10/31/17 Aim: Scaling principle for Volume

Do now: Take out homework

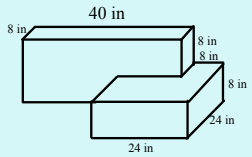
Homework

Test Wednesday and Thursday

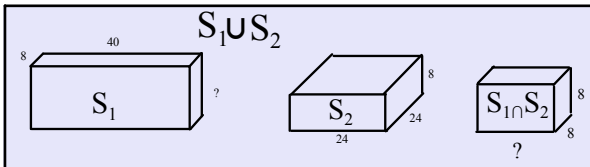
Happy Halloween

Mar 3-2:52 PM

Paul is designing a mold for a concrete block to be used in a custom landscaping project. The block is shown in the diagram with its corresponding dimensions and consists of two intersecting rectangular prisms. Find the volume of mixed concrete, in cubic feet, needed to make Paul's custom block.

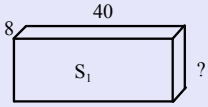


Mar 2-8:24 AM

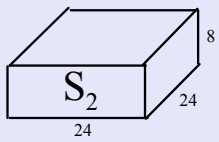


$S_1+S_2-S_1 \cap S_2$

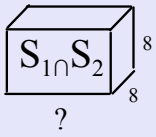
Nov 2-6:11 AM



Nov 2-6:11 AM



Nov 2-6:11 AM



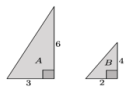
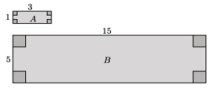
Nov 2-6:11 AM

$S_1+S_2-S_1 \cap S_2$

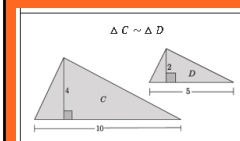
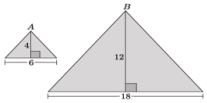
Nov 2-6:11 AM

Paul is designing a mold for a concrete block to be used in a custom landscaping project. The block is shown in the diagram with its corresponding dimensions and consists of two intersecting rectangular prisms. Find the volume of mixed concrete, in cubic feet, needed to make Paul's custom block.

Nov 2-6:11 AM

Similar Figures	Ratio of Side Lengths a: b or c: d	Ratio of Areas $\text{Area}(A):\text{Area}(B)$ or $\text{Area}(C):\text{Area}(D)$
$\triangle A \sim \triangle B$ 	6: 4 3: 2	9: 4 3^2: 2^2
Rectangle A ~ Rectangle B 		

Oct 31-6:23 AM

$\triangle C \sim \triangle D$ 		
$\triangle A \sim \triangle B$ 		

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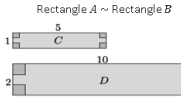
Rectangle A ~ Rectangle B 		

Oct 31-6:23 AM

i. State the relationship between the ratio of sides a:b and the ratio of the areas Area(A): Area(B)

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ii. Make a conjecture as to how the ratio of sides a:b will be related to the ratio of volumes Volumes(S): Volume(T). Explain.

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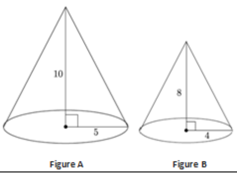
b. What does it mean for two solids in three-dimensional space to be similar?

Oct 31-6:23 AM

1. Each pair of solids shown below is similar. Write the ratio of side lengths $a : b$ comparing one pair of corresponding sides. Then, complete the third column by writing the ratio that compares volumes of the similar figures. Simplify ratios when possible.

Similar Figures	Ratio of Side Lengths $a : b$	Ratio of Volumes Volume(A) : Volume(B)
		

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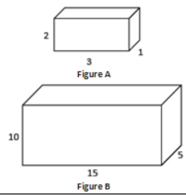
Similar Figures	Ratio of Side Lengths $a : b$	Ratio of Volumes Volume(A) : Volume(B)
		

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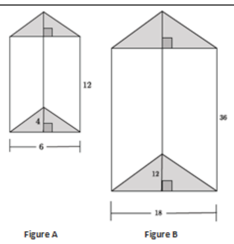
Similar Figures	Ratio of Side Lengths $a : b$	Ratio of Volumes Volume(A) : Volume(B)
		

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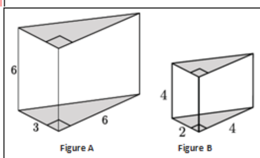
Similar Figures	Ratio of Side Lengths $a : b$	Ratio of Volumes Volume(A) : Volume(B)
		

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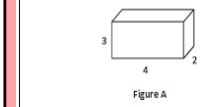
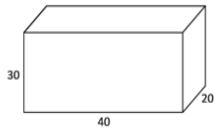
Similar Figures	Ratio of Side Lengths $a : b$	Ratio of Volumes Volume(A) : Volume(B)
 Figure A  Figure B		

Mar 3-3:23 PM

a. What do you notice about the relationships of the corresponding distances and the relationships of the volumes of the similar figures that you examined in the exercise above?

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b. Suppose a similarity transformation takes a solid S to a solid T at scale factor r. How do you think the volume of S compares to the Volume of T?

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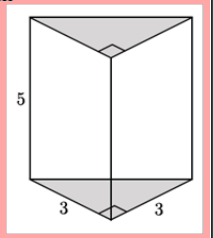
) If 2 rectangular prisms are similar and the ratio of the areas of their bases is 16: 4, find the ratio of the volumes of the similar solids,

Mar 3-3:23 PM

2. Use the triangular prism shown to answer the questions that follow.

a. Calculate the volume of the triangular prism



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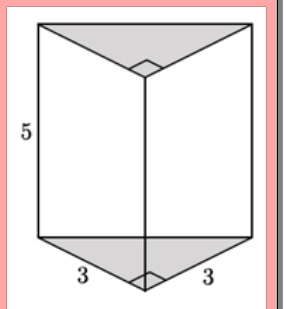
b. If one side of the triangular base is scaled by a factor of 2, the other side of the triangular base is scaled by a factor of 4, and the height of the prism is scaled by a factor of 3, what are the dimensions of the scaled triangular prism?



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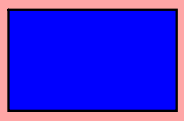
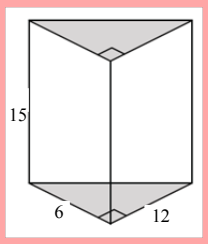
c. Calculate the volume of the scaled triangular prism.



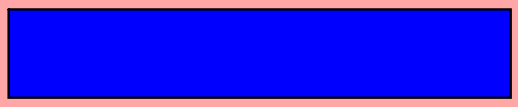


Mar 3-3:23 PM

d. Make a conjecture about the relationship between the volume of the original triangular prism and the scaled triangular prism.

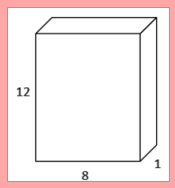
Mar 3-3:23 PM

e. Do the volumes of the figures have the same relationship as was shown in the figures in Exercise 1? Explain.



Mar 3-3:23 PM

3. Use the rectangular prism shown to answer the questions that follow.
a. Calculate the volume of the rectangular prism.



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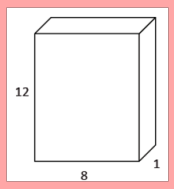
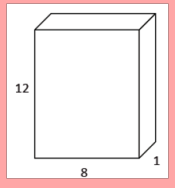
b. If one side of the rectangular base is scaled by a factor of 1/2 , the other side of the rectangular base is scaled by a factor of 24, and the height of the prism is scaled by a factor of 1/3, what are the dimensions of the scaled rectangular prism?



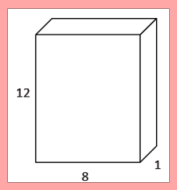
Mar 3-3:23 PM

c. Calculate the volume of the scaled rectangular prism.



Mar 3-3:23 PM

d. Make a conjecture about the relationship between the volume of the original rectangular prism and the scaled rectangular prism.



Mar 3-3:23 PM

4. A manufacturing company needs boxes to ship their newest widget, which measures 2x4x5 in. cubed. Standard size boxes,5- inch cubes, are inexpensive but require foam packaging so the widget is not damaged in transit. Foam packaging costs $0.03 per cubic inch. Specially designed boxes are more expensive but do not require foam packing. If the standard size box costs $0.08 each, and the specially designed box costs $3.00 each, which kind of box should the company choose? Explain your answer.

Oct 31-6:43 AM

1. Coffees sold at a deli come in similar-shaped cups. A small cup has a height of 4.2", and a large cup has a height of 5". The large coffee holds 12 fluid ounces. How much coffee is in a small cup? Round your answer to the nearest tenth of an ounce.

Oct 31-6:47 AM

2. Right circular cylinder A has volume 2,700 and radius 3. Right circular cylinder B is similar to cylinder A and has volume 6,400. Find the radius of cylinder B.

Oct 31-6:48 AM

3. The Empire State Building is a 102 - story skyscraper. Its height is 1,250 ft from the ground to the roof. The length and width of the building are approximately 424 ft. and 187 ft., respectively. A manufacturing company plans to make a miniature version of the building and sell cases of them to souvenir shops.

a. The miniature version is just 1/2,500 of the size of the original. What are the dimensions of the miniature Empire State Building?

H: $1250\left(\frac{1}{2500}\right) = .5'$

L: $424\left(\frac{1}{2500}\right) = .17'$

W: $187\left(\frac{1}{2500}\right) = .07'$

b. Determine the volume of the miniature building. Explain how you determined the volume.

$V = Bh = (L \cdot W)H = .5(.17)(.07)$

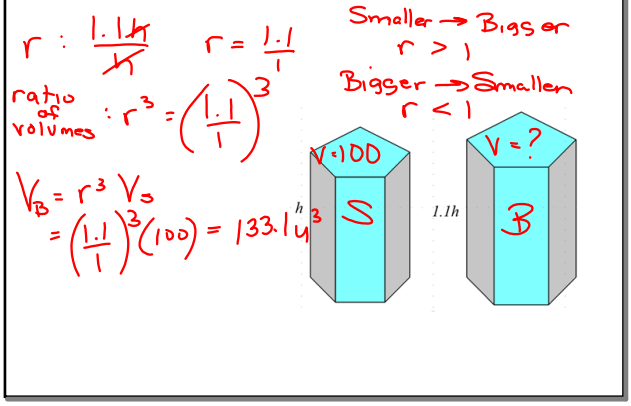
$= .00198\,ft^3$

Oct 31-6:51 AM

4. If a right square pyramid has a 2x2 square base and height 1, then its volume is4/3. Use this information to find the volume of a right rectangular prism with base dimensions axb and height h.

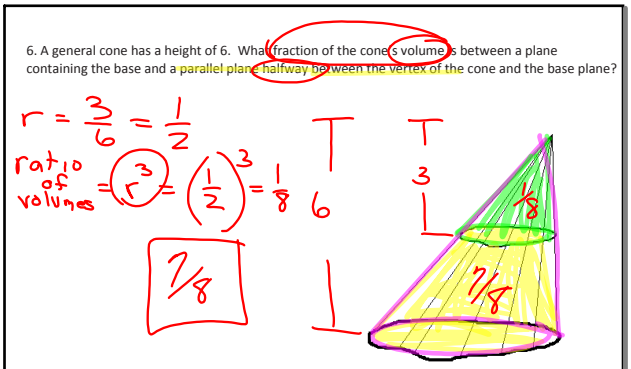
Oct 31-6:55 AM

5. The following solids are similar. The volume of the first solid is 100. Find the volume of the second solid.



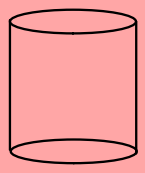
Oct 31-6:57 AM

6. A general cone has a height of 6. What fraction of the cone's volume is between a plane containing the base and a parallel plane halfway between the vertex of the cone and the base plane?



Oct 31-6:58 AM

8. A dairy facility has bulk milk tanks that are shaped like right circular cylinders. They have replaced one of their bulk milk tanks with three smaller tanks that have the same height as the original but 1/3 the radius. Do the new tanks hold the same amount of milk as the original tank? If not, explain how the volumes compare.



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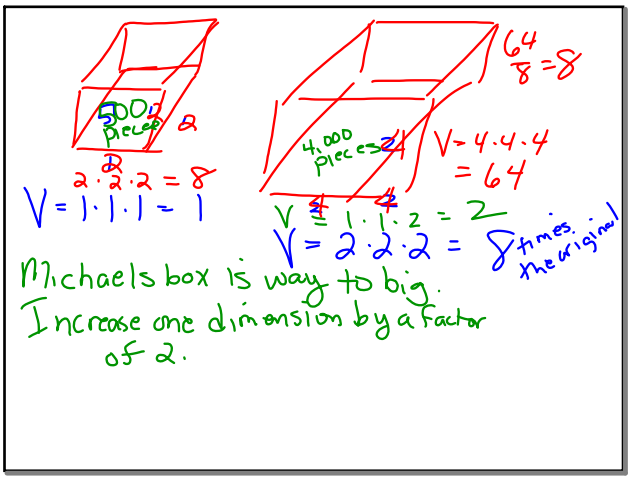
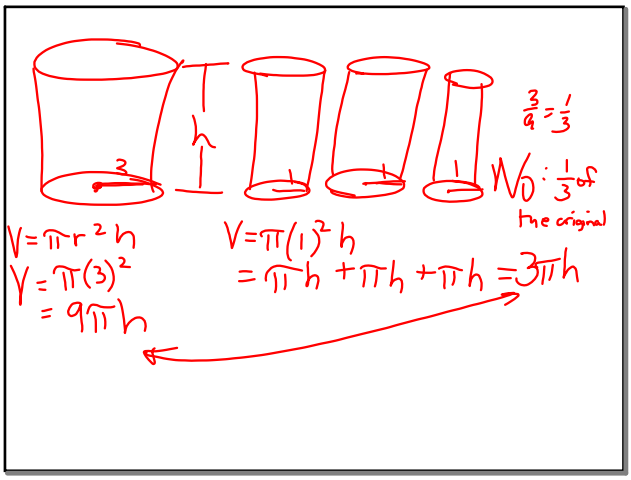


Nov 3-1:08 PM



Nov 3-1:13 PM

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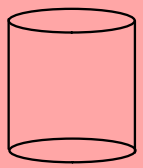


Mar 3-3:23 PM

Homework make flash cards of all your formulas you will need for this up coming exam, along with the exit ticket.

Mar 3-3:23 PM

ratio of areas: $r^2 = \frac{9}{4}$

ratio of sides: $r = \frac{\sqrt{9}}{\sqrt{4}} = \frac{3}{2}$

ratio of volumes: $r^3 = \left(\frac{3}{2}\right)^3 = \frac{3^3}{2^3} = \frac{27}{8}$

Oct 16-3:15 PM

10.

$r^3 = 1$

$r = 1$

$3 \cdot \frac{5}{2} \cdot x = 1$

$\frac{15x}{2} = \frac{1}{1}$

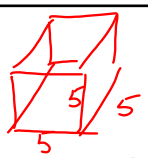
$15x = 2$

$x = \frac{2}{15}$

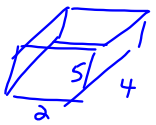
$3 \cdot \frac{5}{2} \cdot \frac{2}{15} = 1$

Nov 3-1:19 PM

4.



Cube ⇒ all dimensions ≅



$V_{CUBE} = 5 \cdot 5 \cdot 5 = 125\ in^3$

$V_{WIDGET} = 2 \cdot 4 \cdot 5 = 40\ in^3$

$V_{foam} = 125 - 40 = 85\ in^3$ of foam

Cost of foam: $.03/in^3 \cdot 85\ in^3 = 2.55$

box $.80

$3.35

$3.00 for special box

Nov 3-1:21 PM