Rational and Irrational Numbers Notes

Rational Numbers:
Can be expressed as the quotient of two integers (i.e. a fraction) with a denominator that is not zero.
Many people are surprised to know that a repeating decimal is a rational number.

Examples: -5, 0, 7, 3/2, $0.\overline{26}$

- $\sqrt{9}$ is rational - you can simplify the square root to 3 which is the quotient of the integers 3 and 1.

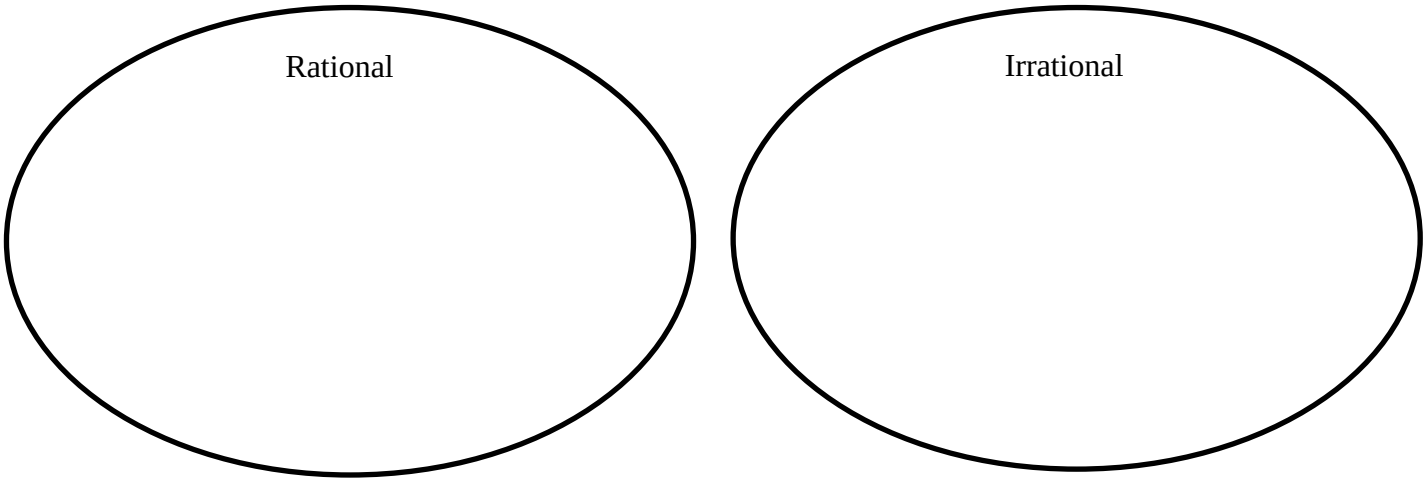
Irrational Numbers:
Can't be expressed as the quotient of two integers (i.e. a fraction) such that the denominator is not zero.

Examples: $\sqrt{7}$, $\sqrt{5}$, π , 0.34989238…0.120102001211…, 3.14151692345…,

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…

$\frac{3}{7}$ $\sqrt{75}$ $6\frac{2}{7}$ $12.6\overline{7}$ $\sqrt{121}$ $\frac{12}{5}$ π



Directions: For each number shown, classify it as either rational or irrational, then tell whether or not it is terminating or repeating.

		(circle one)			*(circle one)*
11)	-0.6	rational	or	irrational	terminating, repeating, or neither
12)	$\sqrt{100}$	rational	or	irrational	terminating, repeating, or neither
13)	$\frac{2}{5}$	rational	or	irrational	terminating, repeating, or neither
14)	$-\frac{2}{3}$	rational	or	irrational	terminating, repeating, or neither
15)	0.35217534 ...	rational	or	irrational	terminating, repeating, or neither

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

		Rational		
	+	5	½	0
Rational	5			
	½			

2. Rational + Irrational = Irrational

		Rational		
	+	5	½	0
Irrational	$\sqrt{2}$			
	π			

3. Irrational + Irrational = Irrational

		Irrational		
	+	$\sqrt{2}$	$-\sqrt{3}$	π
Irrational	$\sqrt{2}$			
	π			

4. Rational x Rational = Rational

		Rational		
	x	5	½	-1
Irrational	5			
	½			

5. Rational x Irrational = Irrational

		Rational		
	x	5	½	-1
Irrational	$\sqrt{2}$			
	$-\pi$			

6. Irrational x Irrational = Irrational

		Irrational		
	x	$\sqrt{2}$	$-\sqrt{3}$	π
Irrational	$\sqrt{2}$			
	π			

*If you ever multiply an irrational number by 0 (which is a rational number), your outcome will always be 0, which is a rational number. Most of the time, when multiplying, it will say a nonzero rational number, which means 0 is excluded from the rational number set.

Ex. $\sqrt{2} \cdot 0 = 0$ Ex. $\pi \cdot 0 = 0$

PRACTICE

Identify each number as rational or irrational.

1. 432.8 _____

2. 0.34343434... _____

3. 4.101010001... _____

4. −0.33333... _____

5. 0.313111331... _____

6. 7.2345 _____

7. $\sqrt{7}$ _____

8. $\sqrt{16}$ _____

9. $\sqrt{52}$ _____

10. $\sqrt{3}$ _____

11. $\sqrt{49}$ _____

12. $\sqrt{36}$ _____

_____13. Which is an irrational number?

A $\sqrt{5}$ B $\sqrt{9}$

C −1 D $-\frac{2}{3}$

_____14. The number 5.3456435... is:

A Rational B Irrational

C Both D Neither

_____15. Which of the following is an irrational number?

A $\sqrt{144}$ B $\sqrt{16}$

C $\sqrt{4}$ D $\sqrt{3}$

_____16. Which is a rational number?

A $\frac{3}{4}$ B $\sqrt{8}$

C 3.14159265... D $\sqrt{38}$

17) Which of the following numbers is irrational?

a) 0.252525... b) 0.875 c) 0.3754152... d) -0.121212...

18) Which of the following numbers is rational?

a) $\sqrt{30}$ b) $\sqrt{42}$ c) $\sqrt{64}$ d) -0.125374...