Unit 3 Lesson 3: Exponents That Are Unit Fractions

1 Sometimes It's Squared and Sometimes It's Cubed (Warm up)

Student Task Statement

Find a solution to each equation.

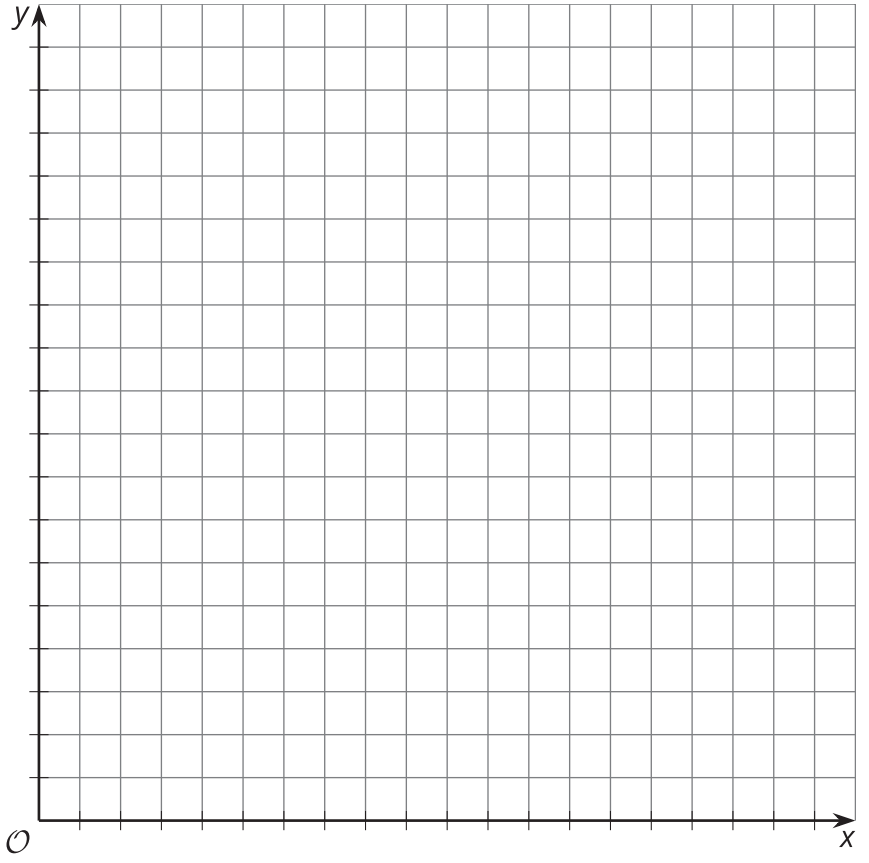
1. $x^2 = 25$
2. $z^2 = 7$
3. $y^3 = 8$
4. $w^3 = 19$

2 To the...Half?

Student Task Statement

1. Clare said, "I know that $9^2 = 9 \cdot 9$, $9^1 = 9$, and $9^0 = 1$. I wonder what $9^{\frac{1}{2}}$ means?" First, she graphed $y = 9^x$ for some whole number values of x, and estimated $9^{\frac{1}{2}}$ from the graph.

   a. Graph the function yourself. What estimate do you get for $9^{\frac{1}{2}}$?

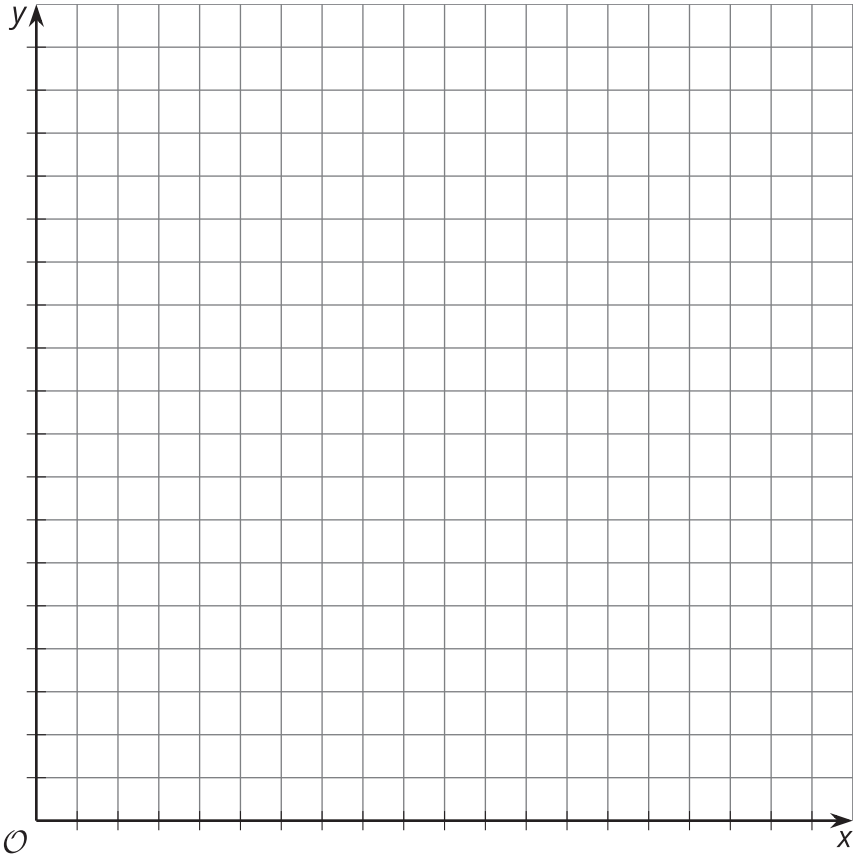


   b. Using the properties of exponents, Clare evaluated $9^{\frac{1}{2}} \cdot 9^{\frac{1}{2}}$. What did she get?

   c. For that to be true, what must the value of $9^{\frac{1}{2}}$ be?

2. Diego saw Clare's work and said, "Now I'm wondering about $3^{\frac{1}{2}}$." First he graphed $y = 3^x$ for some whole number values of x, and estimated $3^{\frac{1}{2}}$ from the graph.

   a. Graph the function yourself. What estimate do you get for $3^{\frac{1}{2}}$?



   b. Next he used exponent rules to find the value of $\left(3^{\frac{1}{2}}\right)^2$. What did he find?

   c. Then he said, "That looks like a root!" What do you think he means?

3 Fraction of What, Exactly?

Student Task Statement

Use the exponent rules and your understanding of roots to find the exact value of:

1. $25^{\frac{1}{2}}$
2. $15^{\frac{1}{2}}$
3. $8^{\frac{1}{3}}$
4. $2^{\frac{1}{3}}$

4 Exponents and Radicals

Student Task Statement

Match each exponential expression to an equivalent expression.

- 7^3
- 7^2
- 7^1
- 7^0
- 7^{-1}
- 7^{-2}
- 7^{-3}
- $7^{\frac{1}{2}}$
- $7^{-\frac{1}{2}}$
- $7^{\frac{1}{3}}$
- $7^{-\frac{1}{3}}$

- $\frac{1}{49}$
- $\frac{1}{343}$
- $\sqrt{7}$
- $\frac{1}{\sqrt[3]{7}}$
- $\sqrt[3]{7}$
- 49
- $\frac{1}{\sqrt{7}}$
- 343
- 7
- $\frac{1}{7}$
- 1