

# Rational and Irrational Numbers

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Score: \_\_\_\_\_ / 18

## Quick Review and Helpful Hints

A *rational* number can be written as a fraction of integers; its decimal *terminates or repeats*. An *irrational* number cannot – its decimal runs forever without repeating (like  $\pi$ , or  $\sqrt{n}$  when  $n$  is not a perfect square).

▶ **Example:** Is  $\sqrt{9}$  rational or irrational? **Work:**  $\sqrt{9} = 3$ , a whole number, which is a fraction  $\frac{3}{1}$ . **★ Answer:** Rational

$\frac{a}{b}$	$\pi, \sqrt{2}$
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Rational | Irrational.

### ◆ Practice Problems

Tell whether each number is Rational or Irrational.

- |                  |       |                                 |       |
|------------------|-------|---------------------------------|-------|
| 1. $\sqrt{9}$    | _____ | 8. $0.\overline{3}$ (repeating) | _____ |
| 2. $\sqrt{2}$    | _____ | 9. $\sqrt{25}$                  | _____ |
| 3. 0.5           | _____ | 10. $\sqrt{10}$                 | _____ |
| 4. $\pi$         | _____ | 11. 4                           | _____ |
| 5. $\frac{1}{3}$ | _____ | 12. $-\frac{2}{5}$              | _____ |
| 6. $\sqrt{16}$   | _____ | 13. $\sqrt{100}$                | _____ |
| 7. $\sqrt{7}$    | _____ | 14. 0.1010010001...             | _____ |

### ◆ Word Problems

15. Is  $\sqrt{4}$  rational or irrational? \_\_\_\_\_
16. Is  $\pi$  rational or irrational? \_\_\_\_\_
17. Is 7 a rational number? \_\_\_\_\_
18. Is  $\sqrt{3}$  rational or irrational? \_\_\_\_\_



## Answer Keys

- |               |                |                |
|---------------|----------------|----------------|
| 1. Rational   | 7. Irrational  | 13. Rational   |
| 2. Irrational | 8. Rational    | 14. Irrational |
| 3. Rational   | 9. Rational    | 15. Rational   |
| 4. Irrational | 10. Irrational | 16. Irrational |
| 5. Rational   | 11. Rational   | 17. Yes        |
| 6. Rational   | 12. Rational   | 18. Irrational |

### Step-by-Step Explanations

**1.** Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is  $\sqrt{9} = 3$ : rational. So the final answer is Rational.

**2.** A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is 2 is not a perfect square: irrational. So the final answer is Irrational.

**3.** Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is It terminates: rational. So the final answer is Rational.

**4.** Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is  $\pi$  never repeats: irrational. So the final answer is Irrational.

**5.** Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is A fraction of integers: rational. So the final answer is Rational.

**6.** A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is  $\sqrt{16} = 4$ : rational. So the final answer is Rational.

**7.** Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is 7 is not a perfect square: irrational. So the final answer is Irrational.

**8.** Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is A repeating decimal: rational. So the final answer is Rational.

**9.** Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is  $\sqrt{25} = 5$ : rational. So the final answer is Rational.

**10.** A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is 10 is not a perfect square: irrational. So the final answer is Irrational.

**11.** Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is A whole number =  $\frac{4}{1}$ : rational. So the final answer is Rational.

**12.** Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is A fraction of integers: rational. So the final answer is Rational.

**13.** Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is  $\sqrt{100} = 10$ : rational. So the final answer is Rational.

**14.** A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is Non-repeating, non-terminating: irrational. So the final answer is Irrational.

**15.** Step by step: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is  $\sqrt{4} = 2$ : rational. So the final answer is Rational.

**16.** Take it one move at a time: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is  $\pi$  is irrational. So the final answer is Irrational.

**17.** Start by naming the process: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is  $7 = \frac{7}{1}$ , so yes. So the final answer is Yes.

**18.** A good way to think about this is: Read what the problem is asking, choose the matching rule, write the setup, and then simplify one step at a time. The setup/work is 3 is not a perfect square: irrational. So the final answer is Irrational.



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