Playing Cards Revisited – Additive Reasoning Y3/4

Day 1

- This week you need to cut a piece of paper into ten pieces and number them zero to nine or you can use ten playing cards, ace to nine plus a joker to act as a zero.
- Using the cards 1 to 8, Stan chooses four cards.
- His four numbers total (add up to) 20.
- What might they be?
- There are 7 different possibilities. See if you can find them all, writing down each one that you find.
- What's the smallest total you can make choosing four cards? The largest total?
- What if Stan chooses three cards instead and they add up to 16? Do you think you'll fewer or more than 7 possible ways to do this? Why?

Notes for adults working with groups of children

- Help the children to work systematically. For example, they could start with 8 and 7 and then look at different combinations that equal 5 before moving on: 8+7+2+3, 8+7+ 1+4 etc. There will be other ways to be systematic
- Children could use Numicon and overlay four different plates onto a rectangle of two tens to check to help explore different possibilities.

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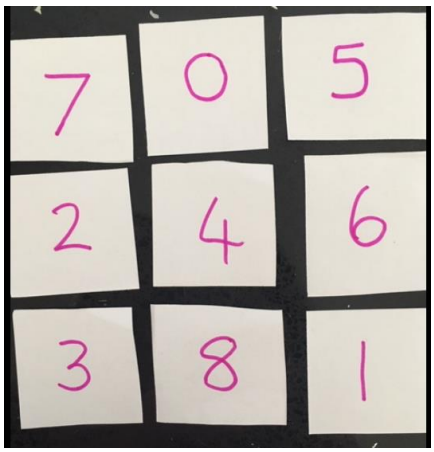
Day 2

- You will need cards 0 to 8 to make a magic square.
- In a magic square every column, row and diagonal adds up to the same number.

  In this example of a magic square each row, column and diagonal adds up to 12. For example:
  - the top row 7 + 0 + 5 = 12
  - the left hand column 7 + 2 + 3 = 12
  - the diagonal top left to bottom right 7 + 4 + 1 = 12

  Check the other rows, columns and diagonal for yourself.



- Using your numbers from 0 to 8 see if you can complete this magic square where each row, column and diagonal also add up to 12.
- Find other ways to make a magic square for 12 using the same cards.
- What do you notice about the centre number each time?

	8	
2		6
7	0	

Notes for adults working with groups of children

- Explore the relationship between the centre number and the 'magic number' (total of each row, column and diagonal).
- Encourage the children to consider the pairs of numbers on either side of the centre number and to explain what they notice and why this has to be.

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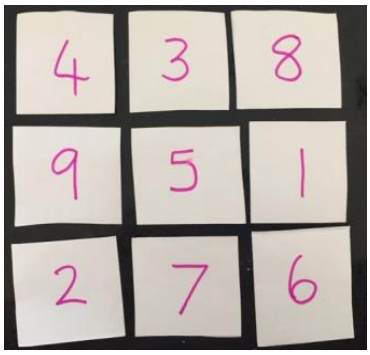
Day 3

- Below is another magic square. Check that the sum of each row, column and diagonal is the same. This is the ‘magic number’ for this square.



- What do you notice?
- Now complete this magic square using the above one to help you.

6		
	5	1
2		

- Using the cards from 1 to 9 see if you can make another magic square with the same ‘magic number’ as the squares above.
- See if you can find more than one new magic square with the same magic number.
- What do you notice about the centre number and the magic number?

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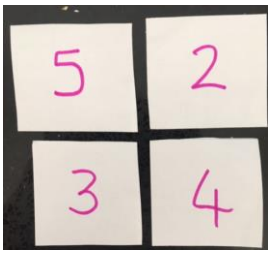
Day 4

- Using the cards 1 to 9, choose four cards and arrange them in a two by two grid. For example:



- There are two ways to read the numbers. Reading from left to right you can see 52 and 34. Add these numbers together, 52 + 34 = **86**
- Reading from top to bottom you can see 53 and 24. Add these numbers together, 53 + 24 = **77**
- The total of these four numbers is 163 (**86** + **77** = 163)
- Now rearrange the same digit cards and add up the four new two-digit numbers. Write down the total.
- How many different totals can you make using the same four cards? What's the smallest total you can make with your cards? What's the largest total?

Notes for adults working with groups of children

- Help the children to work and record systematically to ensure they have considered all possibilities. For example, first put the largest number in the top left hand corner and arrange the other three numbers and then move these around, keeping the top left number the same. There will be other ways to be systematic.
- Use Base 10 to support children to recognise the importance of place value. Draw their attention to the position of the digits and how this influences the value they represent in the numbers. For example, the digit in the top left will only be a tens digit whilst the digit in the bottom right will only be a ones digit.

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Day 5

- Using the cards 1 to 9, choose any four cards and arrange them in a grid like you did on Day 4 and add up the four two-digit numbers you have created, like you did on Day 4.
- The aim now is to arrange your cards so that the total of the four two-digit numbers is as **close** to 100 as possible. Remember, you can go above 100 and still be close.
- What do you notice helps you to get close to 100?
- Now choose four cards that you think will give you a total as close to 100 as possible, arrange them in a grid and add up the four numbers. Were you closer this time?
- Can you find a way to make exactly 100? Is there more than one way?

Notes for adults working with groups of children

- Use Base 10 to support children to recognise the importance of place value. Draw their attention to the position of the digits and how this influences the value they represent in the numbers. For example, the digit in the top left will only be a tens digit whilst the digit in the bottom right will only be a ones digit.

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