

“Maxbox”

General

In this classic optimisation problem, as you vary the dimension that is removed from the corner, how does the volume vary?

What does the graph of height versus volume look like?

Student Specific

Use the ‘Thought-Sheet’ (page 2) to guide you through how to consider the dynamics of this situation, and what sort of relationship it reveals. This task is best done by thinking about it first and then doing it second, in order to see how well formed your thoughts were.

Teacher Specific

This is a very tricky construction to create from scratch, mainly down to the 3D sketch of the resulting cuboid that is drawn.

Using this activity ‘off the shelf’ simply follows on in the same style as all the other ‘Connections’ files, which are recommended to be done first.

Feedback

Do you have any comments on these notes?

Please get in Contact via the website and help improve them further.

All contributors are acknowledged.

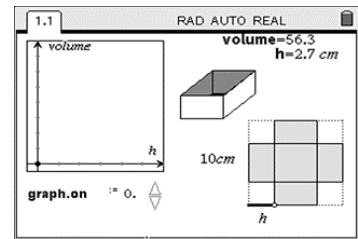
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Connections – HG075 – Thought Sheet

As you vary the dimension that is removed from the corner, how does the volume vary?

What does the graph of height versus volume look like?



For the geometrical construction detailed above, jot down your answers to the following key questions:

1. Is the data relationship linear, or non-linear?
a) If it's linear, what is the slope of the line?
b) If it's non-linear, is the curve upwards or downwards?

2. Is there a direct, or indirect variation?

3. Is the data relationship symmetrical in any way?

4. Is there a maximum, or a minimum?

5. Are there places where it cuts the x-axis (called 'zeros') and, if so, what do they represent?

6. Does it cut the y-axis and, if so, what does that point represent?

7. Can you now draw the shape of the curve?
Sketch on it the axes on one of the screenshots at the top of this sheet.
8. Can you now construct this interactive geometry file, or use the one provided to you, to check all of your thoughts so far?
9. Can you use algebra to work out the equation of the curve?

Using the TI-Nspire, you can check how good your answer to question 9 is by plotting your resultant function on Page 1.1's axes.