Carson Dellosa Education™

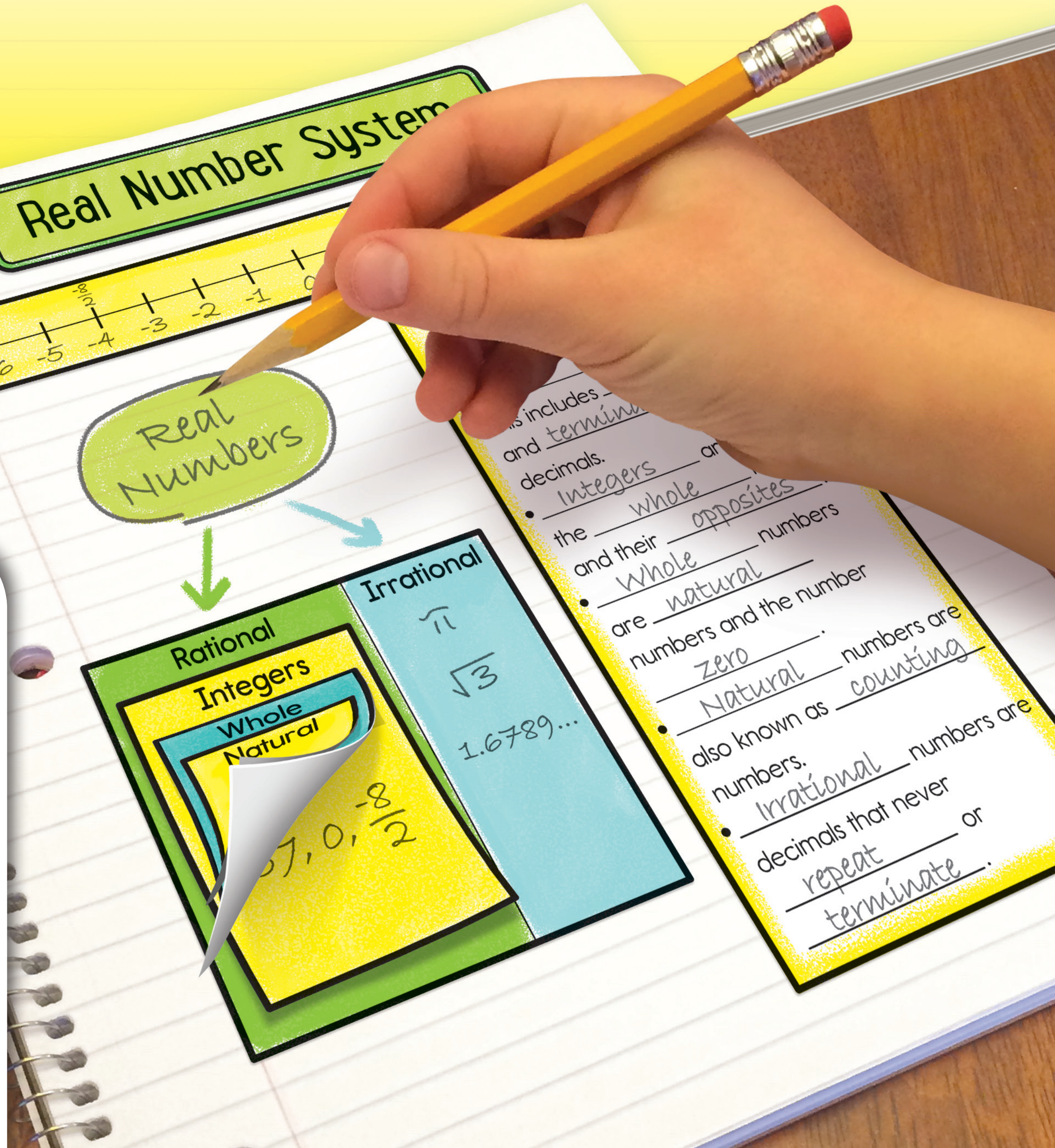
CD-104912

Interactive Notebooks

MATH

Grade 8

CORRELATED TO Current State Standards CARSONDELLOSA.COM

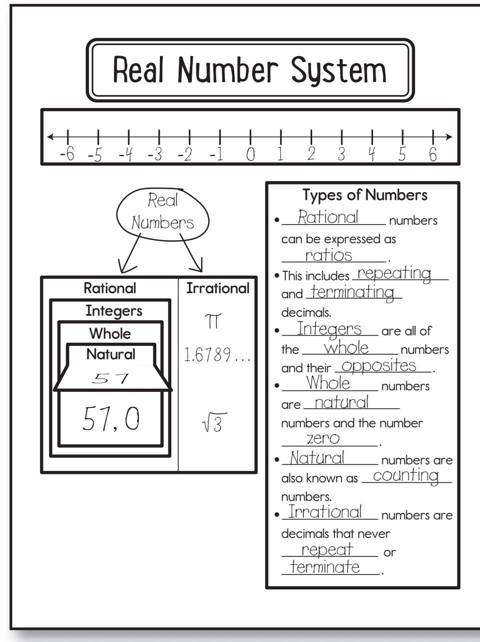


- *Ideal for organizing information and applying learning*
- *Perfect for addressing the needs of individual learners*
- *Includes step-by-step instructions for each page*
- *Great for introducing new math topics*

Real Number System

Introduction

Draw a number line labeled from –5 to 5 on the board. Discuss the different types of numbers represented (positive, negative, and zero). Discuss how each type of number is used in a real-world context. Have students give examples of numbers that would fall in between the labeled numbers.



Creating the Notebook Page

Guide students through the following steps to complete the right-hand page in their notebooks.

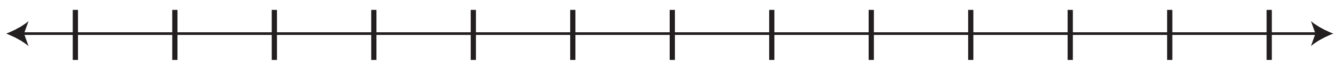
1. Add a Table of Contents entry for the Real Number System pages.
2. Cut out the title and glue it to the top of the page.
3. Cut out the number line and label it from –6 to 6. Glue it below the title.
4. Cut out the *Types of Numbers* piece. Glue it below the number line on the right. Complete the explanations. (**Rational** numbers can be expressed as **ratios**. This includes **repeating** and **terminating** decimals. **Integers** are all of the **whole** numbers and their **opposites**. **Whole** numbers are **natural** numbers and the number **zero**. **Natural** numbers are also known as **counting** numbers. **Irrational** numbers are decimals that never **repeat** or **terminate**.)
5. Cut out the *Rational/Irrational* piece. Write *Real Numbers* below the number line on the left. Glue the *Rational/Irrational* piece below it. Draw two arrows to show that real numbers are either rational or irrational.
6. Cut out the *Integers*, *Whole*, and *Natural* pieces. Apply glue to all three gray glue sections. Stack the pieces to create a stacked flap book (in order: *Rational*, *Integers*, *Whole, Natural*).
7. Discuss how if a number is classified as a natural number, it is also considered a whole number, an integer, and a rational number. Use the numbers 57, $-\frac{8}{2}$, $\frac{1}{3}$, π, $\sqrt{3}$, 1.67, 0, –7, 1.6789…. Classify each number by writing it on the appropriate flap(s). Use the number line to better help you understand the real number system and sort the numbers.

Reflect on Learning

To complete the left-hand page, have students think of one more number that could be added to each flap. List each number and the flap it would belong on.

Answer Key
Natural (also whole, integer, rational): 57; Whole (also integer, rational): 0; Integer (also rational): $-\frac{8}{2}$, –7; Rational: $\frac{1}{3}$, 1.67; Irrational: π, $\sqrt{3}$, 1.6789...

Real Number System



Rational

glue

Irrational

Integers

glue

Natural

Whole

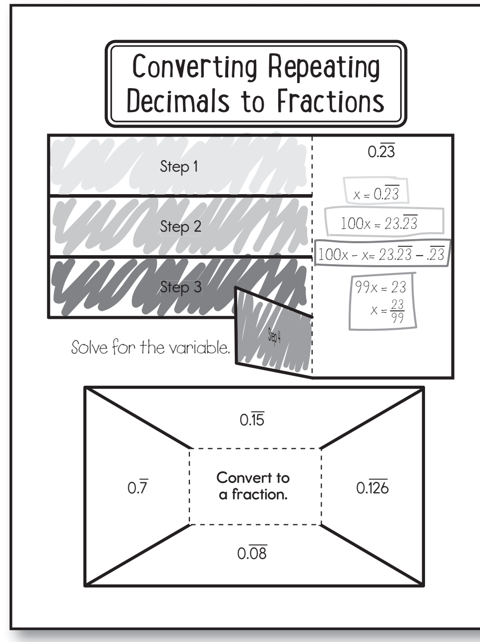
glue

Types of Numbers

- __________ numbers can be expressed as __________.
- This includes __________ and __________ decimals.
- __________ are all of the __________ numbers and their __________.
- __________ numbers are __________ numbers and the number __________.
- __________ numbers are also known as __________ numbers.
- __________ numbers are decimals that never __________ or __________.

Converting Repeating Decimals to Fractions

Introduction



Have students convert 0.2 to a fraction. (They should rewrite it as $\frac{2}{10}$ and reduce it to $\frac{1}{5}$.) Then, have students convert 0.22 to a fraction. (They should write $\frac{22}{100}$ and reduce it to $\frac{11}{50}$.) Ask students to convert $0.\overline{22}$ to a fraction. Have students share their methods.

Creating the Notebook Page

Guide students through the following steps to complete the right-hand page in their notebooks.

1. Add a Table of Contents entry for the Converting Repeating Decimals to Fractions pages.
2. Cut out the title and glue it to the top of the page.
3. Cut out the flap book with the four steps. Cut on the solid lines to create four flaps. Apply glue to the back of the right section and attach it below the title.
4. Under each flap, write a description of the step. (1. Set the repeating decimal equal to a variable. 2. Multiply the variable by the appropriate power of 10. 3. Subtract the original values from each side to remove the repeating decimal. 4. Solve for the variable.)
5. Solve the example problem. If desired, color code the flaps and each step of the process to match.
6. Cut out the *Convert to a fraction* flap book. Cut on the solid lines to create four flaps. Apply glue to the back of the center section and attach it to the bottom of the page.
7. Convert each repeating decimal to a fraction. Write the fraction under the flap.

Reflect on Learning

To complete the left-hand page, have the students evaluate the following expressions:
1. $\frac{2}{3} + 1.\overline{6}$; 2. $0.\overline{18} \times \frac{22}{7}$; 3. $0.\overline{8} - \frac{4}{9}$

Answer Key
Clockwise from top: $\frac{5}{33}$; $\frac{14}{111}$; $\frac{8}{99}$; $\frac{7}{9}$; Reflect: 1. $\frac{7}{3}$; 2. $\frac{2}{11}$; 3. $\frac{4}{9}$

Converting Repeating Decimals to Fractions

Steps	
Step 1	$0.\overline{23}$
Step 2	
Step 3	
Step 4	

$0.\overline{15}$

$0.\overline{7}$

Convert to a fraction.

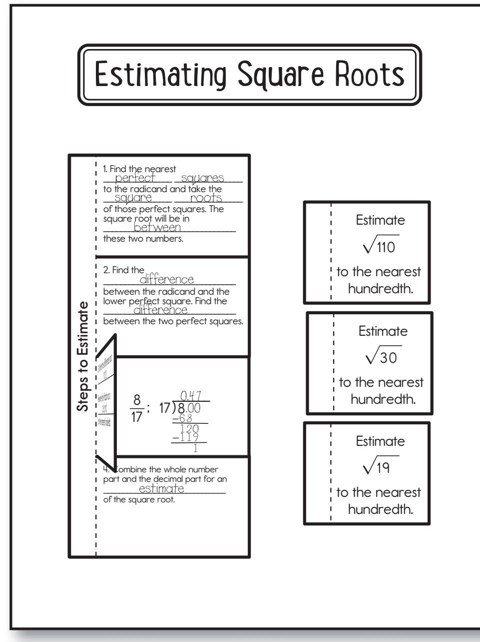
$0.\overline{126}$

$0.\overline{08}$

Estimating Square Roots

Introduction

Review the definition of a square root. Have students find the square roots of 25, 81, and 225. Have them discuss with partners how they got the answers (5, 9, and 15). Have students find the square roots of 20, 50, and 150 without a calculator. Have students discuss their answers in small groups. What challenges did they have? How precise were their answers?



Creating the Notebook Page

Guide students through the following steps to complete the right-hand page in their notebooks.

1. Add a Table of Contents entry for the Estimating Square Roots pages.
2. Cut out the title and glue it to the top of the page.
3. Cut out the *Steps to Estimate* flap book and the matching example flap book. Cut on the solid lines to create four flaps on the *Steps to Estimate* flap book. Apply glue to the gray glue section and place the *Steps to Estimate* piece on top to create a stacked eight-flap book. Apply glue to the back of the left section and attach it to the left side of the page below the title.
4. Complete each of the steps. (1. Find the nearest **perfect squares** to the radicand and take the **square roots** of those perfect squares. The square root will be in **between** these two whole numbers. $\sqrt{\mathbf{64}} < \sqrt{72} < \sqrt{\mathbf{81}}$; $\mathbf{8} < \sqrt{72} < \mathbf{9}$; 2. Find the **difference** between the radicand and the lower perfect square. Find the **difference** between the two perfect squares. 72 – 64 = **8**; 81 – 64 = 17; 3. Write the differences as a **ratio**. Divide to rewrite the fraction as a **decimal** to the nearest hundredth. $\frac{8}{17}$; 17)8= **0.47**; 4. Combine the whole number found in step 1 and the decimal part for an **estimate** of the square root. **8** + 0.**47** = **8.47**) Then, complete the sample problem under the flaps to support the explanation.
5. Cut out the three flaps. Apply glue to the back of the left sections and attach them on the right side of the page.
6. Under each flap, follow the steps from the flap book to estimate the square root.

Reflect on Learning

To complete the left-hand page, have the students solve the following word problem: *Teresa has a string that is $\sqrt{32}$ inches long. Jesse has a string that is $4 \cdot \sqrt{8}$ inches long. Jesse thinks that their strings are of equal length. Is Jesse correct in his thinking? Why or why not?* Students should justify their answers.

Answer Key

$\sqrt{19} \approx 4.3$; $\sqrt{30} \approx 5.45$; $\sqrt{110} \approx 10.48$; Reflect: $\sqrt{32} \approx 5.64$; $4 \cdot \sqrt{8} \approx 4 \cdot 2.80 \approx 11.2$; Jesse has the longer string.

Estimating Square Roots

Steps to Estimate

1. Find the nearest ______ to the radicand and take the ______ of those perfect squares. The square root will be in ______ these two numbers.

2. Find the ______ between the radicand and the lower perfect square. Find the ______ between the two perfect squares.

3. Write the differences as a ______. Rewrite the fraction as a ______ to the nearest hundredth.

4. Combine the whole number part and the decimal part for an ______ of the square root.

glue

$\sqrt{\_\_\_} < \sqrt{72} < \sqrt{\_\_\_}$

$\_\_\_ < \sqrt{72} < \_\_\_$

$72 - 64 = \_\_\_$

$81 - 64 = \_\_\_$

$\frac{8}{17}$; $17\overline{)8}$

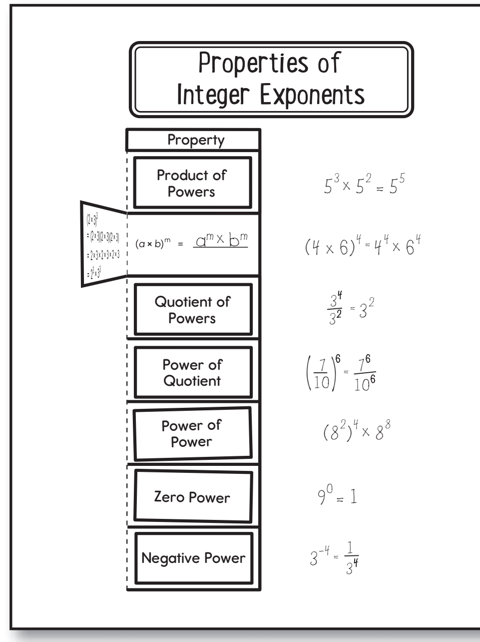
$\_\_\_ + 0.\_\_\_ = \_\_\_$

Estimate $\sqrt{110}$ to the nearest hundredth.	Estimate $\sqrt{30}$ to the nearest hundredth.	Estimate $\sqrt{19}$ to the nearest hundredth.

Properties of Integer Exponents

Introduction

Remind students that using exponents is a shorthand way to write repeated multiplication problems. Have students rewrite 2^3 and 2^5 as multiplication problems. Tell students that there are properties that tell us how to operate with expressions that contain exponents.



Creating the Notebook Page

Guide students through the following steps to complete the right-hand page in their notebooks.

1. Add a Table of Contents entry for the Properties of Integer Exponents pages.
2. Cut out the title and glue it to the top of the page.
3. Cut out the *Property* flap book. Cut on the solid lines to create eight flaps. Fold the flaps over on the dashed lines so that the text is inside the flap book. Apply glue to the back of the right section and attach it below the title on the left side of the page.
4. Cut out the property titles. Glue each title on the appropriate flap. (From top: Product of Powers, Power of Product, Quotient of Powers, Power of Quotient, Power of Power, Zero Power, Negative Power)
5. Discuss the proof of each property. Then, complete the rule for each property. ($a^m \cdot a^n = a^{m+n}$; $(a \cdot b)^m = a^m \cdot b^m$; $\frac{a^m}{a^n} = a^{m-n}$; $\left(\frac{a}{b}\right)^m = \frac{a^m}{b^m}$; $(a^m)^n = a^{m \cdot n}$; $a^0 = 1$; $a^{-m} = \frac{1}{a^m}$)
6. Give an example of each property on the page to the right of the *Proof/Property* flap book.

Reflect on Learning

To complete the left-hand page, have students answer the following problems and tell which property they applied to each:
1. $\frac{4^7}{4^3}$; 2. $(7^3)^5$; 3. $32{,}150^0$; 4. $8^2 \cdot 8^5$; 5. $\frac{3}{4^2}$; 6. 3^{-4}; 7. $(4 \cdot 3)^5$

Answer Key
Reflect: 1. 4^4, quotient of powers; 2. 7^{15}, power of powers; 3. 1, zero power; 4. 8^7, product of powers; 5. $\frac{3^2}{4^2}$, power of quotient; 6. $\frac{1}{3^4}$, negative power; 7. $4^5 \cdot 3^5$, power of product

Properties of Integer Exponents

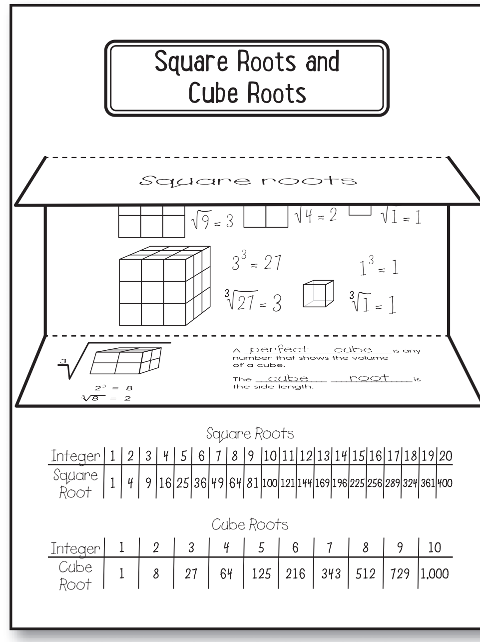
Property name
Product of Powers
Power of Product
Quotient of Powers
Power of Quotient
Power of Power
Zero Power
Negative Power

	Property
$2^3 \times 2^4$ $= (2 \times 2 \times 2)(2 \times 2 \times 2 \times 2)$ $= 2^7$	$a^m \times a^n =$ __________
$(2 \times 3)^3$ $= (2 \times 3)(2 \times 3)(2 \times 3)$ $= 2 \times 3 \times 2 \times 3 \times 2 \times 3$ $= 2^3 \times 3^3$	$(a \times b)^m =$ __________
$\frac{2^5}{2^3} = \frac{2 \times \cancel{2} \times \cancel{2} \times \cancel{2} \times 2}{\cancel{2} \times \cancel{2} \times \cancel{2}}$ $= 2 \times 2 \times 1 \times 1 \times 1 = 2 \times 2$ $= 2^2$	$\frac{a^m}{a^n} =$ __________
$\left(\frac{2}{3}\right)^4 = \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3} \times \frac{2}{3}$ $= \frac{2 \times 2 \times 2 \times 2}{3 \times 3 \times 3 \times 3} = \frac{2^4}{3^4}$	$\left(\frac{a}{b}\right)^m =$ __________
$(2^3)^4 = 2^3 \times 2^3 \times 2^3 \times 2^3$ $= (2 \times 2 \times 2)(2 \times 2 \times 2)(2 \times 2 \times 2)(2 \times 2 \times 2)$ $= 2^{12}$	$(a^m)^n =$ __________
$\frac{2^3}{2^3} = 2^{3-3} = 2^0$ $= 2^0 = 1$ $\frac{2^3}{2^3} = \frac{\cancel{2} \times \cancel{2} \times \cancel{2}}{\cancel{2} \times \cancel{2} \times \cancel{2}} = 1 \times 1 \times 1 = 1$	$a^0 =$ __________
$\frac{2^3}{2^5} = 2^{3-5} = 2^{-2}$ $= 2^{-2} = \frac{1}{2^2}$ $\frac{2^3}{2^5} = \frac{\cancel{2} \times \cancel{2} \times \cancel{2}}{2 \times \cancel{2} \times \cancel{2} \times \cancel{2} \times 2} = \frac{1 \times 1 \times 1}{2 \times 2} = \frac{1}{2^2}$	$a^{-m} =$ __________

Square Roots and Cube Roots

Introduction

Write *14 + 20 = 34* on the board. Ask students what they would do to “undo” this addition problem. Write *3 × 5 = 15*. Ask students how they would “undo” this problem. Finally, write $6^2 = 36$. Have students record how they would “undo” this problem. Students will revisit this at the end of this lesson.



Creating the Notebook Page

Guide students through the following steps to complete the right-hand page in their notebooks.

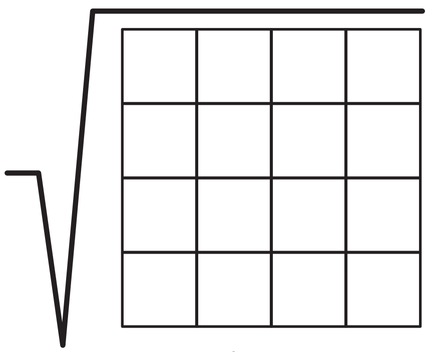
1. Add a Table of Contents entry for the Square Roots and Cube Roots pages.
2. Cut out the title and glue it to the top of the page.
3. Cut out the flap book. Fold the flaps in on the dashed lines to cover the text. Apply glue to the back of the center section and attach it to the page below the title.
4. Write *square roots* on the top flap and *cube roots* on the bottom flap. Complete the definitions inside of the square root flap. (A **perfect square** is any number that shows the area of a square. The **square root** is the side length.) Write the square and square root equation for each given example. ($3^2 = 9$, $\sqrt{9} = 3$; $2^2 = 4$, $\sqrt{4} = 2$; $1^2 = 1$, $\sqrt{1} = 1$)
5. Complete the definitions inside of the *cube root* flap. (A **perfect cube** is any number that shows the volume of a cube. The **cube root** is the side length). Write the cube and cube root equation for each given example. ($3^3 = 27$, $\sqrt[3]{27} = 3$; $1^3 = 1$, $\sqrt[3]{1} = 1$)
6. Below the flap book, create two reference tables. The first table should contain integer square roots 1–20 and the corresponding perfect squares. The second table should contain integer cube roots 1–10 and the corresponding perfect cubes.

Reflect on Learning

To complete the left-hand page, have students solve the following equations: $x^3 = 64$; $x^2 = 361$

Answer Key
Reflect: $x = 4$; $x = 19$

Square Roots and Cube Roots

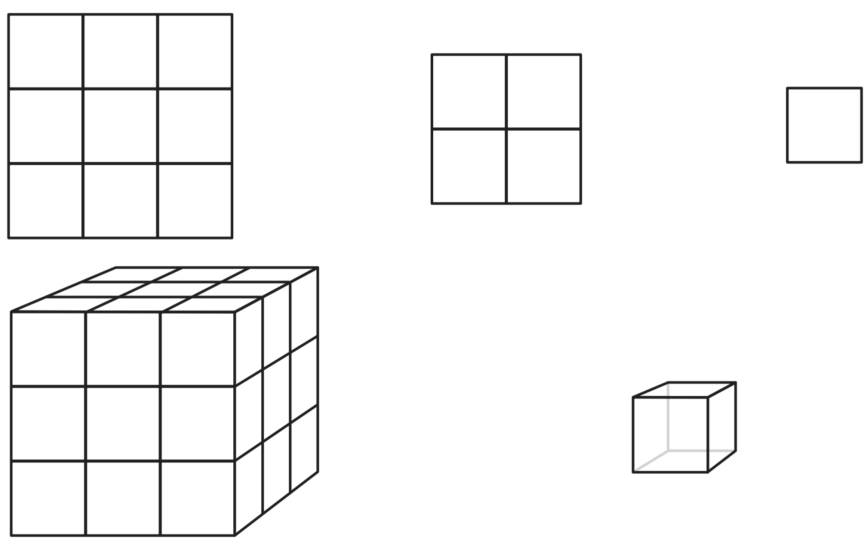


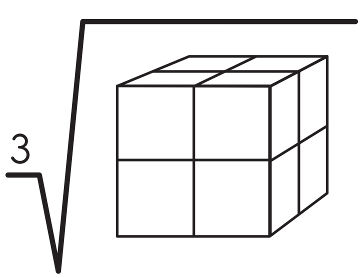
$4^2 = 16$

$\sqrt{16} = 4$

A ____________ ______________ is any number that shows the area of a square.

The ____________ ______________ is the side length.





$2^3 = 8$

$\sqrt[3]{8} = 2$

A ____________ ______________ is any number that shows the volume of a cube.

The ____________ ______________ is the side length.