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Because maths matters!

Welcome to the MEI conference 2026

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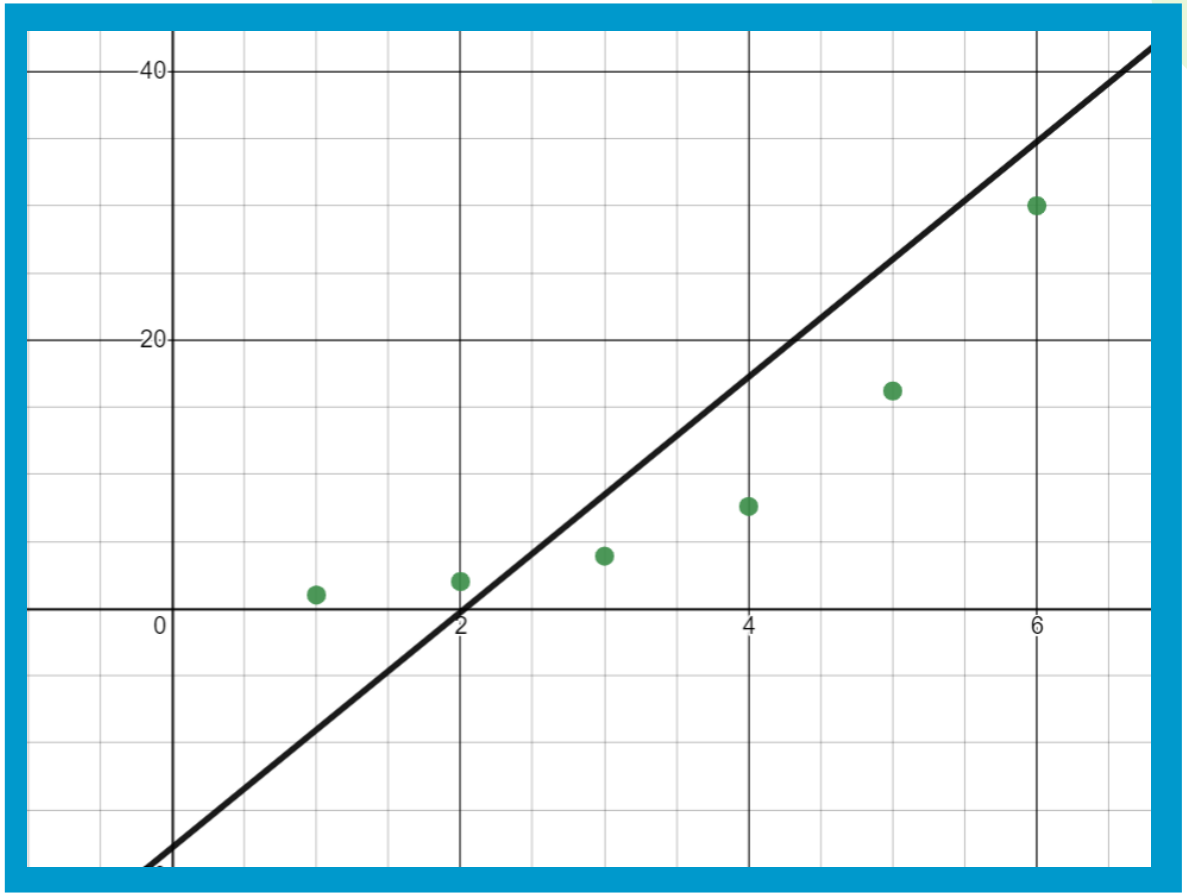
Why are lines of best fit always straight?

Exploring this and other questions that science teachers ask the mathematics department



Developing shared approaches across maths and science

Nicola Coe and Michael Anderson

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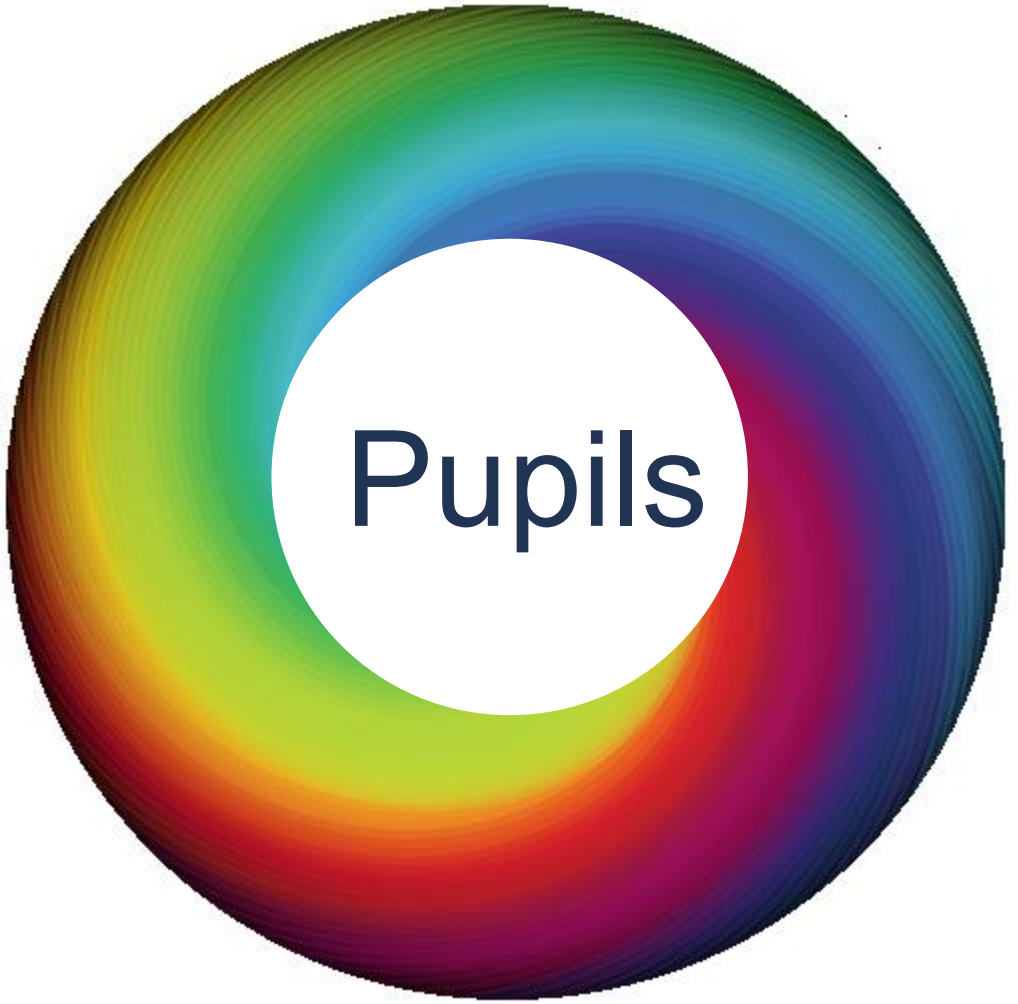
What is our role as a maths teacher?



Awareness – do science teachers know exactly of what is, and what is not, taught in maths? Are maths teachers aware of the mathematical demands in science?

Shared content - Where we teach the same topic, how do we manage this?

Resources – Are there mathematics resources that can be used in science? Which examples form science can be used in mathematics lessons?

Skills – What are the skills common to both subjects and how are they embedded?

Methods – Does the maths department have a preferred method for particular topics? Is there consistency within and across departments? Where there is not consistency, how can we address or acknowledge this?

Language - Do we use the same language and notation? Is there consistency here too?

Timings - Are there areas in which maths skills are required in science before they are taught in maths?

Joint activities - Could joint science/maths activities to help get the message across to staff, students and parents that maths and science are linked?

www.stem.org.uk/all-news/maths-in-science

Ofsted's Research review series for science (April 2021)

"Subject leaders and teachers of mathematics and science should work together to understand how and when knowledge taught in their respective subjects is similar and different. Where there are good reasons for differences, it is important that these are made clear to pupils, including any rationale for this. Pupils will then be clear on what knowledge to use and when. It is also important that teachers do not assume that pupils can easily transfer their learning from mathematics to the science classroom. Pupils will need to be taught how to use mathematics in science."

www.gov.uk/government/publications/research-review-series-science

Curriculum and Assessment Review (November 2025))

“It is also important to ensure horizontal coherence in the curriculum. We are committed to the exisiting subject architecture of the national curriculum. However, better horizontal links could be made across subjects to highlight where content in one area relies on content in another. This supports teachers as well as children and oung people. For example, the methemitical content in a given phase might be requires simultaneously to access other patrts of the curriculum, such as science or finacial education"

" Wetherefore recommend that content across all key stages should be refined and resequenced in line with the fndamental concepts of each sceintific discipline. This should help pupils build progressively on foundational knowledge, supporting deep and lasting scientific understanding and scientific literacy."

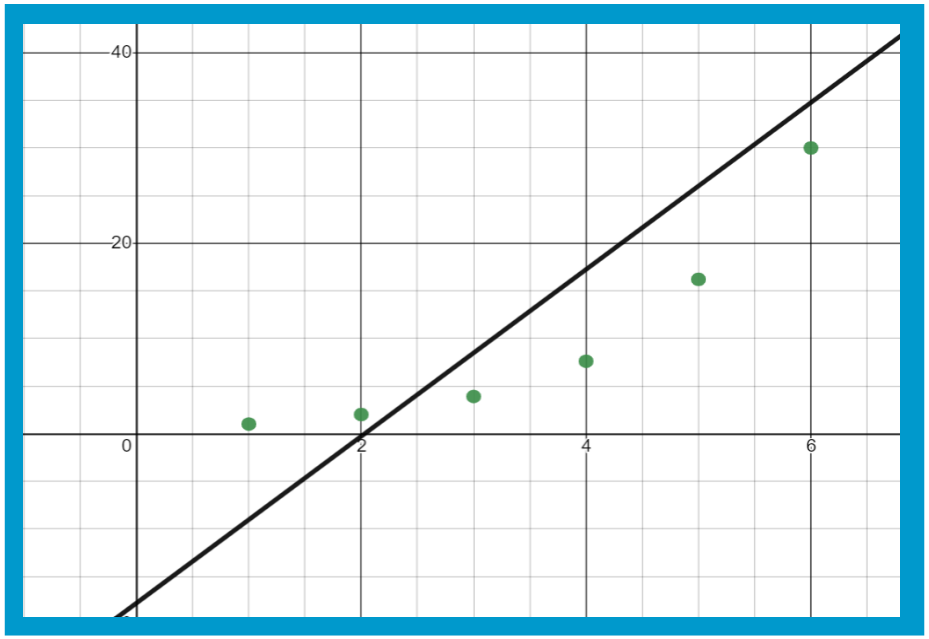
https://assets.publishing.service.gov.uk/media/690b96bbc22e4ed8b051854d/Curriculum_and_Assessment_Review_final_report_-_Building_a_world-class_curriculum_for_all.pdf

What's the same and what's different?

1

Think …

Does a line of best fit have to be straight?



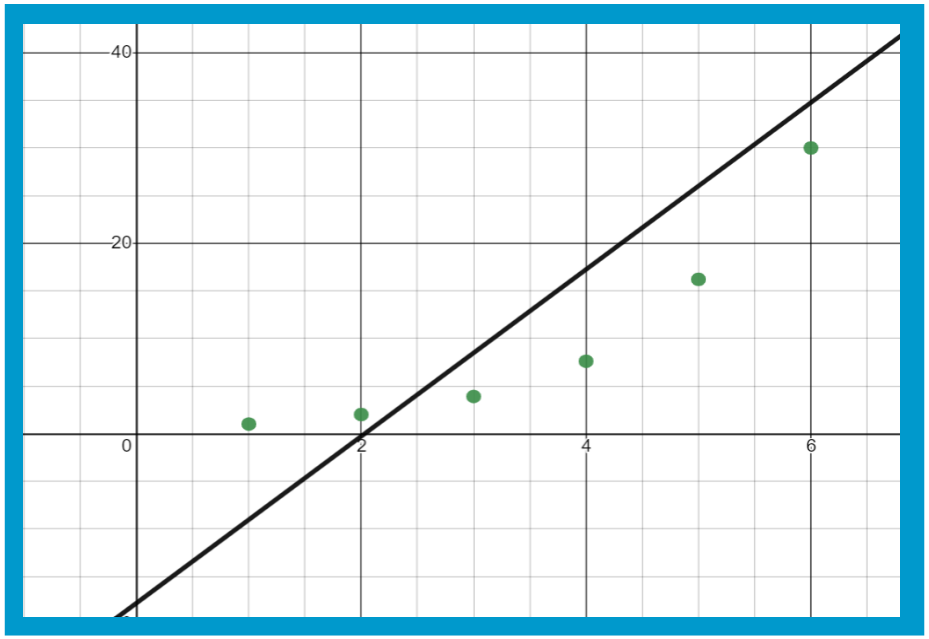
What's the same and what's different?

1

Maths says…

Science says …

Does a line of best fit have to be straight?

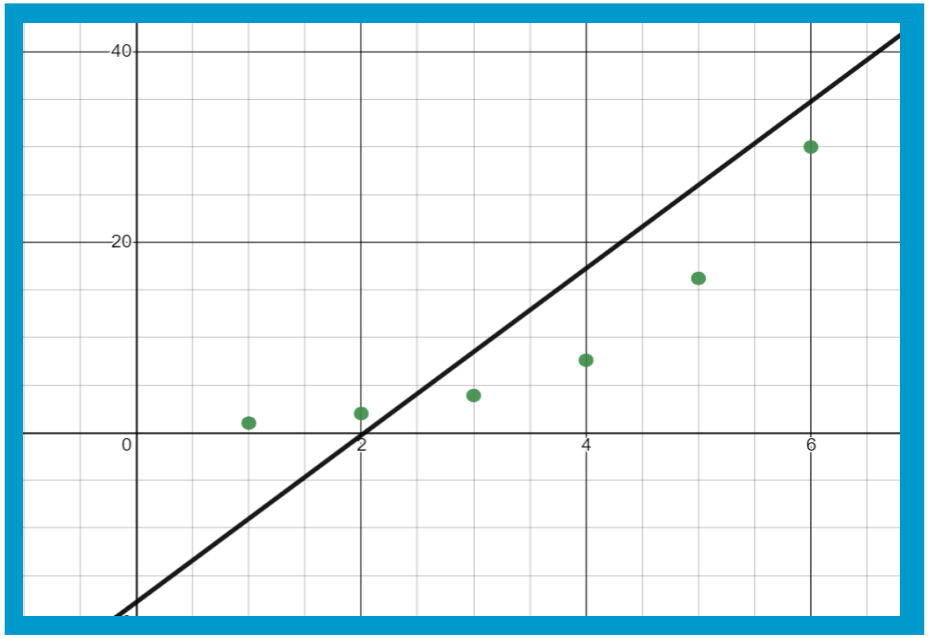


What's the same and what's different?

2

Think …

What do you call a point that doesn't fit with the trend?



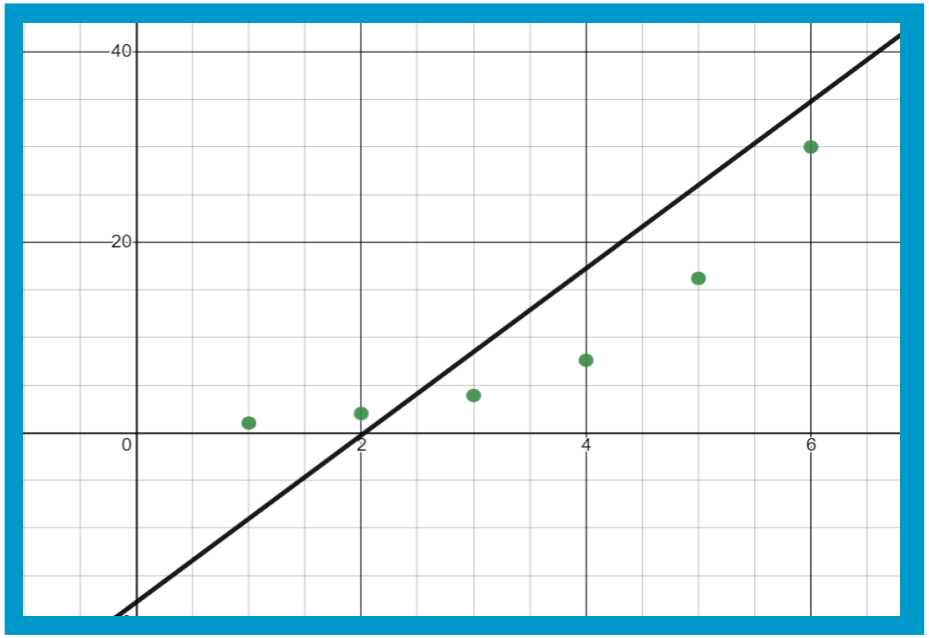
What's the same and what's different?

2

Maths says…

Science says …

What do you call a point that doesn't fit with the trend?



What's the same and what's different?

Think …

Do I have to include all pieces of data when I calculate the mean?

What's the same and what's different?

Maths says…

Science says …

Do I have to include all pieces of data when I calculate the mean?

What's the same and what's different?

Think …

Does it matter if I write my answer as a fraction or a decimal?

In a packet of 200 seeds, 183 germinate. What is the probability that a seed doesn't germinate?

What's the same and what's different?

Maths says…

Science says …

Does it matter if I write my answer as a fraction or a decimal?

In a packet of 200 seeds, 183 germinate. What is the probability that a seed doesn't germinate?

What's the same and what's different?

Think …

Would you expect to see an answer written in this form?

How far is the international space station from the earth? Use SI (standard index) units.

360×10^3 metres

What's the same and what's different?

Maths says…

Science says …

Would you expect to see an answer written in this form?

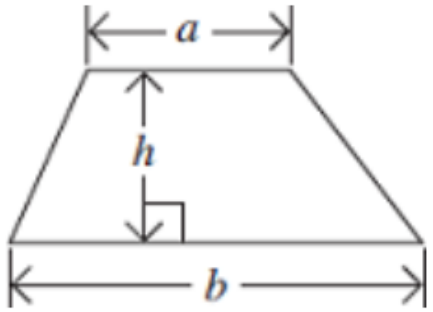
How far is the international space station from the earth? Use SI (standard index) units.

360×10^3 metres

What's the same and what's different?

Think …

Does it matter if I substitute or rearrange first?



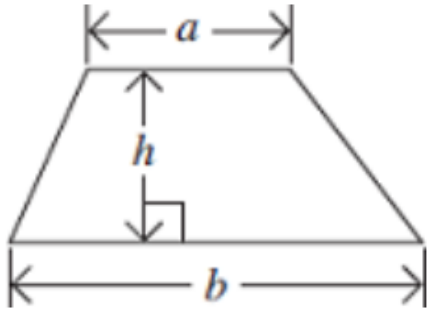
Calculate the value of b when the area is 60cm^2, the height is 5cm and a is 8cm.

What's the same and what's different?

Maths says…

Science says …

Does it matter if I substitute or rearrange first?



Calculate the value of b when the area is 60cm^2, the height is 5cm and a is 8cm.

What's the same and what's different?

Think …

Do we always use the same language?

When measuring people's heights we have CONTINUOUS data.

When recording people's shoe size we have …… data

What's the same and what's different?

Maths says…

Science says …

Do we always use the same language?

When measuring people's heights we have CONTINUOUS data.

When recording people's shoe size we have …… data

What's the same and what's different?

Think …

Do we always use the same methods?

What method would you use to calculate the following:

A car travels 54 miles in one hour. If it maintains constant speed how far will it travel in 20 minutes?

What's the same and what's different?

Maths says…

Science says …

Do we always use the same methods?

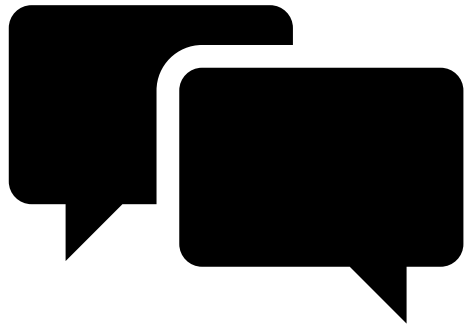
What method would you use to calculate the following:

A car travels 54 miles in one hour. If it maintains constant speed how far will it travel in 20 minutes?

Reflection:
Similarities and Differences in Maths and Science

Does it matter if we teach / do / say things differently?

Do we need to change to be the same?



Practical Activity time…

Aims

- Straight line graphs and proportional graphs are important in both subjects
- How can we support students to develop a greater understanding of the key features of a straight-line graph?
- How can we extend the theoretical knowledge of the graphs to a practical context?

Problem 1

The Crow & the Pitcher

In a spell of dry weather, when the Birds could find very little to drink, a thirsty Crow found a pitcher with a little water in it. But the pitcher was high and had a narrow neck, and no matter how he tried, the Crow could not reach the water. The poor thing felt as if he must die of thirst.

What advice would you give the crow?

Library of Congress Aesop Fables (read.gov)

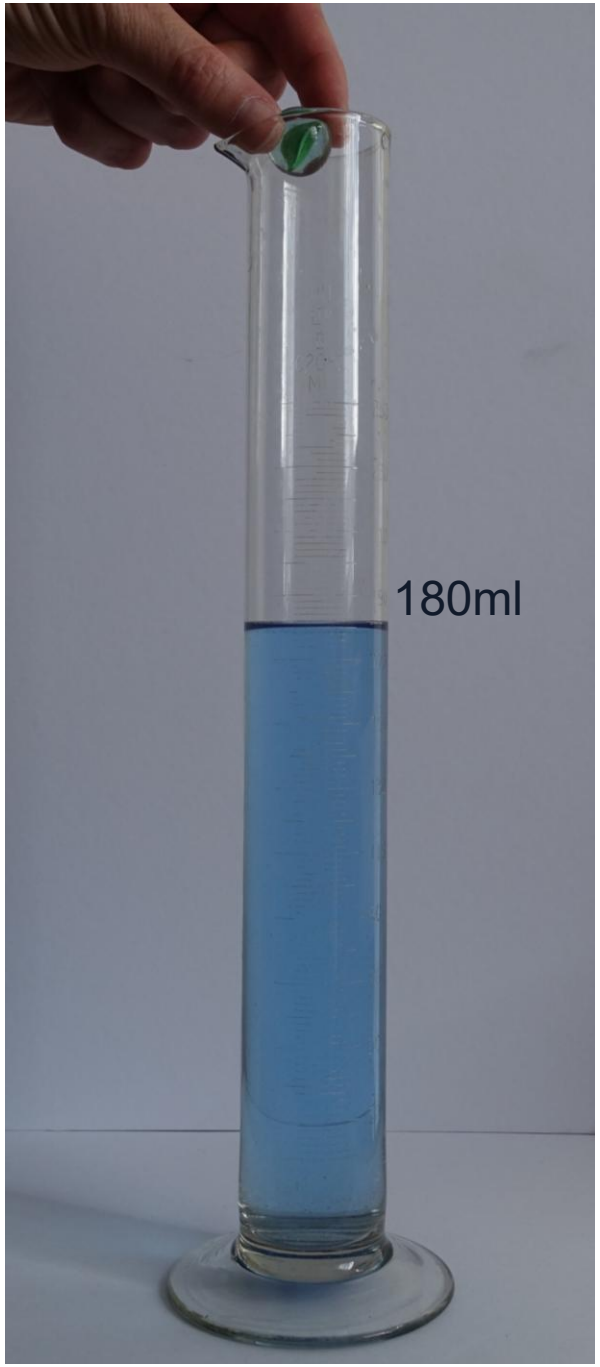
Analysing Data

I have reinvented this problem with a measuring cylinder and some marbles.

An experiment was carried out with 180ml of water in the measuring cylinder. Marbles (of a standard size) were dropped in one at a time.

Predict how many marbles it would take to get the water level to 250ml.

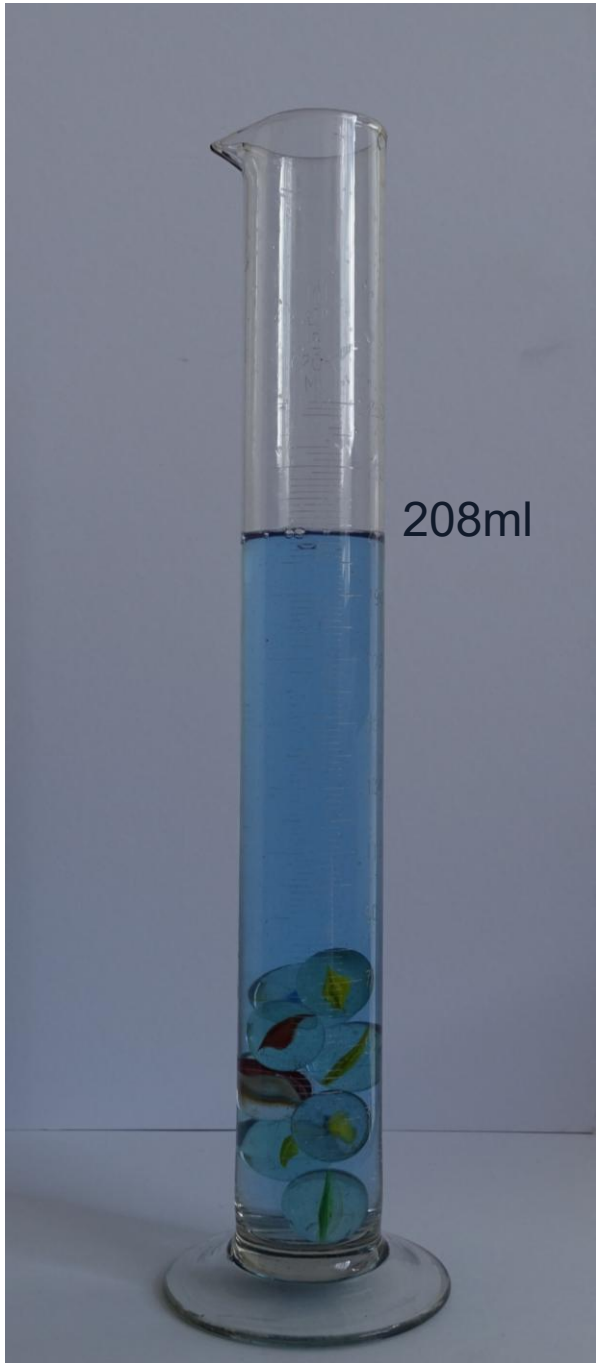

180ml


180ml


188ml


196ml


202ml


208ml

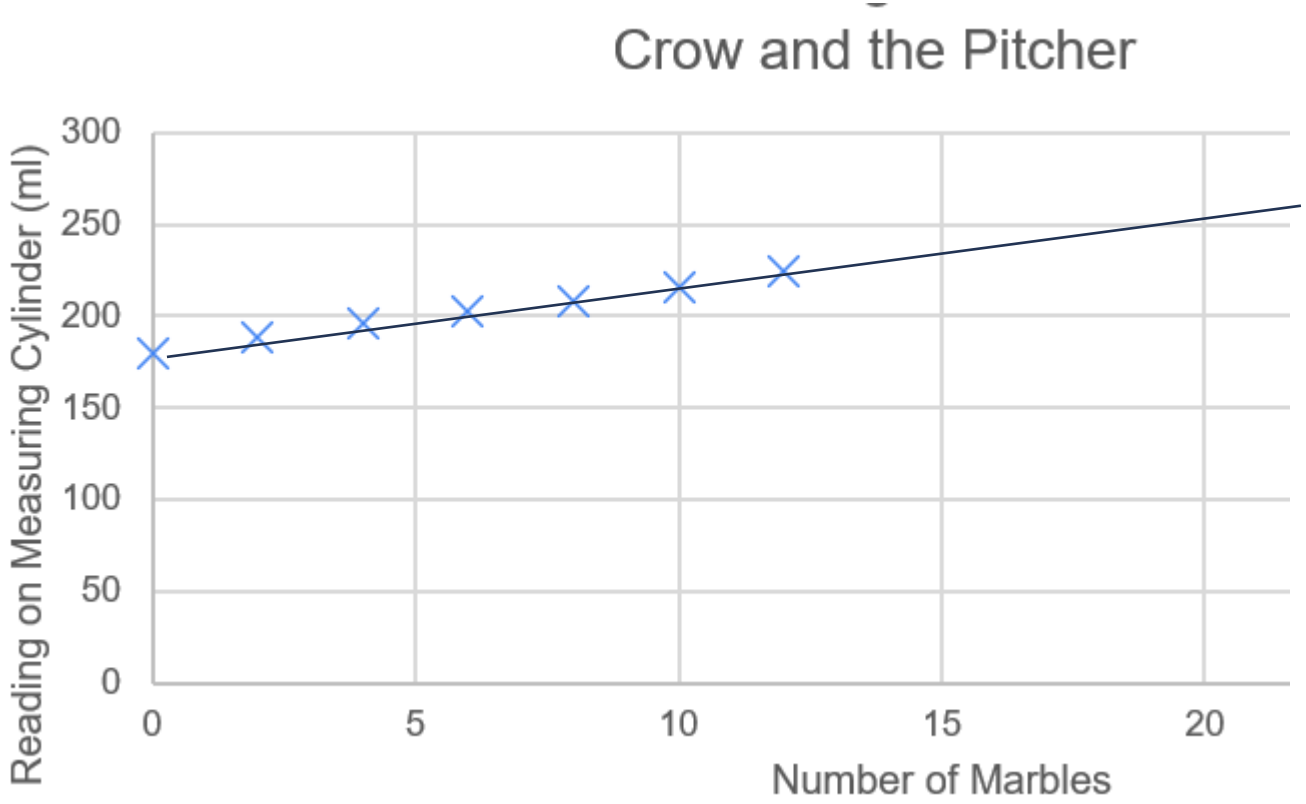

216ml


224ml

Results

marbles	0	2	4	6	8	10	12
reading (ml)	180	188	196	202	208	216	224

Analysing Data

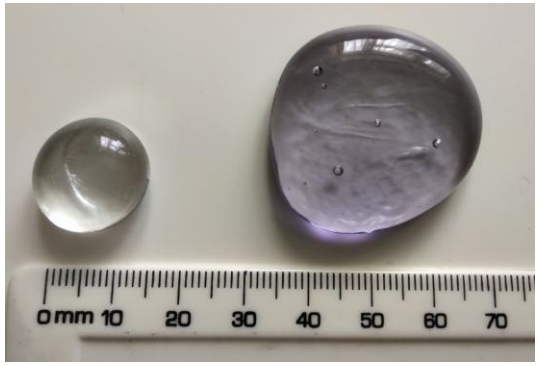


Prediction

It will take 20 marbles to reach 250ml

What questions might you have?

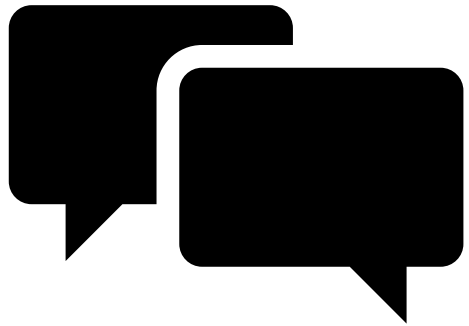
- What does the intercept represent?
- What does the gradient represent?
- How long will it take to overflow?
- What happens to the graph if I change the size of the marbles?
- What happens to the graph is I change the size of the measuring cylinder?
- What is the largest amount of water I can put into the measuring cylinder initially to be sure that the cylinder never overflows when marbles are added?
- What happens to the graph if I change the ‘stone’?
- Write some interesting questions of your own



Problem 2

How does the distance a wave travels affect the speed of a wave?

How does the depth of water affect the speed of a wave?



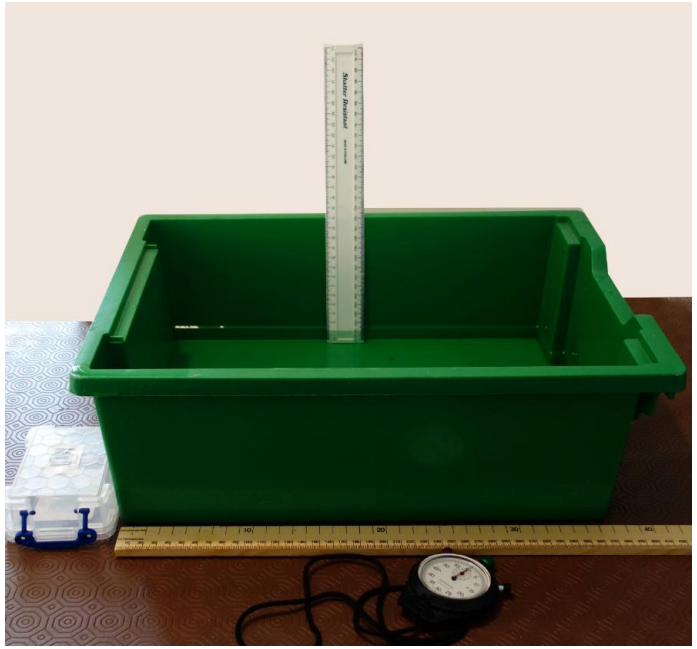
Task

Working in pairs, we can now see whose theory was correct.

You have 15 minutes to collect data, think about what your data shows and to answer the two questions.

How does the distance a wave travels affect the speed of a wave?

How does the depth of water affect the speed of a wave?



Equipment:

1. Gratnell tray (or similar)
2. Stop watch
3. Ruler
4. water

Wave Experiment – part 1

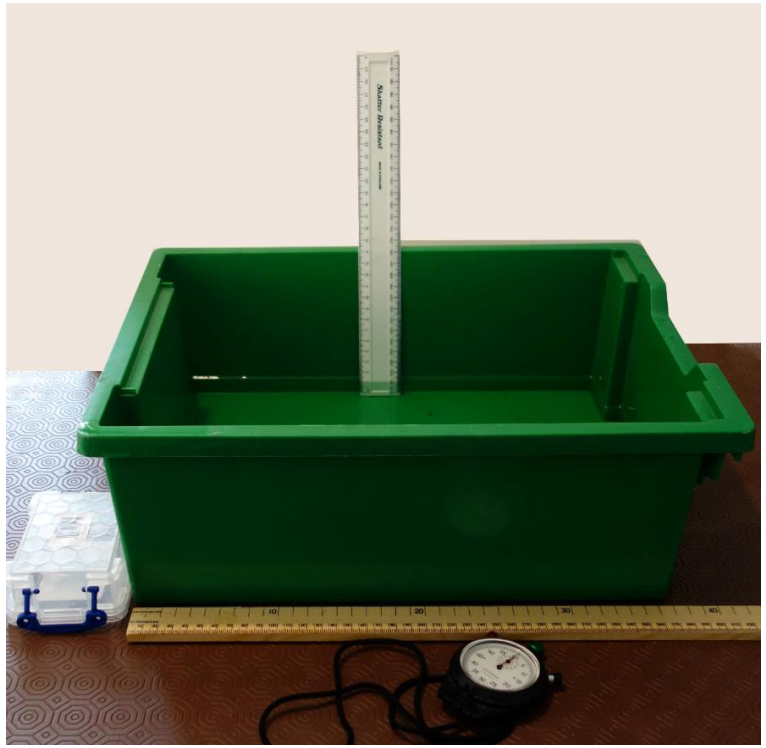
How does the distance a wave travels affect the speed of a wave?

Fill the tray with a measured amount of water.

Raise one end of the tray to a set height and drop.

Record the time taken for a wave to travel to the end of the box and back.

Repeat, allowing the wave to travel to end of the box and back twice, three times etc.



Wave Experiment – part 2

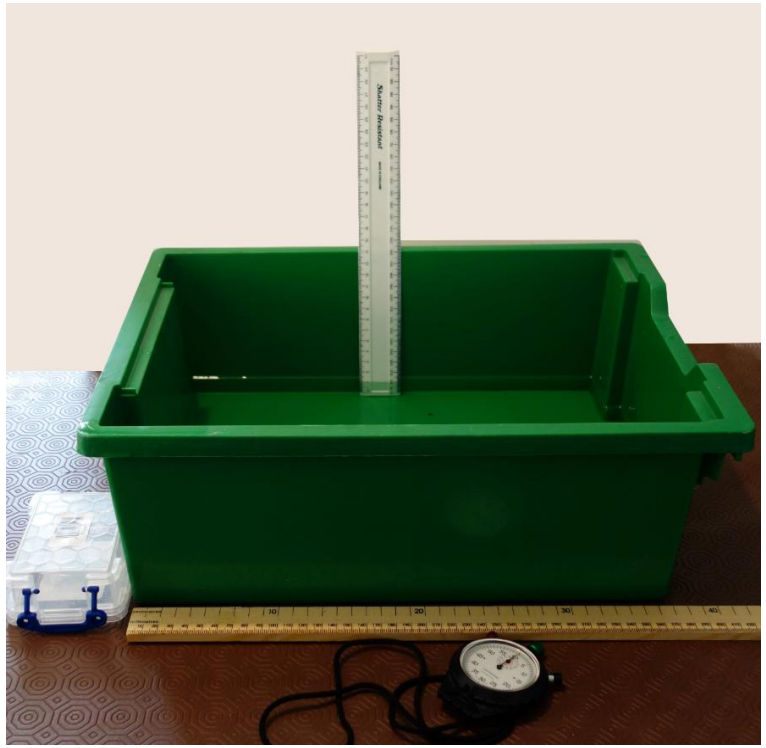
How does the depth of the water affect the speed of a wave?

Fill the tray with different heights of water.

Raise one end of the tray to a set height and drop.

Record the time taken for a wave to travel to the end of the box and back.

Repeat, allowing the wave to travel to end of the box and back twice, three times etc.



Wave Data

Depth – reading 2cm (2.5cm)

Wave Distance (38cm)	Time (secs) Trial 1	Time (secs) Trial 2	Time (secs) Trial 3
2	1.6	1.7	1.5
4	3.6	3.2	3.4
6	5.0	4.9	4.9
8	6.4	6.3	6.2
10	7.9	7.9	8.1
12	9.4	9.2	9.2

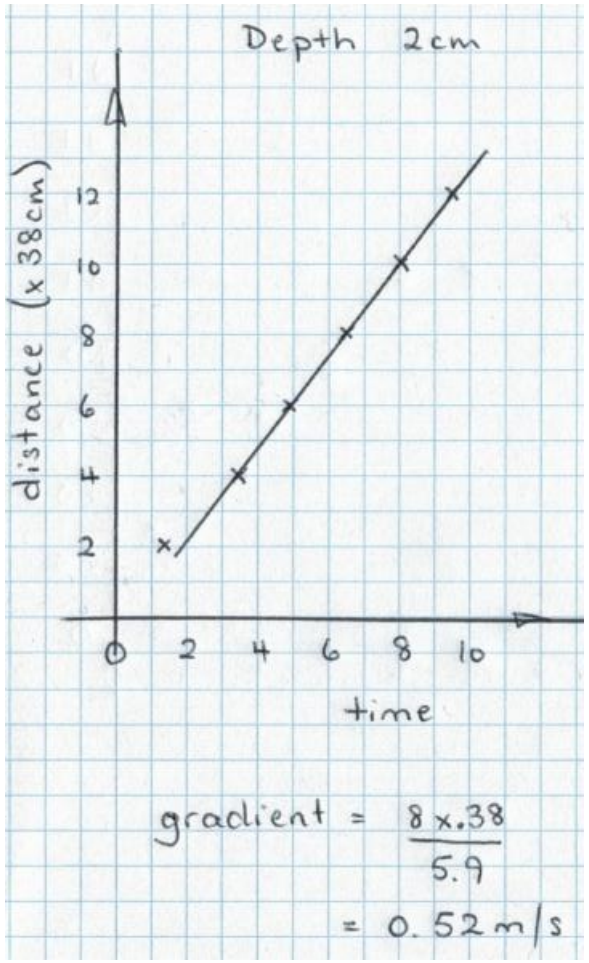
Depth – reading 3cm (3.5cm)

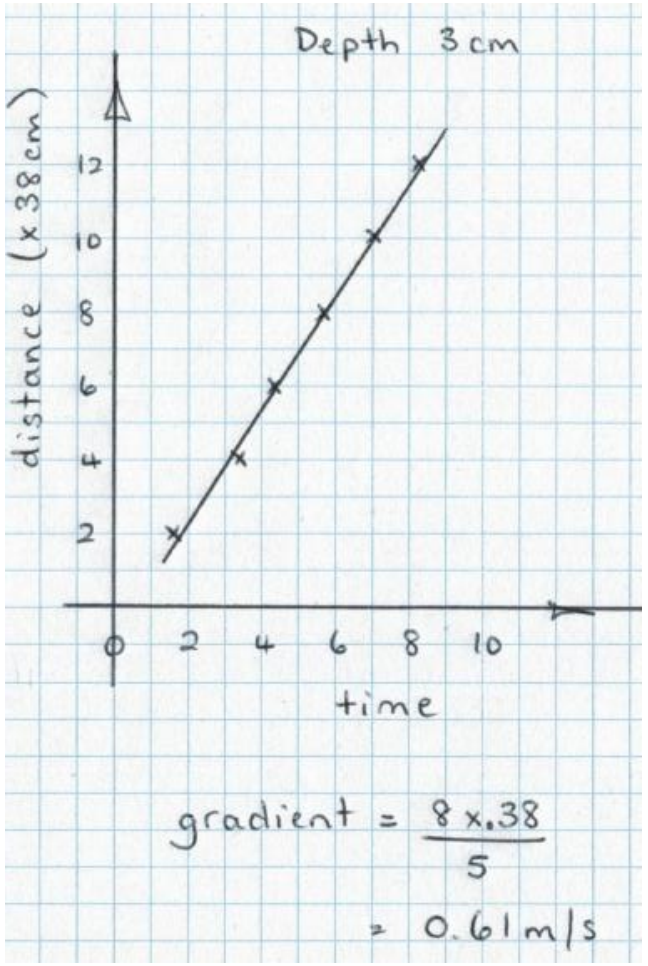
Wave Distance (38cm)	Time (secs) Trial 1	Time (secs) Trial 2	Time (secs) Trial 3
2	1.5	1.5	1.4
4	3.0	3.2	3.1
6	4.3	4.0	3.9
8	5.7	5.6	5.8
10	7.0	7.2	6.9
12	8.1	8.0	8.3

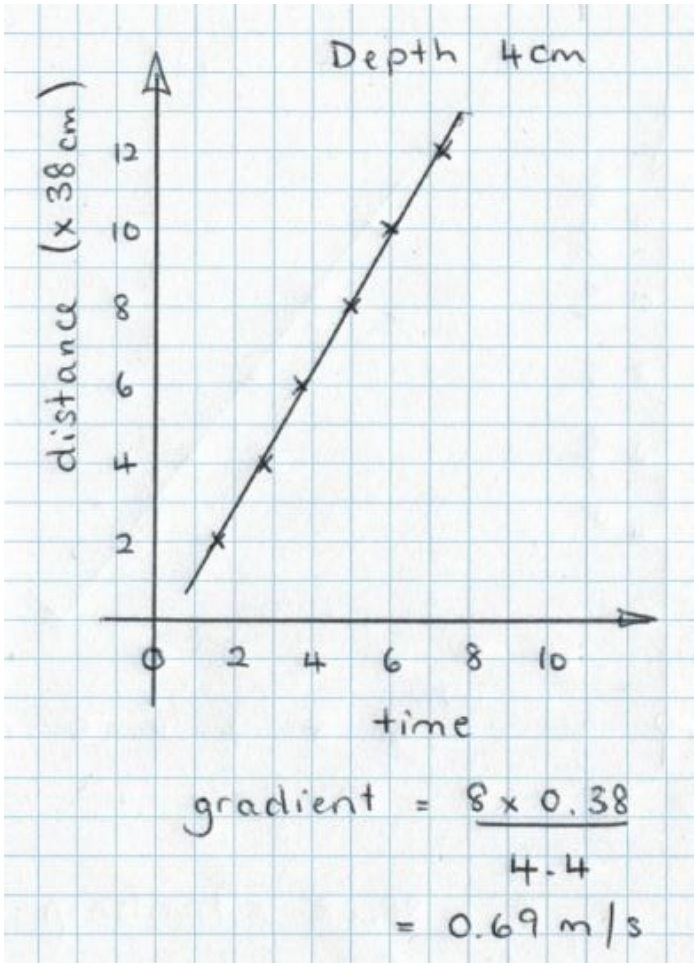
Depth – reading 4cm (4.5cm)

Wave Distance (38cm)	Time (secs) Trial 1	Time (secs) Trial 2	Time (secs) Trial 3
2	1.4	1.4	1.5
4	2.8	2.6	2.7
6	3.7	3.7	3.7
8	4.9	4.9	5.1
10	6.0	6.1	5.9
12	7.1	7.3	7.2

Wave Graphs


Depth 2cm
distance (x 38cm)
12
10
8
6
4
2
0
2
4
6
8
10
time
gradient = 8 x .38 / 5.9
= 0.52 m/s


Depth 3cm
distance (x 38cm)
12
10
8
6
4
2
0
2
4
6
8
10
time
gradient = 8 x .38 / 5
= 0.61 m/s


Depth 4cm
distance (x 38cm)
12
10
8
6
4
2
0
2
4
6
8
10
time
gradient = 8 x 0.38 / 4.4
= 0.69 m/s

Next steps…

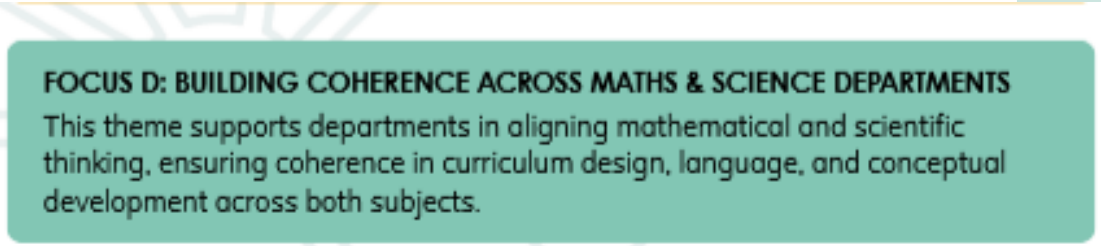
Talk to your maths hub:
www.ncetm.org.uk/maths-hubs/find-your-hub/

Talk to your science department:

www.stem.org.uk/secondary/cpd/science#Maths%20in%20science

Further reading:
The Language of Mathematics in Science

www.ase.org.uk/mathsinscience



Thank you!

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