## Unit 4 Lesson 3: Understanding Rational Inputs

### 1 Keeping Equations True (Warm up)

#### Student Task Statement

1. Select **all** solutions to $x⋅x=5$. Be prepared to explain your reasoning.
	1. $\frac{1}{25}$
	2. $\sqrt{5}$
	3. $\frac{5}{2}$
	4. $5^{\frac{1}{2}}$
	5. $\frac{\sqrt{5}}{2}$
	6. $\sqrt{25}$
2. Select **all** solutions to $p⋅p⋅p=10$. Be prepared to explain your reasoning.
	1. $10^{\frac{1}{3}}$
	2. $\sqrt{10}$
	3. $\frac{10}{3}$
	4. $\frac{\sqrt{10}}{3}$
	5. $\sqrt[3]{10}$
	6. $\frac{1}{3}\sqrt{10}$

### 2 Florida in the 1800’s

#### Student Task Statement

In 1840, the population of Florida was about 54,500. Between 1840 and 1860, the population grew exponentially, increasing by about 60% each decade.

1. Find the population of Florida in 1850 and in 1860 according to this model.
2. The population is a function $f$ of the number of decades $d$ after 1840. Write an equation for $f$.
	1. Explain what $f\left(0.5\right)$ means in this situation.
	2. Graph your function using graphing technology and estimate the value of $f\left(0.5\right)$.
	3. Explain why we can find the value of $f\left(0.5\right)$ by multiplying 54,500 by $\sqrt{1.6}$. Find that value.
3. Based on the model, what was the population of Florida in 1858? Show your reasoning.

### 3 Disappearing Medicine

#### Student Task Statement

The amount of a medicine in the bloodstream of a patient decreases roughly exponentially. Here is a graph representing $f$, an exponential function that models the medicine in the body of a patient, $t$ hours after an injection is given.



1. Use the graph to estimate $f\left(\frac{1}{3}\right)$ and explain what it tells us in this situation.
2. After one hour, 0.75 mg of medicine remains in the bloodstream. Find an equation that defines $f$.

#### Images for Activity Synthesis





© CC BY 2019 by Illustrative Mathematics®