

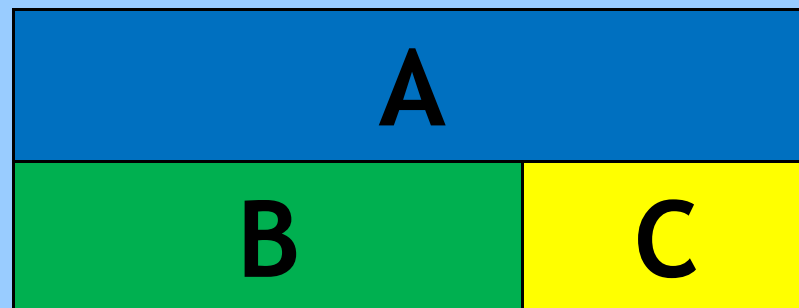


# Progression in bar modelling



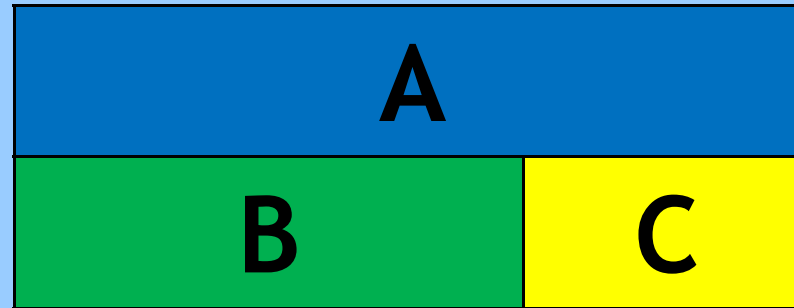
# Uses for bar models

- A way of developing mathematical diagrams that bridge the gap between concrete mathematical experiences and abstract representations.
- It can be used to represent problems involving the four operations, ratio and proportion, fractions and percentages.
- It is also useful for representing unknowns in a problem and as such can be a pre-cursor to more symbolic algebra.

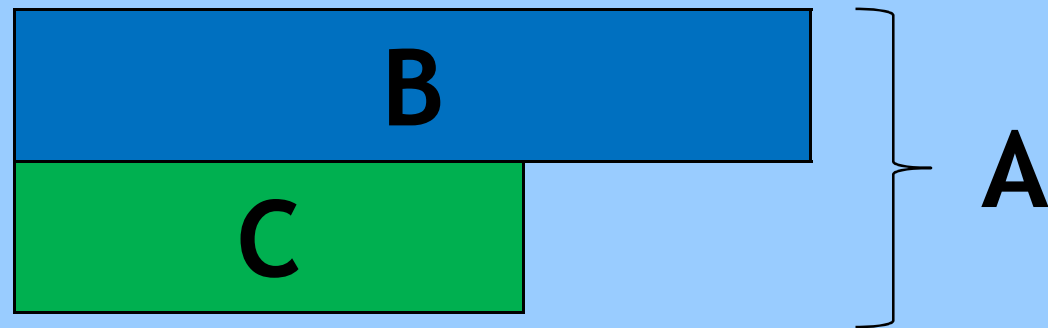


# Types of bar model

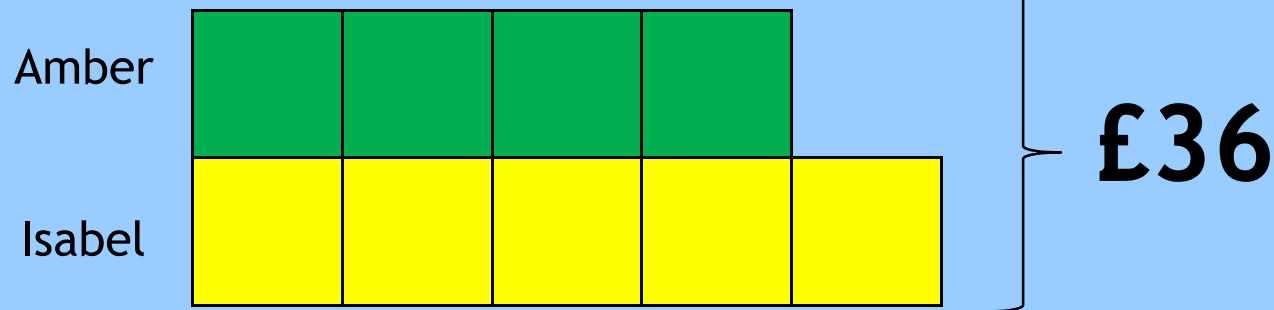
Part-whole models



Comparison models



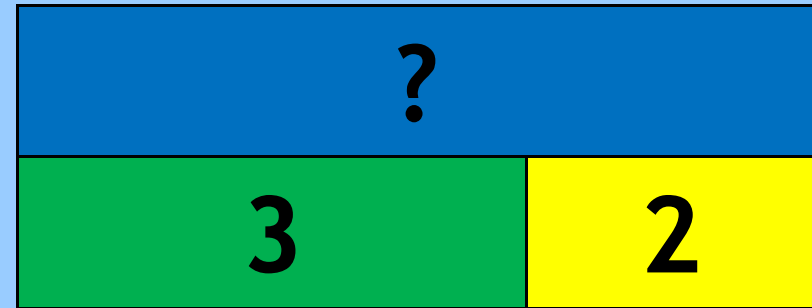
Change/transformation models



# Key addition models

Aggregation (two quantities combined)

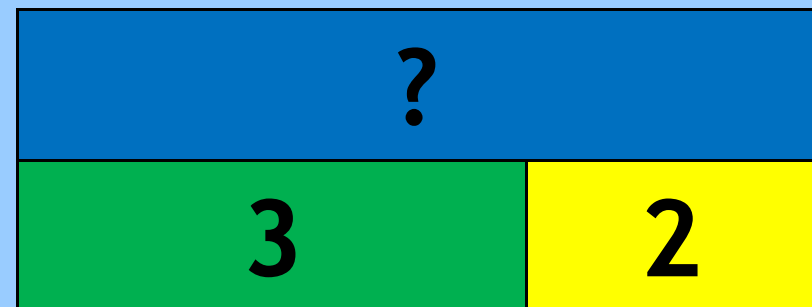
Three green sweets and two yellow sweets are on the table. How many sweets are on the table?



$$3 + 2 = 5$$

Augmentation (one quantity is increased by a provided amount)

James had three stickers. He was given two more. How many stickers does he have now?



$$3 + 2 = 5$$



# Key subtraction models

Take away (one quantity is decreased by a provided amount)

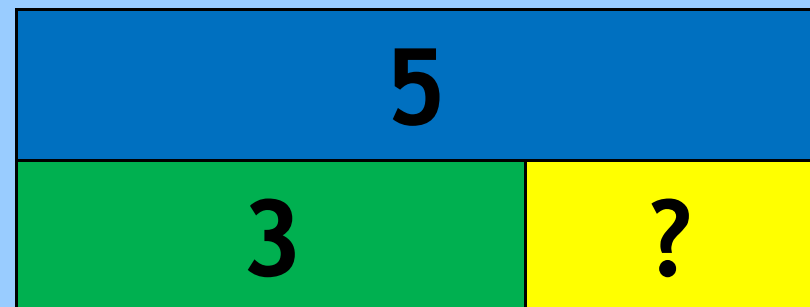
Five sweets were on the table. Tom ate two sweets. How many sweets are on the table now?



$$5 - 2 = ?$$

Comparison (find the difference)

Tom has five sweets and James has three sweets. How many more sweets does Tom have than James?



$$5 - ? = 3$$

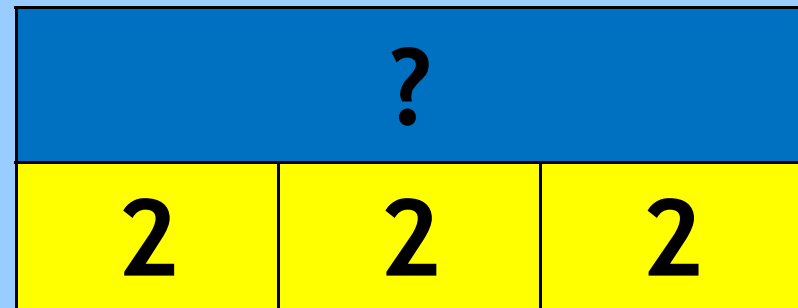
or  $3 + ? = 5$



# Key multiplication models

Multiplication (group size and number of groups provided, product is unknown)

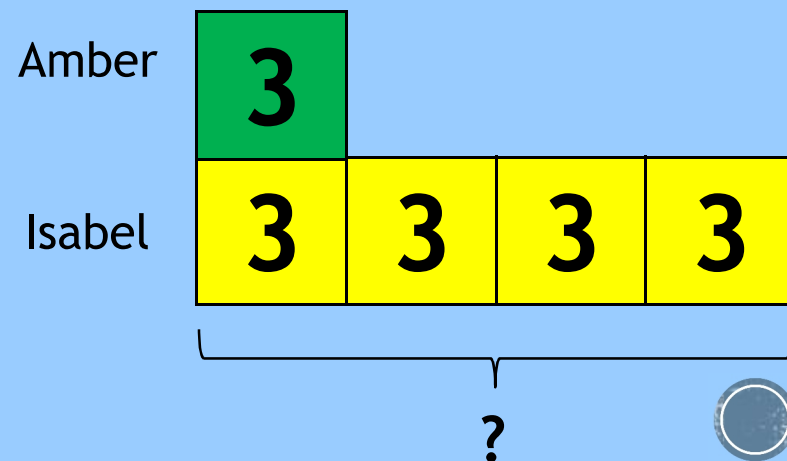
There are three boxes with two teddy bears in each box. How many teddy bears are there in total?



$$2 \times 3 = 6$$

Multiplication (the smaller set and the multiplicative relationship is known, the product is unknown)

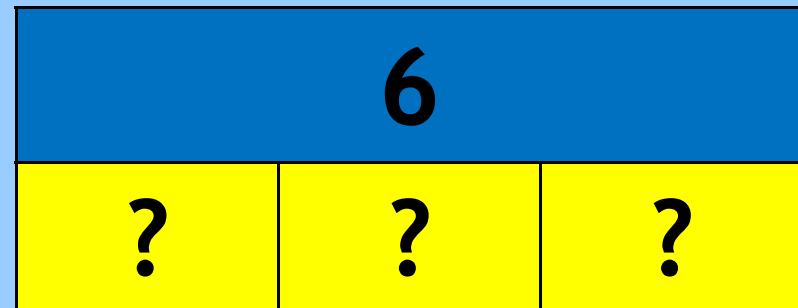
Amber read three books. Isabel read four times as many books as Amber. How many books did Isabel read?



# Key division models

Sharing (product and number of groups is known, group size is unknown)

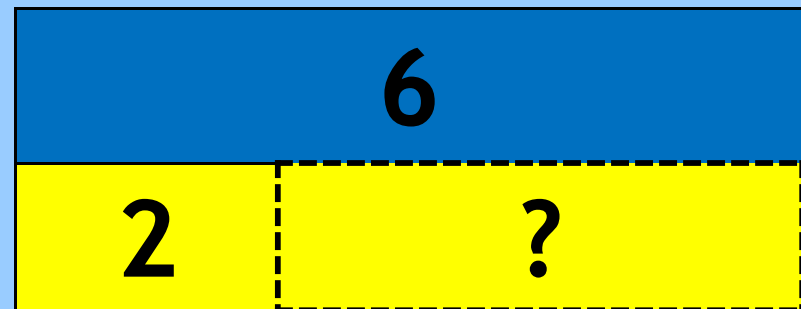
If six teddy bears are shared equally into 3 boxes, how many teddy bears will be in each box?



$$6 \div 3 = 2$$

Grouping (product and groups size is known, number of groups is unknown)

If six teddy bears are to be packed 2 to a box, how many boxes are needed?



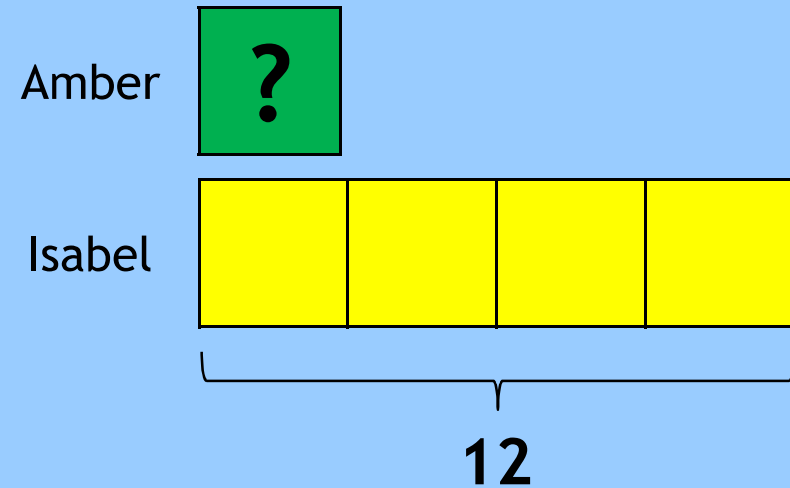
$$6 \div 2 = 3$$



# Key division models

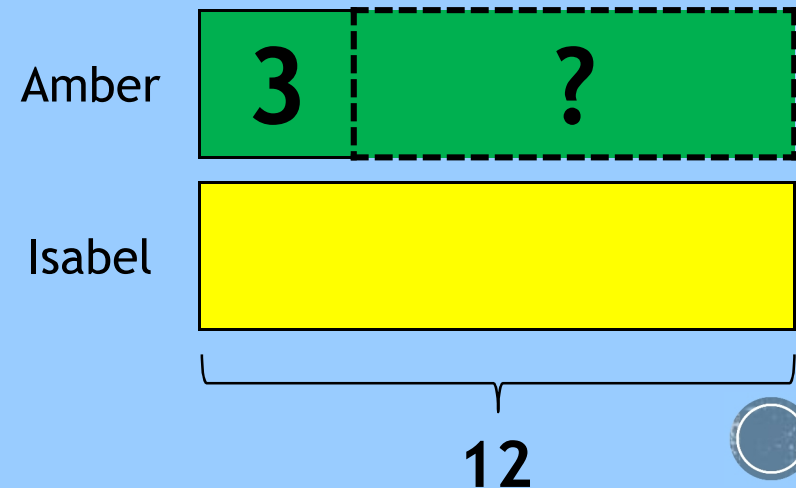
Sharing (the larger set and the multiplicative relationship is known, the smaller set is unknown)

Isabel read 12 books and that is four times as many books as Amber read.  
How many books did Amber read?



Grouping (the larger set and the smaller set is known, the multiplicative relationship is unknown)

Isabel read 12 books and Amber read 3 books.  
How many times as many books did Isabel read as Amber did?



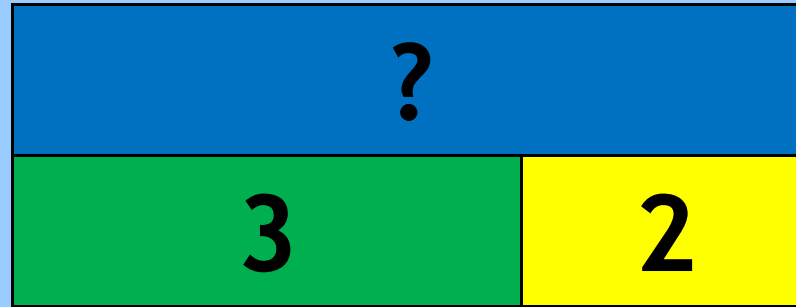


# A useful strategy

A useful strategy at any stage of the bar modelling process is:

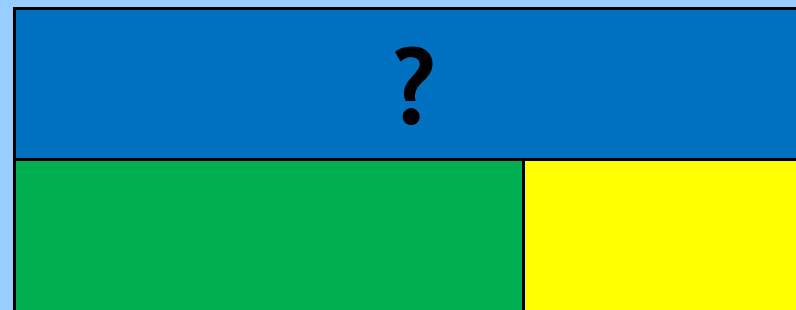
## 1. Example

Three green sweets and two yellow sweets are on the table. How many sweets are on the table?



## 2. Guided practice

Five green sweets and three yellow sweets are on the table. How many sweets are on the table?



## 3. Independent practice

Six apples and two bananas are on the table. How many pieces of fruit are on the table?



whole,  
biggest,  
everything,  
final amount,  
**Do you have the  
TOTAL ?**

?	
20	10

**NO**

I have parts

I need to combine

Do you have  
**EQUAL** parts or  
groups ?

**NO**

**YES**

**+ ADD**

?	
20	10

in all, altogether, total,  
combine, sum, more

**× MULTIPLY**

?		
10	10	10

each, equally, times, per,  
every, share, rate

**YES**

I am missing parts

30	
20	?

I need to separate

Do you need  
**EQUAL** parts or  
groups ?

**NO**

**YES**

**- SUBTRACT**

30	
20	?

left, difference, change, more than,  
less than, how much/many ??-er

**÷ DIVIDE**

30		
?	?	?

each, equally, times, per  
every, share, rate