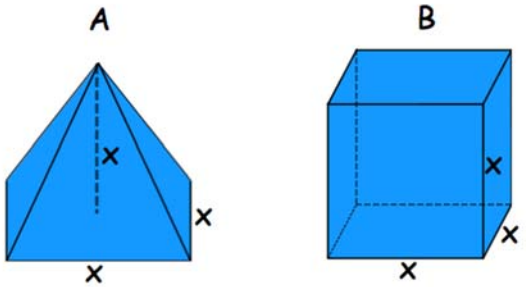
Name:_____ Date:_____

Period:_____

Aim: How can we relate 2D to 3D images?

Do Now: Which figure has a larger volume? Why?



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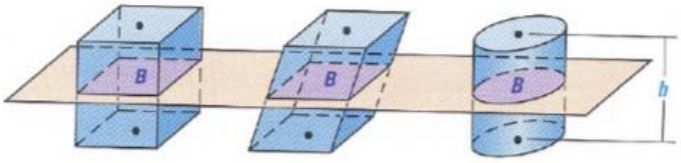
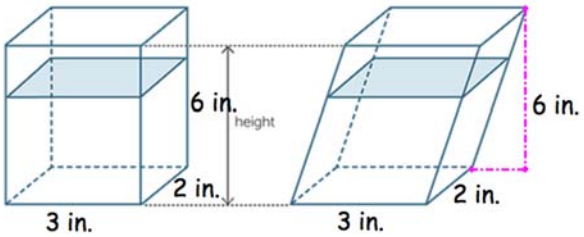
Cavalieri's Principle



1. Which figure has a greater volume? Why?



_____

_____

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_____

2. Two stacks of 23 quarters each are shown below. One stack forms a cylinder but the other stack does not form a cylinder. How do their volumes compare?

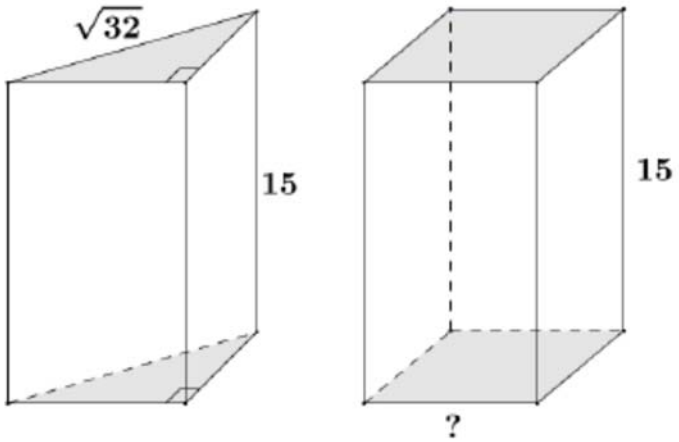
_____

_____

_____

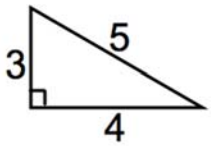
_____

3. A triangular prism has an isosceles right triangular base with a hypotenuse of $\sqrt{32}$ and a prism height of 15. A square prism has a height of 15 and its volume is equal to that of the triangular prism. What are the dimensions of the square base, in simplest radical form?



Generatrix

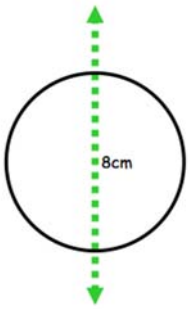
If you rotate the right triangle below about its altitude, what kind of 3-D figure could be formed? Draw it.



3D Figure:

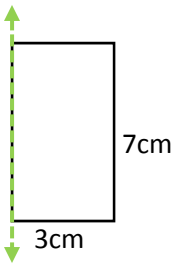
What are the dimensions of the new 3-D figure? Label them above.

What shape is created when revolving the figure around the given axis? _____



What are the dimensions of the new shape?

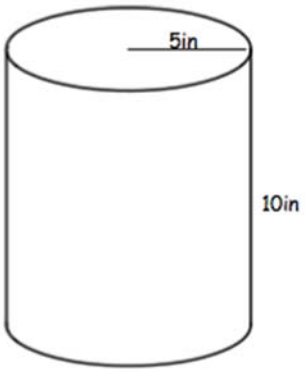
What shape is created when revolving the figure around the given axis? _____



What are the dimensions of the new shape?

What if the location of the axis changed? What shapes could be created?

Practice Problems



1. If the cylinder is sliced **horizontally**, what are the dimensions of the cross section? Draw a picture of the cross section and label its dimensions.

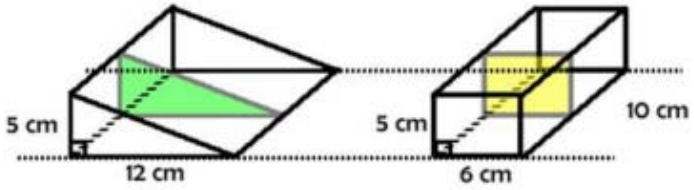
What is the area of the cross section in terms of pi?

2. If the cylinder is sliced **vertically** through the middle, what are the dimensions of the cross section? Draw a picture of the cross section and label its dimensions.

What is the area of the cross section?

3. What generatrix could be used to generate the cylinder above? Draw and label the dimensions of ALL the possibilities (make sure to include the axis of rotation)

4. Jenny says that the two prisms DO NOT have the same volume because the cross sections are not the same shape. Renee disagrees; she says that it isn't the shape that has to be the same, it is the area that must be equal. Renee thinks they have the same volume. Who is right and why?



Who is correct?_____

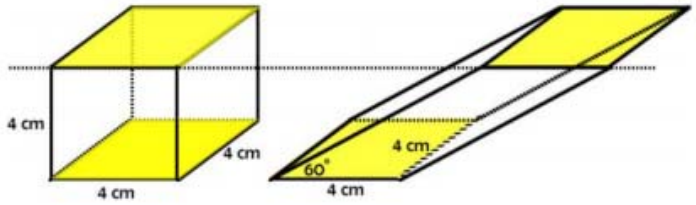
Explanation:_____

_____

_____

_____

5. If the volume of the cube is 64 cm^3, what is the volume of the oblique prism if it has been tilted at 60°?



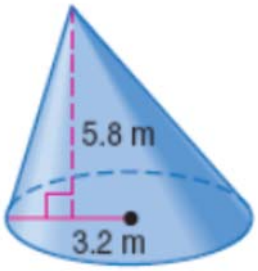
Volume:_____

Explanation:_____

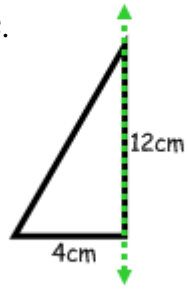
_____

_____

6. Find the volume of the cone, to the nearest tenth.



7. You are given the generatrix below. Draw the 3D shape created when rotating it about the axis. Label the dimensions.

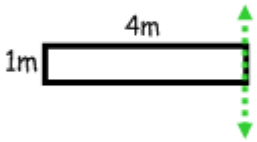


8. If the base is doubled and the height halved, what are the dimensions of the new solid? Draw and label its dimensions:

9. What would the vertical cross section look like? Draw and label its dimensions. What's its area?

10. What could be the length of the slant height of the new generatrix?

11. If the following generatrix was dilated by a scale factor of 3, what would be the result of rotating it around the given axis? Draw and label its new dimensions.



12. What would be the dimensions of the vertical and horizontal cross sections? Draw and label them below.

13. Find the areas of each of the cross sections.