## 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 $9^{2}=9⋅9$, $9^{1}=9$, 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.
	1. Graph the function yourself. What estimate do you get for $9^{\frac{1}{2}}$?
	* 
	1. Using the properties of exponents, Clare evaluated $9^{\frac{1}{2}}⋅9^{\frac{1}{2}}$. What did she get?
	2. 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.
	1. Graph the function yourself. What estimate do you get for $3^{\frac{1}{2}}$?
	* 
	1. Next he used exponent rules to find the value of $\left(3^{\frac{1}{2}}\right)^{2}$. What did he find?
	2. 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



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