Math 7 Test   **Name:** _____

SOL 7.5—Volume and Surface Area of Rectangular Prisms, Cylinders

Complete the following by writing formulas and showing all work. Calculators may be used. Place answers on blanks and include units. Round final answers to nearest tenth.

1. Jason is covering the inside of a box and the underside of the lid with soft fabric to hold his coin collection. The dimensions of the interior of the box are 8 inches long, 5 inches high, and 6 inches wide. How much material will Jason need to cover the inside of the box?
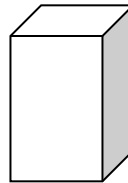
   Formula: _____

   _____

2. Describe and correct the error in finding the surface area of the figure if it has a length of 3 inches, a width of 2 inches, and a height of 7 inches.

   $$SA = (3)(7) + (2)(7) + (3)(2)$$
   $$= \quad 21 \quad + \quad 14 \quad + \quad 6$$
   $$= \qquad\quad 41 \text{ in}^2$$

   Describe the error(s) below.
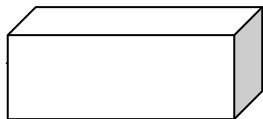
   _____

   _____

   Correction--formula: _____

   _____

3. Lawrence is constructing a wooden box. His first design is shown and has a length of 10 cm, a width of 5 cm, and a height of 7 cm. If Lawrence increases the *width* of the box by a scale factor of 3, *how many more* square centimeters of wood will he need to construct the box?
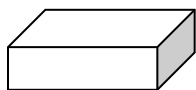
   Formula: _____

   _____

4. The volume of a box of laundry detergent is 17500 cm^3. If the length of the box is 35 cm and the width is 20 cm, what is the height of the box?

   Formula: _____

   _____

5. The figure shown has a length of 7 meters, a width of 4 meters, and a height of 2 meters.

      a) Find the surface area of the figure.

          Formula: _____

          _____

b) Find the surface area of the figure if the length is decreased by a scale factor of $\frac{1}{2}$.

    Formula: _____

    _____

6. Samson's regular cereal box is 10 inches long, 15 inches high, and 4 inches wide.

    a) How much cereal will Samson's regular cereal box hold?

        Formula: _____

        _____

    b) The supersize box of Samson's cereal has the same dimensions as the regular box except the height is 30 inches. *How much more* cereal will he get if he buys the supersize box?

        Formula: _____

        _____

7. Janice is choosing between two sports bags to hold her volleyball apparel and equipment. Both bags are shaped like rectangular prisms. The red bag has a length of 1.5 feet, a width of 0.8 feet, and a height of 1.2 feet. The green bag has a *width double* that of the red bag. Find the volume of both bags. *How many times greater* is the volume of the green bag than the red bag?

    Formula: _____

    red volume_____   green volume_____

           # times greater _____

8. The formula for the surface area of a cylinder consists of the sum of the <u>area of the two circles</u> (A) and the <u>area of the lateral surface (rectangle)</u> (B). Place the correct letter in the blank to describe each part of the formula.

$$SA = 2\pi r^2 + 2\pi rh$$

_____ + _____

9. A large deep dish pizza has a radius of 6 inches and a height of 1.5 inches. Find the surface area of the pizza.

Formula: _____

_____

10. Jane is making a pencil holder from a used soup can which has a diameter of 5 centimeters and a height of 9 centimeters. How many square centimeters of contact paper will she need to cover just the *label area* of the soup can?

Formula: _____

_____

11. A wooden water barrel has a diameter of $2\frac{1}{2}$ feet and a height of $4\frac{3}{5}$ feet. If 1 ft^3 ≈ 7.5 gallons, how many gallons of water will the barrel hold? The barrel is shaped like a cylinder.

Formula: _____

_____

12. Janice's circular swimming pool has a volume of 46.16 m^3 and a radius of 3.5 meters. What is the height of her pool?

Formula: _____

_____

Choose the best answer. Place the letter answers in the blanks.

_____ 13. The base of a water glass has a diameter of 3 inches, and the glass is 4 inches tall. How much will this water glass hold?
  A. 38 in^3 B. 151 in^3 C. 36 in^3 D. 28 in^3

_____ 14. Use the chart below to estimate the ratio of the circumference of a circle to the diameter of a circle.

Round Object	Circumference*	Diameter
glass	6	2
bowl	13	4
saucer	19	6
plate	22	7

*rounded to the nearest whole number

A. 1 : 3   B. 1/3   C. 3 : 1   D. 1 to 3

_____ 15. Jeff built a rectangular box for storing his fishing equipment at the boat dock. It had a length of 4 feet, width of 1 foot, and a height of 2 feet. Jeff felt that the box was too small, so he decided to double all three dimensions of the box. What will be the new volume of his rectangular storage box?

A. 8 ft^3 B. 64 ft^3 C. 24 ft^3 D. 16 ft^3

Answer question #'s 16 - 20 using the information found in the table below.

Length of rectangular prism	Width of rectangular prism	Height of rectangular prism	Measurement Changes	Volume (V)	Surface Area (SA)
4 cm*	3 cm*	2 cm*	Original*	24 cm^3*	52 cm^2*
8 cm	3 cm	2 cm	Doubled length	48 cm^3	92 cm^2
4 cm	6 cm	2 cm	Doubled width	48 cm^3	88 cm^2
4 cm	3 cm	4 cm	Doubled height	48 cm^3	80 cm^2

*original measures

16. a) What happened to the (V) when the length was doubled? _____

b) What happened to the (V) when the width was doubled? _____

c) What happened to the (V) when the height was doubled? _____

17. a) What happened to the (SA) when the length was doubled? _____

b) What happened to the (SA) when the width was doubled? _____

c) What happened to the (SA) when the height was doubled? _____

18. What will happen to the volume of a rectangular prism when one dimension is doubled?

_____

19. What will happen to the volume of a rectangular prism when one dimension is tripled?

_____

20. What will happen to the volume of a rectangular prism when one dimension is halved?

_____

Math SOL 7.5—Volume and Surface Area of Rectangular Prisms, Cylinders
Answer Key

1. $SA = 2lw + 2lh + 2wh$; 236 in^2
2. In the original replacements in the formula on the first line, multiplying each term by '2' was omitted.
   $SA = 2lw + 2lh + 2wh$; 82 in^2
3. $SA = 2lw + 2lh + 2wh$; 340 cm^2
4. $V = lwh$; 25 cm
5. a) $V = lwh$; 600 in^3 ; b) $V = lwh$; 1200 in^3 ; 600 in^3 more cereal
6. $SA = 2lw + 2lh + 2wh$; 100 m^2 ; 58 m^2
7. $V = lwh$; Red volume: 1.44 ft^3; Green volume: 2.88 ft^3; 2 times greater
8. A + B
9. $SA = 2\pi r^2 + 2\pi rh$; 282.6 in^2
10. $2\pi rh$; 141.3 cm^2
11. $V = \pi r^2 h$; 169.3 ft^3
12. $V = \pi r^2 h$; h = 1.2m
13. D
14. C
15. B
16. a) doubled
    b) doubled
    c) doubled
17. a) no pattern
    b) no pattern
    c) no pattern
18. The volume was doubled.
19. The volume will be tripled.
20. The volume will be halved.