

Name _____

Date _____

Day 3 Notes - Rational and Irrational Numbers

Rational Numbers

- Numbers that can be written as a fraction of INTEGERS
- Terminating decimals
- Repeating decimals

6 or $\frac{6}{1}$	can also be written as	6.0
-2 or $\frac{-2}{1}$	can also be written as	-2.0
$\frac{1}{2}$	can also be written as	0.5
$\frac{-5}{4}$	can also be written as	-1.25
$\frac{2}{3}$	can also be written as	0.66666666... $0.\overline{6}$
$\frac{21}{55}$	can also be written as	0.38181818... $0.3\overline{18}$

Examples:

Non-examples:

Irrational Numbers

- Numbers that cannot be written as a fraction of integers or a ratio.
- Decimals that are non-terminating, non-repeating.

$$\pi = 3.141592654\dots$$

$$\sqrt{2} = 1.414213562\dots$$

and 0.12122122212...

Examples:

Non-examples:

Sort the numbers into rational or irrational. Write the numbers in the appropriate bubble.

0.8 $\sqrt{64}$ 0 $\sqrt{32}$ -19 $-\sqrt{100}$ 2.343443444...
 $\frac{3}{7}$ $\sqrt{75}$ $6\frac{2}{7}$ $12.\overline{67}$ $\sqrt{121}$ $\frac{12}{5}$ π

Rational

Irrational

1. For each of the numbers below, decide whether it is rational or irrational.

Explain your reasoning in detail.

5	
$\frac{5}{7}$	
0.575	
$\sqrt{5}$	
$5 + \sqrt{7}$	
$\frac{\sqrt{10}}{2}$	
$\sqrt{2} \cdot \sqrt{32}$	

2. Some students were classifying numbers as rational and irrational.

Decide whether you agree or disagree with each statement.

Correct any errors. Explain your answers clearly.

Student	Statement	Agree or disagree?
Otis	$\frac{\sqrt{3}}{8}$ is a rational number because it can be written as a fraction.	
Lulu	$\frac{\sqrt{3}}{8}$ is irrational because $\sqrt{3}$ is irrational.	
Leon	$\overline{0.286}$ is rational because you can write it as the fraction $\frac{286}{1000}$.	
Joan	$\overline{0.286}$ is an irrational number because that decimal will carry on forever.	
Ray	0.286 (rounded to three decimal places) might be rational or irrational.	
Arita	0.286... is rational - the little dots show the digits carry on in the same pattern forever.	

Sometimes, Always, or Never

Decide if each of the following statements is sometimes, always, or never true. Come up with a few examples or counterexamples to prove your point.

1. Rational + Rational = Rational	2. Rational + Irrational = Irrational
3. Irrational + Irrational = Irrational	4. Rational x Rational = Rational
5. Rational x Irrational = Irrational	6. Irrational x Irrational = Irrational

Irrational Versus Rational Numbers—Practice

Decide whether the following numbers, sums or products yield a number that is rational or irrational. Simplify if necessary and explain for each problem why it is a rational or irrational number.

1. $1.\overline{233}$

2. $1.245\dots$

3. $\frac{3}{5}$

4. 3π

5. $\sqrt{5} + \sqrt{7}$

6. $\sqrt{4} + \sqrt{16}$

7. $\sqrt{2} \cdot \sqrt{18}$

8. $\frac{\sqrt{5}}{2} + 3$

9. $(\sqrt{8} + 4) \cdot 4$

10. $\sqrt{8}(5\sqrt{8} + \sqrt{2})$

11. $(5 + \sqrt{2}) + 2\sqrt{2}$

12. $2(\sqrt{5} + \sqrt{7})$

Let x be a non-zero rational number and y be an irrational number. Tell whether the following will always, sometimes, or never be rational.

13. $x + y$

14. xy

15. y^2

16. x^2

17. $x + x$

18. $y + y$