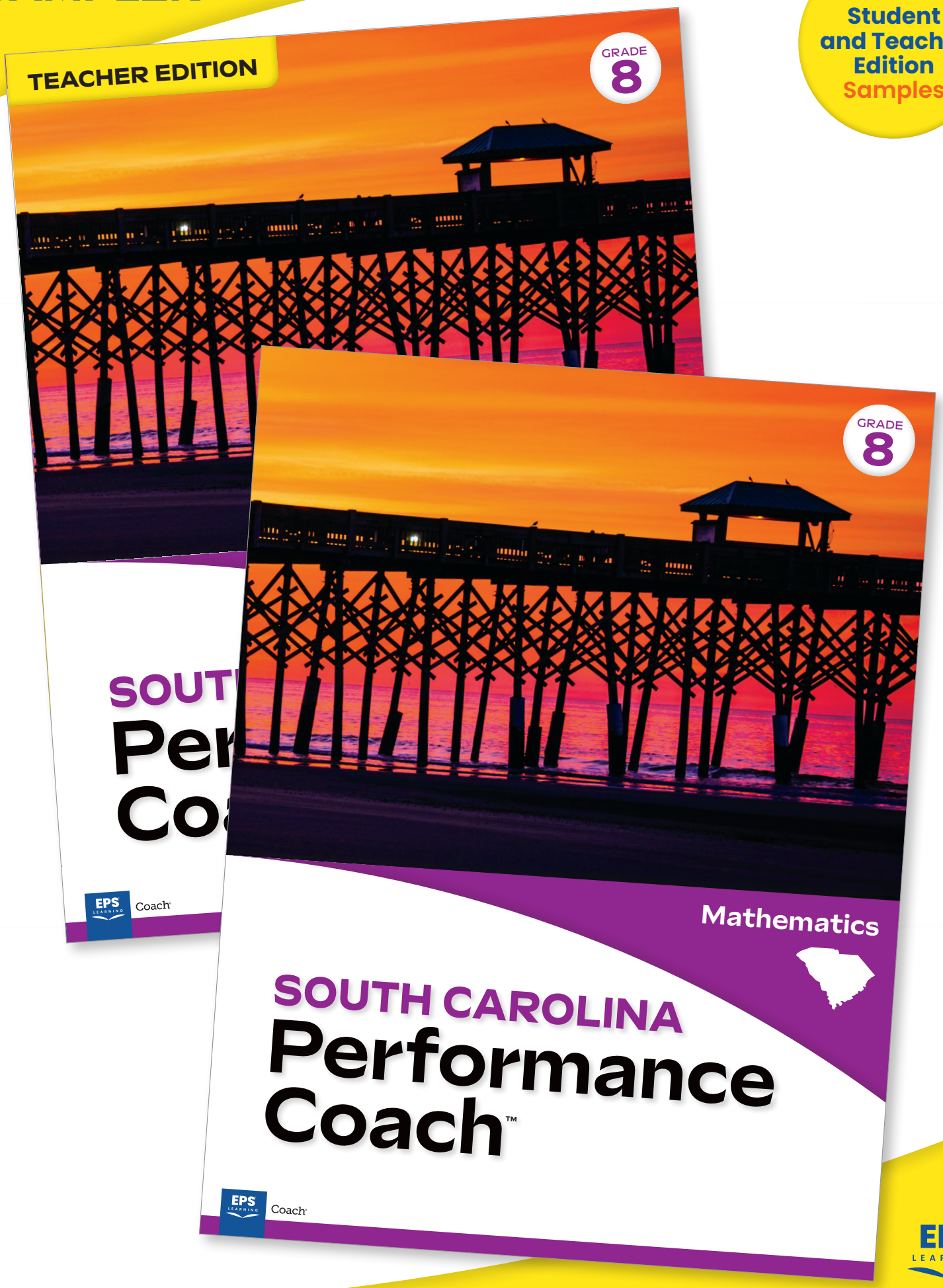
SAMPLER

Includes Student and Teacher Edition Samples



EPS LEARNING

CONTENTS

Aligns to the 2025 South Carolina College- and Career-Ready Mathematics Standards

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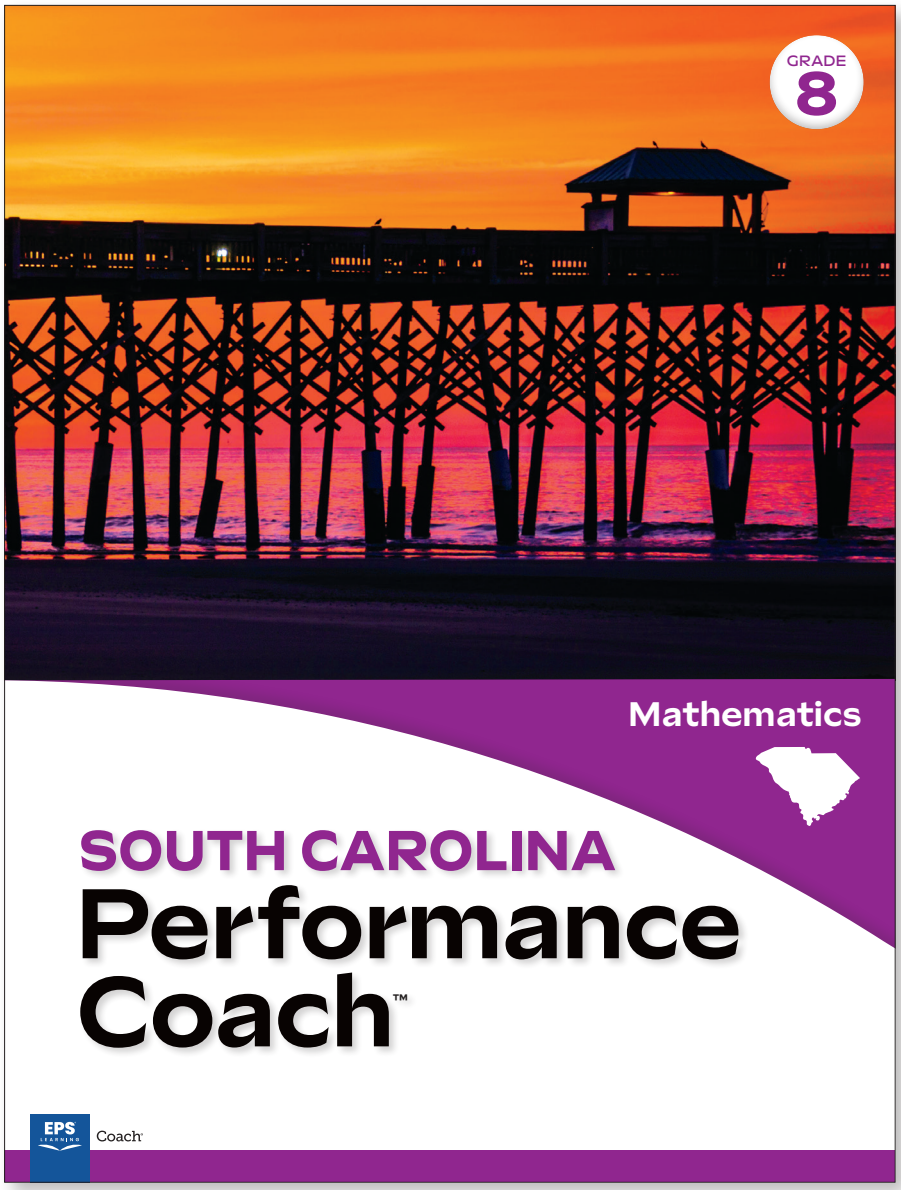


GRADE 8

LESSON 16 SAMPLE

LESSON 16

Comparing Real Numbers

1 GETTING THE IDEA

Getting the Idea models strategies with stepped-out examples to enhance student understanding.

To compare two numbers, use the symbols $>$ (is greater than), $\geq$ (is greater than or equal to), $<$ (is less than), $\leq$ (is less than or equal to), $=$ (is equal to), or $\neq$ (is not equal to). When comparing rational and irrational numbers, it may be necessary to convert some numbers into another representation.

Example 1

Which symbol makes this sentence true? Choose $>$, $<$, or $=$.

$-8.\overline{1}$ ◯ $-\sqrt{81}$

Strategy **Represent each number as a terminating decimal.**

Step 1 Round $-8.\overline{1}$ to the nearest tenth.

$-8.\overline{1}$ is the same as $-8.111\ldots$

Rounded to the nearest tenth, $-8.\overline{1}$ is -8.1.

Step 2 Convert $-\sqrt{81}$ to a terminating decimal.

$\sqrt{81} = 9$, so $-\sqrt{81} = -9$.

Step 3 Compare.

-8.1 is to the right of -9 on a number line, so -8.1 is greater than -9.

$-8.\overline{1}$ is greater than $-\sqrt{81}$.

Solution $-8.\overline{1} > -\sqrt{81}$

Any positive number is greater than any negative number.

Example 2

Order from least to greatest: -3.4, π, $-3\frac{1}{4}$, and $\sqrt{9}$.

Strategy **Separate the negative numbers from the positive numbers. Then compare and combine.**

Step 1 List the negative numbers, write them as decimals, and compare.

-3.4 is a decimal and $-3\frac{1}{4} = -3.25$.

$-3.4 < -3.25$, so $-3.4 < -3\frac{1}{4}$.

Step 2 List the positive numbers, write them as decimals, and compare.

$\pi \approx 3.14$ and $\sqrt{9} = 3$.

$3 < 3.14$, so $\sqrt{9} < \pi$.

Step 3 Order the numbers.

$$-3.4 < -3\tfrac{1}{4} < \sqrt{9} < \pi$$

Solution **From least to greatest, the numbers are -3.4, $-3\frac{1}{4}$, $\sqrt{9}$, and π.**

You can use rational approximations to help compare and order irrational numbers or expressions that contain irrational numbers.

Example 3

Order from least to greatest: 2π, $\frac{8}{15}$, $2\sqrt{3}$, and 4.1.

Strategy **Write each as a decimal, using a decimal approximation for irrational numbers. Then plot the decimals on a number line.**

Step 1 Write 2π as a decimal rounded to the nearest tenth.

$\pi = 3.14159...$, so π is about 3.1.

Therefore, rounded to the nearest tenth, 2π is approximately 2(3.1), or 6.2.

Step 2 Write $\frac{8}{15}$ as a decimal rounded to the nearest tenth.

$\frac{8}{15} = 8 \div 15 = 0.5\overline{3}$

Rounded to the nearest tenth, $\frac{8}{15}$ is 0.5.

Step 3 Write $2\sqrt{3}$ as a decimal rounded to the nearest tenth.

Since 3 is not a perfect square, first determine the nearest perfect squares.

$1^2 = 1$, so $\sqrt{1} = 1$

$2^2 = 4$, so $\sqrt{4} = 2$

Since 3 is closer to 4 than to 1, a close approximation for $\sqrt{3}$ is 2. For a closer approximation, square decimals to the tenths place, and compare them to 3.

$1.7^2 = 2.89$, so $\sqrt{2.89} = 1.7$

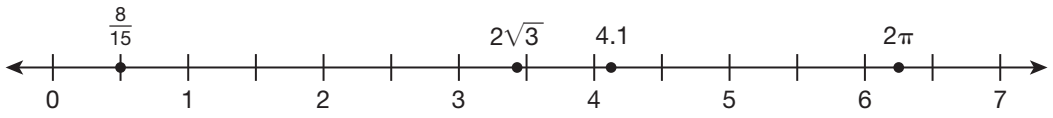
$1.8^2 = 3.24$, so $\sqrt{3.24} = 1.8$

Since 3 is closer to 2.89, a closer approximation of $\sqrt{3}$ is 1.7. A close approximation of $2\sqrt{3}$ is therefore approximately 2(1.7), or 3.4.

Step 4 Make a list of all of the decimal approximations.

$2\pi \approx 6.2$ $\frac{8}{15} \approx 0.5$ $2\sqrt{3} \approx 3.4$ 4.1

Step 5 Locate each decimal on a number line to compare them.



Solution **From least to greatest, the numbers are $\frac{8}{15}$, $2\sqrt{3}$, 4.1, and 2π.**

2 COACHED EXAMPLE

Coached Example sections are scaffolded to support students during the gradual release of responsibility.

Order the following numbers from greatest to least.

$\frac{5}{3}, -5.35, \sqrt{35}, -\pi$

Write each number as a decimal rounded to the nearest tenth.

$\frac{5}{3}$ as a decimal rounded to the nearest tenth is _____.

-5.35 as a decimal rounded to the nearest tenth is _____.

$\sqrt{35}$ is very close to $\sqrt{36}$, which is _____. $\sqrt{35}$ as a decimal rounded to the nearest tenth is _____.

$-\pi$ as a decimal rounded to the nearest tenth is _____.

The numbers ordered from greatest to least are _____.

3 LESSON PRACTICE

Lesson Practice sections allow students to practice questions on the skill independently.

1 Which is a true statement?

- ○ **A.** $\pi \leq 0.314$
- ○ **B.** $\frac{5}{6} < 82\%$
- ○ **C.** $-\frac{3}{4} \leq -0.7$
- ○ **D.** $4 < \sqrt{40}$

2 Which list shows numbers ordered from least to greatest?

- ○ **A.** $-\frac{5}{8}, -0.58, \sqrt{58}, 58\%$
- ○ **B.** $-\frac{5}{8}, -0.58, 58\%, \sqrt{58}$
- ○ **C.** $-0.58, -\frac{5}{8}, 58\%, \sqrt{58}$
- ○ **D.** $-0.58, -\frac{5}{8}, \sqrt{58}, 58\%$

3 Which number makes this a true statement?

$\sqrt{14} >$ _____

- ○ **A.** 4.1
- ○ **B.** $\frac{40}{9}$
- ○ **C.** $3\frac{1}{14}$
- ○ **D.** 400%

4 Which of the following numbers has the greatest value?

- ○ **A.** 8.72801…
- ○ **B.** $\frac{80}{9}$
- ○ **C.** $\sqrt{65}$
- ○ **D.** 25π

5 Which is a true statement?

- ○ **A.** $6\frac{1}{5} \geq \sqrt{30}$
- ○ **B.** $-4.8 > -4\frac{4}{5}$
- ○ **C.** $\pi \geq \frac{15}{4}$
- ○ **D.** $55\% > 2.\overline{5}$

6 Which list shows numbers ordered from greatest to least?

- ○ **A.** $\sqrt{24}, 4\frac{3}{8}, -\frac{4}{5}, -4.8$
- ○ **B.** $4\frac{3}{8}, \sqrt{24}, -\frac{4}{5}, -4.8$
- ○ **C.** $\sqrt{24}, 4\frac{3}{8}, -4.8, -\frac{4}{5}$
- ○ **D.** $4\frac{3}{8}, \sqrt{24}, -4.8, -\frac{4}{5}$

7 Compare the value of each expression to 7. Write each expression in the correct box.

$\sqrt{42}$	12%	$4\sqrt{7}$	-8.95	$7\sqrt{1}$	3π

Less than 7	Equal to 7	Greater than 7

8 Explain the process you would use to compare $3\frac{1}{8}$ and π.

9 Which of the following are less than 4.47? Mark all that apply.

- ○ **A.** $\sqrt{14}$
- ○ **B.** 4π
- ○ **C.** $-4\frac{1}{47}$
- ○ **D.** $\sqrt{42}$
- ○ **E.** $4.\overline{47}$

10 Presley wrote the comparison $\frac{29}{6} > \sqrt{26}$. Is Presley's comparison correct? Explain your reasoning.

11 Which of the following are between -8 and -7 on a number line? Mark all that apply.

- ○ **A.** $-7.\overline{8}$
- ○ **B.** $-\frac{65}{9}$
- ○ **C.** $-\sqrt{70}$
- ○ **D.** $-\frac{80}{11}$
- ○ **E.** -7π

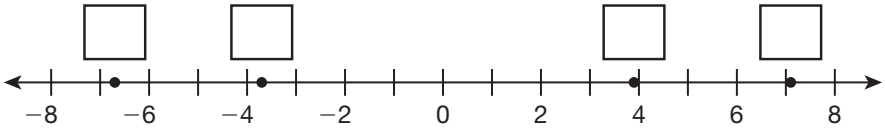
12 Select the boxes in the table to show how each number compares to 4.

	$\frac{31}{9}$	$\sqrt{17}$	-4.38	2π	400%
Less than 4	○	○	○	○	○
Equal to 4	○	○	○	○	○
Greater than 4	○	○	○	○	○

13 Ian plotted the numbers $-\sqrt{14}$, $4\sqrt{\pi}$, $-3\sqrt{5}$, and $\sqrt{15}$ on a number line.

Part A

Label each number on the number line below.

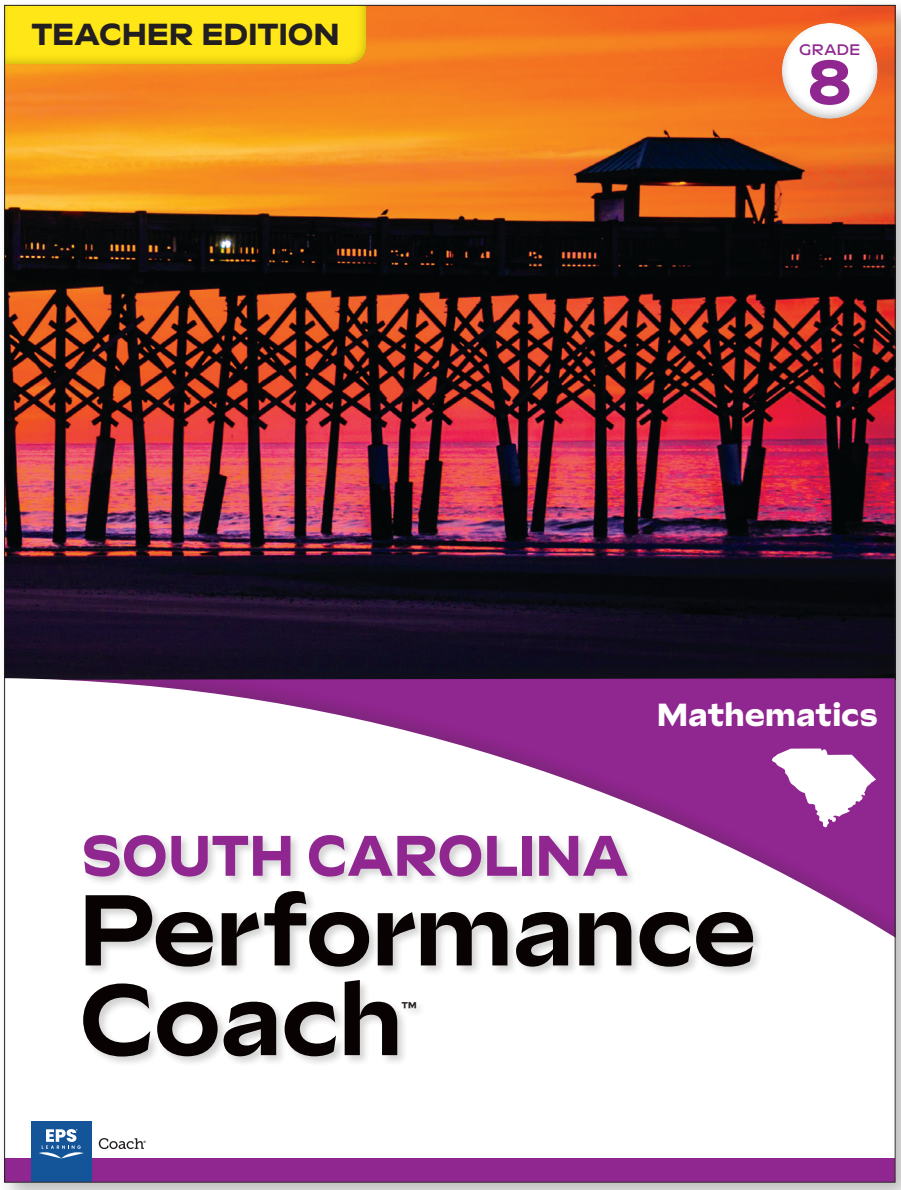


Part B

Use the number line to compare all numbers using *less than* symbols.

Part C

List the numbers in order from greatest to least.



GRADE 8

LESSON 16 SAMPLE

LESSON 16

Comparing Real Numbers

Student Edition pages 174–181

LESSON OVERVIEW

Objectives

Students will:

- Compare rational and irrational numbers using symbols.
- Order three or more rational and irrational numbers.

Discussion Questions

Discussion Questions foster discourse that develops academic language.

SP.1 How could you check two approximations of a square root to see which one is more accurate?

RC.1 Why is it important to be able to approximate the value of an irrational number without the use of a calculator?

Materials

- index cards
- colored pencils

Lesson Support suggestions offer tips for supporting struggling students.

Differentiation

Lesson Support Have students consider the degree of accuracy needed in approximating the value of an irrational number when ordering rational and irrational numbers. Ask: *How can you determine the place to which you must approximate an irrational number when attempting to compare and order a set of rational and irrational numbers?*

Lesson Extension Give students the opportunity to explore and compare related irrational expressions.

- Ask: *Is* $\sqrt{4 + 5}$ *equal to* $\sqrt{4} + \sqrt{5}$*? How do you know?*
- Ask: *What conclusion can you draw about how the value of* $\sqrt{a + b}$ *compares to* $\sqrt{a} + \sqrt{b}$*? Use examples to justify your reasoning.*

Lesson Extensions provide acceleration suggestions for high-achieving students.

1 GETTING THE IDEA

Lesson Opener

Review the process of comparing positive and negative rational numbers. Writing numbers in the same form, often as decimals, makes it easier to compare them. Remind students that numbers to the left on a number line are less than numbers to the right on a number line.

Segue into the Getting the Idea section. Ask: *How might you compare a rational number and an irrational number?* Elicit that this may require rounding or approximating, and prompt students to discuss their thoughts about this.

▲ ***ELL Support*** *Provide students with index cards and colored pencils. Ask students to draw images to help them remember what the symbols mentioned represent.*

▶ Example 1

Remind students that the bar over the 1 in $-8.\overline{1}$ means that the 1 repeats forever, and that $\sqrt{81} = 9$ because $9^2 = 81$. Since both values are negative, drawing a number line on the board and plotting points could help students visualize why $-8.\overline{1}$ is greater than -9.

ELL Support features offer guidance for teaching multilingual learners.

▸ Example 2

Before working through the problem, ask students to describe a plan for sorting these numbers. Ask students if they think it would be useful to use $\frac{22}{7}$ as a rational approximation of π in this problem.

▸ Example 3

After students have plotted the numbers on a number line, ask: *How does the number line help you order numbers?* Remind students that the points show approximate locations of the numbers, so the number line shows the numbers from least to greatest. Ask: *Why was it not necessary to draw this graph with a higher degree of accuracy?*

▲ ***Journal Prompt*** **C.1** *Give a real-world example of when you might need to compare irrational numbers. Then write an explanation for how you would find the number with the greater value.*

Journal Prompts support different learning modalities.

2 COACHED EXAMPLE

Monitor students as they work through the Coached Example. Remind them that they need to find rational approximations of the irrational numbers in order to compare the values. Encourage students to check their answers for reasonableness. Ask: *Are the negative numbers greater than or less than the positive numbers?*

For answers, see Appendix A.

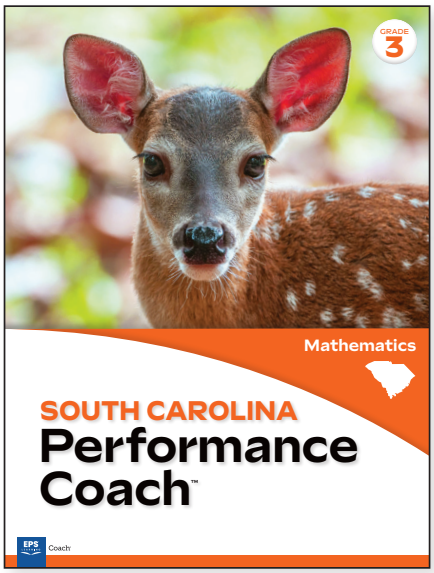
The Teacher Edition offers suggestions for teaching each lesson.

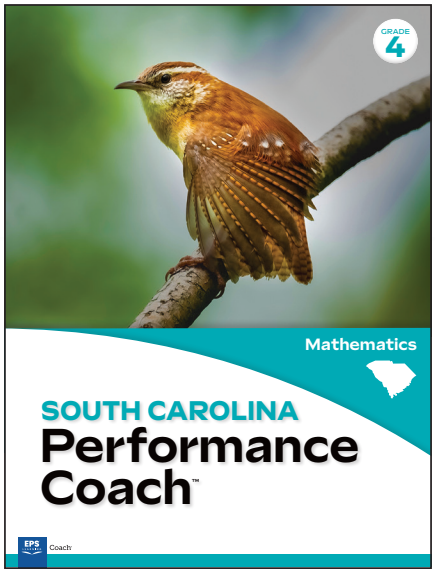
3 LESSON PRACTICE

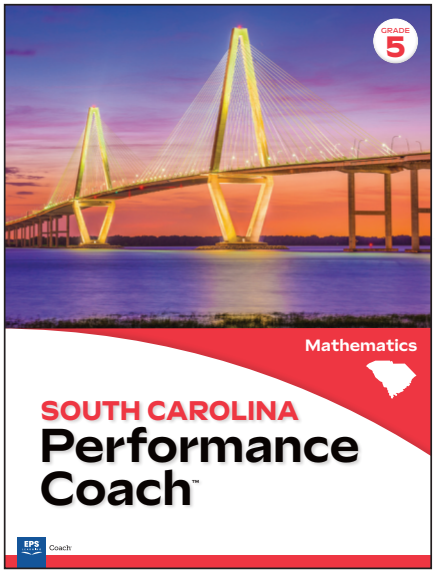
As students are working, pay special attention to problems 7 and 12. For these problems, students may be able to use mental math strategies to determine the relative value of a number. You may want to have students verbalize their thinking, as other students may find their strategies helpful.

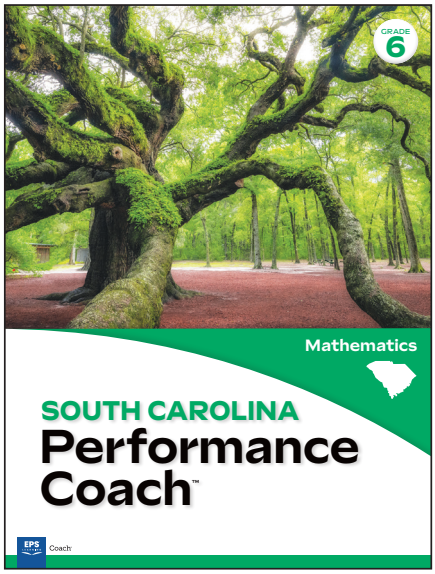
For answers, see Appendix A.

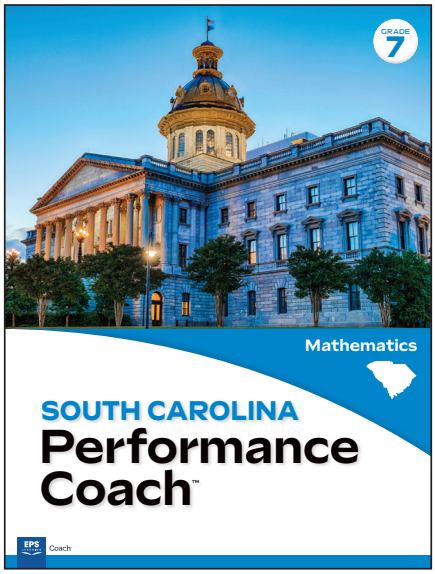
SAMPLER

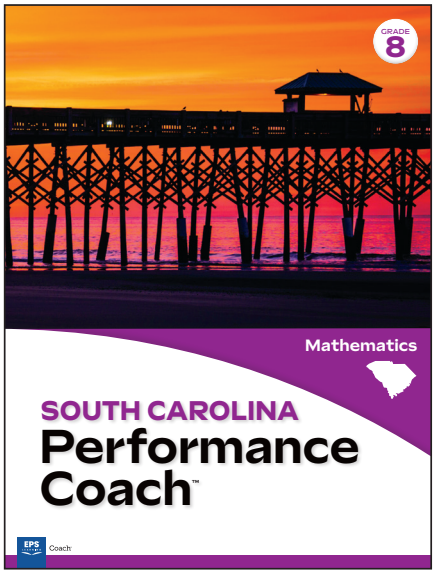












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