

## Unit 3 Lesson 4: Positive Rational Exponents

### 1 Math Talk: Regrouping Fractions (Warm up)

#### Student Task Statement

Find the value of each expression mentally.

$$\frac{1}{2} \cdot 5 \cdot 4$$

$$\frac{5}{2} \cdot 4$$

$$\frac{2}{3} \cdot 7 \cdot \frac{3}{2}$$

$$7 \cdot \frac{5}{3} \cdot \frac{3}{7}$$

## 2 You Can Use Any Fraction As an Exponent

### Student Task Statement

1. Use exponent rules to explain why these expressions are equal to each other:

$$\left(5^{\frac{1}{3}}\right)^2 \quad (5^2)^{\frac{1}{3}}$$

2. Write  $5^{\frac{2}{3}}$  using radicals.
3. Write  $5^{\frac{4}{3}}$  using radicals. Show your reasoning using exponent rules.

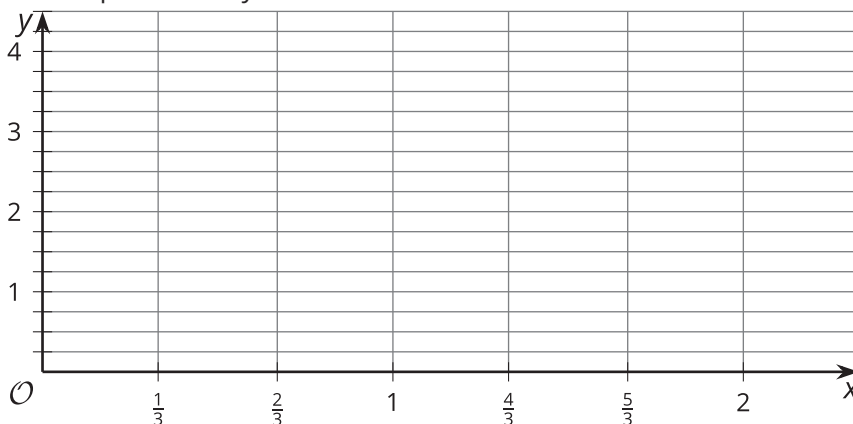
### 3 Fractional Powers Are Just Numbers

#### Student Task Statement

1. Complete the table as much as you can without using a calculator. (You should be able to fill in three spaces.)

$x$	0	$\frac{1}{3}$	$\frac{2}{3}$	1	$\frac{4}{3}$	$\frac{5}{3}$	2
$2^x$ (using exponents)	$2^0$	$2^{\frac{1}{3}}$	$2^{\frac{2}{3}}$	$2^1$	$2^{\frac{4}{3}}$	$2^{\frac{5}{3}}$	$2^2$
$2^x$ (decimal approximation)							

- a. Plot the points that you filled in.



- b. Connect the points as smoothly as you can.

- c. Use this graph of  $y = 2^x$  to estimate the value of the other powers in the table, and write your estimates in the table.

2. Let's investigate  $2^{\frac{1}{3}}$ :

- a. Write  $2^{\frac{1}{3}}$  using radical notation.

- b. What is  $\left(2^{\frac{1}{3}}\right)^3$ ?

- c. Raise your estimate from the table of  $2^{\frac{1}{3}}$  to the third power. What should it be? How close did you get?

3. Let's investigate  $2^{\frac{2}{3}}$ :

- a. Write  $2^{\frac{2}{3}}$  using radical notation.

b. What is the value of  $\left(2^{\frac{2}{3}}\right)^3$ ?

c. Raise your estimate from the table of  $2^{\frac{2}{3}}$  to the third power. What should it be? How close did you get?