Instructional Rounds

ODPS-Student Talk in Maths

By Karen Pascoe, Elizabeth Body and Blane Steel

Incorporating Student Talk in Mathematics?

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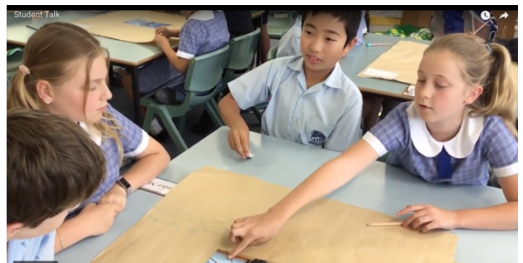

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*Work must allow for argumentation where students can agree / disagree / negotiate understanding / give evidence and support their reasons

*Grouping (balanced and can not be too big: 3-5 usually works well)

*Provide individual and group accountability

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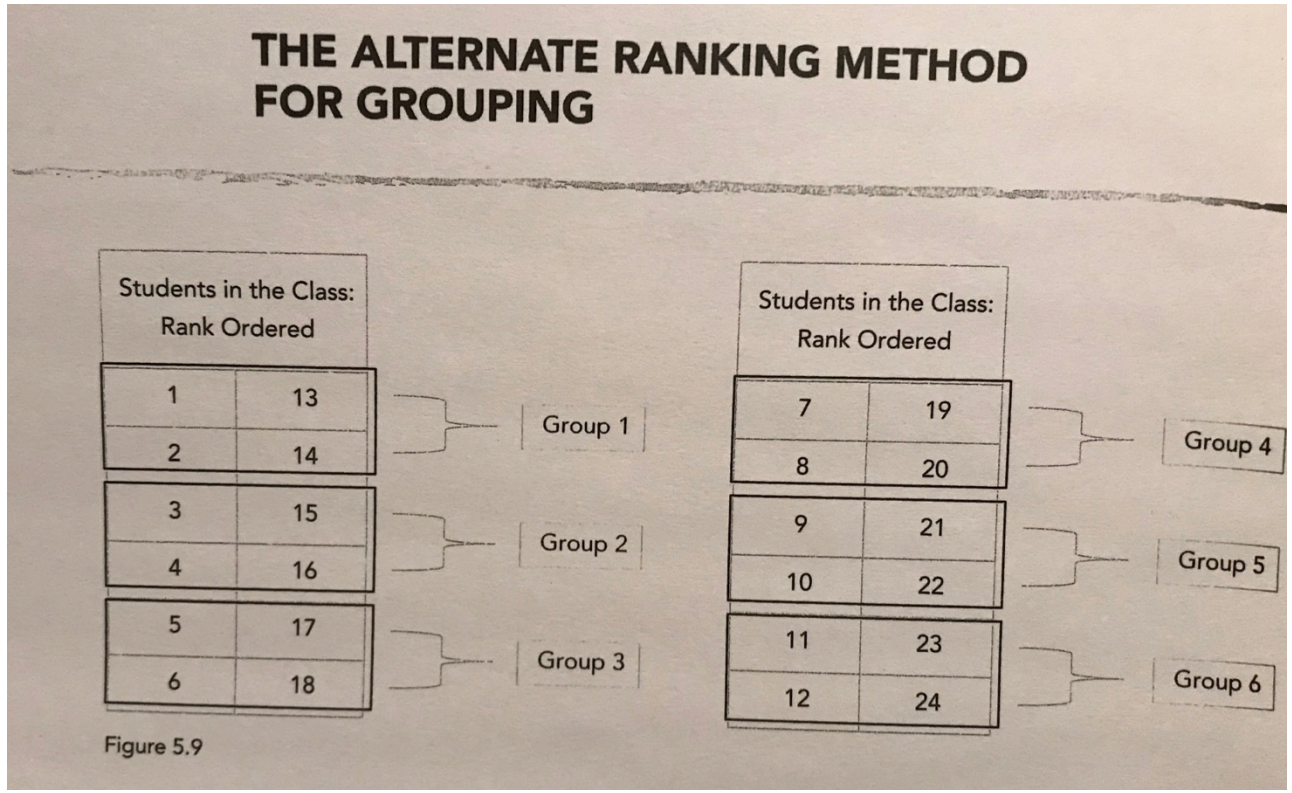
Successful Grouping

Grouping should allow for a moderate but not extreme range of skill level. (J. Hattie)

eg. Highly skilled students paired with students of average skill and
Those with average skill paired with the least skill (eg shown below)



THE ALTERNATE RANKING METHOD FOR GROUPING

Students in the Class: Rank Ordered		
1	13	Group 1
2	14	
3	15	Group 2
4	16	
5	17	Group 3
6	18	

Students in the Class: Rank Ordered		
7	19	Group 4
8	20	
9	21	Group 5
10	22	
11	23	Group 6
12	24	

Figure 5.9

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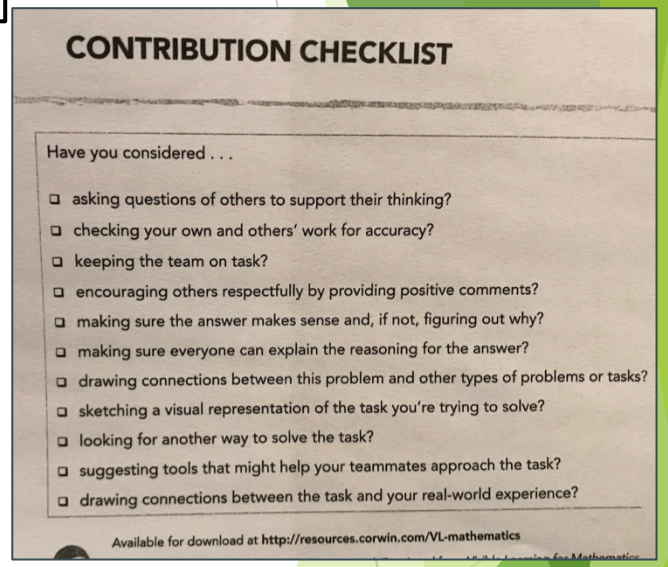
Individual Exploration Notes

1. What is the question asking?
2. What useful information is given?
3. What other information would be helpful?
4. What might an answer look like?

Contribution Checklists



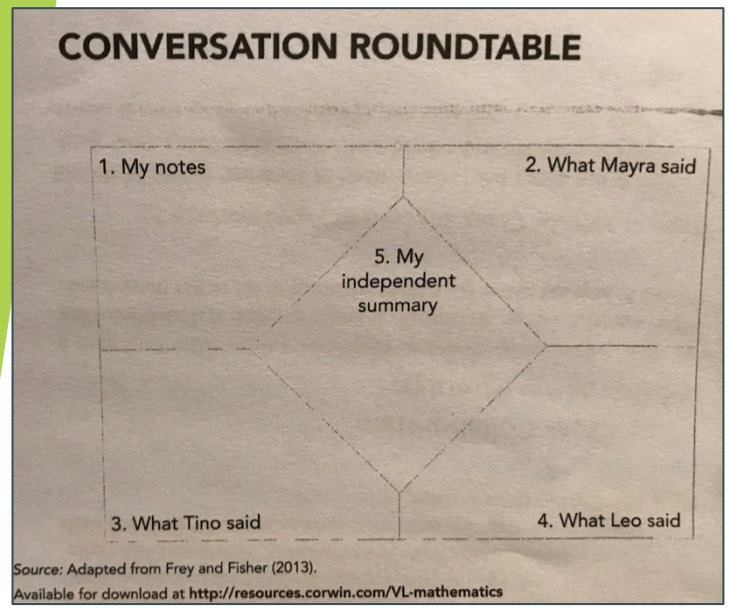
CONTRIBUTION CHECKLIST

Have you considered . . .

- ❑ asking questions of others to support their thinking?
- ❑ checking your own and others' work for accuracy?
- ❑ keeping the team on task?
- ❑ encouraging others respectfully by providing positive comments?
- ❑ making sure the answer makes sense and, if not, figuring out why?
- ❑ making sure everyone can explain the reasoning for the answer?
- ❑ drawing connections between this problem and other types of problems or tasks?
- ❑ sketching a visual representation of the task you're trying to solve?
- ❑ looking for another way to solve the task?
- ❑ suggesting tools that might help your teammates approach the task?
- ❑ drawing connections between the task and your real-world experience?

Available for download at http://resources.corwin.com/VL-mathematics

Conversation Roundtable

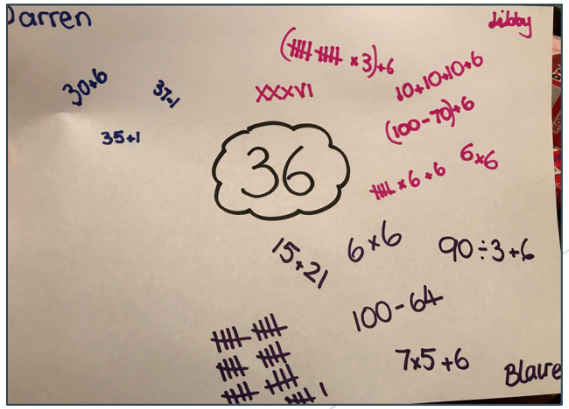


CONVERSATION ROUNDTABLE

1. My notes
2. What Mayra said
3. What Tino said
4. What Leo said
5. My independent summary

Source: Adapted from Frey and Fisher (2013).
Available for download at http://resources.corwin.com/VL-mathematics

Collaborative Posters



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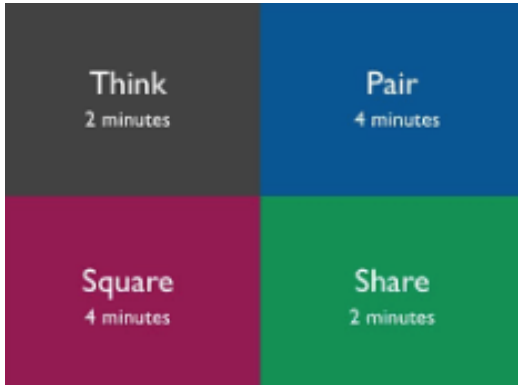
Student Talk Scaffolds

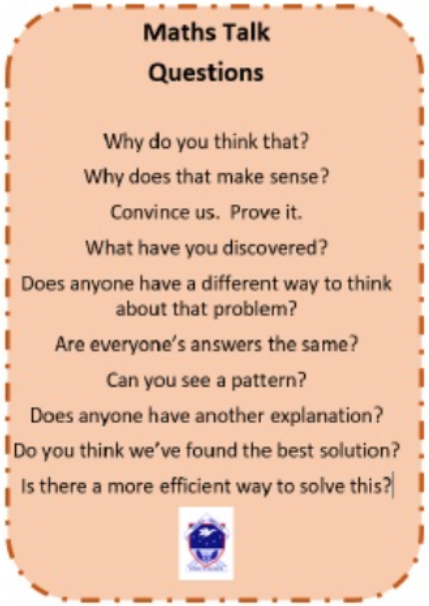
WILF / Success Criteria

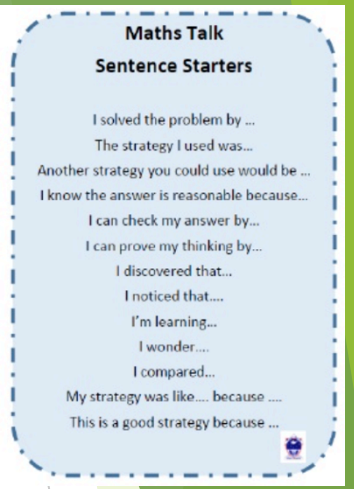
Think Pair Share / Square



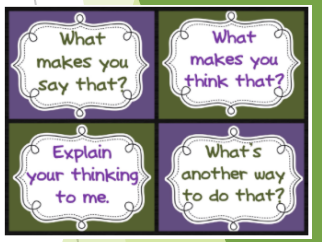
Final Word Protocol

Question Starters

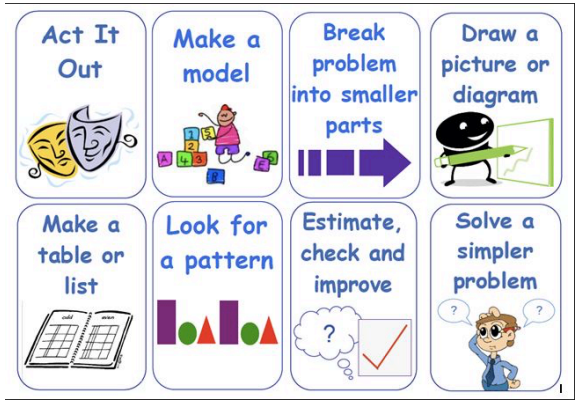




Sentence Starters



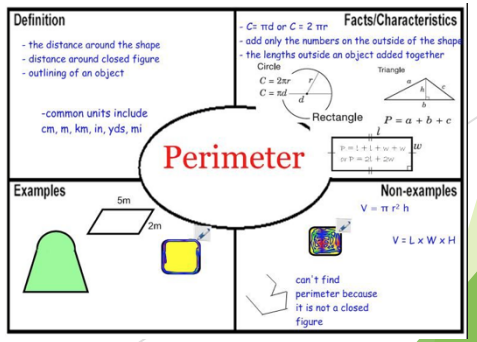
Newman's Prompts

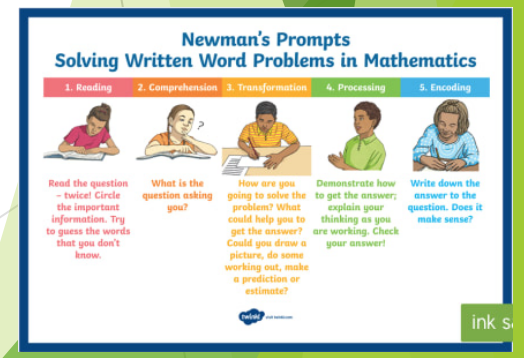


Problem Solving Kits

Advanced Organisers

Frayer Model



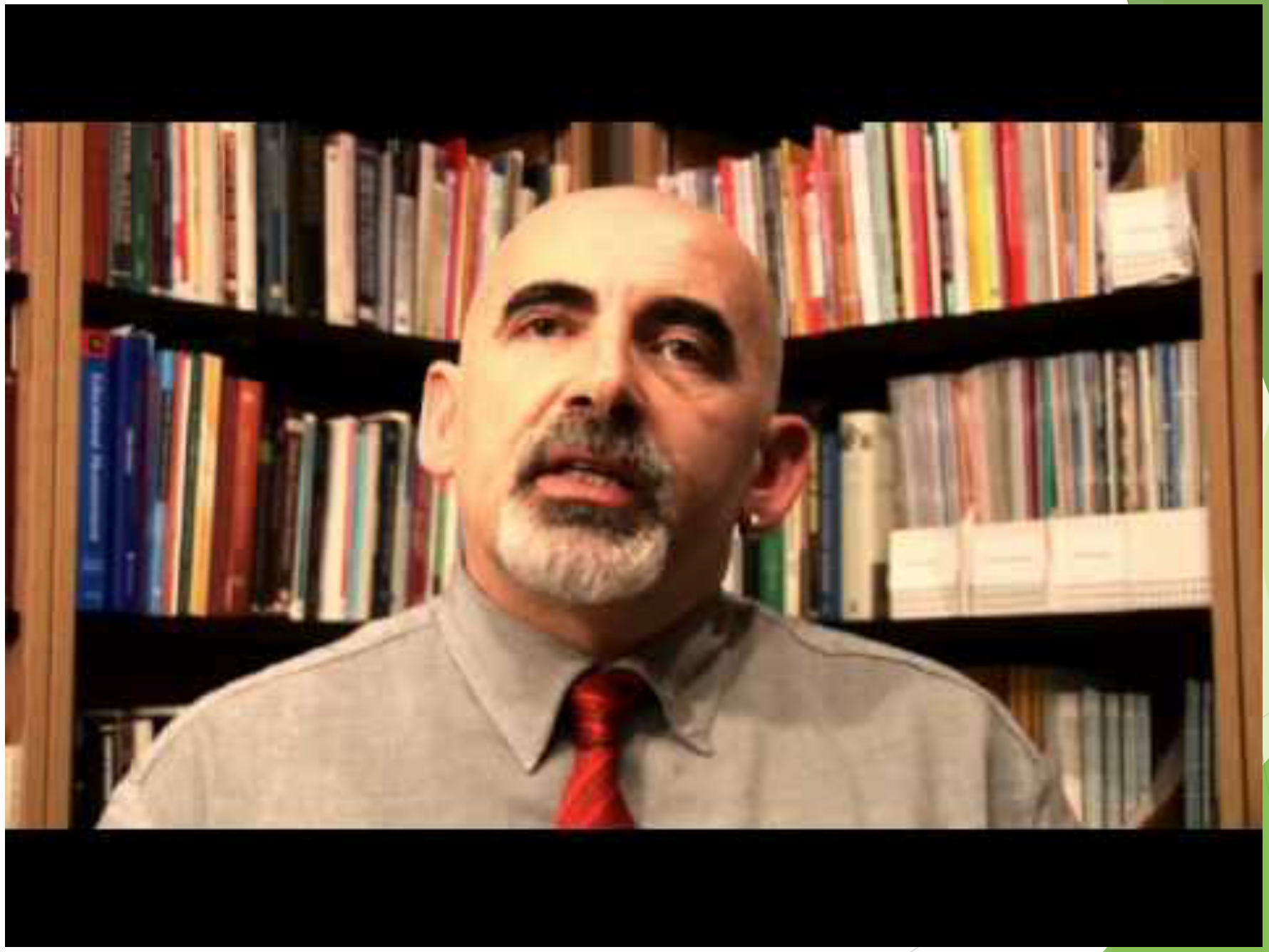


Teacher Questioning Techniques

Student talk in Mathematics - Stage 1

Peer Assessment

During the lesson, students were asked to visit another group and assess how they were going. Students had to provide feedback to the other group based on their achievement of the lesson's success criteria. This process of peer assessment allowed for deep but structured collaborative discussions. Many students gained clarity by analysing the work of others. As a result of this task, students were able to make improvements based on their own observations as well as feedback that they received from their peers.



Funnelling and Focusing Questions

Funnelling questions (Wood 1998) occur when a teacher guides a student down the teacher's path to find the answer.

Focusing questions support students doing the cognitive work of learning by helping to push their thinking forward. Visible Learning in Maths (J. Hattie)

Funnelling questions limit student thinking by hinting at an answer and take away thinking from the students eg What are mean, median and mode?

These types of questions don't always require a deeper understanding of maths concepts just a basic answer to the teacher's basic question with no transfer of knowledge.

Focusing questions encourages students to work things out for themselves eg What are you trying to find out? How did you get that?

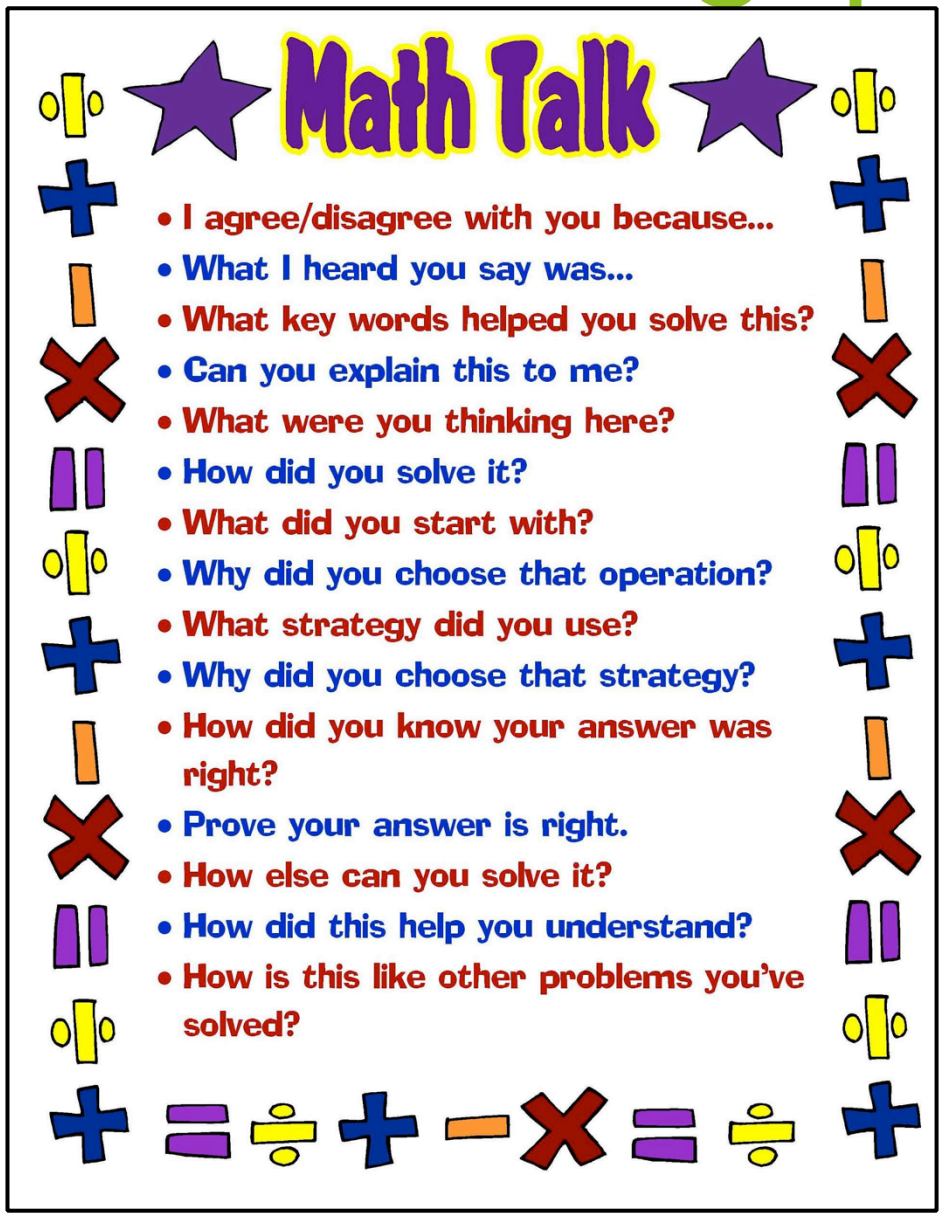
Students are given an opportunity to transfer their understanding to a new concept

Examples of Funnelling and Focusing Questions

Funnelling Questions-leads to one right answer	Focusing Questions-more open and thought provoking answers
• What's a decade? • If 490 were males, how many would be females? • Are these pieces bigger or smaller? • Would 8/7 be more than a whole? • How many multiples of 24 are there? • Do you agree or disagree? • Did anyone else make it simpler? • Is that a fraction? • What are you going to put right there?	• How do you know this answer doesn't make sense? • What do you notice about …. • Tell me which answer is ridiculous and why. • Why is this more complicated? • Can you explain it again? • Do you want to explain what she said? • How did you know that? • Why was I confused?

It is our role as teachers to facilitate effective student talk by providing scaffolds and modeled examples. We need to support our students so they know how to say what they want to say.

More focusing question examples



https://youtu.be/tmlx8Tktg1Q

How many packages of hot dogs and hot dog buns should he purchase so that there are no extra hot dogs or hot dog buns?

How many hot dogs come in a package?

How many hot dog buns come in a package?

What might happen if you buy one package of hot dogs and one package of hot dog buns?

How might that make someone feel?

What is a guess that is too low?

What is a guess that is too high?

What is your best guess?

How can we represent this using pictures, numbers, symbols, and words?

Math Talk

- I agree/disagree with you because...
- What I heard you say was...
- What key words helped you solve this?
- Can you explain this to me?
- What were you thinking here?
- How did you solve it?
- What did you start with?
- Why did you choose that operation?
- What strategy did you use?
- Why did you choose that strategy?
- How did you know your answer was right?
- Prove your answer is right.
- How else can you solve it?
- How did this help you understand?
- How is this like other problems you've solved?

A MATH DISCUSSION-STARTER:

Which number doesn't belong?

9 16 25 43

Math Talk Action Plan

The Way We Were	Getting Started	Getting Better	The Goal
Questioning Techniques			
The teacher asks all the questions while the students listen. The questions are often looking for short answers and are frequently asked of certain students to make sure they are paying attention.	• Ask your students questions that focus more on their thinking than answers. Ask follow-up questions about their methods. • You are still the main questioner. *Why do you think that?* and *What makes you say that*? are two good question to begin with.	• Begin to ask more open ended questions that may have more than one solution. • Give your students question prompts, such as the Math Talk bookmarks) and encourage them to ask questions about other students work. • Practice Math Talk questioning between partners and small groups.	• You can now step away as Math Talk is student initiated and not dependent upon the teacher although you may still guide the dialogue. • Students ask appropriate questions that require explanations, then listen and respond respectfully. • Students continue the discussion until everyone understands and is satisfied with the answers.
Explaining Mathematical Thinking			
Students think independently while they are solving problems. The teacher and student are concerned with the correct answer more than the process.	• Begin to ask more probing questions that require students to think in order to answer, such as *Why did you choose that strategy?* or *What's another way to solve it?*	• You begin to ask and model questioning that elicits detailed descriptions and multiple strategies for the same problem. • Students are beginning to voluntarily ask probing questions and explain why answers are incorrect/correct.	• As the teacher, you follow the math conversations closely, encouraging students to make complete explanations and provide evidence for their answers. • Students are able to describe their strategies and provide evidence as to why their answer is correct. • Classmates listen actively and respond appropriately, explaining why they agree or disagree with the problem solver.
Who's Responsible for What?			
The students listen to the teacher and do their work. If they are having trouble with a problem they ask the teacher who explains it to them. The discussion is between the student and the teacher.	• You are still leading the discussions but you are now asking for student input. When students solve problems, ask other students whether they agree or disagree and why. Ask if anyone has a different way they solved the problem. • The students answer questions they are asked, and they begin to listen more carefully for good strategies and errors they can comment on.	• You will start to notice some co-teaching and co-learning taking place in your classroom. • Begin to distance yourself from the conversations although you are nearby to redirect and encourage higher-level thinking as necessary. • Students are following the techniques that have been modeled.	• Students are working independently, able to evaluate their classmates work and thinking, as well as their own. • They help each other in understanding and correcting their errors. • Students listen actively in order to respond and participate. • Students use rationale questions and explanations. You are there to support and guide your students as they clear up misconceptions.

Scaffolds to assist student talk

Formative assessment: point of need decisions about learning & feedback

Grouping of students: Assigned roles, think pair share

Stories Stories relate complex and abstract material to situations more familiar with students: Recite stories to inspire and motivate learners, analogies

Prompts -physical or verbal cue to aid in recall of prior or assumed knowledge. Self eva[illegible] prompts & cues, question[illegible]ions stems, cue card[illegible]ks, what if question[illegible]

Re-capping and metacomment/ Extended IRF sequences Paraphrasing student language to include target vocabulary or improve accuracy - appropriating, recasting, Talk m[illegible]es

Think aloud Teacher explicitly describes his/he[illegible]inking while demo[illegible]g an activit[illegible]

Lin[illegible]rior ex[illegible]ien[illegible]s - [illegible]ussing how new [illegible]rning relates to personal experiences/ previous lesson topics KWL chart, brain storm, text-self, text-text, text-world

To scaffold the learning

Explanations More de[illegible]ed information to move stu[illegible]ts along on a task or in their thinking of a concept: Written instructions for a task; verbal explanation of how a process works.

Advance organisers -Tools used to introduce new content and tasks -venn diagrams, flow charts organizational chart outlines, mnemonics, statements; rubrics. Writing templates

Scaffolded In[illegible]ction: Lesson sequence - from demonstration/group construction towards independent practice

Modelled - guided – independent lesson

Examples/demonstration Samples, specimens, illustrations, problems: real objects; illustrative problems used to represent something, worked examples, the environment in the classroom, excursions & shared experiences, student or teacher demonstrates

Manipulatives and models- Hands on resources MAB base 10 blocks, counters, anatomical models, making a model or dicrama

Visual scaffolds – methods of highlighting visual info Gestures, diagrams -charts and graphs, word clines, writing structure templates **Visuals** – labelled pictures

Concept and mind maps - show relationships: Partially or completed maps for students to complete; students create maps based on their current knowledge of the task or concept. **Making Thinking Visible** routines.

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