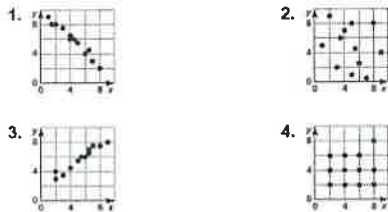


Use the Pythagorean Theorem to find the hypotenuse c of a right triangle with the given leg lengths a and b . Round your answer to the nearest tenth.

- 1. $a = 3, b = 3$
- 2. $a = 9, b = 2$
- 3. $a = 5, b = 7$
- 4. $a = 4, b = 5$
- 5. $a = 2, b = 1$
- 6. $a = 5, b = 2$

Warm Up 1-3

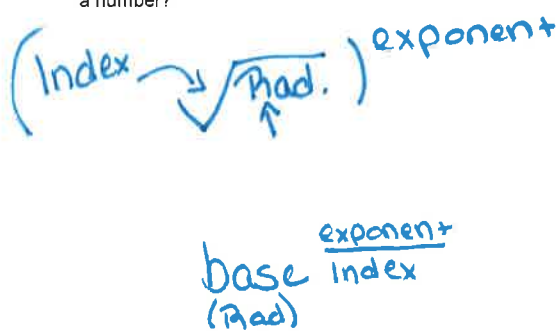
Tell whether x and y show a *positive*, a *negative*, or *no correlation*.



Cumulative Warm Up

Essential Question

How can you write and evaluate an n th root of a number?



Essential Question

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

• Use calculators to find values for c .
 • Read directions to find out if you should round and where to round answers to.

• Review scatter plots and the idea of correlation

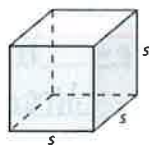
• When would we use a scatter plot?

what you will learn:

- Find n^{th} root
- Evaluate expressions with rational exponents
- Solve real-life problems involving rational exponents.

Rational exponent = fraction

Work with a partner. Use a cube root symbol to write the side length of each cube. Then find the cube root. Check your answers by multiplying. Which cube is the largest? Which two cubes are the same size? Explain your reasoning.



a. Volume = 27 ft³ b. Volume = 125 cm³ c. Volume = 3375 in.³

d. Volume = 3.375 m³ e. Volume = 1 yd³ f. Volume = $\frac{125}{8}$ mm³

Exploration 1a-b

a. $\sqrt[3]{27}$; 3 ft
 b. $\sqrt[3]{125}$; 5 cm
 c. $\sqrt[3]{3375}$; 15 in
 d. $\sqrt[3]{3.375}$ 1.5 m
 e. $\sqrt[3]{1}$ 1 yd
 f. $\sqrt[3]{\frac{125}{8}}$ 2.5 mm

Work with a partner. Estimate each positive n th root. Then match each n th root with the point on the number line. Justify your answers.

a. $\sqrt[3]{25}$ b. $\sqrt{0.5}$ c. $\sqrt[3]{2.5}$
 d. $\sqrt[3]{65}$ e. $\sqrt[3]{55}$ f. $\sqrt[3]{20,000}$



Exploration 2

Blank lined area for student work.

Core Concept

Real n th Roots of a

Let n be an integer greater than 1, and let a be a real number.

- If n is odd, then a has one real n th root: $\sqrt[n]{a} = a^{1/n}$
- If n is even and $a > 0$, then a has two real n th roots: $\pm \sqrt[n]{a} = \pm a^{1/n}$
- If n is even and $a = 0$, then a has one real n th root: $\sqrt[n]{0} = 0$
- If n is even and $a < 0$, then a has no real n th roots.

Core Concept

Find the indicated real n th root(s) of a .
a. $n = 3, a = -27$ b. $n = 4, a = 16$

Example 1

Find the indicated real n th root(s) of a .
1. $n = 3, a = -125$ 2. $n = 6, a = 64$

Monitoring Progress 1-2

Evaluate each expression.
a. $\sqrt[3]{-8}$ b. $-\sqrt[3]{8}$ c. $16^{1/4}$ d. $(-16)^{1/4}$

Example 2

 **Core Concept**
Rational Exponents

Let $a^{1/n}$ be an n th root of a , and let m be a positive integer.

Algebra $a^{m/n} = (a^{1/n})^m = (\sqrt[n]{a})^m$

Numbers $27^{2/3} = (27^{1/3})^2 = (\sqrt[3]{27})^2$

Core Concept

Evaluate (a) $16^{3/4}$ and (b) $27^{4/3}$.

Example 3

Evaluate the expression.

3. $\sqrt[3]{-125}$

4. $(-64)^{2/3}$


5. $9^{5/2}$

6. $256^{3/4}$

Monitoring Progress 3-6

The radius r of a sphere is given by the equation $r = \left(\frac{3V}{4\pi}\right)^{1/3}$, where V is the volume of the sphere. Find the radius of the beach ball to the nearest foot. Use 3.14 for π .

Volume = 113 cubic feet



Example 4

To calculate the annual inflation rate r (in decimal form) of an item that increases in value from P to F over a period of n years, you can use the equation $r = \left(\frac{F}{P}\right)^{1/n} - 1$.

Find the annual inflation rate to the nearest tenth of a percent of a house that increases in value from \$200,000 to \$235,000 over a period of 5 years.

Example 5

7. WHAT IF? In Example 4, the volume of the beach ball is 17,000 cubic inches. Find the radius to the nearest inch. Use 3.14 for π .

8. The average cost of college tuition increases from \$8,500 to \$13,500 over a period of 8 years. Find the annual inflation rate to the nearest tenth of a percent.

• **Response Logs:** Select from "I figured these out because ..."
or "I feel confident about ..."
or "At first I thought ... but now I think ..."

Closure
