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) $\frac{2}{3}+\frac{5}{9}$ b) $6+19.\overline{3}$ c) $-\sqrt{49}+\sqrt{121}$ d) $\sqrt[3]{8}+\frac{1}{2}$

$\frac{6}{9}+\frac{5}{9} \rightarrow \frac{11}{9} \rightarrow 1\frac{2}{9}$ $25.\overline{3}$ $-7+11$ 4 $2+\frac{1}{2}$ $2\frac{1}{2}$

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) $\pi+\pi$ b) $\sqrt{2}+\sqrt{2}$ c) $\sqrt{2}+\sqrt{3}$ d) $\pi+(-\pi)$

2π $2\sqrt{2}$ $\sqrt{2}+\sqrt{3}$ 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) $2+\sqrt{5}$ b) $3+\pi$ c) $-\sqrt{17}+0$ d) $\sqrt{25}+\sqrt{54}$

$2+\sqrt{5}$ $3+\pi$ $-\sqrt{17}$ $5+\sqrt{9}\sqrt{6}$ $5+3\sqrt{6}$

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

Multiplying Radical Expressions

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

1st: Multiply Coefficients

2nd: Multiply Radicands

***Never* multiply a coefficient and a radicand**

Multiply the radical expressions below. Simplify if possible.

1) $\sqrt{2} \bullet \sqrt{5}$

$\sqrt{10}$

2) $\sqrt{3} \bullet \sqrt{15}$

$\sqrt{45}$

$\sqrt{9}\sqrt{5} \rightarrow 3\sqrt{5}$

3) $6\sqrt{7} \bullet 4\sqrt{2}$

$24\sqrt{14}$

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) $-8.\bar{2} \times 0$

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.