

Algebra RH

Essential Question: What types of numbers result from adding and multiplying rational and irrational numbers?

Do Now:

1) Add the following pairs of rational numbers.

a) $\frac{2}{3} + \frac{5}{9}$

$$\frac{6}{9} + \frac{5}{9} \rightarrow \frac{11}{9} \rightarrow 1\frac{2}{9}$$

b) $6 + 19.\bar{3}$

$$25.\bar{3}$$

c) $-\sqrt{49} + \sqrt{121}$

$$-7 + 11$$
$$4$$

d) $\sqrt[3]{8} + \frac{1}{2}$

$$2 + \frac{1}{2}$$

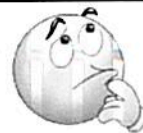
$$2\frac{1}{2}$$

Adding Rational Numbers

The sum of two rational numbers will always be a rational number.

Adding Irrational Numbers

How do we add irrational numbers?



Note: When adding radical expressions, the radicands must be the same in order to combine the terms.

Examples: a) $\sqrt{5} + 3\sqrt{5} = 4\sqrt{5}$

b) $2\sqrt{7} + 9\sqrt{7} = 11\sqrt{7}$

c) $\sqrt{5} + 2\sqrt{7} = \sqrt{5} + 2\sqrt{7}$
cannot combine terms

a) $\pi + \pi$

$$2\pi$$

b) $\sqrt{2} + \sqrt{2}$

$$2\sqrt{2}$$

c) $\sqrt{2} + \sqrt{3}$

$$\sqrt{2} + \sqrt{3}$$

d) $\pi + (-\pi)$

$$0$$

The sum of two irrational numbers may result in an irrational number or a rational number.

Adding Rational and Irrational Numbers

Find the following sums.

a) $2 + \sqrt{5}$

$$2 + \sqrt{5}$$

b) $3 + \pi$

$$3 + \pi$$

c) $-\sqrt{17} + 0$

$$-\sqrt{17}$$

d) $\sqrt{25} + \sqrt{54}$

$$5 + \sqrt{9}\sqrt{6}$$
$$5 + 3\sqrt{6}$$

The sum of a rational number and an irrational number will always be an irrational number.

Multiplying Radical Expressions

Rule: $a\sqrt{b} \cdot c\sqrt{d} = ac\sqrt{bd}$

1st: Multiply Coefficients

2nd: Multiply Radicands

Never multiply a coefficient and a radicand

Multiply the radical expressions below. Simplify if possible.

1) $\sqrt{2} \cdot \sqrt{5}$
 $\sqrt{10}$

2) $\sqrt{3} \cdot \sqrt{15}$
 $\sqrt{45}$
 $\sqrt{9} \sqrt{5} \rightarrow 3\sqrt{5}$

3) $6\sqrt{7} \cdot 4\sqrt{2}$
 $24\sqrt{14}$

What type of number is the result of the product of two rational numbers?

a) 5×10
 50

b) $\frac{1}{2} \times \frac{5}{9}$
 $\frac{5}{18}$

c) -8.2×0
 0

d) $\sqrt{4} \times \sqrt{25}$
 2×5
 10

Conclusion:

The product of two rational numbers is always a rational number.

What type of number is the result of the product of a rational number and an irrational number?

a) $6 \times \sqrt{2}$
 $6\sqrt{2}$

b) $\pi \times 100$
 100π

c) $\sqrt{4} \times \sqrt{5}$
 $2\sqrt{5}$

d) $0 \times \sqrt{18}$
 0

Conclusion:

The product of a non-zero rational number and an irrational number is always an irrational number.

What type of number is the result of the product of two irrational numbers?

a) $\pi \times \pi$
 π^2

b) $\sqrt{2} \times \sqrt{5}$
 $\sqrt{10}$

c) $\sqrt{2} \times \sqrt{8}$
 $\sqrt{16}$
 4

d) $(\sqrt{7})^2$
 $(\sqrt{7})(\sqrt{7})$
 $\sqrt{49}$
 7

e) $\pi \times \frac{1}{\pi}$
 1

Conclusion:

The product of two irrational numbers can result in a rational number or an irrational number.