## Which of these are rational numbers?

Rational numbers are any number that can be written as a fraction (ratio of two integers)

If a number isn't rational then it is Irrational

1. $12.8$
2. $\sqrt{25}$
3. $\sqrt{3}$
4. $\frac{19}{7}$

1, 2 and 4 are rational #'s, they all can be written as a fraction.

$12.8 = \frac{128}{10}$ $\sqrt{25} = 5 = \frac{5}{1}$

$\frac{19}{7}$ is already a fraction

$\sqrt{3}$ is irrational because it can't be written as a fraction (it's a non-terminating, non-repeating decimal). This is because it is the square root of a number that isn't a perfect square.

## Simplify as much as possible:

1. $\sqrt{6} \cdot \sqrt{6}$

$= 6$

Any square root multiplied by itself is just the radicand.

2. $\sqrt[3]{7} \cdot \sqrt[3]{7}$

$= \sqrt[3]{7^2}$

or

$\sqrt[3]{49}$

## What is the smallest number you could replace ? with in order to be able to do the square root?

You are trying to create the smallest perfect square under the radical.

1. $\sqrt{7 \cdot ?}$

replace ? with 7

$= \sqrt{7 \cdot 7} = \sqrt{49} = 7$

2. $\sqrt{18 \cdot ?}$

replace ? with 2

$\sqrt{18 \cdot 2} = \sqrt{36} = 6$

## What is the smallest number you could replace ? with in order to be able to do the cube root?

You are trying to create the smallest perfect cube under the radical.

1. $\sqrt[3]{11 \cdot ?}$

replace ? with $11^2$

$\sqrt[3]{11 \cdot 11^2} = \sqrt[3]{11^3}$

$= 11$

2. $\sqrt[3]{\underbrace{25}_{5^2} \cdot ?}$

replace ? with 5

$\sqrt[3]{5^2 \cdot 5} = \sqrt[3]{5^3}$

$= 5$

What is the smallest number you could replace ? with in order to be able to do the root ?

1. $\sqrt[5]{8 \cdot ?}$

$8 = 2^3$

replace ? with $2^2$

$\sqrt[5]{2^3 \cdot 2^2} = \sqrt[5]{2^5} = 2$

2. $\sqrt[7]{81 \cdot ?}$

$81 = 3^4$

replace ? with $3^3$

$\sqrt[7]{3^4 \cdot 3^3} = \sqrt[7]{3^7} = 3$

What is the smallest quantity that you could replace ? with in order to be able to do the given root?

1. $\sqrt{w^5 \cdot ?}$

replace ? with $w$

$\sqrt{w^5 \cdot w} = \sqrt{w^6} = w^3$

2. $\sqrt[3]{c^4 \cdot ?}$

replace ? with $c^2$

$\sqrt[3]{c^4 \cdot c^2} = \sqrt[3]{c^6} = c^2$

What is the smallest quantity that you could replace ? with in order to be able to do the given root?

1. $\sqrt[5]{g^{17} \cdot ?}$

replace ? with $g^3$

$\sqrt[5]{g^{17} \cdot g^3} = \sqrt[5]{g^{20}} = g^4$

2. $\sqrt[8]{m^{34} \cdot ?}$

Replace ? with $m^6$

$\sqrt[8]{m^{34} \cdot m^6} = \sqrt[8]{m^{40}} = m^5$

## Sec 7-2: Rationalizing Denominators of Radical Expressions

To rationalize a denominator means to remove any irrational number from the denominator.

**Make sure that there are no radicals in denominators and no denominators in radicals.**

To do this we multiply the numerator and denominator of the original ratio by the same radical. The radicand needs to be the quantity that when multiplied by the original denomintor allows us to actually do the root.

Rationalize each denominator and simplify. Assume all variables are positive.

1. $\frac{2}{\sqrt{11}} \cdot \frac{\sqrt{11}}{\sqrt{11}}$ This fraction = 1 and the denominators multiply to 11.

$= \frac{2\sqrt{11}}{11}$

2. $\frac{10}{\sqrt{6w}} \cdot \frac{\sqrt{6w}}{\sqrt{6w}}$

$= \frac{10\sqrt{6w}}{6} = \frac{5\sqrt{6w}}{3w}$

w

Rationalize each denominator and simplify.

1. $\frac{2}{\sqrt{31}} \cdot \frac{\sqrt{31}}{\sqrt{31}}$

$= \frac{2\sqrt{31}}{31}$

2. $\frac{7}{\sqrt{8}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$= \frac{7\sqrt{2}}{\sqrt{16}} = \frac{7\sqrt{2}}{4}$

3. $\frac{10}{\sqrt{12}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$

$= \frac{10\sqrt{3}}{\sqrt{36}} = \frac{10\sqrt{3}}{6} = \frac{5\sqrt{3}}{3}$