and irrational numbers.*

- ◯ **x + y ✓**
- ◯ x - x
- ◯ x/y, where y ≠ 0
- ◯ 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:**

*Hint: Think about the outcomes of different mathematical operations.*

- ☐ **√4 + √9 ✓**
- ☐ π - 3
- ☐ **2/3 * 3/2 ✓**
- ☐ **√2 * √2 ✓**

> The operations that result in a rational number include √4 + √9 and 2/3 * 3/2.

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

*Hint: Think about situations in daily life where these concepts apply.*

> **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

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

*Hint: Consider the properties of multiplication involving irrational numbers.*

- ◯ Always true
- ◯ Always false
- ◯ **Sometimes true, sometimes false ✓**
- ◯ 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?**

*Hint: Think about the characteristics of repeating decimals.*

- ◯ **Yes, because repeating decimals can be expressed as fractions. ✓**
- ◯ No, because repeating decimals can be irrational.
- ◯ Yes, but only if the repeating pattern is finite.
- ◯ 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?**

*Hint: Consider the definitions of rational and irrational numbers.*

- ☐ 0.1010010001...

- ☐ **1.41421356... ✓**
- ☐ **3/7 ✓**
- ☐ **5.5 ✓**

> The numbers that could be included are 1.41421356... (irrational), 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.**

*Hint: Think about how you can use fractions to get close to an irrational number.*

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