Introduction to Bar Modelling

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Aim

To use bar modelling as a technique to support the process of solving word problems.

With the aid of these simple strip diagrams, children can use straightforward reasoning to solve many challenging story problems conceptually.
Beckmann (2004 p46)

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How would you solve this?

24 In a class, 18 of the children are girls.

A quarter of the children in the class are boys.

Altogether, how many children are there in the class?

RUCSAC?

Tom has 20 sweets and shares some of them with his sister.

He gives his sister 5.

How many does he have?

The bar model

http://www.bbc.co.uk/skillswise/0/24925787

*In the 1960s American psychologist Jerome Bruner put forward a theory that people learn in three basic stages: by handling real objects, through pictures, and through symbols.

*In the 1980s Singapore developed its model method based on Bruner's theory.

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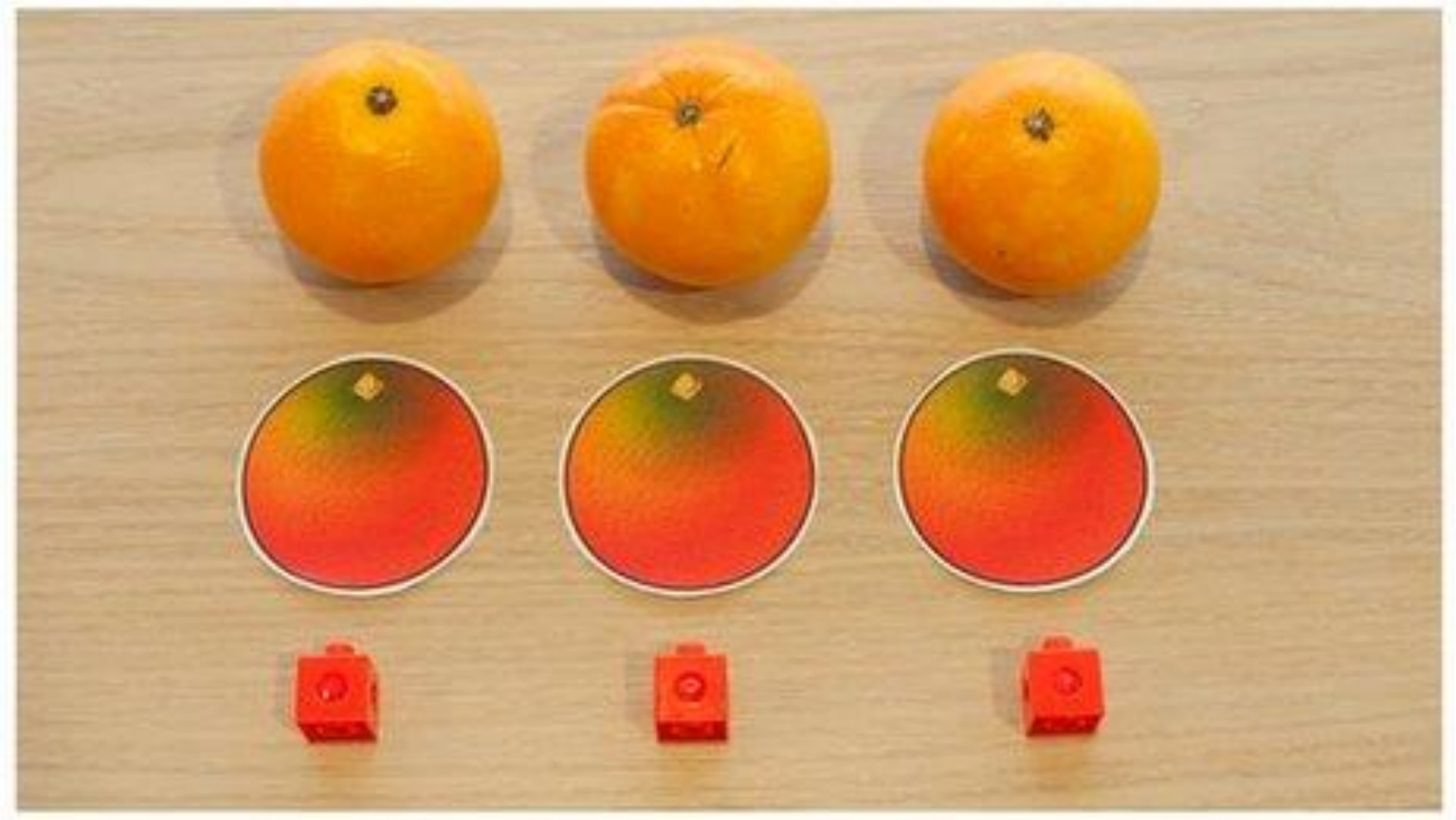
Science STEM myscience

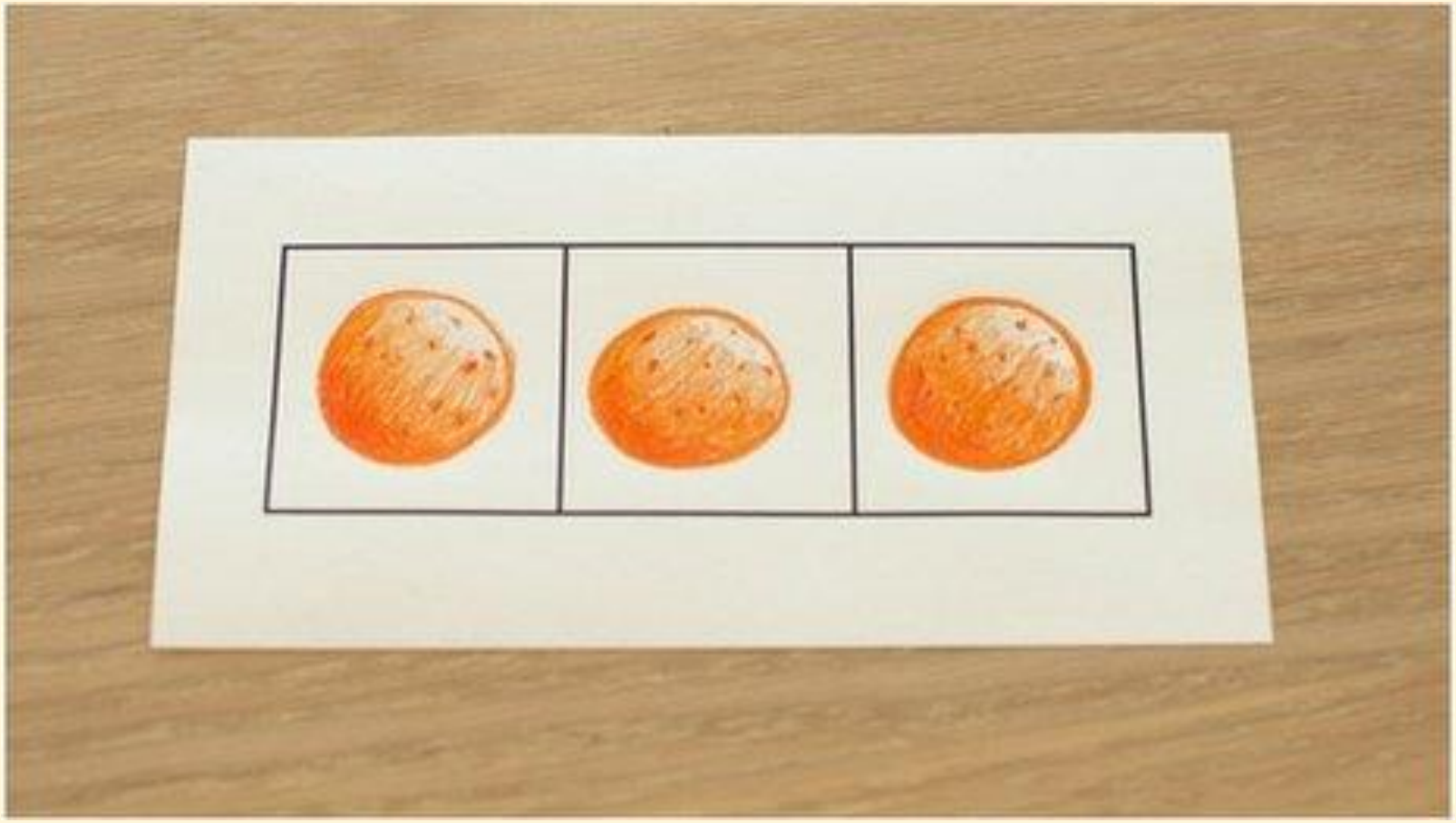
Starting with the physical object

1. Lining up objects in a row



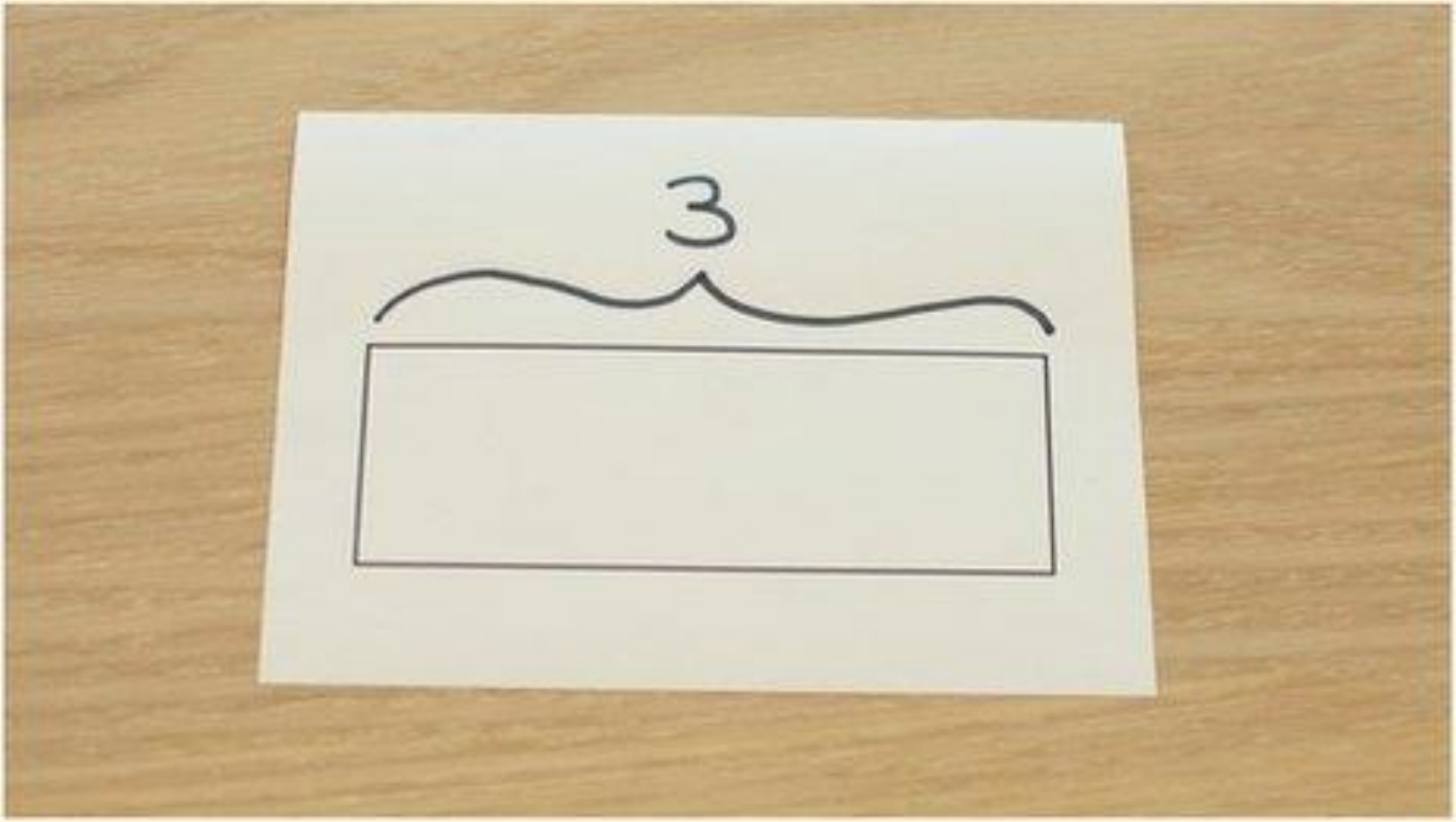
Moving onto pictorial images

2. Drawing boxes around pictures



Symbolic representation

3. Labelling the boxes



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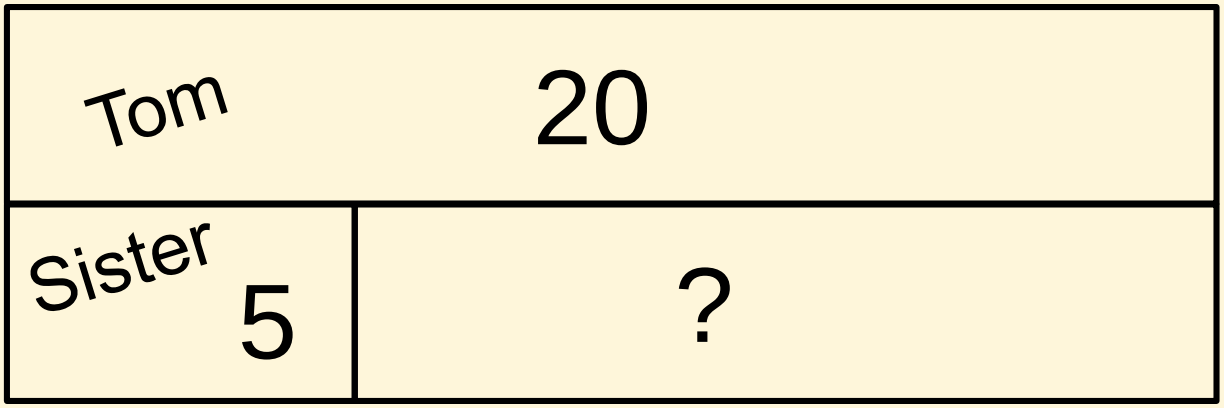

Using the bar model for addition and subtraction

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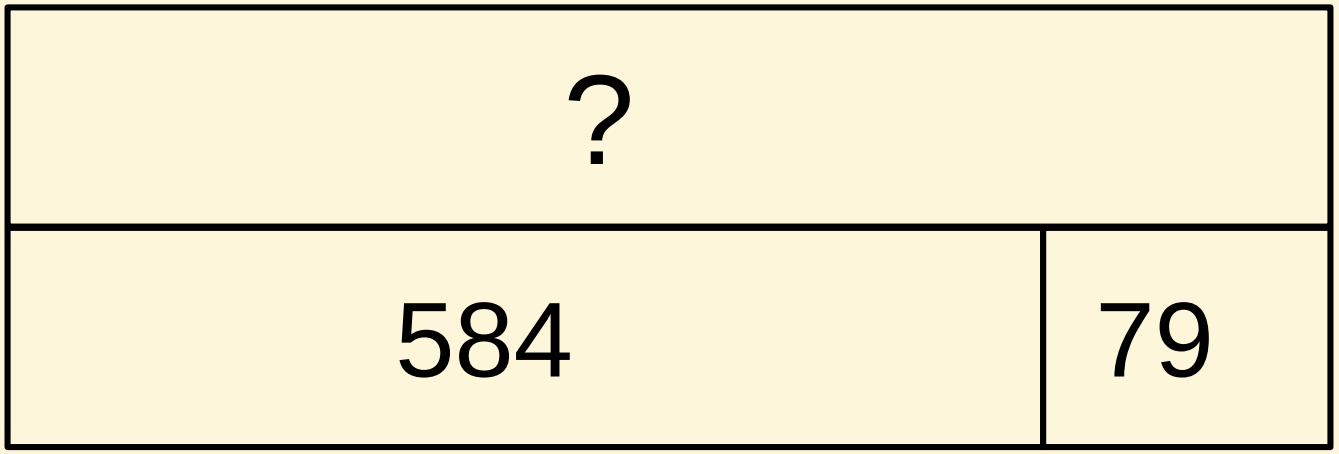
584 + 79 = _____



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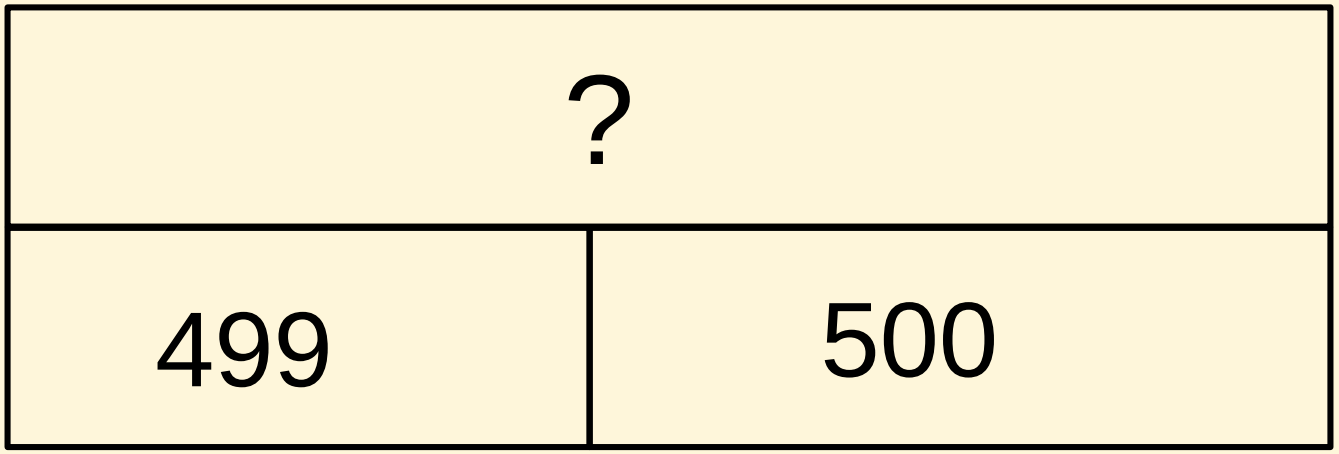
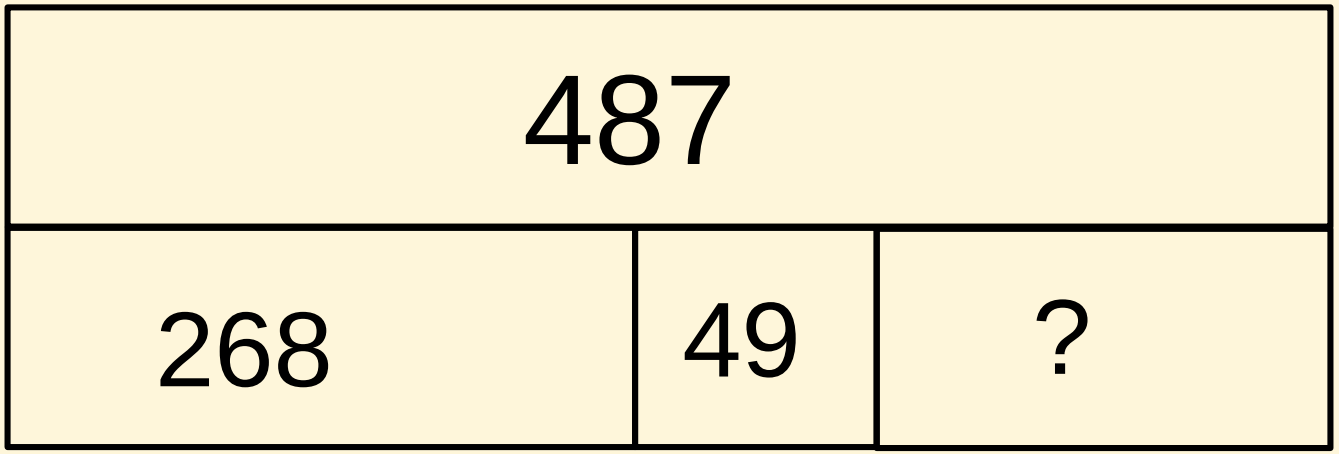
_____ - 499 = 500

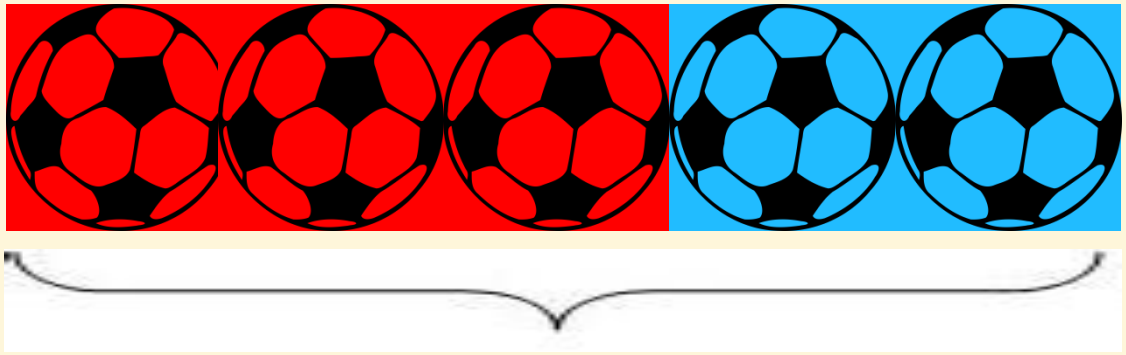


487 = 268 + 49 + _____



Addition

There are 3 footballs in the red basket and 2 footballs in the blue basket.
How many footballs are there altogether?



?

Subtraction

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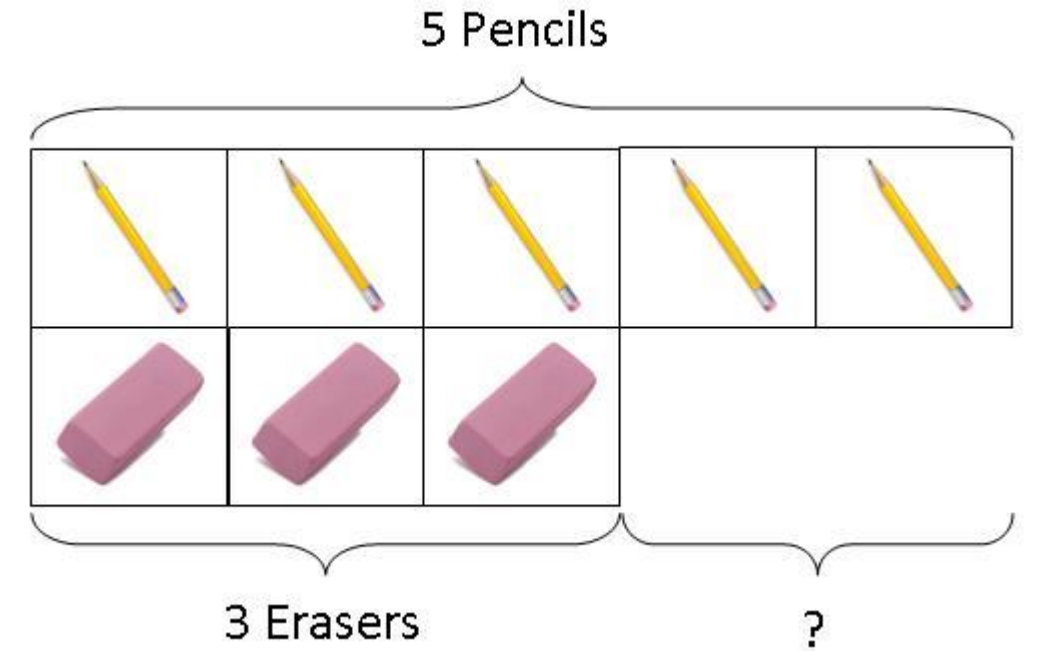
Peter has 5 pencils and 3 rubbers. How many more pencils than rubbers does he have?



Generalisation

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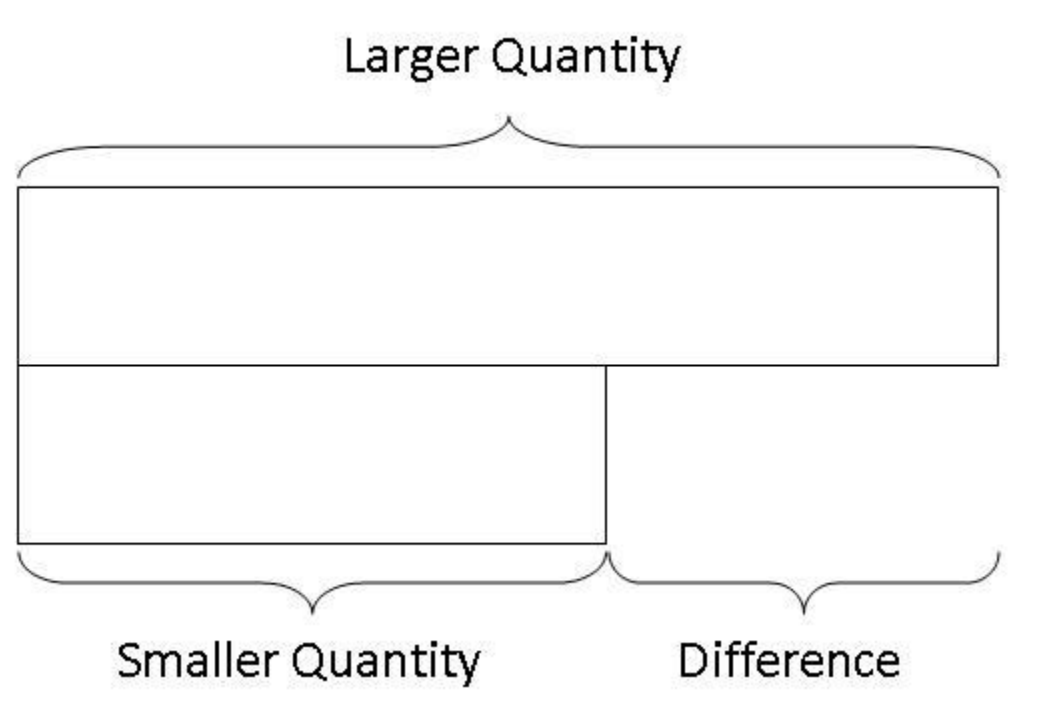
Whole



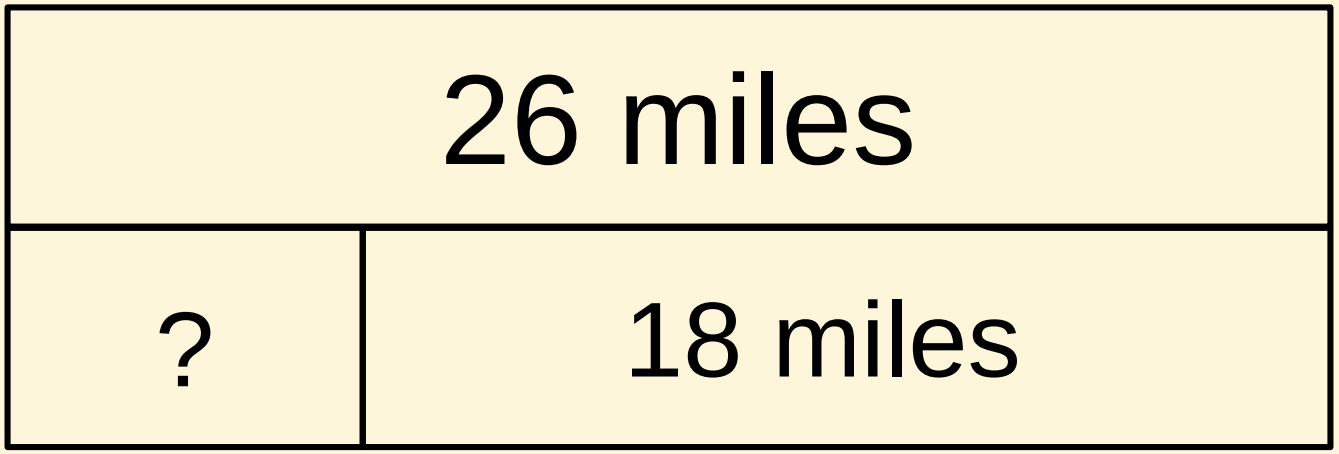
Part Part

Problems to solve

Kelsey was running a 26 mile marathon. After 18 miles she felt very tired. How many more miles did she have to run?

Ali had £10. He bought a DVD for £6.70 and a CD for £2.90.
How much money did he have left?

Kelsey was running a 26 mile marathon. After 18 miles she felt very tired. How many more miles did she have to run?



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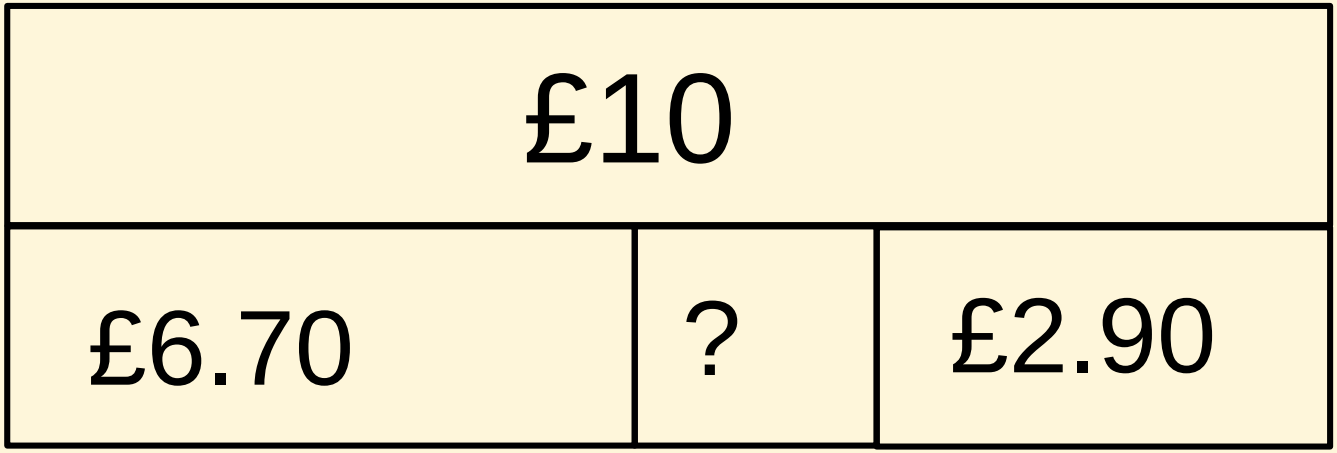

Using the bar model for Multiplication and division

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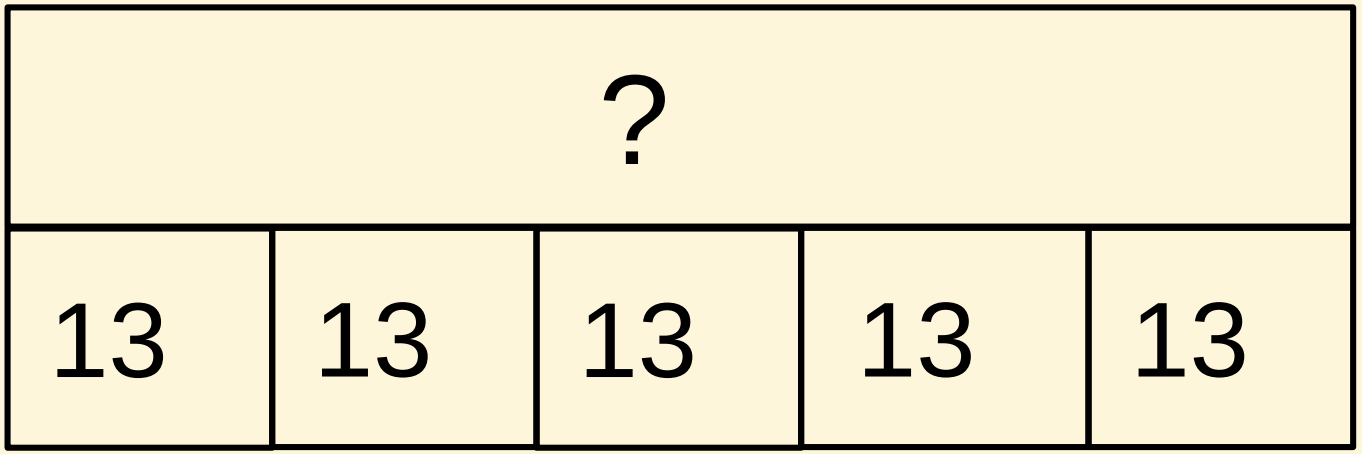
5 x 13 = _____



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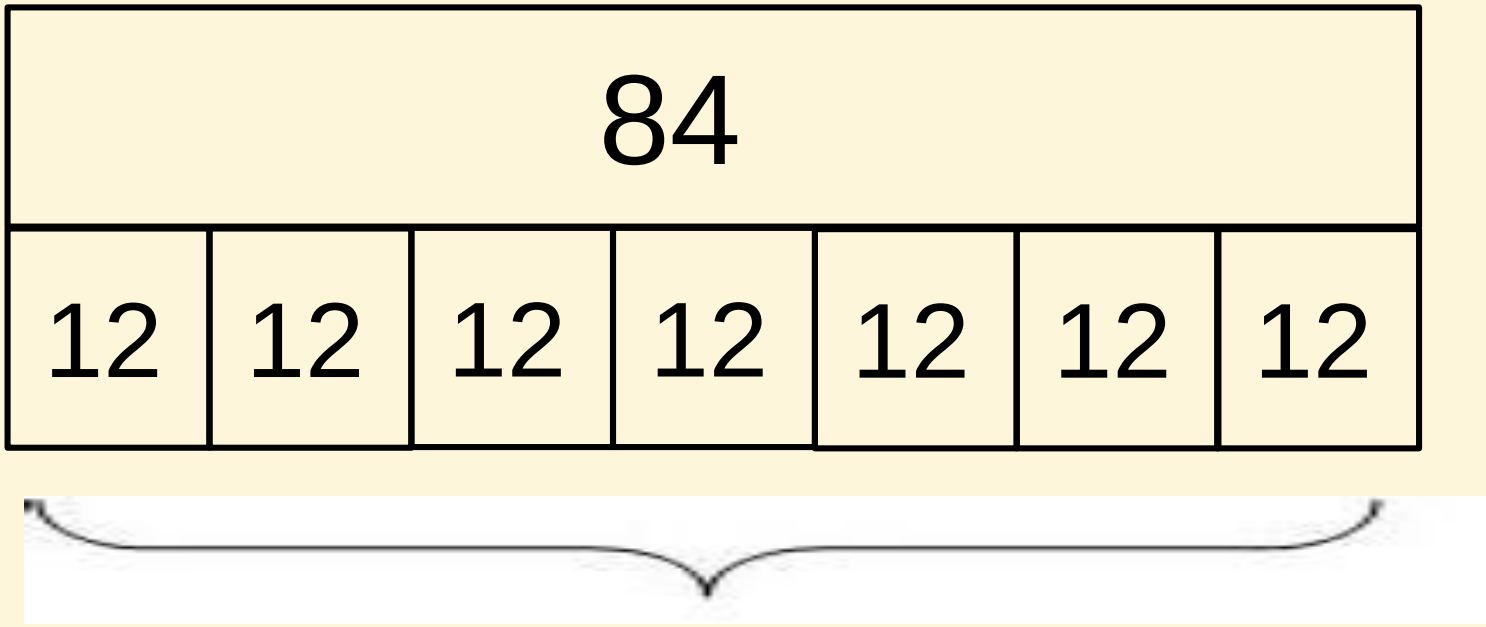
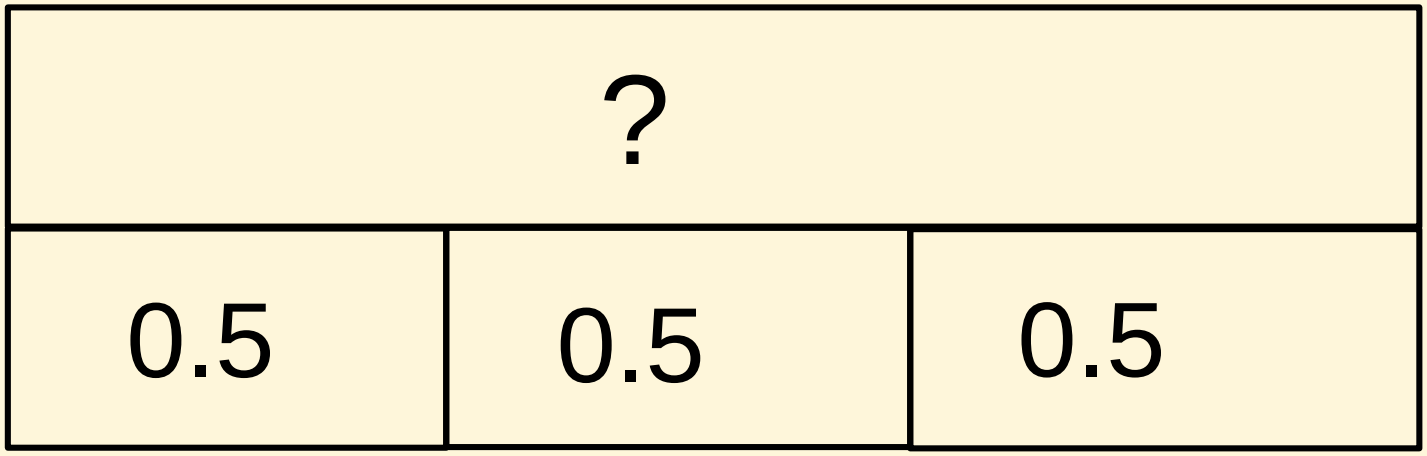
84 ÷ 12 = _____



0.5 x 3 = _____

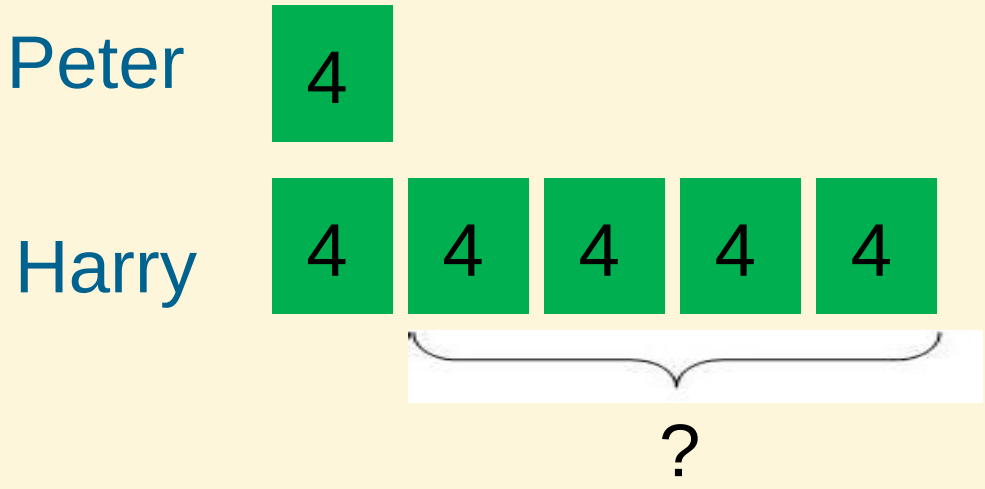


Multiplication

Peter has 4 books

Harry has five times as many books as Peter.

How many more books does Harry have?

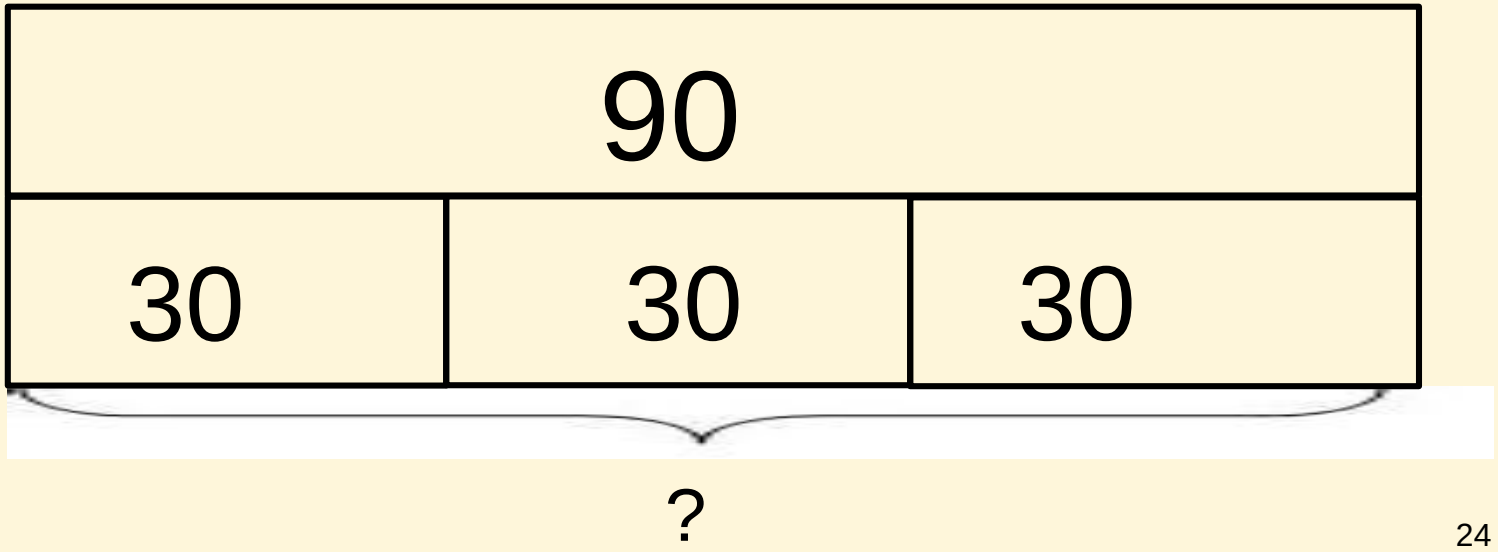


Division

I have 90 oranges delivered to school.

We need 30 for each class.

How many classes are in the school?



Problems to solve

Helen has 9 times as many football cards as Sam. Together they have 150 cards.

How many more cards does Helen have than Sam?

The sum of 2 numbers is 60. One number is 9 times as big as the other.

What is the bigger number?

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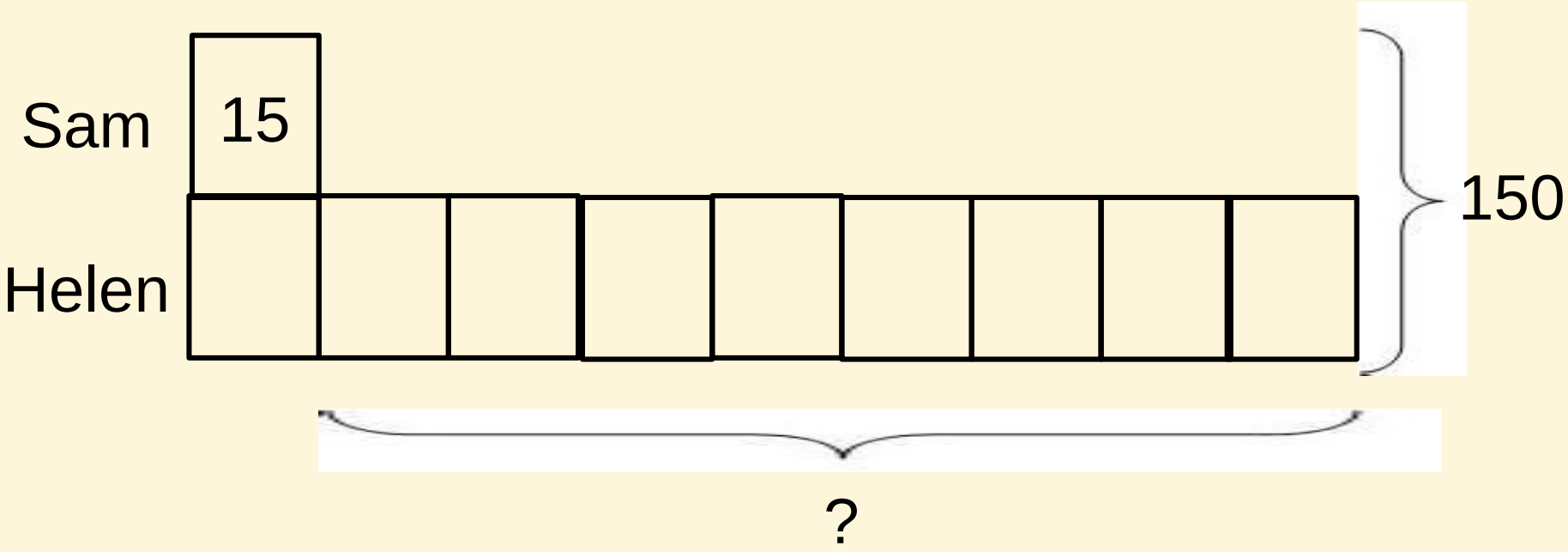

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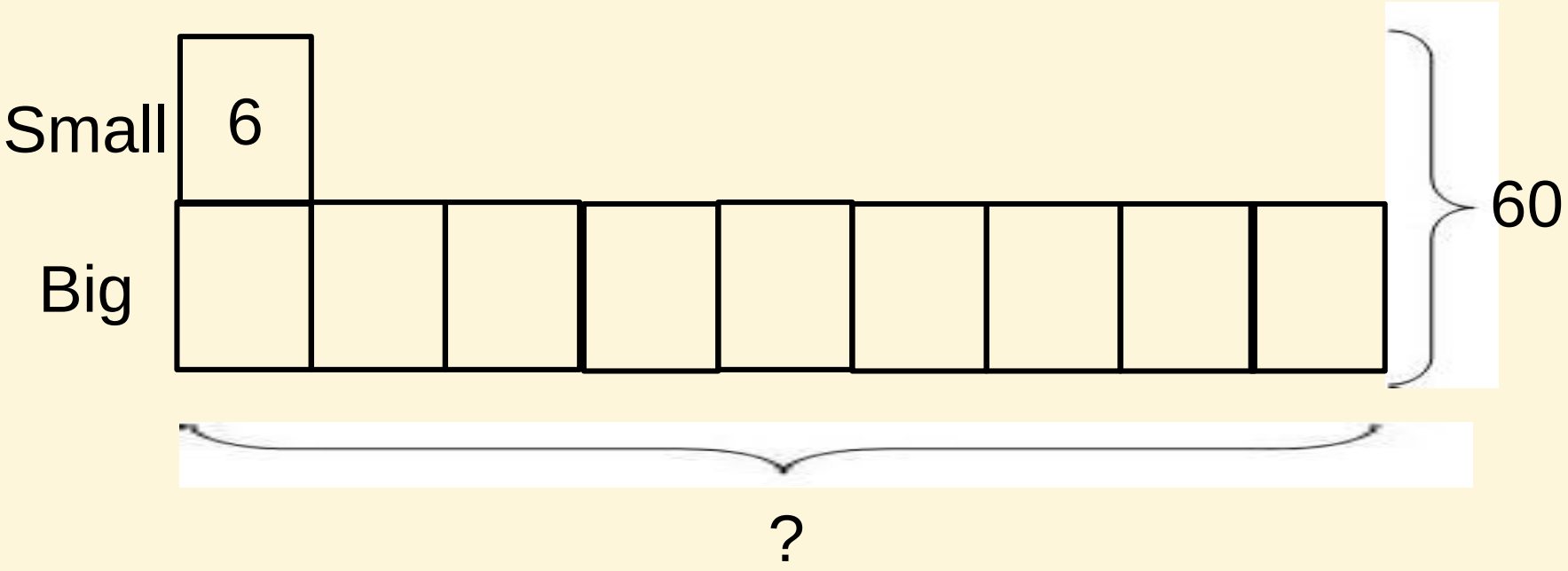

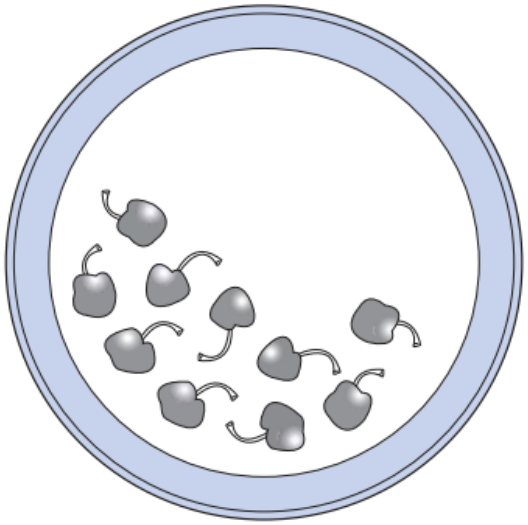

Desi had some cherries.

He ate **half** of them.

These are the cherries he **left**.

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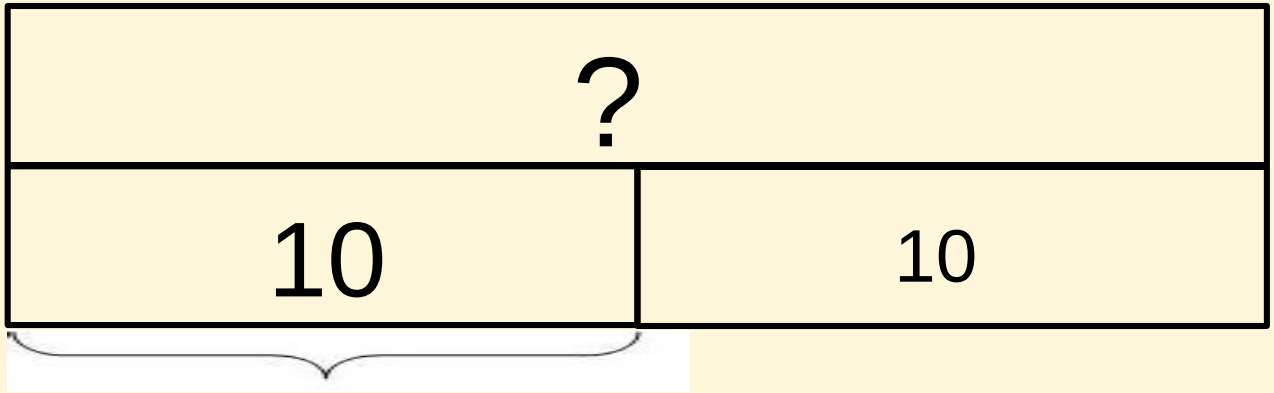
How many cherries did he start with?



$\frac{1}{2}$

Problems to solve

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Sam had 5 times as many marbles as Tom.

If Sam gives 26 marbles to Tom, the two friends will have exactly the same amount.

How many marbles do they have altogether?

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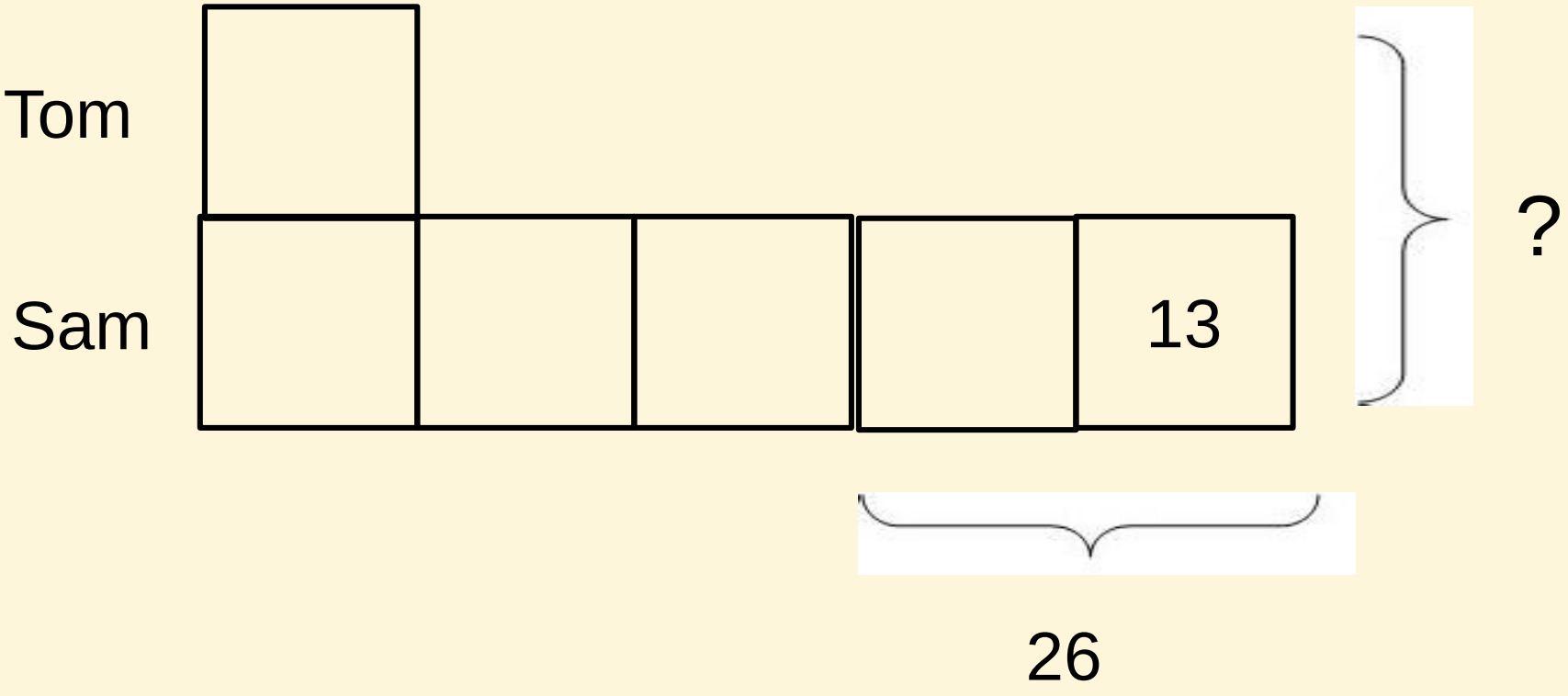
How many marbles do they have altogether?



Solve this using the bar model

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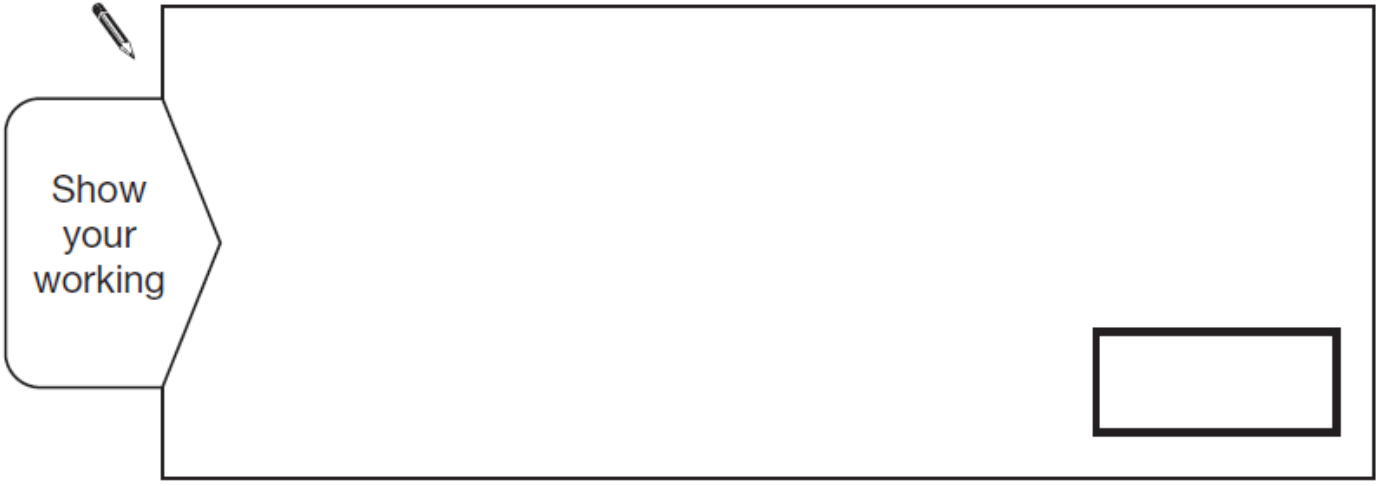
A quarter of the children in the class are boys.

Altogether, how many children are there in the class?



Useful Resources

http://www.mathplayground.com/thinkingblocks.html

http://www.bbc.co.uk/skillswise/0/24925787

http://nrich.maths.org/2421

https://blogs.hertsforlearning.co.uk/2016/12/01/rucsac-pack-your-bags-lets-hit-the-bar-instead/

Andy and his friend Sam were walking along the road together.

Andy had a big bag of marbles.

Unfortunately the bottom of the bag split and all the marbles spilled out. Poor Andy!

One third of the marbles rolled down the slope too quickly for Andy to pick them up. One sixth

of all the marbles disappeared into the rain-water drain.

Andy and Sam picked up all they could but half of the marbles that remained nearby were

picked up by other children who ran off with them.

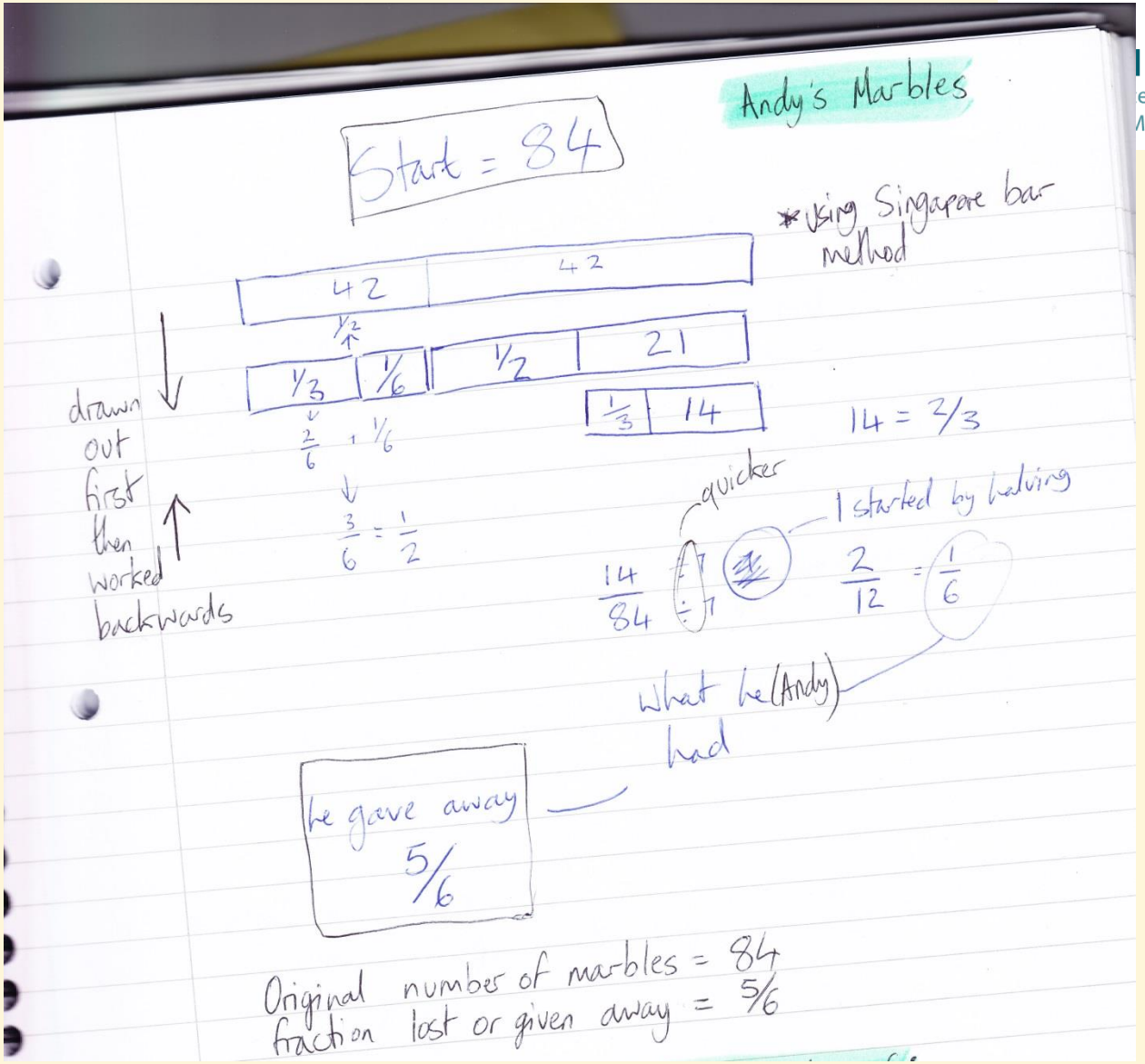
Andy counted all the marbles he and Sam had rescued.

He gave one third of these to Sam for helping him pick them up. Andy put his remaining

marbles into his pocket. There were 14 of them.

How many marbles were there in Andy's bag before the bottom split?

What fraction of the total number that had been in the bag had he lost or given away?


Andy's Marbles
Start = 84
* Using Singapore bar method
42
42
1/2
1/3
1/6
1/2
21
1/3
14
14 = 3/3
drawn out first then worked backwards
1/3 + 1/6
2/6
3/6 = 1/2
quicker
I started by halving
14/84
2/12 = 1/6
What he (Andy) had
he gave away
5/6
Original number of marbles = 84
fraction lost or given away = 5/6