



## Filling vessels

Different vessels are filled with water. In which vessel is the most water?



Today, you will investigate how the filling quantity and the filling level are related, why the water is at different levels in different vessels, and how the relationship between filling quantity and filling level is represented in the graph!

This material is provided by the [FunThink Team](#), responsible institution: Ludwigsburg University of Education



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**Research assignment 1:** How does the filling level in a vessel change when it is filled evenly with water?

**Needed Material:** a vessel of your choice (vessel research assignment 1), measuring cup, measuring rod, bottle with water

**This is how you proceed:**

- Place the measuring rod in the vessel as seen in the picture.
- Now pour 20 ml of water (filling quantity) into the vessel.
- Read as accurately as possible the height of the water level (filling level).
- Repeat the procedure until the vessel is full.

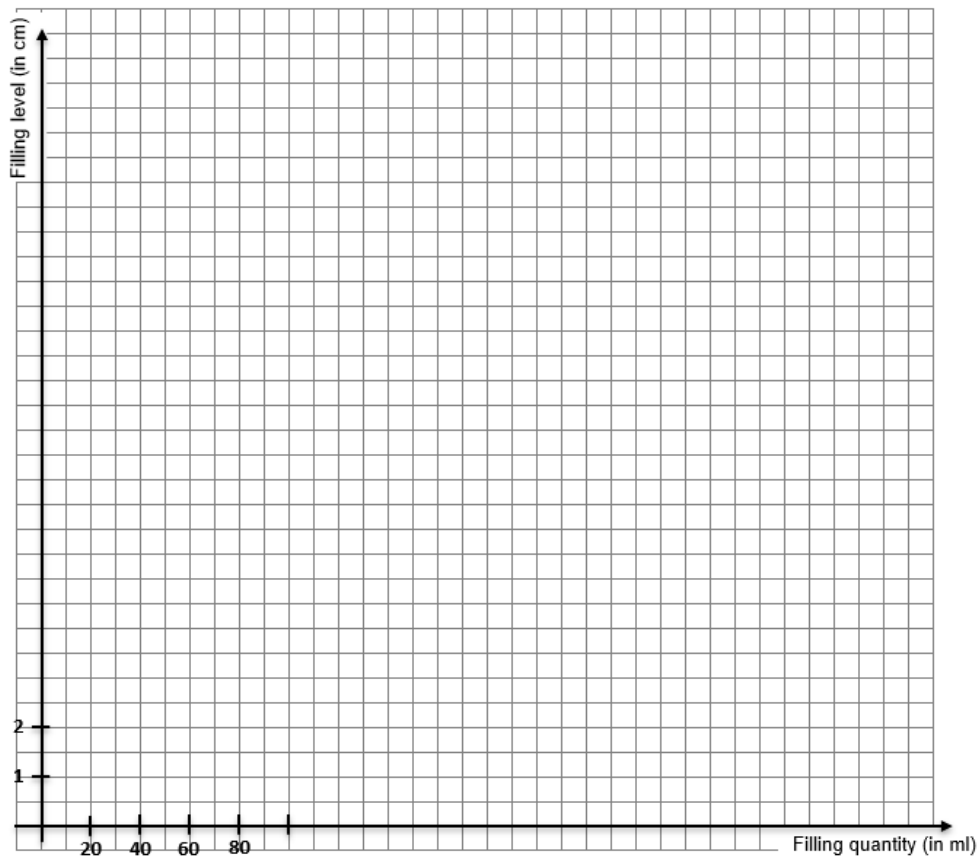


Sketch your vessel:

**1. Table of values:** Enter the filling level in the table. Repeat the procedure until the vessel is full. (You can shorten or add to the table).

<b>Filling quantity (ml)</b>	0	20	40	60	80	100	120	140	160	180	200							
<b>Filling level (cm)</b>	0																	

**2. Graph:** Enter the pairs of values from the table as points into the coordinate system. Connect the points with a line. This creates the filling graph of the vessel. (Don't forget to complete the scaling!)

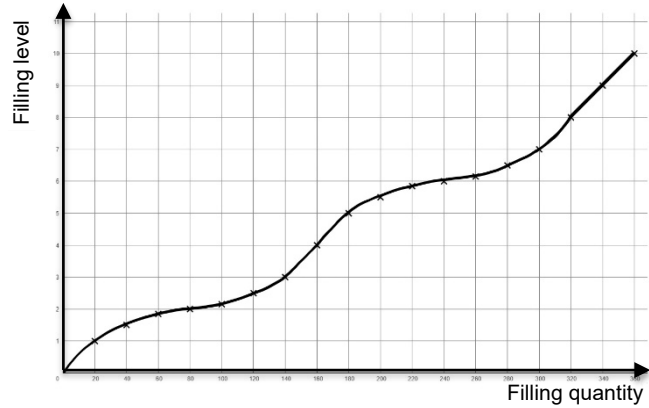
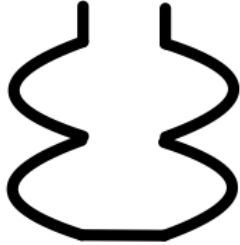


Remember to clean up after the experiment.

## Research assignment 2: What does the graph look like for another vessel?

Here you can see the sketch of another vessel (vessel research assignment 2) and the corresponding graph.

Sketch of the vessel:



- a) For the vessels in research assignment 1 and 2, describe how the water rises and how you can see this in the graph:

Vessel research assignment 1:

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Vessel research assignment 2:

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b) Consider what the graph for both vessels would look like if you filled the vessel with 40ml instead of 20ml each time? Describe!

Vessel research assignment 1:

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Vessel research assignment 2:

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**Research assignment 3:** What does the graph look like if the filling quantity changes?

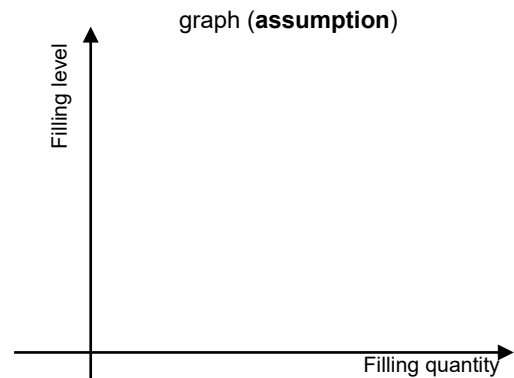


Get a tablet. Open the *Filling vessels 40ml* applet.

a) You see a vessel. Look at its shape.

What does a matching graph look like?

**Sketch** your assumption in the coordinate system on the right side.



b) Fill the vessel with water by clicking on the *40 ml* button.

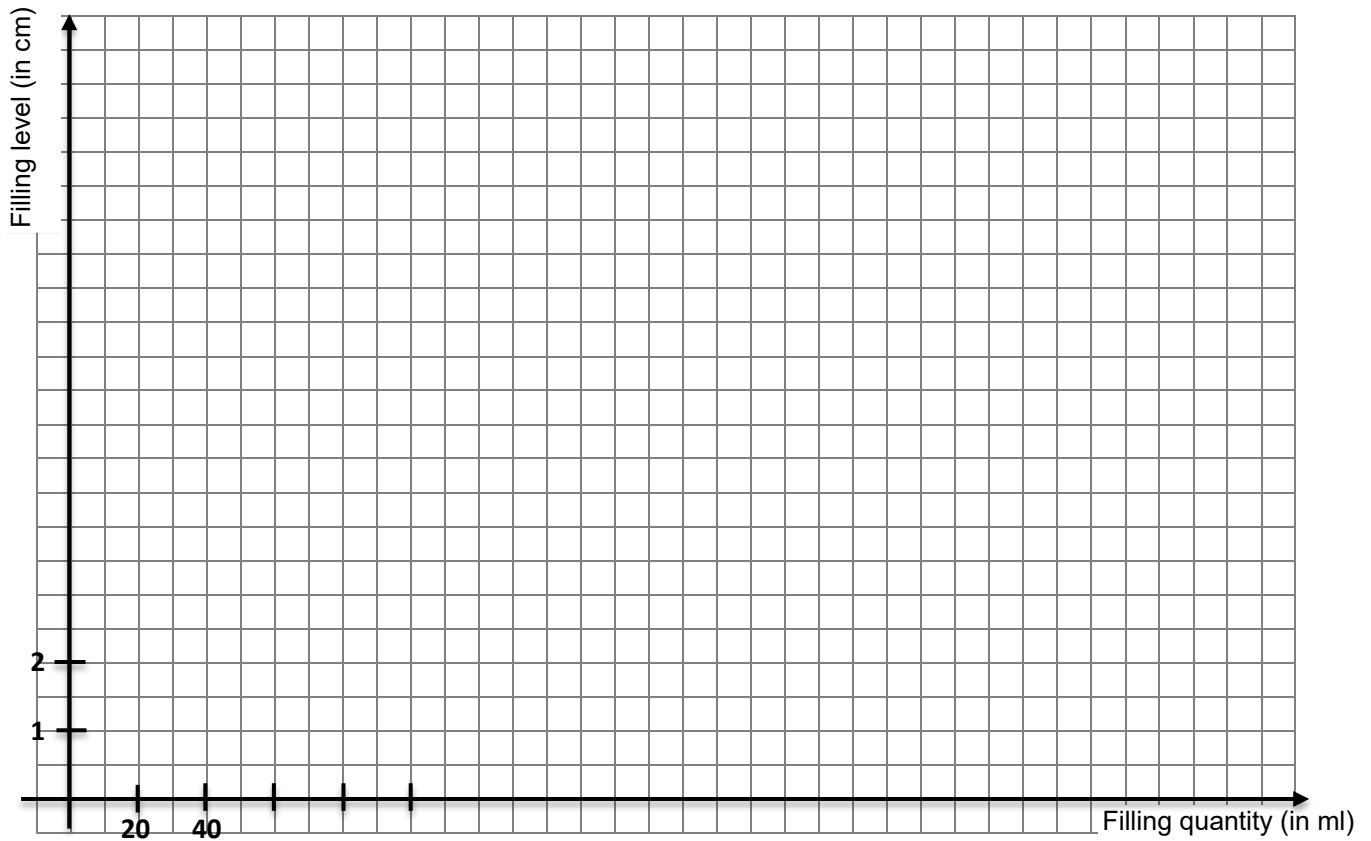
Note the filling level in the table of values.

Continue until the vessel is completely filled.

**Table of values**

Filling quantity (ml)	0	40	80	120	160	200	240	280
Filling level (cm)	0							

c) **Graph:** Enter the pairs of values from the table as points in the coordinate system. Connect the points with a line. Do not forget to complete the scaling!



d) Empty the vessel with the *Empty vessel* button. Check the box of window 2. In the 1st window click on *Fill water evenly*. Observe how the vessel fills with water and how the corresponding graph is created in the 2nd window.

Describe when the water rises quickly and when it rises slowly. How can you tell from the vessel and where can you see it in the graph?

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e) Compare your graph from assignment part c) with the graph you just created in the applet. What do you recognize? Describe!

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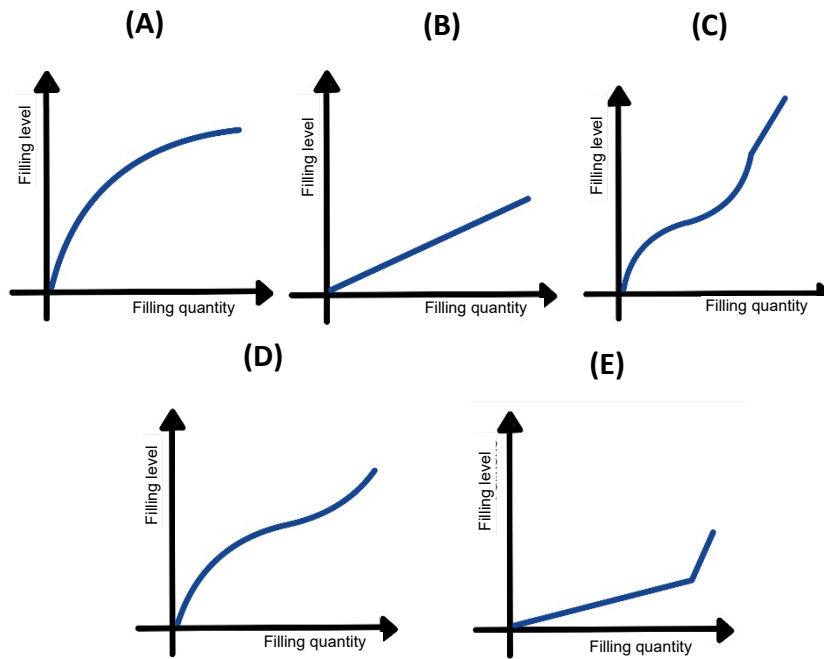
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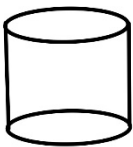
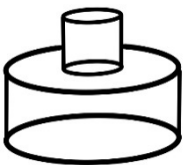
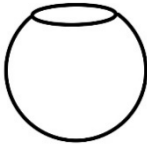
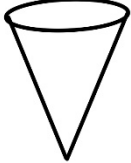
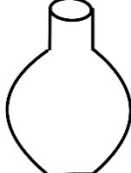


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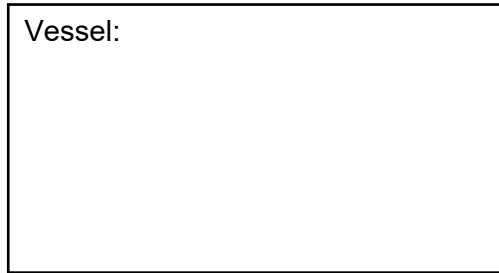
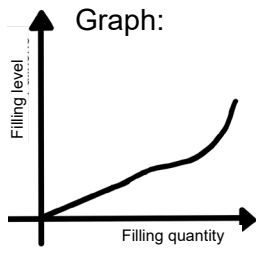
## Research assignment 4: Find the correct graph

a) Match each vessel with the corresponding graph. Explain your decision:



	Vessel	Graph	Explanation
(1)			
(2)			
(3)			
(4)			
(5)			

b) Draw a vessel to match the graph.



c) Your own vessel: Think about a shape for a new vessel. Sketch it. Draw the corresponding graph in the coordinate system.

