A fraction with a denominator of 0 is undefined because you cannot divide by zero. So it is not a number at all.

$\frac{35}{0}$ = undefined

Additional Example 1: Classifying Real Numbers

Write all classifications that apply to each number

A. $\sqrt{5}$ *5 is a whole number that is not a perfect square.*

irrational, real

B. −12.75 *−12.75 is a terminating decimal.*

rational, real

C. $\frac{\sqrt{16}}{2}$ $\frac{\sqrt{16}}{2} = \frac{4}{2} = 2$

whole, integer, rational, real

Write all classifications that apply to each number.

A. $\sqrt{9}$ $\sqrt{9} = 3$

whole, integer, rational, real

B. −35.9 *−35.9 is a terminating decimal.*

rational, real

C. $\frac{\sqrt{81}}{3}$ $\frac{\sqrt{81}}{3} = \frac{9}{3} = 3$

whole, integer, rational, real

Additional Example 2: Determining the Classification of All Numbers

State if each number is rational, irrational, or not a real number.

A. $\sqrt{21}$

irrational

B. $\frac{0}{3}$ $\frac{0}{3} = 0$, whole, integer, Rational, Real

C. $\frac{4}{0}$ = undefined

not a real number

Rational and Irrational Numbers

State whether each of the following are rational or irrational.

a) $5 + 5 = 10$ Rational

b) $0 + \sqrt{2} = \sqrt{2}$ (rat + irr = irr) Irrational

$1+\sqrt{2}$

c) $\sqrt{2} - \sqrt{2} = 0$ (irr. − irr. = rat.) rational

d) $\pi + \sqrt{2} = \pi + \sqrt{2}$ (irr + irr = irr) irrational

Rational and Irrational Numbers

State whether each of the following are rational or irrational.

a) $5 \bullet 5 = 25$ rational

b) $\sqrt{2} \bullet \sqrt{2} = 2$ rational

c) $\left(\frac{1}{\sqrt{2}}\right)\left(\frac{\sqrt{2}}{1}\right) = \frac{\sqrt{2}}{\sqrt{2}} = 1$ rational

d) $\left(\frac{1}{2}\right)\left(\sqrt{2}\right) = \frac{\sqrt{2}}{2}$ (rat. · irra.) irrational

e) $\pi \bullet \pi = 2\pi$ irrational

Based on the above information, conjecture which of the statements ALWAYS true, which is SOMETIMES true, and which is NEVER true? Explain.

a) The product of a rational # and a rational # is rational.

Always true b/c ex. $2 \cdot 2 = 4$ it's

b) The product of a rational # and an irrational # is irrational. Always true b/c ex $\sqrt{2}(3) = 3\sqrt{2}$

c) The Product of an irrational # and an irrational # is irrational. Sometime b/c $\sqrt{2} \cdot \sqrt{2} = 2$

and 2 is a rational #.