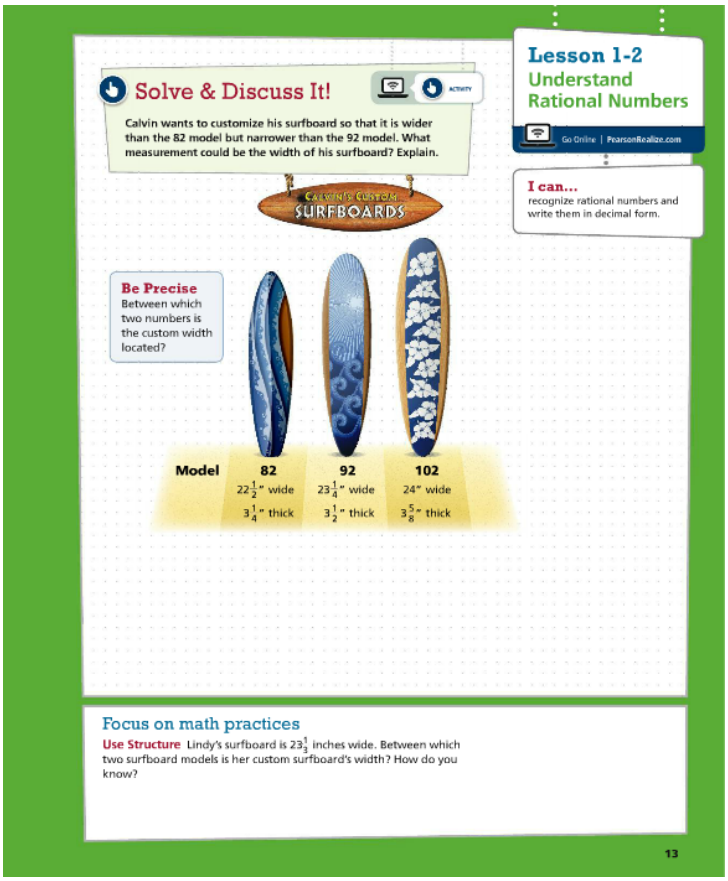

Lesson 1-2 Understand Rational Numbers

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I can... recognize rational numbers and write them in decimal form.

Solve & Discuss It!

ACTIVITY

Calvin wants to customize his surfboard so that it is wider than the 82 model but narrower than the 92 model. What measurement could be the width of his surfboard? Explain.

CALVIN'S CUSTOM SURFBOARDS

Be Precise Between which two numbers is the custom width located?

Model	82	92	102
	$22\frac{1}{2}$" wide	$23\frac{1}{4}$" wide	24" wide
	$3\frac{1}{4}$" thick	$3\frac{1}{2}$" thick	$3\frac{5}{8}$" thick

Focus on math practices

Use Structure Lindy's surfboard is $23\frac{1}{3}$ inches wide. Between which two surfboard models is her custom surfboard's width? How do you know?

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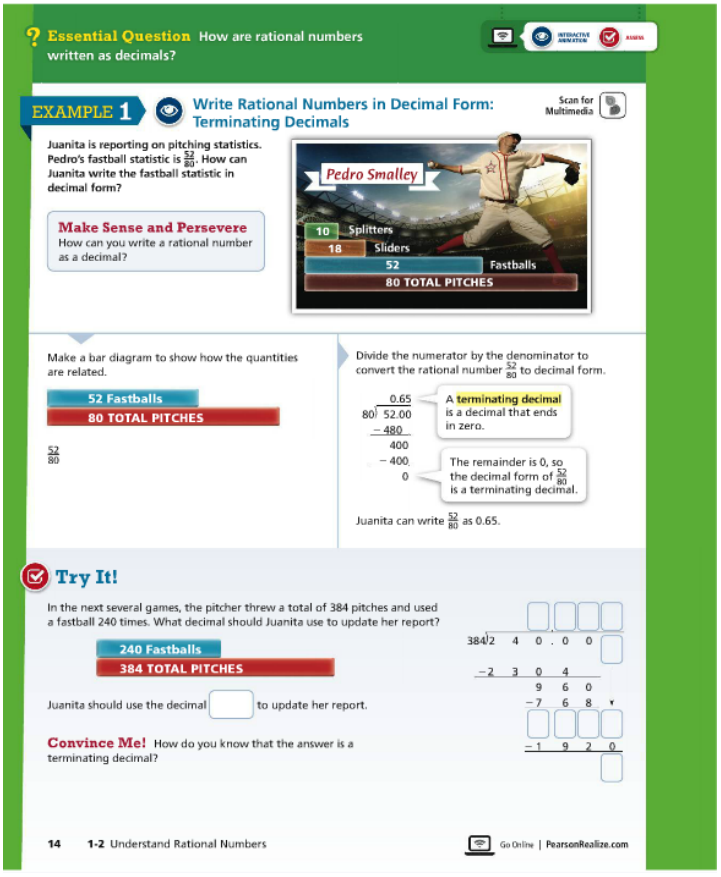

Essential Question How are rational numbers written as decimals?

INTERACTIVE ANIMATION

EXAMPLE 1 Write Rational Numbers in Decimal Form: Terminating Decimals

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Juanita is reporting on pitching statistics. Pedro's fastball statistic is $\frac{52}{80}$. How can Juanita write the fastball statistic in decimal form?

Make Sense and Persevere How can you write a rational number as a decimal?

Make a bar diagram to show how the quantities are related.

52 Fastballs

80 TOTAL PITCHES

$\frac{52}{80}$

Divide the numerator by the denominator to convert the rational number $\frac{52}{80}$ to decimal form.

$$\begin{array}{r} 0.65 \\ 80\overline{)\,52.00} \\ -480 \\ \hline 400 \\ -400 \\ \hline 0 \end{array}$$

A **terminating decimal** is a decimal that ends in zero.

The remainder is 0, so the decimal form of $\frac{52}{80}$ is a terminating decimal.

Juanita can write $\frac{52}{80}$ as 0.65.

Try It!

In the next several games, the pitcher threw a total of 384 pitches and used a fastball 240 times. What decimal should Juanita use to update her report?

240 Fastballs

384 TOTAL PITCHES

$$\begin{array}{r} \square\square.\square\square \\ 384\overline{)\,240.00} \\ -230\,4 \\ \hline 960 \\ -768 \\ \hline \square\square\square \\ -192\square \\ \hline \square \end{array}$$

Juanita should use the decimal ☐ to update her report.

Convince Me! How do you know that the answer is a terminating decimal?

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EXAMPLE 2 Write Rational Numbers in Decimal Form: Repeating Decimals

A class votes on whether to change their school mascot. How can you express the number of students in favor of a new mascot in decimal form?

Divide to write $\frac{5}{18}$ in decimal form.

$$\begin{array}{r} 0.277 \\ 18\overline{)5.000} \\ -36 \\ \hline 140 \\ -126 \\ \hline 140 \\ -126 \\ \hline 14 \end{array}$$

A **repeating decimal** has a decimal expansion that repeats the same digit, or block of digits, without end.

The products and differences repeat. The remainder will never be 0.

In a class of 18 students, 5 voted to change their mascot.

The decimal form of $\frac{5}{18}$ is $0.277\ldots$ or $0.2\overline{7}$.

The ... means the decimal does not terminate.

A line over one or more digits indicates that those digits repeat.

Try It!

What is the decimal form of $\frac{100}{3}$, $\frac{100}{5}$, and $\frac{100}{6}$? Determine whether each decimal repeats or terminates.

EXAMPLE 3 Recognize Rational Numbers in Decimal Form

Explain whether each of the following is a rational number.

a. -6.382

The decimal terminates, so this is a rational number.

b. $1.539\overline{81}$

The digits 8 and 1 repeat infinitely, so this is a rational number.

c. 0.43524982...

The decimal does not terminate and the digits do not repeat, so this is **NOT** a rational number.

Try It!

Is $-0.\overline{3}$ a rational number? Is 3.14144144414444... a rational number? Explain your reasoning.

KEY CONCEPT

can be written as fraction

To convert from the fraction form of a rational number to its decimal form, divide the numerator by the denominator. The decimal form of a rational number either terminates in 0s or eventually repeats.

Terminating Decimal

$\frac{3}{4} = 3 \div 4$ (end/stop)

$$\begin{array}{r} 0.75 \\ 4\overline{)3.00} \end{array}$$

0.75

Repeating Decimal

$\frac{1}{6} = 1 \div 6$

$$\begin{array}{r} 0.16 \\ 6\overline{)1.00} \end{array}$$

$\frac{\text{numerator}}{\text{denominator}}$

0.1666666666667

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Do You Understand?

1. **Essential Question** How are rational numbers written as decimals?

Rational numbers are written as decimals by dividing numerator by denominator.

2. **Reasoning** How can you use division to find the decimal equivalent of a rational number?

3. **Be Precise** What is the difference between a terminating decimal and a repeating decimal?

Do You Know How?

4. What is the decimal equivalent of each rational number?

a. $\frac{7}{20} = 7 \div 20 = 0.35$ ← terminating

b. $-\frac{23}{20} = -23 \div 20 = -1.15$

c. $\frac{1}{18} = 1 \div 18 = 0.0555\ldots = 0.0\overline{5}$ ← repeating

d. $-\frac{60}{22} = -60 \div 22 = -2.727272\ldots$

$-2.\overline{72}$

5. There are 5,280 feet in a mile. What part of a mile, in decimal form, will you drive until you reach the exit?

$\frac{\text{part}}{\text{total}} = \frac{1000}{5,280}$

$= 0.189393939393\ldots$

$= 0.18939$

$= 0.18\overline{93} = 0.18939393$

Name: _____

Practice & Problem Solving

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Leveled Practice In 6–8, write the decimal equivalent for each rational number. Use a bar over any repeating digits.

6. $\frac{2}{3}$ $\frac{2}{3}$ 7. $\frac{3}{11}$ $\frac{3}{11}$ 8. $8\frac{4}{9}$ $8\frac{4}{9} = 8.$

9. Is 1.0227 a rational number? Explain.

10. Which should Aaron use to convert a fraction to a decimal?
   - Ⓐ numerator ÷ denominator
   - Ⓑ $\frac{\text{denominator}}{\text{numerator}} \cdot 100$
   - Ⓒ denominator ÷ numerator
   - Ⓓ $\frac{\text{numerator}}{\text{denominator}} \cdot 100$

11. Is the fraction $\frac{1}{3}$ equivalent to a terminating decimal or a decimal that does not terminate?

12. Determine whether the given number belongs to each set.

	Whole Numbers	Integers	Rational Numbers
−34			

$2\frac{5}{8}$

13. Ariel incorrectly says that $2\frac{5}{8}$ is the same as 2.58.
   a. Convert $2\frac{5}{8}$ to a decimal.
   b. What was Ariel's likely error?

$3\frac{1}{3}$

14. **Use Structure** Consider the rational number $\frac{3}{11}$. $\frac{3}{11}$
   a. What are the values of a and b in $a\overline{b}$ when you use division to find the decimal form?
   b. What is the decimal form for $\frac{3}{11}$?

$3\frac{1}{5}$

15. At a grocery store, Daniel wants to buy $3\frac{1}{5}$ lb of ham. What decimal should the digital scale show?
   Write $3\frac{1}{5}$ as a fraction and then divide.
   The scale should read ____ lb.

16. **Reasoning** At a butcher shop, Hilda bought beef and pork. She left with $18\frac{8}{25}$ pounds of meat. Express the number of pounds of pork she bought using a decimal.

$18\frac{8}{25}$ lb. $8 \div 25$ 18.32 lb $\frac{8}{25} = \frac{32}{100}$ $3\frac{3}{11}$ $9\frac{373}{1000}$

Hilda bought 18.32 lb of meat at the butcher shop.

17. **Analyze** Is 9.373 a repeating decimal? Is it rational? Explain your reasoning.

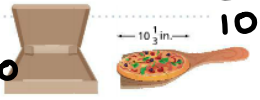
18. **Reasoning** Aiden has one box that is $3\frac{3}{11}$ feet tall and a second box that is 3.27 feet tall. If he stacks the boxes, about how tall will the stack be?

9.373 is not a repeating decimal. It is a terminating decimal. It is a rational number since it can written as a fraction $9\frac{373}{1000}$.

19. You are adding air to a tire. The air pressure in the tire should be $32\frac{27}{200}$ pounds per square inch. What decimal should you watch for on the digital pressure gauge?

$32\frac{27}{200}$ $10\frac{1}{3}$

20. **Higher Order Thinking** Dion has a pizza with a diameter of $10\frac{1}{3}$ in. Is the square box shown big enough to fit the pizza inside? Justify your answer.



$151 \div 200$ 10.38

Assessment Practice

21. Which of the following shows $117\frac{151}{200}$ as a decimal?
   - ● 117.755
   - Ⓑ $117.\overline{7}$
   - Ⓒ $117.\overline{5}$
   - Ⓓ 117.00

$117\frac{151}{200}$ $\frac{151}{200} \times \frac{5}{5} = \frac{755}{1000} = 117.755$

22. Use the negative fractions $-\frac{4}{5}$ and $-\frac{5}{6}$.

PART A
Find the decimal equivalents for each fraction.

PART B
Which is a repeating decimal? Which digit is repeating?