

# Greater Depth

## Greater Depth through the use of Variation

Alison Turner

Primary Maths Teaching for  
Mastery Specialist and NCETM  
PD Accredited lead

# **Greater Depth**

Greater Depth through the use of Variation

Alison Turner

Primary Maths Teaching for Mastery  
Specialist and NCETM PD Accredited lead

# What do we mean by Greater Depth?

# Mastery and Mastery with Greater Depth

‘development of deep rather than superficial conceptual understanding.’

‘some pupils will grasp concepts more rapidly than others and will need to be stimulated and challenged to ensure continued progression.’ ‘Research indicates that these pupils benefit more from enrichment and deepening of content, rather than acceleration into new content.’

‘Acceleration is likely to promote superficial understanding, rather than [the] true depth and rigour of knowledge’

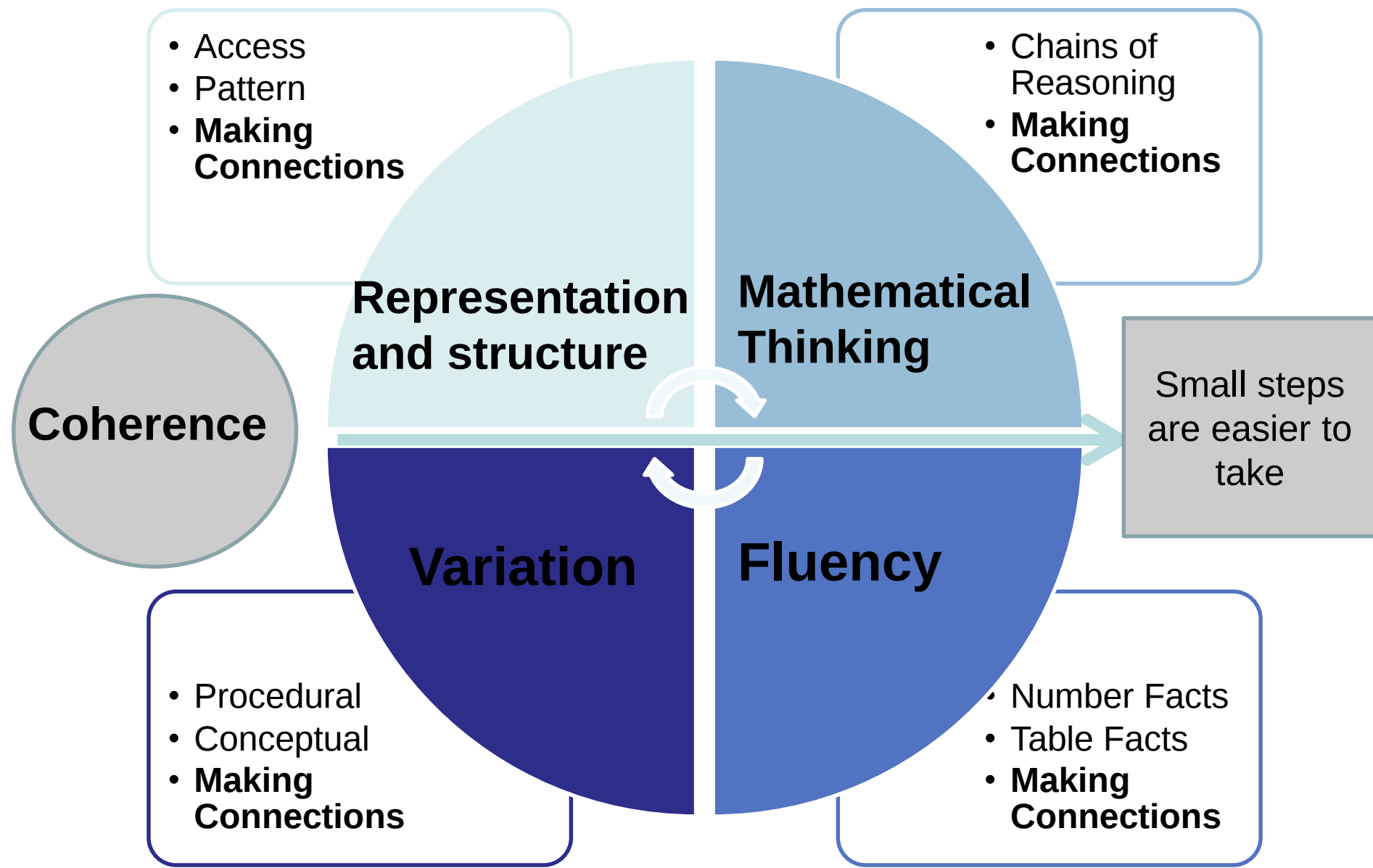
# Mastery and Mastery with Greater Depth

Developing mastery with greater depth is characterised by pupils' ability to:

- solve problems of greater complexity including '**non-routine problems**' (i.e. where the approach is not immediately obvious), demonstrating creativity and imagination;
- independently explore and investigate mathematical contexts and structures, communicate results clearly and systematically explain and generalise the mathematics.

TfM Assessment Documents (NCETM)

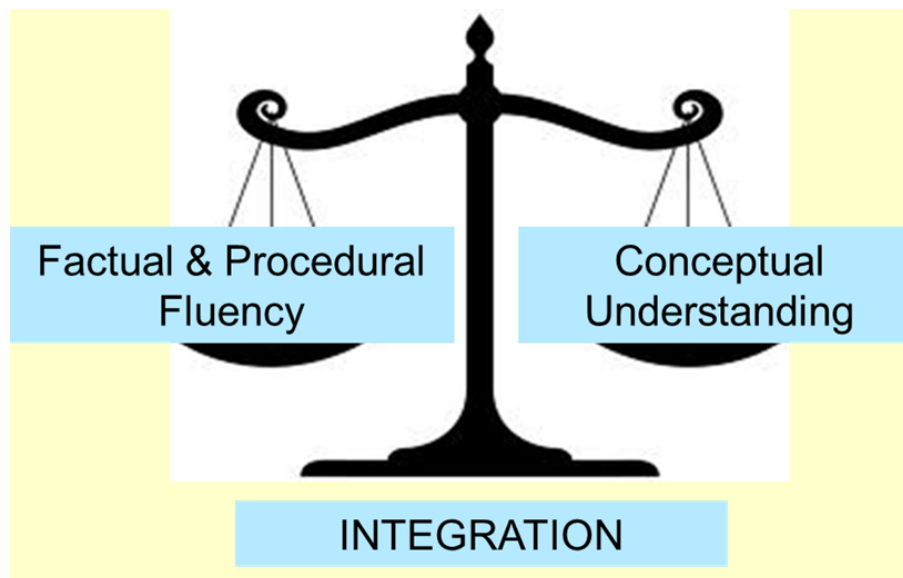
# Teaching for Mastery



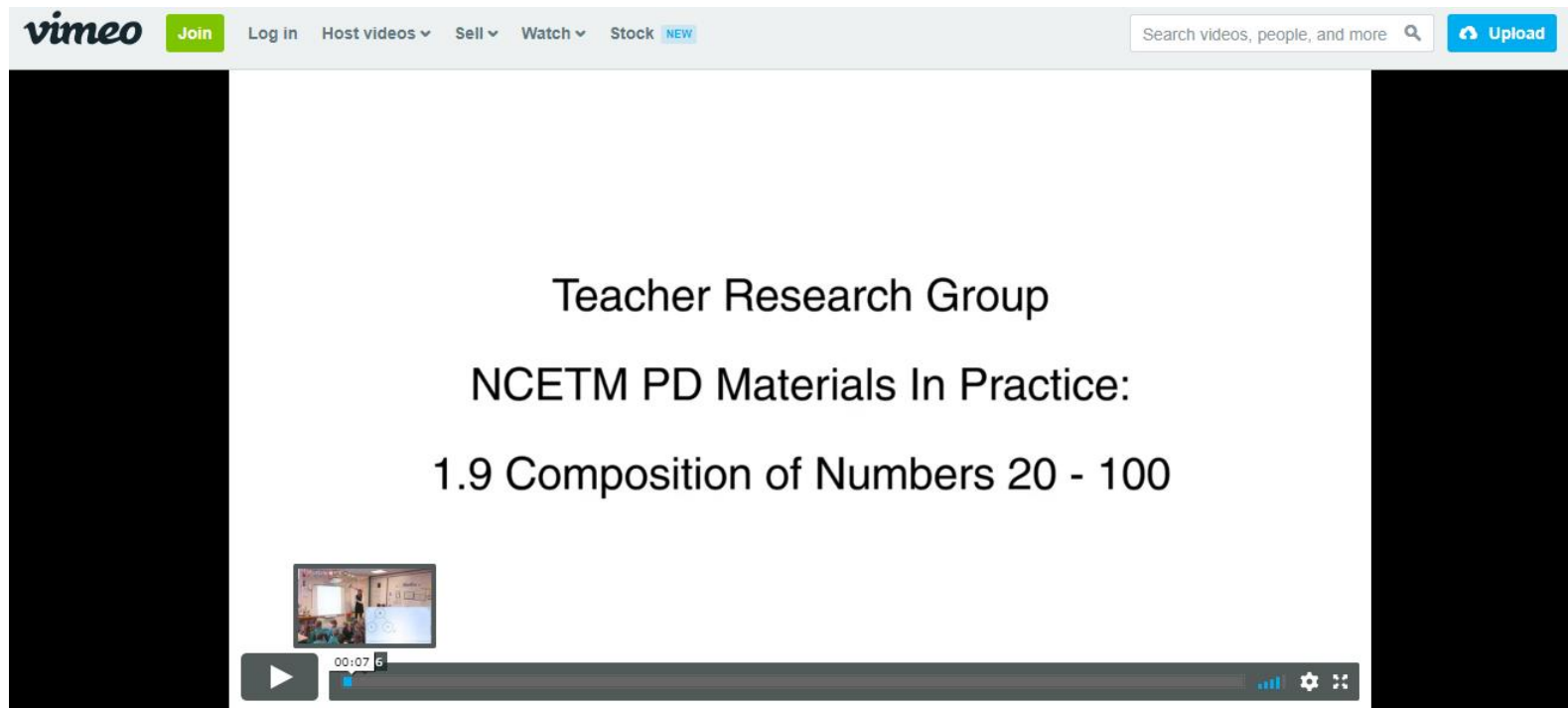
## Greater Depth through Variation

Knowing a set of rules for solving a problem is far from enough - it is also knowing why a computation makes sense.

Li Ping Ma (2010)



# Greater Depth through Variation



Whilst watching consider how children are encouraged to think deeper.

## Variation

‘the structure of the exercise as a whole, not the individual items, [that] promotes common mathematical sense-making.’

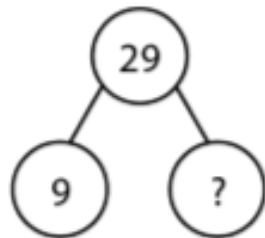
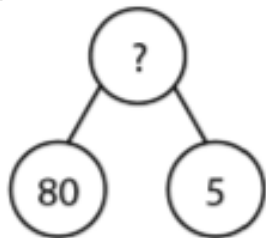
“tasks that carefully display constrained variation are generally likely to result in progress in ways that unstructured sets do not”, and that wisely planned variation, for instance in a task or set of examples, can make certain aspects noticeable for the learner.’

Kullberg et al (2017)

# Depth for all: Independent work & Misconceptions

**Task 1:** Complete the number statements, the first few have models to help you.

a)



$$\boxed{\phantom{00}} = 80 + 5$$

$$29 - 9 = \boxed{\phantom{00}}$$

b)

$$\boxed{\phantom{00}} = 4 + 70$$

$$\boxed{\phantom{00}} = 7 + 40$$

$$74 = \boxed{\phantom{00}} + 70$$

$$47 = 7 + \boxed{\phantom{00}}$$

$$35 - 30 = \boxed{\phantom{00}}$$

$$45 - 40 = \boxed{\phantom{00}}$$

$$55 - \boxed{\phantom{00}} = 50$$

$$\boxed{\phantom{00}} - 60 = 5$$

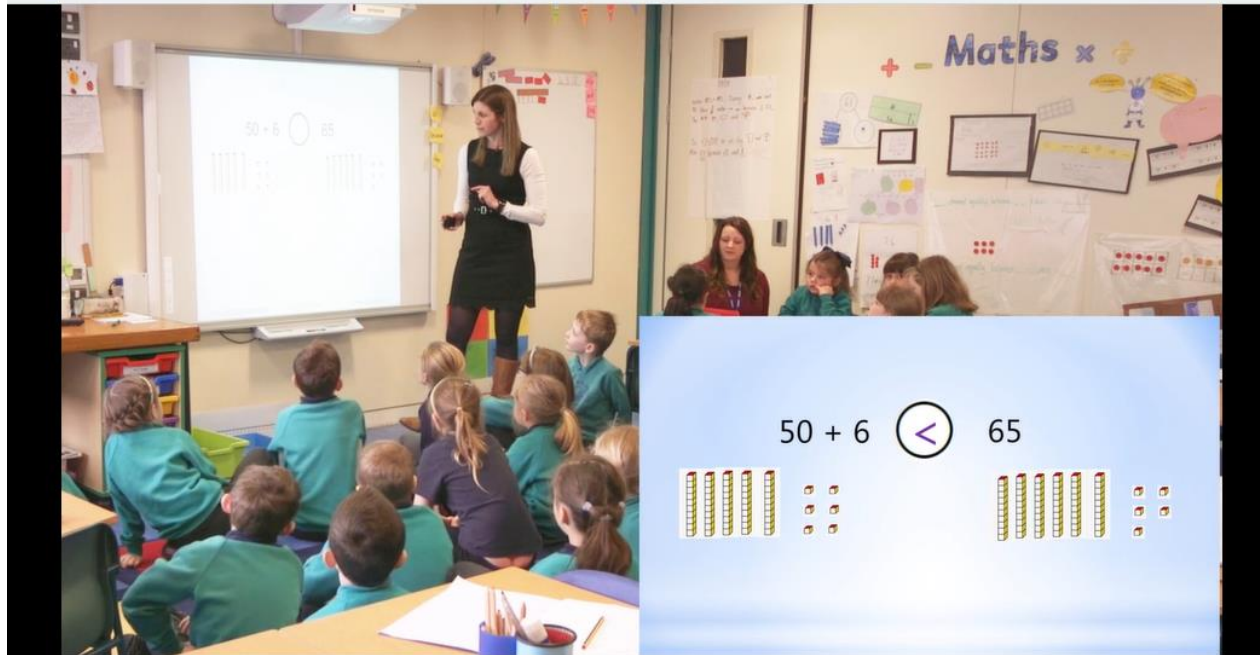
$$\boxed{32} = 3 + 20 \quad \text{✗}$$

$$\boxed{17} = 3 + 20 \quad \text{✗}$$

# Greater Depth through Variation

What's the same and what's different?

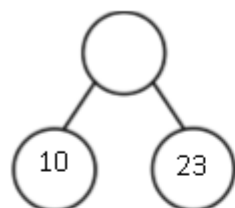
Join Log in Host videos Sell Watch Stock NEW Search videos, people, and more



50 + 6 < 65

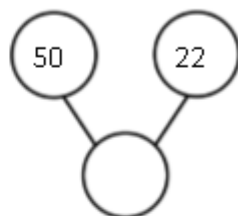
Debbie Morqan T....pptx

**Task 1:** Complete the missing parts/boxes.

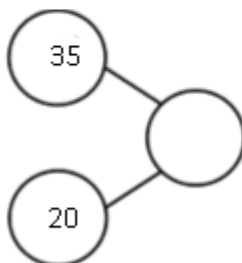


| 10s | 1s |
|-----|----|
|     |    |

$$\boxed{10} + \boxed{23} = \boxed{\phantom{00}}$$

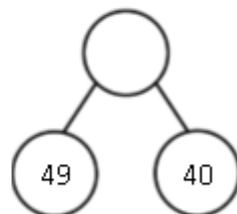


$$\boxed{50} + \boxed{22} = \boxed{\phantom{00}}$$



| 10s | 1s |
|-----|----|
|     |    |

$$\boxed{\phantom{00}} = \boxed{35} + \boxed{20}$$



$$\boxed{\phantom{00}} = \boxed{\phantom{00}}$$

**Task 2:** Complete the number statements.

$$14 + 20 = \boxed{\phantom{00}}$$

$$10 + 43 = \boxed{\phantom{00}}$$

$$24 + 20 = \boxed{\phantom{00}}$$

$$20 + 43 = \boxed{\phantom{00}}$$

$$34 + 20 = \boxed{\phantom{00}}$$

$$30 + 43 = \boxed{\phantom{00}}$$

**Challenge:**

Which one doesn't belong?

$$\boxed{53 = 30 + 23}$$

$$\boxed{56 = 33 + 23}$$

$$\boxed{34 + 30 = 64}$$

$$\boxed{13 + 10 + 20 = 43}$$

Explain how you know using tens and ones to help you.



Write these addition sentences as multiplication sentences.

$$10 + 10 + 10 + 5 + 5 =$$

$$2 + 2 + 2 + 4 =$$

$$2 + 2 + 4 + 4 =$$

$$5 + 5 + 5 + 2 + 3 =$$

What's the same and what's different?

$$2 \times 3 = \boxed{6} \div 3 = 2 \quad 2 \times 3 = \boxed{6}$$

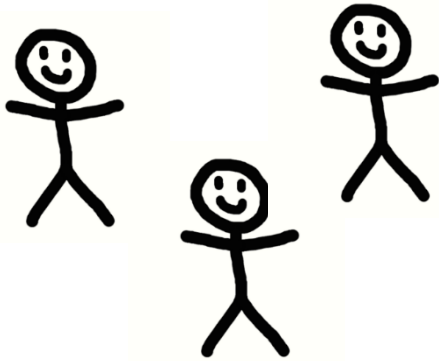
$$2 \times 30 = \boxed{60} \div 3 = 20 \quad 20 \times 3 = \boxed{60}$$

$$2 \times 300 = \boxed{600} \div 3 = 200 \quad 200 \times 3 = \boxed{600}$$

? sweets...



? bags...



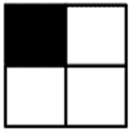
$$3 \overline{) 261}$$

# What is a fraction and what is it **not**?

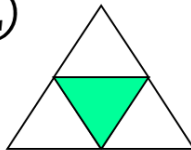
Task 1:

Consider ways of representing  $\frac{1}{4}$  . Tick or cross each one.

①



②



③



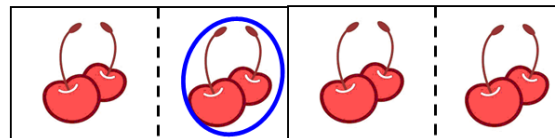
④



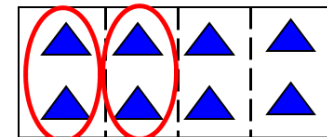
⑤



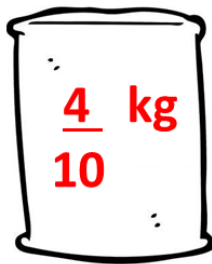
⑥



⑦

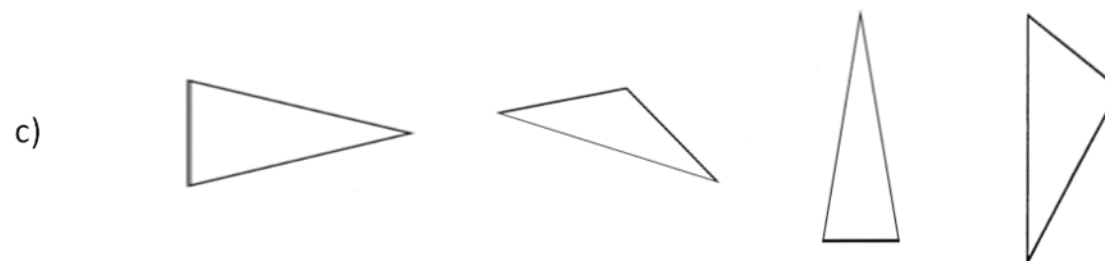
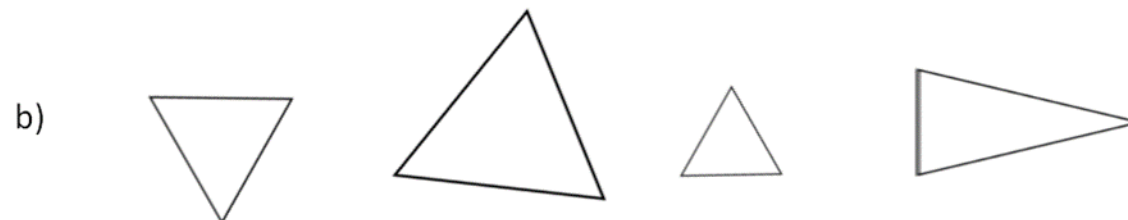
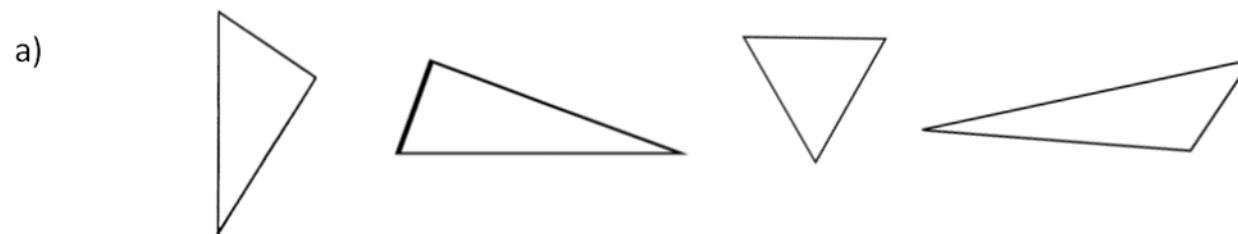


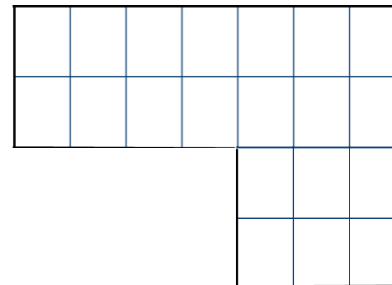
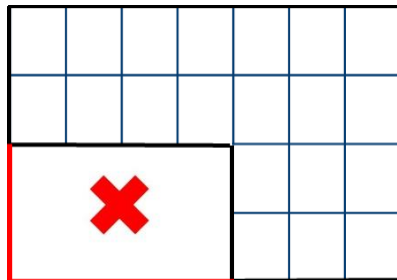
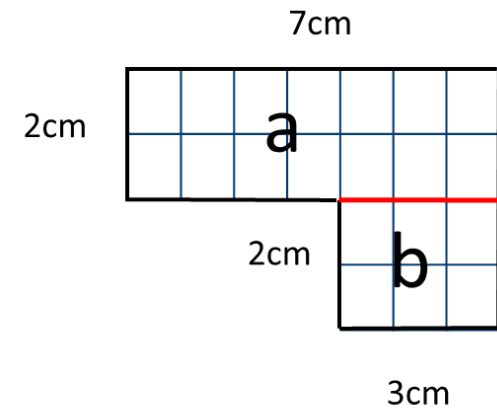
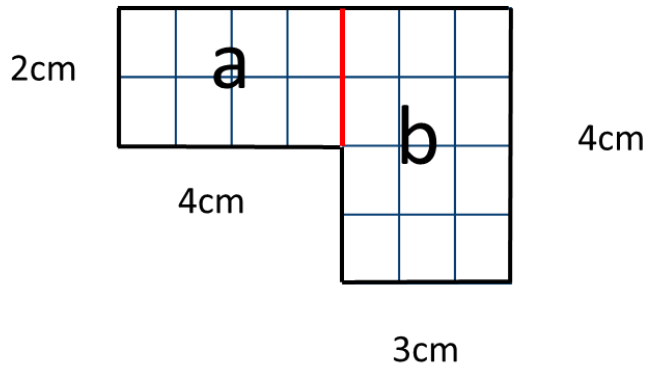
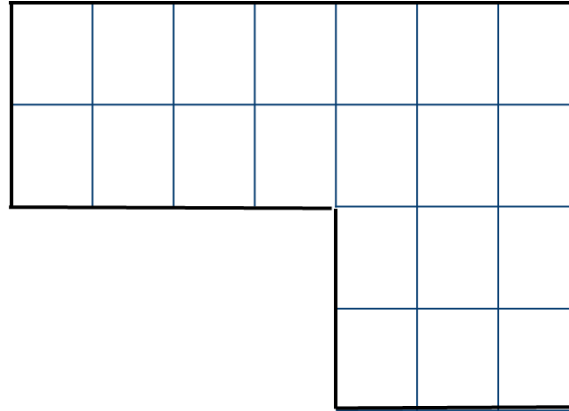
# Comparing using $<$ $>$ $=$



**Task 1:** Which triangle does not belong in each of the sets below? Put a cross in it and explain why it does not belong.

Think about what is the same and what is different when comparing them.





## Addition and Subtraction

### Selected National Curriculum Programme of Study Statements

Pupils should be taught to:

- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
- use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy

### The Big Ideas

Deciding which calculation method to use is supported by being able to take apart and combine numbers in many ways. For example, calculating  $8 \cdot 78 + 5 \cdot 26$  might involve calculating  $8 \cdot 75 + 5 \cdot 25$  and then adjusting the answer.

The associative rule helps when adding three or more numbers:  $367 + 275 + 525$  is probably best thought of as  $367 + (275 + 525)$  rather than  $(367 + 275) + 525$ .

### Mastery Check

Please note that the following columns provide indicative examples of the sorts of tasks and questions that provide evidence for mastery and mastery with greater depth of the selected programme of study statements. Pupils may be able to carry out certain procedures and answer questions like the ones outlined, but the teacher will need to check that pupils really understand the idea by asking questions such as 'Why?', 'What happens if ...?', and checking that pupils can use the procedures or skills to solve a variety of problems.

| Mastery                                                                                                                                                                                                   | Mastery with Greater Depth                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>Calculate <math>36 \cdot 2 + 19 \cdot 8</math></p> <ul style="list-style-type: none"> <li>■ with a formal written column method</li> <li>■ with a mental method, explaining your reasoning.</li> </ul> | <p>Jasmine and Kamal have been asked to work out <math>5748 + 893</math> and <math>5748 - 893</math>.</p> <p>Jasmine says, '893 is 7 less than 900, and 900 is 100 less than 1000, so I can work out the addition by adding on 1000 and then taking away 100 and then taking away 7.'</p> <p>What answer does Jasmine get, and is she correct?</p> <p>Kamal says, '893 is 7 less than 900, and 900 is 100 less than 1000, so I can work out the subtraction by taking away 1000 and then taking away 100 and then taking away 7.'</p> <p>What answer does Kamal get, and is he correct?</p> <p>If you disagree with either Jasmine or Kamal, can you correct their reasoning?</p> |

## Greater Depth

- Is:
  - Greater Depth Thinking
  - Greater Depth Understanding
  - Greater Depth Problem Solving
- Is not:
  - a “level” to label

### **Something to think about...**

At the end of KS2 a measure (higher score) is used to make a judgement but does this relate to Greater Depth thinking?