Warm-up Activities Booklet

"Numeracy for Year 5 – 8 Teachers"

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Task 1: HOW MUCH MONEY IS IN MY POCKET?

Students have 8 questions to ask in order to work out how much money is in the pocket. The 9th turn is a guess of the amount.
Only one questions can be asked per person.
Clearly mark down the side of the whiteboard the numbers 1 – 9, but place a dotted line between 4 and 5, 7 and 8, and 8 and 9. These dotted lines indicate pauses.
Determine your starting range: $0 - $500
The only answers that can be given to the student questions are: Yes/No.
Do the thinking out aloud for the students and discuss the relationships.
Eg: make the connections 50% which is the same as 0.5 which can also be expressed as ½.

Pause the game after question 4. Delete any of the information that is now superfluous due to the new range.

After you have given your response to Question 7, then list all of the numbers which are available as potential answers. The students need to have 15 or less options to proceed to Question 8.

Example below: (This is the task we were given and we still do not know the amount of money that was in the pocket.)

	Question	Response
1		
2		
3		
4		

5		
6		
7		

8		

9	- Guess the value!	

The questions the audience asked were:	Responses
1. Is the value less than $250?	Yes
2. Is the value an even number?	No
3. Is the value less than or equal to $99?	Yes
4. Are there any coins in the pocket?	Yes – but no decimals. (Extra hint given here)

Now go back and look at the questions. Which ones are now unnecessary? You can delete question 1 and the response. This does NOT mean an extra question is given to the students.

The audience continued with these questions:	Responses
5. Is the value a multiple of 3?	No
6. Is there the digit '9' in the value?	No
7. Is there more than 10 coins?	No

Now go back and look at all of the possible remaining answers. Remember: if there are more than 15 the game stops. 1, 5, 7, 11, 13, 17, 23, 25, 29, 31, 35, 37, 41, 43, 47, 53, ... and the list continues.
THIS GAME STOPS!!!!

Task 2: FIND THE CONNECTIONS

35		500		16		90		100	
	12		30		*206		200		
18				4		6		2	
	10	50		3	20		5		8
1000		*71		15		48		72	
	54		60		*1000 000		25		7
*101		9		*624					

Choose a number on the board. X or ÷ by another number on the board AND locate the answer in the board to make an equation. (Also use the terms "product" and "quotient" with the students as another relationship connection.) Example: 4 x 15 = 60
If the student can use 4 numbers - they get to also use addition and score a BONUS point. Eg: 7 x 4 = 20 + 8
If a student uses a number with a * beside in the equation, they get a BONUS point.
Only one response per student.
500 x 100 x 20 x 10 = 1000 000 student will get DOUBLE BONUS points as they have used more than 4 terms and one had a *.

Alternatively – determine your own scoring system.

Start with students finding 10 equations. Give them time to work independently to create a couple of options and they need to try and maximise their points.
If students are capable, they can use numbers as powers (indices) too.

<u>The 10 Equations</u>
1
2
3
4
5
6
7
8
9
10

Task 3: I have .... Who has...?

I have 9. Who has twice my number less 4?	I have 14. Who has my number doubled?	I have 28. Who has my number subtract 13?	I have 15. Who has three times my number?
I have 45. Who has 19 larger than my number?	I have 64. Who has my number divided by 8?	I have 8. Who has six times my number?	I have 48. Who has one-third my number?
I have 16. Who has my number times 5?	I have 80. Who has 25% of my number?	I have 20. Who has my number multiplied by 50% of my number?	I have 200. Who has three-quarters of my number?
I have 150. Who has the largest number that can be made using my digits?	I have 510. Who has 9 less than me?	I have 501. Who has 401 less than my number?	I have 100. Who is my number divided evenly into me 4 times?

I have 25. Who is my number doubled, then divided by 10?	I have 5. Who has my number multiplied by 200?	I have 1000. Who has my number subtract 901?	I have 99. Who has my number divided by 9?
I have 11. Who has my number multiplied by 4, then subtract 12?	I have 32. Who has my number that is halved, halved, then halved again?	I have 4. Who has 15 times my number?	I have 60. Who has two-thirds of my number?
I have 40. Who has my number divided by 5, then add (5 times one-fifth)?			

Also, look at the web address: www.mathwire.com/whohas/whohas

Or Google: I have who has

As another activity – get the students to design their own looping cards.

Task 4: Mind Reader #1

This can be played as a game or used as an activity.

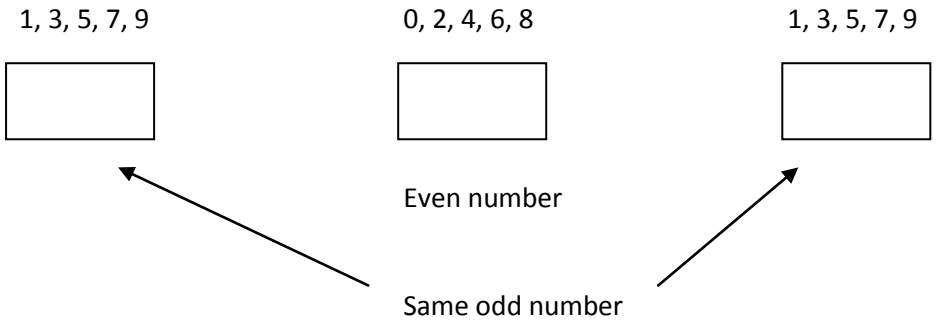
VERBALLY give students only 5 clues to determine a number.
Say all of the 5 clues ONCE, then repeat a second time. DO NOT repeat again.
Students may work in pairs or as a trio.
The number they finally select MUST fit all 5 clues.

Example:
The Clues

1. It is a 3 digit number.
2. It is an odd number.
3. The middle digit is even.
4. The digits at either end are the same.
5. When you add (sum) the 3 digits together, they equal 18.

Allow sufficient working time for the pairs/trios. Get them to SHOW how they worked out their number.

Possible working out:



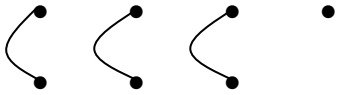
When you add the 3 digits together: If the middle digit is 0, the outsides must be 9.
If the middle digit is 2, the outside digits must also be8. NO
If the middle digit is 4, the outsides must be 7.
If the middle digit is 6, the outsides must also be 6. NO
If the middle digit is 8, the outsides must be 5.

New possibilities (and solutions) 9 0 9, 7 4 7, 9 0 9.

When a group gives you a response, DO NOT say "yes" or "no". Check the response is correct by working through the clues in order.

CHECK the Clues for the answer 747.

1. It is a 3 digit number. Yes
2. It is an odd number. (This means the last digit does not have a partner – cannot be paired.)
   EG: 7



These have partners. No partner, so odd.

3. The middle digit is even. Yes (repeat process for 2 above to show all have partners.)
4. The digits at either end are the same. Yes.
5. When you add (sum) the 3 digits together, they equal 18. 7 + 4 + 7 = 18 Yes.

Repeat checking process for all options.

Task 5: Mind Reader #2

This can be played as a game or used as an activity.

The clues:

1. I am a 2 digit number.
2. I am an even number.
3. The digit in the Ten's column is odd.
4. You can HIDE one digit inside the other.
5. If you add the two digits, the total is 11.

Possible final solutions with reasoning.

38 as the number 3 is hidden within the number 8. Talk about symmetry.
74 as the number 7 is hidden within the number 4. Talk about rotation.
56 as the number 5 is hidden within the number 6 when represented as a digit clock display.
56 as the roman numeral for 5 (V) is within the roman numeral for 6 (VI)

Task 6: Mind Reader #3

This can be played as a game or used as an activity.

The Clues:

1. I am a 2 digit number.
2. I am less than 10. (Straight away the students should recognise that they will be dealing with decimal numbers to one decimal point.)
3. The number is between 7 and 8.
4. The right hand side digit is even.
5. When you add the digits, the total is 15.

Solution: 7.8

Checking and proving.
Consider various scenarios for number lines.
Examples:
Put $7 and $8 on either end of a number line. Consider what the number might look like.
Put 7m and 8m on a number line and represent it as a tape measure. Consider what the number might look like.
Put the numbers 7 and 8 on a straight line. Get students to mark in the increments for themselves.

Task 7: WORD GOLF – 9 hole golf course

Objective: to use as few letters as possible to complete the word starting. The winner is the student with the smallest score. This course is par 18.

Rules:

NO initials, acronyms, greek or other languages, names, abbreviations, slang, or colloquialisms.

IF there is a spelling mistake in your word – there is a 2 stroke PENALTY.

Students have only 2 minutes to complete the course. If they have not finished the course in time, there is a 2 stroke penalty per word.

Understanding the course.

1. Ad (1) _ — This means the word must start with AD and be completed by using only one letter. If a student needs to use more letters than what is indicated in the brackets, the extra letters become the penalty strokes.
   IF the student can complete the word in LESS letters than required, then their score is reduced.

Setting up the course.	Possible solutions (letter endings)
1. ad (1) _	d, o = par
2. pr (2) _ _	y (1 under = birdie)
3. vi (2) _ _	a, e, m (1 under) or ne = par
4. wr (2) _ _	y (1 under = birdie)
5. al (1) _	e, l, m, p = par
6. sw (2) _ _	ap, im, ig, ay = par, but y = birdie
7. ph (3) _ _ _	one, ase, oto = par, but ew = birdie
8. gn (3) _ _ _	at, aw = 1 under, but u = 2 under
9. in (2) _ _	to = par, but k, n = 1 under.

So if par = 18 for the course, the students are to try and get a number smaller than 18 to "beat the course" and the leader is the student who has the minimum score.

Task 8: Number Master Mind

Set up the following grid on the whiteboard.

	Ten Thous	Thousands	Hundreds	Tens	Ones
1st guess					
2nd guess					
3rd guess					
4th guess					
5th guess					

The students are to "guess your number". They have 5 attempts to do this successfully. Each number is to be 5 digits long and each digit is to be clearly placed into a position.

Only clue – I have not repeated a digit.

After each guess, you mark EACH BOX in the following way.
X = this digit is NOT in my number.
○ = this digit IS in my number, but in the wrong place.
✓= this digit IS correct.

Allow students time to consider the digits before determining the next guess.

Example:

	Ten Thous	Thousands	Hundreds	Tens	Ones
1st guess	1 ○	2 X	3 X	4 ○	5 ○
2nd guess	6 X	7 ○	8 X	9 X	0 ○
3rd guess	7 ✓	0 ○	4 ○	5 ✓	1 ○
4th guess	7 KNOW	1	0 KNOW	5 KNOW	4 ✓
5th guess	NOT	REQUIRED			

VARIATION:
Record the results on the same grid, but does not line up with the cross, circle and tick results. If you use this process, add AT LEAST 3 more guesses.
(Example: From the above table, the corrections could have been ○○○XX)

Task 9: "24 is the answer. What could be the question?"

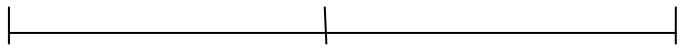
Objective of the game: Students to make you say "24" as the answer to their question.
Instruct students that everyone will get a turn and no-one will miss out. They will not be required to put their hand up as you will ensure everyone gets a turn.

When you receive a question from a student, you then do the thinking out aloud for the other students to "solve the problem" and check that the answer is 24.

Eg: Student question: What is $\sqrt{16} + 20$?
Eg: Verbalization of solution: Square root means the number that was multiplied by itself to give 16, so that must be 4, because 4 x 4 = 16, then add 20. 4 + 20 = 24. The answer is 24. (You are not restricted to verbalisation only, write on the board, draw pictures/tables/shapes or whatever else you may need.)

Move on to the next student's question. You will find responses will vary from very easy to complex. Be careful to select the order of questions from the students. You are trying to ensure everyone can give you a question where you will answer "24".

If you want (and after a while), allow the questions to go onto a scale ranging from:



Boring (you give a yawn) — Not bad (wiggle hand) — "Wah-ha" (fantastic!)

(We were assured the students will enjoy the challenge!)

Examples of "Questions" with suggested ratings: ***** Remember to explain every solution aloud *****
What is double 12 (yawn)
What is half of 48 (yawn)
What is the product of 48 and 0.5? (not bad)
What is $\sqrt{100} \times 2 + \sqrt{16}$? (not bad)
What is 1/6th of 144 m&m's? (between Not bad and Wah-ha)
What is 2 dozen eggs? (Wah-ha - as it incorporates the fact that a dozen is 12 items)
How many children are in a Mathematics class if there are 3 groups, each with 8 students? (Wah-ha)
What is 50% of 48? (not bad – AND can identify that this is the same as product of 48 and 0.5)
What is the date of the day BEFORE Christmas? (Wah-ha)
If I go on holidays for 3 weeks and 3 days, how many days am I away? (Wah-ha)
How many hours are in one day? (Wah-ha)
My Grandma is 72 years old. I am 1/3rd of her age. How old amI? (Wah-ha)
I had $30, then spent $6. What is my change? (yawn)
A footy team kicked 3 goals and 3 behinds. How many points is this? (Wah-ha)

Notice that the "wah-ha" questions are those that require connections, not just use of the usual operations.

More possible questions (without ratings)
What is 0.24 x 100?
What is 2 lots of 10 plus 4?

Another teaching point (if it comes up): $6 \times 4 = 3 \times 8$ (÷2 over 6 x 4; x 2 under 3 x 8)

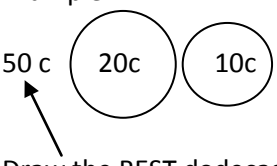
Task 10: I have 80 cents in my pocket. What coins do I have?

To get the best response from the students – ENSURE you have the coins in your pocket to prove to them this was a worthwhile task!

Objective: Get students to identify all of the different combinations which are possible for this question.

Allow students some working time to come up with possible options for the 80 cents. Inform all students that you will only accept ONE response from each student. When they give you a response, draw it on the board (as similar to actual money as possible) AND do NOT respond with "yes" or "no" if it is the combination in your pocket.

Example:



= 80c (What else is important with this response? It is the LEAST number of coins I can have in my pocket!)

Draw the BEST dodecagon you can (12 sides)!

More possible solutions

4 x 20c = 80c

16 x 5c = 80c (Notice this is the MOST number of coins I could have in my pocket!)

(3 x 20c) + (2 x 10c) = 80c (reinforce the use of brackets)
60c 20c

(2 x 20c) + (2 x 10c) + (4 x 5c) = 80c
40c 20c 20c

50c + (3 x 10c) = 80c
30c

50c + 20c + (2 x 5c) = 80c
10c

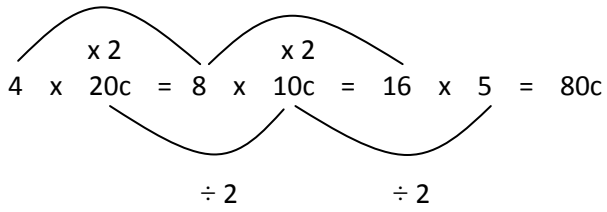
NOW GIVE THE STUDENTS ANOTHER CLUE: I have only 6 coins in my pocket.

50c + 10c + (4 x 5c) = 80c
20c

(3 x 20c) + (2 x 5c) + 10c = 80c
60c 10c

As soon as all possibilities are exhausted ..... get them to guess which combination is in your pocket.
THEN ..... show the students the coins in your pocket!

Additional Teaching Point (depending upon the group) Show the relationship pattern.



Task 11: Balancing Hands (Can be used as a Warm-up or Open-Ended Task)

Objective: Students are to identify the coins that are in your hands.

Scenario (to be explained to students):
I have 2 coins in my LEFT hand AND 3 coins in my RIGHT hand.
(Hold hands out – clenched – and towards the class.)
In terms of VALUE, the hands BALANCE.
This means LEFTY = RIGHTY, and RIGHTY = LEFTY, and Both hands are equal (show balance like a balance beam scale).

Pose the question: **What coins are in my hands?**

Allow time for students to work out solutions. While they are working, go around and check on their answers and verbalise with positive comments. Eg: "Good one, that's it!, Interesting, etc"

To collect answers, only accept one answer per student. Put the responses on the board and check that the left side equals the right side. (This is using the equals sign in a different format to what the students are used to.)

Examples:

2 x 20c	=	20c + (2 x 10c)	
40c		40c	This second line is the checking mechanism
2 x $2	=	$2 + (2 x $1)	
$4		$4	
50c + 10c	=	20c + 20c + 20c	Notice that some students will give you the 3 coins separately, even though they are the same value of coin. (Missing multiplicative thinking – but still correct, so do not dismiss or change! You could write alternative underneath so students are exposed to the method.)
60c		60c	

Keep going until you run out of combinations. When the students are done, then identify the correct answer off the list on the board, THEN prove with the coins.

Task 12: Group Work (Can be used as extension activity)

NOTE: This task was not particularly engaging for us (as adults) as there was too much information that was unknown or not interesting. If you found the "right" questions, this could be a great activity.

Information source: "The Number Crunch" in The Age. Make sure you read the question carefully, as not all of the questions posed in this newspaper are suitable for your class! NO use of google or any other "search" on a computer. See what answers the groups come up with.

FIRSTLY - Outline the Scoring System for all students.

5 points	=	end up with the "correct" year
3 points	=	within 5 years of the correct answer
2 points	=	within 10 years of the correct answer
1 point	=	within 15 years

Bonus Point IF you guess the _____ Eg: "City"
Bonus Point IF you guess the _____ Eg: "Speed"

THEN – Outline the Questions they will be working on.

The Question: What year was the first pedestrian killed by a motor vehicle and the death recorded?
Bonus Questions: What city did this happen?
What speed was the vehicle travelling?

This should lead to discussion within the group.

ANSWER: 1890 Briget Driscoll was run over in LONDON by a car travelling at 6km/hr (converted answer).

Other Questions and Answers you could use: Remember to introduce the points system FIRST.

What is the average number of breaths an adult takes in a day?	20 000 – 23 000
What is the maximum daily growth of bamboo?	30-60 cm per day
What year was the Bunsen burner invented?	1855 by Bunsen
What year was "God save the Queen" first sung?	1740
What is the current number of Australians with a hearing aide?	400 000
What is the length (nose to tail) of Africa's Ghandian Giant rat?	75 cm long
What was the price of the first holden car which was produced in Australia?	£ 760
Bonus Question: In what year?	1948
What is the dimension of the world's LARGEST ruby (red gem)?	130 mm x 145 mm x 138 mm
Bonus Question: Where is it housed?	Japan
Bonus Question: What is its weight?	8.148 kg
What is the proportion of the Earth's surface area that is water?	70.9%

Task 13: Heads or Hips **(Warm-up game or activity)**

Objective: Students are to stand with their hands by their sides. A question is posed and students are to calculate in their head AND in silence the answer to the given problem. The teacher gives them a visual count down (hand raised in air) from 5, 4, 3, 2, 1 and then says "NOW" by which all students must indicate if the number is HIGHER than the magic number (by placing both hands on their head), or LOWER than the magic number (by placing both hands on their hips).

Select a "Magic Number" (predetermined by the teacher). For this example, the Magic Number is 60.

Question 1: I am on 9 weeks long service leave (holidays) and have to come home 4 days early as my cat is sick. How many days am I actually away? (Ie is the answer > or < 60?)

Allow thinking time – in SILENCE. After about 1 minute, the teacher raises their hand and indicates to the student that they must get ready to indicate their answer. The teacher drops their fingers down 5, 4, 3, 2, 1 and calls out "NOW". Watch students place hands in a position.

The idea behind the students NOT indicating their preference early is to allow all students thinking time and so students do not just follow others.

As soon as all students have selected a response, reinforce to one student that their answer is correct (being less than 60days and both hands are on their hips), then ask them to explain their thinking to arrive at their answer. *EG: Well done! You obviously got the answer correct with your hands on your hips. Now explain how you arrived at your answer*. Only choose students who have made the correct selection.

Question 2: I am walking home at night in the dark along a path. I fall over. When I get up, I notice I have lost some of my money. I started with $90. I have lost 5 x $5 notes and 3 x $2 coins. Is the amount remaining in my pocket MORE or LESS than $60?

Question 3: **** It is VERY important to stress the need for NO talking about their responses for this question. **** (The answer will be 60, but you have not explained to the students how to represent this answer. They need to make a decision for themselves.)

Scenario: I am walking home at night in the dark along a path, and in the same spot I fall over again! I had 7 dozen eggs in my shopping bag. I have checked the eggs and found I have smashed "double 12" of the eggs. How many eggs remain intact?

Examples of acceptable responses:
One hand on head and one hand on hip
Hands touching shoulders (to indicate half way)
Arms crossed in front of chest
Arms by their side
..... and there is bound to be plenty of other responses students will give!

Task 14: The age of my children (Open ended task)

I have 3 children. Maddie is the eldest. Cathie was born next, followed by Sophie. The average age of the children is 17. How old could each of the girls be? HINT: The girls are NOT triplets.

State the minimum number of different answers you expect every student to obtain. Ie 5.

Work through the "Problem Solving Steps" with the class.

1. Do you understand the problem? Yes, go to 2. No – do not proceed. Talk to someone (partner), or if a small group of students – go through with the teacher.
2. Plan it. Use/Choose a strategy from the list below. Get every student to verbalise what strategy they will be using BEFORE they start the solving process.
3. Do it. Solve the problem.
4. Check it. Does your solution make sense and does it answer the question?

NOW give the students the **10 Problem Solving Strategies**. The RHS identifies the type of learner based on "multiple intelligences"
Give a starting point as the example.

- Working backwards ie $\square \div 3 = 17$ — Logical/mathematical
- Draw a diagram — Visual spatial
- Write a number sentence — Logical/mathematical
- Table — Visual spatial & logical/mathemat..
- Guess and check — (-)
- Try a simpler, related problem — (-)
- Make a list – What do I know? - What is still to be found out? — Verbal/linguistic & logical/mathe...
- Identify a pattern — Visual spatial & logical/mathem..
- Make a model – using materials — Kinesthetic
- Act it out — verbal/linguistic & interpersonal

(You can find your type of intelligence through a survey on-line)

Another Clue: Maddie has her birthday in December and entered Year 11 in 2006.

Actual solution is: Maddie = 20, Cathie = 16 and Sophie = 15. (Cathie and Sophie are called "Irish Twins" as they are 13 months apart.)

Reflection:
Style – "Share Reflection". This means you get 2 students for each strategy used to come out to the board and share their technique with the rest of the class. Don't worry if some of the strategies were not used.

Additional Notes: When doing open-ended problems, you are saying these 3 items to all students!

1. Trust — I trust you.
2. Independent — Be independent
3. Responsible — and responsible.

AND for ALL students ..... Record, Record, Record. If students work in groups – everyone records!!!!!

Task 15: Uncle Jack's Land (**Open ended task)**

Objective: Area of land – in different visual formats.

Scenario: My Uncle Jack, he's weird. He left school at grade 5. He has been a chef, a sailor, he worked as part of a team repairing roads and he has owned a road-house. Uncle Jack enjoys classical music, Cuban cigars and port. He has given me 120m² of land in Queensland. I have not seen the land. What might it look like?

Set the Minimum number of different answers you expect: 4. Also add that you don't want the students to mix up Perimeter and Area as Uncle Jack will be unhappy if I end up with too much of his land.

Step 1 ⇨ Take the students to the board of 10 Problem Solving Strategies. When you go through these, include a starting point for each.

- Work backwards. 120m² = (? X ?) The m is the units and the ² refers to the 2 dimensions – length and width.
- Draw a diagram. 
- Write a number sentence. 20 m x ☐ m = 120 m²
- Make a table.

L	W	Total area

- Guess and check.
- Try a simpler related problem
- Make a list
- Identify a pattern
- Make a model (have a bag of square tiles available for the students)
- Act it out.

Step 2 ⇨ Students are to choose a strategy. You will find this will match their intelligence style. Also, work with the students who don't understand. Often these are the students who cannot select a strategy. When the students do understand the problem, get them to select a strategy they are going to use and they return to their usual seat.

Next part of the Scenario: In Queensland, they have introduced a new law. Any area that is greater than 119 m², there must be a fence around it. Fencing costs $4 per metre. Work out the cheapest shape to fence. Prove it!

At this stage you may get students claiming they will only have to do one calculation, (because if the area is the same, the perimeter will be the same too), but get them to "humour you" and compare TWO different shapes and get them to show you what they find out. They will realise they need to do all of the calculations.

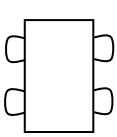
Task 16: My Brother Jack (**Open ended task)**

Scenario: Jack lived in Warnambool and has a Tyrepower Store. He has a 20% off sale to clear all of the 86 small tyres for motorbikes and cars as he wanted room for the "big ticket items" – such as tractor tyres. How many cars and motorbikes might have come in for tyres?

Set a minimum number of solutions expected: 4

10 Problem Solving Strategies – Provide a quick example of what it might look like to use this strategy.

- Work backwards 86 ÷ ? = __
- Draw a diagram



CAR

MOTOR BIKE

- Number Sentence (10 x 4) + (? X ?) = 86
- Table

C = cars	MB = motor bikes	Total Tyres = 86
		86

- Simpler problem Try 46 tyres or 22 tyres first.
- Make a list
- Identify a pattern
- Model – red counters = 1 car tyre and blue counters = 1 motor bike tyre
- Act it out - (this does not mean "muck about")

Check every student has chosen a strategy. Now work with students that don't understand the problem. When they are right to go, walk around to each group and see the kids and their work. Teach explicitly and at the "point-of-need".

Additional Scenario:
Does the pattern still hold if the cars also get their spare tyre changed too?
AND
The motorbikes have 3 wheels.

During open-ended tasks let the students know: I trust you, be independent and responsible!

Task 17: Shape (**Open ended task)**

Scenario: I am a 4 sided shape. I have a perimeter of 3 metres. What might I look like?

Set the minimum number of different shapes you expect: 3

Start modelling the 10 Problem Solving Strategies.

- Working backwards
- Draw a diagram
- Write a number sentence
- Make a table
- Guess and check
- Try a simpler, related problem
- Make a list
- Identify a pattern
- Make a model
- Act it out.

Possible solutions: Rectangle, square, trapezium, parallelogram, rhombus with the related and appropriate dimensions.

Task 18: Find the Answer (**Open ended task)**

111,111,111 x 111,111,111

There is only ONE answer, but MANY methods.

(My solution)

1 x 1 = 1
11 x 11 = 121
111 x 111 = 12321

Now I predict 1111 x 1111 will equal 1234321. Checked with long multiplication to be correct.

Based on this prediction, I can calculate the answer.

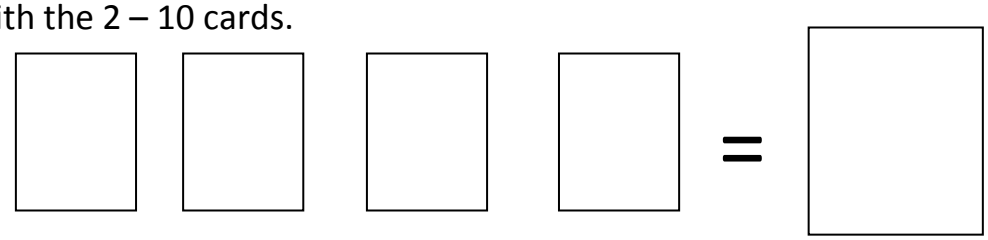
There are 9 one's before the multiplication sign, then 9 ones after. This means 9 will be the middle number. Also, the number starts with a 1, and increases by one as the new digit.

111, 111, 111 x 111, 111, 111 = 12,345, 678, 987, 654, 321 Who can read this number?

Solution:
12 quad million, three hundred and forty five trillion, six hundred and seventy eight billion, nine hundred and eighty seven million, six hundred and fifty four thousand, three hundred and twenty one.

Task 19: Equator **(Warm-up game)**

You will need: a deck of cards with the aces and picture cards removed. You will be left with the 2 – 10 cards.



TARGET CARD

After shuffling the remaining cards, turn one over and this becomes the "Target Card".

Scoring System:
If you use 2 cards to equal the target, you get 2 points.

3 cards	3 points
4 cards	5 points

Time limit: 4 minutes.

Recommended strategy: get the 2 points first, then try for 3 points, then 4 points. This will guarantee you will score something. The object of the game is to find the best equation, not quantity.

NOW: Turn over the next 4 cards. These become the digits to work with. You can change the order of the digits. You can use operations +, -, x, ÷, ( ). You can put digits together to make new numbers to use. Eg 5 and 3 can be 53 or 35. You cannot use the digit more than once (unless it appears more than once).

Example: 8 5 4 3 = 6 (target card)

The more creative the students are, you can slightly differ the points system.

8 – 5 + 3 = 6 (3 points)
¾ x 8 = 6 (creative, so 4 points as still only using 3 cards)
5 – 8 + 4 x 3! = 6 (! = factorial Creative and all cards used, so 6 points!)
Etc ...

Task 20: "What proportion of Australia's population lived in capital cities in 2005?"

(Source: "The Number Crunch" in The Age – 2005)

Objective of the task: Students work in small groups. They need to make any logical connections (or guesses) to try and get the correct answer. Set this problem up so there is a scoring system to make the task more enjoyable.

FIRSTLY - Outline the Scoring System for all students.

5 points	=	end up with the "correct" percentage
3 points	=	within 5% of the correct answer
2 points	=	within 10% of the correct answer
1 point	=	within 15%

Bonus Point IF you guess the _____ Eg: "City"
Bonus Point IF you guess the _____ Eg: "Speed"

THEN – Outline the Questions they will be working on.

What proportion of Australian's lived in capital cities in 2005?

Solution: 64% in 2005.

During the working time, the teacher moves from group to group to listen to the discussions and to make any encouraging remarks. At the end of the working time, the group's answer needs to be written down on paper to eliminate the urge to "refine" the solution.

Other possible questions to be used with this format:

What is the weight of the world's largest ever pig? Bonus point: In what year?
Solution: 865kg in 1939

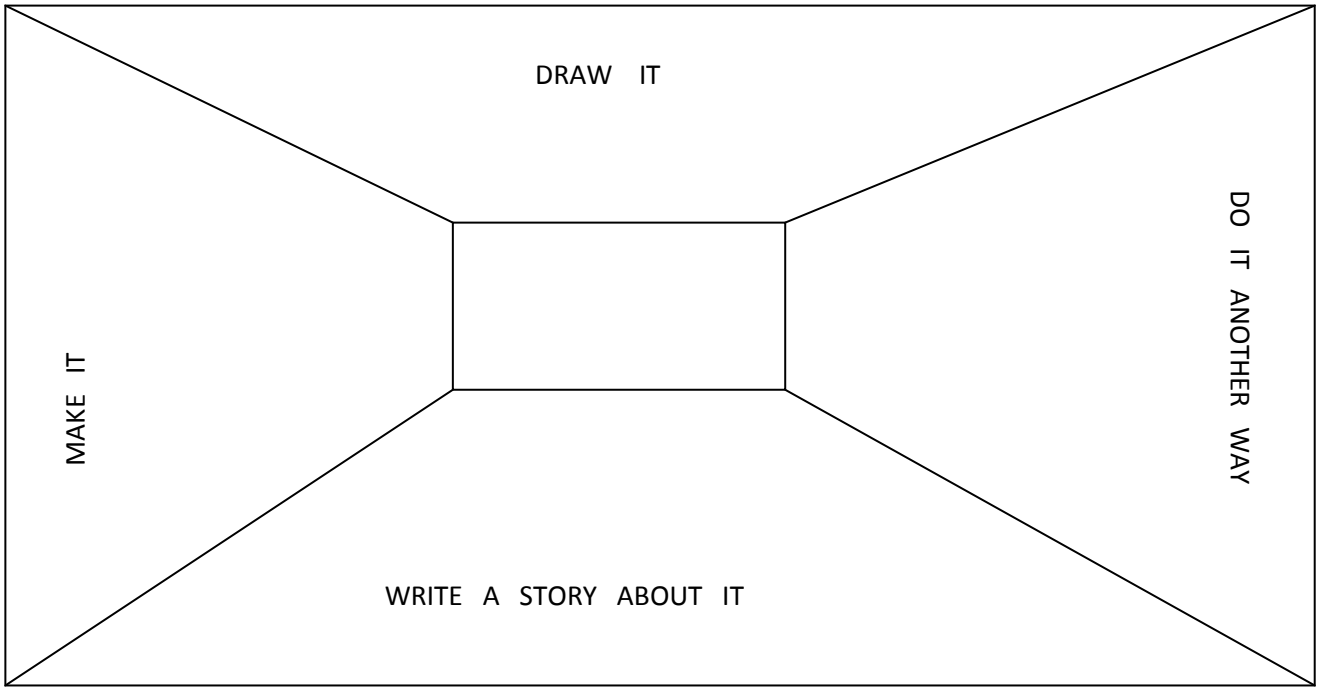
What is the number of human heart beats in a lifetime?
(Solution is based on 70 beats per minutes over 70 years.) Answer: 2.5 million

What is the average number of hairs on a human head?
Solution: 80 000 – 120 000

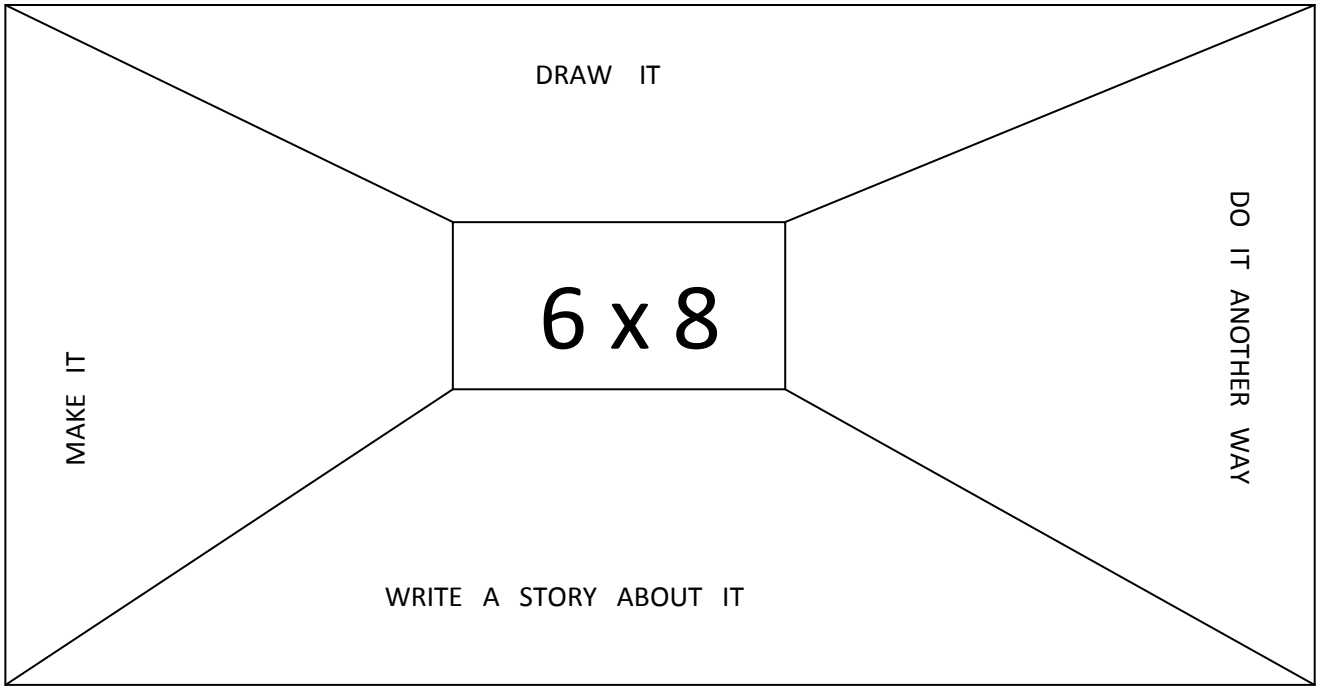
What is the length of the longest wedding dress train? Bonus point: In which country?
Solution: 204 metres in Norway

Task 21: Think Board

Make and laminate these boards for regular student use. Should be A3 size. Leave the centre box blank. Write a problem in the box. When students have completed the task, wipe clean.



Example: The problem is 6 x 8.



This "Think Board" allows students to explore the concept in different ways.

The problem is not restricted to number problems. Look at word problems, shapes, patterns, etc.

Task 22: Calculator V's the Computator

(This task can be found in Rob Vingerhoet's book) Also known as "Calc-u-lator - or Not"

Equipment: 1 basic calculator.

What to do:
Select 2 students (or have 2 volunteers). The person with their name FIRST in the alphabet gets to choose if they want to have the calculator for the task OR can decide to pass it on to their opponent. IF the student chooses to have the calculator, they must push ALL of the buttons for the calculation AND see it on the screen BEFORE they can say the answer.

Objective: The winner is the first student to 3 points.

Examples of questions given to us:

- How many days are there in Spring?
  Answer: Sept 30 + Oct 31 + Nov 30 = 91 days

- How many seconds in 3 ½ minutes?
  Answer: 60 x 3.5 = 210 seconds

- Half of 68?
  Answer: 34

- How many hours in 4 days?
- 3 lots of 17?
- Double 56

Task 23: Make Me Balance

Divide the board into 2 sides and label the left "A" and the right "B". Have a selection of numbers, percentages, fractions and decimals randomly placed on each side written inside individual rectangles (to look like they are on cards).

Example of numbers on each side:

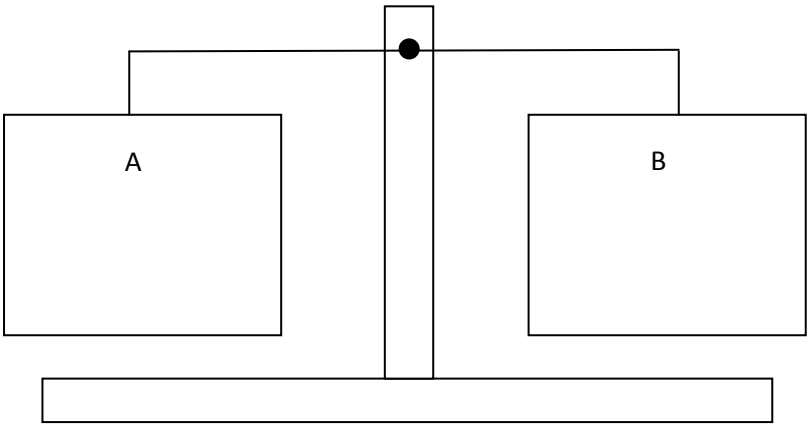
A

3, 120, 10%, 15, 30, 8, 18, 6, 60, 24, 48, ¼, 0.5, 500

B

2, 25, 7, 9, 4, 16, ½, 100, 75, 50, 25%, 1000, 0.75

Also draw up a large balance beam as shown below.



The Rules:

No-one can give me more than 1 response.
Need a minimum of 15 responses from the class.
Students may work in pairs.
Use at least 2 cards from A and create a product or quotient that equal at least 2 cards from B.
You cannot use numbers more than once unless given on the side more than once.

Recording student answers: Record in a table as follows.

A	B	Solution
0.5 x 500	= 25% x 1000	250
[1/4 x 24 + 6]÷ 3	= 25% x 16	4

Teacher Tips:

- Avoid same numbers appearing on both sides of the table.
- Needs multiplication AND division as a MINIMUM of the operations to be used, but if students are going to use more than 2 numbers, then allow any other operations.

Task 24: Things change just by adding one **(Activity)**

Rules:

- Only one answer per person in the group.
- If the answer is incorrect, go to the next table and they can "steal" their question.
- Move around the tables (in order) with the questions.
- Score one point per correct answer.

Examples of the questions to ask the groups:

4 fingers + 1 more =	1 hand
6 days + 1 more =	1 week
11 months + 1 more =	1 year
99 cents + 1 more =	$1.00
99 years + 1 more =	1 century
59 secs + 1 more =	1 minute
365 days + 1 more =	1 leap year
$9999 + 1 more =	$10 000
27 days + 1 more =	February
$9.99 + 1 more =	$10.00
99 cm + 1 more =	1 metre
999mL + 1 more =	1L
99 999 + 1 more =	100 000
11 eggs + 1 more =	1 dozen
23 hours + 1 more =	1 day
999 999 + 1 more =	1 000 000
59 minutes + 1 more =	1 hour
9mm + 1 more =	1 centimetre
12 years + 1 more =	teenager
$999 999.99 + 1 more =	$1 000 000

Task 25: Face the Factors

Version with younger students – use 2 dice only.
Year 5/6 students – use 4 x 4 grid
Year 7/8 students – use 5 x 5 grid

Instructions:
Fill in each of the 25 boxes with a number.
Every number can only be written once in the table.
This competition is played in pairs.
Roll 3 regular 6-sided dice (take in turns).
Multiply out the numbers. Eg 6 x 6 x 3 = 108
If I have 108 on the grid, then cross it out.

To Win:
5 squares in a row, column or diagonal wins!!!!

Clues: Get students to discover these items and then share them with everyone in the class.

- Do NOT include any Prime numbers as cannot be rolled.
- Do NOT include any product of 7
- Even x even x even = even number
- Even x odd x odd = even Eg: 3 x 3 x 2 = 18 or 5 x 1 x 4 = 20
- Odd x odd x odd = odd (this is the only way you will get an odd answer)
- Even x even x odd = even
- Because of the above 4 results, 75% of the rolls you would expect an even result.
- What else can you get by rolling?
- Largest number will be 6 x 6 x 6 = 216
- What numbers would you definitely include in the grid and why? 24, 60, 48, 36 because they have lots of factors and can be achieved in a variety of ways.

Task 26: V-Buzz **("Buzz" with a difference)**

Objective & Rules:
Have a team of students stand in a circle.
Students will be counting by a predetermined certain number Eg: 6
IN ADDITION: Any number ending in 2 or 4 – you cannot say it. You must replace the number with the word "Buzz"
Goal – to reach the final number of 150.
No talking unless it is your turn to respond with an answer.
If an error has been made, the next person must make the correction.
Keep playing until there are no students standing.
The total the team has achieved is their target to beat the next time this game is played.

The Teacher's Role:
Use hand signals to indicate to the students:


Your Turn


Correct response


(Flat hand) Wrong response, so sit down.

Example: Counting by 6's

0
6
Buzz (12 as ends in 2)
18
Buzz (24 as ends in 4)
30
36
Buzz (42 as ends in 2)
48
Buzz (54 as ends in 4)
60
66
Buzz (72 as ends in 2)
78
84
90, etc. If this is the last number called when all of the team members are sitting, this is their target to beat next time. (Notice that 150 was not achieved this time.)

For the next group:
Have the same activity, but change the "buzz" numbers to 2 and 6. They need to get further than 90 to beat the previous team.

Extension Group:
Go up by 4.2. Buzz on any number ending in 4 or 8.

Task 27: Which problems are ...?

- Easy to do in your head?
- Can be done in your head with help?
- Needing extra equipment? Why?

Example: 15 x 40

10 x 40 = 400 + 200 (half of the previous answer) = 600
This is easy to do in your head!

Example 2: 19 x 27

20 x 27 = 2 x 27 x 10 = 540 – 27 (as only need 19 groups)
= 540 – 20 = 520 – 7 = 513
This can be done in your head, maybe with help!

Task 28: Make today's TARGET

Give the students a number.

They need to make this answer by:

1. Adding 2 numbers
2. Multiplying 2 numbers
3. Subtracting 2 numbers
4. Dividing 2 numbers

Extend the problem by allowing the use of more numbers.

Task 29: Back-to-Back

"Space" (dimension) Task

Introduce the Activity and then allow the students to start.

2 students sit in chairs back-to-back.
The focus of the students will be on the language of the Mathematics and their listening skills.
Both students start with the same number and colour of connecting cubes (or whatever materials you use).
One student creates a shape using all of the cubes.
THEN they give verbal instructions so the shape, colour, size is replicated exactly.

Teacher Notes:
This task is immediately self-correcting as students can compare their models and see where errors have been made.

Other materials:
Can use connecting cubes or geo-shapes.
Can be a 2D or 3D shape.
Can vary the construction materials.

Variation: (The cheaper version)
Purchase packets of bendy straws and masking tape if you do not have access to construction materials.
This allows 2D (eg square) and then 3D models (eg cubes) to be created.

Task 30: Tell me 10 Things About … **(Warm-up game)**

You will need: a 3D shape which the students can see.

Between all of the class members, the students will have to come up with 10 things that are TRUE about the item that has been stuck onto the board.

Example: We had a rectangular prism to observe.

1. It has all straight sides
2. It is a 3 dimensional shape as it has length, width and height
3. It has 6 faces – which is each flat piece of the shape
4. It has 8 vertices (where 2 edges meet)
5. It is wooden.
6.
7.
8.
9.
10.

Teacher Notes:
Each of the above 10 items **can** become a mini lesson if needed.

Task 31: Tell me 7 Things About ... (& 2 have to be INTERESTING)

You will need: a **different** WOODEN 3D shape for each group which the students can see and touch.

The Task:
Every group is given a different shape.
They have to agree upon the 7 "things" they are going to share with the rest of the class (2 of them being interesting).
Allow students working time. The teacher moves from group to group during this time to listen to responses.
All students MUST record the responses of their group into their own notebooks.

Reporting Back:
Each group reports back to the rest of the class outlining the name of their shape and all of the 7 "things" about the shape.
These can also be recorded on the board (by the teacher or the group).

If you are running short of time, only ask for the 2 interesting "things" from each group.

Examples:

1. CUBE

- 6 faces all with equal area
- 8 vertices
- 12 edges
- Euler's Rule: vertices + faces – edges = 2
- Same shape as a dice
- 7 x 3 = 21 dots if drew dots on to represent a die
- Volume = 4cm x 4cm x 4cm = $64cm^3$ (estimated volume of our shape)
- Cross-section will always be a square

2. HEXAGONAL PRISM (2 interesting facts)

- Hexagon is a shape that tessellates
- Honeycomb

3. TRIANGULAR PRISM (2 interesting facts)

- Looks like a Toblerone (chocolate)
- Vertical Cut

4. SPHERE (2 interesting facts)

- 1 face
- No edges

5. HEMI-SPHERE (Note: Hemi = Greek for "half")

- Curved surface is double the area of the flat I.e. SA (hemisphere)= $2\pi r^2$ and Area (circle) = πr^2
- We (Australia) live in the Southern Hemisphere

6. CONE

- There are 2 cross sections – Triangle and circle
- The shape "rolls" in a 360° rotation.

Task 32: Shape Search

The Task:
Students are to locate the particular shape (or part of a shape) within the classroom, draw a sketch, then identify its function in context. This allows the students to see the shapes with purpose.

Recording the Information:
Provide the students with the following table. Give the students the "Shape" column so they know what they are finding. Depending upon the class, you may not be restricted to the classroom.

When students are completing the "Function" column, they need to understand that some of the shapes are purely aesthetic (looks good) and has no other function.

SHAPE	SKETCH	FUNCTION OF THE SHAPE (What job does it do?)
Triangular Prism	 Shape is formed in the legs of a portable whiteboard.	The function of the triangular prism is to hold up the white board. This shape provides strength within the "legs".

(Note: In the "sketch" column, only the shape is to be drawn. The Triangular Prism was put in as part of a whole drawing to demonstrate the context as you cannot see where the shape was in the environment I was sitting at the time.)

OTHER PROBING QUESTIONS ...
Get students to consider the answer to one/some/all of the following questions, providing their own justification. They may also be able to research possible answers.

Why are all pipes cylinders?

Why are windows in most boats circles?
(Solution Hint for Teacher: No corners to prevent rusting and leaking)

Why are basketballs spheres and not cubes?

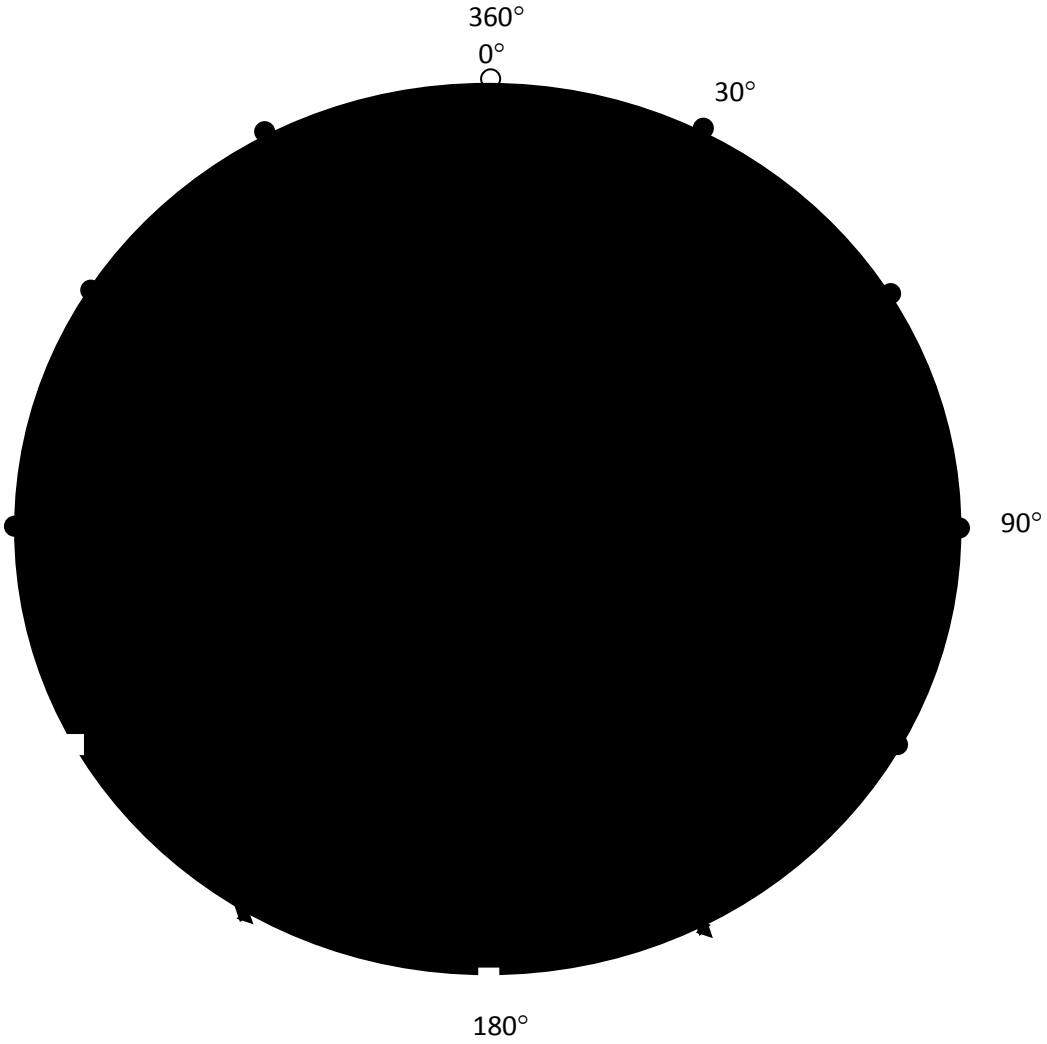
Why are steering wheels circles and not squares?

Why are dice cubes and not square-based pyramids?

Task 33: Direction **(Essential to develop for use in Task 34)**

The Task:

Get students to help develop this clock face for use in an activity.
Everyone starts with a circle and marks in the "clock face" numbers 1 – 12.
Students will be developing and demonstrating the relationships between the clock face numbers, various times (using the hands representation) and angles (up to 360°).



Develop the relationships with the following situations the students will know.

- If I am a "hoon" driver and do a "360" or "donut" – what does this mean? Students should be able to tell you it is a full revolution. Continue questioning "How big is the angle that I have turned?" Again, the students should be able to tell you that 360° refers to the angle size that was travelled. Now, under the number "12" on the clock face, write the words "Full Turn". On the outside of the clock face put 0° and above it 360°.
- What is the angle formed when the hands of the clock are at 3 o'clock? Students may tell you this is 90°, also known as a right angle. They may also tell you it is a quarter of a turn. Write this " ¼ Turn "on the inside of the clock face, to the left of the number "3". Write the angle size on the outside of the clock face.
- Continue with 6 o'clock being 180° and a " ½ turn".
- 9 o'clock is equal to a 270° clockwise turn, OR a 90° (right angle) anti-clockwise turn. In keeping with the spirit of the activity, write " ¾ turn" to the right of the "9" inside the clock face.
- Now go back and develop the angles formed at 1 o'clock and 2 o'clock using the relationship that 3 o'clock is 90°. This means each of the numbers are 30° apart.
- Complete the remaining angles around the outside of the clock face.

Task 34: Directions – "Left/Right Compass & Clock .... Where's the Thing?"

(To be done AFTER Task 33 as need to use the developed equipment)

The Task:
Secretly hide a dice within the classroom.
Students get to use their "compass & clock" (developed in Task 33) to assist in locating the dice.
The only rule to remember: The clock face is ALWAYS actually (or imagined for more able students) to be DIRECTLY in front of them AT ALL TIMES. This includes when they change directions – their location is reset to 0°.

Give directions to the student to assist with finding the "thing".

Example:
Start in the classroom doorway and face into the classroom.
Take 3 paces at 30°. (Once the student has turned and has walked in the 30° direction, as soon as they stop, they continue facing the same direction, but have reset their thinking back to being at 0°. Ensure you account for this with your directions!!)

Task 35: "The Club"

The Task:
The teacher initially provides one example for each column in the table.
Allow the students the opportunity to take the marker pen and put one letter in any of the columns (according to the rule or situation they think is being applied at the time). If it is correct, they must provide the correct reasoning by whispering into their teacher's ear. If they are right – they are "In the Club".
If the response is wrong, it is to be corrected by the teacher by placing the letter into the correct column and the student returns to their seat.
In this case there are 26 letters of the alphabet to use, so there are many opportunities for students to become "members".

Rule:
Students are to keep their reasoning TO THEMSELVES, otherwise they will be expelled from "The Club".

Motivation:
Everyone wants to be "In the Club". Students will continue and be persistent until successful. When they "join", they are then expected to check other responses given by students who want membership.

What if a student gives you a "correct letter response", but it is not within your reasoning?
Say to the student: "You are In A Club, but not in mine". This encourages them and identifies that the underlining rule/reasoning you are following is not the same as theirs. They will have another opportunity to return to the board to join "The Club".

Example: Symmetry
(Teacher definitions: "NOT" = no symmetry lines; "IN" = one line of symmetry; "REALLY IN" = 2 or more lines of symmetry)

The Table:
(Note: The Commentary Column is NOT part of the table, but included so you can see the steps and reasoning that occurs for this particular example).

Commentary	**NOT IN THE CLUB**	**IN THE CLUB**	**REALLY IN THE CLUB**
Teacher Clues	S	A	I
1ST Student response			H (& correct reasoning)
2ND student response With teacher correction to "Not in the club"	F		F (move location)
3RD student response		B (& correct reasoning)	
4TH student response		C (& correct reasoning)	
5TH student response		D (& correct reasoning)	
Teacher Clues	G		X
6th student response	R (& correct reasoning)		

Task 36: Using Problem Solving Strategies

The Task:
The teacher provides an open-ended problem for the students to work on.
The teacher also sets the MINIMUM number of responses they expect to see per person/group.

Example 1: I am a common 4 sided shape. I have a perimeter of 3 metres. What might I look like?

You could also let the students know that they have to use a scale of 1cm = 1m. The students will need to use this to prove their shapes meet the criteria. This also ensures drawings are accurate.

From this activity, the potential results would deal with:

- Fractions
- Decimals
- Shapes
- Scale
- Length
- Perimeter

Example 2: I am holding a shape with 4 lines of symmetry. What might the shape look like?

Task 37: Map/Location Activity

The Task:
You have won a competition for a 150 km free taxi ride.

What you will need:
Melway

Rules:

1. The Journey starts at your current address.
2. Use as close to your 150 kilometres as possible.
3. Where ever your journey takes you, all roads, streets must be recorded including directions.
4. Pass through or visit AT LEAST 5 suburbs
5. The Journey must take you to the CBD (Central Business District). The teacher needs to provide an exact location/address/site to arrive at for the completed journey.
6. For each suburb you travel through, you must record at least 4 features (eg parks, primary schools, etc) Hint: Check the symbols in the index of the Melway. For each of these symbols, give the Map number and Grid references.
7. Presentation (task completed) by the end of a double period.

Other possible examples:
Make the task relevant to the students – especially if they are going on a school camp. Get them to plan the route, what they want to see, calculate the distances to be travelled, etc.
Eg: "Get Year 5/6 to Canberra Challenge"

Set additional Guidelines:

- Make the challenge "environmentally friendly" which means "public transport only".
- Determine the SHORTEST route between 2 given locations.

Task 38: The Big Space Quiz

Students complete in teams.
If they miss a question, the next team can "steal" their question and point.
Each person can only give the final answer to one question.
The first person in each team to give an answer becomes the team's scorer.

The Quiz (examples of questions)

- How many sides make up a rectangle? 4
- How many faces does a cube have? 6
- If 1 side of a regular pentagon is 8cm, what is its perimeter? 40cm
- What is the perimeter of an equilateral triangle with side 12cm? 36cm
- How many right angles in a parallelogram? None
- (draw a shape on the board – in this case a semi-circle). The team has to volunteer 5 facts for 1 point, 4 facts = ½ point, ≤3 facts = 0 points. Ensure all teams get same opportunity, but with different shapes. Eg: Repeat with trapezium.
- In this room find an acute angle
- In this room find a triangular prism
- In this room find a semi-circle
- Guess my shape – 4 sides, top & bottom sides are parallel, symmetrical only once, shape tessellates, 2 angles are acute and 2 are obtuse. Trapezium
- Guess my shape – 6 faces, 12 edges, 3 dimensional, 8 vertices, all faces have the same area. Cube
- Team Challenge – Send 1 person to the board to draw: (examples) an isosceles triangle, shape with more than 4 sides, etc.

Task 39: Creating

Equipment:
1 container of pattern blocks per group.

Using pattern blocks, assign a value to any piece. For example: A Hexagon = 3 points.

Each table needs to create:

- A tessellating shape with no gaps, no over lays, and it must be able to be repeated (tessellating).
- Symmetrical
- Use at least 3 different shapes
- Whatever you make, it must be worth (in total) between 20 – 25 points. Remember a Hexagon = 3 points. Show your calculations.

Teacher Comments:
Students will quickly realise from their pattern blocks that if a hexagon = 3 points, then the 6 triangles that make up the hexagon must be equal to 0.5 points each. They will make connections between other shapes within the box and their point values.

Move around the tables looking at how the students are solving the problem. Draw them back to the rules of their creation. Symmetry is generally not the issue – the tessellation part is. It is also important for them to develop a way to quickly calculate the value of the shape they have created. (This is the first stage and introduction to "algebra".)

Task 40: "Beat the V"

(Change the letter to match the starting letter of your surname.)
This is a great way to introduce and revise Measurement. Recommend 10 items to be used for this activity. It is preferable to run it weekly and it takes approximately ½ hour to complete.

Objective: If this task is completed weekly, the students are to set a personal goal to get the same score or better each time the activity is repeated.

Set up: 2 students are set up at the "Measuring station". They have the following equipment available to use: tape measures, calculator, kitchen scales, water, measuring cups and spoons, calibrated containers, wooden cubes, etc). These students are a different pair every time the activity is attempted to ensure all students have the opportunity to accurately measure.

The rest of the class need to rule up the following table, ready for 10 objects. (We only did 5 due to time constraints.)

Get the students to record the details of the object and what you want them to measure. Walk around the room allowing all students to see the item - but not touch. Remember to cover any parts of the labels that may assist. If the teachers wishes, they can give their students assistance by providing a comparison with an object that they already have the measurements of.
Eg: Shampoo bottle and a 750mL Pump Water bottle to help make a comparison.

As soon as all students have recorded their estimation, give the object to the "Measuring Students". Move on to the next object with the class whilst the 2 students are performing the measuring to obtain the "actual" answer. The measuring students are required to record the technique they used and the actual final answer. Keep progressing through all of the objects.

OBJECT	ESTIMATION	ACTUAL	RANGE	YES/NO
Capacity of Shampoo Container	500 mL	450 mL	350 – 550 mL	Yes
Circumference of Tin	22 cm	34 cm	28 – 40 cm	No
Volume of Strepsils box				
Length of "Two-up" board				
Perimeter of a shape on the wall				

The teacher "plays" by providing the range. Depending upon the reason behind the activity (ie revisional or new concept lesson), the teacher determines the appropriate values for the range.

Students fill in the last column by looking at their "estimation" and seeing if it falls within the given "range". Record "Yes" if the estimation falls within range. Record "No" if estimation is outside of range. Students score 1 point for every "Yes".

Notes:
When measuring capacity objects, students will tend to fill to the top, so the label may differ from the student measurement.

When you are asking the students for their results (final scores), ask for percentages.
Who got 100%, 80%, 60%, rather than single numbers or fractions.

DO NOT have a league table in the room. Celebrate the individual achievements and encourage progress when the activity is repeated. Students can look back in their books and see what score is their target to beat during the next lesson.

When you repeat this activity, make sure you use different items. Start collecting a variety of boxes, glass/clear jars/bottles, or other containers that would normally go into the recycling system.

ESTIMATION is an important focus in VELS and in the Australian Curriculum.

POSSIBLE REASONS WHY MEASUREMENT ENDS UP IN TERM 4 (Generally in Primary School)

1. Lack of equipment – especially MASS. To adequately cover the learning in mass, students need to have access to: balance beams, digital/bathroom scales, kitchen scales, spring balances, weights for 100g, 250g, 500g and 1kg (as a minimum). Teaching Measurement takes a considerable amount of organisation on behalf of the teacher, so tends to be pushed into Term 4.
   Weight is the effect of gravity on an object. For example: An astronaut's weight on Earth is different to their weight in space, but has the same mass. Mass is the amount of matter in an object and does not change.
   To help to overcome this problem, create a mass kit (or purchase one).
   Make the lessons tactile, real and all around us. You cannot teach from a book the weight of a 500g tub of margarine, but putting the weight into their hands gives a representation. If you have empty containers, it also allows students to put the weight into perspective too.

2. Teacher lack of confidence & experience.
   Need to make the connections to real life. Eg: can of soft drink 375mL has the capacity (capable of holding) 375mL of any liquid.
   Also incorporate conversions. 375mL = 0.375L

3. Importance given to Dimension: Number in Terms 1 & 2.
   A general Term 1 planner in Primary School covers: Place Value, Operations, Fractions, Decimals & Percentages.

4. Noisy, Messy, Disruptive ⇨ leads to discipline problems
   To overcome this, you need to have students discussing and talking as part of their learning.

5. Not picking up the connection opportunities.
   - 3D shapes can be taught at the same time as Volume
   - Area can be taught at the same time as multiplication
   - Division can be taught at the same time as length

   Also teach more through integrated units. Eg: Gold inquiry unit allows you to cover: mass (how you got paid – using weight); and area (payment for land)

6. NAPLAN concentration
   Most staff generally focus on number, although measurement is in need of attention (based on review of results).

Task 41: When-ever starting a unit on Measurement

Mass/Volume/Area/Perimeter/etc

The initial lesson should ALWAYS have the following questions. (This can be part of the "Introduction".)

1. What is it?
2. Where do you see it?
3. Who uses it?
4. How do you measure it?

For example: MASS
Do the answers with the class.

1. What is it? Weight. How heavy something is.
2. Where do you see it? Shopping items – 1kg sugar, fruit (weigh to pay), vet (issue medication to an animal according to weight), airport (weight of luggage), butcher (weight of meat), "Biggest Loser" TV show – weight of individual people.
3. Who uses it? (Have already heard some answers, but look for others.) Butcher for meat, chef for recipes, transport – weight of trucks for safety, gym instructor (lifting weights), jockey (they get weighed to determine if the horse has to carry additional weight), boxer (weight for fighting divisions), Aenisthesist (determines amount of medicine according to body weight), elevator (determines weight and ability to move).
4. How do you measure it? Kilograms (kg), grams (g), tonnes.

THEN
Get students to touch/experience the situation to realise it. Need to get a 'reaction of realisation' from the kids.
Example 1: The Titanic is 247m long. Often there is no response from the kids. This means they do not realise how long that is in reality – they cannot imagine the ship. SO, take the students outside with a trundle wheel and witches hats. Make marks every 50 metres IN A STRAIGHT LINE. Make the connections with what they can see and show them the real life. The diagonal on an oval might be 120m. The Titanic is 2 diagonals of the oval and a "bit". Now the students start making noises and comments about the length of the ship as they start making the real-life connections.

Example 2: A giraffe is 6m tall (average height) – with a 10kg heart.
Look at the height of the floor to ceiling in the room. Go outside and try to find something that would be 6m tall – such as a tree. Get the students to realise just how tall 6m is. You could then do proportion of the body as there is the long neck and the long legs.

Example 3: An ostrich is 2.5m tall.
Place a removable mark on a wall to show the height of 2.5m, then get students to stand next to the height to see the mark. Note: You do not see the relevance at a Zoo as you are looking at the item from a distance. It is very hard to make a comparison that is meaningful.

Example 4: Peregrine Falcon – best eye sight in the world. Can see a rat up to 8km away.

You can find other examples to use with the students to make the learning related to "real-life" in The Guiness Book of World Records. There are plenty of sources of information.

Task 42: Steppin' Out

What to do:
Students are to guess and record how many steps it will take to get across the classroom if you walk Heel-to-Toe without any gaps and in a direct (straight) line.

They can have the length of your feet (but NOT your shoe). Eg: Left foot = 27.5cm and Right Foot = 27.5 cm

MY GUESS: 42 steps

Before the teacher starts walking Heel-to-Toe, they record the highest and lowest guesses to show the range within the class.

Teacher starts walking – counting aloud. Stop at approximately 1/3 of the way across the room. Allow the students time to change their mind and record a new revised guess. Due to the new information they have, this can be used to help with the estimation.

NEW GUESS: 37 steps

Teacher continues when all guess have been recorded and goes to the end.

ACTUAL = 32 steps.

THEN get a student who has a significantly larger or smaller foot. Measure the "raw" foot for length. They will be repeating the heel-to-toe process and their peers are to guess the number of steps.

Objective: Want students to realise conservation of measurement.
The larger the foot, the smaller the number of steps required to cover the same distance.
The smaller the foot, the larger the number of steps required to cover the same distance.

Task 43: Tell me 10 things about ... **(A measurement item)**

Hold up an item and get the students to write 10 things about the item.

Example: Measuring jug

1. Plastic
2. Markings on it (which the teacher would use as the basis for a fractions mini-lesson)
3. Capacity ... etc

Example: Clock (analogue and digital. *** This list should be 20 things! ***

Example: Spring balance

1. Hook on end (ask the probing question "Why?") Can help you get the weight of an item.
2. ...etc

Task 44: The Solar System **(Involved measurement activity - over many days)**

Equipment: (Ask permission to borrow from the PE Storeroom)
As many different sized balls as possible

- Squash balls
- Tennis balls
- Basket balls
- Nerf ball (Huge gym ball)
- Golf ball
- ... etc ...

Objective: To create a proportional model of the planets in the solar system to hand in the classroom using different sized balls. Students know that Earth is represented by a furry tennis ball. Find the ball that BEST represents the planet you are working on.

Setting up the Groups:
Assign a different planet to research to each group. (You need to have one group per planet – except Earth as that has been given.)

The students will have to measure Earth's diameter and circumference – tennis ball.
They will then need to measure all of the other balls (appropriate to the size of their planet to Earth).
Students will need to use their calculators to compare.

The Sun: The students will realise it is very large (and will not fit inside the classroom). Take the students out onto the oval. Use witches hats to mark the circumference. Then demonstrate that it will not fit within the classroom (have the dimensions with you).

From past experiences with this activity – the following results will assist.
Kanga cricket ball is almost Venus as it is just smaller than a furry tennis ball.
Mars is almost perfectly a golf ball.
Uranus is best represented by a basket ball.
Neptune is best represented by a volley ball.
Moon – put a little dob of blu-tac on the end of a push pin.

Have ALL models *ready* to hang from the ceiling of the classroom (where possible).

THEN .... Find the scale to put the planets in order – distance from the sun. (Hint: You will find Pluto will provide a problem as the classroom will not be big enough!)

Task 45: Scale **(Measurement Activity)**

Background Information: The design for the Syndey Opera House was a competition. So was the design of Canberra. Sir Walter Burley Griffin, a USA architect, was the design winner.

Task: Come up with the new seating design for our classroom. The winner will be able to have the room changed to represent their design for the duration of 1 term only. All students get one vote on the designs, and so does the teacher.

Time allocation: Year 5/6 – 3 hour task
Year 7 & 8 – 6 hour task

The final design must be presented on graph paper and drawn to scale. All entrants will have their design displayed in the room for all students to consider. In addition, every student also has the opportunity to either complete an oral presentation OR write a persuasive text.

Resources: Need LOTS of tape measures for student use.
Graph paper

Design Criteria:

- Every student within the classroom must have a seat
- Everyone must be able to clearly see the board from their seat
- There must be at least 2 open areas for group work if you leave the tables.
- Everything that is currently within the classroom stays.
- Items can only move if it is physically possible. (May not be able to move some items)
- Design must make sense.
- (Could also include something like: Make the design as environmentally friendly as possible.)

Get students to try and discover on their own the ratio 1 cm = 50 cm.

Students will finish at different rates. The teacher checks the first group's design is accurate. Then these students become the "checkers" for other groups' work.

When the activity is finished, have the students complete a secret ballot. Count up the results, then announce the winner. The next task is to change the room!

Task 46: D.I.Y Calibrated Containers

Task: Advise the students that "we don't have enough containers in the school to measure with – calibrated containers. We need to make more containers to help with measurements."

Resources:

- Need lots of clear (or easy to see through) containers.
- Permanent markers
- Tape measures
- Rulers
- 1 calibrated container per group
- Marker remover (as students tend to use rulers to make marks instead of measuring)

The Groups:

1. Has the 100 mL container
2. Has the 50 mL container
3. Has the 25 mL container
4. Has the 200 mL container

LET THE KIDS LEARN FROM THEIR MISTAKES!!!!!!!

Helpful Tips to tell the students:

- Wait until the liquid settles before making any marks
- Get different shaped and odd shaped containers to show calibration.

When groups think they have finished, get groups to swap to check the calibration markings.

When you have finished this activity – keep the containers and use in future activities to show the value of this task.

Task 47: Build $1m^3$ **(Activity)**

$1cm^3$ (wooden), if it was hollowed out, it should hold 1 mL of water and would weigh 1 gram.

Task: Build 1 cubic metre. Students can use anything they want to complete this task, however there are some suggestions.

Equipment Options:
12 x 1m rulers
Straws
Masking tape
1 m^3 – model
School bags

THEN follow up with .....

Tell me ten things about 1 m^3

Example:

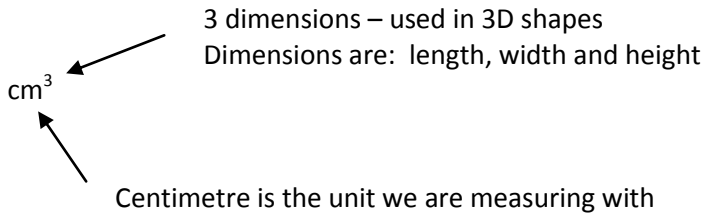
- 8 vertices
- 12 edges
- 6 faces, ... etc

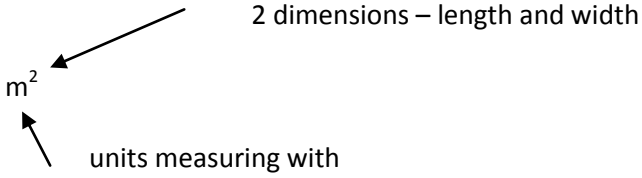
THEN finish with ....

Hold 1 cm^3 up in the air. Drop it into one of the constructed $1m^3$.
How many $1cm^3$ wooden cubes would be needed to fill the cube?

Answer: 100 x 100 x 100 = 1000 000 cm^3

Notes:

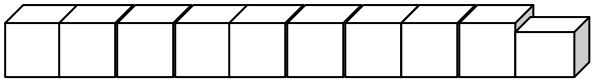




Doing Probability
Line up 10 x $1m^3$ in a row. Fold the last one down to 80% (hopefully it has been made from newspapers)

9.7 million : 1 is the chance of winning on the pokies.

$1cm^3$ (1 little wooden cube) :



Chance of winning

Task 48: The Great Cordial Taste Test **(Activity)**

Note: There is a bit of preparation to be done before doing this task – but it is worth it!

Resources Required:
1 x 600 mL bottle of water per group. Students are to work in pairs or 3's.
1 x 2L bottle of cordial (Orange Crush is good!)
2 dozen CLEAR plastic cups
Jugs of H_2O
Calibrated containers

Specifications	Parts Cordial	Parts H_2O
Group 1	1	2
Group 2	1	3
Group 3	1	4
Group 4	1	5
Group 5	1	9
Group 6	1	2
Group 7	1	3

If you require more groups, keep rotating through the above Specifications.

Teacher Scoring:

Colour /2 Bouquet /3 Taste /5 TOTAL /10

The teacher will not be doing any tasting until all of the mathematics has been recorded. How did you work out the amount of H_2O and cordial?

Hints for Students:
- Don't mix up a fraction with a ratio!
- I will be able to detect this easily and I will not taste your work.

Example of the process:
Group 4 has finished first and has come out with their cordial creation.
Show the teacher the mathematics.
All together there are 6 parts ⇨ 1:5
Cordial = 100 mL = 1 part.
Water = 500 mL = 5 parts.

Ask the students to pour a sample into a drinking cup for the teacher.

(This is where the teacher makes a BIG deal and is very dramatic!!!!)
Assessing Colour – Hold the sample up to the light. Give a rating out of 2.
Assessing Bouquet – Smell the contents of the cup. Swirl it around the cup to release the "bouquet". Give a rating out of 3.
Assessing Taste – Have a sip, swirl around your mouth (just like tasting wine) and then swallow. Give a rating out of 5.

When the teacher is satisfied, ask the students to go back to their table and pour themselves a cup to taste.

If there is time, allow the students to make another strength according the given specifications. Get them to compare their drink with another table who made the same strength.

Task 49: Area of a Triangle **(Activity)**

Using making tape, mark off enough triangles (right-angled, isosceles, and equilateral) around the room (on walls, windows, etc) so every pair of students has their own triangle. Use sticky notes and label each triangle with a letter, A, B, C, ... etc. Pair all students up and label the groups as 1, 2, 3, ... etc.

Match 1 = A, 2 = B, 3 = C, etc.

Give each group a measuring tape and a calculator. They are required to find the area of the triangle.

Alternative taping: Tape a triangle on to the top of each desk. Every pair of students must have a triangle.

Note: Some students will "nail it" – whilst other students will be calculating the perimeter of the triangle. Do explicit teaching at the point of need.

Get students to discover the area of a triangle for themselves.

Get students to compare their triangle to $1m^2$. Is it half or a quarter or a different amount of $1m^2$? Explain.

Task 50: The Great Time Debate

Get students to work in pairs or groups of 3's.

In a container have on different slips of paper the words "Analogue", "Digital" and "24 hour" – enough so that every group will get a piece of paper. Each group randomly selects a piece of paper out of the container. The groups need to develop a mini presentation which will be done at the end of the lesson.

The Topic:
"_____ time is the best way to measure time."

Eg: Analogue time is the best way to measure time.
Digital time is the best way to measure time.
24 hour time is the best way to measure time.

Have all groups complete their presentation. Give a time limit to ensure all groups have the opportunity to present.

Alternative Option:

Tell the students they have 8 hours of Foxtel Viewing to be done over (?) days. Get them to use the Foxtel Subscription Catalogues/Guides to assist them to decide.

Groups will need to explain how they decided how they would spread their 8 hours over the ? days and justify their viewing choices.

Task 51: The Average Height of the People in your Group

The students are required to measure the height of every person in their group. They need to calculate the average height.

Each table will then provide their data to the teacher to record on the board.

	Total Height (No people)	Average Height	Ranking
Group 1	8.61m (5)	172.2 cm	
Group 2	1021 cm (6)	170.6 cm	
Group 3			
Group 4			
Group 5			
Group 6			Etc...

Complete the ranking after the 2 columns are completed.

Does not matter how many people are at the table – the "average" makes it "fair".

Task 52: Find Something that is ....

Find something in the room which is _____ of your height.
(Fill in the blank space with ½, 0.9, 10%, etc)

Alternative: Do the same with weight or mass.

Mr V is 75kg. Find something in the room that is ...

- ¼ of Mr V's mass
- 40% of Mr V's mass
- 1% of Mr V's mass
- ¾ of Mr V's mass

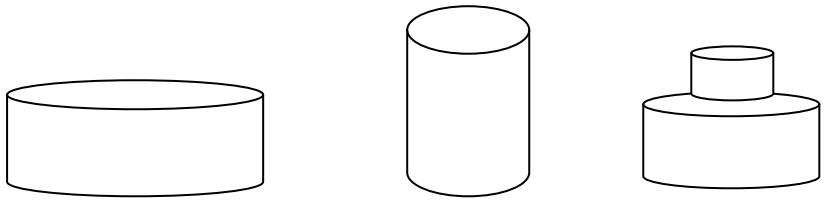
(Note: You may get students who will do the following.
Simon + school bag + holding 16 dictionaries
Allow the students to be this creative!!!!

Resources needed:

- Kitchen scales
- Bathroom scales
- Etc ...

Task 53: Ordering Capacity

Get 3 containers that are deliberately 30 mL apart, but also very different in shape.



Get students to discuss and write down the correct order of capacity.

THEN ...

Get the students to prove their order.
Allow them to complete the measuring.

Alternative Task:

Repeat with volume.

Task 54: Money Prize! **(Group Activity)**

Scenario:
Congratulations! You have won a money prize. You get to choose your prize from the following list.

- 1 L milk carton filled with 20c coins
- 1 kg of $1.00 coins
- A line of $2.00 coins which is 1 metre long, lying flat on the ground and touching.
- 1 m^2 of 5 cent coins with the coins lying flat on the ground.

Which way do you want your prize?

Equipment Required:

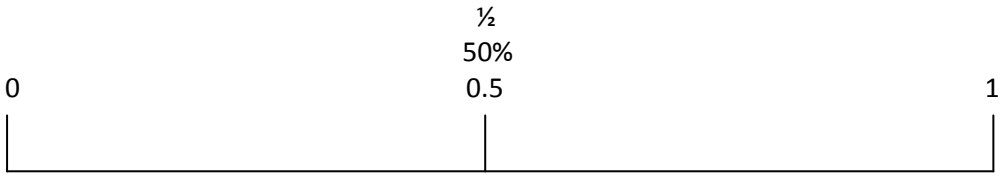
- Enough 20 cent pieces to cover 1 layer of a milk carton, and 1 L milk carton
- $1 coin and kitchen scales
- $2 coin and 1 m ruler
- 5 cent coin and 1 m ruler

Group Activity
Students are allowed to discuss the options within their groups.
Write the options on the board and then each group decide which option they think would offer the largest prize money.
Each group needs to perform the calculations for each option to prove their answers.

(Note: There will be one option that will be obviously larger.)

Task 55: Travelling to Perth (safely)

Have a probability line (1 metre long) in the classroom to assist with this task.



Impossible Can't Happen	Could Might Perhaps Even Chance Maybe	Certain Will Happen

Travelling from Melbourne to Perth (Have 1 probability line – per option)
Students are to place a dot on the line as to where they think the probability should be.

1. Fly by aeroplane _____
2. Drive (depends upon vehicle and driver) _____
3. Train _____
4. Walk/Hitch hike _____
5. Bus _____
6. Bike _____
7. Motor bike _____
8. Sail – ship _____
9. Swim _____
10. Hot air balloon _____
11. Ocean liner _____
12. _____

Students discussion and recording is important!

Task 56: How would you like this Question put to you?

Option 1:
The number of rugby league premierships won by South Sydney?

Option 2:
The number of rugby league premierships won by South Sydney?

(a) 10
(b) 15
(c) 20
(d) 25

Option 3:
South Sydney has won 18 premierships - True or False?

Students are to provide their reasoning as to which option (A, B or C) they would prefer.

Justification:
Option 1. Totally open question. Chances of guessing the correct answer is unlikely.
Option 2. Four choices have been given – so there is ¼ chance of getting the answer correct.
Option 3. Two choices, so 50:50 chance of getting the answer correct.

Relate this back to NAPLAN for the students.
They should follow this process.

1. Eliminate the ridiculous answers to the questions first. This improves the chances of getting the correct answer.
2. Get rid of the distractor – this will leave 2 possible answers which results in a 50:50 chance of getting the correct answer.

Task 57: Race

What numbers can be rolled if adding the sum of 2 dice?

					6,1					
				1,5	5,2	6,2				
			1,4	2,4	4,3	5,3	6,3			
		1,3	2,3	3,3	3,4	4,4	5,4	6,4		
	1,2	3,1	3,2	4,2	2,5	3,5	4,5	5,5	6,5	
1,1	2,1	2,2	4,1	5,1	1,6	2,6	3,6	4,6	5,6	6,6
2	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
					X	X		X		
								X		

Rolled 10
Rolled 10
Rolled 7
Rolled 8
Keep going until one number crosses the finish line.

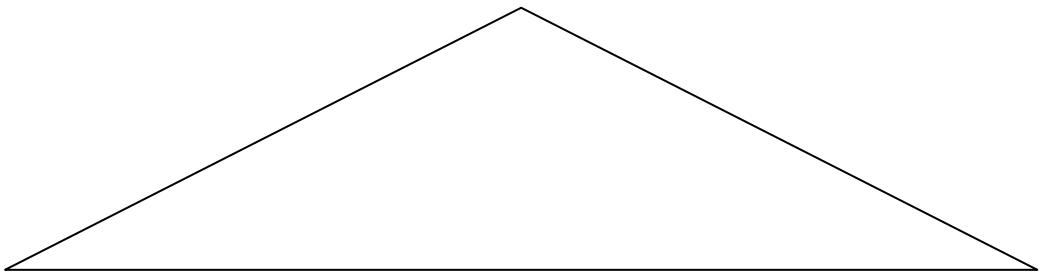
FINISH LINE

Is this a fair race track?

"Lucky 7" – the premise is that the value 7 has more chance of coming up with 2 dice, than any other number.

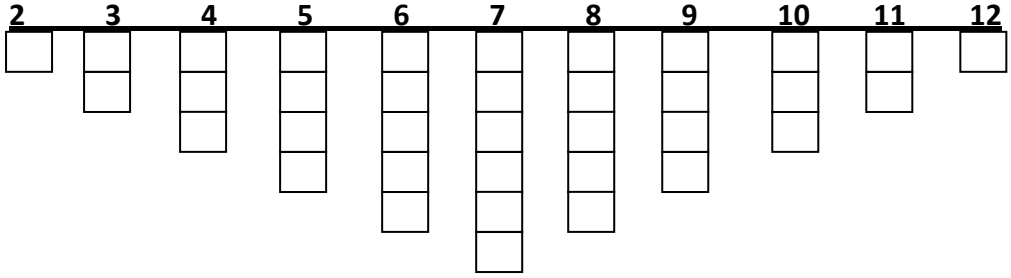
To back up the premise, get students to roll the dice 100 times (50 per pair). Record the data. Now record each group's data on the whiteboard.

Graph the totals. A triangle should form. This will confirm the theory of the race track.



Last part of Task:
Middle numbers have an unfair advantage. Design a "fair" race track with 2 dice.

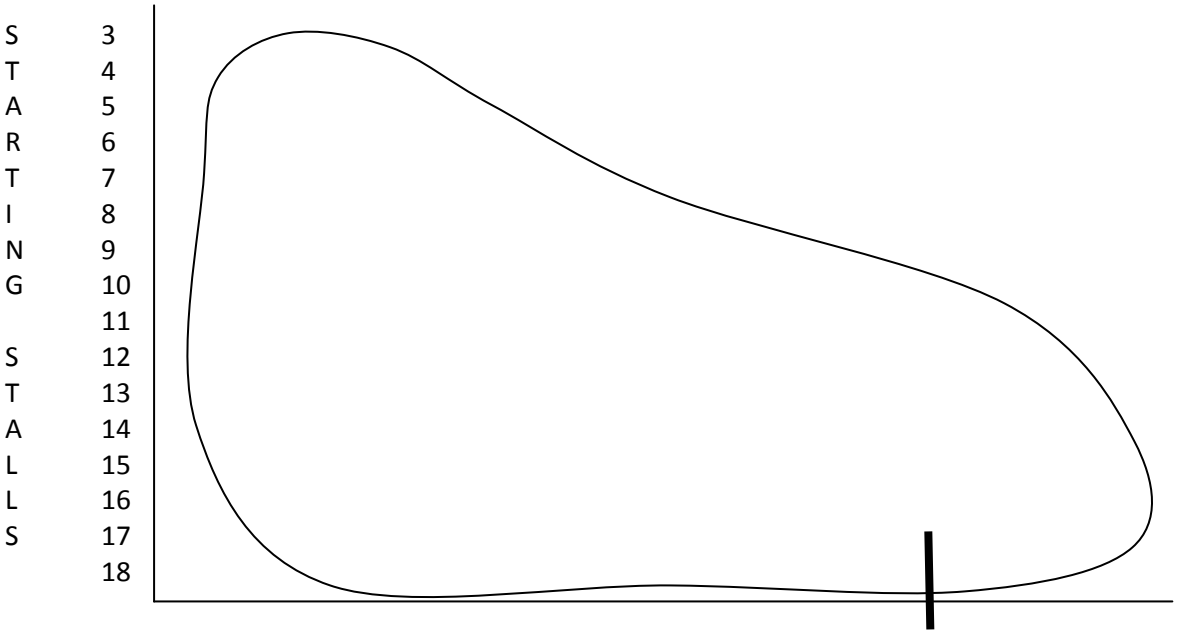
Solutions could be: A staggered race track



OR Partner Up Numbers

2 or 6	3 or 5	8 or 12	9 or 11	10 or 4	7

Task 58: Flemington Race Track



Draw the track on the carpet in chalk. Divide the track into 12-15 sections so that there are markers to move to every time the number is rolled.

Roll 3 dice and sum their totals. Possible results are 3 – 18.

Do NOT ever mention the words "gambling" or "betting". Instead, use the terms "likelihood", "probability" and "likely".

Possible Sum	Points
3 or 18	1000/1
4 or 17	500/1
5 or 16	250/1
6 or 15	100/1
7 or 14	50/1
8 or 13	10/1
9 or 12	5/1
10 or 11	2/1

Students can predict the winning number, OR can choose not to test the likelihood.

Suggest you have milk bottle lids with the numbers 3 – 18 on them to represent the horse numbers. Every student gets a turn at rolling the dice and adding the total to determine which horse moves one place. Race finishes after 1st, 2nd and 3rd horse cross the line.

Example: Student rolls 3, 3, 5. Total = 11. Horse 11 moves one place from the starting stalls.
Pass the dice to the next student and repeat the process.

After the race ....
What 3 observations have you made?
Example: 3 and 18 have not started the race. Etc.

Task 59: Groups of 5

Objective: Show students an easy way to count by getting students to form groups of 5.

Students are to stand up and move into groups of 5. Any students left over do not form a group.
Count the number of students in the room.

Example: 8 groups of 5 students and 1 person not in a group = 41 students.

Ask the students: "Is there any other different groupings that we could create using this number of students so no one is out of a group?"

For this example: No, as 41 is a prime number.
If we had 40 students, however, – we could have regrouped into:
5 groups of 8 people OR
2 groups of 20 OR
20 groups of 2 OR
4 groups of 10 OR
10 groups of 4.

What percentage of the class are: males?
How do we do this?

1. Count the number of males (as there are less of them than females in this group of 41 people)
2. Teacher gets a calculator and talks through the process out aloud. Ie: "Thirteen", " divided by", "forty one", "equals", gives us a decimal answer.
   OR
   "13" "÷" "41" "%" gives a percentage (31.7% = 32%)

So what is the percentage of females? We know the total group = 100%. We calculated males are 32%.
100 – 32 = 68% are female.

Other possible groupings to be done in the class:
Dark coloured tops – go around and look at different tops to define "dark".
School uniforms may cause a problem – so look at students wearing school jumper v's those not wearing it.

Task 60: Capacity of the Dams in Victoria

Melbourne Dams (6 in total) have a total capacity of 1 773 000 mega litres.
The Thompson Dam (1 of the 6) has a total capacity of 1 068 000 mega litres.

What would happen if you emptied the remaining 5 dams (if they were at 100% capacity) from the Greater Melbourne Region into the Thompson Dam?

The Thompson Dam's depth is huge! This means there is a lower evaporation level.

Why is the Thompson Dam's current water levels so low?

Task 61: Addition using the "No Carry – No Midgets Method"

Place Value is used to read, write and say large numbers. It is also used when performing operations. When doing examples, try and put into a context that students will understand – such as money.

```
  763
 4278
   36
  904
+ 2675
```

Look for "friendly numbers". These add together and end in a zero or five. Eg: 6 + 4 = 10, 2 =+ 3 = 5, etc.

Adding down the right hand side column 6 + 4 = 10, then add 8 = 18 + 5 = 23 + 3 = 26
What do I do with 26? When we were at school, we were probably told "put down the 6 and carry the 2". Through student eyes – the total was 26, and when we write the 6 this is only half of the number, and "carry 2" refers to something we do with luggage. If you look in a Mathematics Dictionary "carry" is not a term that is defined. Kids also think of "carried" as the number not being well. They notice that the size of the 2 has diminished, so it must be sick or unwell. Why is the 2 written so small? 26 is written as 6 and 20. 2 shrinks in size as it is a convention, but not a reason. It is something we have done/created.

What **should** the addition look like?

```
  (2)   <-- Make it full size and you can put a circle around it to show it was not part of your original equation.
  763
 4278
   36
  904
+ 2675
    6
```

Column 2 (from the right hand side)
Look for "friendlies" 7 + 3 = 10 + 7 = 17 + 6 = 23 + 2 = 25

```
 (2)(2)
  763
 4278
   36
  904
+ 2675
   56
```

Column 3 (from the right hand side)
6 + 2 + 2 = 10 + 9 = 19 + 7 = 26

```
 (2)(2)(2)
  763
 4278
   36
  904
+ 2675
  656
```

Column 4 (from right hand side)
4 + 2 + 2 = 8

```
 (2)(2)(2)
  763
 4278
   36
  904
+ 2675
 8656
```

Task 62: Addition – Extended Method

(This should be used for students who are struggling with addition)

(Same problem as for Task 61)

763 ⇨	700 + 60 + 3	
4278 ⇨	4000 + 200 + 70 + 8	
36 ⇨	30 + 6	
904 ⇨	900 + 0 + 4	
+ 2675 ⇨	2000 + 600 + 70 + 5	Add down each of the columns
	6000 + 2400 + 230 + 26	
	8400 256	Add each of the paired numbers as indicated
		Add the paired numbers as indicated

Problem: Some students may not be able to identify when they have used friendly pairs and accidentally add the digits a second time. This will be improved with practice.

Task 63: Addition – Left to Right Method

	Th	h	t	o	
		7	6	3	
	4	2	7	8	
			3	6	
		9	0	4	
+	2	6	7	5	

Keep the place value headings above the columns as much as possible.

	1st	2nd	3rd	4th	
	Th	**h**	**t**	**o**	
		7	6	3	
	4	2	7	8	
			3	6	
		9	0	4	
+	2	6	7	5	
	6	0	0	0	(this has come from 1st column 4000 + 2000)
	2	4	0	0	(2nd column 700 + 200 + 900 + 600)
		2	3	0	(3rd column 60 + 70 + 30 + 0 + 70)
+			2	6	
Continue L → R	8	0	0	0	
		6	0	0	
			5	0	
+				6	
Continue L → R	8	6	5	6	

This technique ALWAYS works. Keep everything in it place value parts.

Task 64: Comments about subtraction v's adding on

It is nature that humans don't like to subtract in life.

Example: I go to Subway with $10. I buy a foot-long meatballs sub for $6.75. The change is $3.25

What did you do to calculate the change? It is natural to "add on".

If you spend $6.75, you add 25 cents to get to $7.00, then add an extra $3.00 to get to $10.00. This makes the change $3.25.

What is wrong with Primary School Mathematics?

$$\begin{array}{r} 2000 \\ -999 \\ \hline \end{array}$$

The answer is 1001. Why would you reduce one column, and then put it at the next column?

The ways we present questions to our students results in different responses.

Class 1

$$\begin{array}{rr} & 2\,0\,0\,0 \\ - & 9\;9\,9 \\ \hline \end{array}$$

(Question written vertically)
These students automatically assumed they had to get their books out to solve.

Class 2

2000 – 999

(Question written horizontally)
These students automatically "added on".

Task 65: Subtraction - Decomposition

	h	t	o
	7	4	6
-	3	7	8

Do this activity with money between 3 students and the teacher. Make it a game – played a little like the dealings that go on in "Underbelly".

One student (A) is given 7 x $100 notes
One student (B) is given 4 x $10 notes
One student (C) is given 6 x $1.00 coins

The teacher goes up to the student with $6.00. Say (quietly), "You owe me $8.00. I need $8.00."
Student (C) soon realises that they only have $6, which is less than the $8 they are required to pay.
Student (B) gives Student (C) $10. This means they now have $16 and can pay the $8.00 which they owe.
They pay the money and are left with $6.

The teacher goes up to Student (B) and says "You owe me $70." Student (B) recognises they only have $30 in their hands. They borrow $100 from Student (A), which means they now have $130 and can pay the $70. When they make the payment, they have $60 left.

The teacher goes up to Student (A) and says "You owe me $300". Student (A) can pay $300 out of the $600 they have in their hands.

The students work out how much they have left over as they have paid all that they owed.
Student (A) has $300 remaining.
Student (B) has $60 remaining.
Student (C) has $8 remaining.

This means they have $368 left from the $746 after paying $378 to the teacher.

Task 66: Subtraction – Extending Method

It is important to use the place value names when using this method.

```
 7  4  6      ⇨      700 , 40 , 6
-3  7  8      ⇨    - 300 , 70 , 8
```

Step 1: 6 – 8 cannot do. Change the values around.

```
          700   30   16
        - 300   70    8
```

Step 2: 8

Step 3: 30 – 70 cannot do. Change the values around.

```
          600  130   16
        - 300   70    8
```

Step 4: 300 60 8

The answer is 368.

Task 67: Subtraction – Left to Right Method

Present the question vertically first, then write as below.

```
    h    t    o
    7    4    6
   -3    7    8
    4    0    0
         -3    0      (negative 30)
+                -2   (negative 2)
    3    6    8
```

```
    h    t    o
    7    7    6
-   3    4    8
    4    0    0
         3    0
+                -2   (negative 2)
    4    2    8
```

This method is totally based on Place Value!

Task 68: Subtraction – "Adding On" to find the difference

Write the question horizontally: 7 4 6 – 3 7 8

	3	7	8	
+		**2**	**2**	
	4	0	0	22
+	**3**	**4**	**6**	+ 346
	7	4	6	368

*** Give all of the questions "purpose" with the numbers you use. ***

Task 69: Multiplication – Working the Grid

By the end of Year 4, students are expected to be able to multiply 3 digits by 1 digit.

57
x 64

x	50	7
60	3000	420
4	200	28

3200 448

3648

This diagram also gives a special indication that the largest values will go into the larger squares.

Encourage the students to write the numbers so they are lined up in place value columns.

Add vertically first using the numbers inside the squares.
THEN add horizontally outside the square.

OR add horizontally and write the numbers to the right of the squares, THEN add vertically.

*** Using this technique, students need to know the extended number facts. ***

Task 70: Multiplication

```
  5 7
X 6 4
  2 8      (7 x 4 = 28)
2 0 0      (50 x 4 = 200)
```

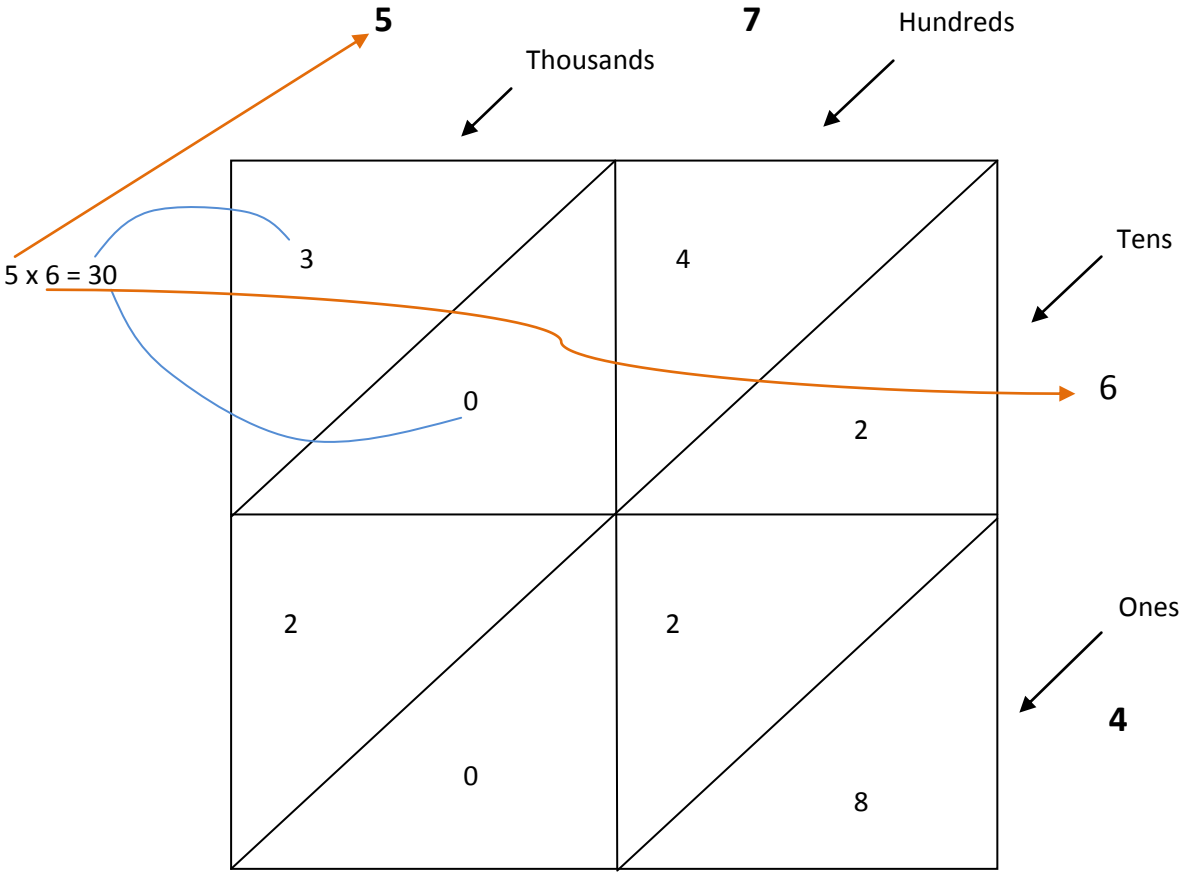
Now the 4 is finished with, so cross it off.

```
  5 7
X 6 4
  2 8
2 0 0
4 2 0      (60 x 7 = 420)
+ 3 0 0 0  (60 x 50 = 3000)  You can leave a blank line for "renaming".
3 6 4 8
```

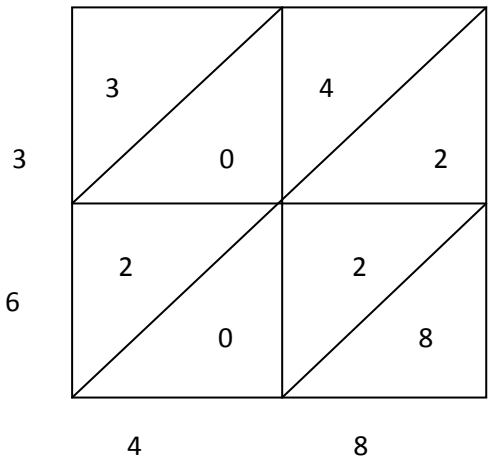
Students need to write notes down the side when starting this technique.

Task 71: Multiplication - Lattice

Divide each square on the lattice on the diagonal. Multiply each single digit in the column above the lattice with the single digit in the row to the right of the lattice. Write the answer in each square as a two-digit number with the top digit being the tens value.



Add up all of the digits on the diagonals created by the lines.



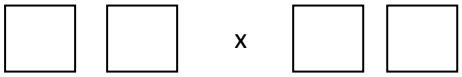
Answer is: 3648

If the diagonal adds to more than 10, then get the student to write +digit (in a circle) at the top of the next diagonal. Example: if the diagonal adds to 17, write 7 at the bottom of the diagonal and +1 at the top of the next diagonal.

*** Students do NOT need to know extended Number Facts for this technique. ***

Task 72: Multiplication - Game

Task: Using the given 4 digits, students have to come up with the biggest product.



Process: Have the digits 3 through to 9 in a container. Randomly select 1 digit. Students have to select which position the digit is going to be placed BEFORE the next digit is drawn. Repeat the process until the 4 digits have been drawn.

Students calculate their answer from the product.

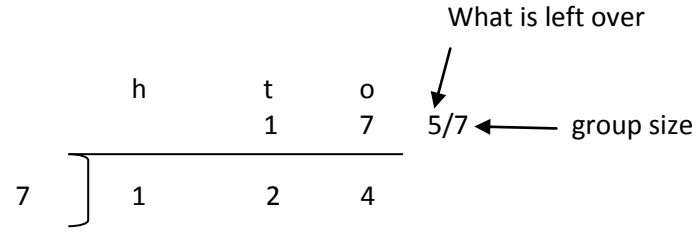
Scoring: 3 points – biggest, 2 points – next biggest, 1 point – next biggest.

Students have to make decisions the whole time in an attempt to get the largest number from the product. It is a game of chance!

Task 73: Division – Short but Ugly

This is something that students don't like doing. We tend to flip the question around to multiply instead.

The context of "sharing equally" is a great application of division. Also, calculating "averages" is making a comparison and gives the notion of "fairness".



Stop saying "7 into 1 doesn't go". This is inaccurate as the true question is "7 into 100" which can be calculated.

Place value is the key to solving this type of question.

Do not write "remainders", instead write as a fraction.

Task 74: Division – Extended Method

$7\overline{)\ 124}$

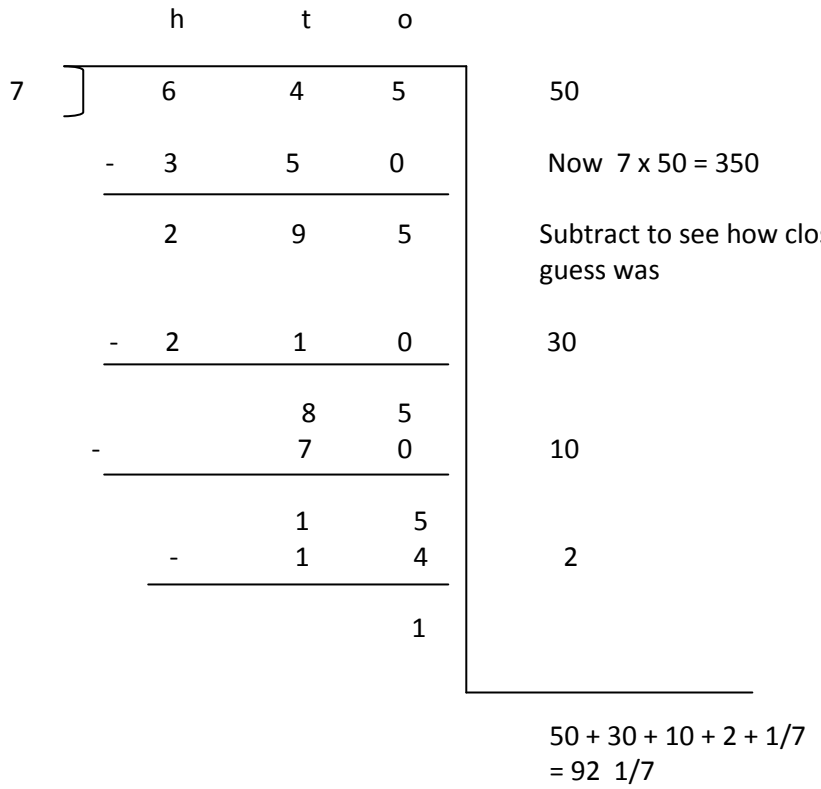
Break this question down into:

100 ÷ 7 = 14 2/7
20 ÷ 7 = 2 6/7
4 ÷ 7 = 4/7 Add the whole numbers and fractions down the page.
16 12/7 Change 12/7 into a whole number and fraction.
16 + 1 + 5/7
17 5/7

If it is not a worded problem, present the question to the students written horizontally. Let them choose the technique they are going to use to solve the problem.

Task 75: Division – Long, but forgiving method

The Problem: 645 ÷ 7



Step 1: Make a reasonable guess as to how many times 7 will go into 645. My first guess is 50. Write 50 on the right hand side of the equation and vertical line drawn above.

Step 2: Multiply 7 x 50 and subtract this value from the starting amount. We are left with 295.

Step 3: Make another reasonable guess as to how many times 7 will go into 295. It needs to be less than 50 as we know 7 x 50 = 350. This time I am going to guess 30.

Step 4: Multiply 7 x 30 = 210 and subtract this value from the starting amount. We are left with 85.

Step 5: Make another reasonable guess as to how many times 7 will go into 85. I'm going to guess 10.

Step 6: Multiply 7 x 10 = 70 and subtract this value from the starting amount. We are left with 15.

Step 7: Make another reasonable guess as to how many times 7 will go into 15. This will be 2.

Step 8: Multiply 7 x 2 = 14 and subtract this value from the starting amount. We are left with 1.

Step 9: We cannot go any further with the division, so now add the column down the right hand side of the calculation and remember to include the fraction.

What happens if a student "over - guesses"? (see next page)

Task 75: Division – Long, but forgiving method (continued)

What if a student OVER-GUESSES?

The Problem: 645 ÷ 7

	h	t	o	
7 ⟌	6	4	5	100
-	7	0	0	Now 7 x 100 = 700
		-5	5	Now left with negative number
-		-4	9	-7
		-	6	(-55 - -49) = (-55 + 49) = -6

100 + -7 + -6/7
= 93 + -6/7
= 92 1/7

Step 1: Make a reasonable guess as to how many times 7 will go into 645. My first guess is 100. Write 100 on the right hand side of the equation and vertical line drawn above.

Step 2: Multiply 7 x 100 and subtract this value from the starting amount. We are left with negative 55.

Step 3: Make another reasonable guess as to how many times 7 will go into -55. It needs to be a negative number so that 7 x –ve = -ve. This time I am going to guess -7.

Step 4: Multiply 7 x -7 = -49 and subtract this value from the starting amount. We are left with -6

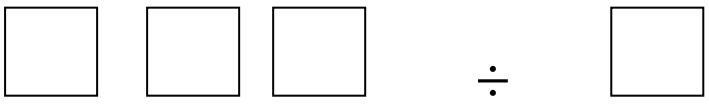
Step 5: We cannot go any further with the division, so now add the column down the right hand side of the calculation and remember to include the fraction and any negative values. Simplify the fraction by removing the negative values and leaving a positive fraction only.

For this question - put it into context for the students.

Examples: Put 645 days into weeks
Share $645 equally between 7 people.

Task 76: Division – Game

Set the students up with the following outline.



Have a container of digits 3 through to 9. Randomly select 1 digit out at a time. Students select position of digit in the equation BEFORE next digit is drawn.

Students are trying to get the largest answer. Scoring – 3pts, 2 pts, 1 pt.

Task 77: Division – "In the Ball Park"

Found in : Maths on the Go Book 2.

Students do not have any pens or paper to complete the calculations. They need to think about how they could solve this problem.

1875 ÷ 13

Scoring:
If you are in the ball park "bleachers" – get 1 point (nose-bleed seats)
If you are in the ball park with good seats – get 2 points
If you are in the ball park and in the corporate box – get 3 points.

Ask students for their strategies.

Example:
13 x 100 = 1300
13 x 10 = 130
13 x 10 = 130
Have now used 1560
13 x 10 = 130
Have now used 1690
13 x 10 = 130
Have now used 1820 which is 140 x 13
Half of 130 is 65 which is 130 x 5 which is just too large, so use 4 x 13.

Answer is approximately 144 x 13.

Task 78: Warm-up using a story book

Book used: "Annos'a Mysterious Multiplying Jar".

Read the story
Write on the board
1 island
Each island contains 2 countries
Each country contains 3 mountains
Each mountain has 4 walled kingdoms
Each kingdom is 5 villages
Each village has 6 houses
Each house has 7 rooms
Each room has 8 cupboards
Each cupboard has 9 boxes
Each box has 10 jars

How many jars were in all of the boxes?
Students can use the problem solving strategies to solve this problem.

Solution: 10! (ten factorial) = 10 x 9 x 8 x 7 x 6 x 5 x 4 x 3 x 2 x 1 = 3 628 000 jars

Task 79: Fractions, Decimals, Percentages - Activity

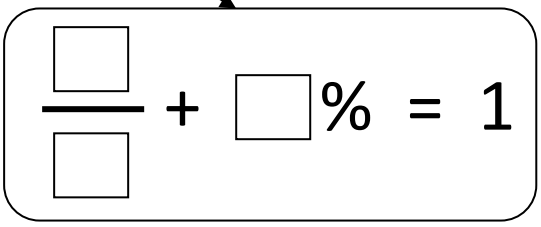
Each open ended problem, give the students a range of strategies to choose from to suit their learning style. Do NOT limit to one strategy.

The Problem:

$$\frac{\square}{\square} + \frac{\square}{\square} + \square\% + 0.\square = 1$$

Students can solve by:

- Draw a diagram
- Write a number sentence
- Make a model → Fraction Towers (we have a set in our storeroom)
- Solve a simpler problem
- Guess and Check



Task: Want at least 4 different answers from each student.
The squares do not have to be the same values.

Extension Task: Change the RHS of the equation too. Eg: 1.5 or 1 + □/□ + □%

Extra Extension Task: All variables need to be assigned a different value in the equation below.

$$\frac{a}{b} + \frac{c}{d} + e\% + 0.f = 1$$

Task 80: Fraction/Decimal/Percentage Warm-up Game

Source: Number Sense Yr 6-8

The teacher decides before the lesson how they are going to determine the fraction/decimal/percentage.

Example: Vowels / Consonants = Fraction/decimal/percentage

Go around the room and say a student name – then give the fraction and equivalent decimal and percentage.

Example:
CHRISTINE: 3/6 = 1/2 = 50 % = 0.5
(Obtained through 3 vowels and 6 consonants in name – do not tell the students this.)

JAYSON: 2/4 = ½ = 50% = 0.5

MICHAEL: ¾ = 75% = 0.75

Get the students to try and figure what rule you are using to determine these fractions.

Other variations:
Vowels / Total letters
Consonants / total letters
First name letters / surname letters
etc ...

Task 81: Place Value Warm-up – "In betweens"

Resources Required: thick black texta and pad of sticky notes.

Set-up: Teachers gets the notepad and sticky notes and writes 2 numbers (one per page).
Example: 17 and 22. Stick 17 on something to the left side of the classroom and 22 on the right side of the class room.

Student Participation: Hand the texta and sticky notes to a student. Give the following instructions.
"Write me a number between 17 and 22, but it cannot be one that is already out there.

Generally, the whole numbers are written first. Students will tend to resist decimals.

If the students then say there aren't any more numbers, give them a scenario that will make them think of decimals values. "When I go to the shops, are all the items prices $17 and $18 with nothing in between?" Obviously the answer is no, and students will realise the need for decimal values.

Depending upon the students, ask them to work according to their abilities.
For example, a student may be asked to write a fraction that occurs between 21 and 21.5.

After you have approximately 12 – 15 (half of your class in the numberline), get them to give their answer as a length in metres and centimetres. If the student wrote 21.5 – they would say 21 metres and 50 centimetres. If they had the value 21.05 – they would say 21 metres and 5 centimetres.

Extensions:
Have the number line only between 0 and 1.
Work in mL, $ or kg for the values you are dealing with. Give the problem a scenario.

Task 82: The Carousel

Students form mixed ability groups. There are 6 groups and 6 stations. Every group has 1 x A3 sheet of paper. Every group has the same problem, but have to use the solving strategy stated. Every group has to write an original entry for the rotation. There is no need for "sharing" as every group must read the entries made by every previous group to ensure they do not repeat the answer.

Group 1

0.4 + 2/5

Group 2

Group 3

Group 4

Group 5

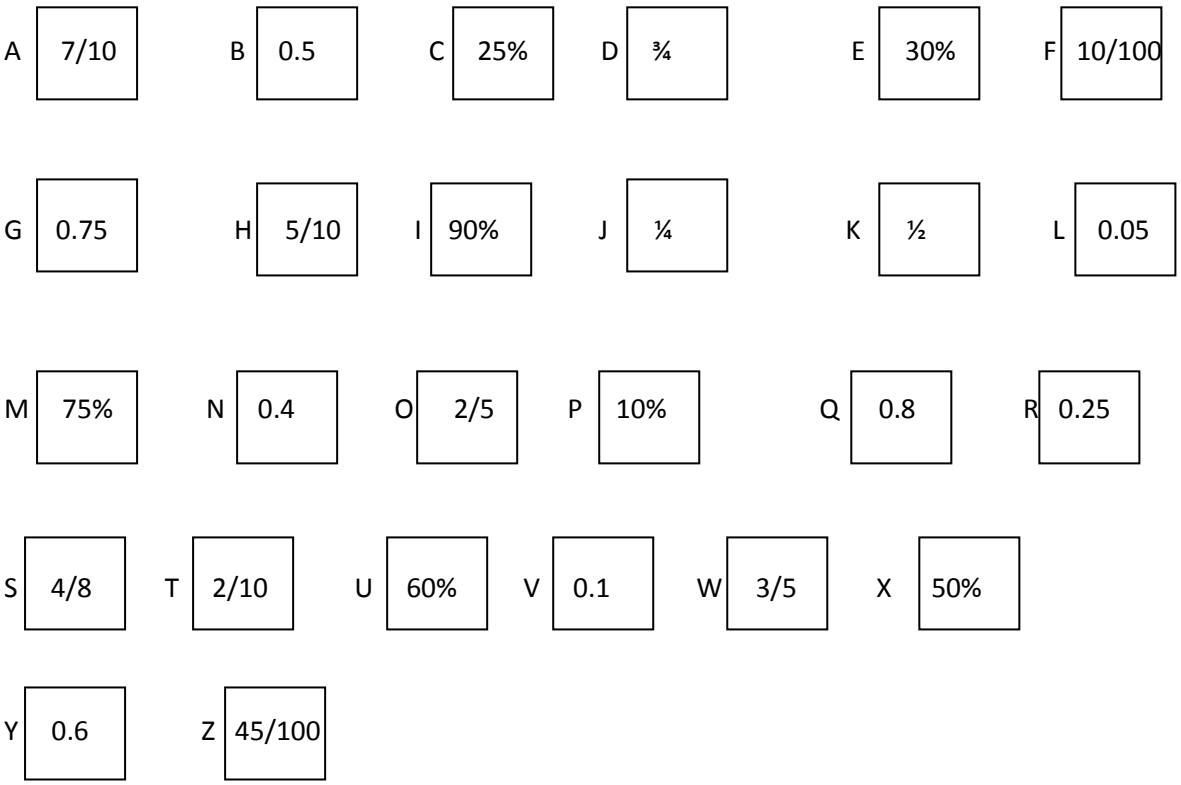
Group 6

Problem Solving Strategies to be used:
Group 1 – Calculator
Group 2 – Draw it
Group 3 – Do it in your head. Record your THINKING
Group 4 – Story (creative narrative)
Group 5 – Pen & Paper to show working out
Group 6 – Make it. Have coins and fraction towers available only. Check the results of this group at the end of each rotation. They do not record. Pack up the equipment each time so the next group starts with no idea of the previous group's work.

Reflection at the end of the activity:
Students must have a group conference first – then have one presenter.

1. What activity did you enjoy the most? Explain why.
2. What activity did you find the most challenging? Explain why.
3. What bit of work (from a different group) did you admire the most? Give us the details.

Task 83: Get me to ONE!



1 card = 1 point
2 cards = 2 points
3 cards = 3 points

Cannot double the use of a card in 1 equation.
BONUS point is issued when a fraction and a decimal and a percentage card is used in one equation.
You can go past the total 1 and then use subtraction.

Students must record their equations in two lines. The top line is the letter that corresponds to the card. The second line is the numbers which prove the equation. At the end of each equation, write the points obtained.

Students are given targets for the task. Minimum score is 15 points. (Give individual challenges to those who you identify as capable - whisper to them their new target such as 30 or 40 points.)

Examples of what students are required to record:
B + P + N = 1
0.5 + 10% + 0.4 = 1 {3 points}

U + W – C + L = 1 6 points
60% + 3/5 – 25% + 0.05 = 1 {5 points} Note: The teacher has the right to change the points upwards. Check at least one per student during the activity. When the teacher changes the mark upwards by 1 point, the student is happy and it has cost the teacher nothing. This will increase motivation levels.

Task 84: True or False? **(Task for Lower Secondary Students)**

Students respond well to this activity. Do it early in a unit of work.

Setting up:
Divide the students into groups.
Each group has a different "material" to solve the problem.
Give the students the problem (in this case - an equation).

Tell the students: "I don't want to know if this equation is True or False until you PROVE it with the material you have been given."

Materials:
Group 1 – metre ruler
Group 2 – Calculators
Group 3 – Coins
Group 4 – Fraction towers

} Repeat the equipment if you have more groups.

The Problem:

$$1/5 + 30\% + 0.45 = 1$$

Note: Avoid the fractions that involve thirds and eighths due to the materials given.

Rotate the materials between the groups and then provide a new question for students to solve.

New Problem:

$$0.05 + 7/10 + 20\% = 50/100 + 0.4$$

Task 85: D.I.Y Fraction Wall

Give every student a piece of A3 paper. Let them know if they do a good job you will have their work laminated and cut up for use within the classroom.

The following "equal parts" must be created: 1 (whole), ½, 1/3, ¼, 1/5, 1/6, 1/10.
Each "part" must be labelled with a different name. See the labels in the table below.

1									
½					0.5				
1/3			0.3333333				33.33333%		
¼			0.25			25%			25/100
1/5		0.20		20%			2/10		20/100

Equipment:

- 1 Ruler per student
- 1 sheet A3 paper
- 1 calculator per student
- Black marker to draw lines and write labels on "equal parts"

Get the students to find out the measurements. (Hint: the best result is using 30cm wide)

Reflection: Students are to record AT LEAST 6 observations they have discovered from their fraction wall.

Task 86: Closest to ONE

This is an activity to be played in pairs.

Equipment required per pair:

- 1 deck of cards with the picture and ace cards removed
- 1 calculator

Winner:
The winner is the first person in the pair to 15 points.

Rules:

- The Calculator is the referee. It can only be used when you have obtained permission from the teacher.
- Students deal in turns.
- Each deal requires each student to have a total of 2 cards only.
- The student has to make a fraction with their two cards – trying to be the closest to the value 1.
- Being closest can be less than or greater than 1.
- Students need to compare their fractions and determine who is closer to 1, thus winning a point.
- Students are to agree on the decision – and if agreement cannot be reached, ask the teacher if they can use the calculator to assist. The teacher needs to assess if there has been sufficient discussion (and other techniques – such as drawing diagrams, or number lines, etc) before allowing use of the calculator.

Example of playing the game:

Player 1 Cards: 6 and 9
Fraction is 6/9 which simplifies to 2/3

Player 2 Cards: 4 and 6
Fraction is 4/6 which simplifies to 2/3

As fractions are equal (and students agree they are equal) no point is awarded.

Player 1 Cards: 5 and 10
Fraction is 5/10 which is equal to half.

Player 2 Cards: 6 and 10
Fraction is 6/10 which is bigger than half.
Player 2 wins a point.

Continue until a player reaches 15 points.

Task 87: Design a Die

This task looks at probabilities. Have blank dice with white sticky dots on each side. Students are to mark the dice with appropriate colours/numbers to represent the given probabilities.

Example of a problem:
Instruction 1: On a die, 5 has to appear 2/3 of the time, and 2 has to appear 1/3 of the time. Work out the numbers on the die.
(The resulting student die would have 5, 5, 5, 5, 2, 2 to match the given instructions.)

Instruction 2: 2's have to come up 50% of the time. 1's have to come up 1/6 of the time. 4's have to come up 0.33333 of the time.
(The resulting student die would have 2, 2, 2, 1, 4, 4 to match the given instructions.)

Make sure there is a mix of percentages, decimals and fractions within the instructions.

THEN get the students to test their die by completing 100 rolls and recording the data in a frequency table. See what results they get and compare this to what was expected.

Task 88: Everything About My Fraction

Source: Mathematics Assessment for Learning
Rich Tasks & Work Samples (Red book)
(Junior Primary to Junior Secondary)
Task 19
A. Downton, R. Knight, D. Clarke, G. Lewis

The teacher has a "Mystery Spinner" which is not shown to the students.

The teacher performs 50 spins (in secret) and the students record the results. At the end of the spinning, the students have to describe what they think the spinner might look like (based on the data collected).

Example:

Blue	𝍸 𝍸 𝍸 𝍸 𝍸 I	26
Red	𝍸 𝍸 III	13
Green	𝍸 III	8
Yellow	III	
		50 ROLLS

Describe the Spinner:
Blue - half = 50%
Red – quarter = 25%
Green – 20%
Yellow - 5%
Total = 100%

Show the students the spinner you were using to see if their description was accurate.

Task 89: Order Order

Objective: Students have to work quickly and efficiently to correctly order the cards they have received, competing against all other teams in the class. (Note: These cards can be fractions, decimals, percentages, or a combination of all three. Carefully select each group and match the students to the cards you issue. Each set are different, so groups cannot receive assistance through listening to other conversations.)

Each group of students receives a set of cards. The students allocate them so every person receives at least one, and all face down. Students have to arrange themselves so they are arranged from smallest to largest for the values on the cards, with the cards being held chest height for the rest of the class to view. (Note: Some students have ordered themselves according to their heights, ignoring the cards. Ensure all instructions are clear.)

Scoring: If there are 7 teams = 7 points to allocate. This ensures all teams can score a point, however it is conditional. As soon as teams call "Finished", they are not allowed to move, swap cards, talk, etc. All teams must be finished before checking (in the order of completion) can begin. Teams are only awarded their points (based on the speed of completion) if ALL of their cards are in the correct order.

First team finished = 7 points
Second team finished = 6 points
Third team finished = 5 points
...
Seventh team to finish = 1 point.

When each team reads the order of their cards (the student holding the card gives the response), get them to answer in a particular unit. Example: 1.12 in kilograms and grams would become 1kg and 120 grams. Other options are: millilitres or money.

Example: Our cards were: 55%, 5/9, 3/8, 0.805 and 45%
We had to order them, and then give the answers in millilitres.

Task 90: Fun Activities

If you had a match and entered a dark room with:

- An oil lamp
- An oil heater
- Kindling wood;

Which would you light first?

Answer: The match

A Person builds a house with 4 sides (rectangle).
Each side faces south.
What colour is the bear?

Answer: White

How far can a dog run into a forest?

Answer: Half way

Task 91: Brain Teasers "BT" or Brain Expanders "BE"

BT 1

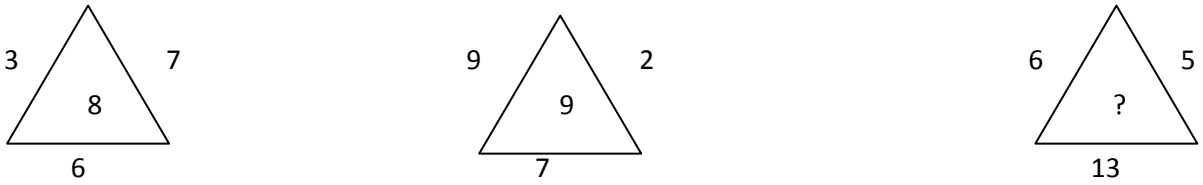
2	10	5	4
6	4	8	3
6	2	3	☐

What could be the missing number?

Possible solutions:

- Draw a vertical line between the 2nd and 3rd columns. You will notice that when you multiply the first two numbers, they are equal to the multiplication of the second pair of numbers.
  Eg: 2 x 10 = 5 x 4, then 6 x 4 = 8 x 3, and finally 6 x 2 = 12, so 3 x ☐ must also equal 12. This means ☐ = 4.
- For each ROW: Multiply the first 2 numbers, then divide by the third number, and get the fourth number as the solution. eg: 2 x 10 ÷ 5 = 4. Row 2: 5 x 4 ÷ 8 = 3. Row 3: 6 x 2 ÷ 3 = ☐, so ☐ = 4.
- If you sum the columns, they form a symmetrical pattern. Eg: 14, 16, 16, 14. This would make ☐ = 7.

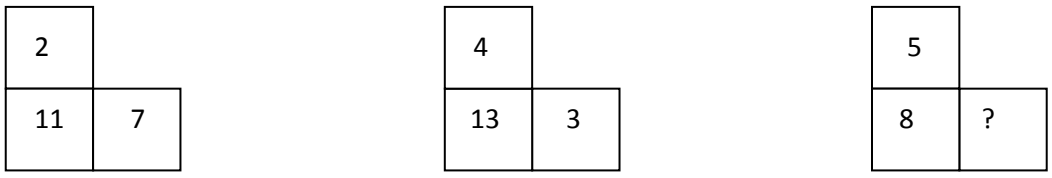
BT 2



What could be the number missing inside the last triangle?

One Solution:
The same rule is applied to all 3 triangles. Sum the numbers on the outside of the triangle, divide by 2 and this is the number inside the triangle.
3+7+6 = 16÷ 2 = 8 9+2+7 = 18÷2 = 9 6+5+13 = 24÷2 = 12, so ? = 12

BT 3



What could the missing number be? Note: They all sum to 20, so ? = 7

Teacher notes: Give the students acknowledgement if they can give excellent reasons that are legitimate. Don't restrict the problems only to numbers. Use letter patterns too.

Source: IQ Books – Know your own IQ.

Task 92: Problem Solving

$$\frac{\square}{\square} + \frac{\square}{\square} + \square\% + 0.\square = 1\frac{2}{5}$$

Get students to put values into this equation so that it is true. The same number does NOT have to appear in every box. Students are required to find at least 5 different combinations.

Use the 10 problem solving strategies.
For Example: Try making the problem smaller as a starting point.

$$\frac{\square}{\square} + \frac{\square}{\square} + \square\% = 1$$ and/or

$$\frac{\square}{\square} + \frac{\square}{\square} + 0.\square = 1$$

Or ... Draw a diagram
Make a model (eg fraction towers)
Guess & Check
Number sentence
Make a list
Work Backwards ... etc

Challenge Question:

$$\frac{a}{b} + \frac{c}{d} + e\% + 0.f = 1\frac{1}{8}$$

Help the students break the question down by suggesting that the two fractions should add together to equal 1, then the decimal and percentage sum to $\frac{1}{8}$. Students are allowed to use more than one digit for each letter.

Task 93: Make me Balance

Give the students two columns – A and B. Beneath those columns list a variety of fractions (proper, improper and mixed numerals), decimals, percentages and whole numbers on each side. Make it look like a board of cards.

A	B
$\frac{3}{5}$ 0.7 3	$1\frac{2}{3}$ 35% $\frac{3}{4}$
$\frac{4}{9}$ 0.05 90% 0.1 $\frac{8}{5}$	$\frac{4}{5}$ 84% 5% 0.01
1.4 0.5 $\frac{3}{10}$ $\frac{15}{20}$	$\frac{2}{5}$ $1\frac{1}{5}$ $\frac{5}{100}$ $1\frac{5}{10}$
	0.6 $\frac{2}{6}$

Draw a balance beam on the board. Students are to use 2 or more cards from side A with any operations and 2 or more cards from side B to make the beam "balance".

Students are to do the each of the following tasks:

1. Check their equations are correct
2. Use equipment to check
3. Use a calculator to check
4. Check with another student

THEN ...

Write the equation in their book.

The object of this task is to write as many different correct equations as possible within the given time limit.

Report back to the class.

THE FOLLOWING TASKS WERE SHARED BY PD PARTICIPANTS

All of the following tasks (94 - 99) are those shared by the PD Participants after attending the 5 previous PD sessions. These tasks have been trialled and found to be successful

.

Task 94: The Jackpot Game (from Thailand)

Task shared by PD participant (*Elise*) – Successful implementation in the classroom

The actual board game was demonstrated to the group.

Equipment required: 2 x 6-sided dice
Board game with 9 rotating blocks (1 side for a number, the other side with the letters *JACKPOT*- one on each of the blocks)

Instructions:
Roll the 2 die.
Example: Rolled 2 and 6
This means students can turn the block with ONE of the numbers: 2, 6 or 8 (2 + 6).
Note: the only operation allowed is addition.

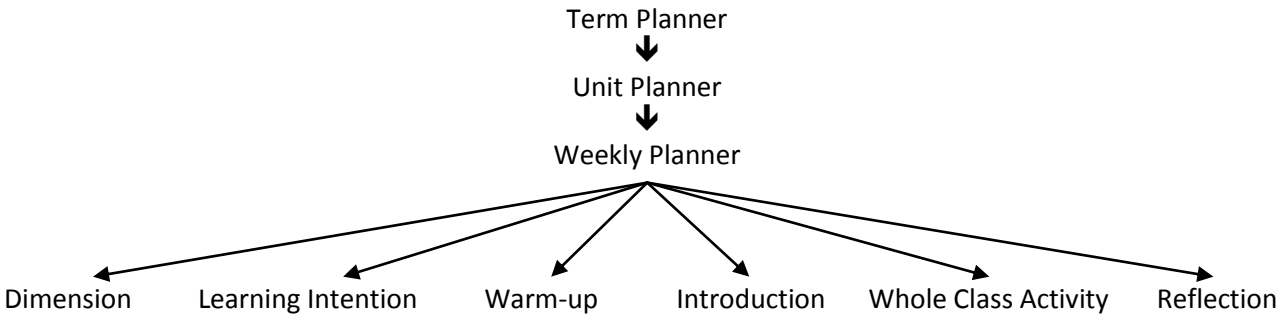
Keep rolling until you cannot cross off/flip another number.

Winner: is the person scoring the word *JACKPOT*

This game takes about 20 minutes . Write the names of the students who scored *JACKPOT*.
This activity lends itself to calculating rates.

Task 95: "e-planner"

Resource shared by PD participant (*Sam – Bayden Powell College, Tarneit*) – Successful implementation within the Mathematics KLA.



Notes:
The weekly planner is different for every teacher.
Planning is set at 3 different levels to cover all student abilities (classes are streamed)
CRT is able to have a print-off of the lesson they are to deliver. Lesson is detailed for ease of teaching.

Purchased "e-planner" for approx $100 + GST, however, it has been significantly modified to suit the school's needs.

Task 96: Displacement/Volume/Capacity – Unit of Work

Task shared by PD participant – Successful implementation in the classroom

Building/Construction

Displacement - cm^3 v's mL

Dam Activity

1. order the dams' capacities
2. Estimate the dams' capacities
3. Estimate the area
4. Percentage
5. Gigalitres/megalitres
6. Compare to the current dam levels

Practical Application of Displacement - "Who has the biggest head?"\
You will need a bucket with water.

Task 97: Survey – "Body Systems"

Task shared by PD participant (*Mossfiel PS*) – Successful implementation in the classroom

Survey – "Body Systems" (Presented as an inquiry unit of work.) MCTP Activity "This goes with this"

Students create 10 – 15 survey questions.
5/6 questions have alternatives as answers.

Have 12-15 cups for the survey.
Cups get the student responses.

Students collect a cup.
Strip graph – students are required to use fractions and percentages.

Glue the strips on to form a pie graph
Glue on to a chart → form a poster

Students are to write a summary about their survey and results.

Task 98: Benchmark Wall

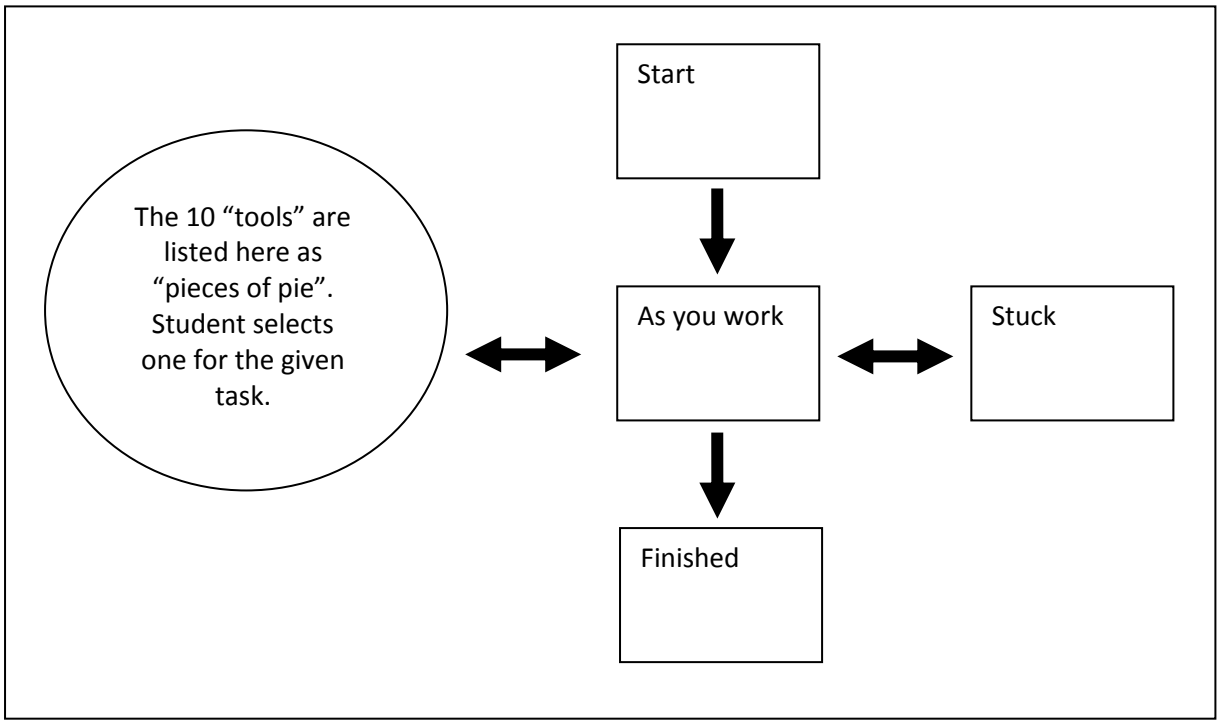
Task shared by PD participant – Successful implementation in the classroom

"Beat the V Activities"
Have all student responses on the walls/windows or in booklets.

Task 99: Problem Solving Strategies

Task shared by PD participant (*Lauren - Werribee*) – Successful implementation in the classroom

Based on the Problem Solving Strategies sheets created by K Stacey, R Vingerhoets & C. Lovitt
There are laminated sheet sets in each classroom for the students to use.



Task 100: Rob's Final Words – Some top tips

1. What is the best way to observe?

Assign students a described activity.
See what the students are doing.

If necessary, start with an easier task.
Re-clarified the task in their own words, but modified (easier task).
Share with others in the group.
Identify their comfortable approach to solving the task. For example: using decimals rather than fractions. Knows to avoid recurring decimals (such as $\frac{1}{3}$), etc.
Allow students to build to an answer. Example: 1. Start with 0.7, so I know I need 0.3 to get to 1. O.3 could also be written as $\frac{3}{10}$ or $\frac{30}{100}$ or 30%, etc. Then move to a harder numbers, such as 2.
Then allow students to build to complex answers.

*** Remember to set parameters for more able students ***

2. Practical Classroom Strategies for Mathematics – Some Tips

1. Be yourself, but be up for Mathematics! BE POSITIVE!
2. Know when to get off the stage. Follow the lesson structure.
3. You don't need to be the source of all knowledge. Kids are smart and already think you are.
4. Don't "tell". Let the kids "Discover". Making a discovery is at least 4 time more powerful than if they are told the same information.
5. Think out aloud. Don't hog it – share it!
6. Give "think time" as this helps to create a very positive learning environment.
7. Reinforce first, then dig. "You got that right, so how did you do it?" "Why?" "Prove it."
8. Be mobile for Mathematics. This can be positive, guiding, directive, and provides opportunities for explicit teaching and gives students immediate individualised feedback.
9. Meet the kids "where they are" (the current level of learning). Don't blame them – it's your responsibility to meet them where they are and move from there.
10. NEVER let a chance go by. Make connections.
11. Make open-ended problems part of what you do.
12. Record, record, Record!

3. Learning Reflection

After the task has been completed, get the students to reflect upon what they learnt and the process they used. Sometimes it is beneficial to give students sentence starters to give them direction with their writing (and this also gives the teacher an opportunity to see what the students have identified).

- The strategy I used was _____
- It helped me because _____
- Next time I need to _____
- I need help with _____

4. Assessments

FOR	AS	OF
Teacher designed task/test	Share Reflection	Open Ended Task

Assessments should be:

- Collecting and recording information
- Provide evidence of learning over time
- In different contexts

5. Planning your teaching calendar

When planning your lessons, it is important to take into account all of the non-negotiable activities that will eat into your teaching time. This will result in a more realistic timetable and will allow you to plan appropriately to ensure you meet your teaching objectives.

Some suggested guidelines to determine your teaching time available.

	Example
How many weeks are in the Term?	9 weeks
Convert this into days	45 days
Less 10% for incursions/excursions/absence/PD, etc	- 5 days (round up)
	40 days
Less Public Holidays	- 1 day (eg: Labour day)
	39 days
Less Camps/Carnivals/etc	- 9 days
Remaining Teaching Days in the Term	30 days

From that 30 days, how many times do you teach your class Mathematics? Eg: 5 sessions in a 10 day timetable. This means there are only 15 teaching periods for the Term. If you end up with more, consider this a bonus!

6. Units of Work – Created by your peers

Units of work (Primary and Secondary) which have been overviewed by Rob Vingerhoets can be found at:

wmrnumeracyunitplanners.wikispaces.com

This location is considered a "Bank". This means that if you access units of work (withdrawal), you will also submit units of work (deposits). This will ensure the "bank" grows.

Further contact can be made by emailing Rob Vingerhoets at: rvec@bigpond.com