

5.3 Take Another Spin

A Solidify Understanding Task

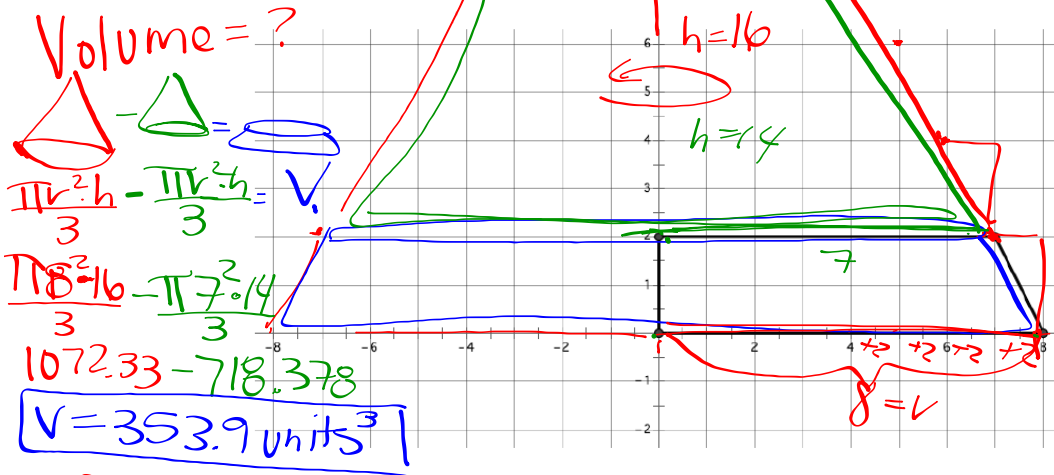
The trapezoid shown below is revolved about the y-axis to form a frustum (e.g., bottom slice) of a cone.



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Begin on this task!



1. Draw a sketch of the three-dimensional object formed by rotating the trapezoid about the y-axis.

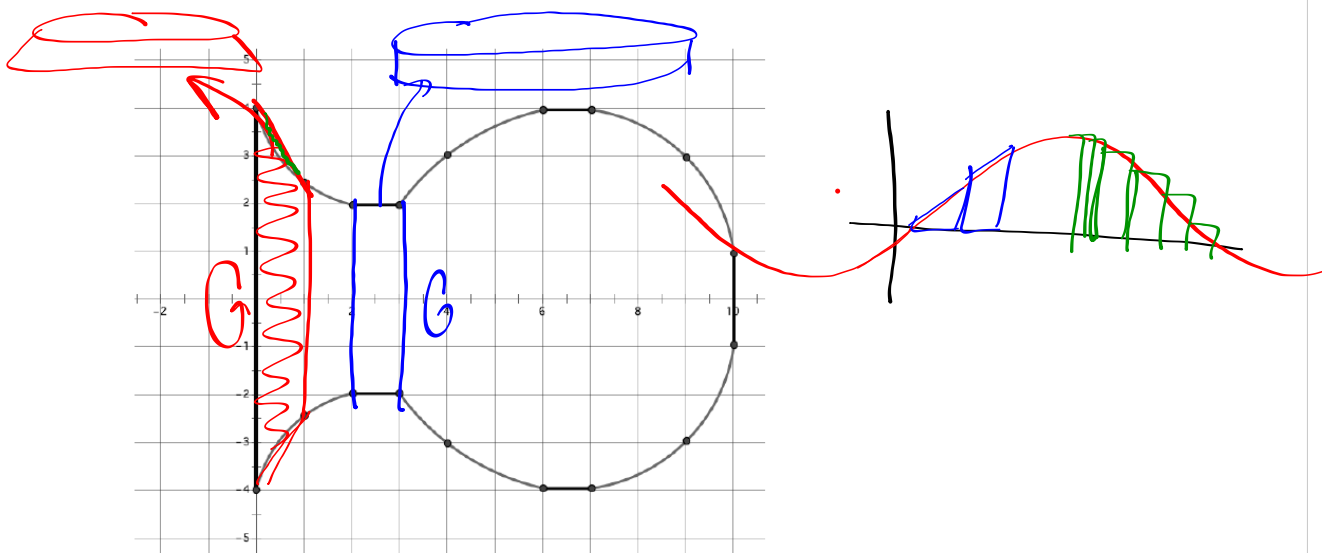


part of a cone
dog dish

2. Find the volume of the object formed. Explain how you used the diagram to help you find the volume.

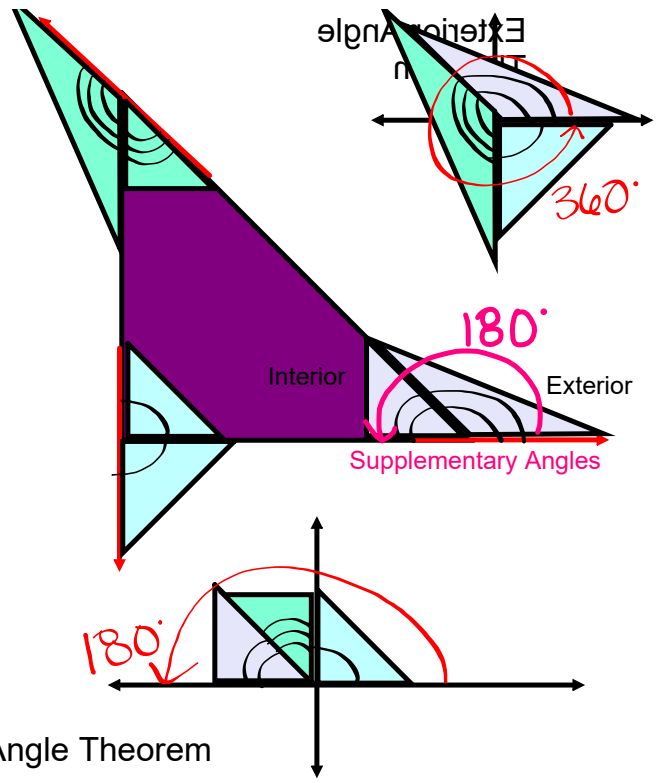
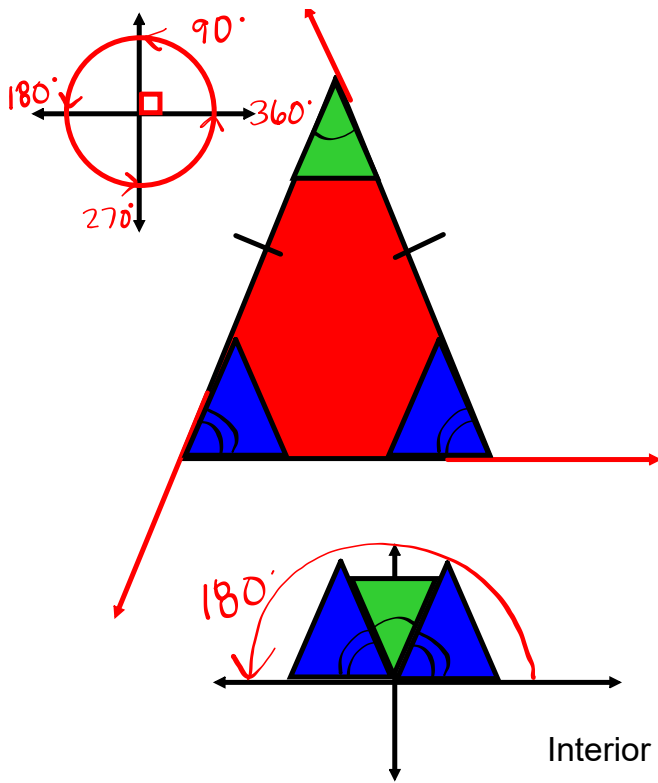
Sometimes a solid of revolution cannot be decomposed exactly into cylinders and cones. We can approximate the volume of solids of revolution whose cross sections include curved edges by replacing them with line segments.

3. The following diagram shows the cross section of a flower vase. Approximate the volume of the vase by using line segments to approximate the curved edges. (Show you the line segments you used to approximate the figure on the diagram.)



4. Describe and carry out a strategy that will improve your approximation for the volume of the vase.

Break/decompose the shape into more familiar shapes, and estimate volume. The more decomposed, the more accurate.



click play

Name _____

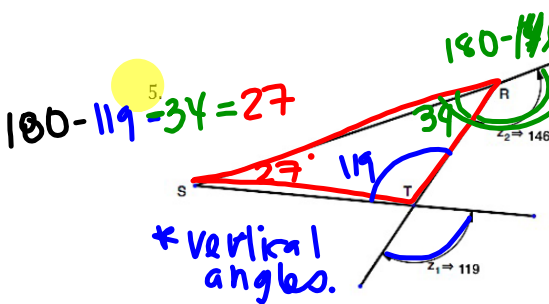
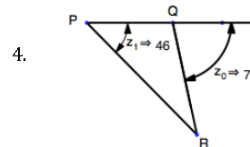
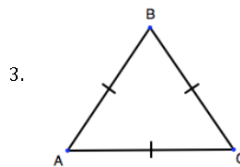
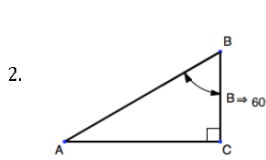
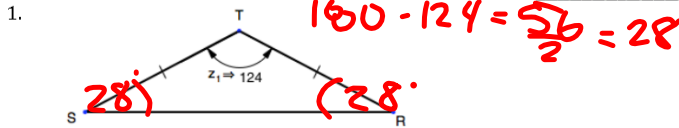
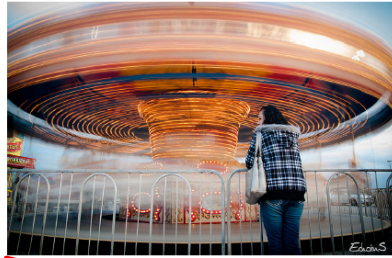
Modeling with Geometry 5.3

Ready, Set, Go! Interior = 180°
Exterior = 360°

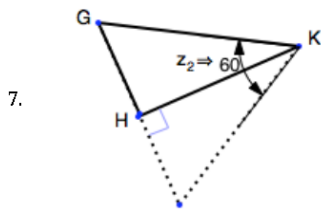
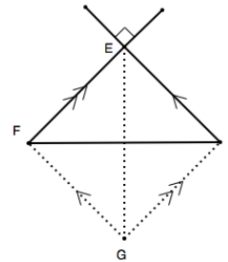
Ready

Topic: Finding missing angles in triangles

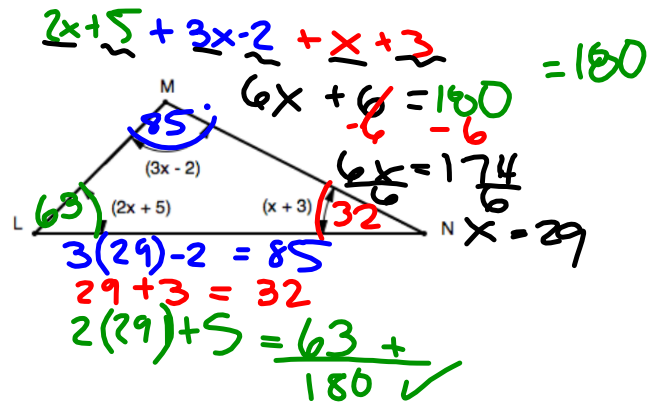
Use the given information and what you know about triangles to find the missing angles. (All angle measures are in degrees.)



6. $\overline{EG} \cong \overline{FH}$



8.



Set

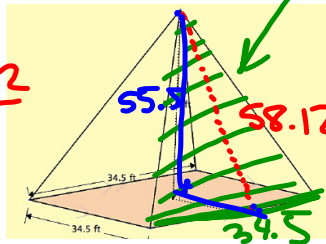
Topic: Finding the surface area and volume of combined shapes

The picture at the right is of the Washington Monument in DC. The shaft of the monument is a square frustum. The bottom square measures 55 ft. on a side and the top square measures 34.5 feet. The top is a square pyramid.

9. Find the dimensions of the 4 triangular faces of the pyramid. (Height is 55.5 ft)

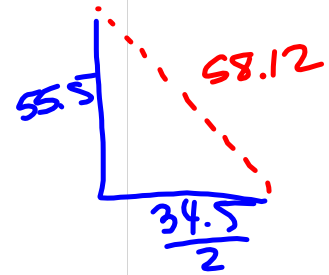


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$$A = \frac{b \cdot h}{2}$$

$$A = \frac{34.5 \cdot 58.12}{2}$$



$$a^2 + b^2 = c^2$$

$$55.5^2 + \left(\frac{34.5}{2}\right)^2 = c^2$$

$$3080.25 + 297.563$$

$$3377.8125 = c^2$$

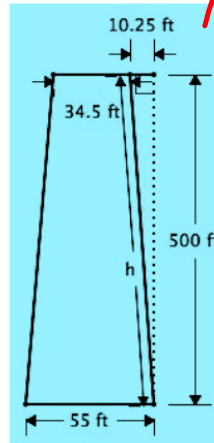
$$58.12 = c$$

10. Find the area of each face of the pyramid.

$$A = \underline{\hspace{2cm}} \times 4 = A_{\text{pyramid}}$$

11. Find the area of the 4 trapezoids that make the faces of the frustum.

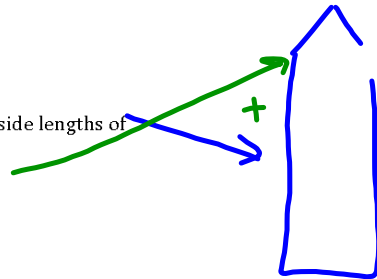
The area of a trapezoid: $A = \frac{b_1 + b_2}{2} h$ (You will need to find h.)



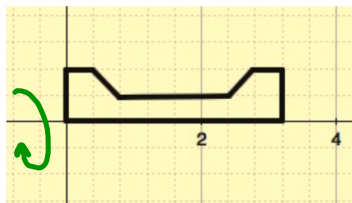
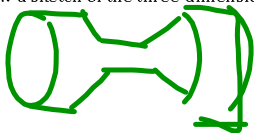
12. Find the total surface area of the Washington Monument.

13. Find the total volume of the Washington Monument.

Volume of a square frustum: $V = \frac{1}{3}h(a^2 + ab + b^2)$ where a and b are the side lengths of each square. Volume of pyramid: $V = \frac{1}{3}l^2h$



14. Draw a sketch of the three-dimensional object formed by rotating the figure about the x-axis.



*Simplify

$$\sqrt{9} = 3$$

$$\sqrt{12} = 2\sqrt{3}$$

$$\sqrt{32} = 4\sqrt{2}$$

$$\sqrt{48} = 4\sqrt{3}$$

* Notes

Rules $\sqrt{3} \cdot \sqrt{3} = (\sqrt{3})^2 = 3$

$$\sqrt{3} \cdot \sqrt{2} = \sqrt{3 \cdot 2} = \sqrt{6}$$

$$\sqrt{3} + \sqrt{2} = \text{Same like } x + y$$

like: $2x \cdot 5x = 10x^2$

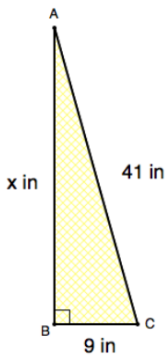
ex: $2\sqrt{3} \cdot 5\sqrt{3} = 10(\sqrt{3})^2 = 10 \cdot 3 = 30$

like: $2x + 5x = 7x$

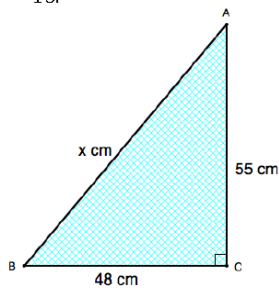
ex: $2\sqrt{3} + 5\sqrt{3} = 7\sqrt{3}$

Calculate the missing side in the right triangles. Give your answers in simplified radical form.

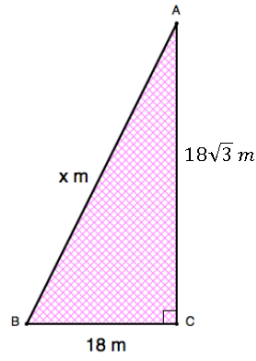
15.



16.

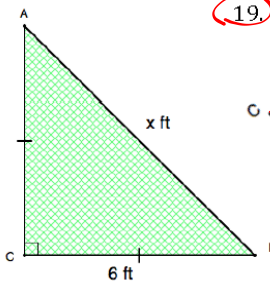


17.

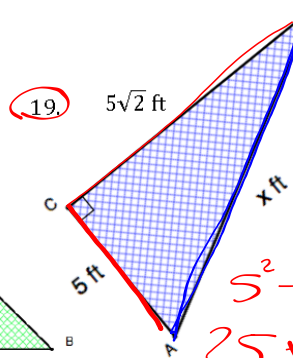


Pythagorean Theorem
 $a^2 + b^2 = c^2$

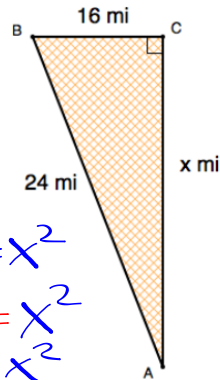
18.



19.



20.



$$\begin{aligned}
 5^2 + (5\sqrt{2})^2 &= x^2 \\
 25 + 25 \cdot 2 &= x^2 \\
 25 + 50 &= x^2 \\
 \sqrt{75} &= x \\
 \sqrt{3 \cdot 25} &= x \\
 5\sqrt{3} &= x
 \end{aligned}$$