

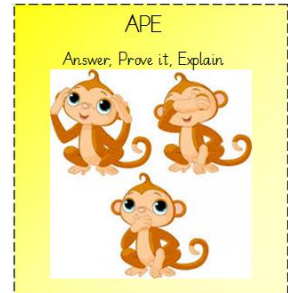
Reasoning at St John's

'I WILL Shine'



Fluency, reasoning and problem-solving skills will lead to children becoming great mathematicians! Reasoning is all about mathematical thinking! Can children justify their ideas and explain their thinking?

Teaching children reasoning skills needs lots and lots of modelling. This should include lots of talking out loud, explaining to children how you would approach a problem. This should also include how to respond to a reasoning question in a written format (following the APE approach: Answer, Prove it, Explain).



Progression in reasoning:

Step 1: Describe. The child can simply tell an adult or a partner what they did. "Can you tell me what you did?"

Step 2 Explain: The child can offer some reasons for what they did. These may or may not be correct. "Why you did do... to work out the answer?"

Step 3 Convince: The child is confident that their reasoning is right and may use words such as 'I think' or 'I know'. The underlying mathematical argument may not be accurate yet but it is likely to have more coherence.

Step 4 Justify: The child can give a correct logical argument that has a complete chain of reasoning and uses words such as 'because/ therefore/and so' to explain their thinking. "Explain to be why this answer must be correct."

Step 5 Prove: The child is able to give a watertight argument that is mathematically sound and proven using evidence. "Prove your answer must be correct."

Spot the mistake

Are they correct?

Explain why

How do you know?

True or false? Why?

Which one is the odd one out? Why?

Always, sometimes or never true?

Examples of reasoning opportunities in the classroom

APE
Answer, Prove it, Explain

Viktor says, "In the 10 times table, all the numbers have a zero. Therefore, in Roman Numerals all multiples of 10 have an X."

Do you agree/disagree? Explain your answer and give examples.

A) yes. no.
P) because 50 is L and 50 is in the 10 times table.
E) 10 is X, 20 = XX, 30 = XXX, 40 = XL, 50 = L and L doesn't end on X.

APE

3a. Susie is converting a fraction to a decimal. Her working out is shown below.

I think that $\frac{6}{8}$ is equivalent to 0.76

$$\begin{array}{r} 0.76 \\ 8 \overline{) 6.40} \\ \underline{8 0} \\ 40 \\ \underline{40} \\ 0 \end{array}$$

Is she correct? Convince me.

3. $0.75 = \frac{75}{100} = \frac{3}{4}$

16
24
32
40
48
56
64

Susie is incorrect because she thought that 8 into 40 was 6.

hp

Weaver is trying to find lines of symmetry in letters. He says one of these is different to the others. Which do you think is the odd one out? Explain why using APE.

B E F K

X

A) F is the odd one out.
P) E, I know that because F does not have the same side. When you use a mirror it base north have a dot on line.

hockey	3:15	4:00
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Art club is longer than homework club.
 Rugby club is shorter than tennis club.
 Cooking club is longer than maths club.
 Hockey club is shorter than craft club.

L.A.) False
P.) Art club = 45
 Homework club = 50 ✓
E.) it's false because Homework club is 50 mins and Art club is 45 mins ✓

6) **APE**

A) Tom is incorrect

P) He could buy Pint of Milk, lemons, loaf of bread and bananas

$$\begin{array}{r} \pounds 0.60 \\ \pounds 0.40 \\ \pounds 0.79 \\ + \pounds 0.76 \\ \hline \pounds 2.55 \\ \underline{ 2} \end{array}$$

E) Tom is incorrect because he added all items altogether and it only cost $\pounds 2.55$ so Tom is incorrect.