Name________________________________ Date__________

Chapter 7 Fair Game Review

Complete the number sentence with $<$, $>$, or $=$.

1. 3.4 ______ 3.45

2. -6.01 ______ -6.1

3. 3.50 ______ 3.5

4. -0.84 ______ -0.91

Find three decimals that make the number sentence true.

5. $-5.2 \geq$ ______

6. $2.65 >$ ______

7. $-3.18 \leq$ ______

8. $0.03 <$ ______

9. The table shows the times of a 100-meter dash. Order the runners from first place to fifth place.

Runner	Time (seconds)
A	12.60
B	12.55
C	12.49
D	12.63
E	12.495

Name ____________________ Date ________

Chapter 7

Fair Game Review (continued)

Evaluate the expression.

10. $10^2 - 48 \div 6 + 25 \bullet 3$

11. $8\left(\frac{16}{4}\right) + 2^2 - 11 \bullet 3$

12. $\left(\frac{6}{3} + 4\right)^2 \div 4 \bullet 7$

13. $5(9 - 4)^2 - 3^2$

14. $5^2 - 2^2 \bullet 4^2 - 12$

15. $\left(\frac{50}{5^2}\right)^2 \div 4$

16. The table shows the numbers of students in 4 classes. The teachers are combining the classes and dividing the students in half to form two groups for a project. Write an expression to represent this situation. How many students are in each group?

Class	Students
1	24
2	32
3	30
4	28

Name____ Date__________

7.1 Finding Square Roots

For use with Activity 7.1

Essential Question How can you find the dimensions of a square or a circle when you are given its area?

When you multiply a number by itself, you square the number.

Symbol for squaring is the exponent 2. → $4^2 = 4 \bullet 4$

$= 16$

4 squared is 16.

To "undo" this, take the *square root* of the number.

Symbol for square root is a *radical sign*, $\sqrt{\ }$. → $\sqrt{16} = \sqrt{4^2} = 4$

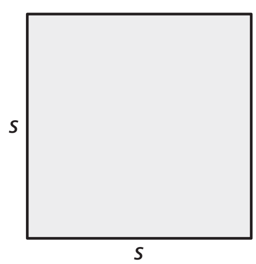
The square root of 16 is 4.

1 ACTIVITY: Finding Square Roots

Work with a partner. Use a square root symbol to write the side length of the square. Then find the square root. Check your answer by multiplying.

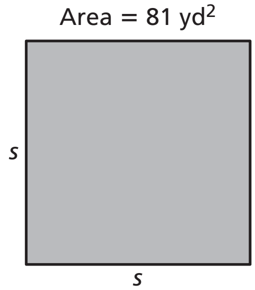
a. Sample: $s = \sqrt{121} =$ **Check:**

Area = 121 ft^2

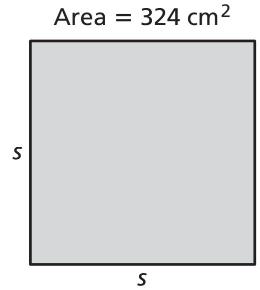


The length of each side of the square is ______________________.

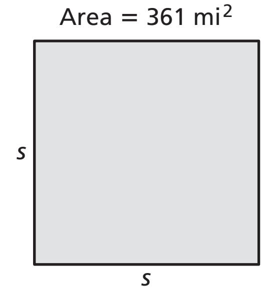
b. Area = 81 yd^2



c. Area = 324 cm^2

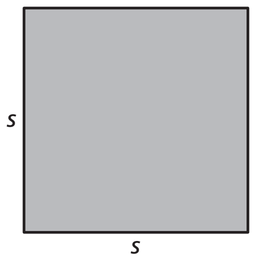


d. Area = 361 mi^2

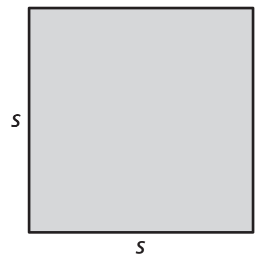


Name ____ Date __________

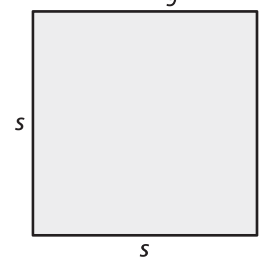
e. Area = 225 mi^2



f. Area = 2.89 $in.^2$



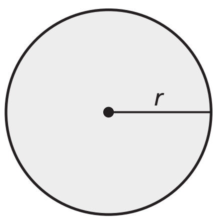
g. Area = $\frac{4}{9}$ ft^2



2 ACTIVITY: Using Square Roots

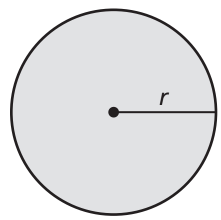
Work with a partner. Find the radius of each circle.

a.



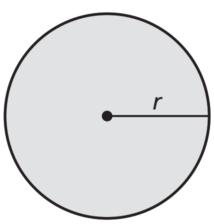
Area = 36π $in.^2$

b.



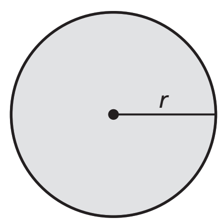
Area = π yd^2

c.



Area = 0.25π ft^2

d.



Area = $\frac{9}{16}\pi$ m^2

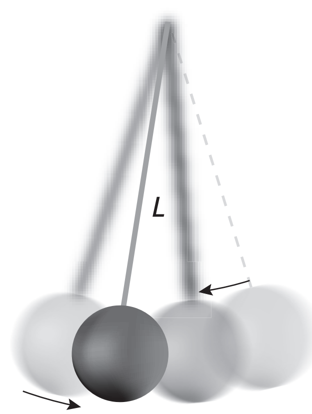
3 ACTIVITY: The Period of a Pendulum

Work with a partner.

The period of a pendulum is the time (in seconds) it takes the pendulum to swing back *and* forth.

The period T is represented by $T = 1.1\sqrt{L}$, where L is the length of the pendulum (in feet).

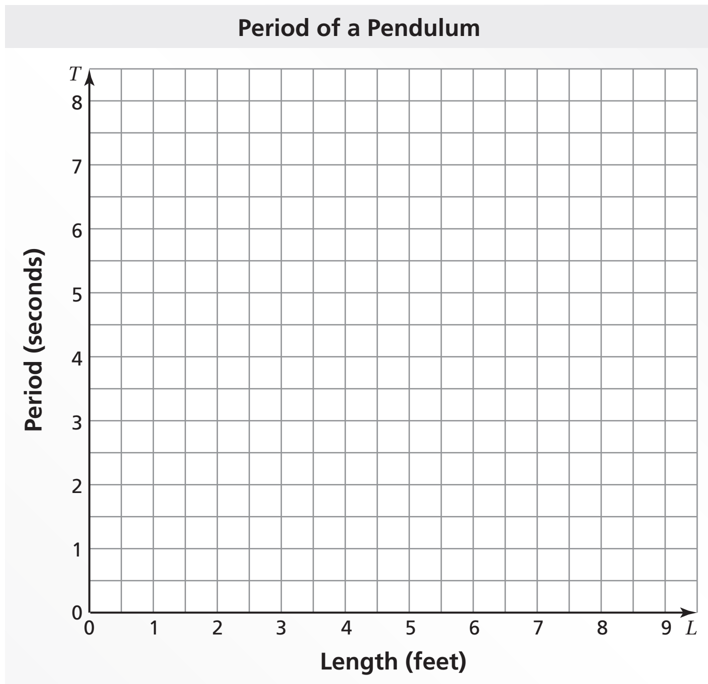
Complete the table. Then graph the function on the next page. Is the function linear?



Name____ Date__________

7.1 Finding Square Roots (continued)

L	1.00	1.96	3.24	4.00	4.84	6.25	7.29	7.84	9.00
T									



What Is Your Answer?

4. **IN YOUR OWN WORDS** How can you find the dimensions of a square or circle when you are given its area? Give an example of each. How can you check your answers?

Name ____ Date __________

7.1 Practice
For use after Lesson 7.1

Find the two square roots of the number.

1. 16

2. 100

3. 196

Find the square root(s).

4. $\sqrt{169}$

5. $\sqrt{\dfrac{4}{225}}$

6. $-\sqrt{12.25}$

Evaluate the expression.

7. $2\sqrt{36} + 9$

8. $8 - 11\sqrt{\dfrac{25}{121}}$

9. $3\left(\sqrt{\dfrac{125}{5}} - 8\right)$

10. A trampoline has an area of 49π square feet. What is the diameter of the trampoline?

Name____ Date__________

7.2 Finding Cube Roots
For use with Activity 7.2

Essential Question How is the cube root of a number different from the square root of a number?

When you multiply a number by itself twice, you cube the number.

Symbol for cubing is the exponent 3. → $4^3 = 4 \bullet 4 \bullet 4$

$= 64$

4 cubed is 64.

To "undo" this, take the *cube root* of the number.

Symbol for cube root is $\sqrt[3]{\ }$. → $\sqrt[3]{64} = \sqrt[3]{4^3} = 4$

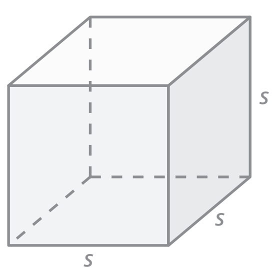
The cube root of 64 is 4.

1 ACTIVITY: Finding Cube Roots

Work with a partner. Use a cube root symbol to write the edge length of the cube. Then find the cube root. Check your answer by multiplying.

a. Sample: $s = \sqrt[3]{343} = \sqrt[3]{7^3} = 7$ inches

Volume = 343 in.^{3}



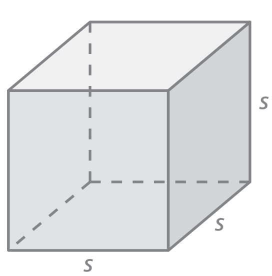
Check

$7 \bullet 7 \bullet 7 = 49 \bullet 7$

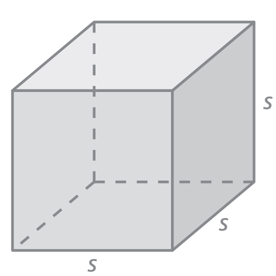
$= 343$ ✓

The edge length of the cube is 7 inches.

b. Volume = 27 ft^3

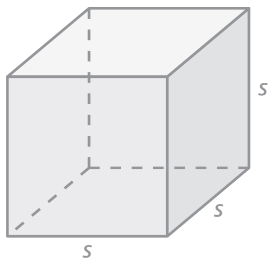


c. Volume = 125 m^3

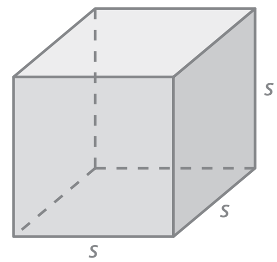


7.2 Finding Cube Roots (continued)

d. Volume = 0.001 cm^3



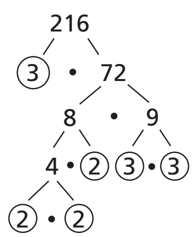
e. Volume = $\frac{1}{8}$ yd^3



2 ACTIVITY: Use Prime Factorizations to Find Cube Roots

Work with a partner. Write the prime factorization of each number. Then use the prime factorization to find the cube root of the number.

a. 216



$216 = 3 \bullet 2 \bullet 3 \bullet 3 \bullet 2 \bullet 2$ Prime factorization

$= (3 \bullet \square) \bullet (3 \bullet \square) \bullet (3 \bullet \square)$ Commutative Property of Multiplication

$= \square \bullet \square \bullet \square$ Simplify.

The cube root of 216 is __________.

b. 1000

c. 3375

d. **STRUCTURE** Does this procedure work for every number? Explain why or why not.

What Is Your Answer?

3. Complete each statement using *positive* or *negative*.

a. A positive number times a positive number is a ____________ number.

b. A negative number times a negative number is a ___________ number.

c. A positive number multiplied by itself twice is a ____________ number.

d. A negative number multiplied by itself twice is a ___________ number.

4. **REASONING** Can a negative number have a cube root? Give an example to support your explanation.

5. **IN YOUR OWN WORDS** How is the cube root of a number different from the square root of a number?

6. Give an example of a number whose square root and cube root are equal.

7. A cube has a volume of 13,824 cubic meters. Use a calculator to find the edge length.

Name ______________________________ Date __________

7.2 Practice

For use after Lesson 7.2

Find the cube root.

1. $\sqrt[3]{27}$

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

3. $\sqrt[3]{-64}$

4. $\sqrt[3]{-\frac{125}{216}}$

Evaluate the expression.

5. $10 - \left(\sqrt[3]{12}\right)^3$

6. $2\sqrt[3]{512} + 10$

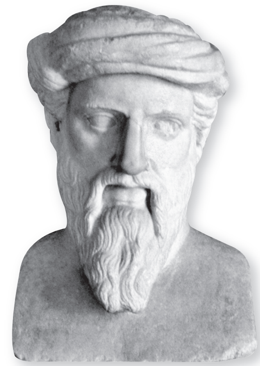
7. The volume of a cube is 1000 cubic inches. What is the edge length of the cube?

Name____ Date__________

7.3 The Pythagorean Theorem
For use with Activity 7.3

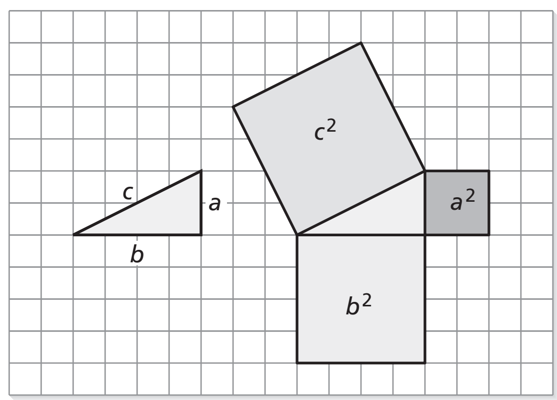
Essential Question How are the lengths of the sides of a right triangle related?

Pythagoras was a Greek mathematician and philosopher who discovered one of the most famous rules in mathematics. In mathematics, a rule is called a **theorem**. So, the rule that Pythagoras discovered is called the Pythagorean Theorem.


Pythagoras
(c. 570–c. 490 B.C.)

1 ACTIVITY: Discovering the Pythagorean Theorem

Work with a partner.

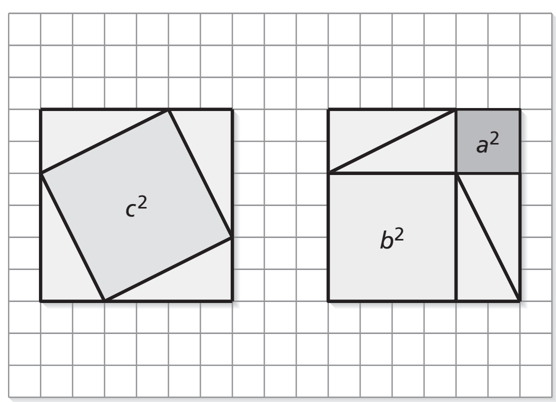


a. On grid paper, draw any right triangle. Label the lengths of the two shorter sides *a* and *b*.

b. Label the length of the longest side *c*.

c. Draw squares along each of the three sides. Label the areas of the three squares a^2, b^2, and c^2.

d. Cut out the three squares. Make eight copies of the right triangle and cut them out. Arrange the figures to form two identical larger squares.



e. **MODELING** The Pythagorean Theorem describes the relationship among a^2, b^2, and c^2. Use your result from part (d) to write an equation that describes this relationship.

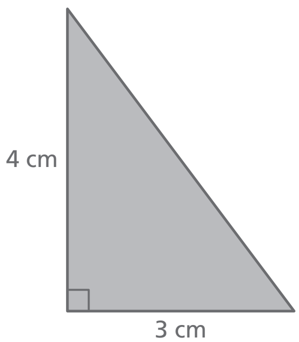
Name ____ Date __________

7.3 The Pythagorean Theorem (continued)

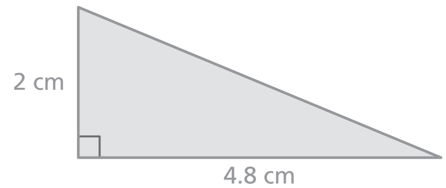
2 ACTIVITY: Using the Pythagorean Theorem in Two Dimensions

Work with a partner. Use a ruler to measure the longest side of each right triangle. Verify the result of Activity 1 for each right triangle.

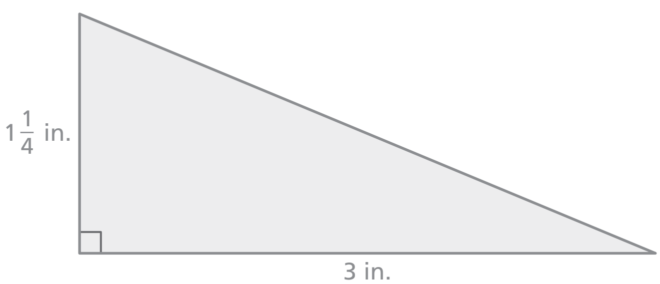
a.



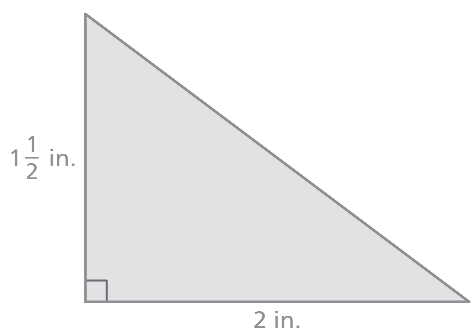
b.



c.



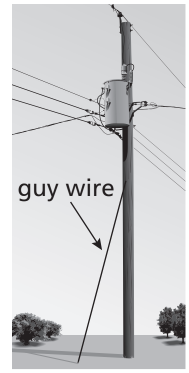
d.



7.3 The Pythagorean Theorem (continued)

3 ACTIVITY: Using the Pythagorean Theorem in Three Dimensions

Work with a partner. A guy wire attached 24 feet above ground level on a telephone pole provides support for the pole.



a. **PROBLEM SOLVING** Describe a procedure that you could use to find the length of the guy wire without directly measuring the wire.

b. Find the length of the wire when it meets the ground 10 feet from the base of the pole.

What Is Your Answer?

4. **IN YOUR OWN WORDS** How are the lengths of the sides of a right triangle related? Give an example using whole numbers.

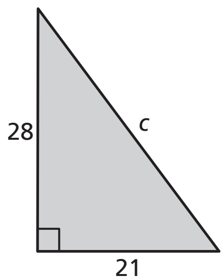
Name ____________________ Date __________

7.3 Practice

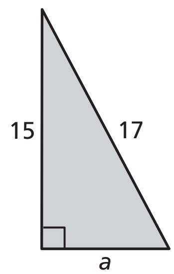
For use after Lesson 7.3

Find the missing length of the triangle.

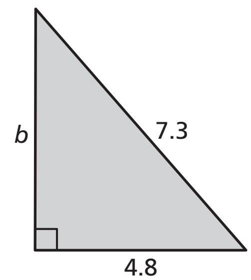
1.



2.

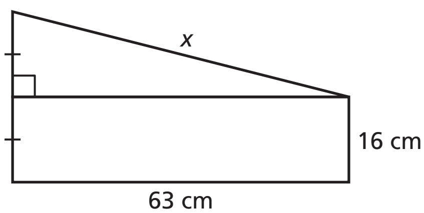


3.

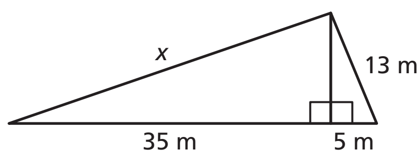


Find the missing length of the figure.

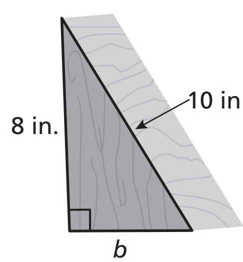
4.



5.



6. In wood shop, you make a bookend that is in the shape of a right triangle. What is the base *b* of the bookend?



Name____ Date__________

7.4 Approximating Square Roots

For use with Activity 7.4

Essential Question How can you find decimal approximations of square roots that are not rational?

1 ACTIVITY: Approximating Square Roots

Work with a partner. Archimedes was a Greek mathematician, physicist, engineer, inventor, and astronomer. He tried to find a rational number whose square is 3. Two that he tried were $\frac{265}{153}$ and $\frac{1351}{780}$.

a. Are either of these numbers equal to $\sqrt{3}$? Explain.

b. Use a calculator to approximate $\sqrt{3}$. Write the number on a piece of paper. Enter it into the calculator and square it. Then subtract 3. Do you get 0? What does this mean?

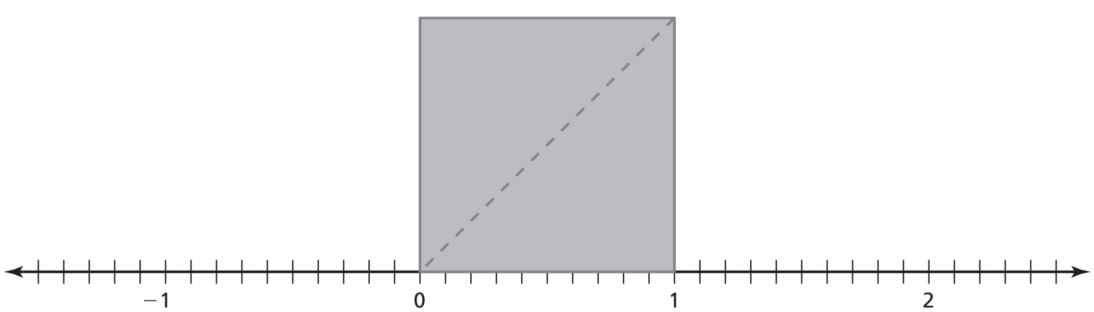
c. The value of $\sqrt{3}$ is between which two integers?

d. Tell whether the value of $\sqrt{3}$ is between the given numbers. Explain your reasoning.

1.7 and 1.8 | 1.72 and 1.73 | 1.731 and 1.732

2 ACTIVITY: Approximating Square Roots Geometrically

Work with a partner. Refer to the square on the number line below.



a. What is the length of the diagonal of the square?

b. Copy the square and its diagonal onto a piece of transparent paper. Rotate it about zero on the number line so that the diagonal aligns with the number line. Use the number line to estimate the length of the diagonal.

7.4 Approximating Square Roots (continued)

c. STRUCTURE How do you think your answers in parts (a) and (b) are related?

3 ACTIVITY: Approximating Square Roots Geometrically

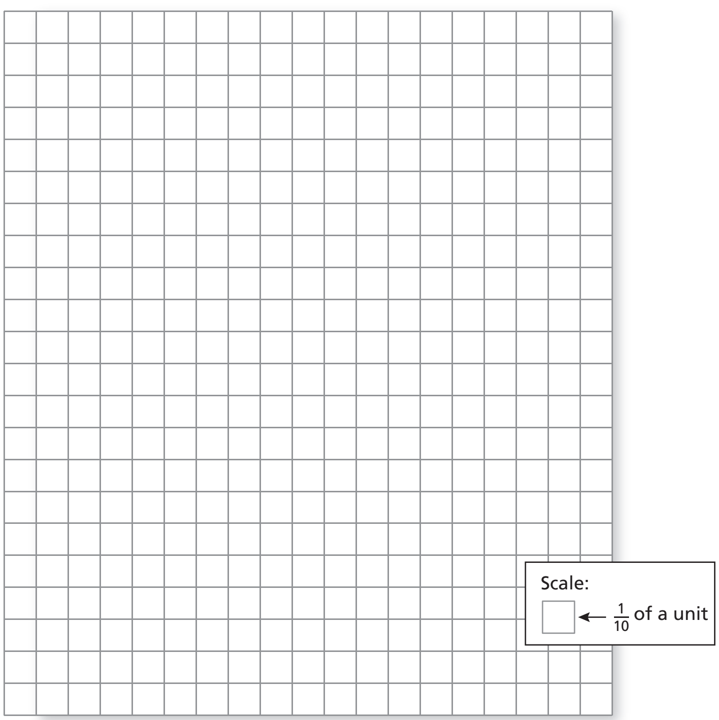
Work with a partner.

a. Use grid paper and the given scale to draw a horizontal line segment 1 unit in length. Draw your segment near the bottom of the grid. Label this segment *AC*.

b. Draw a vertical line segment 2 units in length. Draw your segment near the left edge of the grid. Label this segment *DC*.

c. Set the point of a compass on *A*. Set the compass to 2 units. Swing the compass to intersect segment *DC*. Label this intersection as *B*.

d. Use the Pythagorean Theorem to find the length of segment *BC*.



e. Use the grid paper to approximate $\sqrt{3}$ to the nearest tenth.

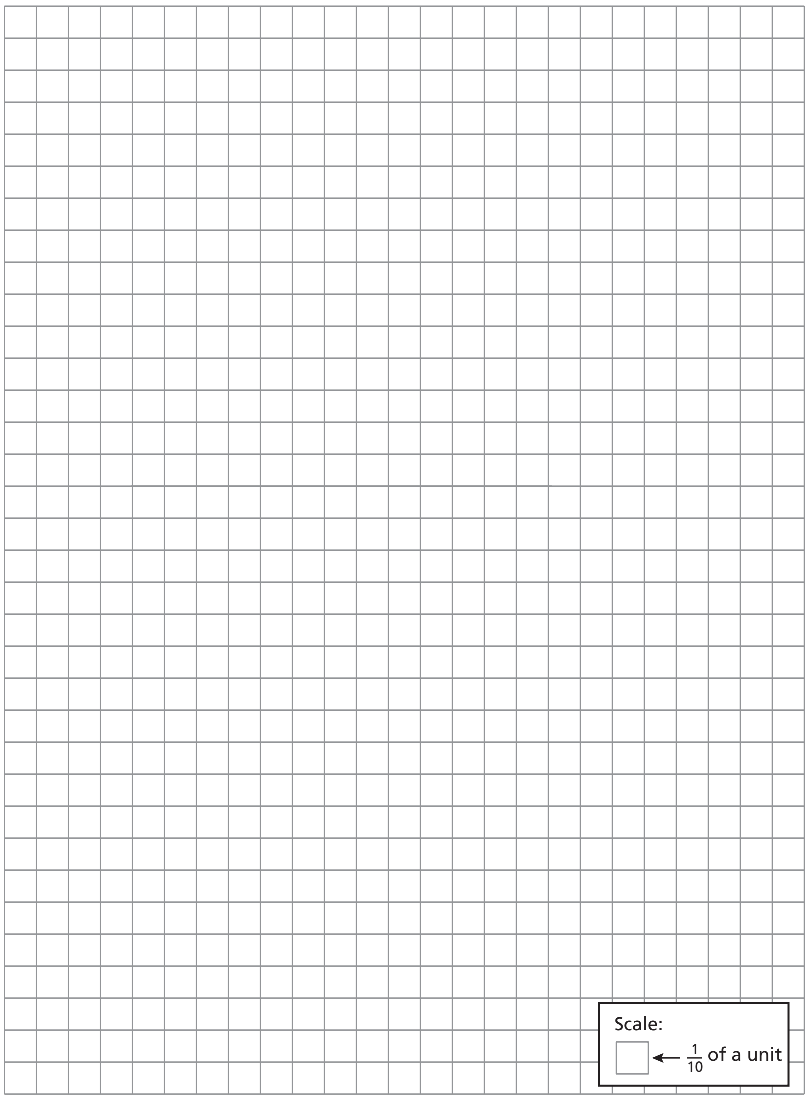
Name____ Date__________

7.4 Approximating Square Roots (continued)

4. Compare your approximation in Activity 3 with your results from Activity 1.

What Is Your Answer?

5. Repeat Activity 3 for a triangle in which segment *AC* is 2 units and segment *BA* is 3 units. Use the Pythagorean Theorem to find the length of segment *BC*. Use the grid paper to approximate $\sqrt{5}$ to the nearest tenth.



6. **IN YOUR OWN WORDS** How can you find decimal approximations of square roots that are not rational?

Name ____ Date __________

7.4 Practice
For use after Lesson 7.4

Classify the real number.

1. $\sqrt{14}$

2. $-\frac{3}{7}$

3. $\frac{153}{3}$

Estimate the square root to the nearest (a) integer and (b) tenth.

4. $\sqrt{8}$

5. $\sqrt{60}$

6. $-\sqrt{\frac{172}{25}}$

Which number is greater? Explain.

7. $\sqrt{88}, 12$

8. $-\sqrt{18}, -6$

9. $14.5, \sqrt{220}$

10. The velocity in meters per second of a ball that is dropped from a window at a height of 10.5 meters is represented by the equation $v = \sqrt{2(9.8)(10.5)}$. Estimate the velocity of the ball. Round your answer to the nearest tenth.

Name____ Date__________

Extension 7.4

Practice

For use after Extension 7.4

Write the decimal as a fraction or a mixed number.

1. $0.\overline{3}$

2. $-0.\overline{2}$

3. $1.\overline{7}$

4. $-2.\overline{6}$

5. $0.4\overline{6}$

6. $-1.8\overline{3}$

Extension 7.4 **Practice (continued)**

7. $-0.7\overline{3}$

8. $0.\overline{18}$

9. $-3.\overline{24}$

10. $1.\overline{09}$

11. The length of a pencil is $1.5\overline{6}$ inches. Represent the length of the pencil as a mixed number.

Name ____ Date __________

7.5 Using the Pythagorean Theorem

For use with Activity 7.5

Essential Question In what other ways can you use the Pythagorean Theorem?

The *converse* of a statement switches the hypothesis and the conclusion.

Statement:	Converse of the statement:
If p, then q.	If q, then p.

1 ACTIVITY: Analyzing Converses of Statements

Work with a partner. Write the converse of the true statement. Determine whether the converse is *true* or *false*. If it is true, justify your reasoning. If it is false, give a counterexample.

a. If $a = b$, then $a^2 = b^2$.

Converse:____

b. If $a = b$, then $a^3 = b^3$.

Converse:____

c. If one figure is a translation of another figure, then the figures are congruent.

Converse:____

d. If two triangles are similar, then the triangles have the same angle measures.

Converse:____

Is the converse of a true statement always true? always false? Explain.

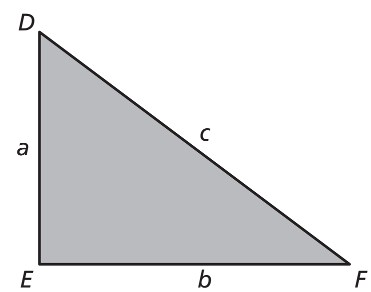
7.5 Using the Pythagorean Theorem (continued)

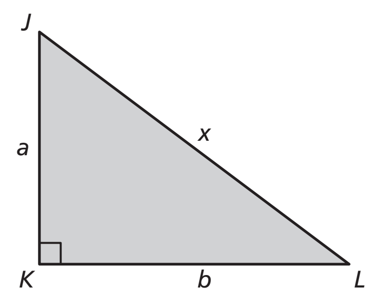
2 ACTIVITY: The Converse of the Pythagorean Theorem

Work with a partner. The converse of the Pythagorean Theorem states: "If the equation $a^2 + b^2 = c^2$ is true for the side lengths of a triangle, then the triangle is a right triangle."

a. Do you think the converse of the Pythagorean Theorem is *true* or *false*? How could you use deductive reasoning to support your answer?

b. Consider $\triangle DEF$ with side lengths a, b, and c, such that $a^2 + b^2 = c^2$. Also consider $\triangle JKL$ with leg lengths a and b, where $\angle K = 90°$.





- What does the Pythagorean Theorem tell you about $\triangle JKL$?

- What does this tell you about c and x?

- What does this tell you about $\triangle DEF$ and $\triangle JKL$?

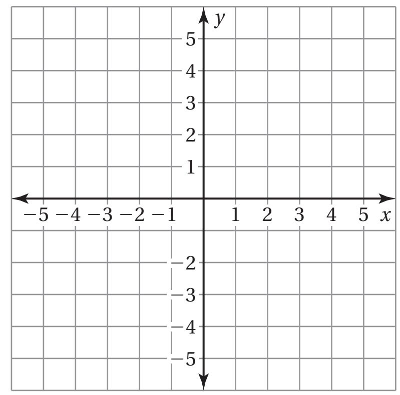
- What does this tell you about $\angle E$?

- What can you conclude?

7.5 Using the Pythagorean Theorem (continued)

3 ACTIVITY: Developing the Distance Formula

Work with a partner. Follow the steps below to write a formula that you can use to find the distance between and two points in a coordinate plane.



Step 1: Choose two points in the coordinate plane that do not lie on the same horizontal or vertical line. Label the points (x_1, y_1) and (x_2, y_2).

Step 2: Draw a line segment connecting the points. This will be the hypotenuse of a right triangle.

Step 3: Draw horizontal and vertical line segments from the points to form the legs of the right triangle.

Step 4: Use the x-coordinates to write an expression for the length of the horizontal leg.

Step 5: Use the y-coordinates to write an expression for the length of the vertical leg.

Step 6: Substitute the expressions for the lengths of the legs into the Pythagorean Theorem.

Step 7: Solve the equation in Step 6 for the hypotenuse c.

What does the length of the hypotenuse tell you about the two points?

What Is Your Answer?

4. **IN YOUR OWN WORDS** In what other ways can you use the Pythagorean Theorem?

5. What kind of real-life problems do you think the converse of the Pythagorean Theorem can help you solve?

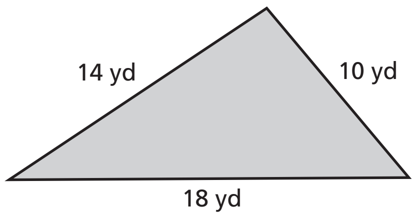
Name ______________________________ Date __________

7.5 Practice

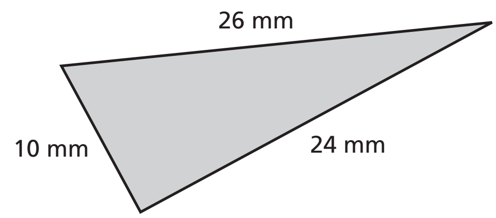
For use after Lesson 7.5

Tell whether the triangle with the given side lengths is a right triangle.

1.



2.



3. 4 m, 4.2 m, 5.8 m

4. 31 in., 35 in., 16 in.

Find the distance between the two points.

5. $(2, 1), (-3, 6)$

6. $(-6, -4), (2, 2)$

7. $(1, -7), (4, -5)$

8. $(-9, 3), (-5, -8)$

9. The cross-section of a wheelchair ramp is shown. Does the ramp form a right triangle?