

How to help develop your  
child's mathematical  
reasoning.

# Here at Mawsley, we teach mathematics using the mastery approach

## What is mastery?

Procedural  
fluency



I know what  
to do...

Conceptual  
understanding



I know what  
to do and  
**why** I'm doing  
it!

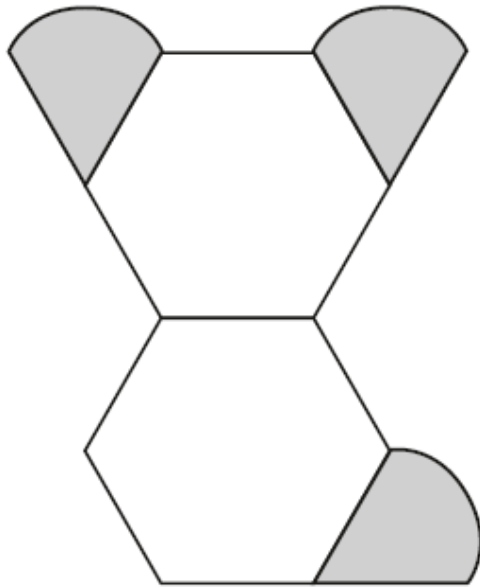


You can't achieve mastery of a concept unless you can reason. So, what is reasoning?

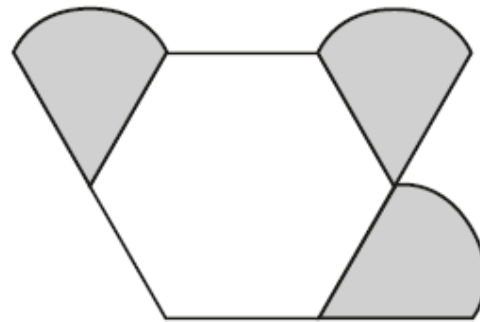
- ▶ Mathematical reasoning is the skill that enables a child to make use of all their mathematical skills.
- ▶ It helps children make sense of maths, to understand it so that they can use it.

Amina is making designs with two different shapes.

She gives each shape a value.



Total value is 147



Total value is 111

Calculate the value of each shape.

This is a question from the 2018 year 6 SATs. You can't solve this problem unless you can reason.

What is different?  
There is one more pentagon so the pentagon is  $147 - 111 = 36$   
So if  $111 = 36 + 3 \text{ triangles}$   
 $111 - 36 = 3 \text{ triangles} = 75$  so  
one triangle = 25

It requires systematic thinking and being able to explain your thinking

*Convince me!*

*Explain why.*

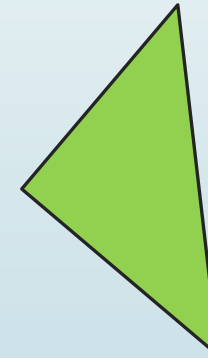
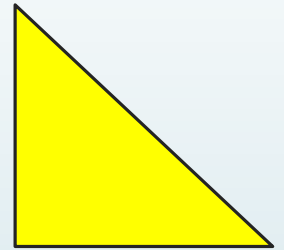
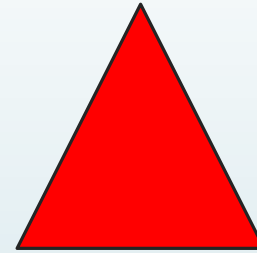
*Odd one out.*

*Do you agree?*

*True or false?*

*Prove it!*

*What do you notice?*



These questions/statements promote reasoning.

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# Examples of reasoning skills

- ▶ **Justify or argue their point.**
- ▶ **Prove something to be true or not true**
- ▶ **Use logic to solve problems, not just guessing**
- ▶ **Find patterns**
- ▶ **Think about what they need to know to find an answer**
- ▶ **Work backwards (inverse)**
- ▶ **Think about how to do things a better way**



# Prove something to be true

Harry says, "6/8 is always the same as 3/4"  
Is he correct? Explain your answer using diagrams and sentences.



## Find patterns

- Making chairs and table from cubes
- 



## Working backwards

- Would you rather be bitten by 15% of 120 mosquitoes or 8% of 250 mosquitoes?



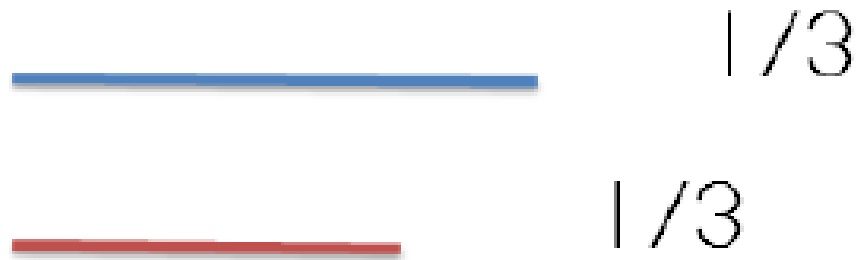
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## Justify or argue their point

- ➡ The best way to solve  $300 \times 9$  is to use short multiplication

## Using logic

Two lengths of string are cut up into lengths. Which length of string was originally the longest? Explain how you know.



Find a better way





## How to help at home

- Model your own reasoning- think aloud!
- Be argumentative. Make statements and ask your child to prove you wrong. Ask why- describe, explain, convince, justify, prove
- Talk maths all the time. Live it, love it, explore it in the world around them!



# Useful websites

- ▶ This has a selection of pictures, number and word puzzles
- ▶ [http://www.brainboxx.co.uk/a4\\_resource/pages/puzzleboxx/puzzles/MENU.htm](http://www.brainboxx.co.uk/a4_resource/pages/puzzleboxx/puzzles/MENU.htm)
- ▶ <https://nrich.maths.org/primary-upper>
- ▶ Word based riddles and puzzles to figure out!
- ▶ <https://www.mathsisfun.com/puzzles/>
- ▶ <http://www.folj.com/puzzles/>
- ▶ This has a variety of activities organised by year group
- ▶ <http://www.roathparkprimaryschool.co.uk/help-your-child-with-mathematical-reasoning/>
- ▶ This has online games to develop reasoning and problem solving
- ▶ <http://www.topmarks.co.uk/maths-games/7-11-years/problem-solving>