Title: Geometry Words

Materials:
Teacher notes and script. (*This page and next.*)
Student note sheets. (*There are 2 pages. Make a copy of both pages for each student.*)
Word Sort Activity (*Make enough copies of the activity page so that, when cut in half, there are enough for each student to have one copy. Each student will also need a sheet of colored copy paper to make the foldable.)*
Overheads *(Make an overhead of the answers to the word sort as well as the student problems.)*

Previous Knowledge Needed: Basic Mathematical Operations and General Understanding of Ratios & Proportions, Perimeter & Circumference, Area & Surface Area, and Volume

Important Concepts/Methods:
To change words to the math they represent:
Step 1: Read the problem and answers
Step 2: Reread the problem and highlight or circle the key words.
Step 3: Now go back and cross out names, places, and other non-essential information.
Step 4: Change the key words to the symbols they represent, and decide what mathematical operations and procedures you need to use to solve the problem.

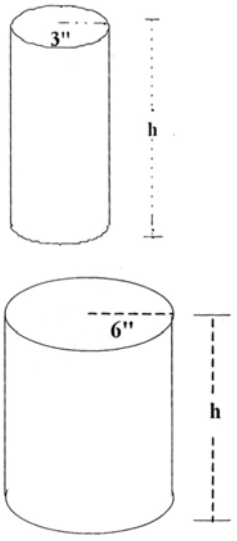
Script:

Today we're going to work on the vocabulary we find in word problems and changing the words to the symbols and operations that represent them. We are going to start by making a foldable to sort the most common words. You need to take your colored paper and fold it in half hamburger style. Unfold and fold each hamburger half in half again – to the middle fold line. Unfold and make a new fold hot dog style. Tear or cut at the fold lines on one half of the hotdog fold to make 4 flaps. Label the 4 flaps with *Ratios & Proportions, Perimeter & Circumference, Area & Surface Area, and Volume*. (*Hand out list of words to be sorted.*) This is a list of some of the most frequently used words that tell us to do specific operations. You need to sort these words by identifying the operations they represent. (*Have students write them on the inside of their foldables IN PENCIL so they can erase and move any they place incorrectly. Students can work with a partner or in small groups for this part.*)

After allowing some time for sorting and discussion (limit to 10 minutes), go over the correct placement with students.

Now let's practice with some word problems. *(Pass out "Ideas that I'm going to study and learn.")* Step 1 says, "Read the problem and answers." *(Put problem up on overhead and read.)*

Problem: It takes 198 cubic centimeters of sand to fill the small cylinder below. If the cylinder is stretched so the height stays the same but the radius is doubled, how much sand is needed to fill the new cylinder?



A 7128 cubic centimeters
B 1188 cubic centimeters
C 792 cubic centimeters
D 494 cubic centimeters
E 396 cubic centimeters

Step 2 says, “Reread the problem and highlight or circle the key words.” Who can help me find the key words? *(Give students a chance to think, then help them come up with “fill, cubic centimeters, height same, radius doubled”. Circle on the overhead. Make sure students do the same on their papers.)*

Step 3 says, “Now go back and cross out names, places, and other non-essential information.” What words can we cross out? *(Students will see that there is no non-essential information. They could fill in the numbers on the diagram.)*

Step 4 says, “Change the key words to the symbols they represent, and decide what mathematical operations and procedures you need to use to solve the problem.” What do we need to find in this problem? *(Guide students to say “we need to calculate volume of the large cylinder, which needs information, namely height, from the small cylinder.)* How should we set up our problem? *(Guide students through setup of volume equation for small cylinder. Solve for the height. Use this height to find the volume of the large cylinder. Write the problem on the overhead and show solution is 792 cubic centimeters.)* So the answer is C.

Any questions? *(Answer any questions students have.)*

Common Mistakes:
Point out to students that they don’t have to multiply through by pi, they should keep pi in their answer until the last minute because in problems like these it cancels out. Don’t do unnecessary multiplying.

Student Problems:
Try the next problems on your own. *(Give students time to try the problem.)*
(Put overhead up and either work out problems or give students the opportunity to come up and explain them. Make sure they do all steps.)

Assignment: *None*

It takes 198 cubic centimeters of sand to fill the small cylinder below. If the cylinder is stretched so the height stays the same but the radius is doubled, how much sand is needed to fill the new cylinder?

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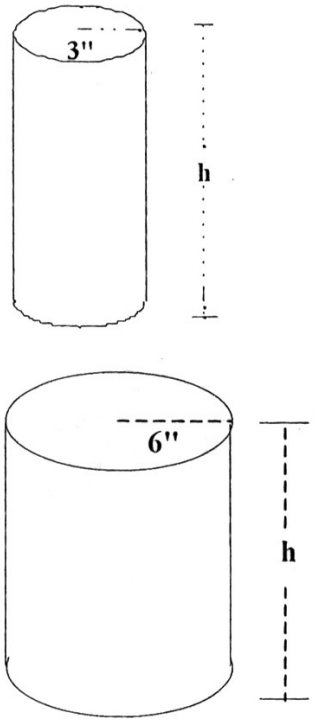

The depth of a rectangular wading pool is 2 feet. The volume of the pool is 16 cubic feet. What is the area, in square feet, of the bottom of the pool?

A. 4
B. 8
C. 14
D. 32

Tess is laying new floor tiles in her bathroom. Her bathroom floor is a perfect rectangle and covers 40 square feet. If each tile measures 2 feet on each side, how many tiles will she need to cover the floor?

A. 10 tiles
B. 20 tiles
C. 40 tiles
D. 80 tiles

Brandon wants to enlarge a photo that is 3 inches wide and 4 inches long to be a 24-inch-wide poster. How long will the poster be?

A. 6¾ inches
B. 9⅓ inches
C. 18 inches
D. 32 inches

The length of a rectangular field is 3 feet more than its width. The farmer who owns the field wants to enclose the field with a fence. If the field is 12 feet wide, how much fencing does the farmer need to completely enclose the field?

A. 27 feet
B. 30 feet
C. 36 feet
D. 54 feet

Word Sort

Is to	Laps around a pool/track	How many cubic units	Around	trimming/ framing
Painting	__ has a scale factor of ___	Filling a pool or a box	Covering	enclose
__ is __% of __	__ is to __ as __ is to __	How much space inside	__ is similar to __	different units with different numbers
Borders/edges	Carpeting/ wallpaper	Stacking/pile	How many units	circle graphs
Revolutions of a tire	wrapping	How many square units	stuffing	filling a flat surface
shadow & mirror problems	laying sod or seeding	Fencing	Percents	similar triangle problems

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Word Sort Answers

Ratio/Proportion

Is to
Has a scale factor of
___ is ___% of ____
___is to ___as ___is to ____
_____ is similar to _____
different units with different numbers
circle graphs
shadow and mirror problems
percents
similar triangle problems

Perimeter & Circumference

Laps around a pool/track
around
trimming/framing
enclose
borders/edges
how many units
revolutions of a tire
fencing

Area & Surface Area

Filling a flat surface
Painting
Covering
How much space inside
Carpeting/wallpaper
Wrapping
How many square units
Laying sod or seeding

Volume

filling a pool or a box
How much space inside a 3-D shape
Stacking/pile
How many cubic units
Stuffing

Ideas that I'm going to study and learn.

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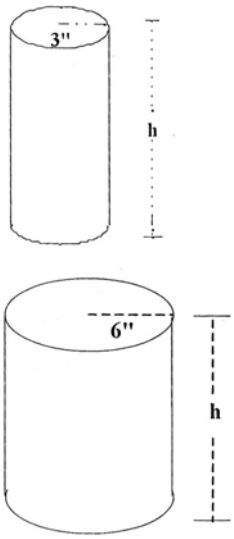
Example:

It takes 198 cubic centimeters of sand to fill the small cylinder below. If the cylinder is stretched so the height stays the same but the radius is doubled, how much sand is needed to fill the new cylinder?



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D. 494 cubic centimeters

To try on my own:

The depth of a rectangular wading pool is 2 feet. The volume of the pool is 16 cubic feet. What is the area, in square feet, of the bottom of the pool?

A. 4
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Solution Key

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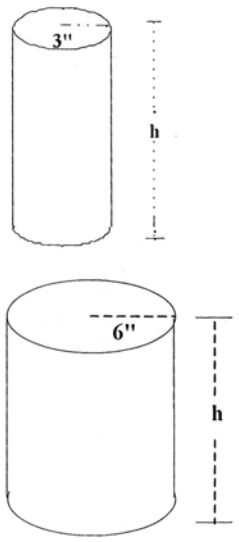

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$$V = 2\pi r^2 h$$

For small cylinder: $198 = 2\pi\left(3^2\right)h$, *now solve for h*

$$198 = 2\pi(9)h$$
$$198 = 18\pi h$$
$$\frac{198}{18\pi} = \frac{18\pi h}{18\pi}$$
$$\frac{11}{\pi} = h \Rightarrow \textit{Use to find Volume of big cylinder!}$$

For big cylinder: $V = 2\cancel{\pi}\left(6^2\right)\left(\frac{11}{\cancel{\pi}}\right)$

$$V = 2(36)(11)$$
$$V = 792$$

To try on my own:

The depth of a rectangular wading pool is 2 feet. The volume of the pool is 16 cubic feet. What is the area, in square feet, of the bottom of the pool?

A. 4
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$V = l \times w \times h$, *but* $l \times w$ *is the area of the base!*

Then $V = (\textit{area of base}) \times h$

So, $16 = \textit{area} \times 2$

$$\frac{16}{2} = \frac{\textit{area} \times 2}{2}$$
$$8 = \textit{area}$$

Tess is laying new floor tiles in her bathroom. Her bathroom floor is a perfect rectangle and covers 40 square feet. If each tile measures 2 feet on each side, how many tiles will she need to cover the floor?

A. 10 tiles
B. 20 tiles
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Covering means area!

If each tile is 2 feet on each side, it must be a square.

$$Area\ of\ a\ square = s^2$$

$$So,\ area\ of\ each\ tile = (2\ ft)^2 = 4\ ft^2$$

$$\frac{Total\ area\ of\ floor}{area\ of\ each\ tile} = \#\ of\ tiles$$

$$\frac{40}{4} = 10\ tiles$$

Brandon wants to enlarge a photo that is 3 inches wide and 4 inches long to be a 24-inch-wide poster. How long will the poster be?

A. 6¾ inches
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Enlarging photos means proportion!

$$\frac{Width\ of\ photo}{Length\ of\ photo} = \frac{Width\ of\ poster}{Length\ of\ poster}$$

$$\frac{3}{4} = \frac{24}{x} \Rightarrow Cross\ multiply!$$

$$3x = 96$$

$$\frac{3x}{3} = \frac{96}{3}$$

$$x = 32$$

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Fencing means perimeter!

Perimeter of a rectangle $= 2l + 2w$

$$P = 2(12\ feet + 3\ feet) + 2(12\ feet)$$

$$P = 2(15\ feet) + 24\ feet$$

$$P = 30\ feet + 24\ feet$$

$$P = 54\ feet$$