

CURRICULUM, PEDAGOGY AND BEYOND



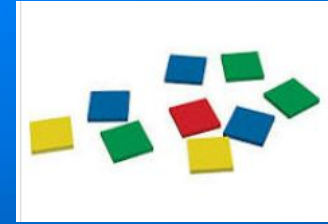
THE MATHEMATICAL
ASSOCIATION OF VICTORIA

MAV24
CONFERENCE

24 Square Counters

(Embedding the Proficiencies in Rich
investigations)

MAV Primary Education Conference 2024



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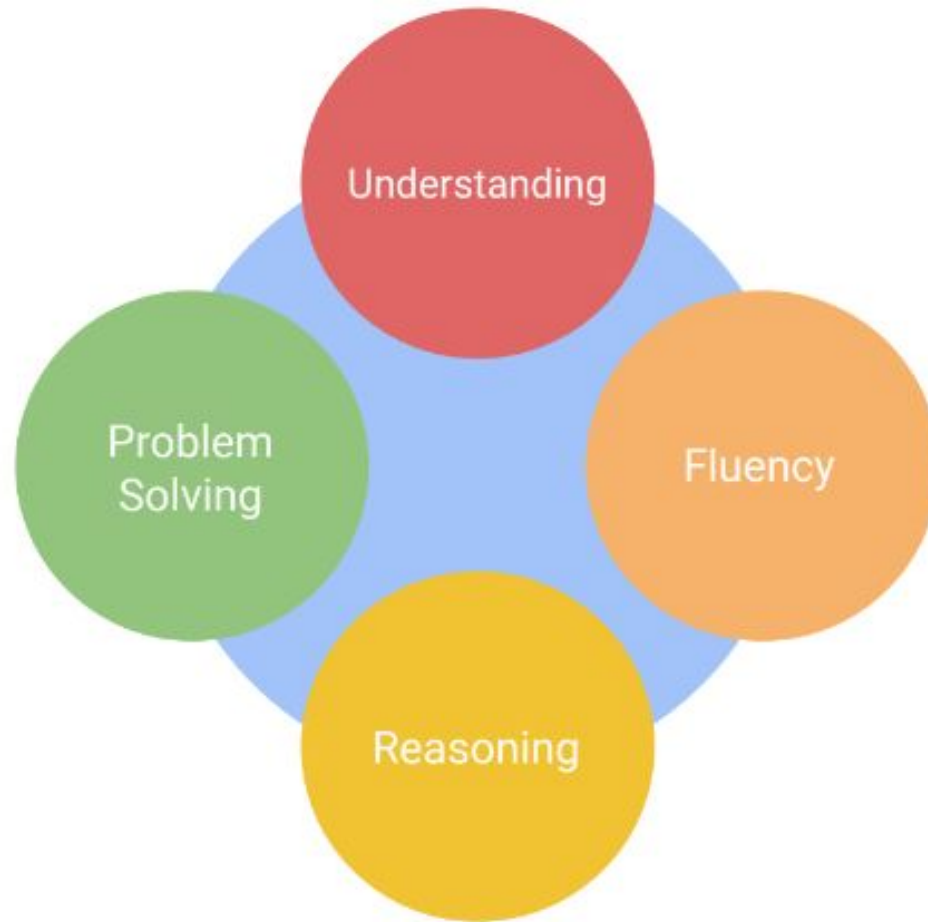
Aim

Square counters are an excellent hands on classroom resource that can be used as a tool to empower and enable students to creatively investigate many areas of Mathematics and solve problems.

In this workshop we will look at tasks in all six strands and investigate how manipulations with 24 square counters can provide rich learning opportunities for students to reason, justify, connect ideas and draw conclusions to ultimately develop understanding.

Within each exploration we will consider strategies to promote rich dialogue and how each task can be differentiated to enhance the learning.

Proficiencies





Proficiency Strands

“Proficiencies are embedded in all 6 strands and further the development of increasingly sophisticated knowledge and understanding of mathematical concepts, fluency in representations and procedures and sound mathematical reasoning and problem solving skills. Proficiency in mathematics enables students to respond to familiar and unfamiliar situations by employing mathematical processes to solve problems efficiently and to make informed decisions. Proficiency in Mathematics also enables students to reflect on and evaluate approaches, and verify that answers and results are reasonable in the context”

Victorian Curriculum 2.0



Proficiency Strands

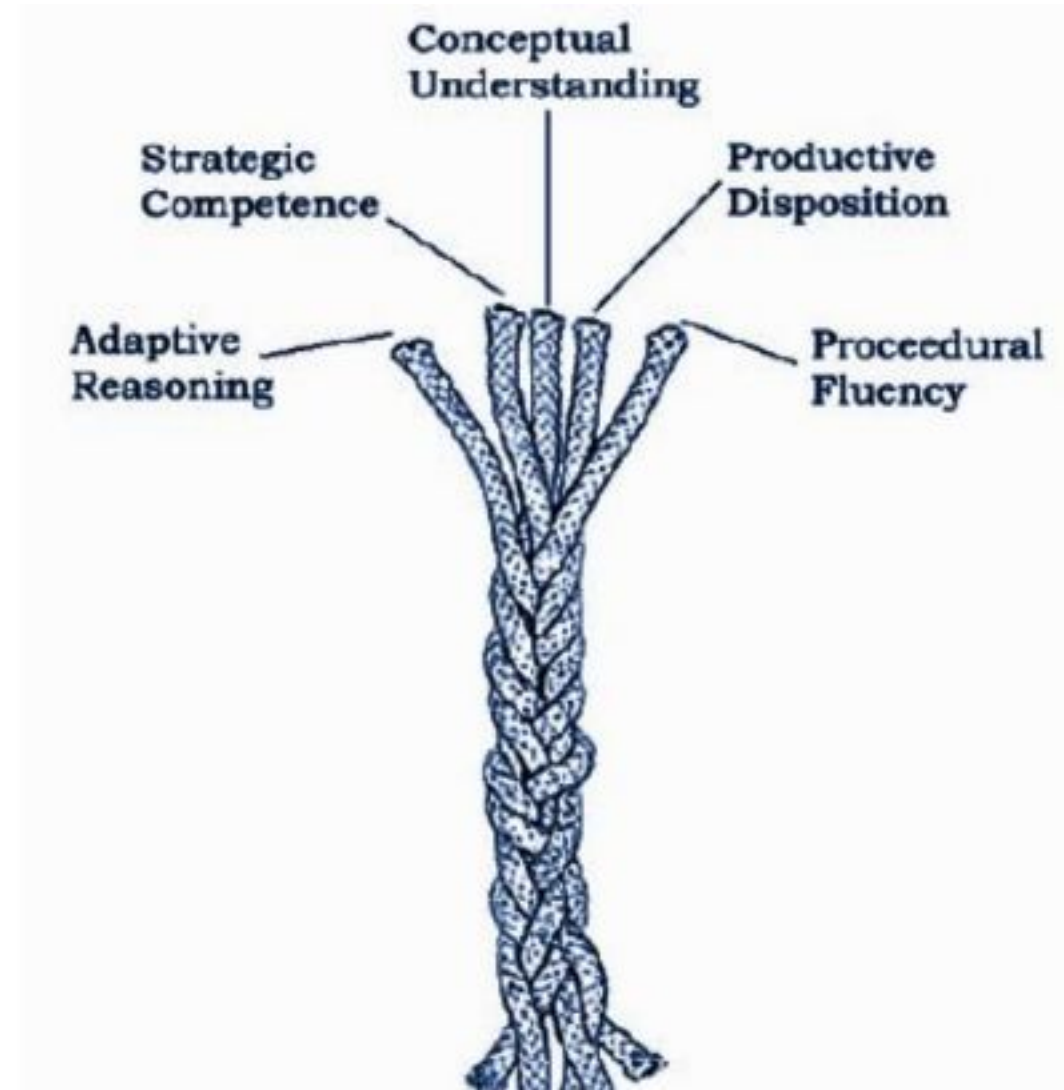
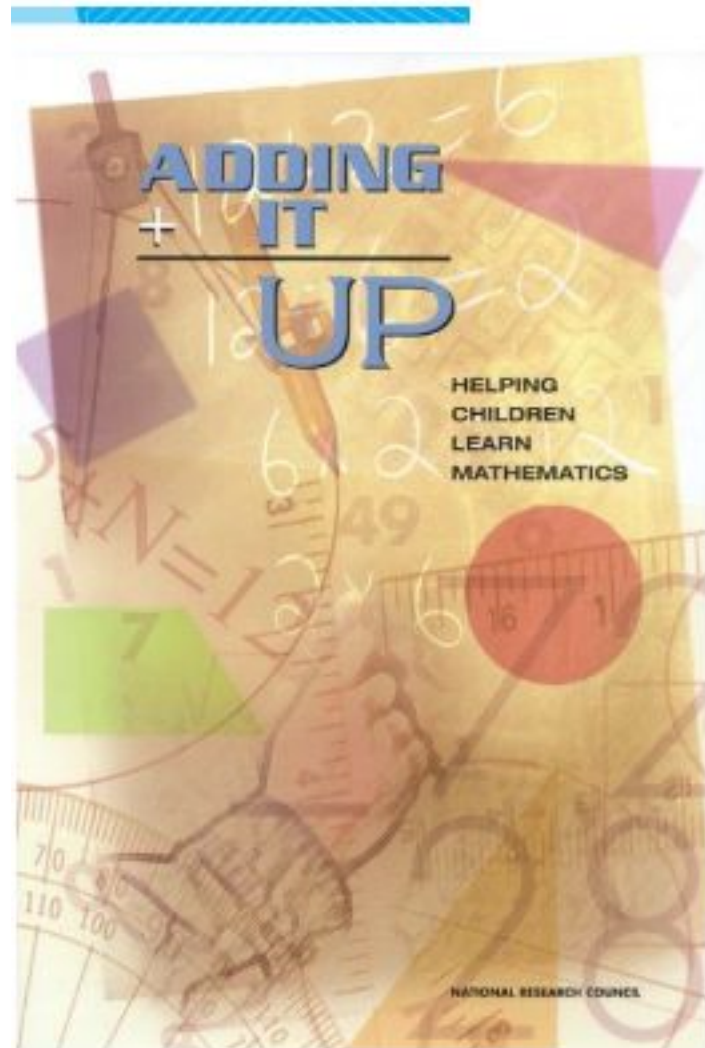
Understanding refers to students building a robust knowledge of adaptable and transferable mathematical concepts and structures.

Fluency describes students developing skills in choosing appropriate procedures, carrying out procedures flexibly, accurately, efficiently and appropriately, and recalling factual knowledge and concepts readily.

Reasoning refers to students developing an increasingly sophisticated capacity for logical, statistical and probabilistic thinking and actions, such as conjecturing, hypothesising, analysing, proving, evaluating, explaining, inferring, justifying, refuting, abstracting and generalising.

Problem-solving is the ability of students to make choices, interpret, formulate, model and investigate problem situations, select and use technological functions and communicate solutions effectively.

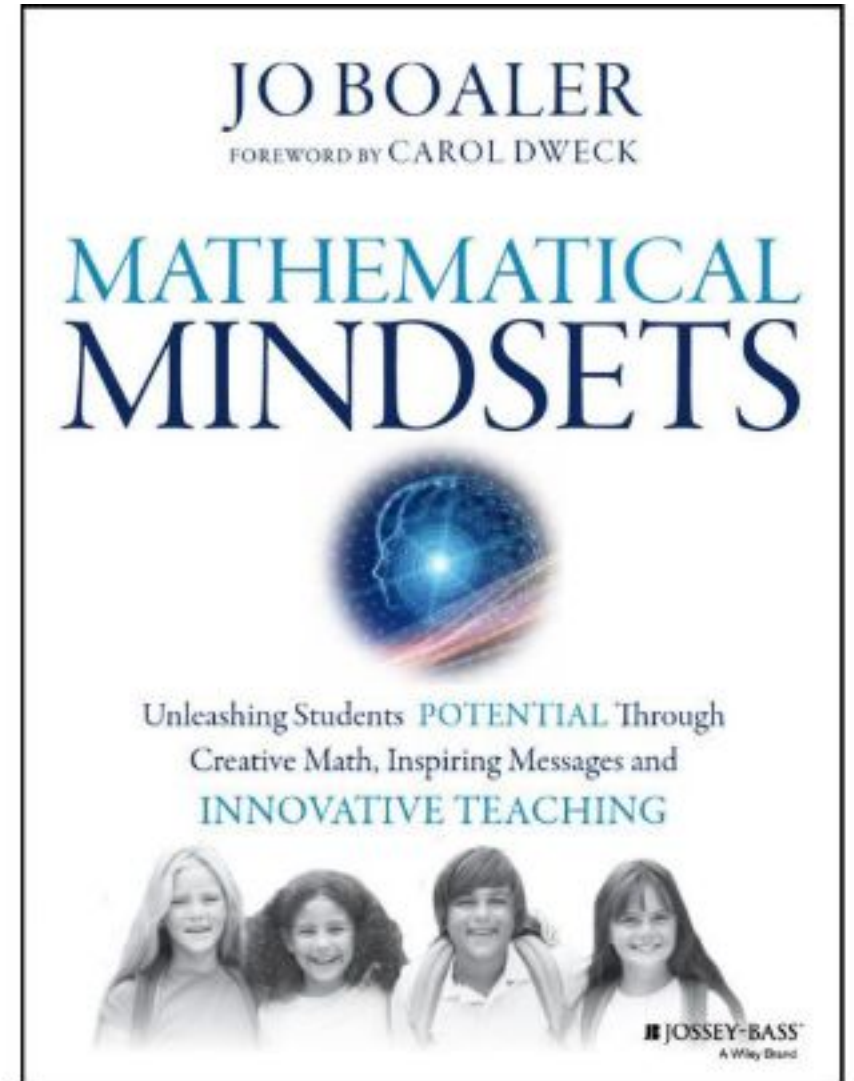
Where did they come from?



Kilpatrick,
Swafford &
Findell
(2001)

Mathematical Disposition

- make sense of mathematics
- useful and worthwhile
- steady effort pays off
- effective learner
- doer of mathematics
- challenge





Thoughts

With each activity consider

- What are the Big Ideas behind the task
- What proficiencies are being covered
- How can you enable and extend
- What assessment opportunities it allows
- Where to from here?



Number Talk 1

The teacher gave Sam 192 counters and 8 bags, how many counters were to go in each bag?

$$160 \div 8 = 20$$

$$32 \div 8 = 4 \rightarrow 24$$

$$5 \times 8 = 40$$

$$10 \times 8 = 80$$

$$15 \times 8 = 120$$

$$20 \times 8 = 160$$

$$4 \times 8 = 32$$

$$10 \times 8 = 80$$

$$20 \times 8 = 160$$

$$192 - 160 = 32$$

$$32 \div 8 = 4$$

$$20 + 4 = 24$$

Chunks	
$8 \overline{) 192}$	$10 \times 8 = 80$
$\underline{-160}$	$\therefore 20 \times 8 = 160$
$\underline{32}$	4×8
$\underline{-32}$	$20 + 4 = 24$
$\underline{0}$	

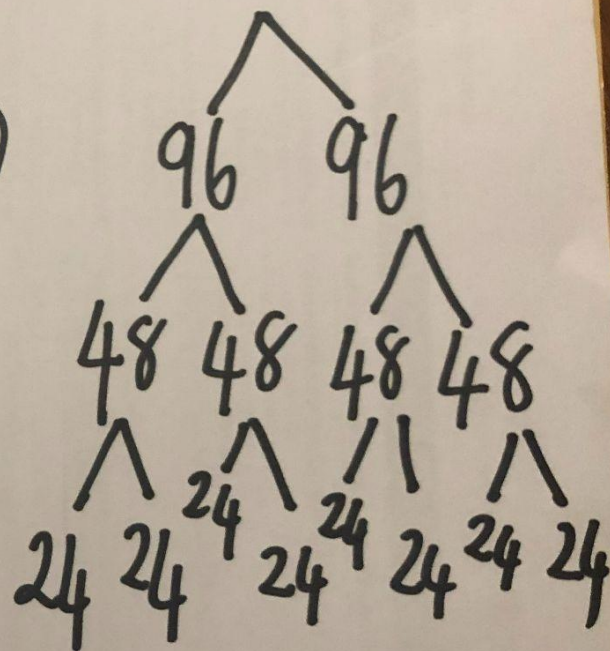
$$192 \div 8$$

$$12 \times 8 = 96$$

$$2 \times 96 = 192$$

$$8 \overline{) 192}$$

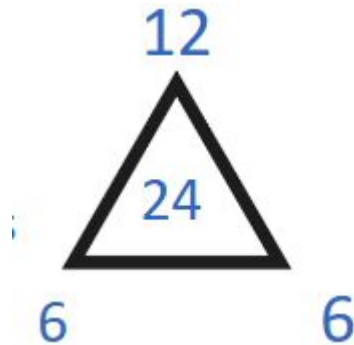
$$192$$



Warm Up

- Estimate how many counters you have
- How can you arrange to efficiently count?
- How many ways can you combine 2 numbers to make 24?
- Draw a triangle and write 24 in the middle - can you bust it 3 ways

My answer is 24
what is the equations



FACT FAMILIES

Who belongs in my family ?
(3 for free)

What other facts can you make
because you know ...

$$12 + 12 = 24?$$

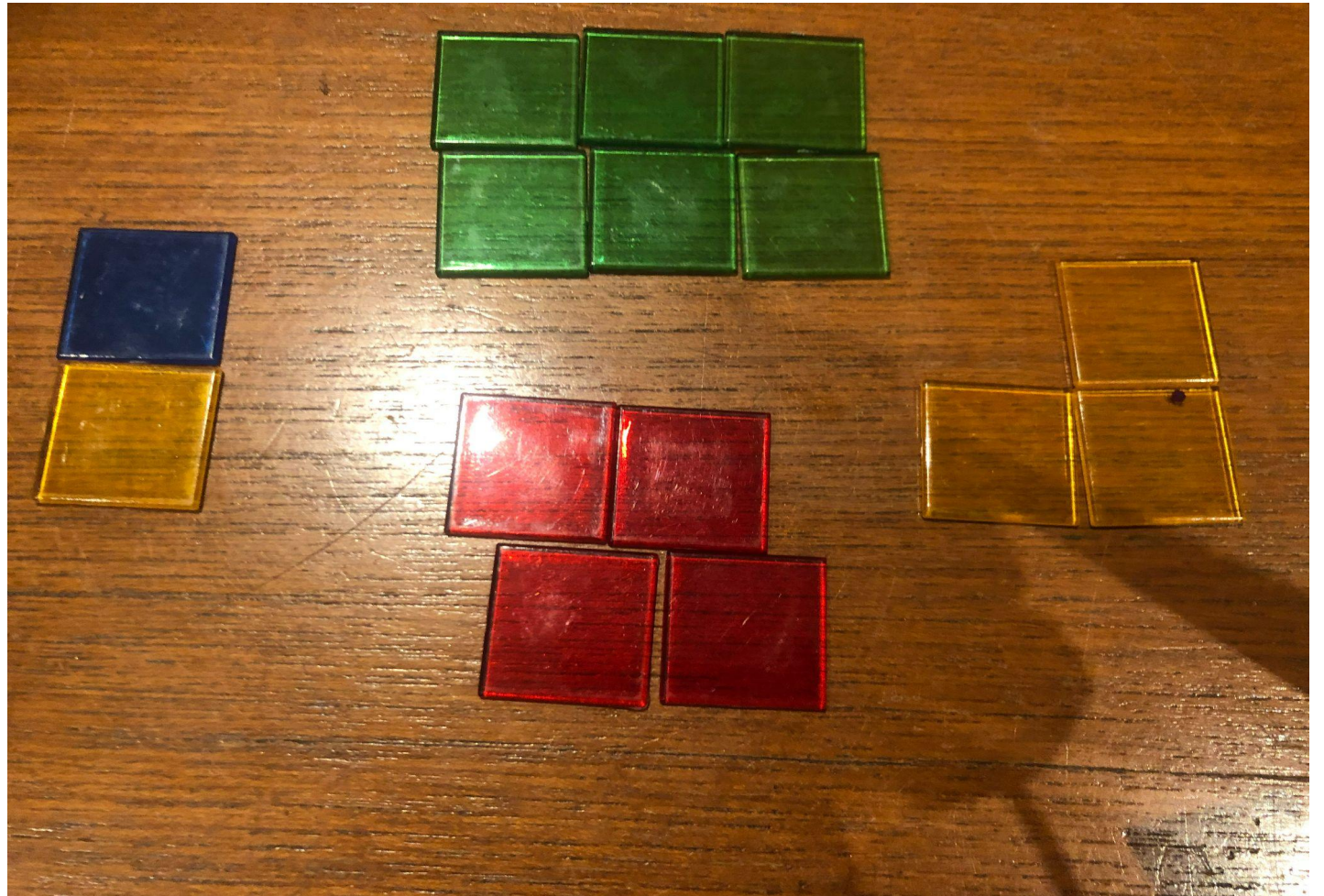
$$120 + 120 = 240 \text{ etc}$$

Number Talk 2

Which collection is the Odd one out ?

Explain your reasoning

WODB

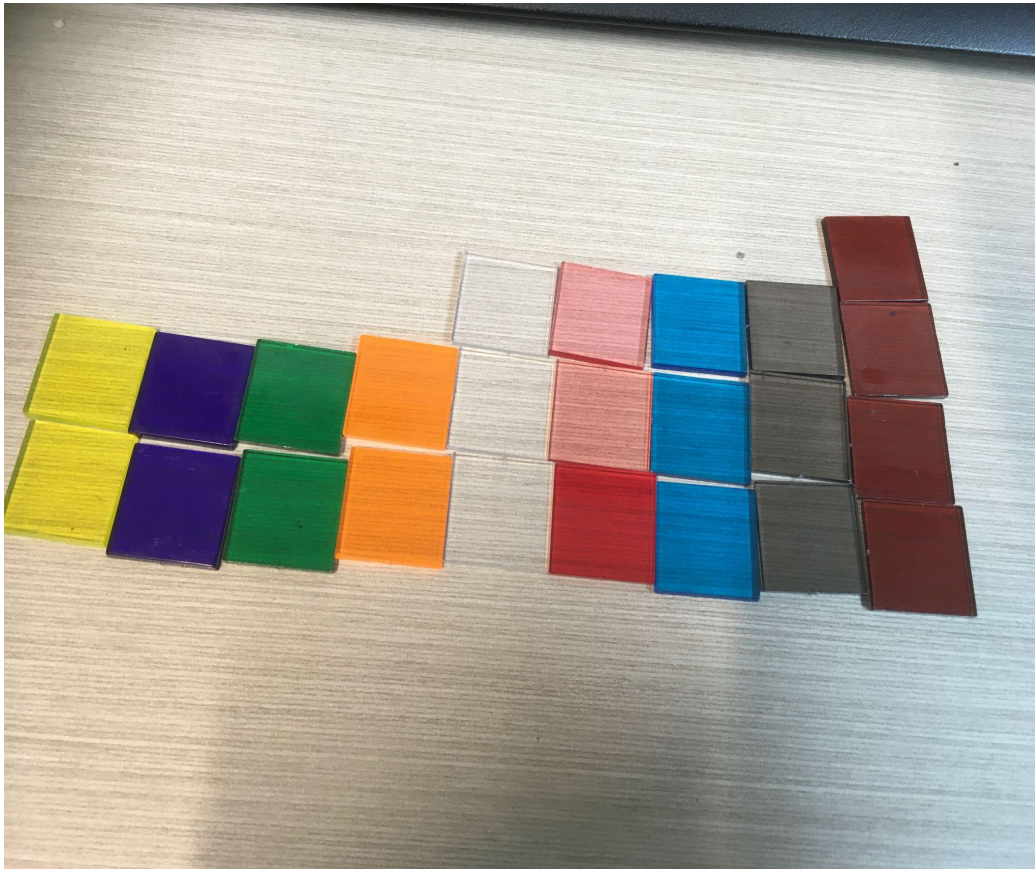


Number Talk 3



How many?

Addition/Multiplication



- Line up your counters in their colour columns
- Roll a dice to find the value of each counter
- What is the value of your collection
- What is the most efficient way to add?

Enable?

Extend?

Going Further

This is my collection of 24



This is the numbers I added to find my total. What could I have rolled for each colour?

4, 12, 2, 6, 18, 15, 12, 9, 24

What did I roll?

This is my collection of 24



The total of my quantity is 102, What could I have rolled for each colour?

Modify?

Data

This is my collection of 24



1. What type of graph have you created?
2. What needs to be include in this graph
3. Tell me a story about your graph
4. could you rearrange into a different graph?

Data

Arrange your squares in towers according to colour



1. If each of these counters represent a fruit what could the graph be about and how could it be labelled?
2. What if each counter represented 4 fruits.

Turn and talk

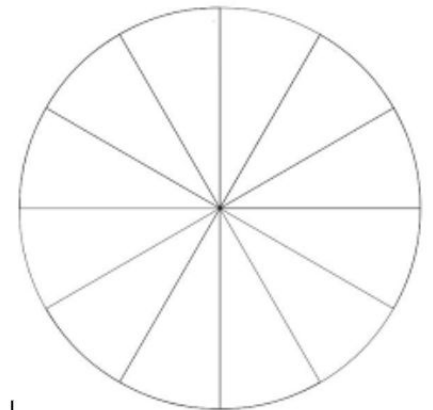
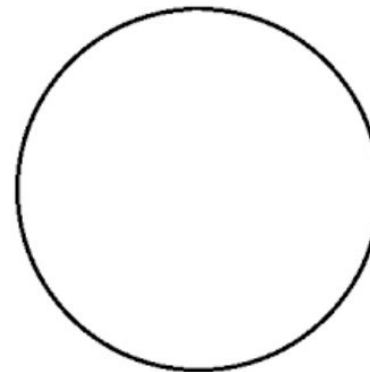
Data/Chance

Grab 12 squares and arrange in towers according to colour



I had a spinner that I spun 12 times and these were the results

Visualise and tell me about my spinner. Explain your reasoning



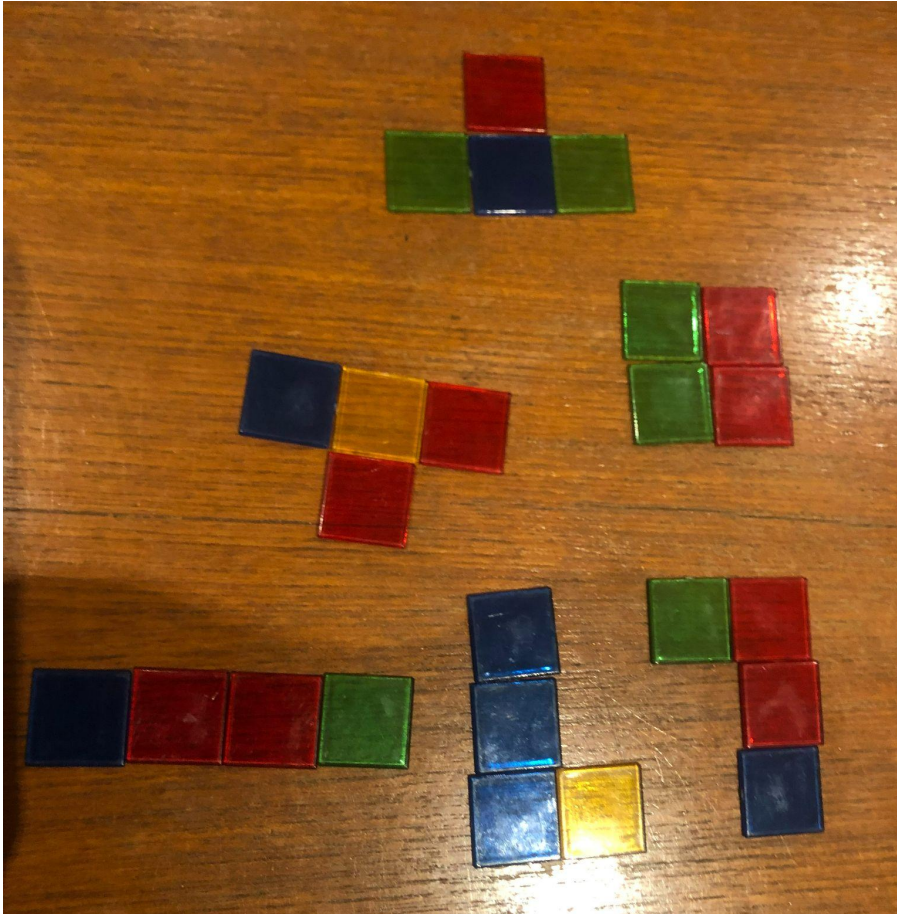
Area and Perimeter 1

How many shapes Can you make
with an area of 4 square units?

(Straight sides must join straight
sides)



Area and Perimeter 1

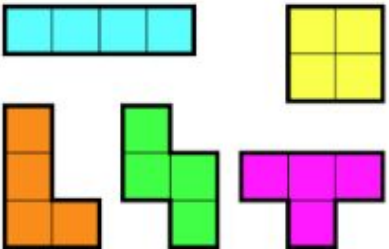


How many shapes Can you make with an area of 4 square units?

(Straight sides must join straight sides)

Space

Using just 4 Squares how many tetrominoes can you find (CEM)

	Rotational Symmetry	No Rotational Symmetry
Reflective Symmetry		
No Reflective Symmetry		

What about Pentominoes (group of 5) Maths 300

Area and Perimeter 2



Using the 24 squares can you write your name, nickname or a short version of your name?

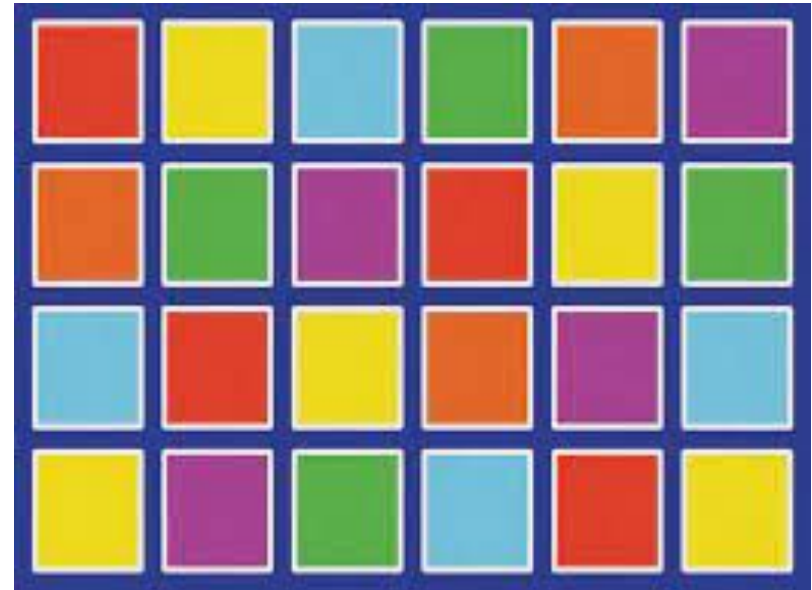
What is the area of your name?

What is the perimeter of your name?

Fractions 1

Create a flag or rectangle with
your square tiles.

Identify the fraction
represented by each of the
colours.



Fractions 2 - Junior

Working in pairs with one set of 24 square cubes.

Task 1. Each build an interesting object with $\frac{1}{2}$ the squares tiles. (explain your structure to your partner)

Task 2 Each create a shape with $\frac{1}{4}$ of the squares (explain your shape to your partner)

Task 3 Each create a building with $\frac{1}{3}$ of the square tiles

etc

Observations

- Can they find....

$$\frac{1}{2}$$

$$\frac{1}{4}$$

$$\frac{1}{3}$$

Of 24

Chocolate Fractions

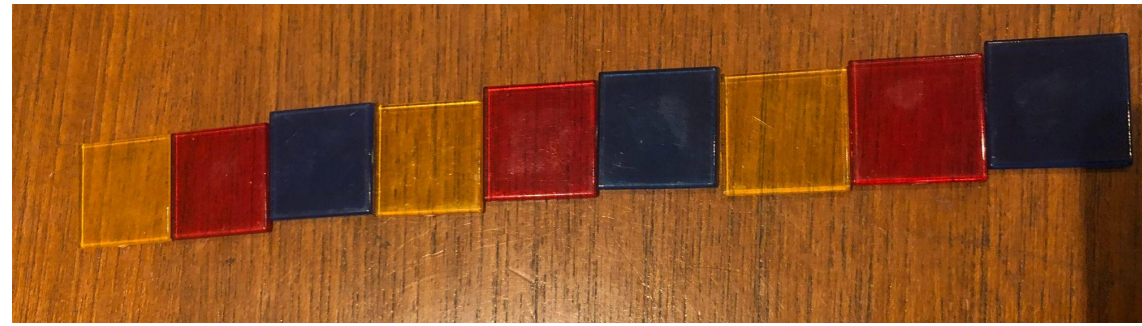
Jay is given a block of chocolate that is made up of square pieces.
The block is 6 pieces wide and 4 pieces long



She eats the outside pieces, what fraction of the block did she eat?

Ref - Australian Maths Trust (Problemo) Doug Clarke Sharing 3 choc bars

Repeating Patterns



7 Elements to Exploring Patterns

1. **Identification** of core element (blue, red, yellow)
 2. **Replication** (with different colours or copy)
 3. **Completion** (Cover a part. What's missing)
 4. **Prediction** (What comes next, consider both ends)
 5. **Extension** (20th colour? etc)
 6. **Description or generalisation** (rule)
 7. **Representation** (symbols to represent)
- Reference: Rosemary Irons

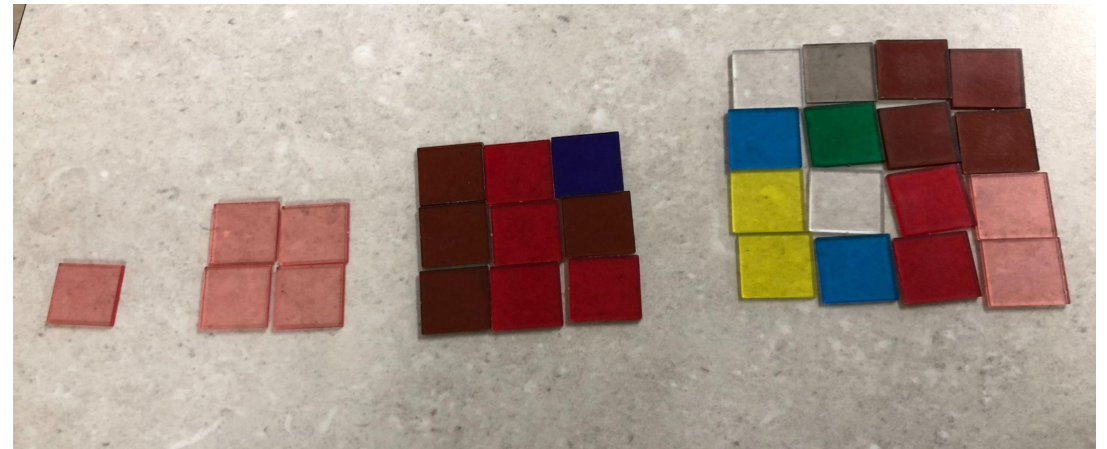
Growing patterns 1



What comes next?

How is it growing?

Growing patterns 2



Term	Term 1	Term 2	Term 3	Term 4
No of Square	1	4	9	16
Relationship	adding on each side, +3, +5, +7 T x itself, rule is T^2			



Exit Ticket

One thing I can use straight away

One thing I would like to gradually implement

One thing I need to know more about?

References

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<https://www.youcubed.org/>

<https://wodb.ca/>



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