Have out your homework ready to check. TEST on Wednesday when we return from break!

Classwork - Changes in Dimension Day 2

1. The surface area of a cube is 400 square millimeters. What is the surface area of a similar cube that is larger by a scale factor of 3?

$$400 \cdot 3^2 = 3600 \, mm^2$$

2. **CANDLES** The volume of a candle is 8 cubic inches. What is the volume of a similar candle that is larger by a scale factor of 1.5?

$$8 \cdot 1.5^3 = 27 \, in^3$$

3. **TRAVEL** The volume of a suitcase is 4.2 cubic feet. What is the volume of a suitcase that is smaller by a factor of 0.9? Round to the nearest tenth.

$$4.2 \cdot 0.9^3 = 3.1 \, ft^3$$

4. DELI A deli owner uses 215 square centimeters of plastic wrap to cover a wedge of cheese. How many square centimeters of plastic wrap would she need to cover a wedge of cheese with a similar shape that is smaller by a scale factor of $\frac{1}{2}$? Round to the nearest tenth.

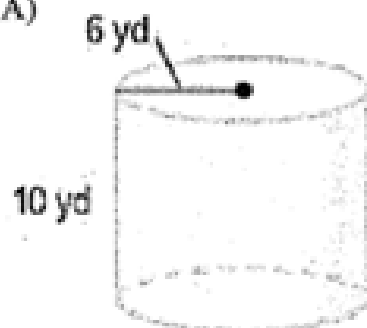$$215 \cdot \left(\frac{1}{2}\right)^2 = 53.8\,cm^2$$

5. CRACKERS A box of crackers has a volume of 48 cubic inches. What is the volume of a similar box that is smaller by a scale factor of $\frac{2}{3}$?

$$48\left(\frac{2}{3}\right)^3 = 14.\overline{2}\,in^3$$

SNACK CRACKERS
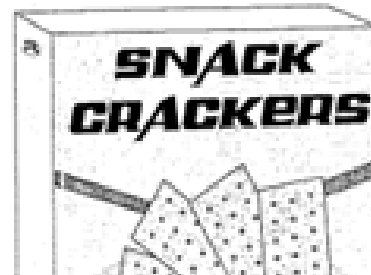
6. Find the volume and surface area of each 3D figure below and then use the scale factor given to find the new volume and scale factor of the similar figure. SHOW WORK AND LABEL.

A)

6 yd

10 yd

$$V = 3.14(6^2)(10) = 1130.4\,yd^3$$

New Volume

$$1130.4(2^3) = 9043.2\,yd^3$$

SA
$$C = 3.14(6)(2) = 37.68$$
$$A \text{ of } \square = 37.68(10) = 376.8\,yd^2$$
$$A \text{ of } O = 3.14(6^2) = 113.04\,yd^2$$
$$SA = 376.8 + 113.04 + 113.04 = 602.9\,yd^2$$

New SA
$$602.9(2^2) = 2411.6\,yd^2$$

New volume and surface area after enlarged by scale factor of 2.

$V = \underline{1130.4\,yd^3}$ S.A. $= \underline{602.9\,yd^2}$

$V = \underline{9043.2\,yd^3}$ S.A. $= \underline{2411.6\,yd^2}$

B)

20 in.

25 in.

$r = 12.5 in$

15 in.
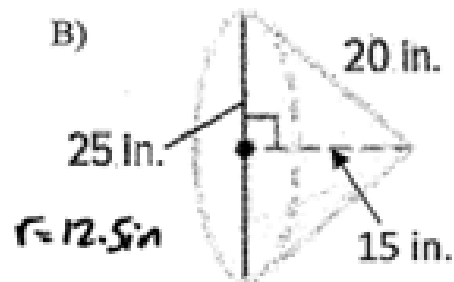
$B = 3.14(12.5^2)$

$B = 490.6 in^2$

$V = \frac{1}{3}(490.6)(15) = 2453 in^3$

SA

$L.A. = 3.14(12.5)(20) = 785 in^2$

$SA = 785 + 490.6 = 1275.6 in^2$

New Volume

$2453 \cdot (\frac{1}{3})^3 = 90.6 in^3$

New SA
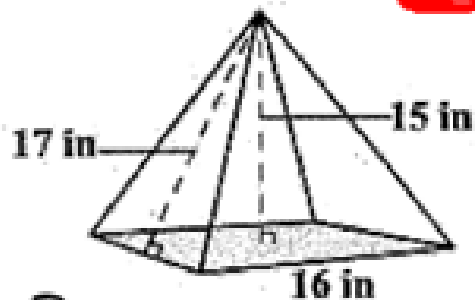
$1275.6 \cdot (\frac{1}{3})^2 = 141.73 in^2$

New volume and surface area after enlarged by scale factor of $\frac{1}{3}$.

$V = \underline{2453 in^3}$ S.A. = $\underline{1275.6 in^2}$

$V = \underline{90.6 in^3}$ S.A. = $\underline{141.7 in^2}$

C) The figure below is a square pyramid.

17 in

15 in

16 in

$B = 16 \cdot 16 = 256 in^2$

$V = \frac{1}{3}(256)(15) = 1280 in^3$

SA

$P = 16 \cdot 4 = 64 in$

$L.A. = \frac{1}{2}(64)(17) = 544 in^2$

$SA. = 544 + 256 = 800 in^2$

New Volume

$1280 \cdot 4^3 = 81920 in^3$

New SA.

$800 \cdot 4^2 = 12800 in^2$

New volume and surface area after enlarged by scale factor of 4.

$V = \underline{1280 in^3}$ S.A. = $\underline{800 in^2}$

$V = \underline{81920 in^3}$ S.A. = $\underline{12800 in^2}$

1) Suppose that a company sells laundry soap in boxes that measure 4 inches by 8 inches by 12 inches. The company wants to offer larger economy size box. $V = 4(8)(12) = 384 in^3$

   A) What changes in dimensions would give a box with double the volume?

   $4 \cdot 2 = 8 \ inches$

   $8 \ in \ by \ 8 \ in \ by \ 12 \ in$

   $\frac{768}{384} = 2$

   B) What changes in dimensions would give a box with triple the volume?

   $4 \cdot 3 = 12 \ inches$

   $12 \ in \ by \ 8 \ in \ by \ 12 \ in$

   $\frac{1152}{384} = 3$

   C) What change in dimensions would give a box with half the volume?

   D) Given each scale factor below, find the volume of the box similar to the basic box.

   i. scale factor of 2

   $384(2^3) = 3072 \ in^3$

   ii. Scale factor of 1.5

   $384(1.5^3) = 1296 \ in^3$

   iii. Scale factor of 0.5

   $384(0.5^3) = 48 \ in^3$

$r = 4$ in

2) Shamrock Pizza sells an 8-inch diameter pizza. SHOW WORK AND LABEL.

A) What is the total area of the pizza? SHOW WORK.

$A = \pi r^2$

$A = 3.14(4^2) = 50.24$ in^2

B) What is the circumference of the pizza?

$C = \pi d$

$C = 3.14(8) = 25.12$ in

C) Suppose Shamrock Pizza makes a larger pizza whose diameter is 1.5 times the size of the 8-inch. What is the new area of pizza? How many times larger is the area of the new pizza compared to the area of the 8-inch pizza?

$50.24 \cdot (1.5^2) = 113.04$ in^2

$\dfrac{113.04}{50.24} = 2.25$

$1.5^2 = 2.25$

The pizza $2\frac{1}{4}$ times larger

D) What is the new circumference of the pizza that is 1.5 times the size of the 8-inch? How many times larger is the circumference compared to the circumference of the 8-inch pizza?

$25.12 \cdot (1.5^1) = 37.68$ in

The circumference is 1.5 times larger.

3) The city of Centerville plans to dig a landfill in the shape of a rectangular prism. The landfill is 85 feet deep, 200 feet wide, and 700 feet long.

A) How many cubic feet of garbage will the landfill hold?

≥ 1.1

B) The city manager says that an increase of only 10% in each dimension would increase the capacity of the landfill by 33%. Is she correct? Explain.

$$Percent\ of\ Change = \frac{Amount\ of\ Change}{Original\ Amount} \times 100$$

4) A small box of cereal in the shape of a rectangular prism costs $3.25. The volume is 138 cubic inches. If the manufacturer changes each of dimensions of the box by a scale factor of 1.2, what should the new cost of the cereal be? SHOW WORK.

$138 \cdot (1.2)^3 = 238.5 in^3$

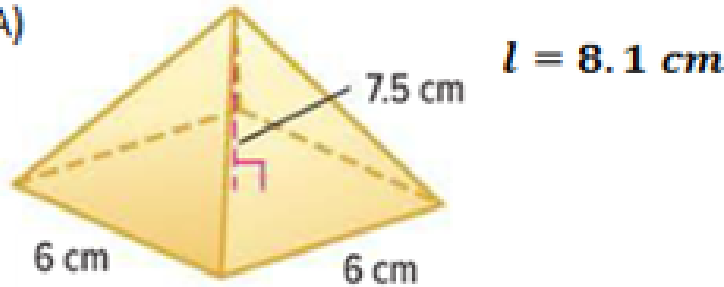$\frac{238.5}{138} = 1.73$

$Cost = 3.25(1.73) = \$5.62$

$1.2^3 = 1.73$

5) Find the volume and surface area of each 3D figure below and then use the scale factor given to find the new volume and scale factor of the similar figure. SHOW WORK AND LABEL.
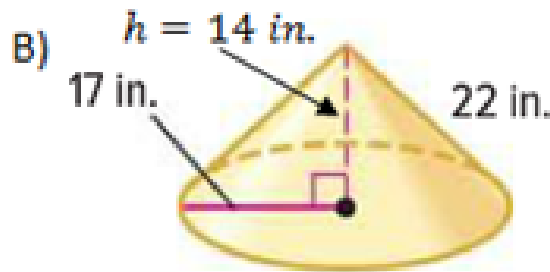
A)

$l = 8.1\ cm$

7.5 cm

6 cm

6 cm

New volume and surface area after enlarged by scale factor of 3.

V = _____   S.A. = _____   V = _____   S.A. = _____

B)

$h = 14\ in.$

17 in.

22 in.

$B = 3.14(17^2) = 907.46\ in^2$

$V = \frac{1}{3}(907.46)(14) = 9239.8$

$L.A. = 3.14(17)(22)$

$SA = 1174. \quad = 1174.36$
$\quad\quad 7.36 + 907.46$

$V = \underline{9239.8\ in^3}$ S.A. = $\underline{2081.82\ in^2}$

New volume and surface area after enlarged by ~~reduced~~ scale factor of $\frac{1}{4}$.

V = _____   S.A. = _____