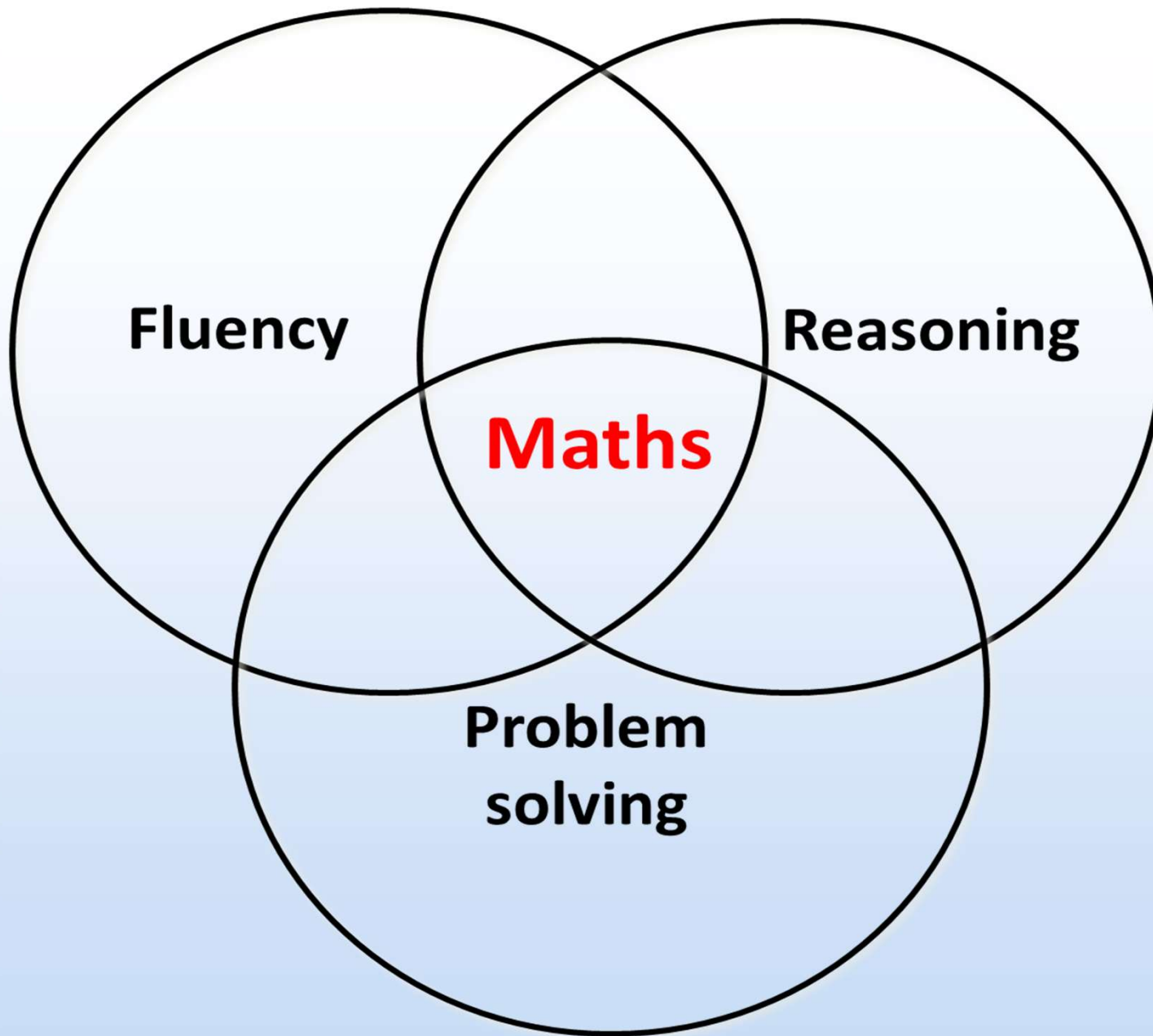




Maths – The New Curriculum
REASONING



Fluency

Reasoning

Maths

**Problem
solving**

Reasoning in the National Curriculum

reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language

Reasoning

Using what you know to
figure out what you don't
know

Reasoning chains

$$10 \times 8$$

$$2 \times 8$$

$$12 \times 8$$

$$6 \times 16$$

Reasoning

- Trying out examples (specialising)
- Looking for patterns and connections
- Generalising
- Explaining and justifying

Not everything can be figured out by reasoning

- Paris is the capital of France
- Rome is the capital of Italy
- What is the capital of Greece?

Lots of mathematics can be figured out by reasoning

- $200 + 400 = 600$
- $198 + 402 = ?$
- $3 \times 4 = 12$
- $30 \times 40 = ?$
- $15 \times 80 = ?$

Reasoning requires a shift

- From
 - Finding the answer
- To
 - How you got there

Always, sometimes, never true?

- The sum of four even numbers is divisible by 4.
- Multiplication leaves a number unchanged.
- Half a circle is a semi-circle.
- Division makes smaller.

Square root of 144

$\frac{1}{3}$ of 36

3×4

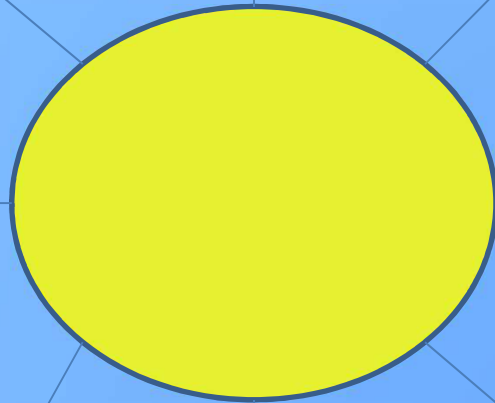
24 divided by 2

10% of 120

6×2

$13 - 1$

$11 + 1$



$$6 \times 40 = 240$$

$$0.6 \times 0.4 = 0.24$$

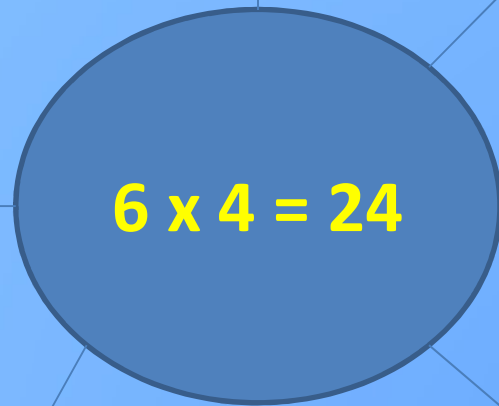
$$3 \times 4 = 12$$

$$6 \times 4 = 24$$

$$0.6 \times 4 = 2.4$$

$$12 \times 4 = 48$$

$$60 \times 40 = 2,400$$



A class has 18 girls.

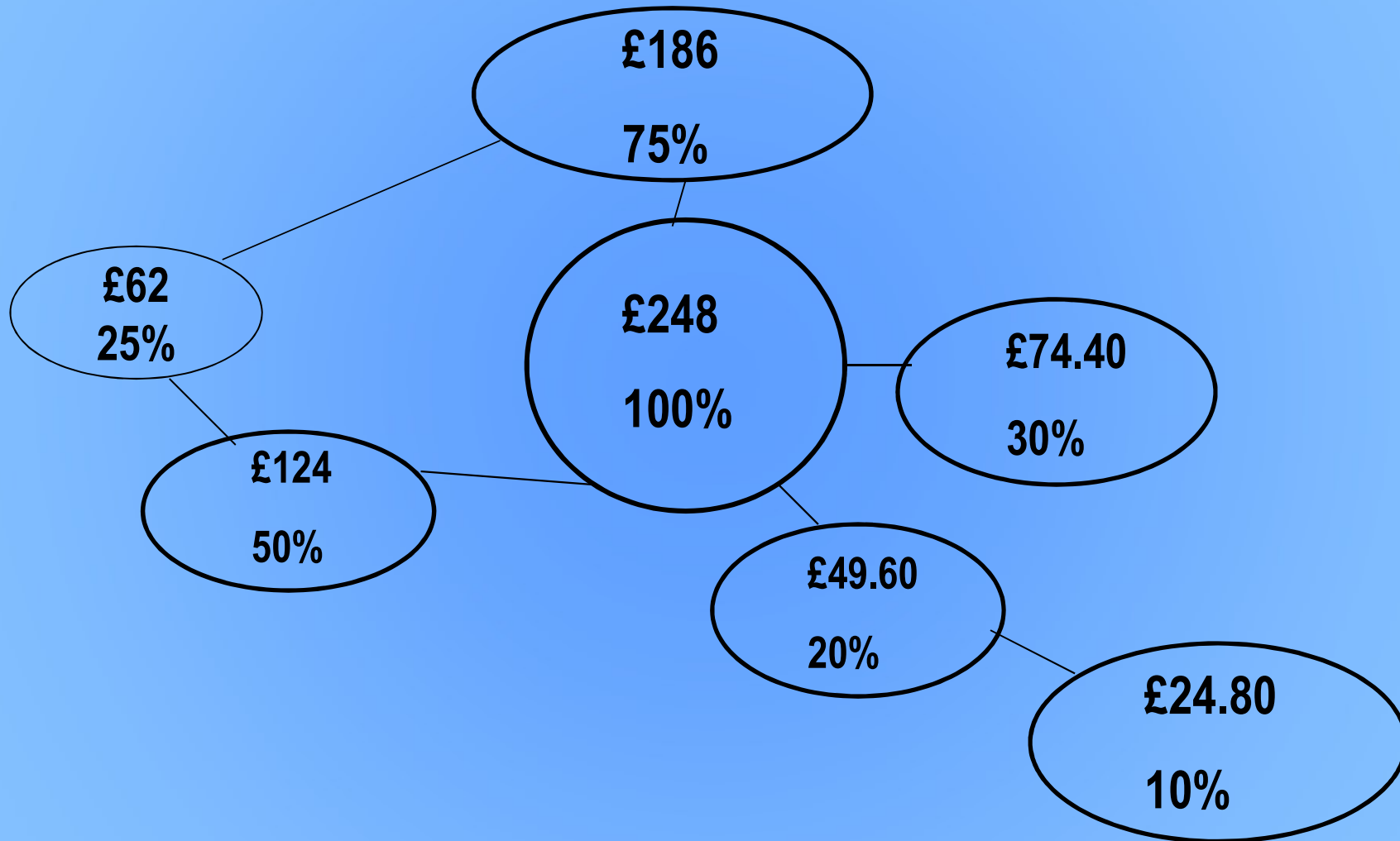
$\frac{1}{4}$ of the class are boys.

Altogether, how many children are in the class?
(use cuisenaire)

- If I know 40% of a number how do I work out the original number
- For reasoning we need the language and mathematical vocabulary

$$3 + 2 = 5$$

Web of several percentages



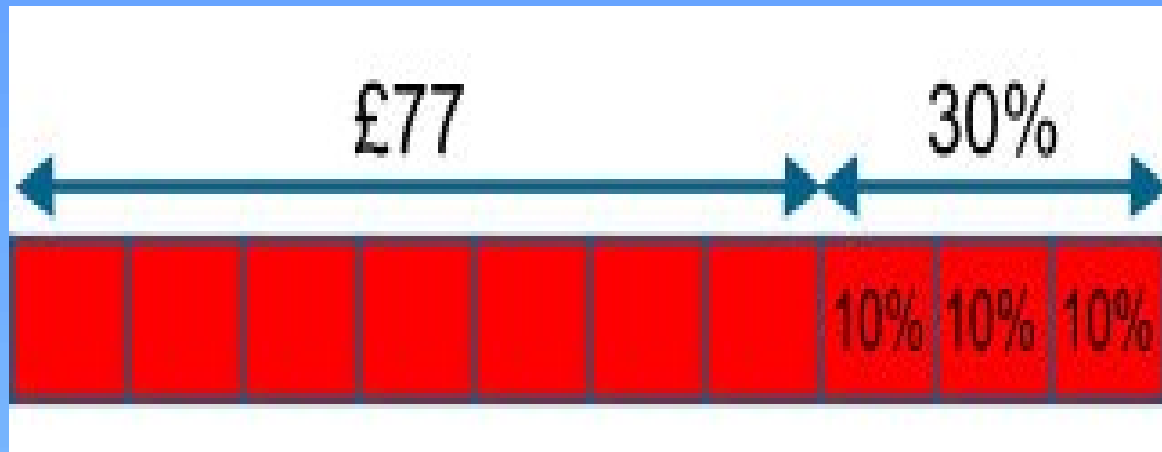
3 + 2 = 5

Different approaches to get to 100%



Percentages

A computer game is reduced in a sale by 30%. Its reduced price is £77. How much was the original price?

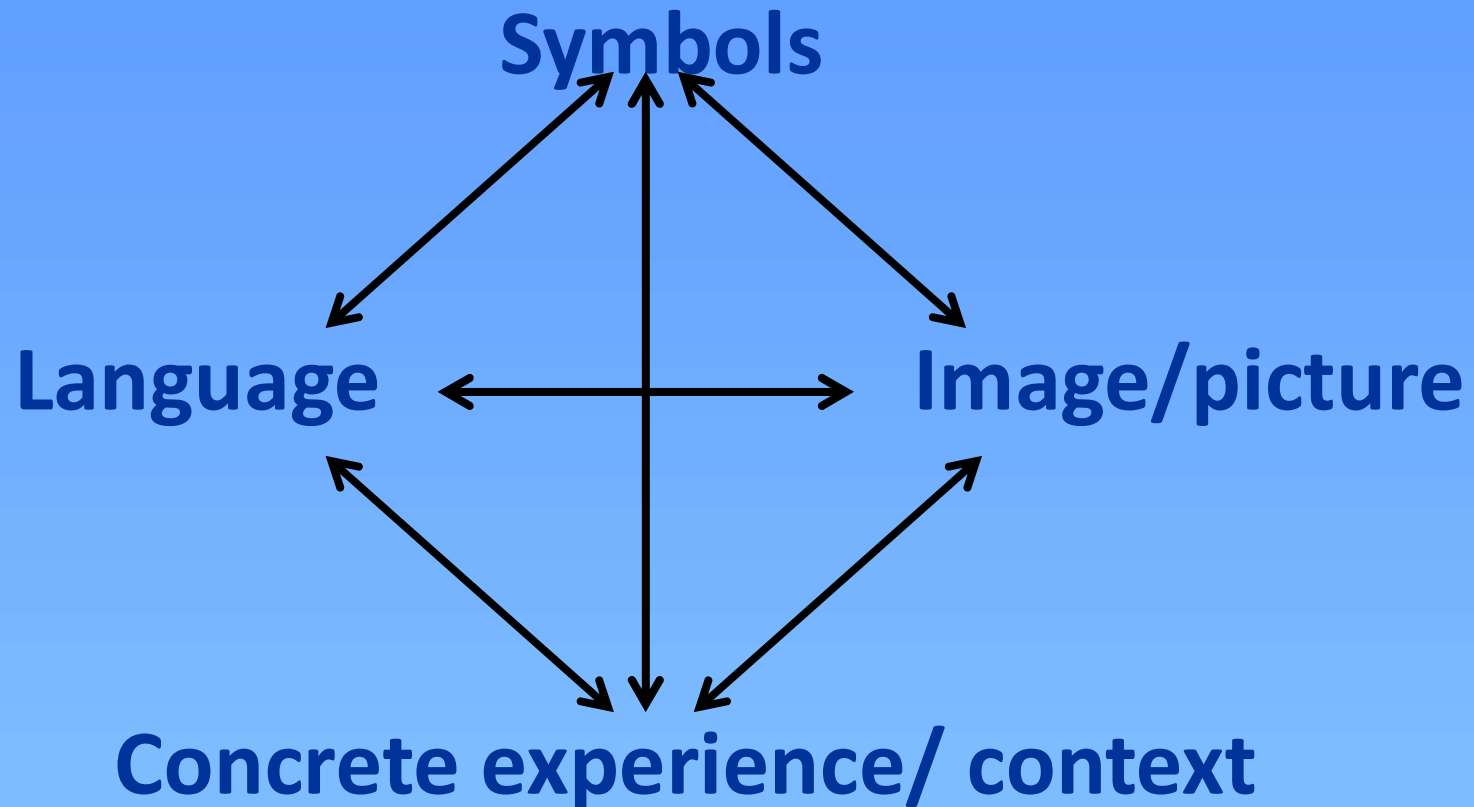


Dividing the bar into ten equal pieces allows us to represent 30% and keep the other pieces the same size.

$$£77 \div 7 = £11$$

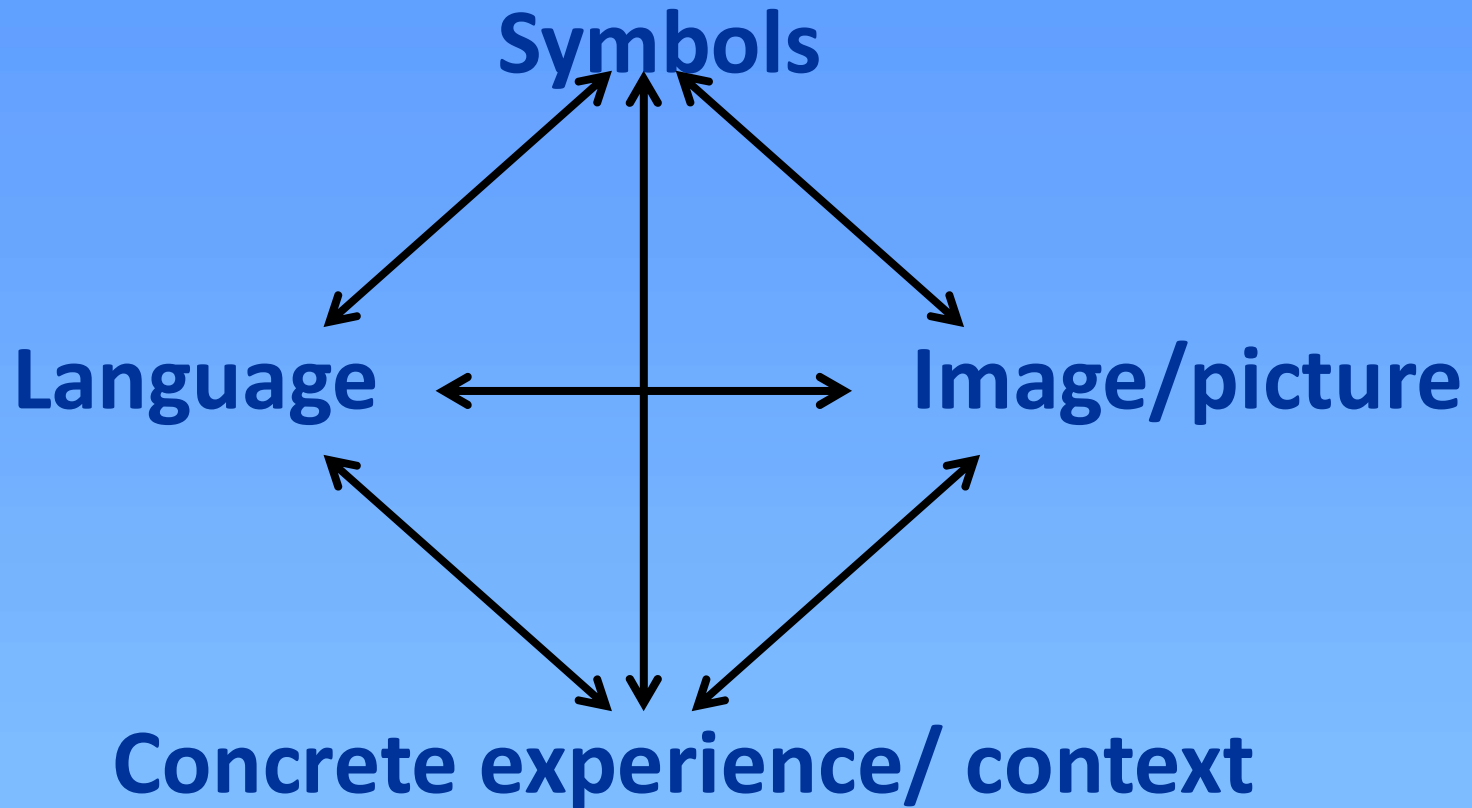
The original cost (the whole bar) is $£11 \times 10 = £110$

CONCRETE \square VISUAL \square ABSTRACT



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The “Connections Model”

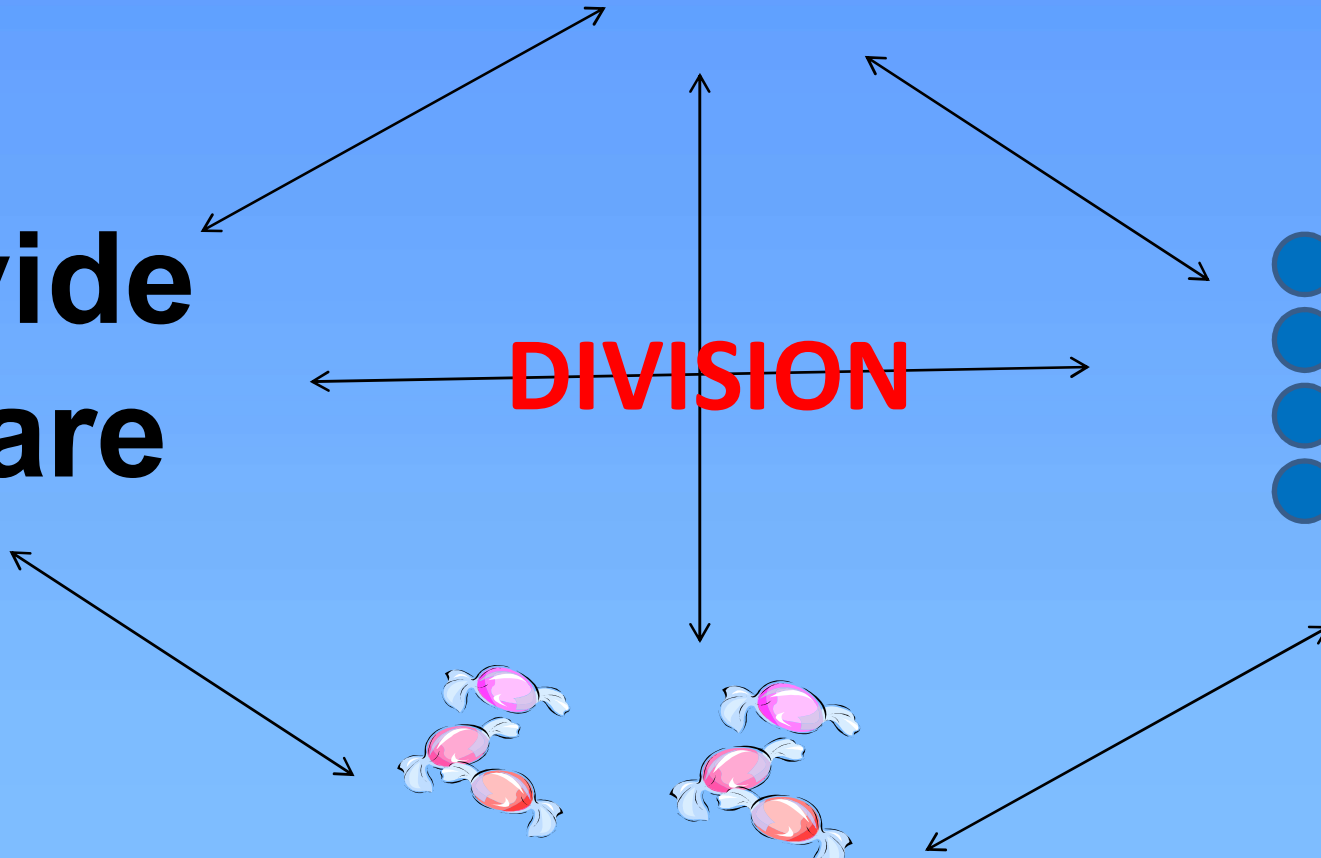
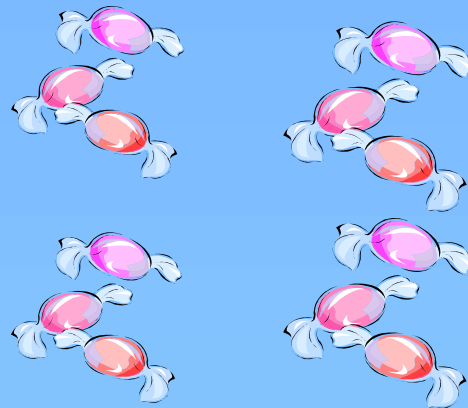
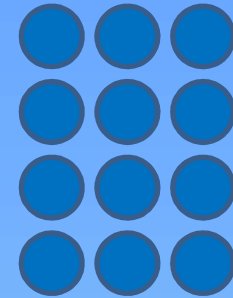


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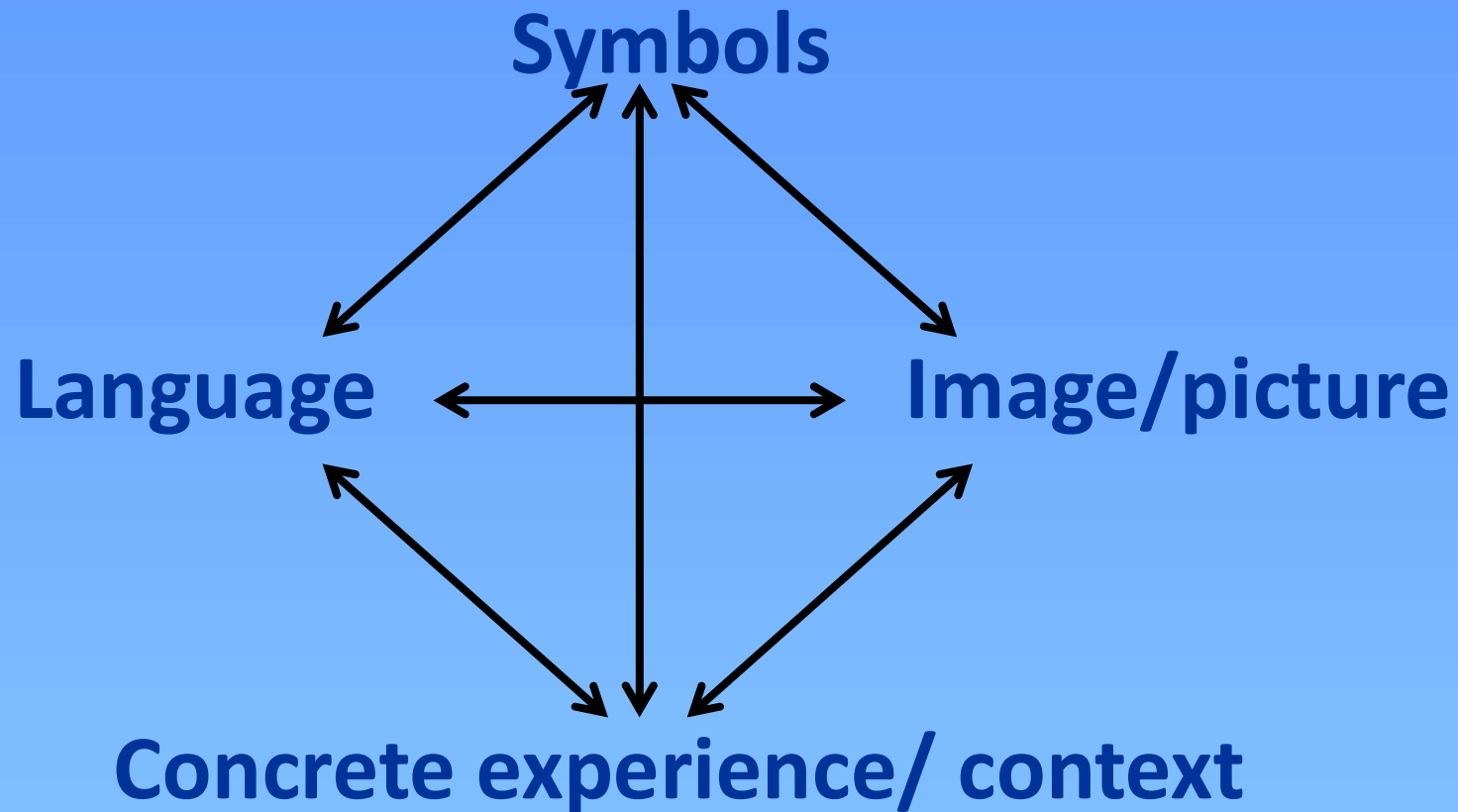
$$12 \div 4$$

**divide
share**

DIVISION



Can you complete the connections model for subtraction?



Derek Haylock and Anne Cockburn