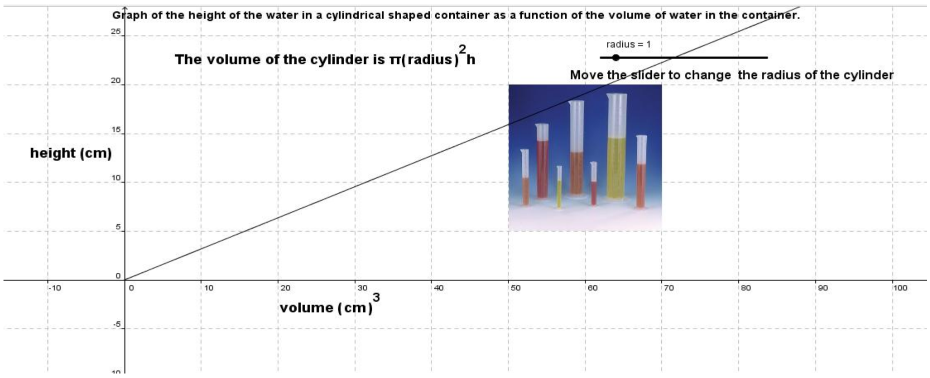
Student Activity: To investigate the rate of change of height with respect to volume

Use in connection with the interactive file, 'Height with respect to volume', on the student's CD.

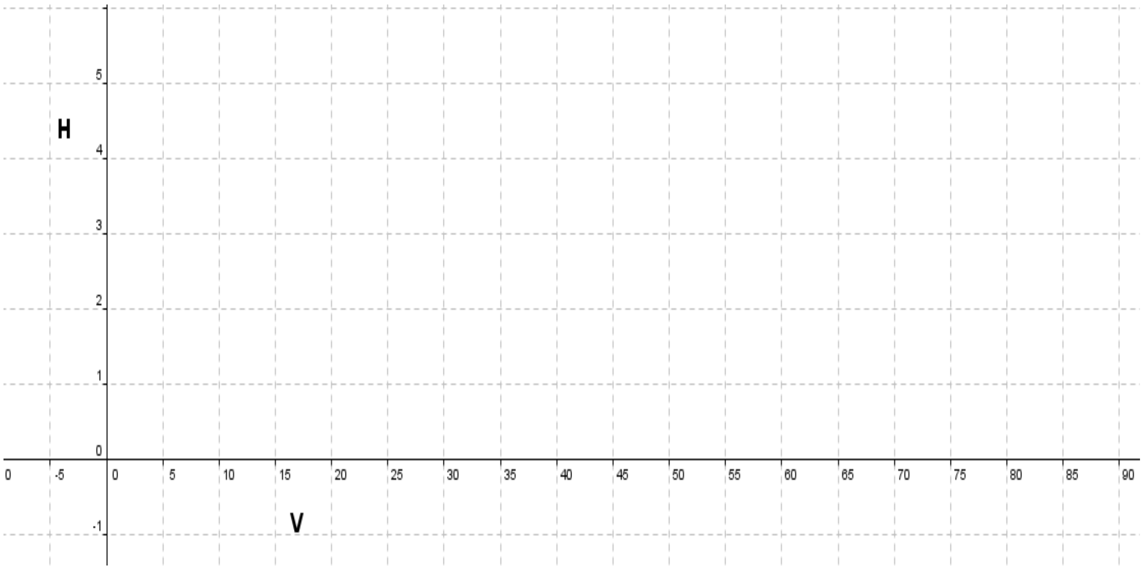


1.

a. Using a calculator complete the following table for a container of radius r = 2 cm and height h:

Volume $(cm)^3$	$h = \dfrac{\text{volume}}{\pi(r)^2}$ (cm)
10	
20	
30	
40	
50	

b. Draw a graph of the data represented in the table.



c. Did your data form a linear, quadratic or exponential graph? Explain your answer.

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d. Is the height of this cylinder proportional to its volume? Explain your answer.

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e. What does the slope mean in the context of this problem?

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f. Is the rate of change of the height with respect to volume increasing, decreasing, or constant for this problem? Explain your answer.

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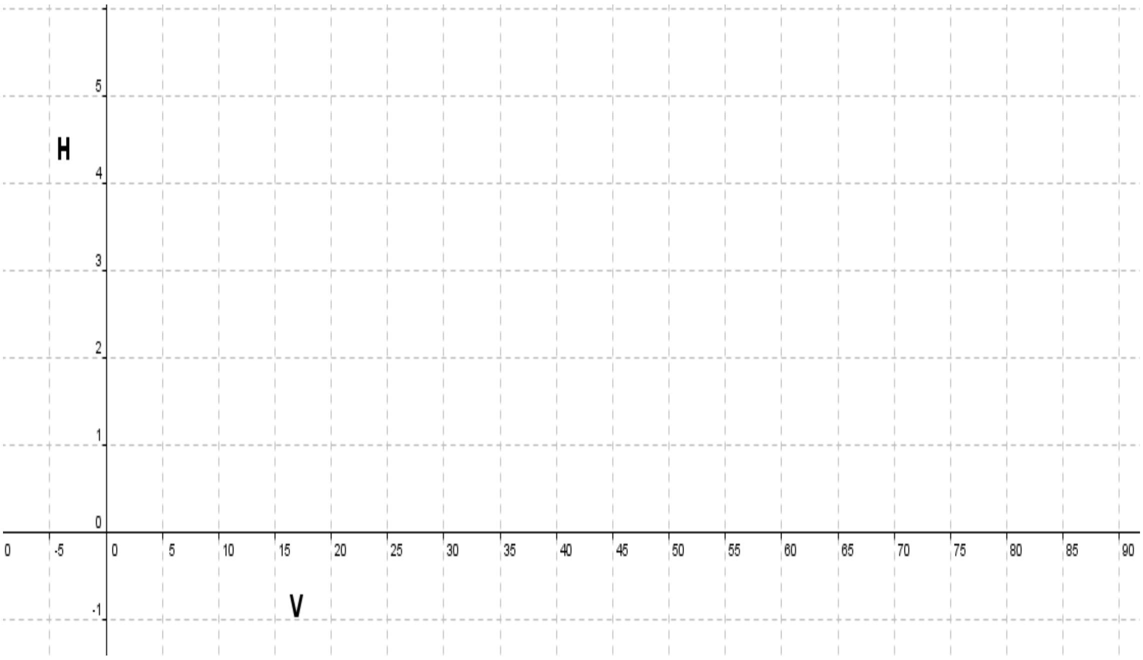
2.

a. Using a calculator, complete the following table for a container of radius r = 3 cm and height h:

Volume $(cm)^3$	$h=\frac{volume}{\pi(r)^2}$ (cm)
10	
20	
30	
40	
50	

b. Draw a graph of the data represented in the table.



c. Did your data form a linear, quadratic or exponential graph? Explain your answer.

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d. Is the height of this container proportional to its volume? Explain your answer.

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e. What does the slope mean in the context of this problem?

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f. Is the rate of change of the height with respect to volume increasing, decreasing, or constant for this problem? Explain your answer.

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3. Using the two graphs you have drawn and the interactive file, do you agree with the statement that "The greater the radius of the container the slower the rate of change of the height (cm) with respect to the volume $(cm)^3$." Explain your reasoning.

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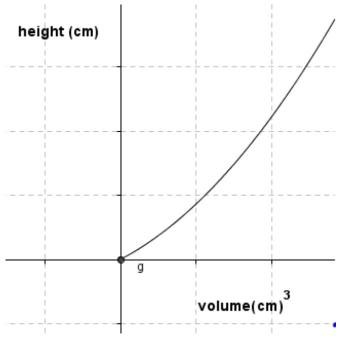
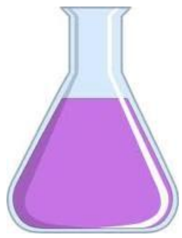
4. Following the logic obtained in the above questions can you explain why, if the radius of a container is getting smaller as in the flask opposite, the graph of volume (cm)^3 vs. height (cm)will be shaped as follows:





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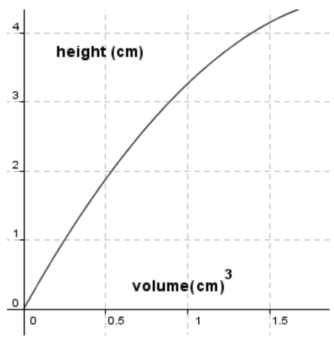
5. Following the logic obtained in the above questions can you explain why if the radius of a container is getting larger as in the container opposite, the graph of volume (cm^3) vs. height (cm) will be shaped as follows:



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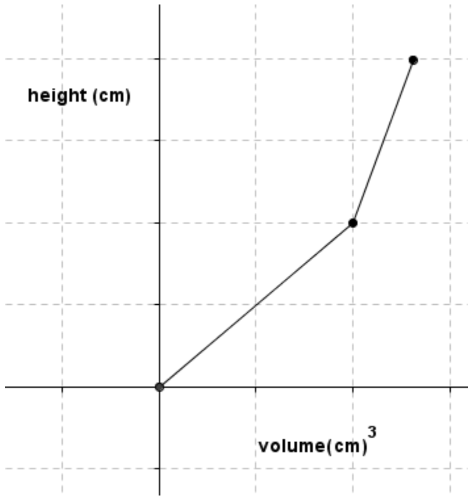
6. Draw a rough sketch of the graph of the volume vs. the height of the following container. Note water cannot enter the handles.

7. Draw a rough sketch of the shape of the container represented by the following graph as water is being poured into it.



8. Draw a rough sketch of the shape of the container represented by the following graph as water is being poured into it.