Adding Rational and Irrational Numbers

	Rational		
+	5	½	0
5	$5+5$ 10		
½		$0.5+0.5$ 1	
0			$0+0$ 0

(Row header: **Rational**)

Adding Two Rational Numbers

Conclusion:

The sum of two rational numbers is

Rational

	Rational		
+	5	½	0
$\sqrt{2}$	$5+\sqrt{2}$ 6.4142...		
$-\sqrt{2}$		$0.5+(-\sqrt{2})$ $-.9142...$	
π			$0+\pi$ π

(Row header: **Irrational**)

Adding Rational and Irrational Numbers

Conclusion:

The sum of a rational and irrational is

Irrational

	Irrational		
+	$\sqrt{2}$	$-\sqrt{2}$	π
$\sqrt{2}$	$\sqrt{2}+\sqrt{2}$ 2.8284...	$-\sqrt{2}+\sqrt{2}$ 0	
$-\sqrt{2}$	$\sqrt{2}+-\sqrt{2}$ 0		
π			

(Row header: **Irrational**)

Adding Two Irrational Numbers

Conclusion:

The sum of two irrational numbers is

Irrational

Except when:

(+) opposites

Multiplying Rational and Irrational Numbers

		Rational		
	x	5	½	-1
Rational	5	5×5 25		
	½		0.5×0.5 $.25$	$(-1)(-1)$ 1
	-1			

Multiplying Two Rational Numbers

Conclusion:

The product of two rational numbers is

Rational

		Rational		
	x	5	½	-1
Irrational	$\sqrt{2}$	$5 \times \sqrt{2}$ $7.07106...$		
	$-\sqrt{2}$		$0.5 \times -\sqrt{2}$ $-.707106...$	$(-1)(\pi)$
	π			$-\pi$

Multiplying Rational and Irrational Numbers

Conclusion:

The product of a rational and irrational is

Irrational

		Irrational		
	x	$\sqrt{2}$	$-\sqrt{2}$	π
Irrational	$\sqrt{2}$	$\sqrt{2 \cdot 2} = \sqrt{4}$ $= 2$	-2	
	$-\sqrt{2}$	-2	2	
	π	$4.443...$		$9.8696...$

Multiplying Two Irrational Numbers

Conclusion:

The product of two irrational numbers is

IRRational

Except when:

the product (x) creates a perfect square

ex. $\sqrt{8} \times \sqrt{2} = \sqrt{16} = 4$

*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: Classify each number as rational or irrational and explain why.