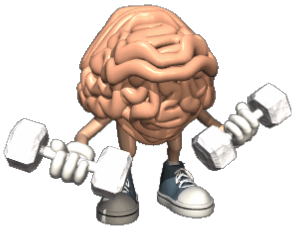
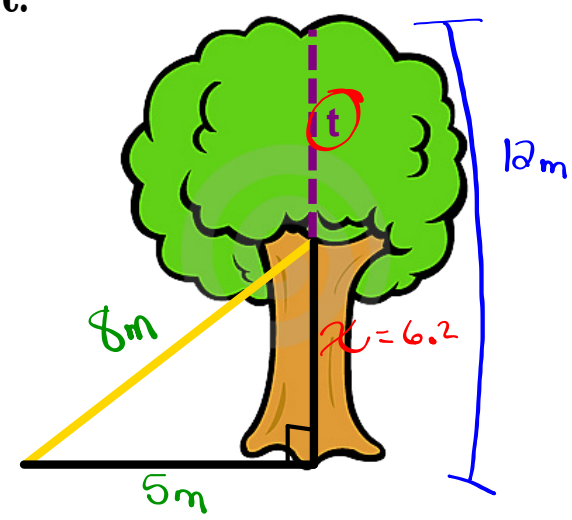
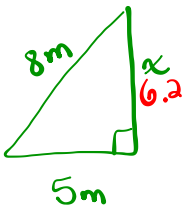


Warm Up

To support the tree, a guy wire 8 m long is attached to the trunk and then secured in the ground 5 m from the base of the tree. The tree is 12 m in height. Find "t" to the nearest tenth of a metre.





$c^2 = a^2 + b^2$

$a^2 = c^2 - b^2$

$a^2 = c^2 - b^2$

$= 8^2 - 5^2$

$a^2 = 64 - 25$

$a^2 = 39$

$\sqrt{a^2} = \sqrt{39}$

$a = 6.2$

$t = 12 - 6.2$

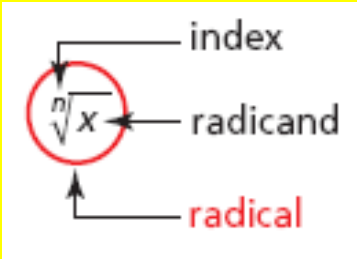
$t = 5.8$

t is 5.8 m

What do you know???

$\sqrt{36} = 6$

$\sqrt[3]{64} = 4$



Exponent Button

x^y or y^x

Root button

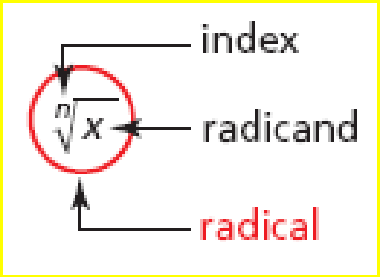
$\sqrt[4]{64} = 2.8284\ldots$

What do you know???

Reduce

$$\sqrt[2]{\frac{144}{196}} = \frac{\sqrt{144}}{\sqrt{196}} = \frac{12}{14} \overset{\div 2}{\underset{\div 2}{}} \boxed{\frac{6}{7}}$$

$$\sqrt[3]{\frac{125}{1000}} = \frac{\sqrt[3]{125}}{\sqrt[3]{1000}} = \frac{5}{10} \overset{\div 5}{\underset{\div 5}{}} = \frac{1}{2}$$



TRY THIS

Have already

Determine the value of each radical.

Radical	Value	Is the Value Exact or Approximate?
$\sqrt{16}$	4	Ex
$\sqrt{27}$	5.1	App
$\sqrt{\frac{16}{81}}$	$\frac{\sqrt{16}}{\sqrt{81}} = \frac{4}{9}$	Ex
$\sqrt{0.64}$	$\frac{\sqrt{64}}{\sqrt{100}} = \frac{8}{10} = 0.8$	Exact
$\sqrt[3]{16}$	2.3....	App
$\sqrt[3]{27}$	3	Ex
$\sqrt[3]{\frac{16}{18}}$	$\frac{\sqrt[3]{16}}{\sqrt[3]{18}}$ Round / Round	App

Use fractions to help

Use cube numbers list to help

4.1 Math Lab: Estimating Roots

16

4

144

100

9

Radicals

15^2

$\sqrt{225}$ = $\sqrt{15^2}$ = 15

Square root
(if no index present)

2^3

Radical sign

$\sqrt[3]{8}$ =

Index

Radicand

$8^{1/3}$

Radicals

Write a fraction that is equivalent to:

$\frac{3}{4}$ $\frac{6}{8}$ $\frac{9}{12}$ $\frac{12}{16}$

Just as with fractions, Radicals expressions have equivalent expressions:

$\sqrt{16 \cdot 9} = \sqrt{16} \cdot \sqrt{9}$

$= 4 \cdot 3$

$= 12$

or

$\sqrt{16 \cdot 9} = \sqrt{144}$

$= 12$

Same works if we change the "index":

Separate

$\sqrt[3]{8 \cdot 27} = \sqrt[3]{8} \cdot \sqrt[3]{27}$

$= 2 \cdot 3$

$= 6$

or

look in perfect cube list

$\sqrt[3]{8 \cdot 27} = \sqrt[3]{216}$

$= 6$

a^n

POWERS

From last day

x^t

$1^0 = 1$
$1^1 = 1$
$1^2 = 1$
$1^3 = 1$
$1^4 = 1$
$1^5 = 1$

$2^0 = 1$
$2^1 = 2$
$2^2 = 4$
$2^3 = 8$
$2^4 = 16$
$2^5 = 32$

$3^0 = 1$
$3^1 = 3$
$3^2 = 9$
$3^3 = 27$
$3^4 = 81$
$3^5 = 243$

$4^0 = 1$
$4^1 = 4$
$4^2 = 16$
$4^3 = 64$
$4^4 = 256$
$4^5 = 1024$

$5^0 = 1$
$5^1 = 5$
$5^2 = 25$
$5^3 = 125$
$5^4 = 625$
$5^5 = 3125$

$6^0 = 1$
$6^1 = 6$
$6^2 = 36$
$6^3 = 216$
$6^4 = 1296$
$6^5 = 7776$

$7^0 = 1$
$7^1 = 7$
$7^2 = 49$
$7^3 = 343$
$7^4 = 2401$
$7^5 = 16807$

$8^0 = 1$
$8^1 = 8$
$8^2 = 64$
$8^3 = 512$
$8^4 = 4096$
$8^5 = 32\ 768$

$9^0 = 1$
$9^1 = 9$
$9^2 = 81$
$9^3 = 729$
$9^4 = 6561$
$9^5 = 59049$

$10^0 = 1$
$10^1 = 10$
$10^2 = 100$
$10^3 = 1000$
$10^4 = 10000$
$10^5 = 100000$

51^7

$(2x)^n$

Reducing Radicals

Multiplication Property of Radicals

$\sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b}$,
where n is a natural number, and a and b are real numbers

Same works if we change the "index":

$\sqrt[3]{8 \cdot 27} = \sqrt[3]{8} \cdot \sqrt[3]{27}$
$= 2 \cdot 3$
$= 6$

or

$\sqrt[3]{8 \cdot 27} = \sqrt[3]{216}$
$= 6$

NEED in front of you perfect squares, cubes

Evaluate each radical. Justify you answer

a) $\sqrt{64} = 8$

Rewrite

$= \sqrt{16 \cdot 4}$

$= \sqrt{16} \cdot \sqrt{4}$

$= 4 \cdot 2$

$= 8$

b) $\sqrt[4]{81} = 3$

c) $\sqrt[3]{27} = 3$

$=$

Estimate to one decimal

a) $\sqrt[3]{9}$

$\sqrt[3]{8}$ $\sqrt[3]{27}$

2 3

≈ 2.2

Cal 2.08

b) $\sqrt[5]{1562}$

$\sqrt[5]{1024}$ $\sqrt[5]{3125}$

4 5

4.2

$1^4 = 1$

$2^4 = 16$

$3^4 = 81$

$4^4 = 256$

$5^4 = 625$

$6^4 = 1296$

$7^4 = 2401$

$8^4 = 4096$

$\vdots$

$1^5 = 1$

$2^5 = 32$

$3^5 = 243$

$4^5 = 1024$

$5^5 = 3125$

$6^5 = 7776$

$7^5 = 16807$

$8^5 = 32768$

Remember

Rational numbers are numbers that can be written as a fraction or is a decimal that repeats or terminates. Ex) $\sqrt[4]{\frac{1296}{10000}}$ Ex) $\sqrt[3]{\frac{8}{27}}$

Irrational numbers are numbers that cannot be written as a fraction and its decimal neither terminates or repeats. $\sqrt[3]{28}$

Class Work/Homework

Page 206 # 1 to #6

2a c d ef
3 c d f

2a) $\sqrt{36} = 6$

$\sqrt{4} \cdot \sqrt{9}$

$2 \cdot 3$

6

$\sqrt[4]{10000} = 10$

$\sqrt[4]{625} \cdot \sqrt[4]{4}$

$5 \cdot 2$

10

STOP