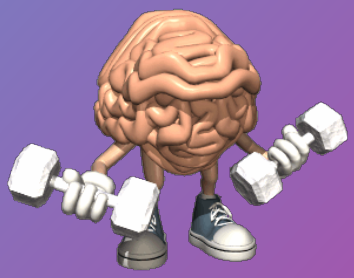
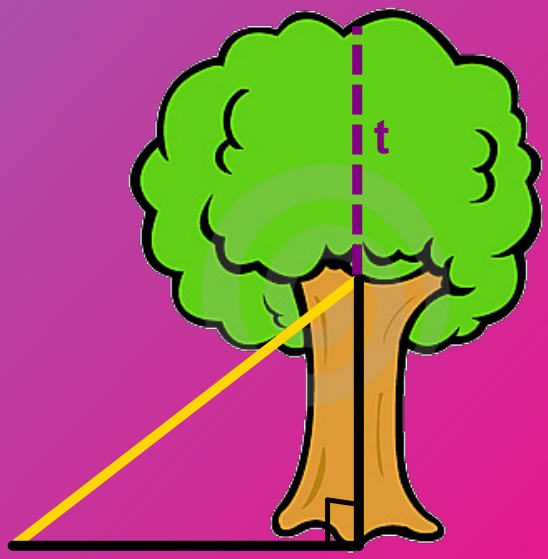


Warm Up

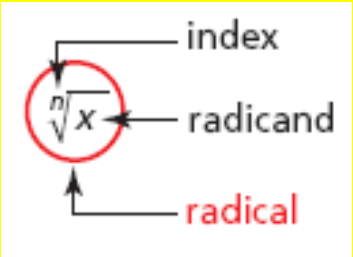
To support the tree, a guy wire 8 m long is attached to the trunk and then secured in the ground 5 m from the base of the tree. The tree is 12 m in height. Find "t' to the nearest tenth of a metre.



What do you know???

$\sqrt[2]{36}$

$\sqrt[3]{64}$

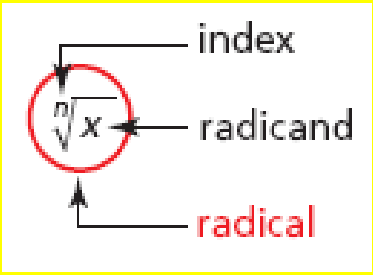


$\sqrt[4]{64}$

What do you know???

$$\sqrt[2]{\frac{144}{196}} = \frac{\sqrt{144}}{\sqrt{196}} = \frac{12}{14} = \frac{6}{7}$$ Reduce

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



TRY THIS

Write the two consecutive perfect squares closest to 20.

Fill in the table until the square of the estimate is within 1 decimal place of 20.

Estimated value of $\sqrt{20}$	Square of estimate

4.1 Math Lab: Estimating Roots

TRY THIS

Have already

Determine the value of each radical.

Radical	Value	Is the Value Exact or Approximate?
$\sqrt{16}$		
$\sqrt{27}$		
$\sqrt{\frac{16}{81}}$		
$\sqrt{0.64}$		
$\sqrt[3]{16}$		
$\sqrt[3]{27}$		
$\sqrt[3]{\frac{16}{18}}$		

Use fractions to help

Use cube numbers list to help

4.1 Math Lab: Estimating Roots

16

4

144

100

9

Radicals

15^2

$\sqrt{225} = 15$

Square root
(if no index present)

2^3

Radical sign

$\sqrt[3]{8} = 2$

Index

Radicand

$8^{1/3}$

Radicals

Write a fraction that is equivalent to:

$\frac{6}{8}$ (×2) $\frac{3}{4}$ (×4) $= \frac{12}{16}$

Just as with fractions, Radicals expressions have equivalent expressions:

$\sqrt{144} = \sqrt{16 \cdot 9} = \sqrt{16} \cdot \sqrt{9} = 4 \cdot 3 = 12$ or

$\sqrt{16 \cdot 9} =$

$=$

Same works if we change the "index":

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

$=$

$=$

or

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

$=$

a^n

POWERS

From last week

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":

$\sqrt[3]{216}$

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

$= 2 \cdot 3$

$= 6$

or

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

$= 6$

$\sqrt{4 \cdot 9} \Rightarrow \sqrt{36}$

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

$2 \cdot 3$

6

$\sqrt{4 \cdot 3} = \sqrt{12}$

$\sqrt{4} \cdot \sqrt{3}$

$2 \sqrt{3}$

$\sqrt[x]{\quad}$ or $\sqrt[3]{\quad}$

$\sqrt[3]{8} = 2$

NEED in front of you perfect squares, cubes

Evaluate each radical. Justify you answer

a) $\sqrt{64}$

$= 8$

or

$= \sqrt{4 \cdot 16}$

$\sqrt{4}\ \sqrt{16}$

$2 \cdot 4$

8

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

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

$= 3$

Estimate to one decimal

$\sqrt[3]{9}$

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

2 3

≈ 2.1

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

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

4 5

≈ 4.1

Remember

Rational numbers are numbers that can be written as a fraction or is a decimal that repeats or terminates. Ex) $\sqrt[4]{\frac{1296}{10000}}$ $\frac{6}{10} = \frac{3}{5}$ 0.60 Ex) $\sqrt[3]{\frac{8}{27}}$ $\frac{2}{3}$ $0.\overline{66}$

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

Class Work/Homework

Page 206 # 1 to #6

2f) $\sqrt{2.25} = \sqrt{\frac{225}{100}} = \frac{\sqrt{225}}{\sqrt{100}} = \frac{15}{10} = 1.5$

STOP