

11.02.21

WALT: Solve problems and reason about our work

In our mathematicians toolbox, we need ways of thinking that can help us solve problems. These include:

Positive attitudes: **being curious** , **being willing to take risks** (not worrying about getting it wrong!), **persevering** (keeping going)

Useful strategies like our Mathematical Thinking Powers

Useful questions to ask ourselves:

I wonder what would happen if...?

How else can I show this?

What's really going on here?

Is this always true? Why?



Mathematical Thinking Powers

Imagining	Expressing (Showing & talking)
<p>Imagining is the ability to think about "What will happen if...?". You can imagine objects, patterns, numbers and resources to help you solve problems. Imagination allows you to contemplate what is not actually present.</p> <p>E.g. I think it will be an odd number.</p>	<p>Expressing is any means of communicating mathematically. It is telling or showing each other how you work something out – it can be talking, sketches, diagrams, using equipment, recording equations etc.</p> <p>E.g. "Area = length x heightso the area of this rectangle is 9cm x 5cm = 45cm²."</p>
Conjecturing (Clever guessing)	Convincing
<p>Conjecturing is making educated guesses based on what you have noticed. If you see a pattern, you can make clever guesses about what you think will happen because of the pattern you saw.</p> <p>E.g. "4, 8, 12 and 16 are all even. I think all the multiples of 4 must be even."</p>	<p>Convincing is the process of showing that your ideas are correct (or incorrect).</p> <p>E.g. "All multiples of 4 must be even because all multiples of 4 are double the corresponding multiple of 2, which means they must be multiples of 2, which are all even."</p>
Specialising (Trying it out)	Generalising (Making rules)
<p>Specialising is trying out a few specific examples to test an idea or find out more information.</p> <p>E.g. "Does odd plus odd make an even?" "Okay, let's try it. 3+1=4. Erm...5+7=12. And 1+5=6. Looks like it, yes."</p>	<p>Generalising is making rules (generalisations) that work in different situations.</p> <p>E.g. "Right, so odd + odd always makes an even."</p>
Organising	Classifying (Sorting out)
<p>Organising is using a system or working systematically (having a clear starting and finishing point). It allows you to see what you have done and notice patterns.</p> <p>E.g. "If we always start with the biggest number first, followed by the next biggest, then the next biggest, until we get to the smallest number last."</p>	<p>Classifying is identifying common properties or differences by which we can sort ideas or information.</p> <p>E.g. "3, 18, 27 and 42 are all multiples of three, but only 18 and 27 are also multiples of 9."</p>

Three Neighbours

Take any three numbers that are 'next door numbers' when you count. These are called **consecutive** numbers.

Add them together.

What do you notice about the **total**?

Take another three consecutive numbers and add them together. What do you notice this time?

Compare the first set and the second set. What is the same? What is different?

Three Neighbours

What are the different things that **you** noticed? Answers in the chat or on whiteboards.

Did you notice the same thing as someone else? Is it always true? How do you know?

Did someone else notice something that you didn't? Does it work with your calculations?

Choose some more sets of three consecutive numbers to try out these different ideas. Can you explain what is going on.

Three Neighbours

Things to think about:

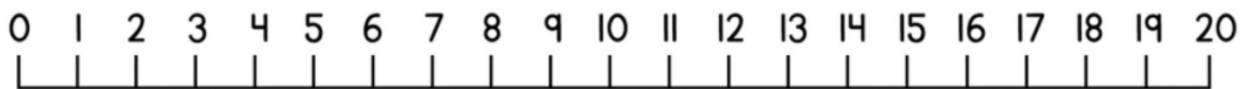
How can you prove your ideas? Does showing the numbers in a different way help?

What happens if you add five consecutive numbers? Why?
If you understand this, what happens if you add four?

Three Neighbours

Something to think about if you are stuck:

Choose three consecutive numbers less than 20. Look at your numbers on a number line:

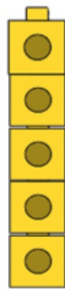


Compare your three numbers and describe how they are related
- write down as many different relationships as you can. Do any of these help you to explain the relationship with the total?

Three Neighbours

One more thing to think about if you are stuck:

If this is five, what would four and six look like?



Does this help you to explain the relationship with the total?

$$4 + 5 + 6 = 15$$

Success criteria - what did you try?

As a learner:

- **be curious**
- **take risks**
- **persevere**

Ask yourself:

- **What would happen if...?**
- **What's really going on here?**
- **How else can I show this?**
- **Is this always true? Why?**

If you get stuck, try:

- **imagining**
- **expressing** (showing in different ways, explaining)
- **specialising** (creating and comparing different examples)
- **generalising** (explaining a rule and when it works)
- **conjecturing** (say what you think is going on)
- **convincing** (yourself and others why it is true)
- **classifying** (describe your examples, what is the same or different about them?)