

A Guide to...

# MENTAL WARM UPS *and Maths Talks*

## What is a Mental Warm Up?

A Mental Warm Up refers to the first 8 - 10 minutes of a lesson. Many people think that a Mental Warm Up is all about speed and racing through the tables facts to develop fluency. Practise sessions where calculations are performed to develop fluency can feature in a Mental Warm Up, but so can vocabulary development and consolidating understanding of key ideas.

## Why use Mental Warm Ups?

Mental Warm Ups are used for three different purposes:

1. To review or practise something that has been taught in the past. For example, basic number facts.  
**High Impact Teaching Strategy Link: Multiple Exposures**
2. To practise a skill that is required for the lesson to come. For example, multiply ( $\times$ ) and divide ( $\div$ ) by 10, 100, 1000 when the lesson involves converting from centimetres to metres and vice versa.  
**High Impact Teaching Strategy Links: Multiple Exposures, Mathematical Language**
3. To pre-load some knowledge required for an upcoming lesson later on in the week. For example, vocabulary.  
**High Impact Teaching Strategy Links: Structuring Lessons**

Using this time as a Mental Warm Up helps get the lesson off to a good start. It settles students down and gets them ready to focus. The Mental Warm Up is the first part of a structured lesson approach, which is a **High Impact Teaching Strategy**. After completing the Warm Up, teachers will then launch into the lesson by articulating the goals of the lesson (See also "**A Guide to Teacher Planning**").

## A Warning

Fluency is an important goal. However, adding a timed response can be counterproductive. Many students do not think well under pressure. Many adults have an anxiety and aversion to maths because of childhood mental maths in the form of a daily list of timed questions. These activities are often more about testing than teaching. Students can be left answering the questions practising the same inefficient methods day after day. Such activities do not feature in this guide.



# Types of Mental Warm Up Activities

Mental Warm Up Activities can be grouped into three broad types of activities.

## 1) Understanding and Reasoning

All Understanding and Reasoning Warm Ups are types of **Maths Talks** (sometimes referred to as Number Talks). They revolve around the students - rather than the teacher - talking maths. These activities can be open ended and often involve only one question.

Maths Talks encourage students to communicate their thinking and use their maths vocabulary. Students begin the activity by thinking about the question posed and solving it independently. Then the class comes together to discuss their thinking guided by the teacher. The teacher can correct misconceptions and rephrase some responses to help improve and build maths vocabulary.

Understanding and Reasoning Mental Warm Ups focus students on:

- thinking about concepts
- making connections and,
- explaining why.

Using Mental Warm Ups in this way uses the High Impact Teaching Strategy of **Making Connections**.

## 2) Fluency

During Fluency Mental Warm Up activities, students practise a skill. These activities focus on maximising the number of student responses.

Completing Fluency Mental Warm Ups in pairs is preferable to independent practice because pair work allows the teacher to introduce rules about using mathematical language and accountability. Students can check each other ensuring they are practising correct mathematics.

If the fluency activity also involves strategy then increase the group size to three or four. Keep in mind though that as the number of students in the group increases, the number of turns for each student decreases. For this reason whole class fluency games such as “Shoot the Sheriff” are inappropriate. In this game only two students play while the rest of the class watches. These games have a detrimental impact on how many students feel about themselves and mathematics.

## 3) Problem Solving

In Problem Solving Mental Warm Up activities students are typically given one problem to solve independently.

While students are working on the problem the teacher takes the opportunity to observe students, have brief discussions and prepare them to share their thinking with the rest of the class.

Then the teacher brings the class together for a discussion to draw out **one** key teaching point.

A similar style of problem would then be repeated another two times so the students have three experiences learning this style of problem, developing both fluency and generalisation.



## Planning Mental Warm Ups

See also “A Guide to Teacher Planning” from [drpaulswan.com.au](http://drpaulswan.com.au)

There are two approaches to incorporating Warm Ups:

- Teachers may adopt an approach where every Monday is a card game, so students know to have the cards ready. The same game would be played every Monday for 3 - 4 weeks (a planning cycle). Tuesday might be basic facts practice day, etc.
- Alternatively teachers spend three days (8 - 10 minutes) on the same Warm Up, such as basic number facts. This is the approach the Bond Blocks system uses, when used as to teach mental maths addition and subtraction for Years 1 to 3. See [www.bondblocks.com](http://www.bondblocks.com)



Week	M	T	W	T	F
1	Understanding and Reasoning Activity	Fluency Activity #1	Fluency Activity #1	Fluency Activity #1	-
2	Understanding and Reasoning Activity	Fluency Activity #2	Fluency Activity #2	Fluency Activity #2	-
3	Understanding and Reasoning Activity	Problem Solving Activity	Problem Solving Activity	Problem Solving Activity	-

## Using Routines

“Routine” refers to becoming efficient at the mechanics of an activity so that those mechanics do not “get in the way” of the mathematics being taught. Students who experience Executive Function issues will benefit from consistent routines.

Routines work very well for Mental Warm Ups. Ideal warm up routines are any repeatable activities that are short, focused, may be made a little simpler or harder (differentiated) and use little or no materials. The card game “Snap” meets these criteria. Differentiations include playing snap + 1, snap - 1, snap to ten, etc.

First and foremost *the focus should be on the mathematics being taught*. Using Mental Warm Ups at the start of the lesson gets the lesson off to an efficient start. This frees the teacher up to work with struggling students, make observations and assess students.

### Caution

Students will tire of a routine after a while, hence the suggested 3 - 4 week cycle. The same routine may be used again later in the term or year.

Read more about the ‘planning cycle’ approach in the “A Guide to Teacher Planning.”



## Using Materials

Warm Up routines often require the distribution and collection of materials. Keep this to a minimum to maximise learning time.

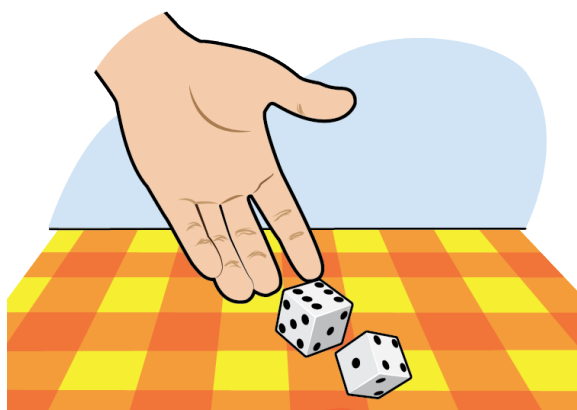
It is for this reason the routines in this booklet require few (or no) materials.

The routines “Today’s Number Is” or “Which One Doesn’t Belong” are examples of ‘brainstorming-type’ activities that simply involve a board or a screen.

For any material that is used, time must be spent teaching students how to use that material and pack it away. For example:

- Card Games  
*Shuffling, dealing, turn taking and scoring.*
- Dice Games  
*Rolling the dice efficiently, filling out scoring sheets when required.*

Once students have developed familiarity with these materials, the Warm Up will run far more smoothly and the focus will be on the mathematics rather than on using the materials.



## Versatile Materials

- Cards  
*School Friendly Cards are shown in this booklet but standard playing cards could be substituted.*
- Counters  
*Transparent 19mm counters for use in games and two-coloured counters.*
- Dice  
*Six faced dot dice ideal for playing many games and ten faced dice (0-9) are ideal for extending games and place value activities.*
- Spinner  
*Reusable spinners may be placed on a variety of spinner templates and games.*



You can buy a pre-made kit of these items from [drpaulswan.com.au/shop](http://drpaulswan.com.au/shop) called the Essential Maths Pack. It comes with a set of activities.



# Today's Number Is...

Understanding and Reasoning Activity #1 | Whole Class Mental Warm Up

## Today's Number Is

12

The teacher writes a number on the board.

For example, "Today's number is 12."

A student might say that it is one dozen or the number of hours in half a day. Both of these are valid responses and would be written on the board.

Students could then be encouraged to provide calculations for which the answer is 12. For example  $2 \times 6$ , one half of 24,  $10 + 2$ ,  $18 - 6$ . Because the question is open the possibilities are endless. The teacher can then manoeuvre the students into providing more calculations of one type, e.g. "Write more that involve ... [division / fractions / etc]"

## Today's Number Is

12

$$6 + 6$$

$$15 - 3$$

$$3 \times 4$$

$$24 \div 2$$

$$3 + 4 + 5$$

$$11.5 + 0.5$$

$$4 + 8$$

$$20 - 8$$

$$6 \times 2$$

$$12 \div 1$$

$$(2 \times 5) + 2$$

$$24 \times \frac{1}{2}$$

$$0 + 12$$

$$112 - 100$$

$$1 \times 12$$

$$1 \times 2 \times 2 \times 3$$

$$48 \times \frac{1}{4}$$

"give me more like this"

"no more like this"

"give me some ways..."

**Assessment Opportunity:** Once every few weeks students can be given a blank sheet of paper and then asked to list all they know about a particular number in a set time frame (e.g. 3 minutes).



# How Did You Do It?

*Understanding and Reasoning Activity #2 | Whole Class Mental Warm Up*

One of the simplest number talks involves writing a question on the board for students to try. e.g.  $28 + 27$ . Once they have completed the question, confirm the answer (55) and ask how they did it.

A student might say;

“I added 28 and 20 to make 48 and another 7 to make 55.”

You can probe further by asking how the student added the 7 and 8 bit. Ask for two or three different ways the addition can be done.

It is a good idea to pick a few students beforehand who are using efficient strategies. That way the students are not put on the spot and you can coach them a little. Also, it avoids students' sharing inefficient strategies such as counting in ones.

# If I Know, Then I Know...

*Understanding and Reasoning Activity #3 | Whole Class Mental Warm Up*

Write a number sentence on the board

***If I know  $5 \times 3 = 15$ , then I also know...***

Students then brainstorm all of the related facts that they can make from this initial fact

$$3 \times 5 = 15$$

$$15 \div 3 = 5$$

$$15 \div 5 = 3$$

$$\frac{1}{5} \text{ of } 15 = 3$$

$$\frac{1}{3} \text{ of } 15 = 5$$

$$5 \times 30 = 150$$

$$30 \times 5 = 150$$

$$30 \times 50 = 1500$$

$$30 \times 0.5 = 1.5 \dots$$

Two thirds of ..

Four fifths of ...

Once in the teaching cycle students can write their derived facts onto a piece of paper. Set a time limit such as three minutes.



# Splat

Understanding and Reasoning Activity #4 | Whole Class Mental Warm Up

A simple splat shows an image of some dots. Some of the dots are covered by an ink splat. The total number of dots is shown in as a number in a box. Students have to work out how many dots are covered. Essentially this builds part-part-whole understanding which is essential for solving word problems in addition and subtraction

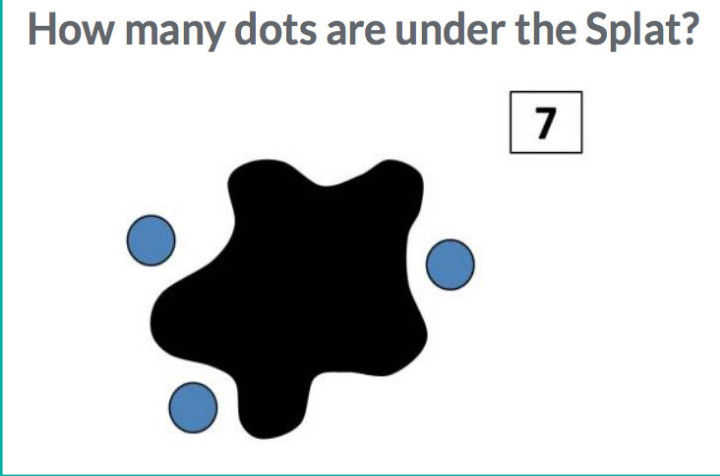
Students are shown an image and asked to explain what they see.

SPLAT, developed by Steve Wyborney, is a series of PowerPoint slides that feature these dot patterns and hidden dots. It is well worth exploring his website: <https://stevewyborney.com>

This is an example of a Splat that uses more than one operation (subtraction and division).

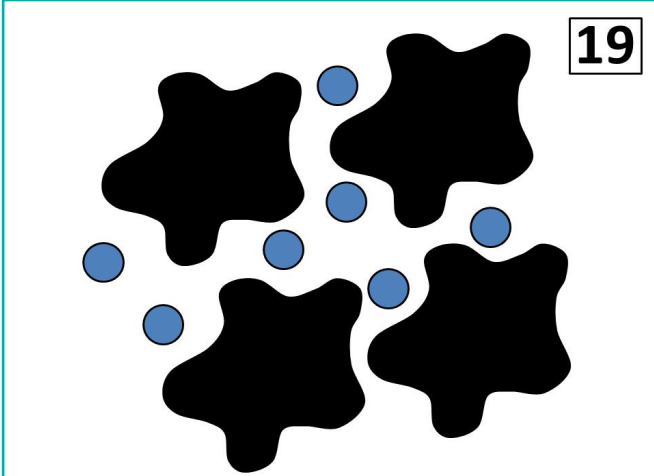
Avoid the temptation to show too many Splats in a single Warm Up but focus on the students explaining how they reached and answer (as per "How Did You Do It").

**How many dots are under the Splat?**



**7**

*"I see  $3 + ? = 7$  because part + part = whole"*  
*"I see  $7 - 3 = ?$  because whole - part = part"*



**19**

*"I see 7 dots, so  $19 - 7 = 12$ . There are 12 dots under 4 splats.  $12 \div 4 = 3$ . Each Splat has 3 dots."*





# Which One Doesn't Belong?

Understanding and Reasoning Activity #5 | Whole Class Mental Warm Up

Basically four different items are shown and students need to suggest why one item *does not belong*.

Students might supply several reasons for numbers/shapes/objects not belonging to the group.

For example:

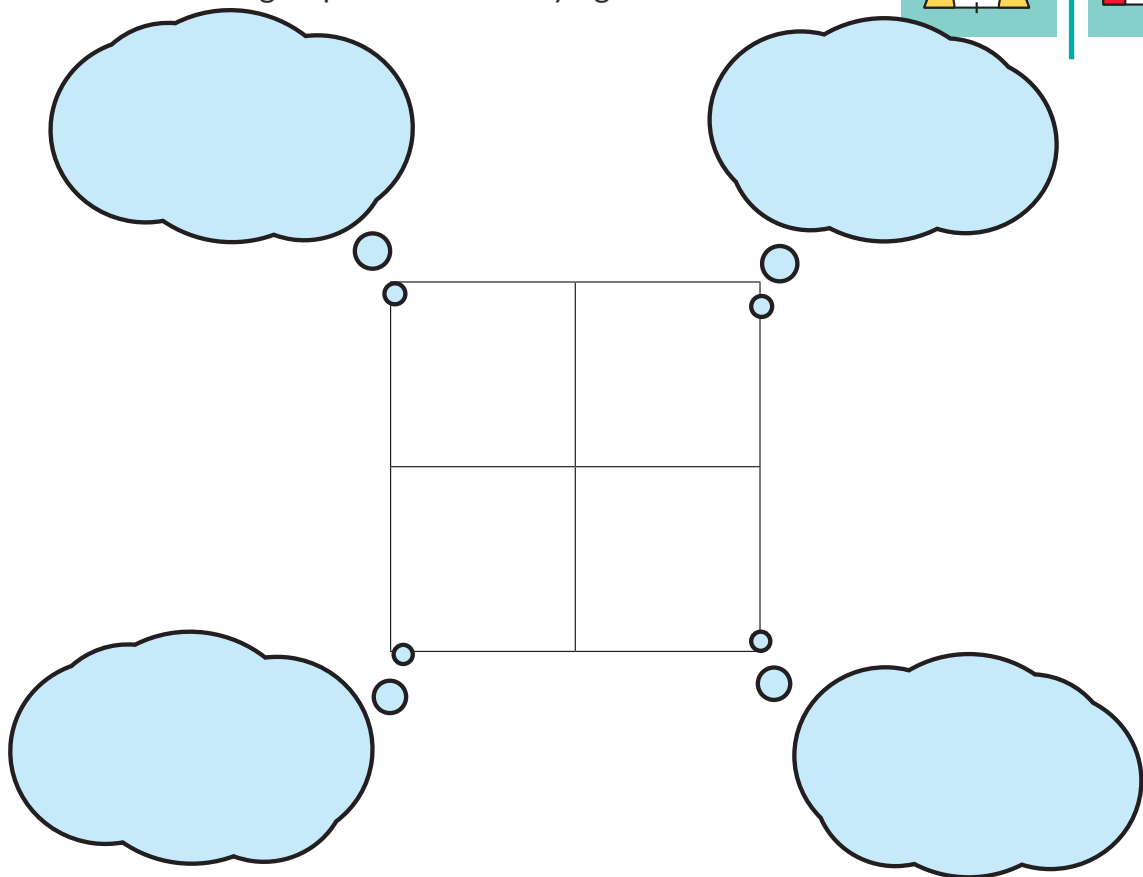
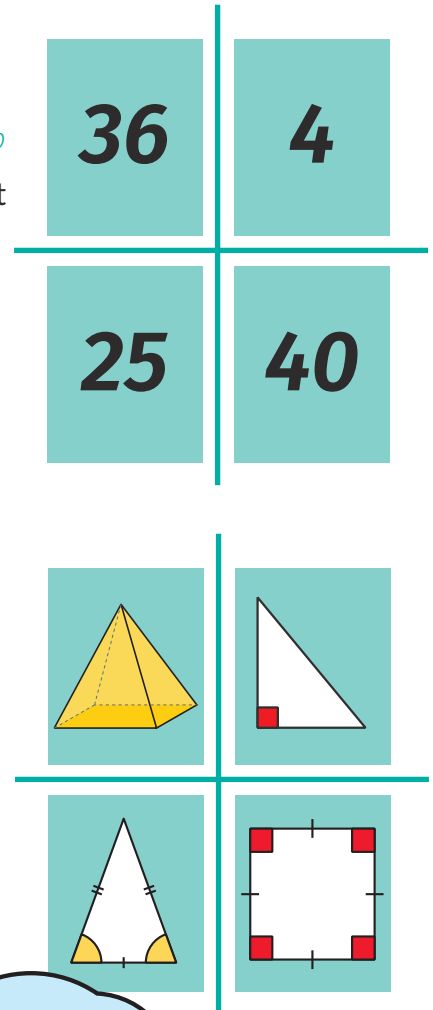
- “Four does **not** belong because it is a single digit number.”
- “Twenty-five does **not** belong because it is not divisible by four.”
- “Forty does **not** belong because it is not a square number.”
- “Thirty-six does **not** belong because its tens digit is odd.”

This simple routine builds students' classification and language skills as they use their powers of reason.

Further examples may be found on the website [WODB.ca](http://WODB.ca) and in the book, ‘Which One Does Not Belong?’ by Christopher Danielson.

The same idea may be applied to Geometry.

The real value lies in small groups of students trying to create their own.





# Choral Counting

Fluency Activity #1 | Whole Class Mental Warm Up

The class counts together. In this routine students say and hear numbers. A PowerPoint slide show may be used along with Choral Counting if the teacher wants students to see the numbers.

Here are some examples:

- Count in 1s, 2s 5s etc, starting from one
- Start at any number and count in 1s, 2s 5s
- Count backwards from any number, e.g.. count back from 99 in sevens
- Count in fractions, one-fourth, two-fourths, three-fourths, four-fourths (one), five-fourths (1 and one-fourth) ...
- Count in decimal fractions 0.1, 0.2, 0.3 .. one-tenth, two-tenths, three-tenths ...
- Count in time intervals e.g. 5 minutes 1:05, 1:10, 1:15 ... what happens after 1:55?

## Starting off

Tell the students your learning intention. "Today we will be counting in 5's from two."

When starting a new sequence, write the numbers using a variety of representations, e.g.:

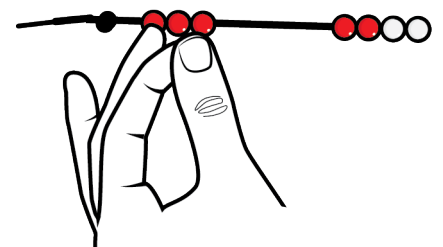
- on the board in sequence
- on a number line/track
- on a number board

The students may notice a pattern e.g. when you count in fives the numbers always end in 5 or 0. Ask the students to suggest the next three numbers in the sequence.

## Count Count Count

The teacher then sets the pace and counts to the point where students start to fade off.

As students become more fluent the speed of the count can increase and the count can go further.



## Extending Counting

A beadstring may be used to extend and support counting. For example, students might be told that they will be counting in one-fourths and asked what number will be said when they move the last bead on the string. After predicting the answer they can count to check.

The constant feature on a calculator may be used to support and check choral counting. To count forwards from two in 5s enter  $2 + 5 = = =$ .

Make sure the students say the number **before** pressing =, otherwise they are reading the number, not counting.



# Pegs on a String

Fluency Activity #2 | Whole Class Mental Warm Up

Pegging numbers onto a string or piece of rope is a variation on the number line theme.

Students can be given two end points of zero and ten and asked to peg five onto the line. Students will need to use estimation of length to determine the midpoint.

One student can be chosen to slide the number along the rope. Make sure the student stands behind the rope and faces the class. The class can then participate by directing that student which way to move the number.

To check, the rope can be folded in half. This could be extended even further for older students to find halves and quarters.

Students can be given the number 5 and asked to peg the numbers 0 and 10 onto the string. When completing a task like this students will need to use their understanding of length to determine the placement of zero and ten.

This same procedure may be applied to different number ranges. e.g. 0 to 40; place 20.



The same idea may be applied to:

- larger numbers e.g. 0 to 80
- decimal fractions 0 to 1 and beyond in 0.1 intervals
- fractions 0 to 1 and beyond in  $\frac{1}{10}$  intervals
- fractions beyond one whole e.g. 0 to 2. Show  $\frac{1}{4}$ ,  $\frac{2}{4}$  ( $\frac{1}{2}$ ),  $\frac{3}{4}$ ,  $\frac{4}{4}$  (1),  $\frac{5}{4}$ ,  $\frac{6}{4}$  (3 halves)...
- decimal fractions beyond one whole e.g. 0 to 6. Show 0.75, 1.5, 2.25...

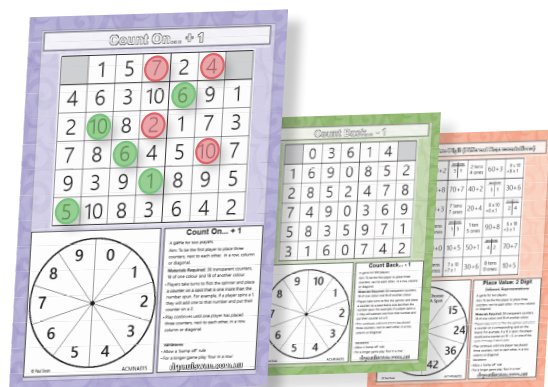
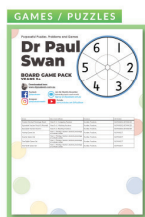
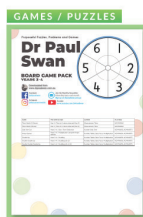
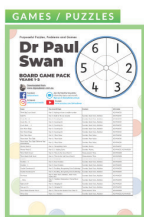
## Short Games

Fluency Activity #3 | Pairs/Groups Mental Warm Up

Many short card, dice and spinner games may be used as fluency Warm Ups.

You can download a packet of these games from

[www.drpaulswan.com.au/resources](http://www.drpaulswan.com.au/resources)



# One Question

Problem Solving Activity | Whole Class Mental Warm Up

Showing one single problem solving question on the board and allowing students the time to work through it can be useful. Standardised test questions for example include vocabulary, graphics and symbols that can all be discussed and the students can then complete the question and explain how they did it.

Other suitable single question Mental Warm Ups include:

Problem Solving with School Friendly Cards.

A booklet and the associated PowerPoint slides may be downloaded from

[www.drpaulswan.com.au/resources](http://www.drpaulswan.com.au/resources)

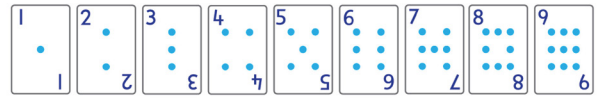
Likewise the booklet Number Line-Up Totals and associated Powerpoint slides may be downloaded and used as a Mental Warm Up.

Further similar questions may be found in the books *Problem Solving Money Puzzles for Years 4 to 6* and *Problem Solving Number Line-Ups*, available from [drpaulswan.com.au/shop](http://drpaulswan.com.au/shop)

Other “One Question” card type activities can be found in the titles “*Problem Solving Number Line-Ups*” and “*Problem Solving Money Puzzles Years 4 - 6*”

## Three Groups A

1



Try forming groups of three cards where the total of each group of three cards is **15**.

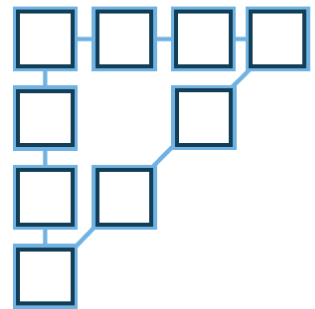
There is more than one answer. Try to find them all.

From the Free Booklet “Problem Solving with School Friendly Cards” from [www.drpaulswan.com.au](http://www.drpaulswan.com.au)

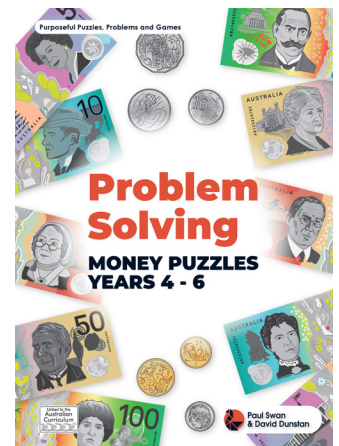
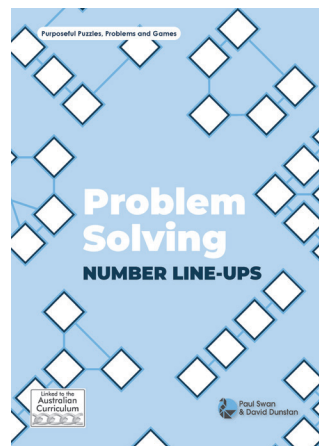
## Number Line-Up Totals

6

Arrange the numbers 1 to 9 in the squares so that the sum of the digits along each side is the same.

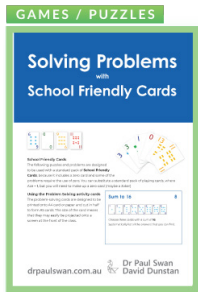


From the Free Booklet “Problem Solving Number Line-up Totals” from [www.drpaulswan.com.au](http://www.drpaulswan.com.au)

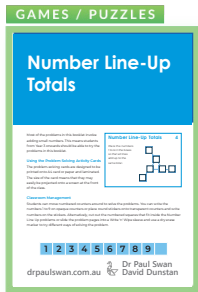


# Featured in this Booklet

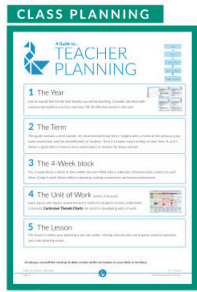
## Free Booklets



*Problem Solving with School Friendly Cards*



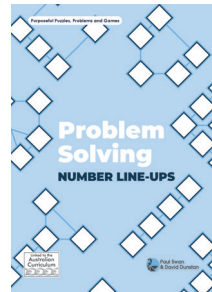
*Number Line-Up Totals*



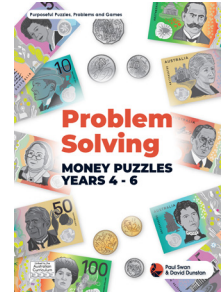
*A Guide to Teacher Planning*

## Books

(Available at [www.drpaulswan.com.au/shop](http://www.drpaulswan.com.au/shop))



*Problem Solving Number Line-Ups*



*Problem Solving Money Puzzles Years 4 - 6*

## Materials (Available at [www.drpaulswan.com.au/shop](http://www.drpaulswan.com.au/shop))



Bond Blocks



Essential Maths Pack



Pegs on a String



Bead String 1-20

## Watch the accompanying Video PL: Mental Warm Ups

The video course on [drpaulswan.com.au/video-pl](http://drpaulswan.com.au/video-pl) on **Mental Warm Ups** goes further into this topic with more activities you can try.

Other PL course videos can also be purchased on the website.

