Accessing mathematical content through the Proficiency Strands - Years 4 - 9

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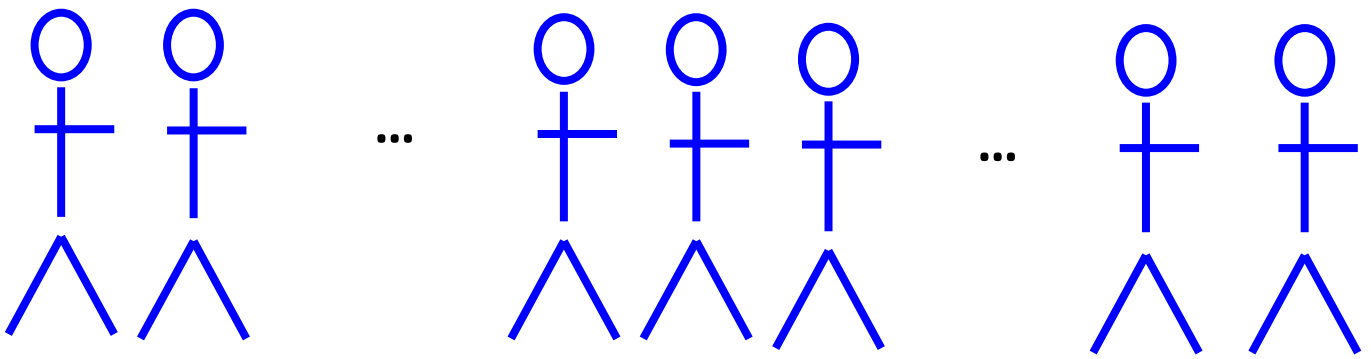
Line-up!

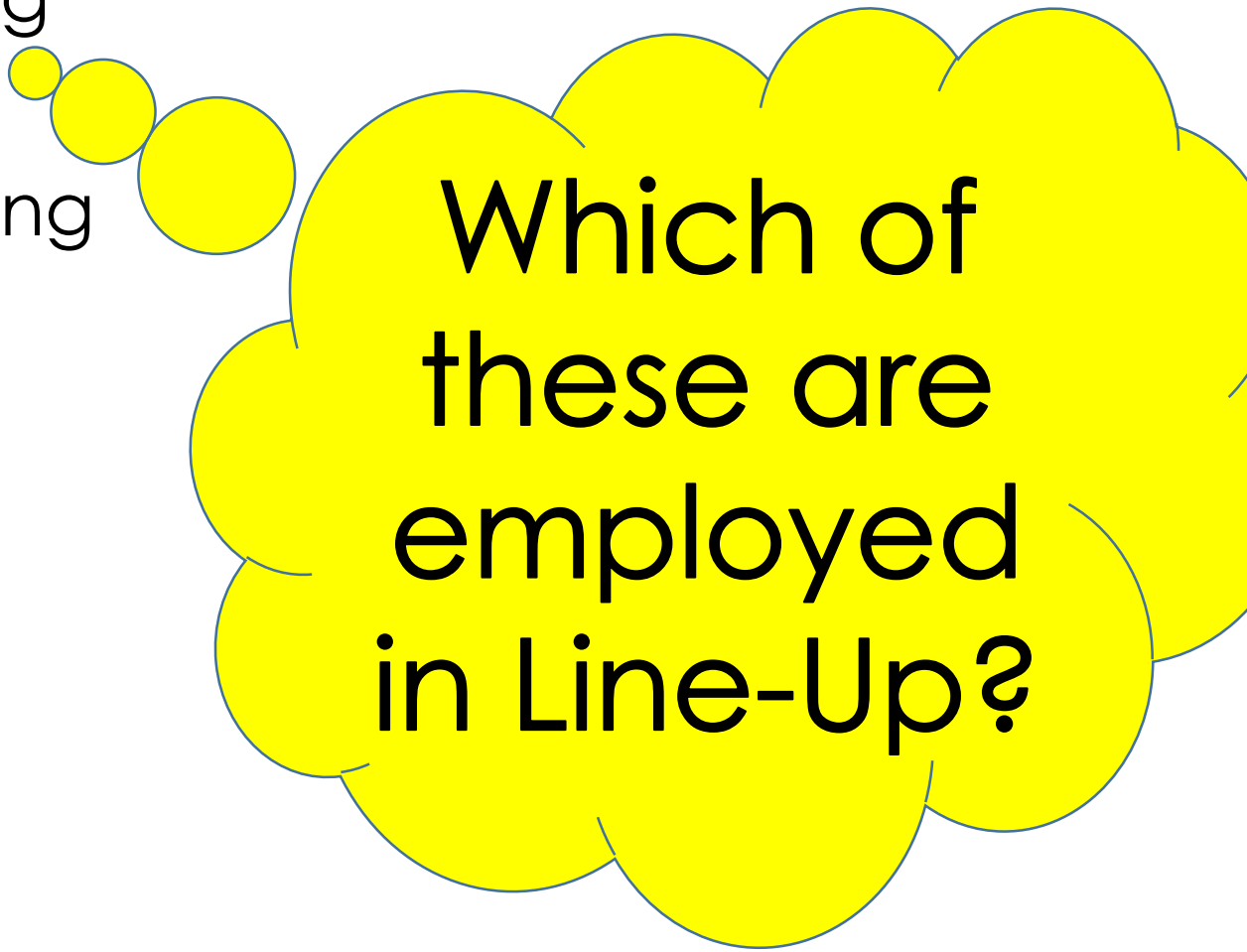
I am 19th from either end.

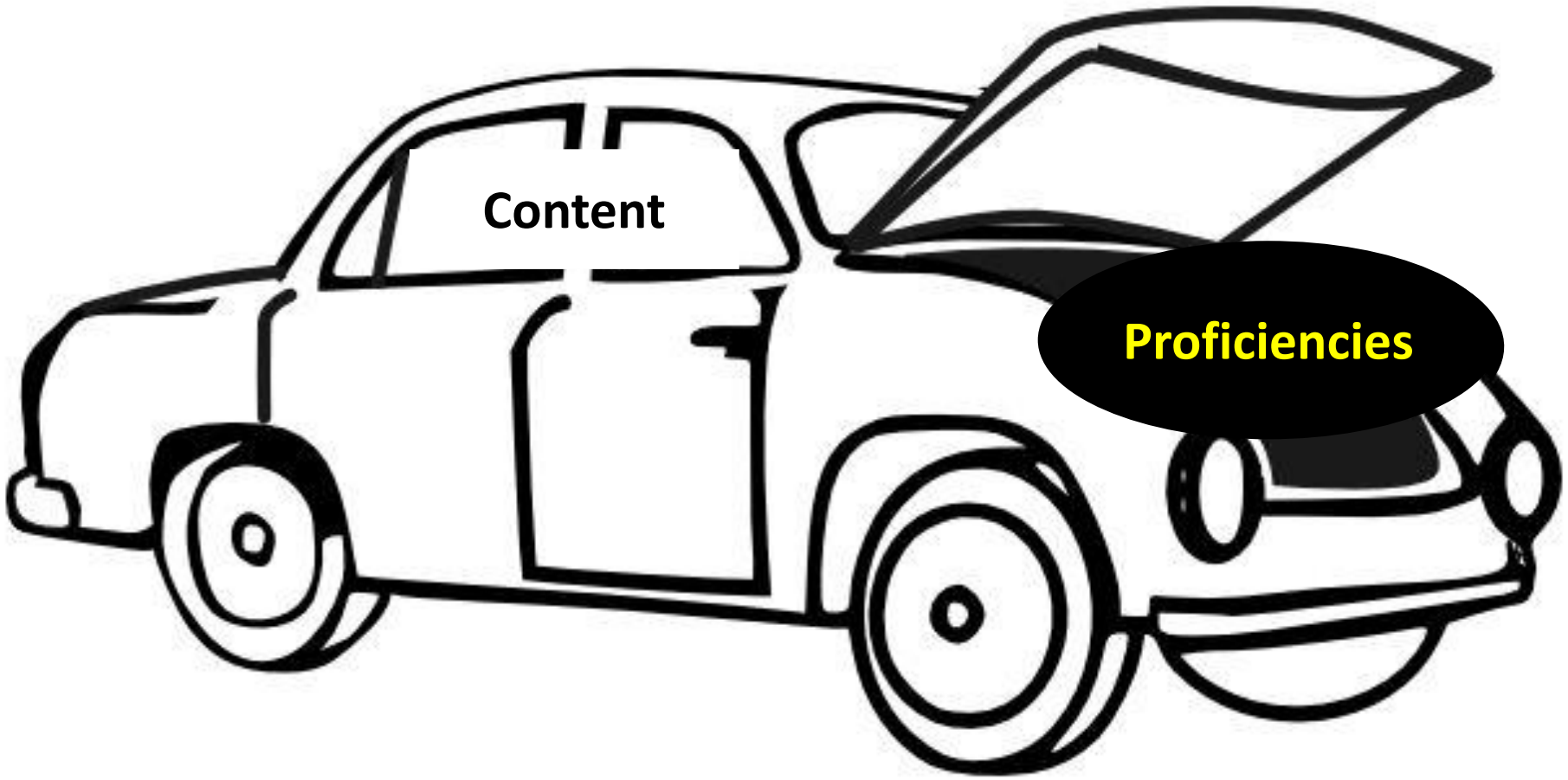
How many in the line?



Proficiency Strands

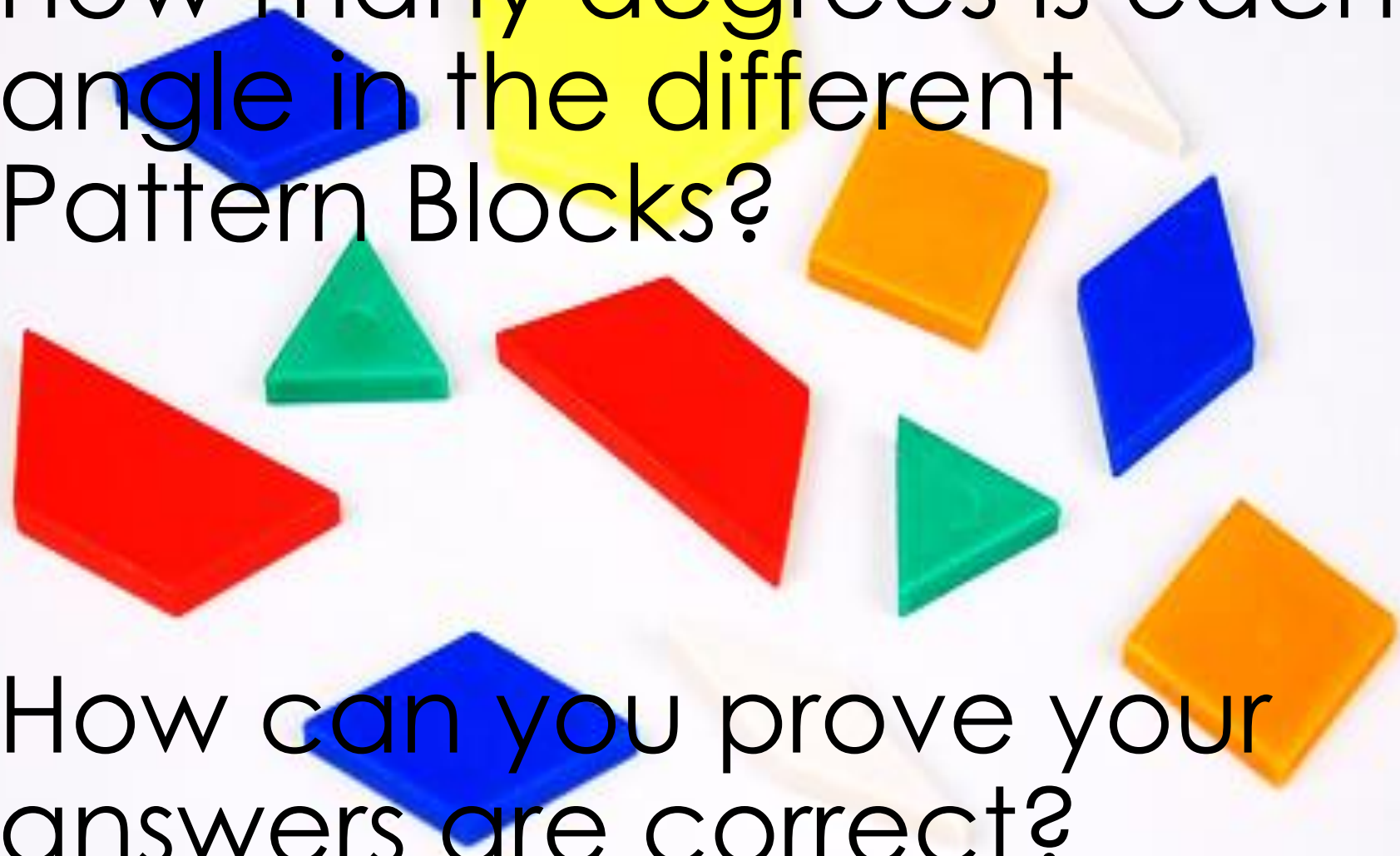
- Understanding
- Fluency
- Problem Solving
- Reasoning





Proficiencies: The power behind the curriculum

Without using a protractor, how many degrees is each angle in the different Pattern Blocks?



How can you prove your answers are correct?

Proficiency Strands

- Understanding
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- Reasoning

Which of these are employed in Pattern Block angles?

Mountain Range Challenge

Proficiency Strands

- Understanding
- Fluency
- Problem Solving
- Reasoning

Which of these are employed in Mountain Range Challenge?

Proficiency Strands

- Understanding
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- Reasoning

Which of these are employed in Boxes without lids?

Proficiency Strands

The proficiency strands… describe how content is explored or developed, that is, the thinking and doing of mathematics. They provide the language to build in the developmental aspects of the learning of mathematics and have been incorporated into the content descriptions of the three content strands. This approach has been adopted to ensure students' proficiency in mathematical skills develops throughout the curriculum and becomes increasingly sophisticated over the years of schooling.

Understanding

Students build a robust knowledge of adaptable and transferable mathematical concepts. They make connections between related concepts and progressively apply the familiar to develop new ideas. They develop an understanding of the relationship between the 'why' and the 'how' of mathematics. Students build understanding when they connect related ideas, when they represent concepts in different ways, when they identify commonalities and differences between aspects of content, when they describe their thinking mathematically and when they interpret mathematical information.

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No rules without meaning! (the why and the how)

Fluency

Students develop skills in choosing appropriate procedures, carrying out procedures flexibly, accurately, efficiently and appropriately, and recalling factual knowledge and concepts readily. Students are fluent when they calculate answers efficiently, when they recognise robust ways of answering questions, when they choose appropriate methods and approximations, when they recall definitions and regularly use facts, and when they can manipulate expressions and equations to find solutions.

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Choose and use the right tools Correctly

Problem Solving

Students develop the ability to make choices, interpret, formulate, model and investigate problem situations, and communicate solutions effectively. Students formulate and solve problems when they use mathematics to represent unfamiliar or meaningful situations, when they design investigations and plan their approaches, when they apply their existing strategies to seek solutions, and when they verify that th answers are reasonable.

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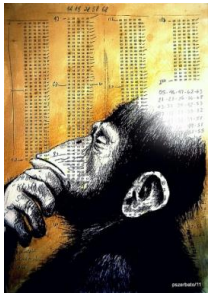
Involves investigating, thinking, and Communicating (The creative element of mathematics!)

Reasoning

Students develop an increasingly sophisticated capacity for logical thought and actions, such as analysing, proving, evaluating, explaining, inferring, justifying and generalising. Students are reasoning mathematically when they explain their thinking, when they deduce and justify strategies used and conclusions reached, when they adapt the known to the unknown, when they transfer learning from one context to another, when they prove that something is true or false and when they compare and contrast related ideas and explain their choices.



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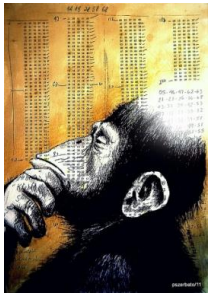
Explain thinking and justify decisions (Convince me!)



- If we are seeking fluency, then clear explanations followed by practice will work

- If we are seeking understanding, then very clear and interactive communication between teacher and students and between students will be necessary

- If we want to foster problem solving and reasoning, then we need to use tasks with which students can engage, which require them to make decisions and explain their thinking

(Sullivan, 2012)

Mathematically Rich Tasks

- Allow students to work mathematically and see others working mathematically to **solve problems**
- Easy to start while still providing opportunities for challenge and extension
- Situated within meaningful or intriguing contexts
- Develop thinking, **reasoning** and **communicating** skills
- Seek genuine **understandings**
- Cater for a variety of learning styles
- Encourage students to **explain their thinking**
- Develop **fluency** in context

Thank you!

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