Name____________________________ Period___________ Date____________________

8-15
STUDENT PACKET

GRADE 8 MATHLINKS
STUDENT PACKET 15
GEOMETRY DISCOVERIES

WORD BANK

Word or Phrase	Definition or Explanation	Example or Picture
base		
cone		
cylinder		
height		
similar triangles		
sphere		
volume		

SIMILAR TRIANGLES

Summary (Ready)	Goals (Set)
We will establish the angle-angle criterion for similar triangles, and use it to show that triangles are similar. We will find missing side lengths of similar triangles. We will link properties of similarity to the slope of a line and to a famous theorem.	• Establish the angle-angle criterion for similarity of triangles. • Apply the angle-angle criterion to solve problems. • Link concepts of parallel lines and similar triangles to slopes of lines. • Prove a famous theorem using similar triangles.

Warmup (Go)

In similar figures, like the triangles given below, corresponding angles are congruent (≅), and lengths of corresponding sides are proportional.

Fill in each blank to complete a true statement

1. $\angle CTA \cong$ __________

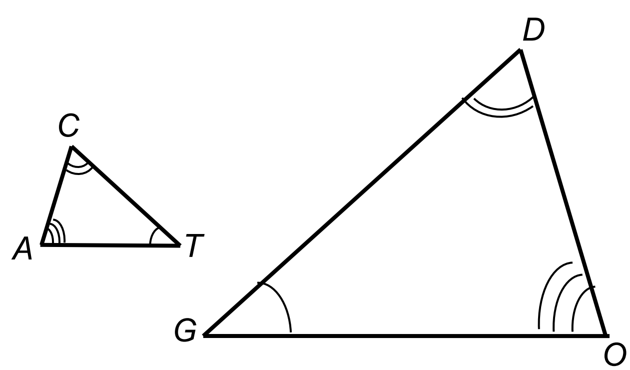
2. $\angle CAT \cong$ __________

3. $\angle GDO \cong$ __________

4. $\dfrac{|CT|}{|DG|} = \dfrac{|CA|}{\quad} = \dfrac{\quad}{\quad} = \dfrac{1}{3}$

5. $\dfrac{|OG|}{|AT|} = \dfrac{\quad}{\quad} = \dfrac{\quad}{\quad} = \dfrac{3}{1}$

6. Δ __________ ~ Δ __________



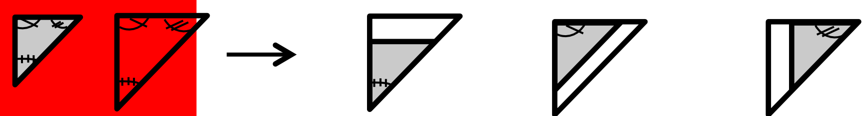
SIMILAR TRIANGLES REVISITED

1. Your teacher will give you some triangles to cut out. Determine which pairs of triangles are similar.

2. Record pairs of similar triangles and the ratio of corresponding lengths (scale factor).

pairs of similar triangles	______, ______	______, ______	______, ______	______, ______
scale factor				

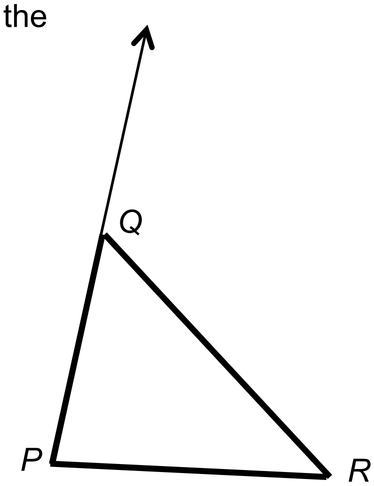
Gaby took two triangles and nested them to show that corresponding angles are congruent.



3. Why does this confirm that the sides that appear parallel are, in fact, parallel?

4. Do you think Gaby's two triangles are similar? _____ Explain.

To show that two triangles are similar, you only need to show that corresponding angles are congruent.



5. On the diagram at the right, draw points, rays, and segments on the diagram as instructed by your teacher.

6. Mark congruent angles. Explain why they are congruent.

7. What is the name of the transformation illustrated in the diagram?

8. Name the similar triangles. Δ __________ ~ Δ __________

9. Did you use the fact that the angles were congruent to create similar triangles? _______

10. Did you use the fact that the sides were proportional to create similar triangles? _______

ANGLE-ANGLE SIMILARITY CRITERION

1. To determine if two triangles are similar, is it sufficient to show that corresponding angles of one triangle are congruent to corresponding angles of another?

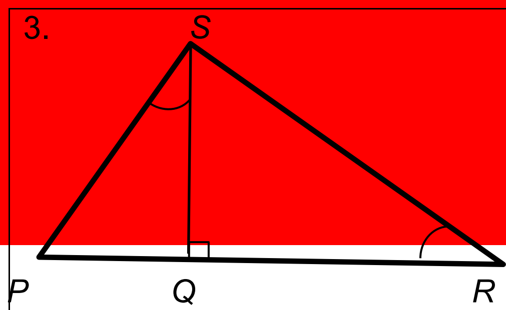
2. To determine if two triangles are similar, what is the minimum number of corresponding angles that must be shown to be congruent?

Angle-Angle Criterion for Similar Triangles (AA Criterion)

If two angles of one triangle are congruent to two angles of another triangle, then the triangles are similar.

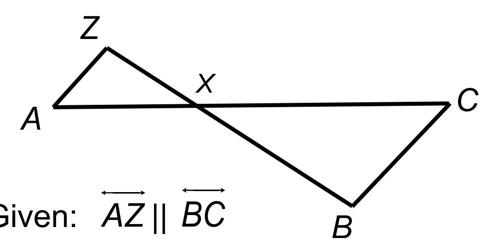
- Use what is given to mark what you know about congruent angles directly on the diagram.
- Establish similar triangles by selecting an appropriate reason from the "Reason List."

3.



Statement	Reason
$\angle PSQ \cong \angle$ ______	______
$\angle PQS \cong \angle$ ______	______
$\Delta PQS \sim \Delta$ ______	______

4.



Given: $\overleftrightarrow{AZ} \parallel \overleftrightarrow{BC}$

Statement	Reason
$\angle ZXA \cong \angle$ ______	______
$\angle AZX \cong \angle$ ______	______
$\Delta AZX \sim \Delta$ ______	______

Reason List

A. If two parallel lines are cut by a transversal, alternate interior angles are congruent.

B. If two parallel lines are cut by a transversal, corresponding angles are congruent.

C. All right angles are congruent.

D. AA Criterion

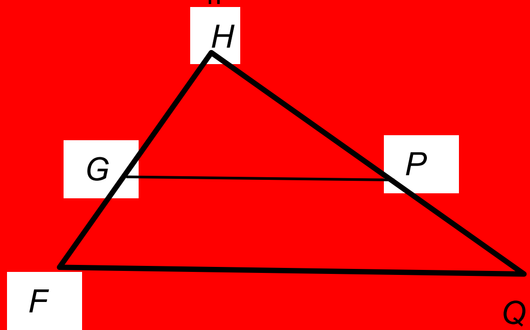
E. Vertical angles are congruent.

F. Given information

SHOWING TRIANGLES ARE SIMILAR

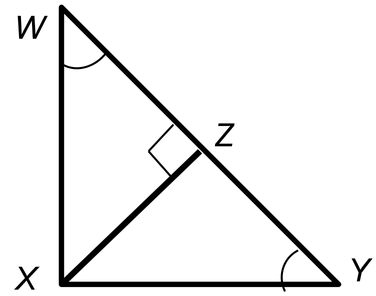
- Use what is given to mark what you know about angles and their measures on the diagram.
- Show the triangles are similar by selecting appropriate reasons from the "Reason List."

1. Given: $\overleftrightarrow{GP} \parallel \overleftrightarrow{FQ}$



Statement	Reason
$\overleftrightarrow{GP} \parallel \overleftrightarrow{FQ}$	________
$\angle HFQ \cong \angle$ ________	________
$\angle FHQ \cong \angle$ ________	________
$\Delta HFQ \sim \Delta$ ________	________

2. Given: $\lvert\angle W\rvert = 45°$



Statement	Reason
$\lvert\angle W\rvert = 45°$	________
$\angle W \cong \angle Y$	________
$\lvert\angle WXY\rvert = 90°$	________
$\lvert\angle WZX\rvert = 90°$	________
$\angle WXY \cong \angle WZX$	________
$\Delta WXY \sim \Delta WZX$	________

Reason List

A. If two parallel lines are cut by a transversal, then alternate interior angles are congruent.

B. If two parallel lines are cut by a transversal, then corresponding angles are congruent.

C. All right angles are congruent and equal to 90°.

D. An angle is congruent to itself.

E. Vertical angles are congruent.

F. Given information.

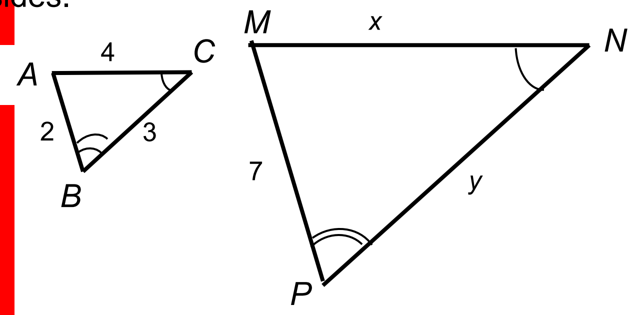
G. The measure was found using the fact that perpendicular lines form right (90°) angles.

H. The measure was found using the fact that the sum of the measures of the angles in a triangle is 180°.

J. AA Criterion

SIDE LENGTHS OF SIMILAR TRIANGLES

Recall that if two triangles are similar, then their corresponding sides are proportional. We can use proportions to find the lengths of missing sides.



1. Identify similar triangles.

   $\Delta ABC \sim \Delta$_________

   Why?

2a. Find x by creating a proportion based on ratios of corresponding segments <u>between</u> the two figures. $\frac{4}{x} = \frac{\quad}{\quad}$	2b. Find x by creating a proportion based on a ratio of corresponding segments <u>within</u> each figure. $\frac{4}{2} = \frac{\quad}{\quad}$
2c. Why do the two proportions give the same result?	

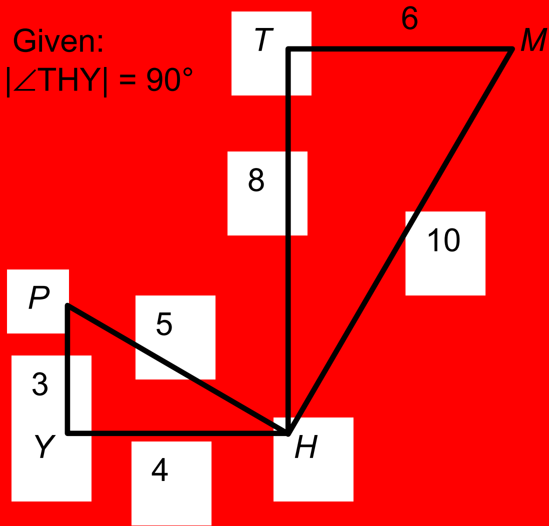
3a. Find y by creating a proportion based on ratios of corresponding segments <u>between</u> the two figures.	3b. Find y by creating a proportion based on a ratio of corresponding segments <u>within</u> each figure.
3c. Serena tried to find the length of segment y using the proportion $\frac{2}{3} = \frac{y}{7}$. Why is it incorrect to use this equation to solve for y?	

SIDE LENGTHS OF SIMILAR TRIANGLES (Continued)

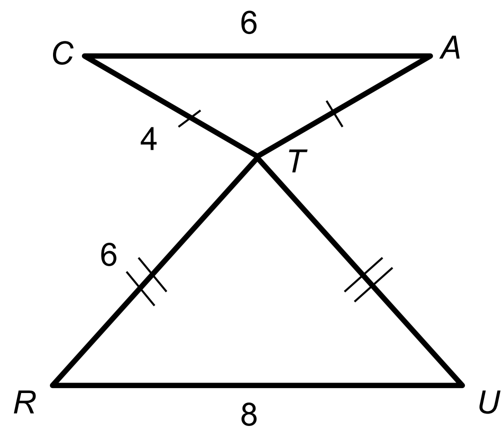
Determine if the triangles in each problem are similar. Justify your conclusion.

4.

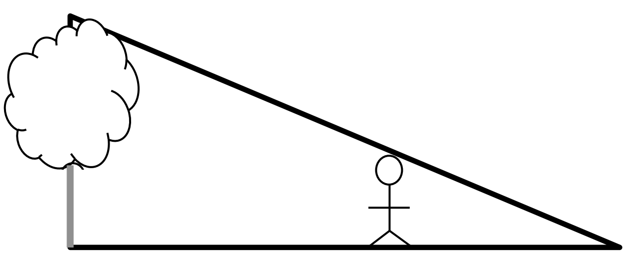
Given:
$|\angle THY| = 90°$



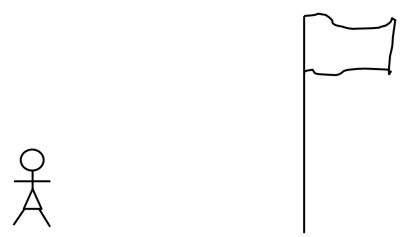
5.



6. Marcellus is 5 feet tall. He casts a 7-foot shadow. At the same time, the shadow of a tree is 21 feet. Approximately how tall is the tree?



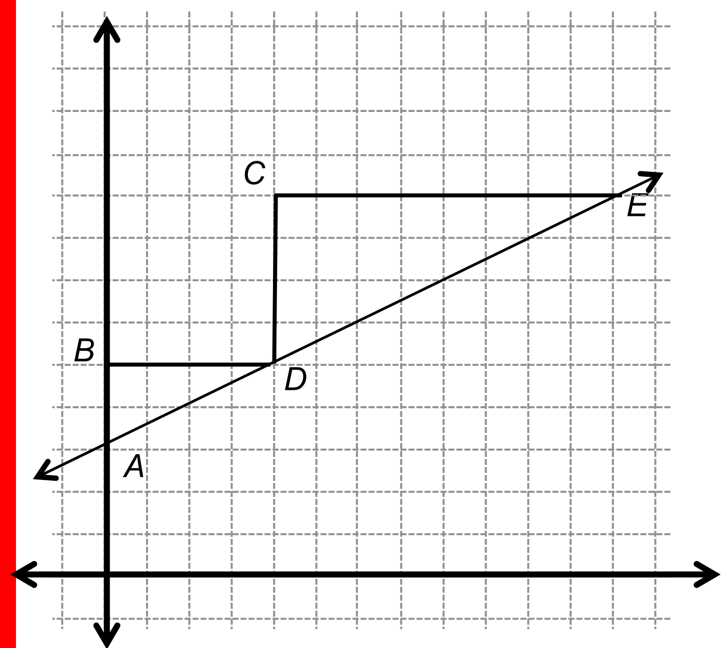
7. Nadia is 4 feet 8 inches tall. She casts a shadow that is 2 feet 4 inches. At the same time, the shadow of the flagpole is 6 feet 8 inches. Find the approximate height of the flagpole in feet and inches.



SIMILARITY AND SLOPE

We will now connect our knowledge of similar triangles to the concept of slope.

First we will establish that $\Delta ABD \sim \Delta DCE$ in the diagram to the right.



1. Why is $\overline{BD} \parallel \overline{CE}$?

2. $\angle ABD \cong \angle$ ________ Explain

3. $\angle BAD \cong \angle$ ________ Explain

4. $\Delta ABD \sim \Delta$ ________ Explain

5. Mark congruent angles for ΔABD and ΔDCE on the diagram.

6. In similar triangles, corresponding side lengths are ____________________.

   Therefore the ratios of corresponding legs will be ____________________.

7. Find ratios of corresponding legs within the similar triangles.

   $\dfrac{|AB|}{|BD|} =$ $\qquad\qquad$ $\dfrac{|CD|}{|CE|} =$

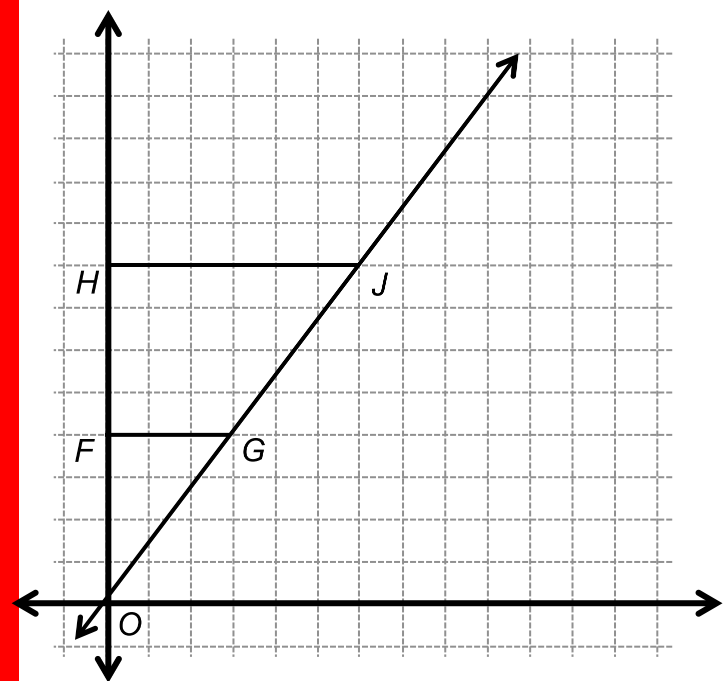
8. Find the equation of $\overleftrightarrow{AE}$ in slope-intercept form. Circle the slope in your equation.

9. How are the results from problems 7 and 8 related?

SIMILARITY AND SLOPE 2

Show that the slope between any two points on a line is the same using a different diagram.

First establish that $\Delta OFG \sim \Delta OHJ$ in the diagram to the right,



1. Why is $\overleftrightarrow{FG} \parallel \overleftrightarrow{HJ}$?

2. $\angle OHJ \cong \angle$________ Explain

3. $\angle HJO \cong \angle$ ________ Explain

4. $\Delta OFG \sim \Delta$ ________ Explain

5. Mark congruent angles for ΔOFG and ΔOHJ on the diagram.

6. Find ratios of corresponding legs within the similar triangles.

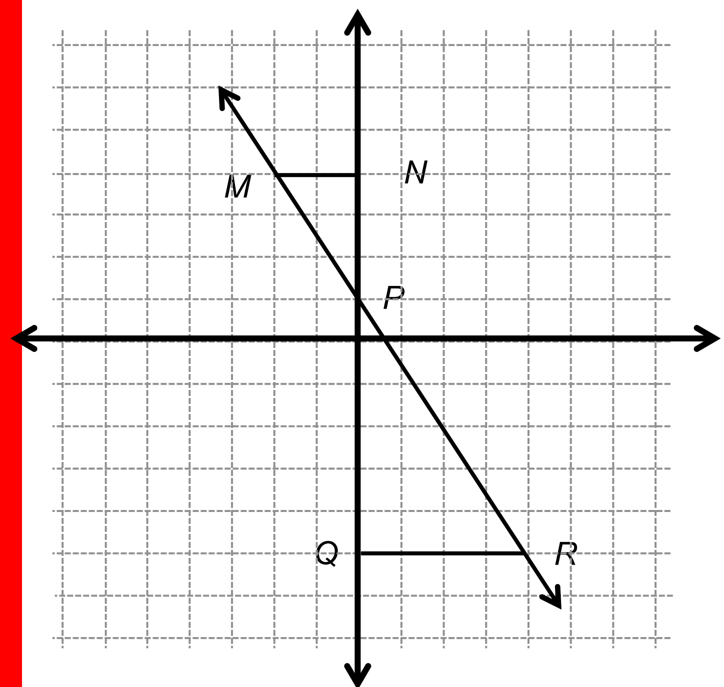
   $\frac{|OF|}{|FG|} =$ $\qquad\qquad$ $\frac{|OH|}{|HJ|} =$

7. Find the equation of line $\overleftrightarrow{OJ}$ in slope-intercept form. __________________ Circle the slope in the equation. Why is the slope the same as the ratio of corresponding sides of the similar triangles?

8. Draw another right triangle whose legs are horizontal and vertical segments and whose hypotenuse is a segment on $\overleftrightarrow{OJ}$. Find the ratio of the legs. What do you notice?

SIMILARITY AND SLOPE 3

1. Do you think the slope of a line is always the same as the ratio of lengths of the legs obtained from similar right triangles that use a portion of the line as the hypotenuse?



First establish that $\Delta MNP \sim \Delta RQP$ in the diagram to the right.

2. Why is $\overleftrightarrow{MN} \parallel \overleftrightarrow{QR}$?

3. $\angle MPN \cong \angle$_______ Explain

4. $\angle PNM \cong \angle$ _______ Explain

5. $\Delta MNP \sim \Delta$ _______ Explain

6. Mark congruent angles for ΔMNP and ΔRQP on the diagram.

7. Find ratios of corresponding legs within the similar triangles.

$$\frac{|NP|}{|MN|} = \qquad\qquad \frac{|PQ|}{|QR|} =$$

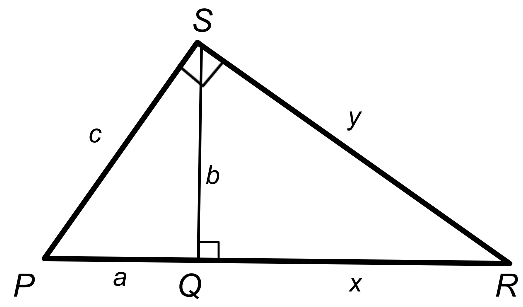
8. Find equation of $\overleftrightarrow{MR}$ in slope-intercept form. ________________ Circle the slope.

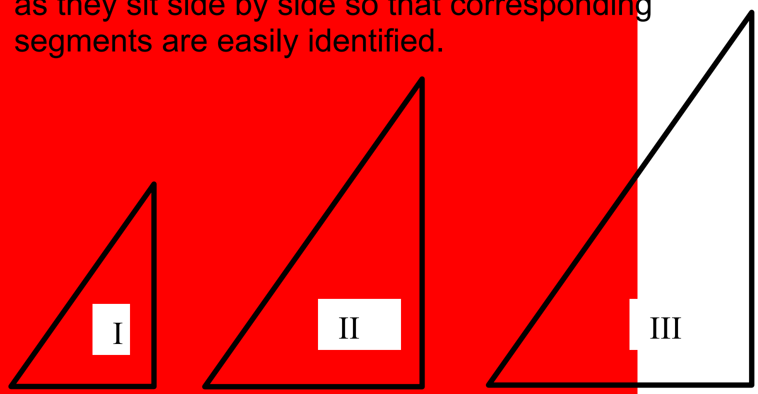
9. Why is the slope NOT the same as the ratio of corresponding sides of the similar triangles?

10. Use similar triangles to explain why the slope is the same between any two distinct points on a non-vertical line in the coordinate plane.

SIMILIARITY DISCOVERY

1. Within the diagram at the right are three right triangles. Label angles and lengths of the triangles as they sit side by side so that corresponding segments are easily identified.





2. Establish that the triangles are similar using the AA Similarity Criterion.

Δ I ~ Δ III because $\angle$______ $\cong \angle$______ and $\angle$______ $\cong \angle$______ .

Δ II ~ Δ III because $\angle$______ $\cong \angle$______ and $\angle$______ $\cong \angle$______ .

Δ I ~ Δ II because ____ .

When triangles are similar, their sides are proportional.

3. Write an equation that states that $\dfrac{\text{length of shorter leg}}{\text{length of longer leg}}$ in triangles I and II are proportional. This proportion tells us that *ax* = _____	4. Write an equation that states that $\dfrac{\text{length of hypotenuse}}{\text{length of shorter leg}}$ in triangles I and III are proportional. This proportion tells us that *ax* = ________

5. Since two expressions are equal to *ax*, they are equal to each other. Write the equality. Then rewrite it so there are no negative coefficients.

What did you just prove?

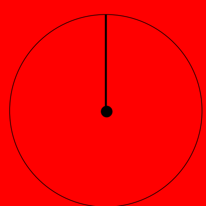
VOLUME OF CYLINDERS

Summary (Ready)	Goals (Set)
We will develop the formula for the volume of cylinders and apply it to solve problems.	• Develop the formula for volume of cylinders. • Use the formula for the volume of cylinders to solve problems.

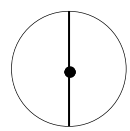
Warmup (Go)

Find the area of each circle with the given radius or diameter measures. (Use $\pi \approx 3.14$.)

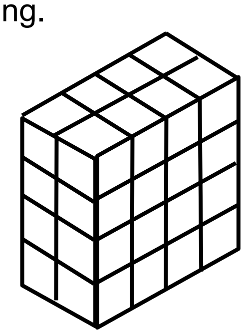
1. r = 6mm



2. d = 8mm



Consider the rectangular prism pictured here to complete the following.



3. How many squares are in the top (or bottom) rectangular base (B) of this prism? _____

4. How many cubes are in the top (or bottom) horizontal “layer” of this rectangular prism? _____

5. How many horizontal layers are there? _____

6. How many cubes are there in all? (this is the total volume) __________

7. Write the length, width, and height of this prism. ℓ = _____, w = _____, h = _____
8. Write a formula to find the volume of a rectangular prism using ℓ, w, and h.

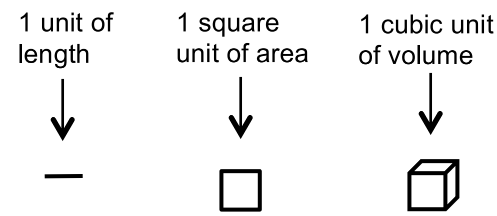
   V = __________________

9. Write a second version of this formula using B. V = _________

VOLUME OF A CYLINDER

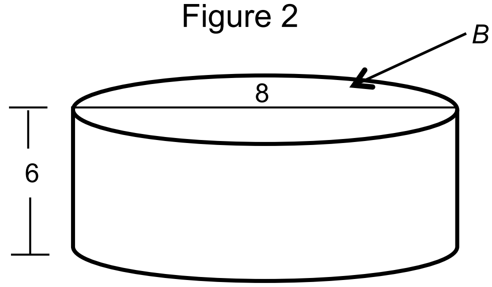
1. Figure 1 illustrates some common units of measurement. The line segment represents one unit of ________________, the square represents one square unit of ________________, and the cube represents one cubic unit of ______________.

Figure 1



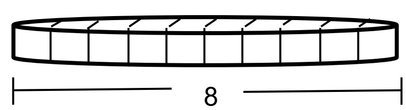
2. Figure 2 illustrates a shape that is called a ________________. It has a base area (B) in the shape of a ________________. The ____________________ of the base is 8 units. Find the area of the base. (Use $\pi \approx 3.14$.)

Figure 2



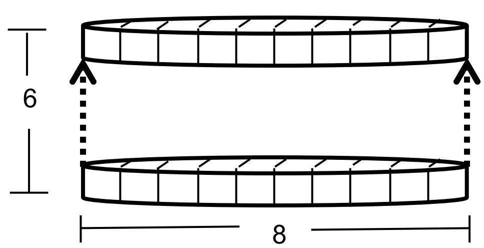
3. Figure 3 illustrates the bottom "layer" of the cylinder, which has height 1 unit. How many cubic units are in this layer? In other words, what is the volume of the bottom layer?

Figure 3



4. Figure 4 suggests that the cylinder has ______ layers. How many cubic units are in this cylinder? In other words, what is the volume of the cylinder?

Figure 4



VOLUME OF A CYLINDER (Continued)

5. John observed the process on the previous page and said, “the formula for the volume of a cylinder is really the same as the formula of a rectangular prism, as long as you can find the base area and know the height.” Write a formula based upon John’s comment in terms of *B* and *h*.

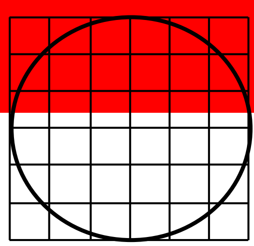
$V =$ ___________

6. Jasmin said, “I agree with John, but I have something different, because I know that the base of a cylinder is a circle.” Substitute the circle area formula into the formula above to illustrate what Jasmin is saying.

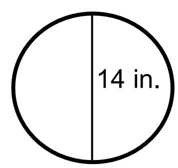
$V =$ ___________

Find the volume of each cylinder described below. (Use $\pi \approx 3.14$.)

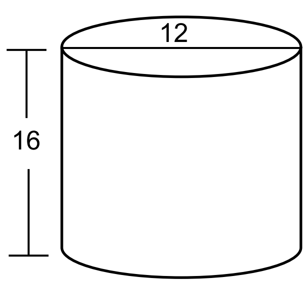
7.
- base pictured here
- each small square is 1 square unit
- height is 10 units



8.
- base is pictured here
- diameter is given
- height is 20 inches



9.
- Units given in centimeters



10.
- base has radius is 6 feet
- height is 30 feet

CYLINDER PROBLEMS

1. Find the volume of a cylinder if the radius of the base is $3\frac{1}{2}$ cm, and the height is 4 cm. (Use $\pi \approx \frac{22}{7}$.)

2. Find the volume of a cylinder if the base has a diameter of 3 inches and the height is 6 inches. (Use $\pi \approx 3.14$.)

3. A soup can is measured and is found to have a radius of about 3.7 cm and a height of about 7.3 cm. Round all decimals to two places.

a. Sketch and label the can's dimensions.

b. Find its volume in cubic cm (Use $\pi \approx 3.14$.)

c. The label on the can lists the volume as 310.52 mL. Is this a reasonable volume of soup for this can compared to what you calculated above? Explain. (1 cubic cm is equivalent to 1 mL.)

VOLUME OF CONES AND SPHERES

Summary (Ready)	Goals (Set)
We will develop of the formulas for the volume of cones and spheres and apply them to solve problems.	• Develop the formulas for volume of cones and spheres. • Use the formulas for volume of cones and spheres to solve problems.

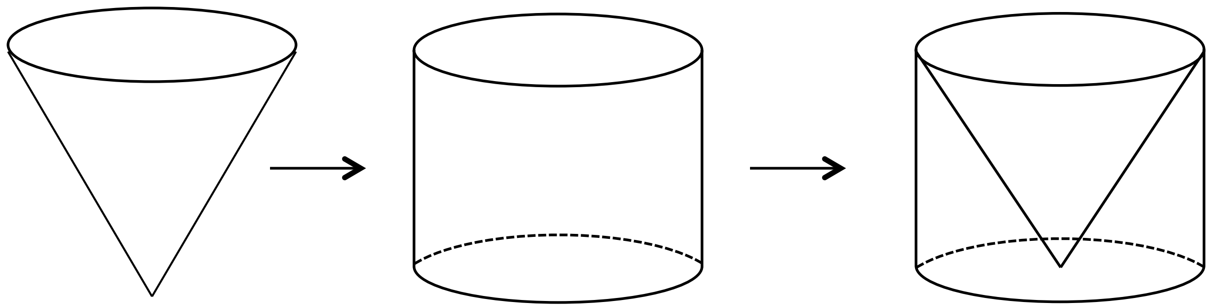
Warmup (Go)

1. Sketch a cylinder with a height of 20 cm and diameter of 14 cm. Then find its volume.

   Express an exact answer in terms of π and an approximate answer using $\pi \approx \frac{22}{7}$.

2. A circle has a circumference of 40 in. Find its radius. Express an exact answer in terms of π and an approximate answer using $\pi \approx 3.14$

VOLUME OF A CONE DISCOVERY



1. Compare the height h of the cone and the cylinder.

2. Compare the areas of the circular bases B of the cone and the cylinder.

3. Predict the number of pours it will take from the cone to fill the cylinder. ________

4. This means that the volume of the cone is ________ (fraction) of the volume of the cylinder.

(After the experiment)

5. Derive the formula for volume of a cone.

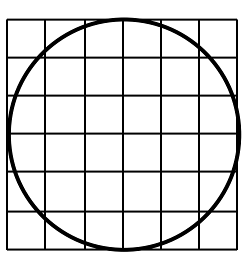
   a. Begin with volume of a cylinder ⟶ $V_{cylinder}$ = ______________

   b. The cone is ________ (fraction) of the cylinder ⟶ V_{cone} = (_____) • $V_{cylinder}$

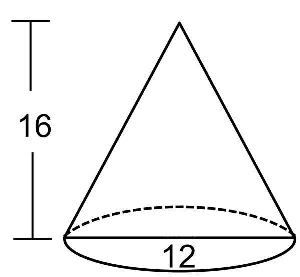
   c. Substitute ⟶ $\boxed{V_{cone} = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_}$

Find the volume of each cone described below. (Use $\pi \approx 3.14$.)

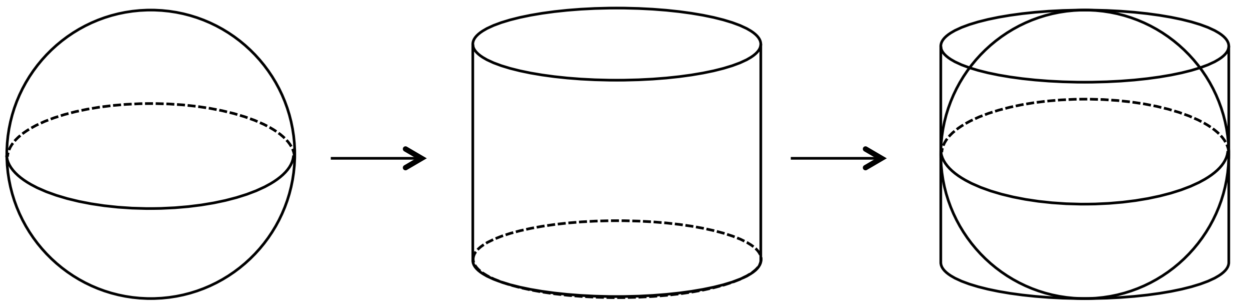
6. base area pictured;
   each small square is 1 square unit;
   height is 10 units



7. units given in cm



VOLUME OF A SPHERE DISCOVERY



1. Compare the height h of the cylinder to the diameter of the sphere.

2. Compare the diameter d of the cylinder to the diameter of the sphere.

3. Predict the number of pours it will take from the sphere to fill the cylinder. ________

4. This means that the volume of the sphere is ________ of the cylinder.
   (fraction)

(After the experiment)
5. Derive the formula for volume of a sphere.

   a. Begin with volume of a cylinder $\longrightarrow$ $V_{cylinder}$ = ______________

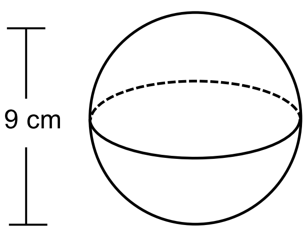
   b. The sphere is ________ (fraction) of the cylinder $\longrightarrow$ V_{sphere} = (_____) • $V_{cylinder}$

   c. Substitute (recall the relationship between the height of the cylinder and diameter of the sphere) $\longrightarrow$ V_{sphere} = ______________

   V_{sphere} = ______________

   $\boxed{V_{sphere} = \text{\_\_\_\_\_\_\_\_\_\_\_\_\_\_}}$

6. Find the volume of the sphere. (Use $\pi \approx 3.14$.)



CONE AND SPHERE PROBLEMS

Use $\pi \approx 3.14$ and round all decimals to two places.

Circumference of a circle	Volume of a cone	Volume of a sphere
$C = 2\pi r$	$V_{cone} = \frac{1}{3}\pi r^2 h$	$V_{sphere} = \frac{4}{3}\pi r^3$

1. A basketball used by the NCAA can be no larger than 30 inches in circumference. Find the maximum volume.	
Sketch:	Calculations:
Answer in a complete sentence:	

2. A dessert cone is packed with frozen yogurt, and then another scoop is placed on top. The cone's base has a diameter equal to 6 cm and a height of 10 cm. The scoop on top approximates a hemisphere that is 8 cm in diameter. Give a reasonable approximation of the total amount of yogurt used in the cone and on top of the cone. Which part of the dessert cone contains more yogurt?	
Sketch:	Calculations:
Answer in a complete sentence:	

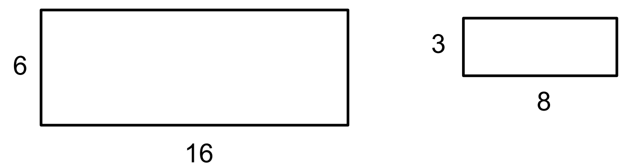
SKILL BUILDERS, VOCABULARY, AND REVIEW

SKILL BUILDER 1

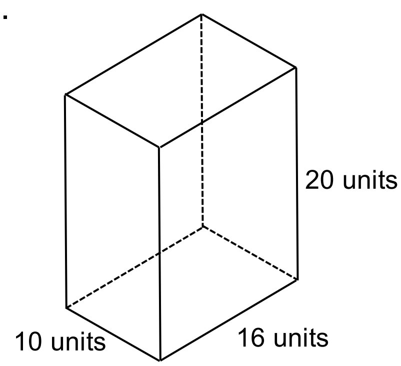
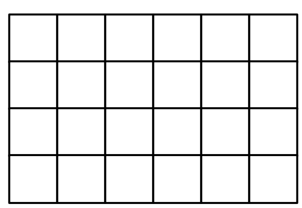
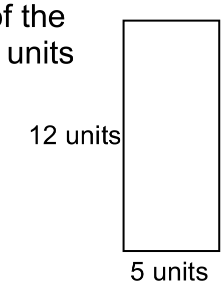
Write each listed number in scientific notation.

	Number NOT in Scientific Notation	Number in Scientific Notation
1.	37,900,000,000	
2.	0.000000379	
3.	23.4×10^{10}	
4.	0.234×10^{-6}	

5. The following rectangles are similar. Using their given side lengths, write at least three different, true proportions.



Find the volume of each right rectangular prism illustrated or described in cubic units.

6.  *V* = ________________	7. Top view of the prism: Height of the prism: 5 units  *V* = ________________	8. Top view of the prism Height of the prism: 6 units  *V* = ________________

9. Why can a right triangle NOT have side lengths 9, 12, and 16 inches?

SKILL BUILDER 2

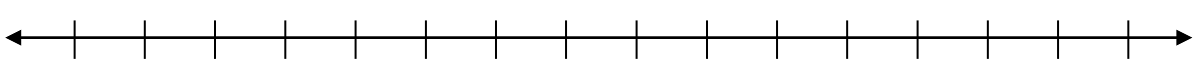
Compute.

1. $\frac{5}{6}+\frac{3}{8}$	2. $\frac{5}{6}-\frac{3}{8}$	3. $4\frac{2}{3}+1\frac{3}{5}$
4. $4\frac{2}{3}-1\frac{3}{5}$	5. $\frac{3}{4}\bullet\frac{2}{5}$	6. $\dfrac{\frac{5}{6}}{\frac{1}{3}}$
7. $3.0005 + 24.76$	8. $(2.7)(9.1)$	9. $\dfrac{0.045}{0.9}$

Write each fraction as a decimal. (The letters are for number line placement below.)

10. (*A*) $\frac{1}{2}$	11. (*B*) $\frac{1}{4}$	12. (*C*) $\frac{3}{4}$	13. (*D*) $1\frac{1}{2}$
14. (*E*) $\frac{1}{10}$	15. (*F*) $\frac{9}{10}$	16. (*G*) $\frac{1}{100}$	17. (*H*) $\frac{57}{100}$

Locate each number from problems 10-17 on the number line. Scale appropriately.



SKILL BUILDER 3

Compute. Write answers as rational numbers.

1. $2^{-4} \bullet 2^{2}$	2. $(2^{-3})^{-2}$	3. $3^{3} \bullet 2^{-2}$

Write in exponent form.

4. $17^{19} \bullet 17^{-25}$	5. $(x^{5})^{-2}$	6. $\dfrac{\left(x^{-3}\right)^{5}}{x^{-6}}$

Compute.

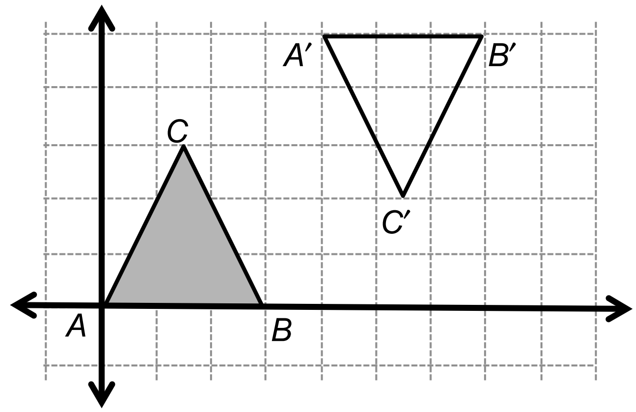
7. $\dfrac{\sqrt{64}}{4}$	8. $\dfrac{\sqrt[3]{64}}{4}$	9. $\dfrac{5+\sqrt{4}}{5-\sqrt{4}}$
10. $\sqrt{\dfrac{1}{81}}$	11. $\sqrt[3]{\dfrac{8}{27}}$	12. $\left(8+\sqrt{25}\right)\left(8-\sqrt{25}\right)$

Put $>, <$, or = in the blank to complete a true statement.

13. $\sqrt[3]{-1}$ _____ $\sqrt{1}$	14. $\left(\sqrt{\dfrac{16}{25}}\right)^{2}$ _____ $\dfrac{4}{5}$	15. $\sqrt{9+16}$ _____ $\sqrt{9}+\sqrt{16}$

SKILL BUILDER 4

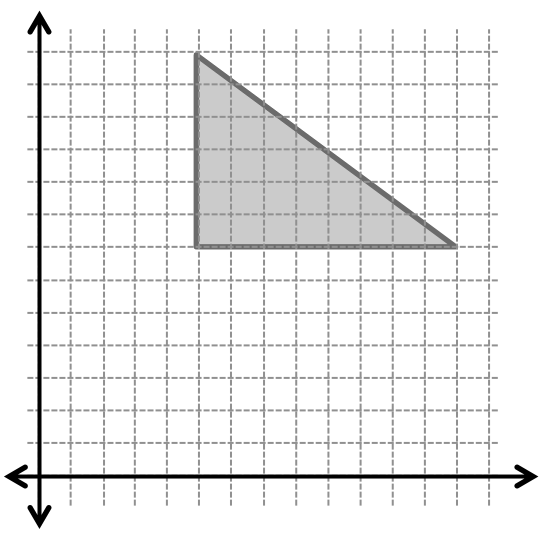
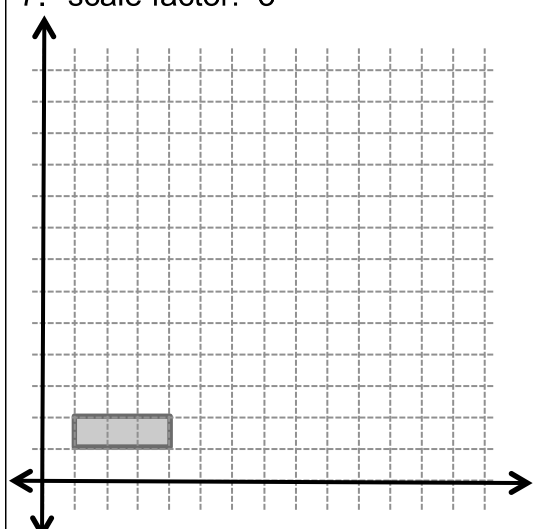
1. Describe a sequence of transformations that maps ΔABC to its image $\Delta A'B'C'$. Use words, pictures and symbols.



Answer each question using proper notation.

2. Which angles are congruent ($\cong$) to each other?	3. Which sides are congruent ($\cong$) to each other?
4. When two figures are congruent, what do you know about their corresponding angles?	5. When two figures are congruent, what do you know about their corresponding sides?

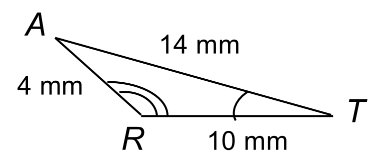
For each figure, identify the coordinates of its vertices. Then dilate it using the given scale factor and center at the origin. Check that the center of the dilation is the origin by drawing rays from the origin through corresponding points on the figure and its image.

6. scale factor: 0.5 	7. scale factor: 3 

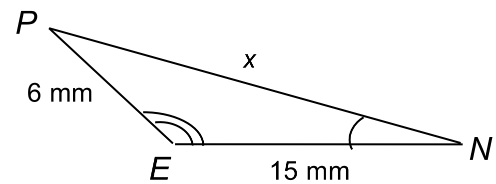
8. How does a dilation with scale factor greater than 1 differ from a dilation with scale factor less than 1?

SKILL BUILDER 5

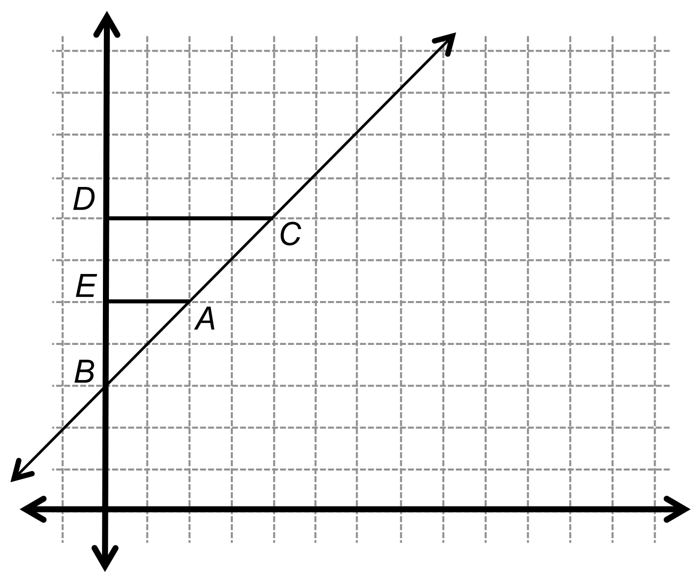
1. Explain how you know $\Delta ART \sim \Delta PEN$.



2. Knowing these triangles are similar, find x.



Establish that $\Delta BEA \sim \Delta BDC$.



3. Find ratios of corresponding legs **within** the similar triangles.

   $\dfrac{|BE|}{|EA|} =$

   $\dfrac{|BD|}{|DC|} =$

4. Find the slope of $\overleftrightarrow{BC}$ and write the equation of the line in slope-intercept form. Circle the slope in your equation.

5. How are the results of problems 3 and 4 related?

6. Use the Pythagorean Theorem to find |BA| and |BC|. Leave these lengths in square root form.

SKILL BUILDER 6

Use $\pi \approx 3.14$ and round all decimals to two places.

1. Sketch and label a cylindrical cup that has a height of 12 cm and a circular base with diameter of 8 cm. Then find the volume.	2. Sketch and label a traffic cone that has a height of 2 feet and a base with an 8 inch radius. Then find the volume. (Think about what units are appropriate.)

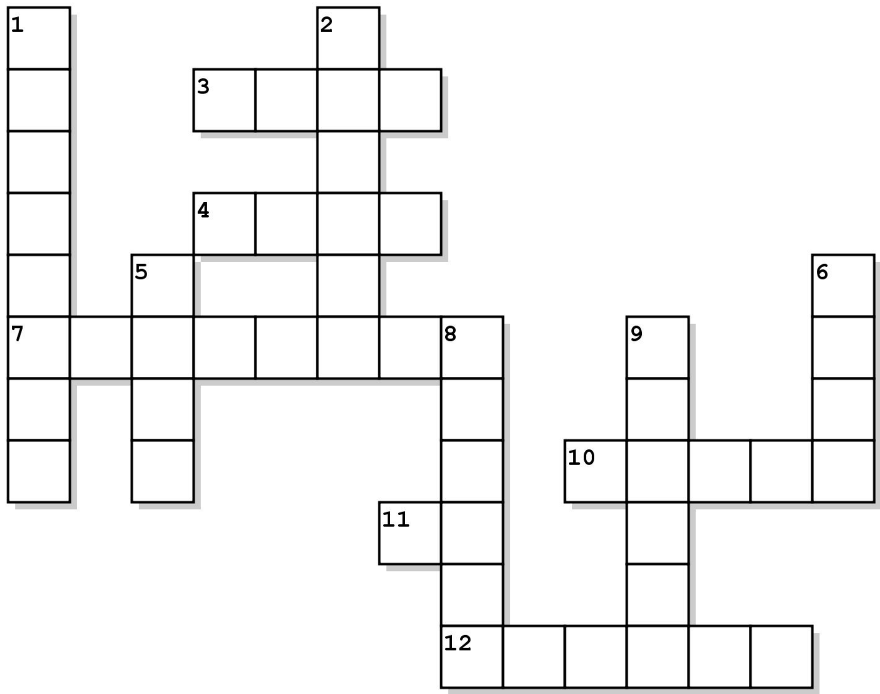
3. The rules of golf specify that a golf ball must have a diameter that is at least 42.8 mm.

   a. Use this information to find the approximate volume of a golf ball in cubic cm.

   b. About how many times smaller is the volume of the golf ball than the volume of the cup in problem 1?

   c. Estimate the number of golf balls that you think might actually be able to fit in the cup. Write a few sentences to justify why your estimate is reasonable.

FOCUS ON VOCABULARY



Across		Down	
3	measure of size of a two-dimensional figure	1	3-dimensional shape whose bases are congruent circles
4	two of the sides of a right triangle	2	length of an altitude
7	longest chord in a circle	5	a cone has one of these
10	ratio of vertical change to horizontal change on a line	6	a 3-dimensional figure with one circular base and an apex
11	ratio of circumference to diameter in a circle	8	half the diameter of a circle
12	3-dimensional surface defined by a center and a radius	9	measure of size of a three-dimensional figure

SELECTED RESPONSE

Show your work on a separate sheet of paper and choose the best answer(s).

1. Choose all true statements regarding the angle-angle similarity criterion for triangles.
   A. If two angles of one triangle are congruent to two angles of another triangle, then the triangles are similar.

   B. If we know two pairs of corresponding angles of two triangles are congruent, we need not consider the third pair of corresponding angles because we can reason they are already congruent.

   C. If two angles of one triangle are congruent to two angles of another triangle, then you should always check to see if corresponding sides of the triangles are congruent before determining that the triangles are similar.

   D. If two angles of one triangle are congruent to two angles of another triangle, then you should always check to see if corresponding sides of the triangles are proportional before determining that the triangles are similar.

---

2. A 5, 12, 13 right triangle is similar to which of the following right triangles?

   A. 3, 4, 5 B. 6, 8, 10 C. 10, 24, 26 D. 15, 36, 39

---

3. Find the volume of a cylinder with height of 12 cm and diameter of 16 cm. Use $\pi \approx 3.14$.

   A. 1,808.64 cm^2 B. 2,411.52 cm^2 C. 7,234.56 cm^2 D. 9,646.08 cm^2

---

4. How are the volume of a cylinder and a cone with the same base diameter and same height related? Choose ALL that apply.

   A. The cylinder's volume is three times the cone's volume.

   B. The cone's volume is three times the cylinder's volume.

   C. The cylinder's volume is one-third of the cone's volume.

   D. The cone's volume is one-third of the cylinder's volume.

---

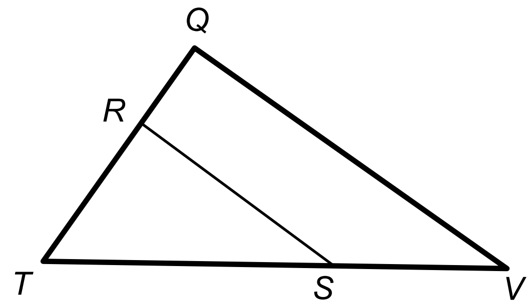
5. A standard tennis ball is approximately 6.7 cm in diameter. Find its volume. Use $\pi \approx 3.14$.

   A. About 157 cm^3 B. About 47 cm^3 C. About 1,2594 cm^3 D. About 188 cm^3

KNOWLEDGE CHECK

15.1 Similar Triangles

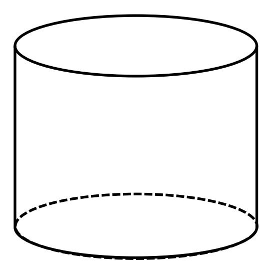
1. $\overleftrightarrow{RS} \parallel \overleftrightarrow{QV}$. Choose reasons from the “Reason List” to explain why $\Delta RTS \sim \Delta QTV$.

<table>
<tr>
<td>


$\overleftrightarrow{RS} \parallel \overleftrightarrow{QV}$ because ______
$\angle QTV \cong \angle RTS$ because ______
$\angle TRS \cong \angle TQV$ because ______
$\Delta RTS \sim \Delta QTV$ because ______
</td>
<td>
Reason List
A. Given information
B. If two parallel lines are cut by a transversal, then alternate interior angles are congruent.
C. If two parallel lines are cut by a transversal, then corresponding angles are congruent.
D. AA Similarity Criterion
E. An angle is congruent to itself.
</td>
</tr>
</table>

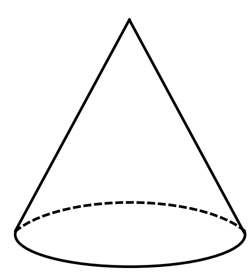
15.2 Volume of Cylinders

2. Find the volume of a cylinder with a height of 10 inches and radius of 6 inches. Use $\pi \approx 3.14$.



15.3 Volume of Cones and Spheres

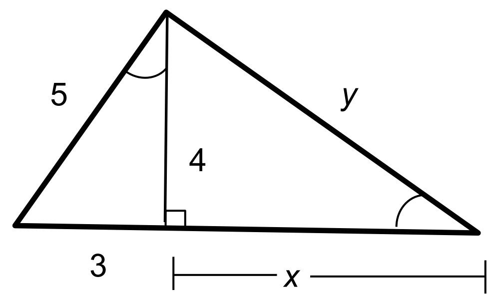
3. Find the volume of a cone with a height of 10 inches and a diameter of 12 inches. Use $\pi \approx 3.14$.



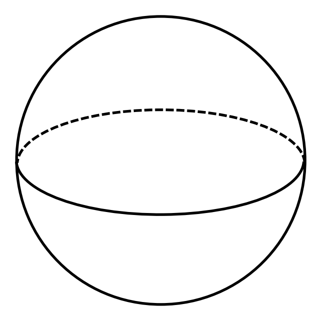
HOME-SCHOOL CONNECTION

Here are some questions to review with your young mathematician.

1. There are three similar triangles in this figure. Draw and label them. Then find x and y.



2. Basketballs come in different sizes for different age players. A basketball used for a middle school league is about 28 inches in circumference. Find the approximate volume of this basketball.



Parent (or Guardian) Signature ___________________________

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COMMON CORE STATE STANDARDS – MATHEMATICS

STANDARDS FOR MATHEMATICAL CONTENT

8.NS.2	Use rational approximations of irrational numbers to compare the size of irrational numbers, ~~locate them approximately on a number line diagram, and estimate the value of expressions~~ (e.g., $\sqrt{2}$). *For example, by truncating the decimal expansion of* $\sqrt{2}$ *, show that* $\sqrt{2}$ *is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.*
8.EE.6	Use similar triangles to explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.
8.G.5	Use informal arguments to establish facts about ~~the angle sum and exterior angle of triangles, about~~ the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. *For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.*
8.G.6	Explain a proof of the Pythagorean Theorem and its converse.
8.G.9	Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

STANDARDS FOR MATHEMATICAL PRACTICE

MP1	Make sense of problems and persevere in solving them.
MP2	Reason abstractly and quantitatively.
MP3	Construct viable arguments and critique the reasoning of others.
MP4	Model with mathematics.
MP5	Use appropriate tools strategically.
MP6	Attend to precision.
MP7	Look for and make use of structure.
MP8	Look for and express regularity in repeated reasoning.

9 7 8 1 6 1 4 4 5 2 2 3 2