

Number Line-Up Totals

Most of the problems in this booklet involve adding small numbers. This means students from Year 3 onwards should be able to try the problems in this booklet.

Using the Problem Solving Activity Cards

The problem-solving cards are designed to be printed onto A4 card or paper and laminated. The size of the card means that they may easily be projected onto a screen at the front of the class.

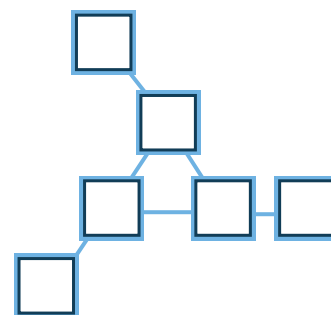
Classroom Management

Students can move numbered counters around to solve the problems. You can write the numbers 1 to 9 on opaque counters or place round stickers onto transparent counters and write numbers on the stickers. Alternatively, cut out the numbered squares that fit inside the Number Line Up problems or slide the problem pages into a Write 'n' Wipe sleeve and use a dry erase marker to try different ways of solving the problem.

Number Line-Up Totals

4

Place the numbers 1 to 6 in the boxes so that all lines add up to the same total.



Australian Curriculum Links

Year	Curriculum Links	Proficiencies
Year 3	ACMNA055	Recall addition facts for single-digit numbers and related subtraction facts to develop increasingly efficient mental strategies for computation.
Year 4	ACMNA071	Investigate and use the properties of odd and even numbers.
Year 5	ACMNA291	Use efficient mental and written strategies and apply appropriate digital technologies to solve problems.

Finding all of the solutions, however, requires students to:

- Reason
- Work systematically and
- Record the solutions in a list or table

This means that students at higher year levels will still find these problems challenging.

Solving the Problems

In each of the Problem-solving series of books we have applied the Polya's four step approach to problem solving.

Understand the problem: Students need to read the whole problem carefully, often rereading the problem to determine what is required.

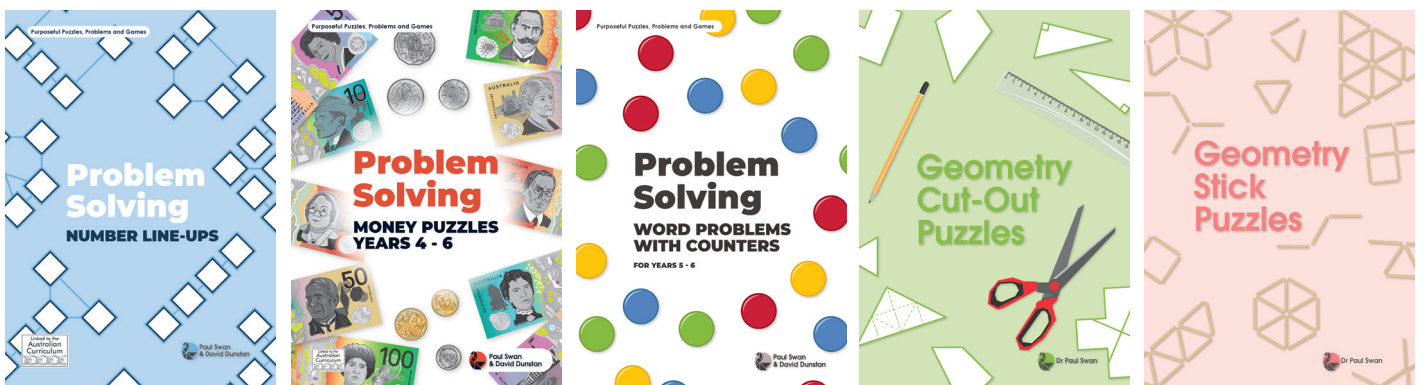
Devise a plan: For the most part this will require manipulating number tiles / counters on the table.

Carry out the plan: Students will need to group the number tiles / counters, check their calculation, and record their results in a systematic manner.

Look back: Students will need to check that they have answered the question and the calculations that were made. During the checking process the 'systematic' manner of solving the problem may be re-examined to check that all solutions have been found.

More Dr Paul Swan Problem Solving Activities

The title "Problem Solving Number Line-ups" contains 28 more of these types of puzzle.

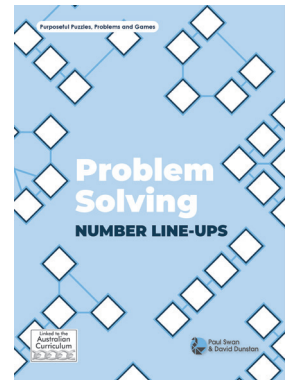


Purchase at www.drpaulswan.com.au

Differentiation

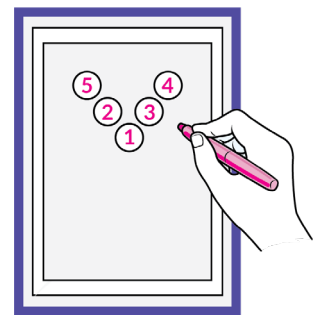
Understanding that a problem may be made a little easier through offering hints or 'enabling prompts' or a little harder is the key to differentiation and working with multi year levels within the one room.

This is why when we created Problem Solving: Number Line-Ups made up of 28 Number Line Up problems - we suggested the problems could be used anywhere from Year 3 to 7. We provided comprehensive teaching notes and systematically the answers so that teachers could provide extra support for students who required it while allowing more able students to explore the problem more deeply.



Using Materials to Ease Maths Anxiety

We find students feel less threatened when they can move numbered tiles or counters around and try different options. If students do not want to use counters and feel confident solving the problem without using counters, don't force them. Later students can slide the problems into Write 'n' Wipe sleeves and use a dry erase marker so they can easily rub out and try different options.



Changing Part of the Question

Note that in each of the problems the line total was not given. Students were simply told that the line totals were the same. This way the question is more open. If you provide the clue that the line totals are 10 or 8, the problem becomes simpler and more accessible to a struggling student.

Learn More: The Magic V Problem

A similar problem to the ones provided in this booklet, known as "The Magic V" has been trialled with Year 4 classes in Australia on the basis that when reasoning at Year 4 students will be applying mathematics learnt in Year 2 and 3.

See The Resolve Project Reasoning Exemplars Year 4

https://www.resolve.edu.au/assessing-reasoning-year-4-exemplars?special_topic=83

The Magic V problem first appeared on the Nrich website, where it is listed as being suitable for 7 to 11 year-olds.

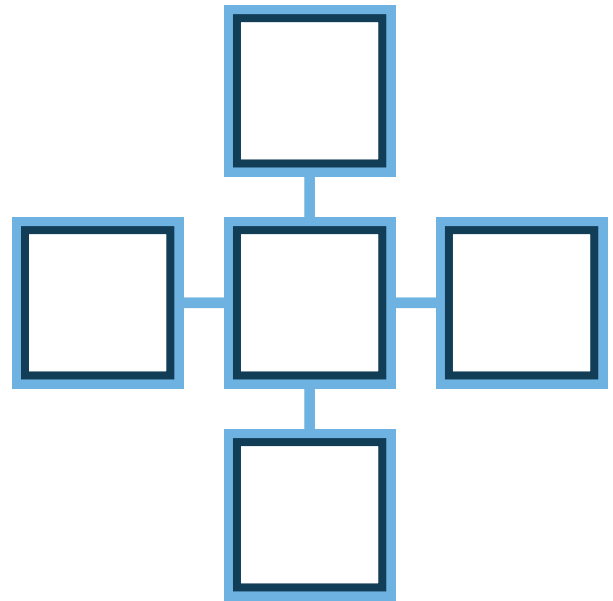
<https://nrich.maths.org/6274>

Number Line-Up Totals

1

Place the numbers 1, 2, 3, 4, and 5 into each box so that each line adds up to the same total.

Try finding another line total.

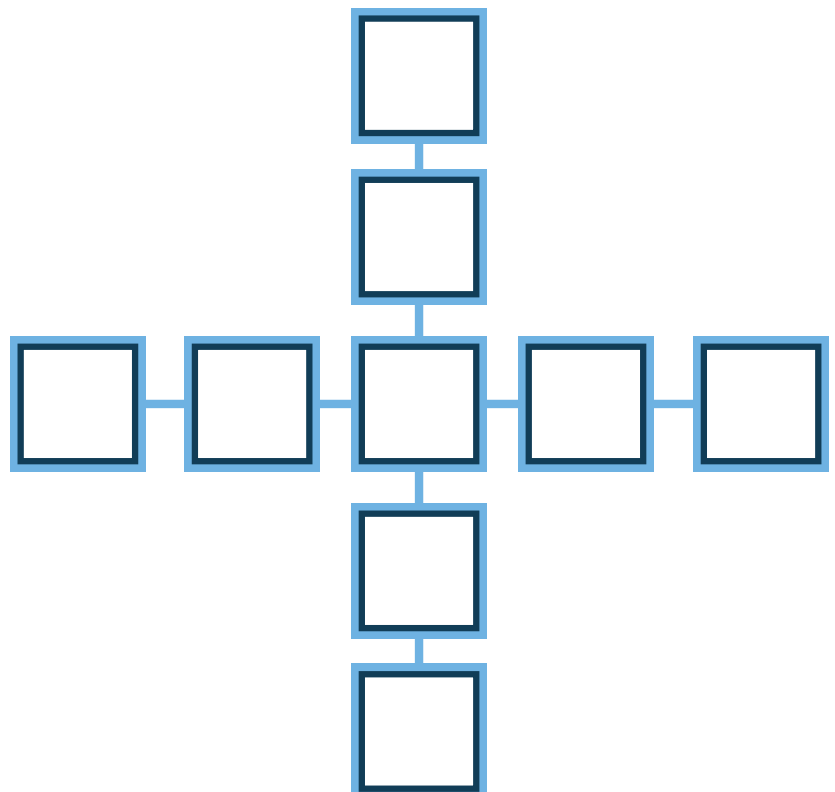


Number Line-Up Totals

2

Place the digits 1 to 9 in the boxes so that both lines add up to the same total.

How many different line totals can you find?

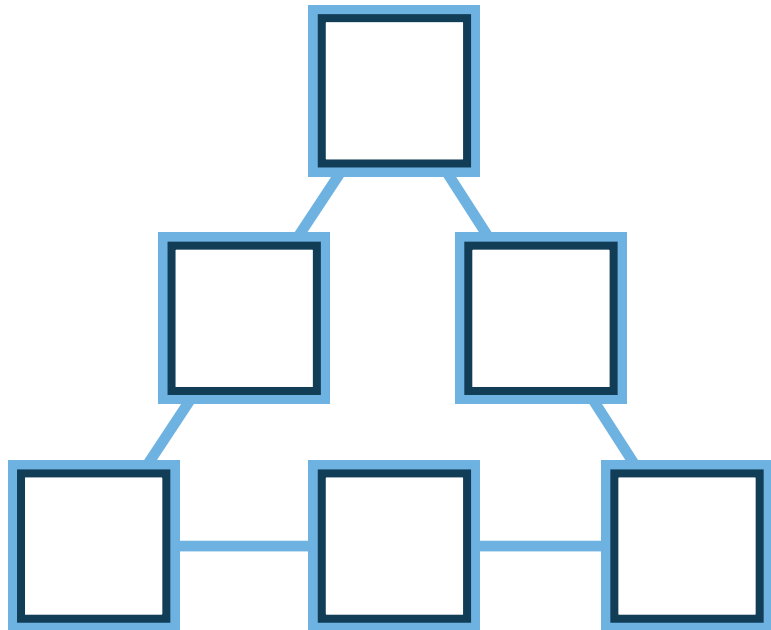


Number Line-Up Totals

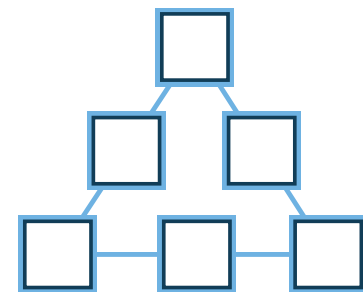
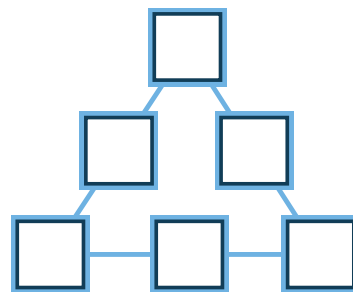
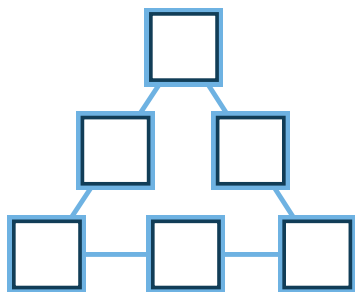
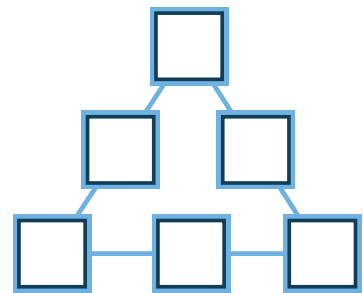
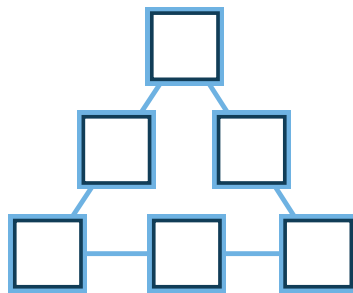
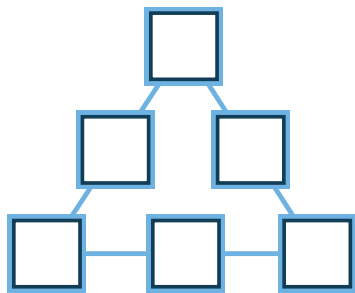
3

Place the numbers
1 to 6 in the boxes
so that all lines
add up to the
same total.

Record your
answers below.



Name _____ Date _____

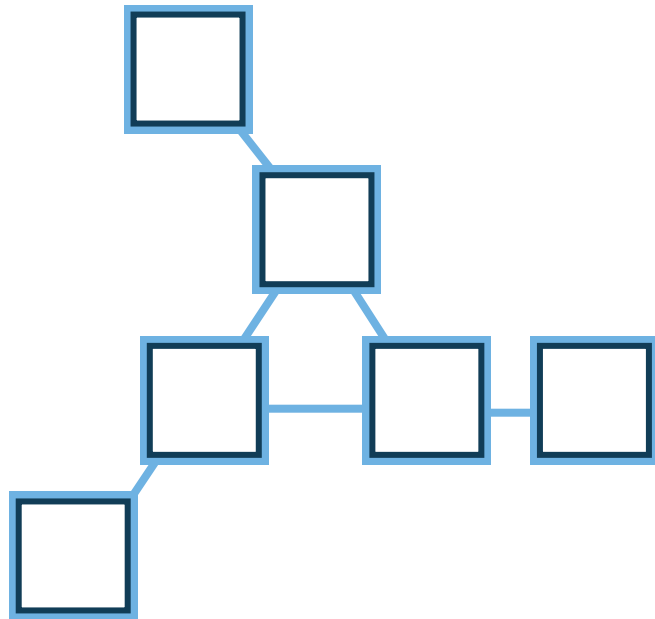


What do you notice? _____

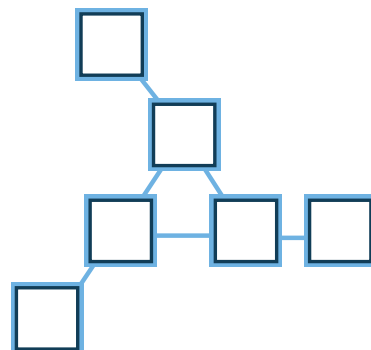
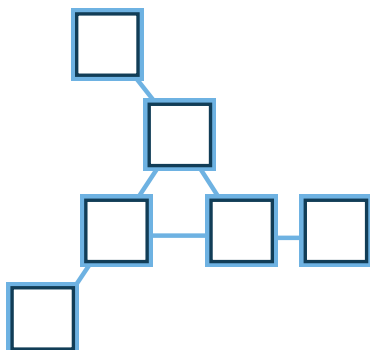
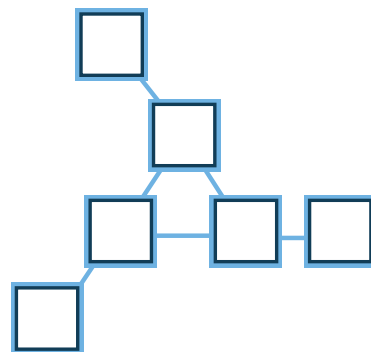
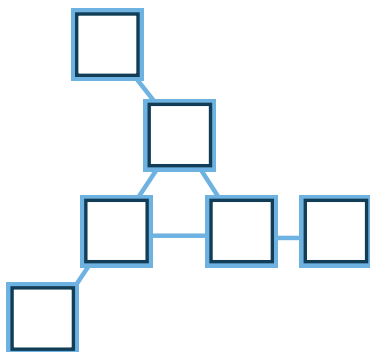
Number Line-Up Totals

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Name _____ Date _____

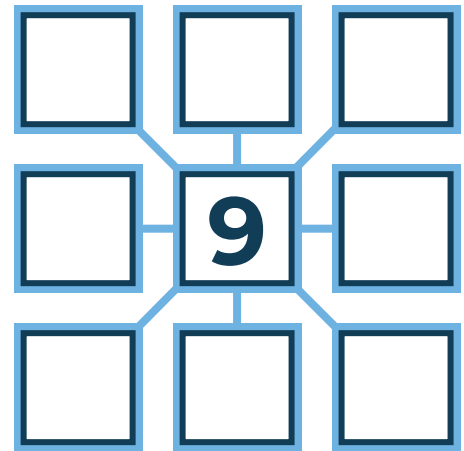


What do you notice? _____

Number Line-Up Totals

5

Place the digits 1 to 8 in the boxes so that each line adds up to the same total.

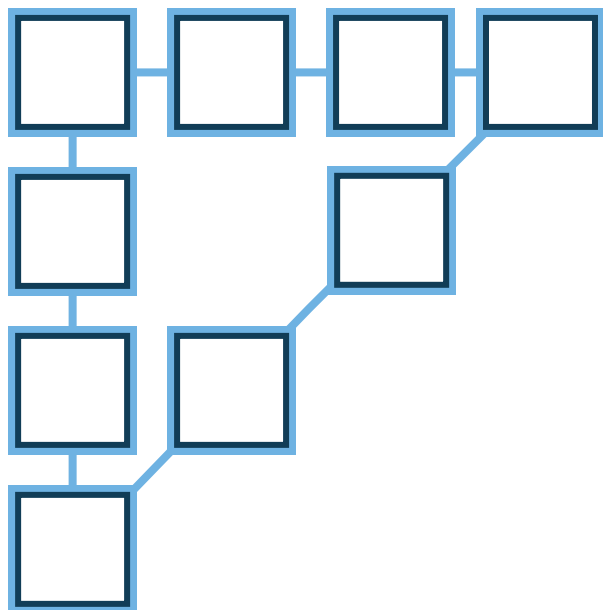


Number Line-Up Totals

6

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

List the possible line totals.

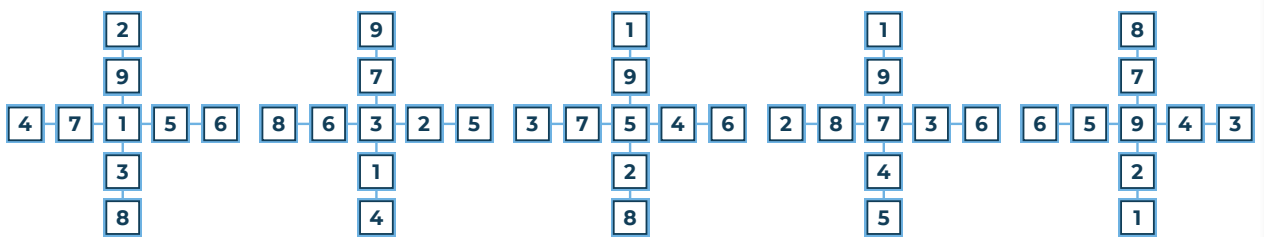


Answers

Note: These are sample answers and do not show all arrangements.

- 1.
- | | | |
|---|---|---|
| 3 | | |
| 5 | 1 | 2 |
| 4 | | |
- Line Total: 8
- | | | |
|---|---|---|
| 1 | | |
| 2 | 3 | 4 |
| 5 | | |
- Line Total: 9
- | | | |
|---|---|---|
| 2 | | |
| 1 | 5 | 4 |
| 3 | | |
- Line Total: 10

2. Possible totals are 23, 24, 25, 26 and 27.



- 3.
- | | | |
|---|---|---|
| 1 | | |
| 6 | 5 | |
| 2 | 4 | 3 |
- Line Total: 9
- | | | |
|---|---|---|
| 1 | | |
| 6 | 4 | |
| 3 | 2 | 5 |
- Line Total: 10
- | | | |
|---|---|---|
| 2 | | |
| 3 | 5 | |
| 6 | 1 | 4 |
- Line Total: 11
- | | | |
|---|---|---|
| 4 | | |
| 3 | 2 | |
| 5 | 1 | 6 |
- Line Total: 12

- 4.
- | | | |
|---|---|---|
| 5 | | |
| 1 | | |
| 2 | 3 | 4 |
| 6 | | |
- Line Total: 9
- | | | |
|---|---|---|
| 4 | | |
| 1 | | |
| 3 | 5 | 2 |
| 6 | | |
- Line Total: 10
- | | | |
|---|---|---|
| 3 | | |
| 2 | | |
| 4 | 6 | 1 |
| 5 | | |
- Line Total: 11
- | | | |
|---|---|---|
| 2 | | |
| 4 | | |
| 5 | 6 | 1 |
| 3 | | |
- Line Total: 12

- 5.
- | | | |
|---|---|---|
| 3 | 1 | 5 |
| 2 | 9 | 7 |
| 4 | 8 | 6 |
- Line total of 18

- 6.
- | | | | |
|--|--|--|--|
| | | | |
| | | | |
| | | | |
| | | | |
- Possible Line Totals are 17, 19, 20, 21 and 23.
 Note this problem is quite difficult so a hint (enabling prompt) might be provide a student with a line total.
 Another possible hint could be giving students three shared numbers.