Unit 4 Lesson 8: Unknown Exponents

1 A Bunch of x's (Warm up)

Student Task Statement

Solve each equation. Be prepared to explain your reasoning.

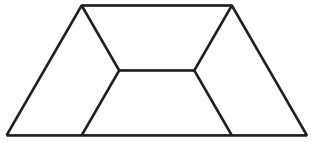
1. $\frac{x}{3} = 12$
2. $3x^2 = 12$
3. $x^3 = 12$
4. $\sqrt[3]{x} = 12$
5. $\sqrt{3x} = 12$
6. $\frac{3}{x} = 12$

2 A Tessellated Trapezoid

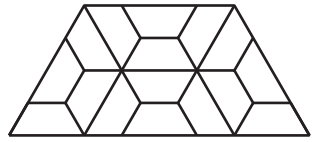
Student Task Statement

Here is a pattern showing a trapezoid being successively decomposed into four similar trapezoids at each step.

Step 0



Step 1



Step 2

1. If n is the step number, how many of the smallest trapezoids are there when n is 4? What about when n is 10?
2. At a certain step, there are 262,144 smallest trapezoids.
    a. Write an equation to represent the relationship between n and the number of trapezoids in that step.

    b. Explain to a partner how you might find the value of that step number.

3 Successive Splitting

Student Task Statement

In a lab, a colony of 100 bacteria is placed on a petri dish. The population triples every hour.

1. How would you estimate or find the population of bacteria in:
   a. 4 hours?

   b. 90 minutes?

   c. $\frac{1}{2}$ hour?

2. How would you estimate or find the number of hours it would take the population to grow to:
   a. 1,000 bacteria?

b. double the initial population?

4 Missing Values (Optional)

Student Task Statement

Complete the tables.

x			-1	0	$\frac{1}{2}$	1			5		
2^x	$\frac{1}{32}$	$\frac{1}{4}$	$\frac{1}{2}$				4	16		256	1,024

x				$\frac{1}{3}$	$\frac{1}{2}$				
5^x	$\frac{1}{25}$	$\frac{1}{5}$	1			5	125	625	3,125

Be prepared to explain how you found the missing values.