

12.02.21

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 can I show this?

Is this the best place to start?



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>

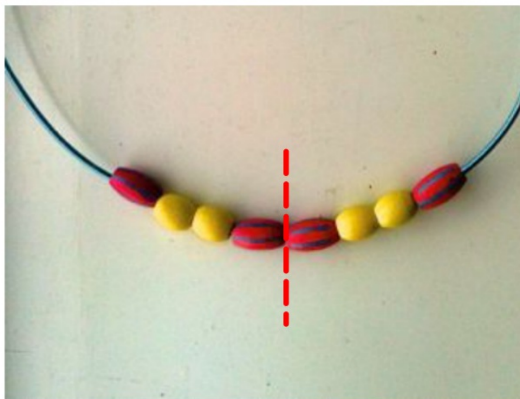
School Fair Necklaces

Rob and Jennie were making necklaces to sell at the school fair.

They decided to make them very mathematical.

Each necklace was to have eight beads, four of one colour and four of another.

And each had to be symmetrical, like this.



What do we mean by symmetrical?

What is the dashed red line showing us?

Can you make your own version of this necklace to show me?

Do you need to use beads? What could you use instead?

School Fair Necklaces

Rob and Jennie were making necklaces to sell at the school fair.

They decided to make them very mathematical.

Each necklace was to have eight beads, four of one colour and four of another.

And each had to be symmetrical, like this.



Can you make a different necklace that follows the same rules?

How will you compare your two necklaces?

Can you convince me that the necklace follows the rules?

Can you convince me that the necklace is different from the first one?

School Fair Necklaces

Rob and Jennie were making necklaces to sell at the school fair.

They decided to make them very mathematical.

Each necklace was to have eight beads, four of one colour and four of another.

And each had to be symmetrical, like this.



How many **different** necklaces is it possible to make? (only ones that follow the rules!!)

Can you find them all?

How will you know that you found them all? Can you convince me?

School Fair Necklaces

Things to think about:

What if you had 9 beads (four of one colour, five of another)?
Now how many different necklaces? How do you know?

What if you had 10 beads (five each of two colours)? How many
different necklaces this time? Can you convince me?

Success criteria - what did you try?

As a learner:

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

Ask yourself:

- **What would happen if...?**
- **Is this the best place to start?**
- **How can I show this?**

If you get stuck, try:

- **imagining**
- **expressing** (showing in different ways, explaining)
- **specialising** (creating and comparing examples that follow rules)
- **conjecturing** (say what you think is going on)
- **convincing** (yourself and others how you know)
- **classifying** (describe your examples, what is the same or different about them?)
- **organising** (having a system)