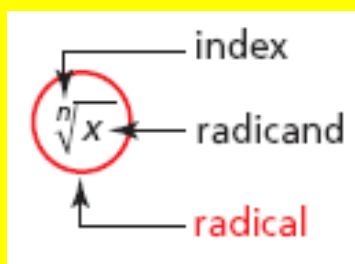




What do you know???

$$\sqrt{36} = 6$$

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



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



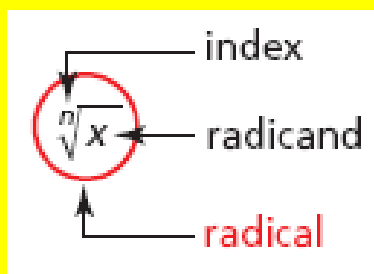
What do you know???

$$\sqrt{\frac{144}{196}} = \frac{\sqrt{144}}{\sqrt{196}} = \frac{12}{14} = \frac{6}{7}$$

Always Reduce Fractions

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

Reduce Fraction



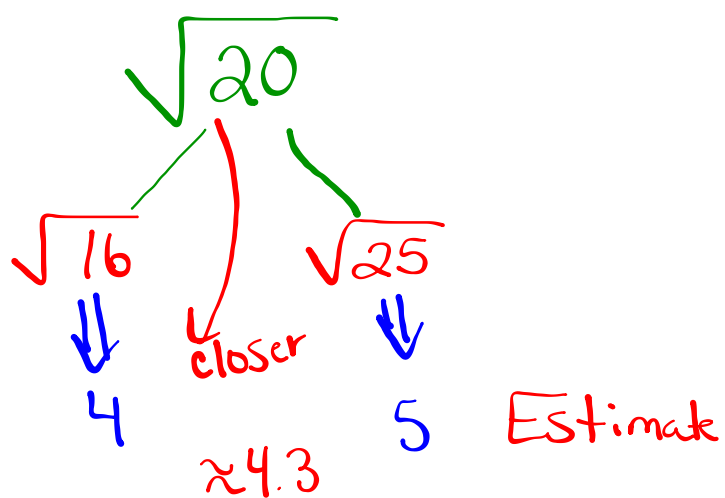
TRY THIS



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
on next page	≈ 4.3



$$\sqrt{\frac{36}{25}} = \frac{\sqrt{36}}{\sqrt{25}} = \frac{6}{5} \quad \text{Exact}$$

1
 4
 9
 16
 20 \rightarrow 25
 36
 49
 64
 81
 100
 121
 144

TRY THIS

Have already



Determine the value of each radical.

Radical	Value	Is the Value Exact or Approximate?
$\sqrt{16}$	4	Exact
$\sqrt{27}$	5.1962	Approximate
$\sqrt{\frac{16}{81}}$	$\frac{4}{9}$ or $0.\bar{4}$	Exact
$\sqrt{0.64}$	$\sqrt{\frac{64}{100}} = \frac{8}{10} = \frac{4}{5}$	Exact
$\sqrt[3]{16}$	≈ 2.49	Approx
$\sqrt[3]{27}$	3	Exact
$\sqrt[3]{\frac{16}{18}}$	$\frac{\sqrt[3]{16}}{\sqrt[3]{18}}$ NO NO	Approx

Use fractions to help

Use cube numbers list to help

$$\sqrt{0.64}$$

$$\sqrt{\frac{64}{100}}$$

$$\frac{\sqrt{64}}{\sqrt{100}} = \frac{8}{10} = \frac{4}{5} \text{ Exact}$$

Estimate

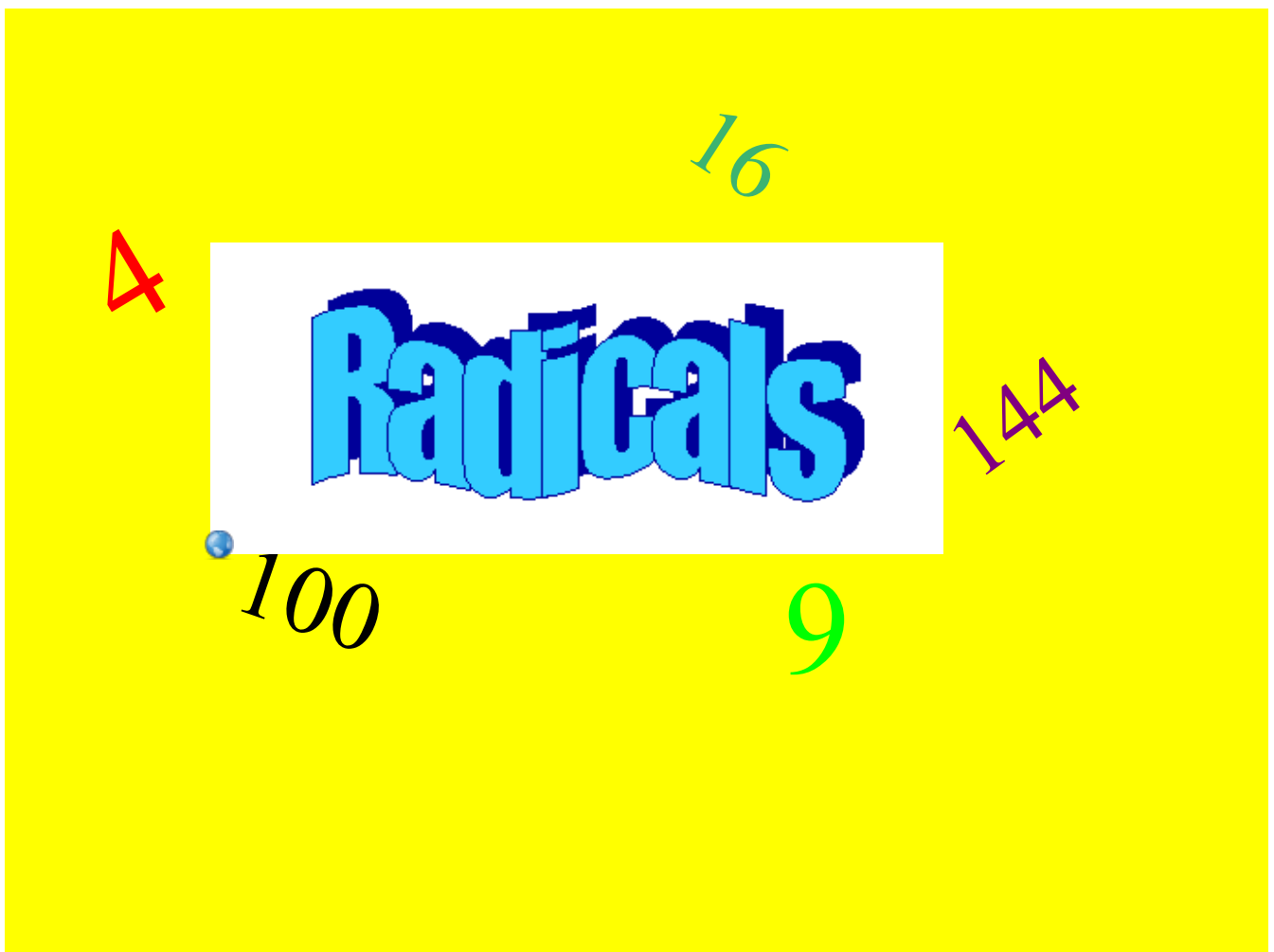
$$\sqrt{27}$$

$$\sqrt{25} \quad \sqrt{36}$$

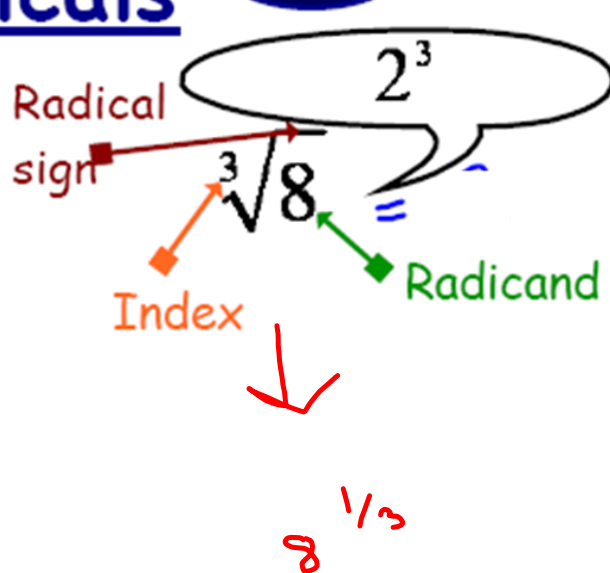
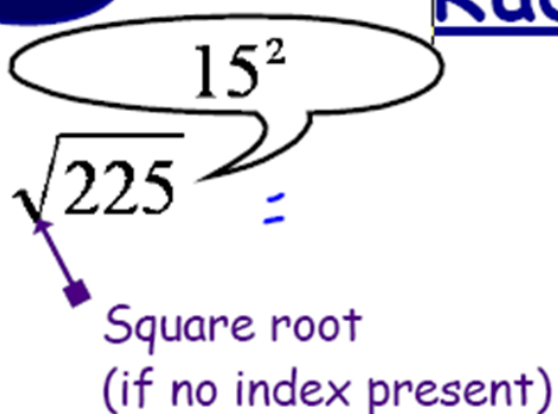
5

6

≈ 5.2



Radicals



Radicals

Write a fraction that is equivalent to:

$$\frac{3^{x^2}}{4^{x^2}} \quad \frac{6}{8}$$

$$\frac{3^{x^3}}{4^{x^3}} = \frac{9}{12}$$

$$\frac{3^{x^4}}{4^{x^4}} = \frac{12}{16}$$

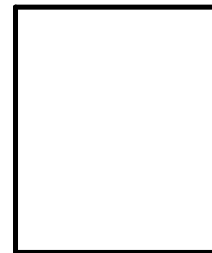
Just as with fractions, Radicals expressions have equivalent expressions:

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

or

$$\sqrt{144} = 12$$

$$\sqrt{16 \cdot 9} = \sqrt{144} = 12$$

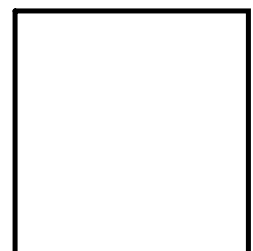


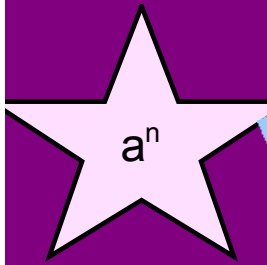
Same works if we change the "index":

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

or

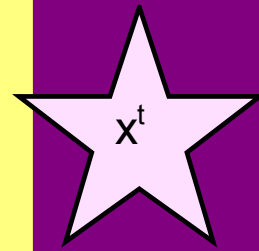
$$\sqrt[3]{8 \cdot 27} = \sqrt[3]{216} = 6$$





POWERS

From last week



$$\begin{aligned} 1^0 &= 1 \\ 1^1 &= 1 \\ 1^2 &= 1 \\ 1^3 &= 1 \\ 1^4 &= 1 \\ 1^5 &= 1 \end{aligned}$$

$$\begin{aligned} 2^0 &= 1 \\ 2^1 &= 2 \\ 2^2 &= 4 \\ 2^3 &= 8 \\ 2^4 &= 16 \\ 2^5 &= 32 \end{aligned}$$

$$\begin{aligned} 3^0 &= 1 \\ 3^1 &= 3 \\ 3^2 &= 9 \\ 3^3 &= 27 \\ 3^4 &= 81 \\ 3^5 &= 243 \end{aligned}$$

$$\begin{aligned} 4^0 &= 1 \\ 4^1 &= 4 \\ 4^2 &= 16 \\ 4^3 &= 64 \\ 4^4 &= 256 \\ 4^5 &= 1024 \end{aligned}$$

$$\begin{aligned} 5^0 &= 1 \\ 5^1 &= 5 \\ 5^2 &= 25 \\ 5^3 &= 125 \\ 5^4 &= 625 \\ 5^5 &= 3125 \end{aligned}$$

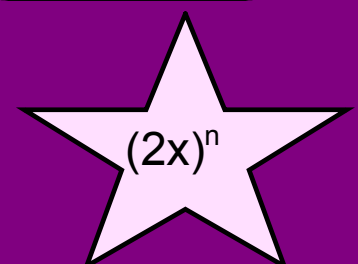
$$\begin{aligned} 6^0 &= 1 \\ 6^1 &= 6 \\ 6^2 &= 36 \\ 6^3 &= 216 \\ 6^4 &= 1296 \\ 6^5 &= 7776 \end{aligned}$$

$$\begin{aligned} 7^0 &= 1 \\ 7^1 &= 7 \\ 7^2 &= 49 \\ 7^3 &= 343 \\ 7^4 &= 2401 \\ 7^5 &= 16807 \end{aligned}$$

$$\begin{aligned} 8^0 &= 1 \\ 8^1 &= 8 \\ 8^2 &= 64 \\ 8^3 &= 512 \\ 8^4 &= 4096 \\ 8^5 &= 32\,768 \end{aligned}$$

$$\begin{aligned} 9^0 &= 1 \\ 9^1 &= 9 \\ 9^2 &= 81 \\ 9^3 &= 729 \\ 9^4 &= 6561 \\ 9^5 &= 59049 \end{aligned}$$

$$\begin{aligned} 10^0 &= 1 \\ 10^1 &= 10 \\ 10^2 &= 100 \\ 10^3 &= 1000 \\ 10^4 &= 10000 \\ 10^5 &= 100000 \end{aligned}$$



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":

$$\begin{aligned}\sqrt[3]{8 \cdot 27} &= \sqrt[3]{8} \cdot \sqrt[3]{27} \\ &= 2 \cdot 3 \\ &= 6\end{aligned}$$

or

$$\begin{aligned}\sqrt[3]{8 \cdot 27} &= \sqrt[3]{216} \\ &= 6\end{aligned}$$

NEED in front of you perfect squares, cubes

Using Product of perfect squares or 4th or cubes

Evaluate each radical. Justify you answer

a) $\sqrt{64}$

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

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

$$= 4 \times 2$$

$$= 8$$

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

$$= 3$$

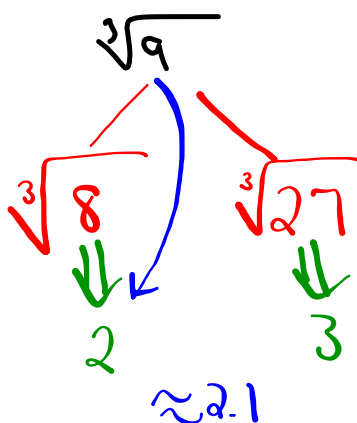
c) $\sqrt[3]{27}$

$$= 3$$

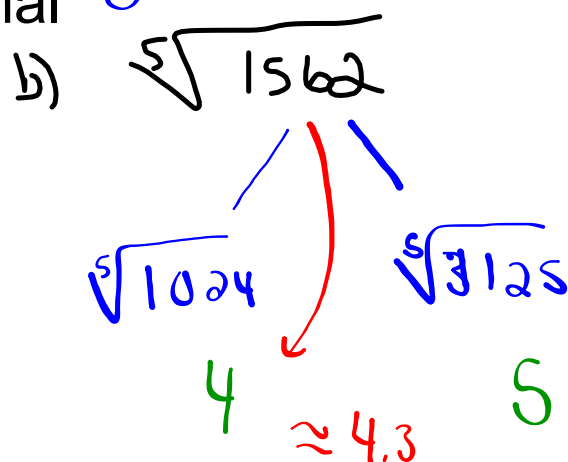
1, 4, 9, 16, 25, 36, 49, 64, ...

1, 16, 81, 256
1, 8, 27

Estimate to one decimal



"Like" grade 8



Remember

Rational numbers are numbers that can be written as a fraction or is a decimal that repeats or terminates. Ex) $\sqrt[4]{\frac{1216}{10000}}$ Ex) $\sqrt[3]{\frac{8}{27}}$

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

Class Work/Homework

Page 206 # 1 to #6


2 a b c d h (use chart/cal)
e f g (use chart and separate)

3

5 a d

6 a b

5b example

$$\begin{aligned} \sqrt{x} &= 3 \\ \sqrt{9} & \\ \sqrt[3]{27} & \\ \sqrt[4]{8} & \end{aligned}$$


STOP