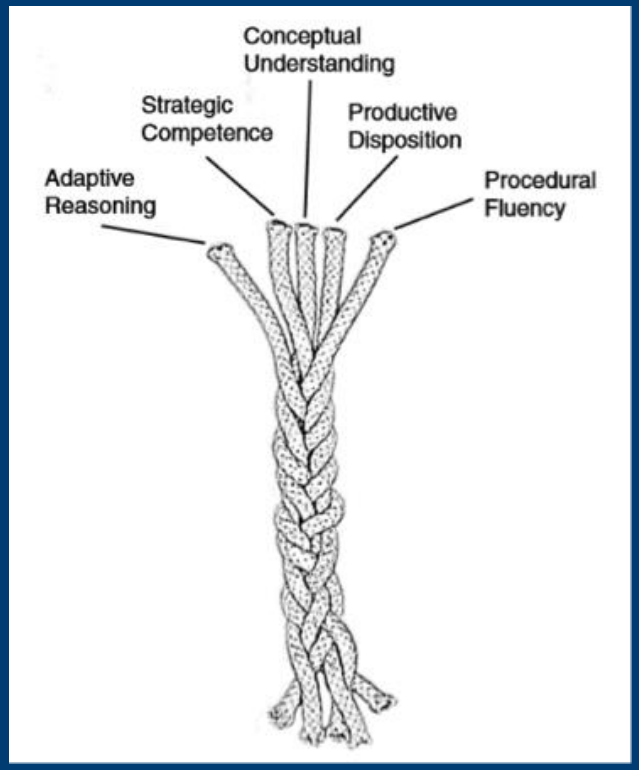
Purposeful practice: Consolidating understanding using rich tasks

Alison Kiddle

Strands of Mathematical Proficiency



Kilpatrick, J. Swafford, J. & Findell, B.(eds.)(2001). Adding it up: Helping children learn mathematics. Mathematics Learning Study Committee: National Research Council.

Consolidating with rich tasks

To:

Deepen understanding

Build connections

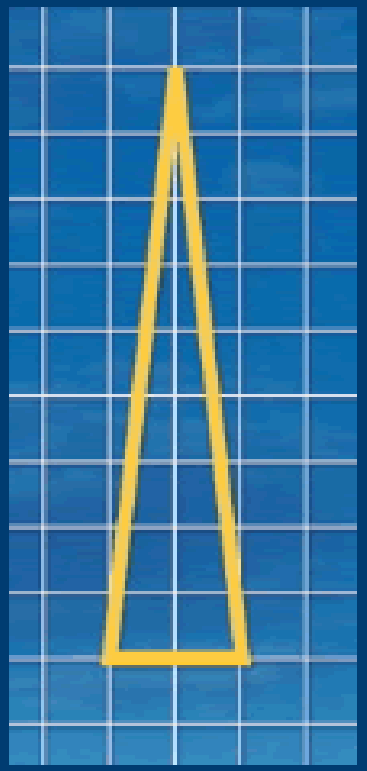
Develop fluency

Isosceles Triangles

Draw some isosceles triangles with an area of 9 cm^2 and a vertex at (20, 20).

If all the vertices have whole number coordinates, how many is it possible to draw?

Can you explain how you know that you have found them all?



Unequal Averages

Here's an interesting set of five numbers:

2,5,5,6,7

Mean, mode, median and range are all 5.

Can you find other sets of five positive whole numbers where:

Mean = Median = Mode = Range

Unequal Averages

Can you find sets of five positive whole numbers that satisfy the following properties?

Mode < Median < Mean

Mode < Mean < Median

Mean < Mode < Median

Mean < Median < Mode

Median < Mode < Mean

Median < Mean < Mode

There are many more NRICH tasks that offer opportunities for consolidation…

Number and Algebra

Dicey Operations

American Billions

Keep it Simple

Arithmagons

Pair Products

Temperature

Painted Cube

Factors and Multiples Puzzle

Factors and Multiples Game

What Numbers Can We Make?

Peaches Today, Peaches Tomorrow…

What's Possible?

Attractive Tablecloths

How Old Am I?

Geometry and Measures

Isosceles Triangles

Can They Be Equal?

Translating Lines

Opposite Vertices

Coordinate Patterns

Route to Infinity

Pick's Theorem

Cuboid Challenge

Semi-regular Tessellations

Warmsnug Double Glazing

Handling Data

M, M and M

Which List is Which?

Odds and Evens

Which Spinners?

Interactive tasks

GOT IT
Dozens
Mixing Lemonade
Missing Multipliers
Shifting Times Tables
Finding Factors
Charlie's Delightful Machine
Factors and Multiples Game

Connect Three
Estimating Angles
Square It
Treasure Hunt
Diamond Collector

…and for even more, see the Curriculum Mapping Document

Using rich tasks to introduce new topics

Start with a rich challenge

To:

Introduce new ideas

Develop understanding of new curriculum content

Discover important mathematical results

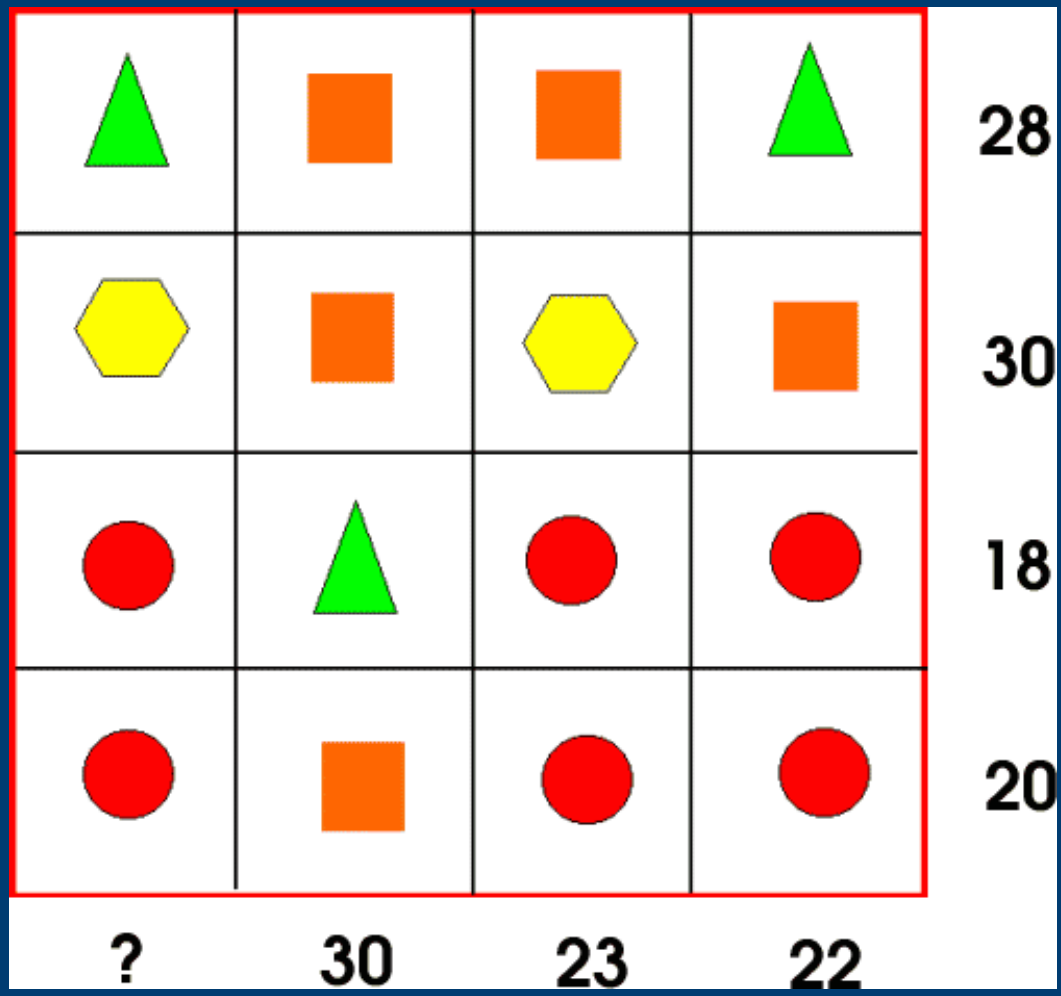
Fruity Totals

What's it Worth?

Each symbol has a numerical value.

The total for the symbols is written at the end of each row and column.

Can you find the missing total that should go where the question mark has been put?



Right Angles

Join any two points on the edge to the middle to form a triangle.

Can you work out the angles in your triangle?

Can you join three points on the edge to form a right-angled triangle?

Mathematics is not a spectator sport

Exploring
→ Noticing Patterns
→ Conjecturing
→ Generalising
→ Explaining
→ Justifying
→ Proving

The role of the teacher

Teacher's role

- To choose tasks that allow students to explore new mathematics
- To give students the time and space for that exploration
- To bring students together to share ideas and understanding, and draw together key mathematical insights

There are many more NRICH tasks that make excellent starting points…

Number and Algebra

Summing Consecutive Numbers

Number Pyramids

What's Possible?

What's It Worth?

Perimeter Expressions

Seven Squares

Attractive Tablecloths

Geometry

Painted Cube

Cyclic Quadrilaterals

Semi-regular Tessellations

Tilted Squares

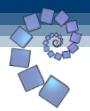
Vector Journeys

Handling Data

Statistical Shorts

Odds and Evens

Which Spinners?



… a teacher of mathematics has a great opportunity. If he fills his allotted time with drilling his students in routine operations he kills their interest, hampers their intellectual development, and misuses his opportunity. But if he challenges the curiosity of his students by setting them problems proportionate to their knowledge, and helps them to solve their problems with stimulating questions, he may give them a taste for, and some means of, independent thinking.

Polya, G. (1945) How to Solve it

I don't expect, and I don't want, all children to find mathematics an engrossing study, or one that they want to devote themselves to either in school or in their lives. Only a few will find mathematics seductive enough to sustain a long term engagement. But I would hope that all children could experience at a few moments in their careers ... the power and excitement of mathematics ... so that at the end of their formal education they at least know what it is like and whether it is an activity that has a place in their future. *David Wheeler*

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Email: ajk44@cam.ac.uk