Filling and Wrapping Unit Test Review

Standards

7.G.3 Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.

7.G.4 Know the formulas for the area and circumference of a circle and use them to solve problems.

7.G.6 Solve real-world and mathematical problems involving volume and surface area of three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

8.G.9 Know the formulas for the volume of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

1. Below is a right rectangular prism.

![Right Rectangular Prism Image]

a. What are ALL the two-dimensional figures that can be formed by a **vertical slice** of the prism?
   - rectangle

b. What are ALL the two-dimensional figures that can be formed by a **horizontal slice** of the prism?
   - rectangle

c. What are ALL the two-dimensional figures that can be formed by an **angled slice** of the prism?
   - rectangle, triangle, parallelogram, trapezoid, pentagon, hexagon

2. Below is a right rectangular pyramid.

![Right Rectangular Pyramid Image]

a. What are ALL the two-dimensional figures that can be formed by a **vertical slice** of the pyramid?
   - trapezoid, triangle

b. What are ALL the two-dimensional figures that can be formed by a **horizontal slice** of the pyramid?
   - rectangle

c. What are ALL the two-dimensional figures that can be formed by an **angled slice** of the pyramid?
   - triangle, trapezoid, pentagon, quadrilateral
3. A children’s pony ride at the zoo has ponies attached to carousel pole in the center of a circle that the ponies walk around as children ride. Suppose the diameter of the circle is 25 feet. How many feet does a pony walk to complete one trip around the circle? Show how you found your answer.

\[ C = 25 \pi \approx 78.54 \text{ ft} \]

4. The zoo also has a merry-go-round. To set up the merry-go-round, the zoo manager has to clear some land. The diameter of the merry-go-round is 18 feet. How much land does the manager need to clear in order to build the merry-go-round? Show how you found your answer.

\[ A = \pi \cdot 9^2 \approx 254.47 \text{ ft}^2 \]

5. The Student Government sells juice at school athletic events. They have been using cylinder-shaped containers with a 2-inch radius and an 8-inch height. Their supplier has suggested that they could also sell juice in cone-shaped containers with the same dimensions.

a. How much juice will the cylinder-shaped container hold if it is filled to the rim?

\[ V = \pi \cdot 2^2 \cdot 8 \]

\[ V \approx 100.53 \text{ in}^3 \]

b. How much juice will the cone-shaped container hold if it is filled to the rim?

\[ V = \frac{\pi \cdot 2^2 \cdot 8}{3} \]

\[ V \approx 33.51 \text{ in}^3 \]

6. Find the volume of the solid at right.

\[ V = \frac{12 \cdot 9 \cdot 11}{3} \]

\[ V = 396 \text{ in}^3 \]

7. The Apple Theater concession sells two sizes of popcorn—a micro box and a jumbo box. If the micro box sells for 75¢, what should the price of the jumbo box be if it is based on the amount the box holds? Explain.

\[ V_{\text{jumbo}} = 12 \cdot 8 \cdot 4 = 384 \text{ in}^3 \]

\[ V_{\text{micro}} = 2 \cdot 4 \cdot 6 = 48 \text{ in}^3 \]

The volume of the jumbo is 8 times greater than the micro, so the price should be 8 times greater, which is $6.00.
8. Billy used three toy prisms, a cylinder, and a half-sphere to build a house and a barn as pictured below.

![House and Barn](image)

- **90 degrees**
  - 2 in. 2 in.
  - 2 in.

- **2 in.**
  - 2 in.
  - 2 in.

- **2 in.**
  - 2 in.
  - 4 in.

- **2 in.**
  - 4 in.

- **2 in.**
  - 2 in.

- **2 in.**
  - 2 in.

- **4 in.**

- **1 in.**

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a. What is the combined *volume* of the house and the barn? Show ALL work.

  - **rectangular prism:** $V = 2 \cdot 2 \cdot 4 = 16$
  - **triangular prism:** $V = \frac{2 \cdot 2 \cdot \sqrt{3}}{2} \cdot 2 = 4$
  - **semi-sphere:** $V = \frac{1}{2} \left(4 \pi \cdot \frac{1}{3}\right) = \frac{2}{3} \pi$
  - **cube:** $V = 2 \cdot 2 \cdot 2 = 8$
  - **cylinder:** $V = \pi \cdot 1^2 \cdot 4 = 4\pi$

  **total volume** $= 16 + 8 + 4 + 4\pi + \frac{2}{3} \pi = 28 + 4\frac{2}{3} \pi$

b. What is the *surface area* of the house? Show ALL work.

  - **exposed rectangular prism** $SA = 2 \cdot 2 \cdot 2 + 2 \cdot 4 \cdot 2 + 2 \cdot 2 = 28$
  - **exposed cube** $SA = 2 \cdot 2 \cdot 4 = 16$
  - **exposed triangular prism** $SA = 2 \left(\frac{2 \cdot \sqrt{3}}{2}\right) + 2 \cdot 2 \cdot 2 = 12$

  **total surface area** $= 28 + 16 + 12 = \boxed{56 \text{ in}^2}$