



Because maths matters!

Let's talk about maths!

Alison Hopper

Have a look at the first two problems in the handout.

What do you notice?



Because maths matters!

Setting the scene

Five Themes:

1. Ask open questions
2. Making extended contributions
3. Acknowledge and explore differences of opinion and their reasons
4. Through explicit links between contributions, integrated lines of inquiry should be pursued
5. Adopt a metacognitive perspective – participants aware of its value and reflect accordingly

‘Teacher-Student Dialogue during Classroom Teaching: Does it Really Impact upon Student Outcomes?’, Howe et al, JLS, 2019

Departing from I-R E/F format

I – Initiation (“What is 7×8 ?”)

R – Response (“58”)

E/F – Evaluation/Feedback (“No, it’s 56”)

I and E/F generally the prerogative of the teacher

‘Teacher-Student Dialogue during Classroom Teaching: Does it Really Impact upon Student Outcomes?’, Howe et al, JLS, 2019

Departing from I-R E/F format

Dialogic ethos is typically seen to include such characteristics as open-mindedness, mutual respect, freedom from censure, reduced role division, and space to explore ...

... (e.g. Boyd & Markarian, 2011; Freire & Macedo, 1995; Haneda & Wells, 2008; Matusov, 2009; Wegerif, 2013).

Notes from Howe et al paper

So long as students participated extensively, elaboration and querying of previous contributions were found to be positively associated with curriculum mastery, and elaboration was also positively associated with attitudes. (P2)

The final theme relates to the adoption of a meta-cognitive perspective upon verbal interaction, where participants should become aware of its value and reflect accordingly on their practice (P4)

Notes from Howe et al paper

Teacher-student dialogue that promotes student contribution **has also been reported as having positive implications for attitudes to schooling and peers** (Richter & Tjosvold, 1980) and for academic attainment in mathematics, science and literacy (Clarke, Xu, & Wan, 2010; Muhonen, Pakarinen, Poikkeus, Lerkkanen, & Rasku-Puttonen, 2018). (P8)

Relating to the second and third themes, benefits for mathematics, science, literacy and oral communicative competence have been reported **when teachers build on or elaborate students' ideas and encourage them to do the same; or do such things while also encouraging students to explain and justify their ideas** (Muhonen et al., 2018; O'Connor et al., 2015; van der Veen et al., 2017). (P8)



Because maths matters!



Talk tactics

Voice 21 Talk Tactics

Instigate

Present an idea or open up a new line of inquiry



“ I would like to start by saying ____

“ I think ____

“ We haven't yet talked about ____

Instigate

Probe

Dig deeper, ask for evidence or justification of ideas



“ Why do you think ____?

“ What evidence do you have to support X idea?

“ Could you provide an example?

Probe

Challenge

Disagree or present an alternative argument



“ I disagree because ____

“ To challenge you X, I think ____

“ I understand your point of view, but have you thought about ____?

Challenge

Clarify

Asking questions to make things clearer and check your understanding



“ So are you saying ____?

“ Does that mean ____?

“ Can you clarify what you mean by ____?

Clarify

Note which ones you use and hear used.

Summarise

Identify and recap the main ideas



“ So far we have talked about ____

“ The main points raised today were ____

“ Our discussion focused on ____

Summarise

Build

Develop, add to or elaborate on an idea.



“ Building on X's idea ____

“ I agree and would like to add ____

“ X's idea made me think ____

Build

think



prepare



discuss



share



scan



notice



respond



What do you know?

What might be asked?

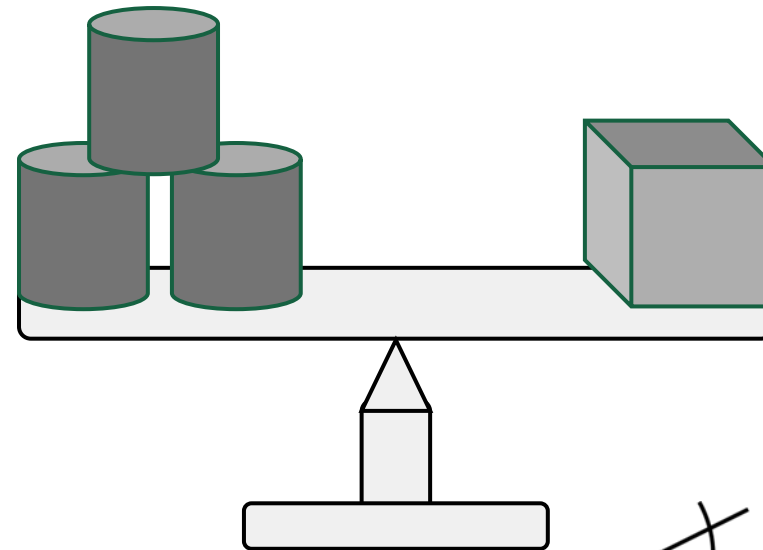
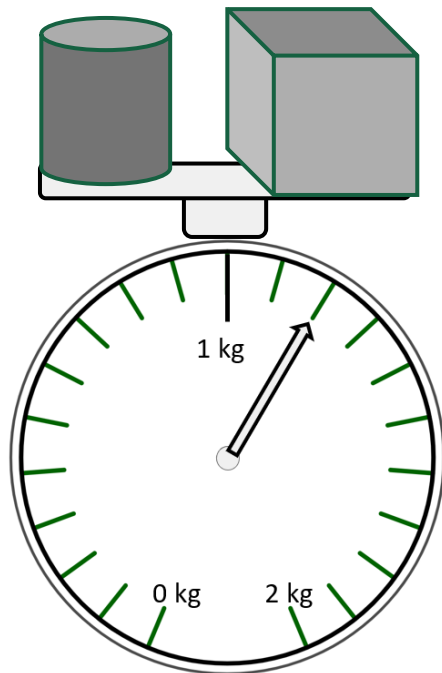
What do you notice?

Problem 17

What is the mass of the tin in grams?

What is the mass of the box in grams?

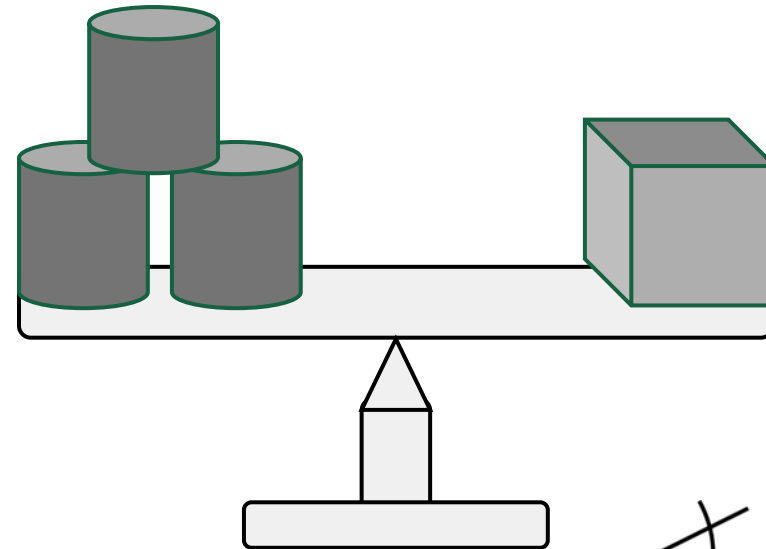
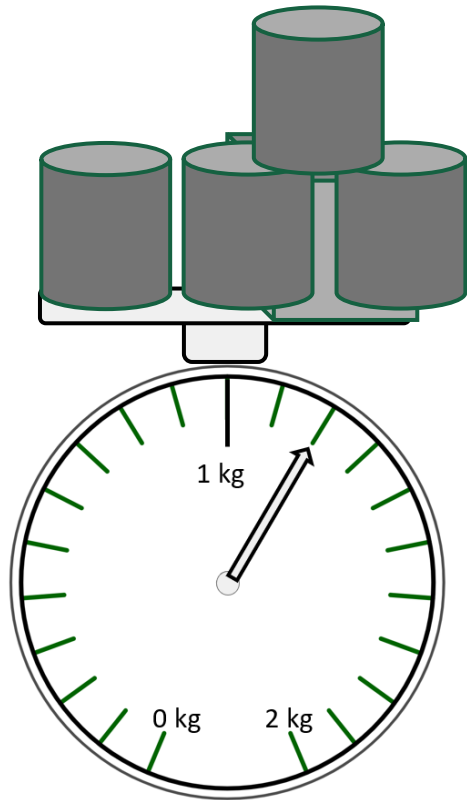
Discuss different ways to represent and solve this problem.



Problem 17

What is the mass of the tin in grams?

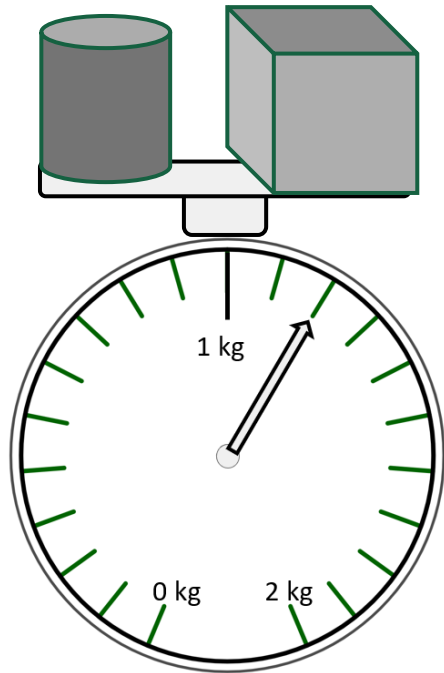
What is the mass of the box in grams?

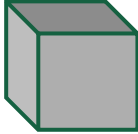


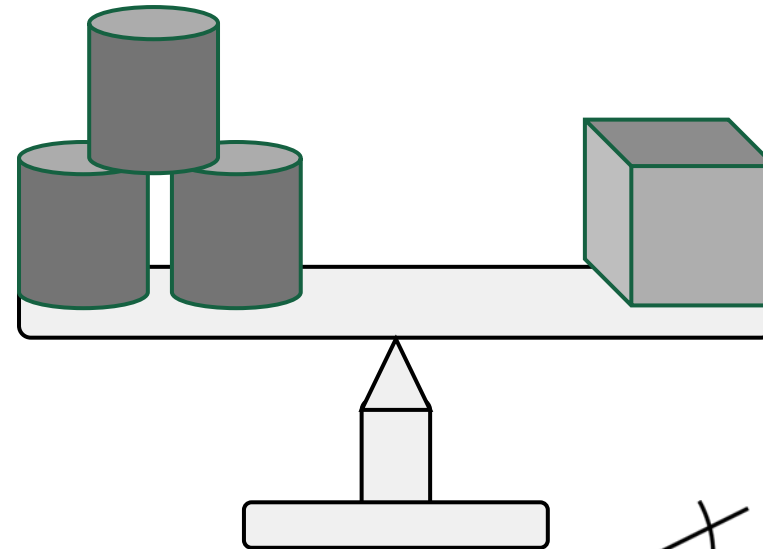
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What is the mass of the tin in grams?

What is the mass of the box in grams?



1,200 g			
			
			



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Challenge

Clarify

Asking questions to make things clearer and check your understanding



“ So are you saying ____?

“ Does that mean ____?

“ Can you clarify what you mean by ____?

Clarify

Which were you using?

Summarise

Identify and recap the main ideas



“ So far we have talked about ____

“ The main points raised today were ____

“ Our discussion focused on ____

Summarise

Build

Develop, add to or elaborate on an idea.



“ Building on X's idea ____

“ I agree and would like to add ____

“ X's idea made me think ____

Build

Which rely most on 'deep' or 'authentic' listening?

Which are used most often by students?

Circle the fractions that are **less than** $\frac{2}{3}$

$$\frac{5}{9}$$

$$\frac{4}{9}$$

$$\frac{7}{9}$$

$$\frac{8}{9}$$

$$\frac{3}{9}$$

How far can
you get without
equivalent
fractions?

Circle the fractions that are **greater than** $\frac{2}{5}$

$$\frac{5}{8}$$

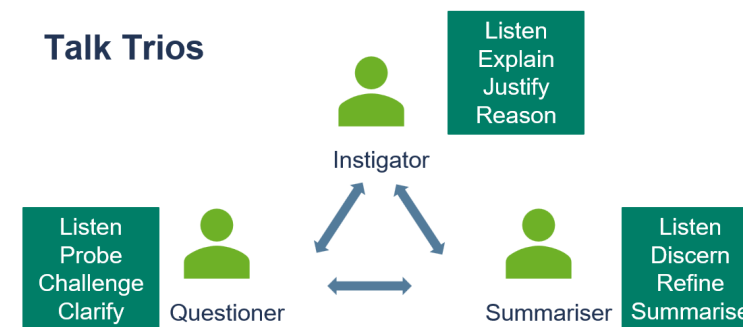
$$\frac{3}{8}$$

$$\frac{2}{8}$$

$$\frac{6}{8}$$

$$\frac{4}{8}$$

Talk Trios



Which are straightforward? Which require deeper thinking or manipulation?

Circle the fractions that are **less than** $\frac{2}{3}$

$\frac{5}{9}$

$\frac{4}{9}$

$\frac{7}{9}$

$\frac{8}{9}$

$\frac{3}{9}$

Circle the fractions that are **greater than** $\frac{2}{5}$

$\frac{5}{8}$

$\frac{3}{8}$

$\frac{2}{8}$

$\frac{6}{8}$

$\frac{4}{8}$

What do we
want to hear
being
summarised?

Summarise

Identify and recap the
main ideas



- “ So far we have talked about ____
- “ The main points raised today were ____
- “ Our discussion focused on ____

Summarise

Clarify

Asking questions to make
things clearer and check
your understanding

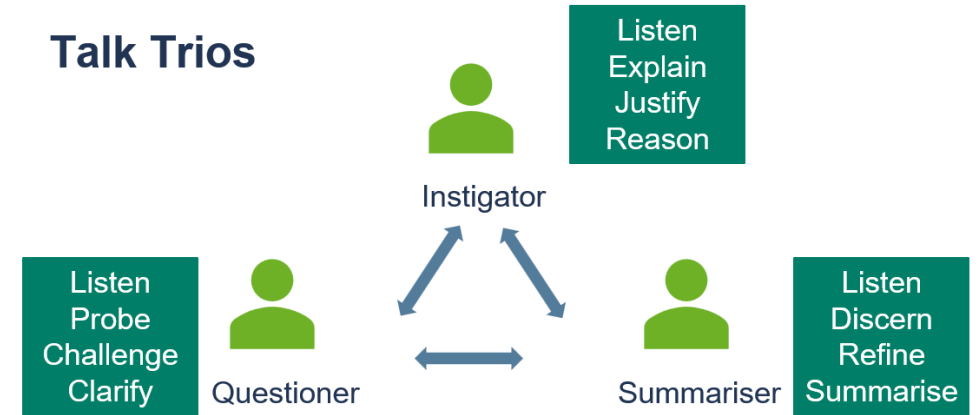


- “ So are you saying ____?
- “ Does that mean ____?
- “ Can you clarify what you mean by ____?

Clarify

What did you
clarify?

Talk Trios



Problem 49

What do you know?

A game developer is testing three different servers: A, B, and C which handle a total of 64 active players.

Which server handles the most/fewest players?

What else could you ask?

What talk could we prompt to break down this question?

Number
of bags

- 4 Serena wants to make a total of 180 bags of beads to sell at a fair.
She will make small bags and large bags where
- $$\text{number of small bags} : \text{number of large bags} = 7 : 5$$

Mass of
bags

Each small bag will contain 65 grams of beads.
Each large bag will contain 145 grams of beads.

Serena thinks she will need less than 17 kilograms of beads to fill 180 bags.

Is Serena correct?
You must show how you get your answer.

(5 marks)

Pearson Edexcel Level 1/Level 2 GCSE (9–1)

Wednesday 3 June 2026

Morning (Time: 1 hour 30 minutes)

Paper
reference

1MA1/2H

Mathematics

PAPER 2 (Calculator)

Higher Tier



What might the talk look like?

How many of each bag does she need to make?

What is the mass of the 180 bags?

Which set of bags had the greatest mass?

- 4 Serena wants to make a total of 180 bags of beads to sell at a fair. She will make small bags and large bags where

number of small bags : number of large bags = 7 : 5



Because maths matters!



Developing talk and listening.

Three types of talk (Mercer, 2008)

Disputational talk

- There is frequent disagreement which may not be supported with reasons
- Contributions are competitive rather than collaborative
- Nobody bridges the gap between different ideas and opinions
- Students hold onto their own views

Cumulative talk

- Contributions build on each other but go unchallenged
- Ideas may be repeated or elaborated upon
- Contributions are accepting and uncritical rather than questioning or challenging

Exploratory talk

- There is a sense of collaboration and purpose
- Contributions are treated with respect
- Students offer reasons for their opinions
- Students are not afraid to politely challenge, question or probe each other's ideas

Dialogic ethos is typically seen to include such characteristics as open-mindedness, mutual respect, freedom from censure, reduced role division, and space to explore ...

Groupings

Different groupings support different types of talk

Trios

Pair

Talk to a partner

Fishbowl

Similar to an onion, but the people in the inner circle face each other while the people on the outer circle observe the inner circle's discussion.



How do we make students aware that this way of working is purposeful?

“The more they understood the purpose of their talk, the more purposeful their talk became.”

RIWG Feedback

Have we got time to talk in maths lessons?

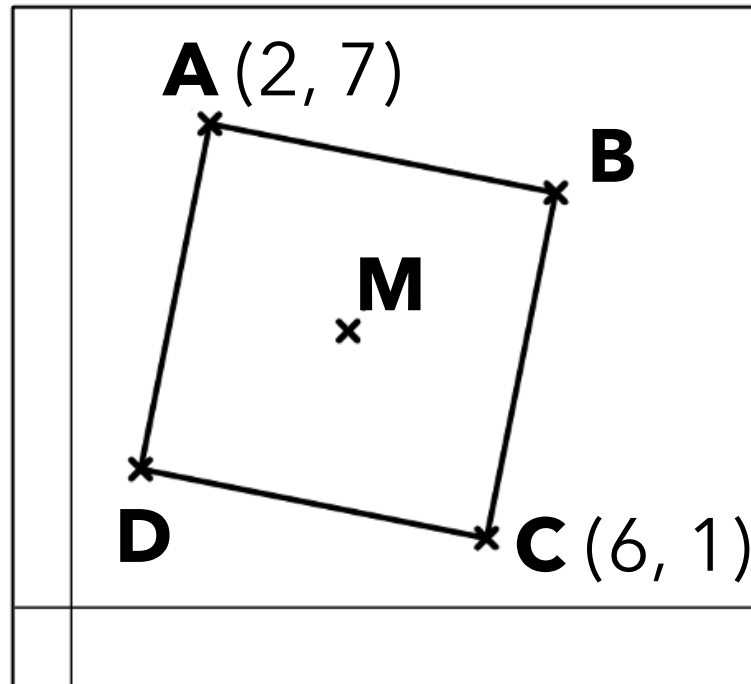


Problem 50

ABCD is a square. Work out the coordinates of point M, where M is the middle of the square, and points B and D, which are vertices of the square.

Questions
to structure
thinking?

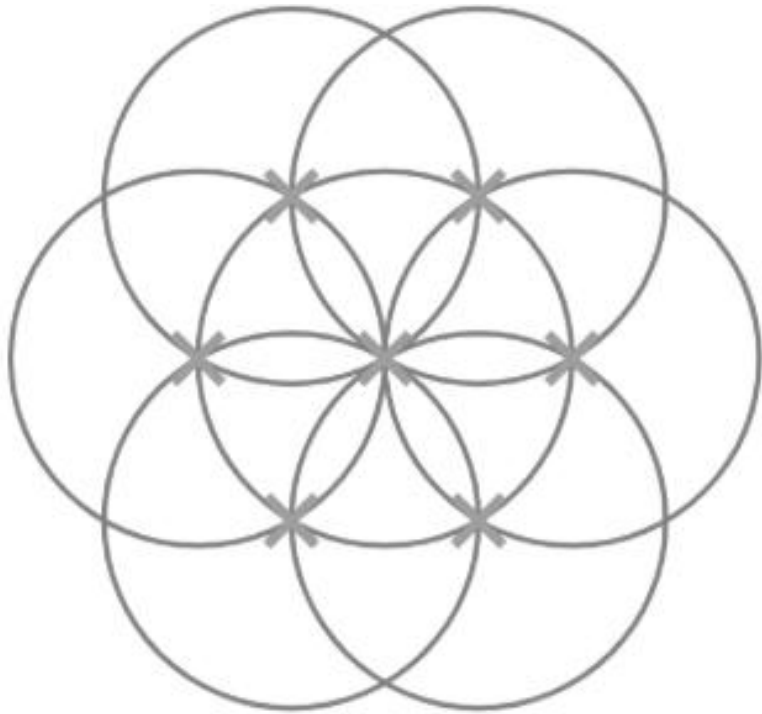
How might
you
structure
the talk?



Remove the
task to start
with?

Problem 42

This construction shows seven congruent circles. The centre of each circle is labelled with a cross.



Find, draw and label as many different polygons and angles as you can.

Are there any quadrilaterals that cannot be drawn accurately?
Explain how you know.

Voice 21 – The Talking Point



Making talk meaningful

We need to:

- Plan for talk
- Model talk
- Model listening and responding
- Ask questions to prompt thinking and talk
- Value responses
- Build meaning and understanding from and through responses
- Allow students to reflect on the value of talk

Links

Blog Post by Christine Howe: <https://www.bera.ac.uk/blog/teacher-student-dialogue-why-it-matters-for-student-outcomes>

Voice 21 'The Talking Point' 2026 <https://voice21.org/wp-content/uploads/2026/06/Voice21-TalkingPointJournal-2026-v7-web.pdf>

NCETM Oracy Guidance and Podcasts
<https://www.ncetm.org.uk/search?q=Oracy>

Maths Horizons Problem Solving Resources
<https://www.mathshorizons.uk/upper-ks2-and-ks3>