



<u>Reasoning Progression in Maths at English</u> <u>Martyrs'</u>

Progression in Reasoning

- 1. **Observe**: describe what they see or do without deeper explanation.
- 2. **Explore**: start investigating and offer reasons for their actions.
- 3. **Investigate**: present a strong, structured argument, piecing together.
- 4. **Convince**: speak with growing confidence to persuade someone of your mathematical reasoning
- 5. **Philosophise**: construct a complete and logical chain of reasoning, much like a philosopher.

These steps can be taught and used by children through modelled activities and questioning using the sentence stems outlined below. The questions should be used to show progression throughout the students' mathematical journey throughout the school.













Progression in Questioning

EYFS	Examples questions
Observe	Can you follow the number sequence? Show me what is next Show me which is more/less?. What could you use to show me this number? (drawing and manipulatives?
Explore	What is the mistake? What is hidden beneath the splat? Can you talk about the pattern? What do you see? Tell me a story?

KS1	Examples questions
Observe	What can you see in this number pattern?
	How many sides does this shape have?
	Can you tell me what happens when we add 2
	tơ 5?
	What do you notice about these two objects?
	Can you show me where this number belongs on
	the number line?
Explore	Can you find a quicker way to add these
	numbers?
	Why do you think this pattern is growing this
	way?
	How could you group these objects to make it
	easier to count them?
r	What tools could help us measure this length?
	Why does this number come next in the
	sequence?
Investigate	How do you know that 3 + 4 = 7?
	Can you find another way to solve this problem?
	What patterns can you see in this set of
	numbers?
	Can you prove that this shape is a rectangle?
	What would happen if we swapped the order of
	these numbers when adding?





Convince	Can you explain why your answer is correct?
	If your friend thinks the answer is 10, how would
	you show them it's 12?
	Why do you think this is the best way to solve
	the problem?
	What makes you sure that this pattern will
	continue like this?
	Can you tell a story that matches this number
	problem?
Philosophise	How do you know that your method works every
	time?
	Can you explain step-by-step how you solved
	the problem?
	What if we change one of the numbers—how
	does it affect your solution?
	How can we check if we've found all the possible
	answers?
	Can you connect this problem to something else
	you've learned?

KS2	Examples questions
	What patterns do you notice in this sequence of
	numbers?
Observe	Can you describe the similarities and differences
	between these shapes?
	What happens to the total when we add odd
	numbers together?
	How would you describe the change in this
	graph over time?
	What do you notice about the angles in this
	triangle?
Explore	Is there a more efficient method to solve this
	calculation? Why?
	What happens to the total if we double one of
	the numbers?
	How could you group these numbers to make the
	calculation easier?
	What tools or diagrams might help you solve
	this problem?
	Can you use what you already know about
	fractions to estimate the answer?





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Investigate	How can you prove that 24 is divisible by 4?
	Can you find all the possible outcomes for this
	problem? How do you know you've found them
	all?
	What patterns can you find in the multiples of 6?
	How would you explain why 3 x 4 = 4 x 3 using
	a diagram?
	What happens to the area of a rectangle if we
	double one side but keep the other side the
	same?
	How would you explain your method to someone
Convince	who solved the problem differently?
	Can you convince me that your answer to this
	equation is correct?
	Why do you think this method works for dividing
	fractions?
	Can you explain why this shape can (or cannot)
	be classified as a parallelogram?
	How would you use reasoning to prove that this
	number is prime?
Philosophise.	Can you create a rule to describe the pattern in
	this sequence?
	How can you be sure that your solution works
i nuo so pruso	for all possible cases?
	Why is it always true that the angles in a
	triangle add up to 180 degrees?
III	What happens if you apply this method to a
	different type of problem?
	Can you explain why multiplying by 0 always
	gives an answer of 0, using reasoning and
	examples?





English Martyrs' Approach to Mathematical Problem Solving

At English Martyrs, our approach to problem solving follows a strategic process where, in order to solve mathematical problems, students should be guided through the following stages:

- 1. Activate prior knowledge, setting the stage and building readiness.
- 2. **Present the problem** but leave gaps for curiosity, using simple examples to pique interest.
- 3. **Share a worked example,** modelling thinking aloud with visual aids and tools to guide the adventurers.
- 4. **Introduce a similar challenge** in a new context for students to explore independently, with scaffolds to help if needed.
- 5. **Provide extension challenges** for those who quickly master the task, encouraging further exploration.
- 6. **Encourage students to reflect** on their journey, evaluating their reasoning and celebrating their discoveries.