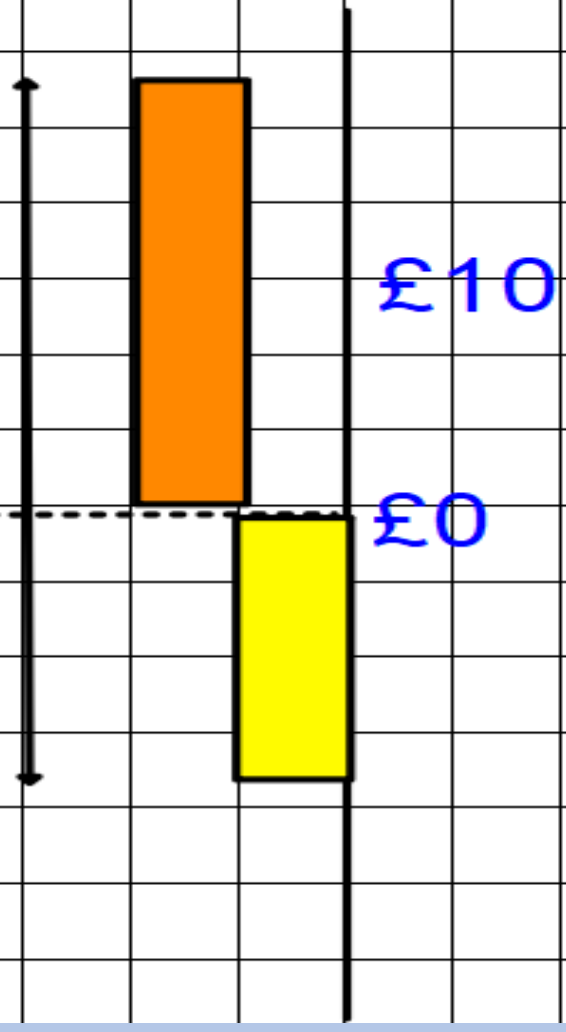
LO: To solve problems involving negative numbers

1.

Mr Newsam had £10 in his bank account. He wanted to buy a DVD for £15. How much would he have left?



Philip had £17.00 in his bank account.
He paid for a jumper that was £30.
How much did he have in his bank account after he had paid?

Numberline

£17

£0

£30

Start with the blue problems and then move onto the white problems

Show how you know by using a number line to support your explanation.

Spot the mistake:
-80,-40,10,50
What is wrong with this sequence of numbers?

True or False?
When I count backwards in 50s from 10 I will say -200

True or False?
The temperature is -3. It gets 2 degrees warmer. The new temperature is -5?

A scientist measures the depth of some objects below the surface of the sea. She records her measurements using negative numbers.

Object	Depth
Coral reef	−2 m
Shipwreck	−11 m
Pirate treasure	four times as deep as the coral reef
Sleeping shark	3 metres above the shipwreck

Which object is deepest? Explain your choice.

Is the sleeping shark deeper than the pirate treasure? Explain your reasoning.

A seagull is hovering 1 m above the surface of the sea. How far apart are the seagull and the coral reef?

A scientist measured the temperature each day for one week at 06:00.

On Sunday the temperature was 1·6°C.
On Monday the temperature had fallen by 3°C.
On Tuesday the temperature had fallen by 2·1°C.
On Wednesday the temperature had risen by 1·6°C.
On Thursday the temperature had risen by 4·2°C.
On Friday the temperature had fallen by 0·9°C.
On Saturday the temperature had risen by 0·2°C.

What was the temperature on Saturday?

Let's Think...

Zain is counting forwards in threes.
He starts at -17. Does he say 2?
Explain how you know.

Toby says that the difference between -3 and 4 is six.
This is how he counted:
"negative two, negative one, one, two, three, four"
Toby is wrong. Where did he go wrong in his counting?

LO: To choose appropriate strategies to solve calculations

2.

Which question is harder/easier and why?

231,515 + 199=

231,515 + 300=

Adjusting

Add one or two to a multiple of 50 or a hundred. Then remember to subtract it again after finiding your answer.

Step 1: 49 + 376=
Step 2: 50 + 376= 426
Step 3: 426 - 1= 425

Step 1: 298 + 625=
Step 2: 300 + 625= 925
Step 3: 925 - 2= 923

Which question is harder/easier and why?

145 + 146 =

239 + 137

Near Doubles

Recognise when numbers are close to double the other number in the calculation:

Example 1

135+ 137=

35+35=70

100+100=200

270+2=272

Example 2

351+353=

350+350=700

700+4=704

Which question is harder/easier and why?

23,567 + 454

5,625 + 1,654

Number Lines

When adding units of time:

Example 1

14:53+ 26

mins

14:53 15:00 15:19

Choose 2 numbers to write a number sentence for.

1. That you would use a number line to solve
2. One that you would use a near double or adjustment
3. One that you would use a column method
4. Explain why you have chosen your method

299,997

7,564, 356

27,009

101

300,000

5909

99

101.9

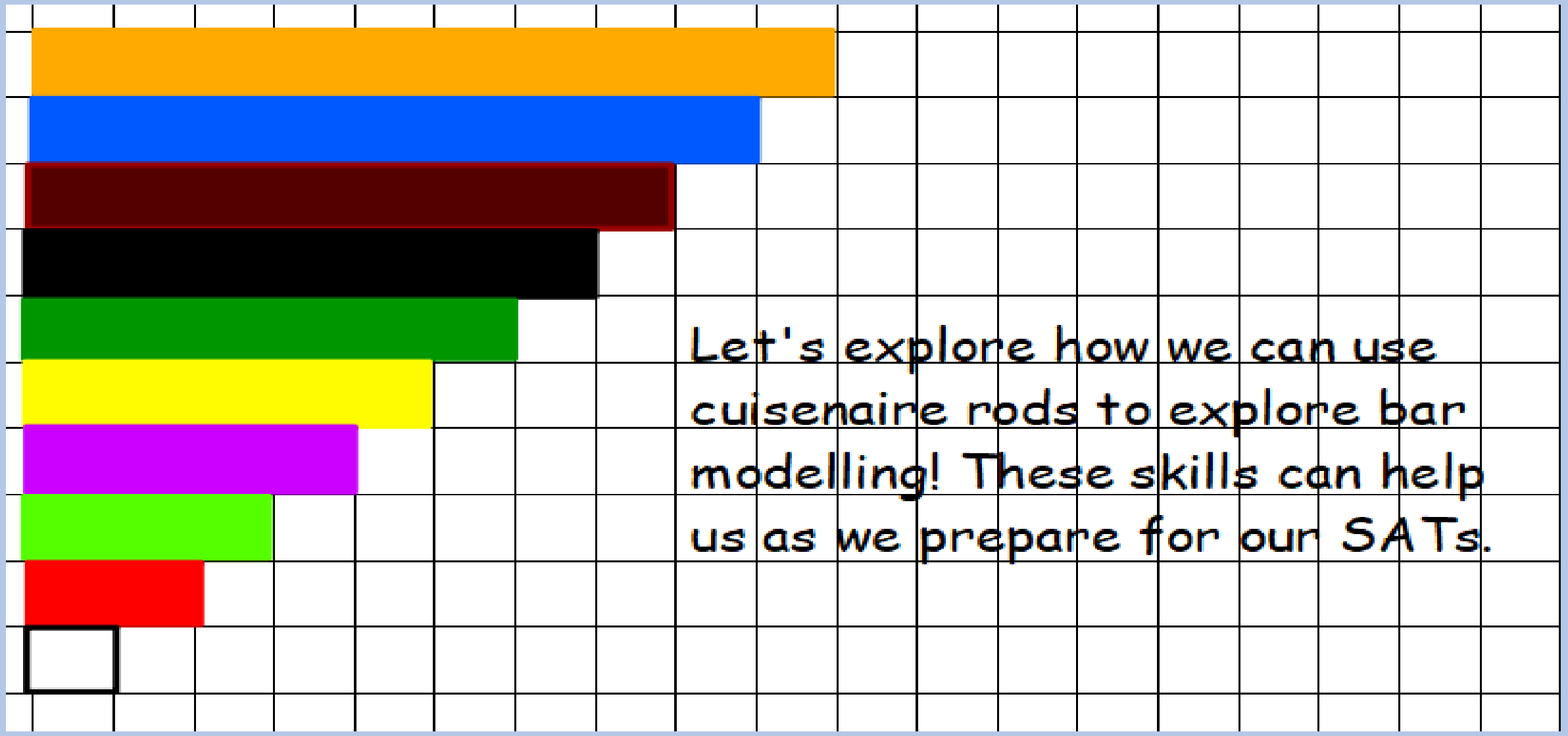
Challenge: When you have done 5 calculations, check them with a calculator. Now do two calculations where you add three numbers and then come and get the challenge

Explain

Bill wants to use the strategies he has learned today with the following problem: The train leaves Winchester at 12:35 and arrives in Reading at 13.07. How long is the journey? What is the same about the strategy he can use? What is different?

LO: To identify different relationships between the whole and parts

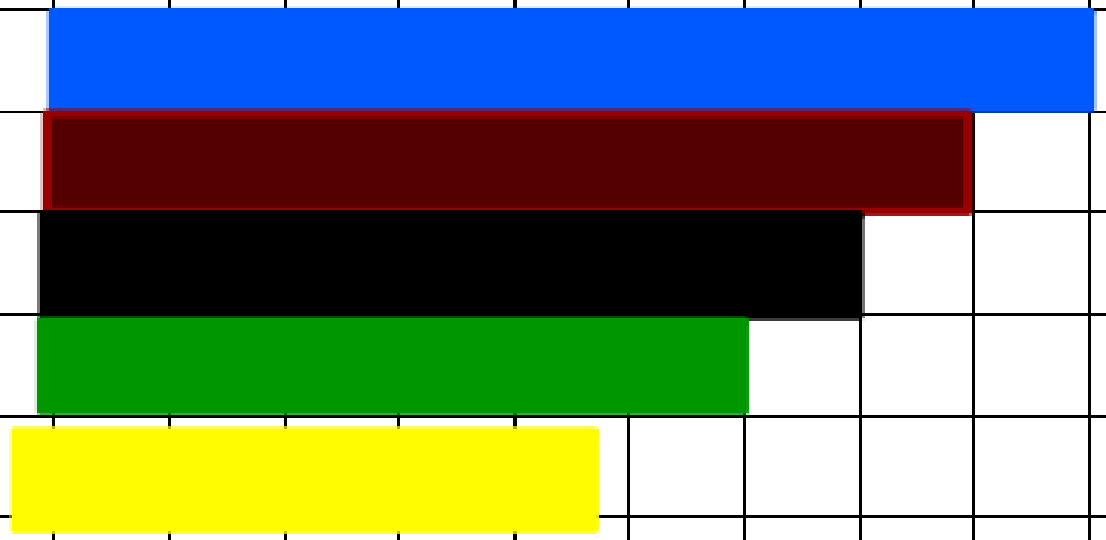
3.

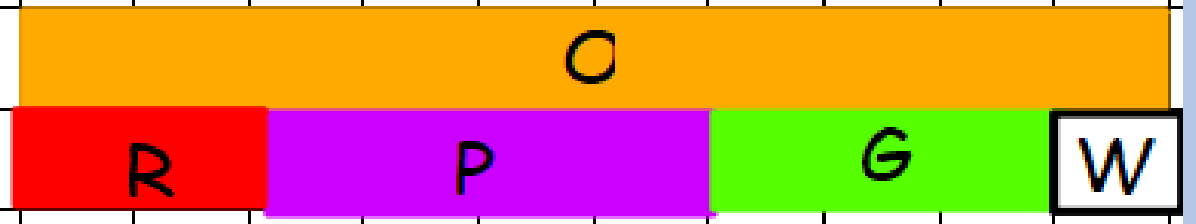


Let's explore how we can use cuisenaire rods to explore bar modelling! These skills can help us as we prepare for our SATs.

Structure 1

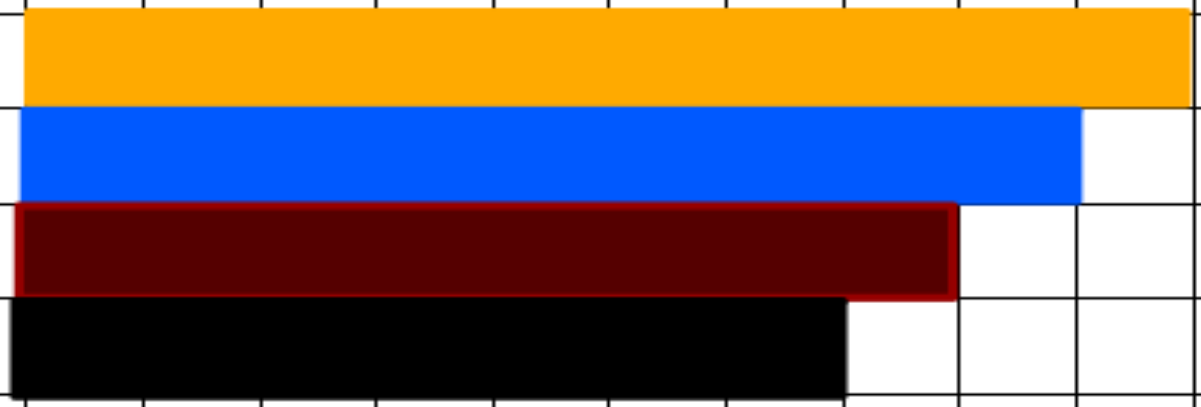
Additive with different parts.





O=R+P+G+W

How many different ways can you make orange without repeating a colour?

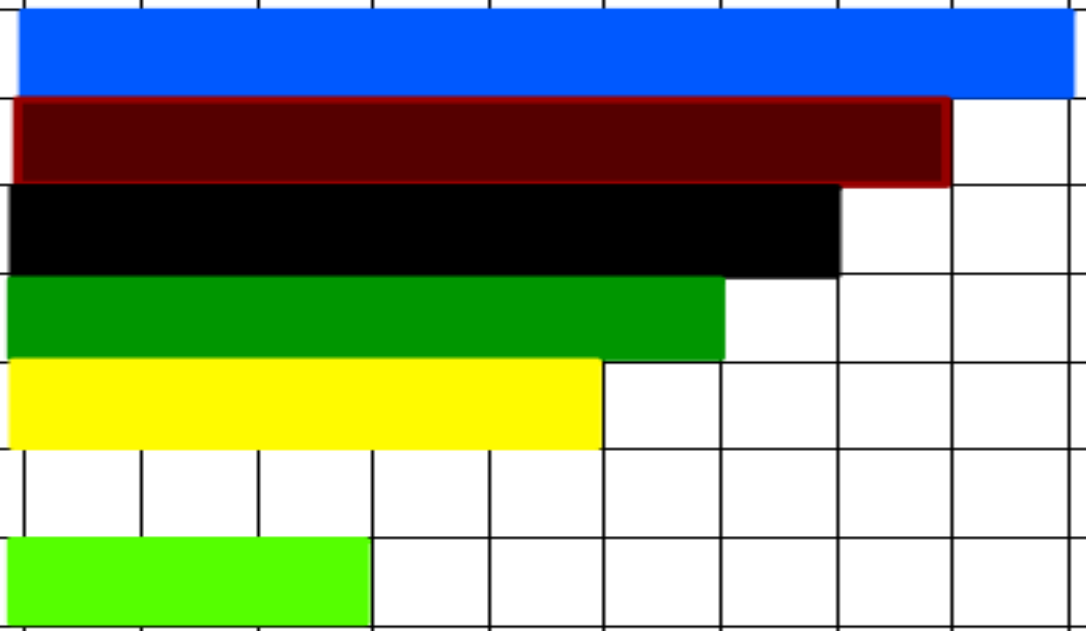


Structure 2
Multiplicative or Repeat Addition

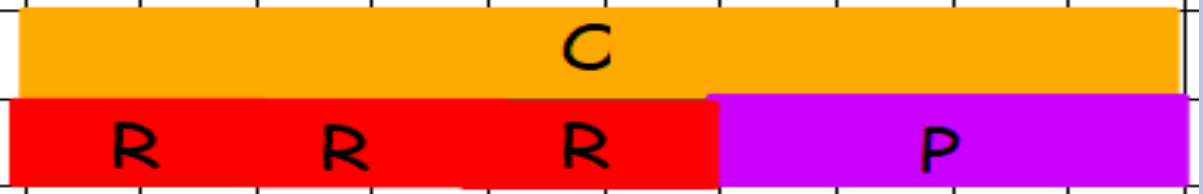
3xR=G

R+R+R=G

How many different multiplicative structures can you come up with?



Structure 3
Combining additive and multiplicative



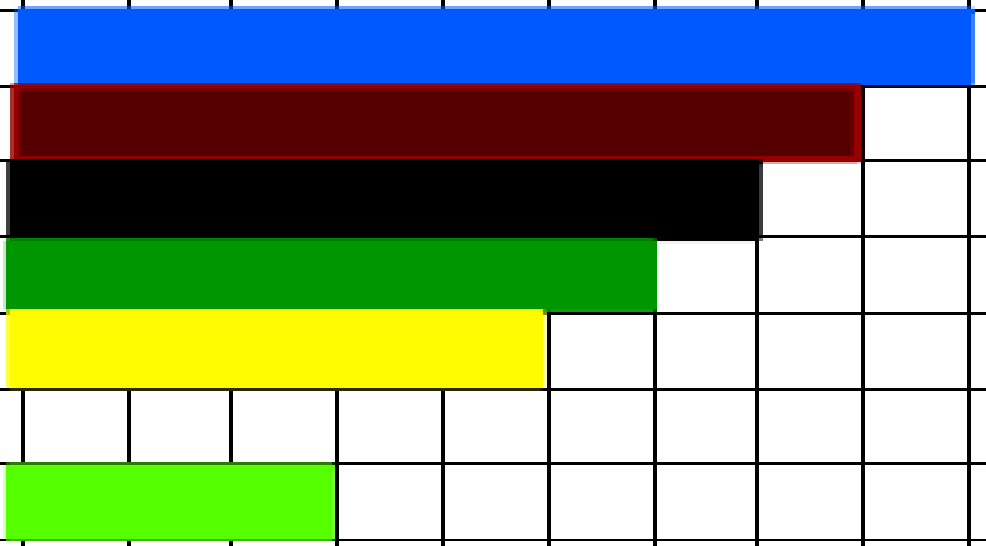
3xR+P=O

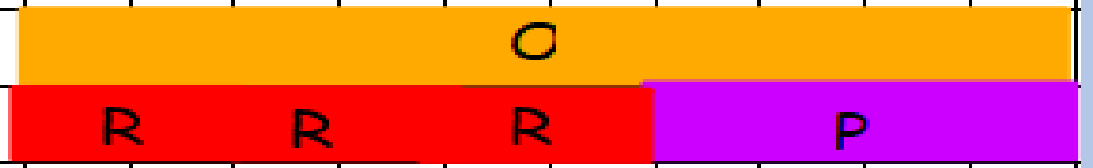
R+R+R+P=O

How many ways can you make orange as the whole using a mixture of additive and multiplicative structures?

Structure 4

Combining additive and multiplicative





3xR+P=O

R+R+R+P=O

How many ways can you make orange as the whole using a mixture of additive and multiplicative structures?

Structure 1
Additive with different parts.

Structure 2
Comparative bar models- Additive

Structure 3
Multipicative or Repeat Addition

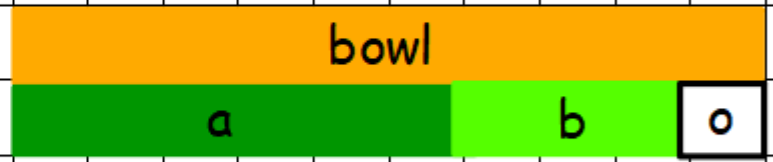
Structure 4
Combining additive and multiplicative

A bowl of fruit contains more apples than bananas and more bananas than oranges.

oranges.

We know it is structure 1 because you are adding together three different amounts. ***The whole is made up of three different parts.***

Which structure is this word problem? Can you represent it with your cuisenaire rods?



Structure 1
Additive with different parts.

Structure 2
Multiplicative or Repeat Addition

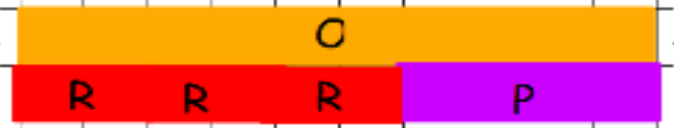
Structure 3
Combining additive and multiplicative

A bowl of fruit contains equal quantities of apples, bananas and oranges.

Structure 1
Additive with different parts.

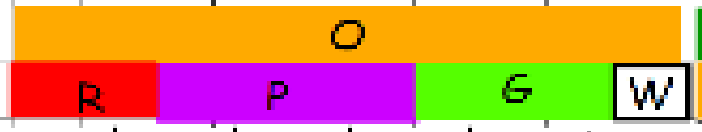
Structure 2
Multiplicative or Repeat Addition

Structure 3
Combining additive and multiplicative



A bowl of fruit contains mostly apples and equal amounts of bananas oranges.

Structure 1
Additive with different parts.



Structure 2
Comparative bar models- Additive

Structure 3
Multipicative or Repeat Addition

Structure 4
Combining additive and multiplicative

- A can of drink costs £1.50. I buy three cans of drink for £4.50
- I spend £30 buying a t-shirt, a DVD and a book
- There are fifteen stickers on a sheet. Some are red, some are blue and some are green.
- Twenty children are having school dinners. Twelve of these are having pasta, two are having curry and the rest are having sandwiches.

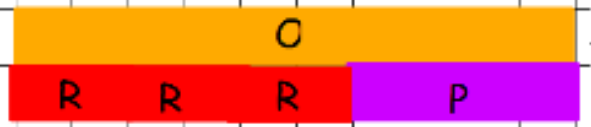
Stick in one problem at a time. Draw an appropriate bar model and decide which structure it shows.

Complete 6 with at least one being from each of structures 1, 3 and 4.

Structure 1
Additive with different parts.

Structure 2
Multiplicative or Repeat Addition

Structure 3
Combining additive and multiplicative



Challenge

Write your own word problems that are one of the three structures. Draw bar models to match your word problems.

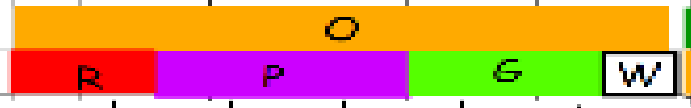
I have eighteen toys cars. Two are blue, ten are black and six are red.

I have some toy cars. Two are blue, ten are black and six are red. How many toy cars do I have altogether?

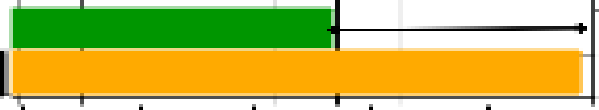
~~I have eighteen toy cars. Some are blue, some ae black and some are red.~~

LO: To identify missing parts

Structure 1
Additive with different parts.



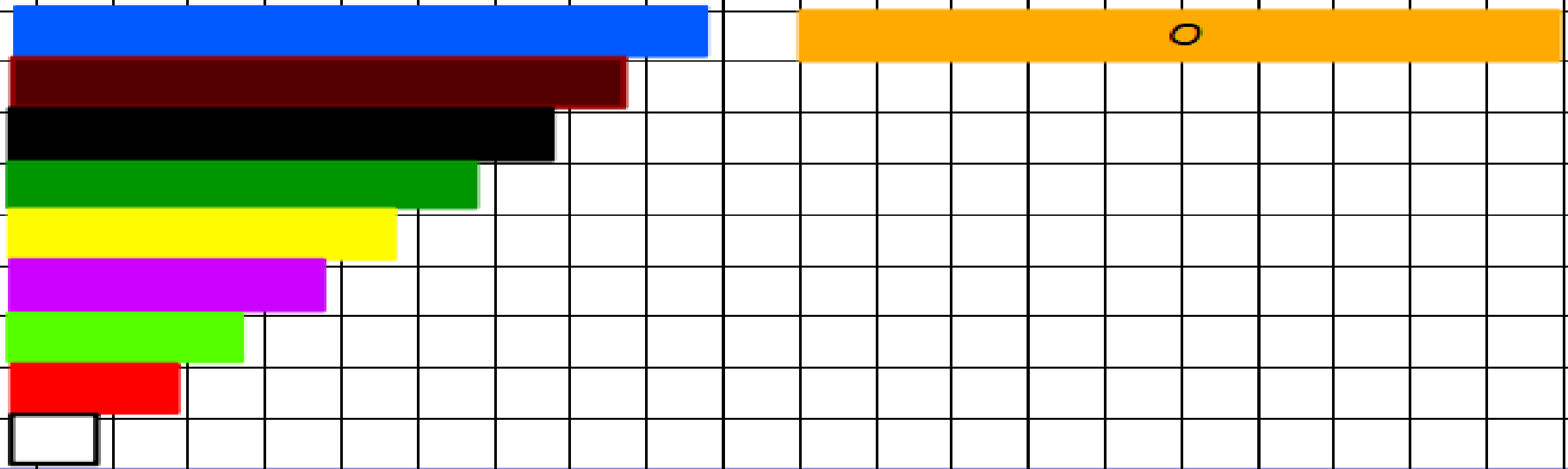
Structure 2
Comparative bar models- Additive



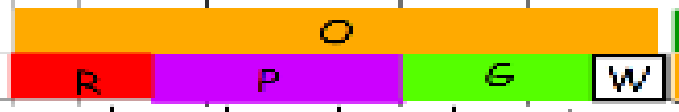
Structure 3
Multipicative or Repeat Addition

Structure 4
Combining additive and multiplicative

How many different ways can you use three different rods to make an amount the same as the orange rod?



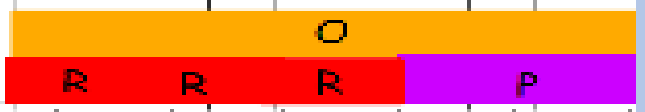
Structure 1
Additive with different parts.



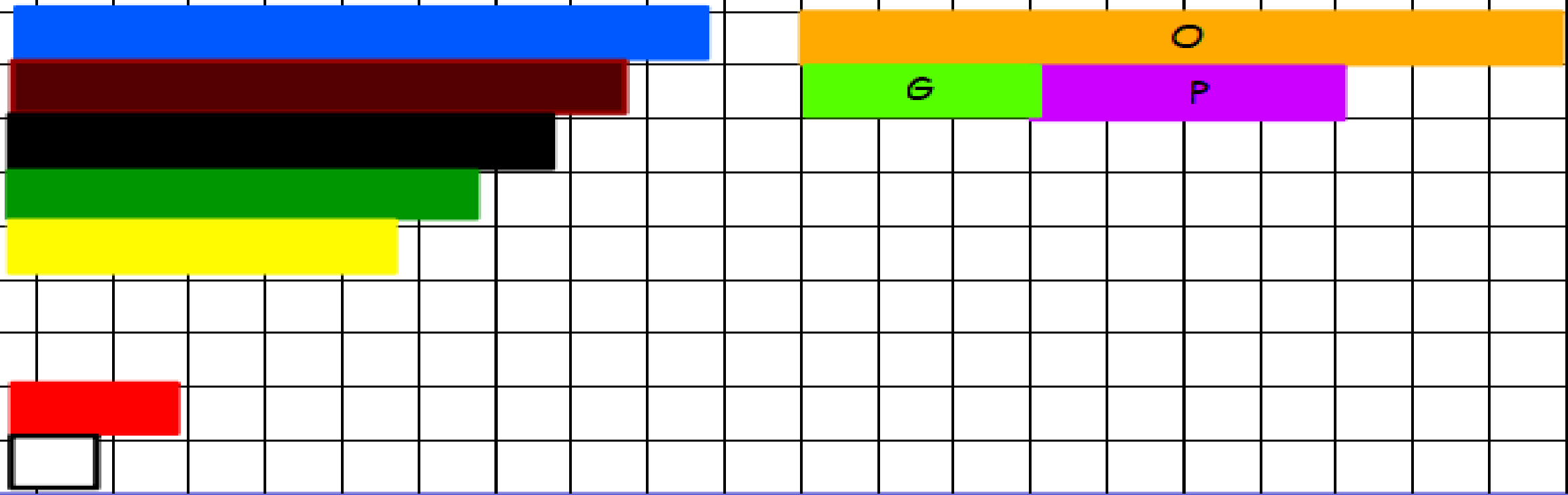
Structure 2
Comparative bar models- Additive

Structure 3
Multipicative or Repeat Addition

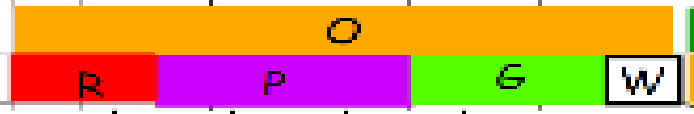
Structure 4
Combining additive and multiplicative



We know 2 of the rods that are equal to the orange one. What could the third one be?



Structure 1
Additive with different parts.

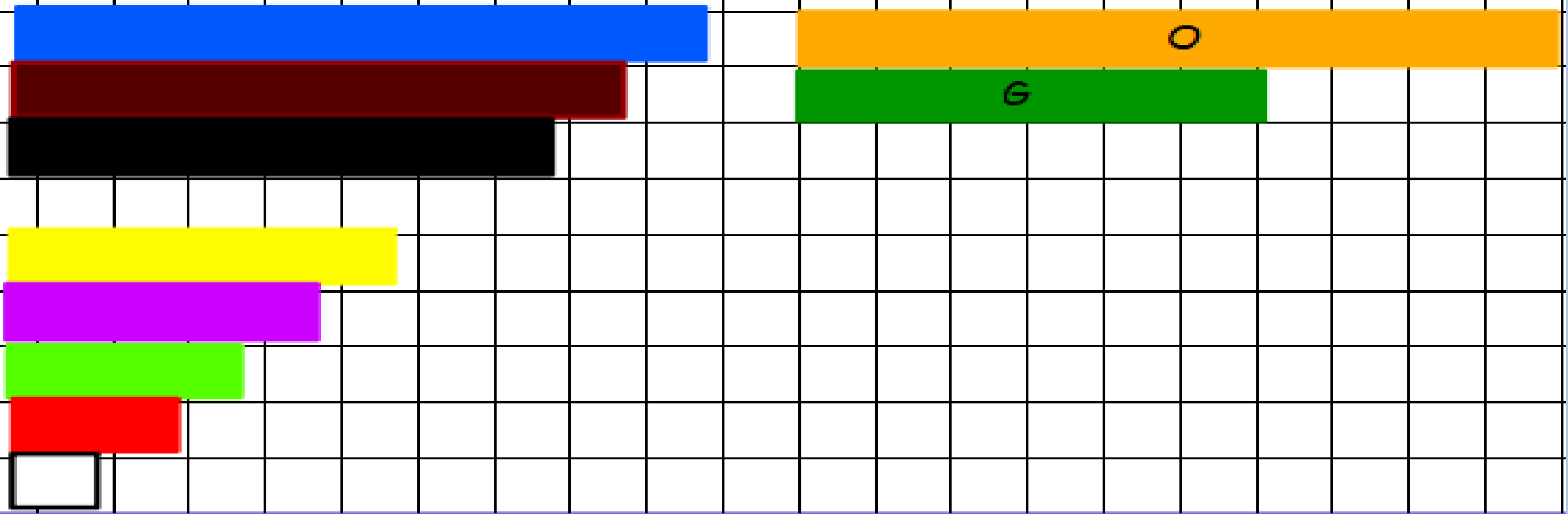


Structure 2
Comparative bar models- Additive

Structure 3
Multipicative or Repeat Addition

Structure 4
Combining additive and multiplicative

What about if we know only one of the rods? Can we work out what the other two will be? Is there more than one option?



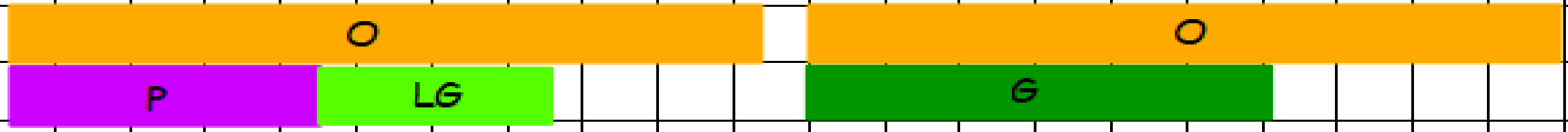
Structure 1
Additive with different parts.

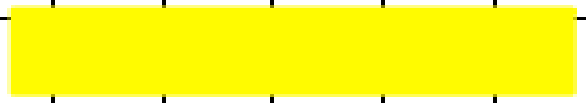
Structure 2
Comparative bar models- Additive

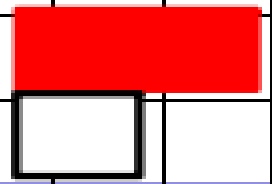
Structure 3
Multipicative or Repeat Addition

Structure 4
Combining additive and multiplicative

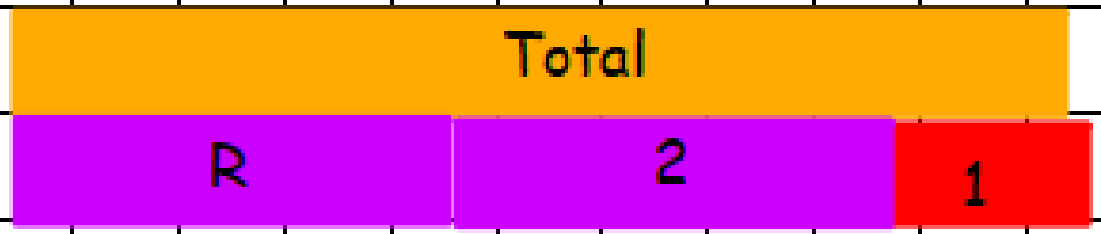
Which is easier to calculate? When we know one part or two? Why?





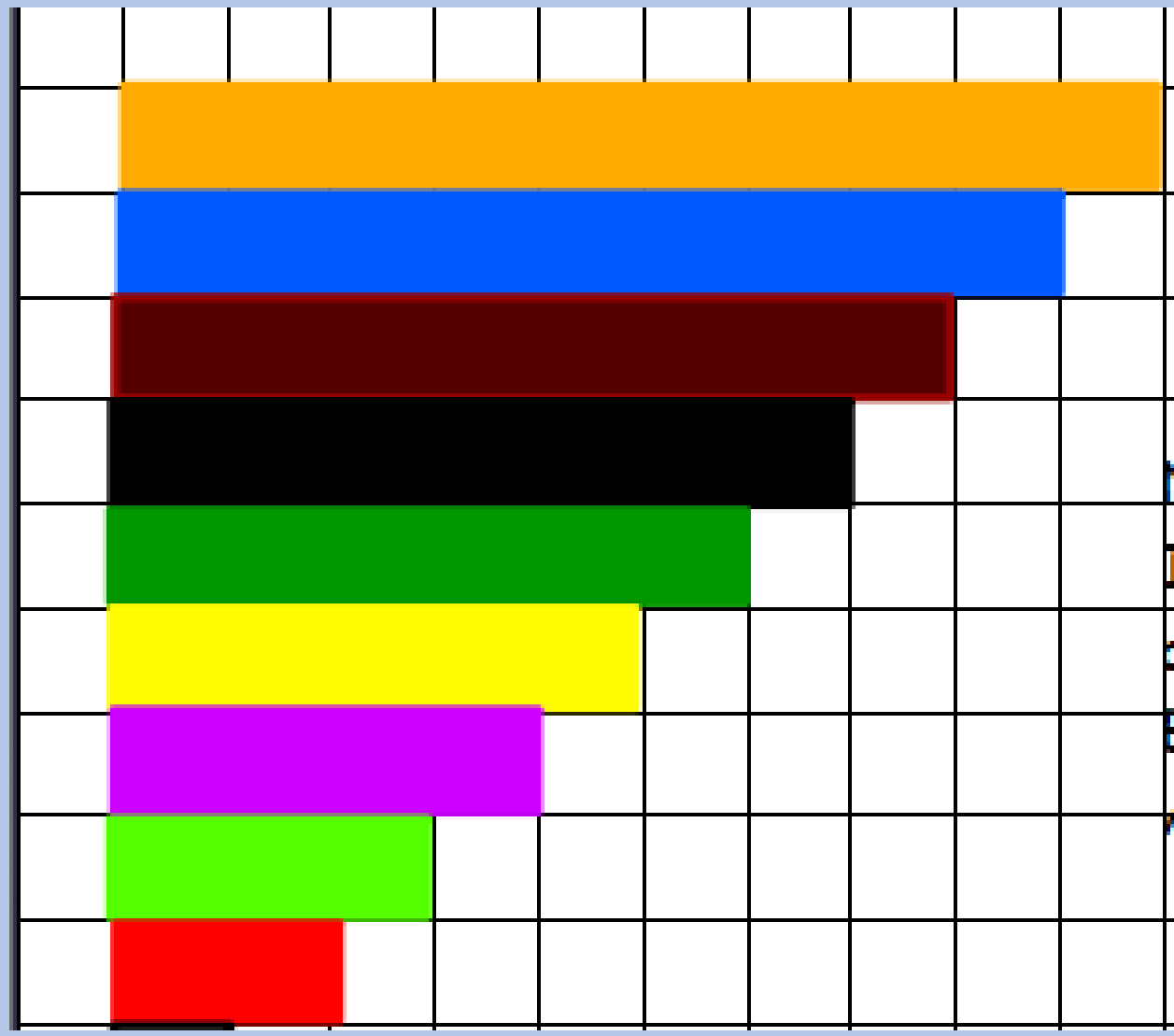


There are 60 children in a Reception Class, 59 in Year 1 and 60 in Year 2. How many are there in total?



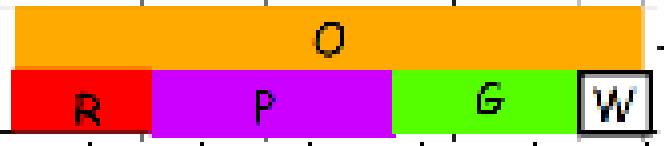
What operation are we completing?

Which structure are we using?



Structure 1

Additive with different parts.



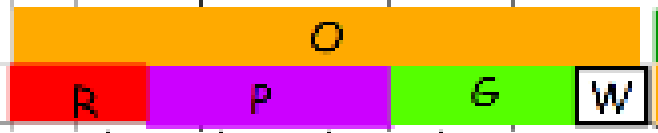
Now you try:

In your maths books, write a problem and draw a bar model to explain it.

Either use:

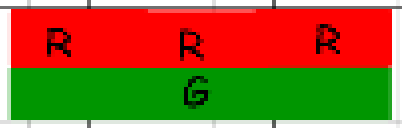
Animals, Money, Distances or Swimming

Structure 1
Additive with different parts.

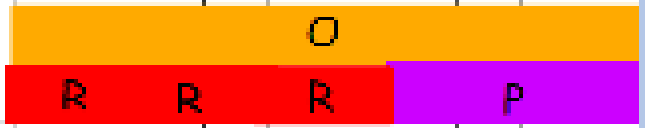


Structure 2
Comparative bar models- Additive

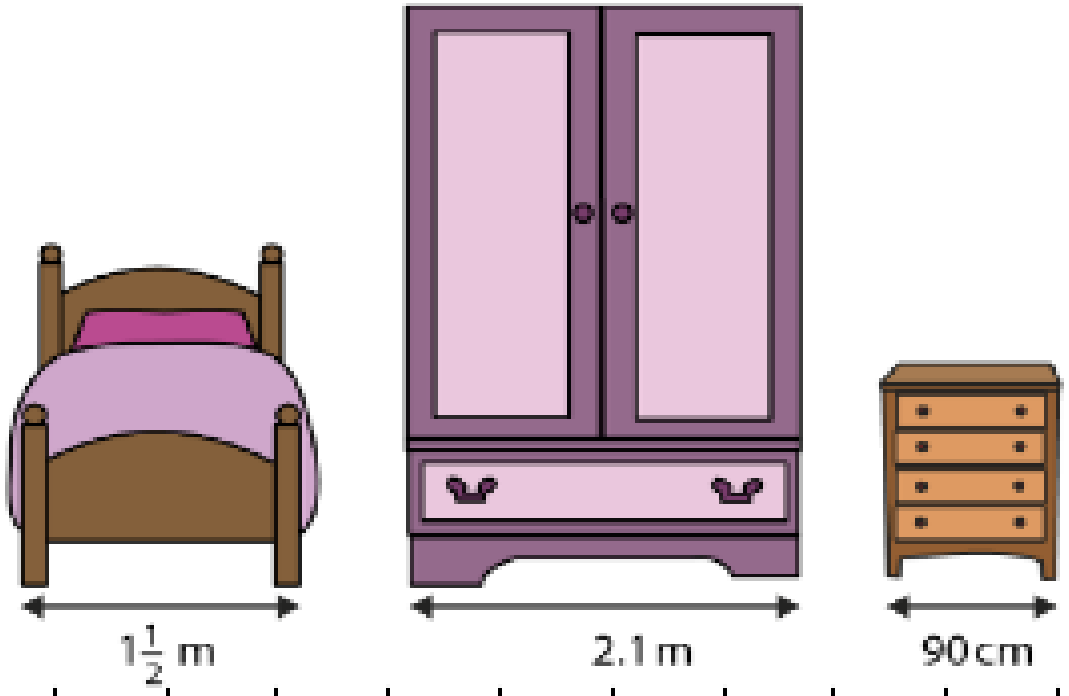
Structure 3
Multipicative or Repeat Addition



Structure 4
Combining additive and multiplicative



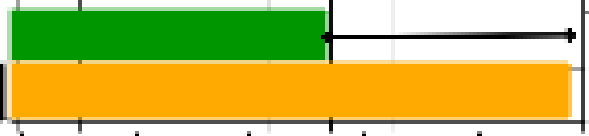
'If I line the three pieces of furniture up along a wall, side-by-side, what length of the wall do they take up in total?'



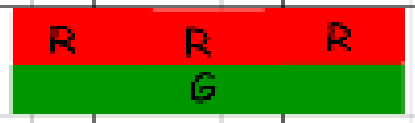
What's the same/ different here?
What structure are we using?

Structure 1
Additive with different parts.

Structure 2
Comparative bar models- Additive



Structure 3
Multipicative or Repeat Addition



Structure 4
Combining additive and multiplicative

'Tell a story to go with this representation.'

?		
1.5	2.1	0.9

E.g.

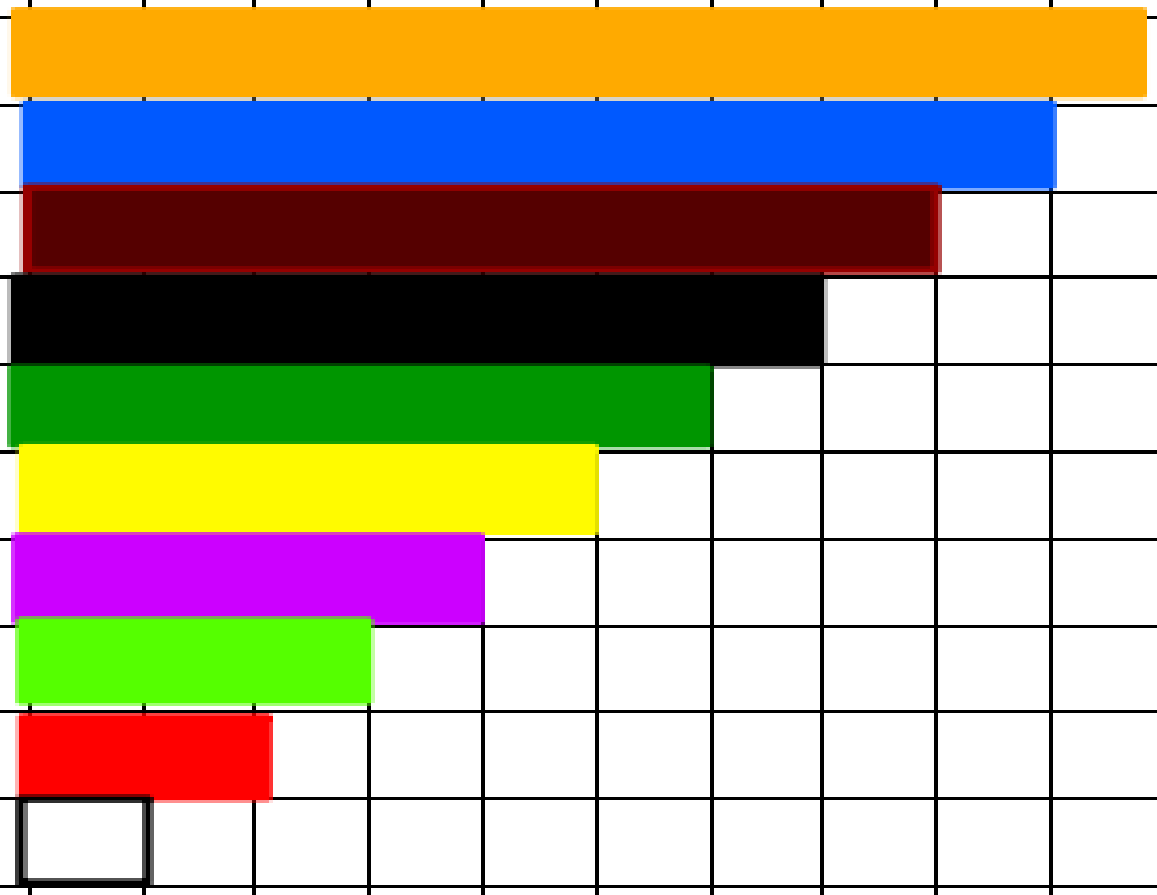
'I have 1.5 m of red ribbon, 2.1 m of blue ribbon and 0.9 m of yellow ribbon. How much ribbon do I have altogether?'

Structure 1
Additive with different parts.

Structure 2
Comparative bar models- Additive

Structure 3
Multipicative or Repeat Addition

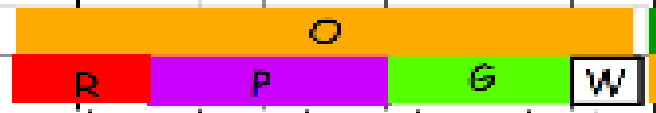
Structure 4
Combining additive and multiplicative



'80 children chose an orange, apple or banana for fruit break. 16 children chose oranges and 23 chose apples. How many chose bananas?'

Use Cuisenaire rods to make the following problem. What has changed. What structure are we using?

Structure 1
Additive with different parts.



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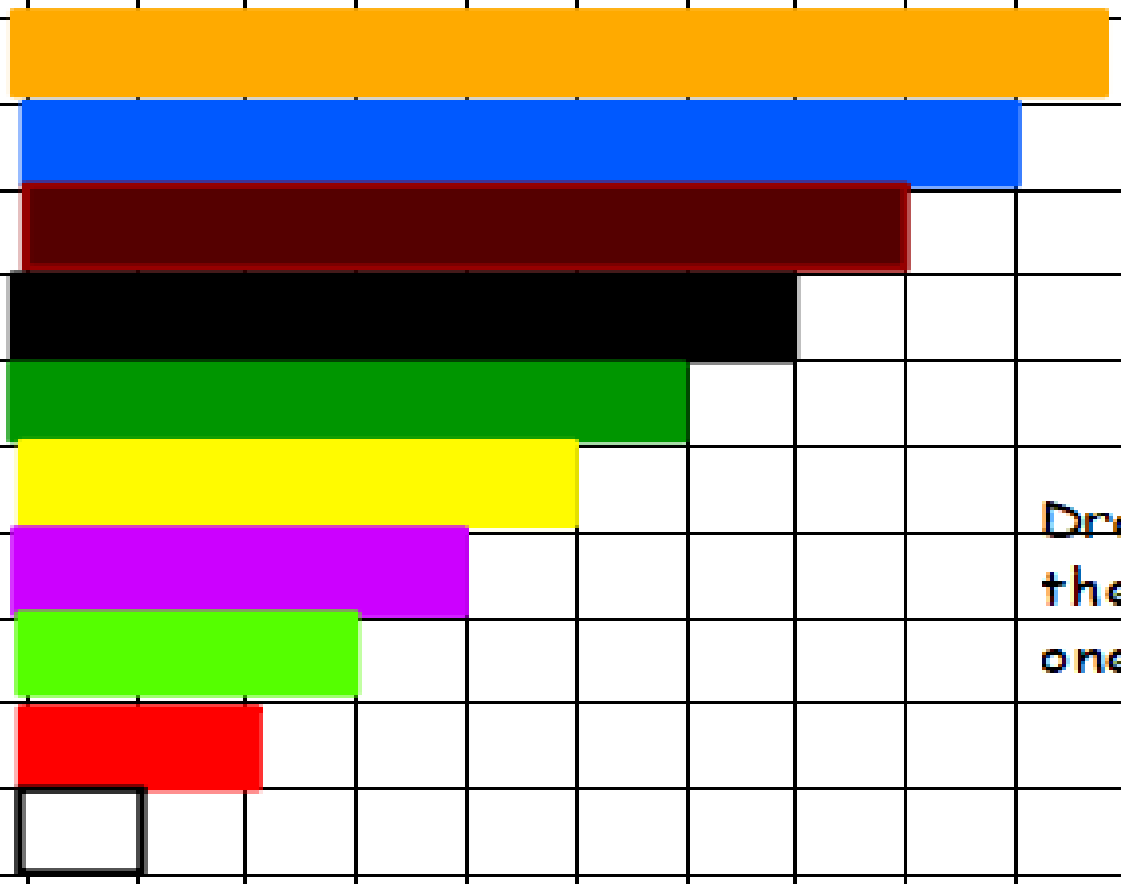


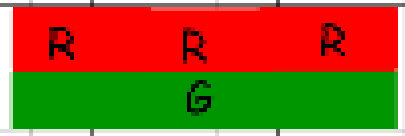
Jess spent all €10 of her pocket money. She bought a DVD for €4, a notebook for €2.25, a pencil case for €1.20, a pen for 45p and the rest on sweets. How much did she spend on sweets?

Draw the following problem. What is the same/ different as the previous one?

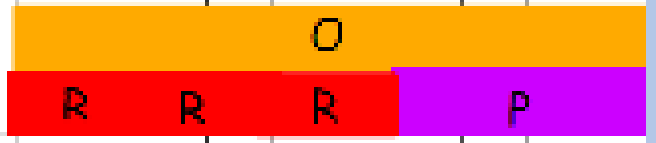
Structure 1
Additive with different parts.

Structure 2
Comparative bar models- Additive

Structure 3
Multipicative or Repeat Addition

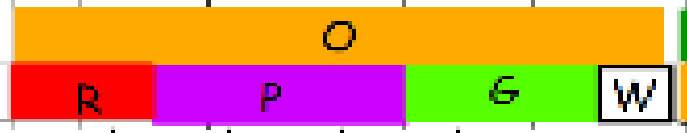


Structure 4
Combining additive and multiplicative



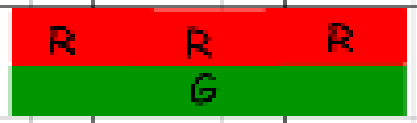
- ***'If we know the value of the whole, and all but one of the parts, we can find the missing part:***
  - ***'the whole minus the known parts is equal to the missing part***
  - ***'the sum of the known parts plus the missing part is equal to the whole.'***

Structure 1
Additive with different parts.



Structure 2
Comparative bar models- Additive

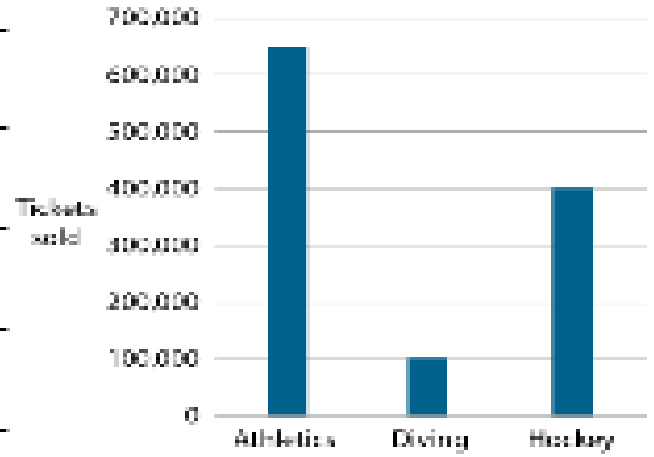
Structure 3
Multipicative or Repeat Addition



Structure 4
Combining additive and multiplicative

Task 1- Draw the bar models for these problems and solve:

1.) *The graph shows the approximate number of tickets sold for three different events at the 2012 London Olympics. Each value is rounded to the nearest 50,000.*



Source: London Olympics
Public sector information licensed under the Open Government Licence v2.0

Felicity says that about 1,100,000 tickets were sold in total for these three events. Is she correct?

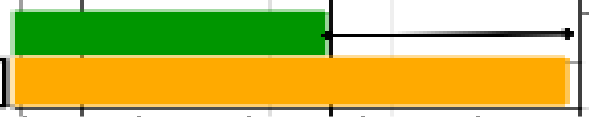
2.) *The table shows the population of four islands. What is the total population of all four islands?*

Island	Approximate population in 2016 (thousands)
Isle of Wight	140
Isle of Man	83
Guernsey	62
Jersey	104

LO: To identify missing parts

Structure 1
Additive with different parts.

Structure 2
Comparative bar models- Additive



Structure 3
Multipicative or Repeat Addition

Structure 4
Combining additive and multiplicative

Task 2- Draw the bar models for these problems where we know all but one piece of information and solve:

1.) *'Rahul is solving a word problem involving favourite drinks. He draws this representation.'*

drinks		
lemonade	milk	juice

'Use Rahul's model to decide whether the following equations are true or false.'

	True (✓) or false (×)?
lemonade + milk + juice = drinks	
drinks − lemonade = milk + juice milk = drinks − juice	

'Rahul writes the following, correct equation.'

juice = drinks − lemonade − milk

'Complete these similar equations.'

_____ = drinks − lemonade − juice

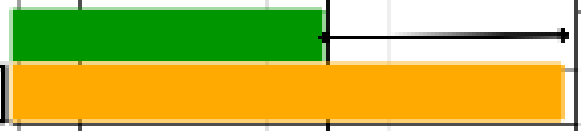
lemonade = _____ − milk − _____

2.) *'Use the equations to complete this table of data about different year-groups' favourite drinks.'*

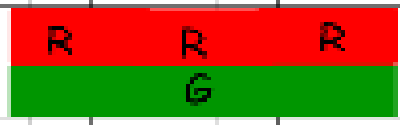
	Year 1	Year 2	Year 3
number of children asked about their favourite **drink**	62	58	59
number who like **milk** best		13	21
number who like **lemonade** best	20		18
number who like **juice** best	12	35	

Structure 1
Additive with different parts.

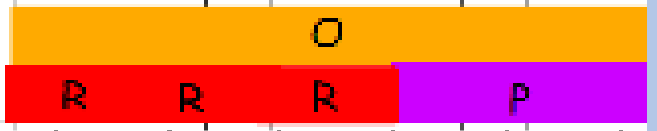
Structure 2
Comparative bar models- Additive



Structure 3
Multipicative or Repeat Addition

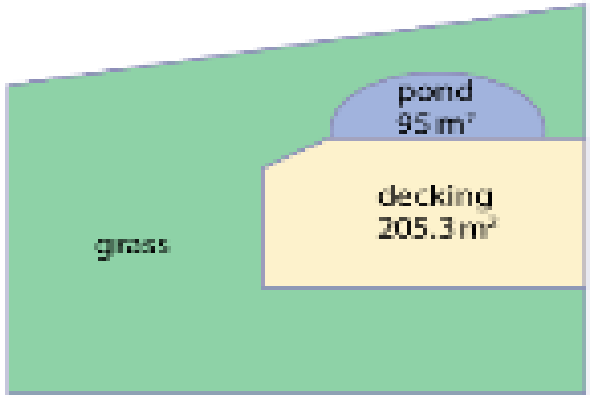


Structure 4
Combining additive and multiplicative



Task 3- Draw the bar models for these problems where we know all but one piece of information and solve:

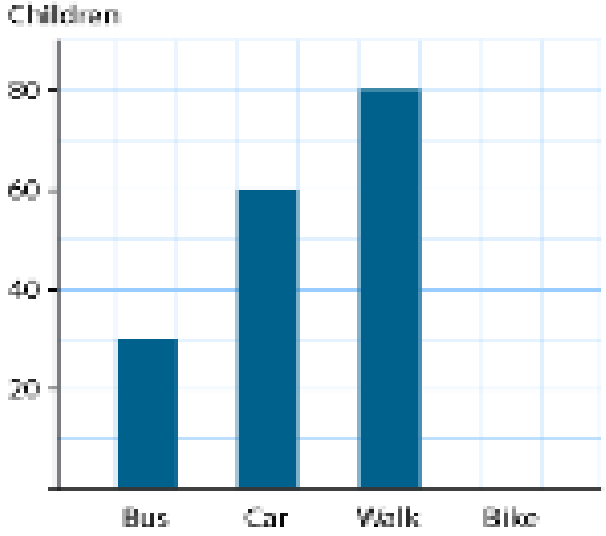
1.) *'Charlie is redesigning his garden. The garden has a total area of 661.5 m². He builds a pond and a decking area as shown on the diagram.'*



Not to scale

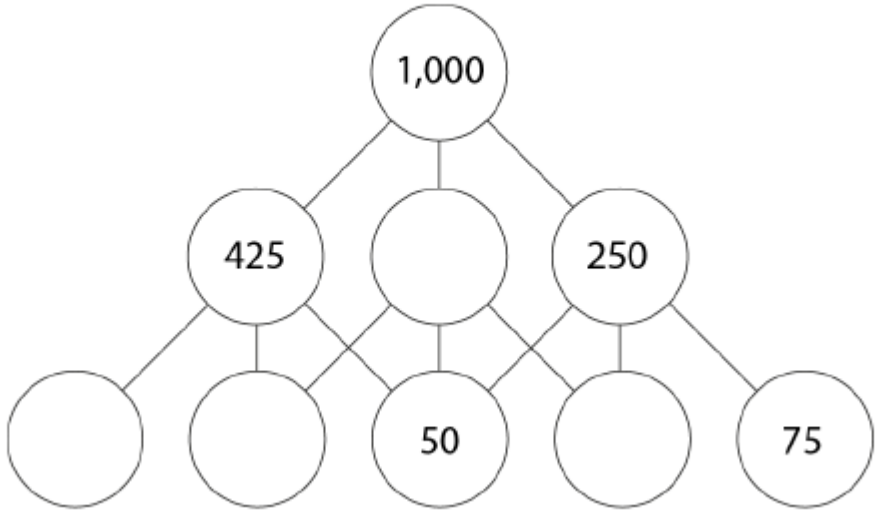
'Will Charlie have enough turf to grass the rest of the garden if he buys 360 m²? Explain your answer.'

2.) *'The bar chart shows the results of a survey that asked 195 children how they travel to school. Complete the chart to show how many children travelled by bike.'*



Challenge

'The number in each circle is the sum of three numbers in the row below it. Fill in the missing numbers.'



'The sum of each row, each column and each of the two long diagonals is 13.6. Fill in the missing numbers.'

		4.8	0.4
0.8			5.6
	4		
	2	3.6	1.6

LO: To identify two unknowns

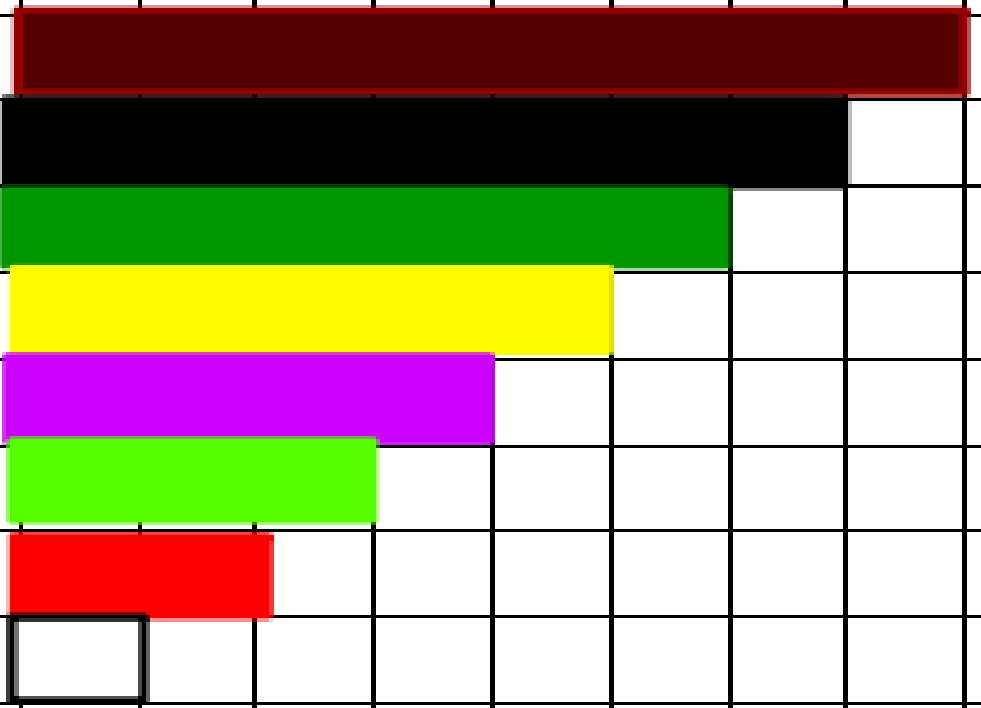
Structure 1
Additive with different parts.

Structure 2
Comparative bar models- Additive

Structure 3
Multipicative or Repeat Addition

Structure 4
Combining additive and multiplicative

'I am thinking of two rods that are equivalent to blue. One of them is red. What is the other one?'



Structure 1
Additive with different parts.

Structure 2
Comparative bar models- Additive

Structure 3
Multipicative or Repeat Addition

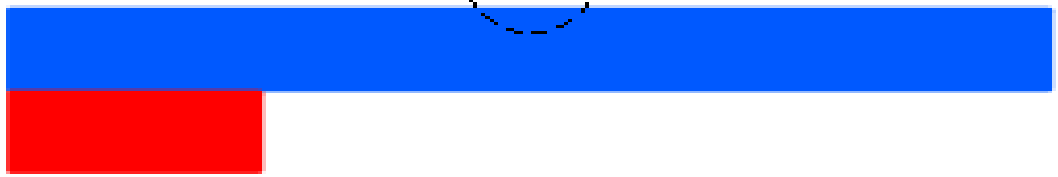
Structure 4
Combining additive and multiplicative

'I am thinking of two rods that together are equivalent to blue. What are they?'

How many options can you think of?

What's the same? What's different?

'I am thinking of two rods that are equivalent to blue. One of them is red. What is the other one?'



'I am thinking of two rods that together are equivalent to blue. What are they?'

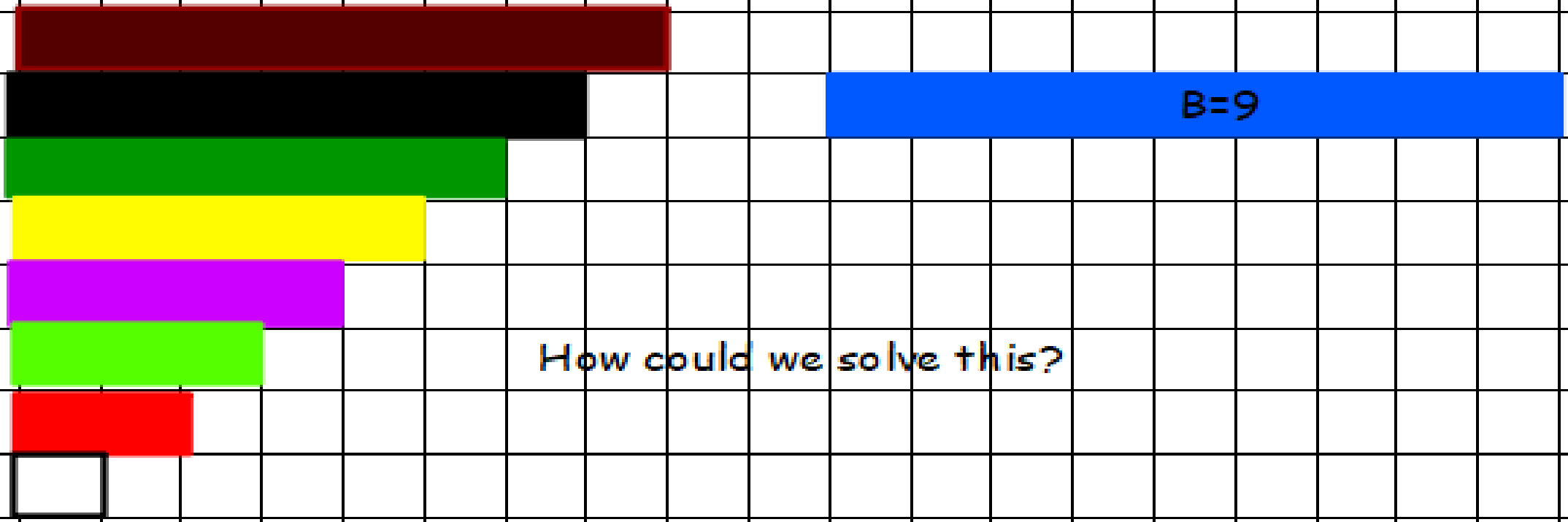
Structure 1
Additive with different parts.

Structure 2
Comparative bar models- Additive

Structure 3
Multipicative or Repeat Addition

Structure 4
Combining additive and multiplicative

'I am thinking of two rods that together are equivalent to blue. Once is twice as long as the other. What are they?'



How could we solve this?

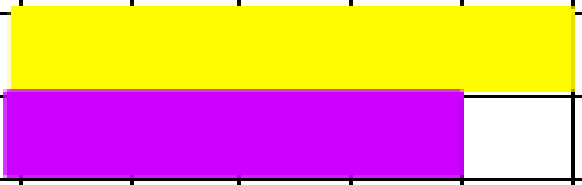
Structure 1
Additive with different parts.

Structure 2
Comparative bar models- Additive

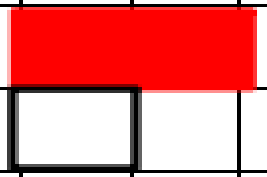
Structure 3
Multipicative or Repeat Addition

Structure 4
Combining additive and multiplicative

'I am thinking of two rods that together are equivalent to blue. Once is twice as long as the other. What are they?'



'Show that light green plus dark green is equal to blue.'
'Show that that dark green is twice as long as light green.'



Structure 1
Additive with different parts.

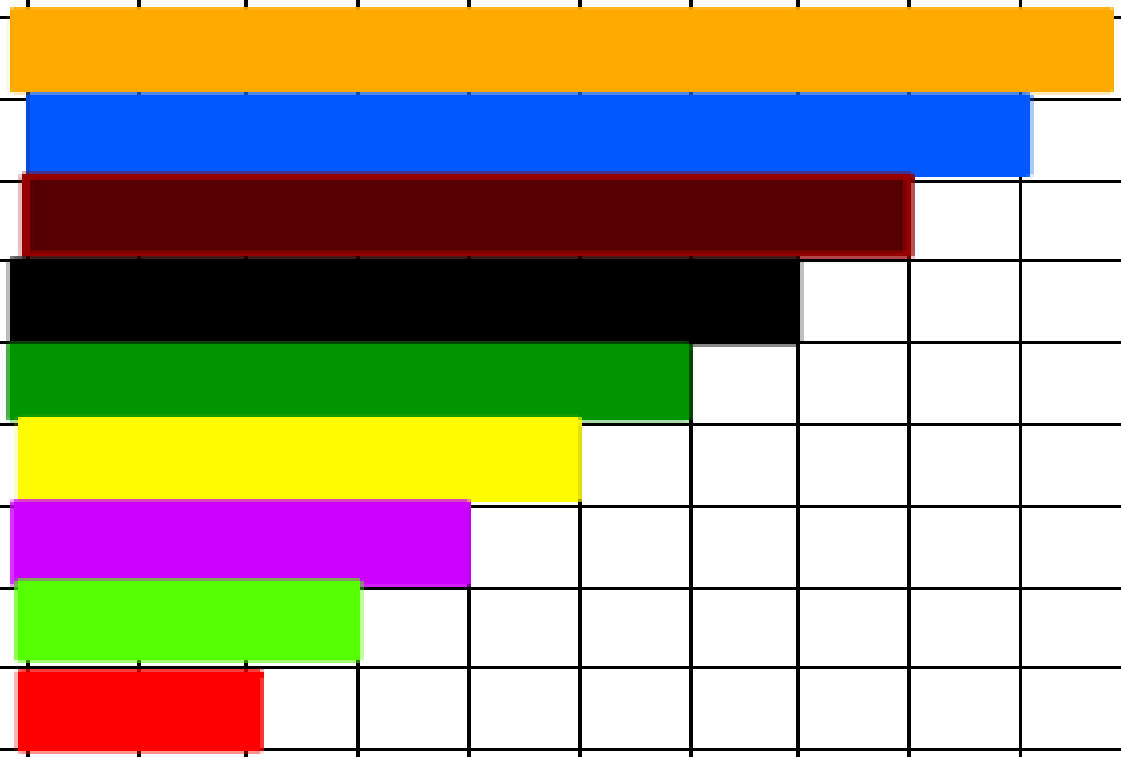
Structure 2
Comparative bar models- Additive

Structure 3
Multipicative or Repeat Addition

Structure 4
Combining additive and multiplicative

Structure 1

'I am thinking of two rods that together are equivalent to blue. There is a difference of white between the two rods. What are they?'



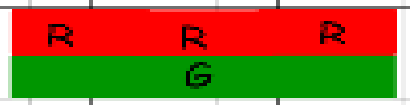
Structure 2

How could we solve this?

Structure 1
Additive with different parts.

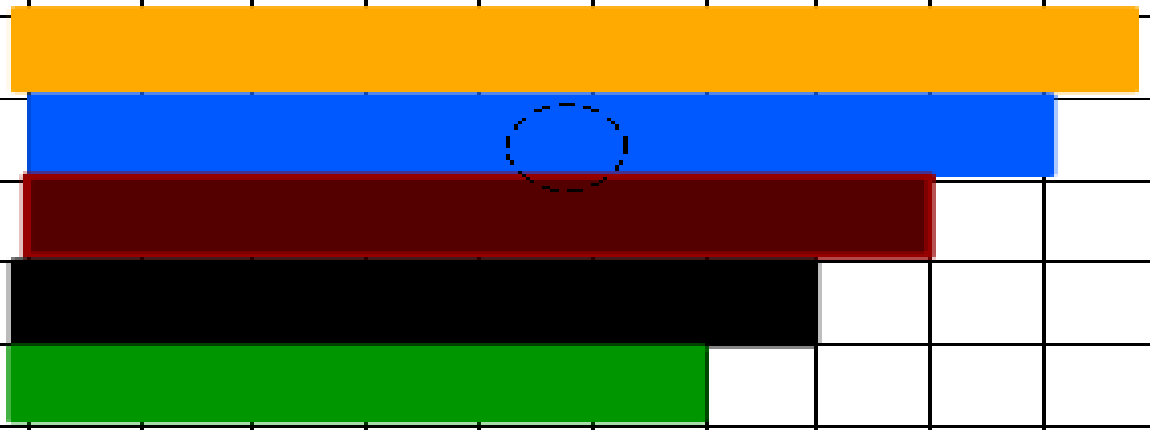
Structure 2
Comparative bar models- Additive

Structure 3
Multipicative or Repeat Addition

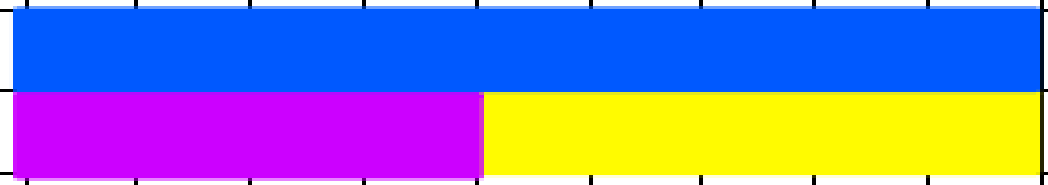


Structure 4
Combining additive and multiplicative

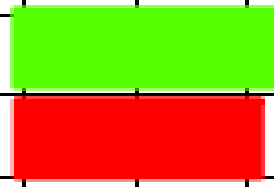
Structure 1



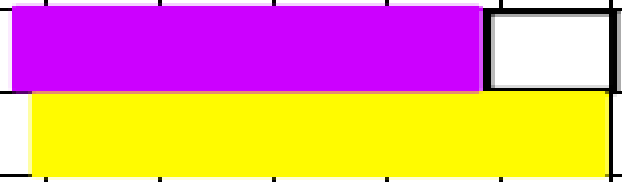
'I am thinking of two rods that together are equivalent to blue. There is a difference of white between the two rods. What are they?'



'Show that pink plus yellow is equal to blue.'
(first arrangement opposite)
'Show that pink and yellow have a difference of white.'
(second arrangement opposite)



Structure 2



How could we solve this?

Task

With a partner, sort different pairs of rods into each category

How do you know you have found all the solutions?

sum = orange	
sum = orange *and* **difference = red**	
difference = red	

I know I have found all the solutions to the sum equalling orange because...

I know I have found all the solutions to the sum equalling orange and the difference between red because...

I know I have found all the solutions to the difference being red because...

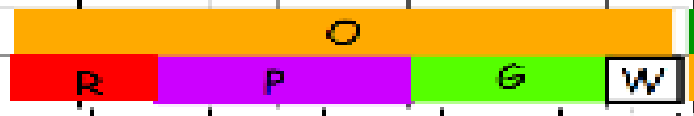
Extension

'Two rods have a sum equal to the length of orange, and one is two-thirds the length of the other. What are they?'

'Two rods have a sum equal to the length of blue, and one is three-and-a-half times as long as the other. What are they?'

LO: To identify two unknowns

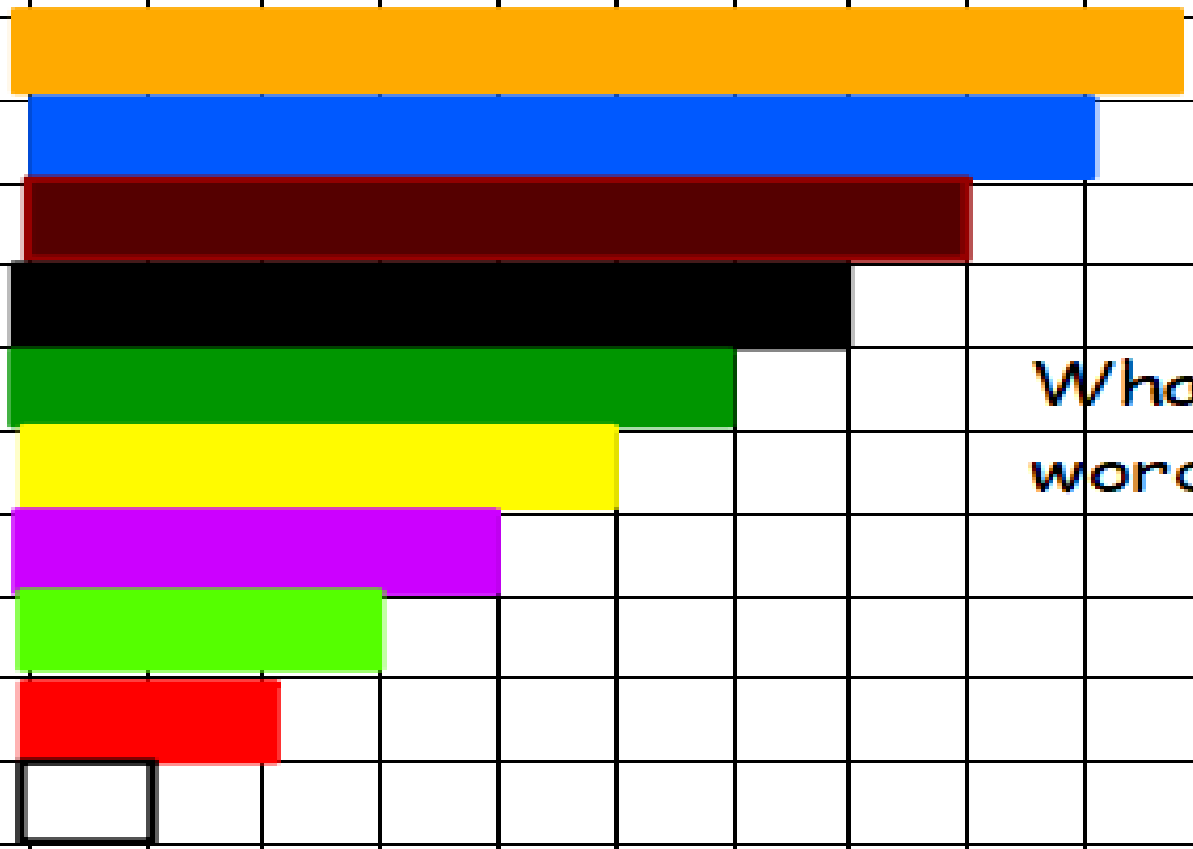
Structure 1
Additive with different parts.



Structure 2
Comparative bar models- Additive

Structure 3
Multipicative or Repeat Addition

Structure 4
Combining additive and multiplicative



'Year 6 have earnt 200 stars; the stars are either gold or silver. They have 30 more gold stars than silver. How many are gold?'

What can we tell from the wording of this problem?

With a partner, discuss the 5 solutions to the problem. Which one/ ones are correct? Which are incorrect? How do we know? Are there any incomplete?

Child A:

$\frac{1}{2}$ of 200 = 100

100 + 30 = 130

130 stars are gold

Child B:

g = 130, s = 70 ×

g = 100, s = 100 ×

g = 105, s = 95 ×

g = 110, s = 90 ×

g = 111, s = 89 ×

g = 120, s = 75 ×

Child C:

200 − 30 = 170

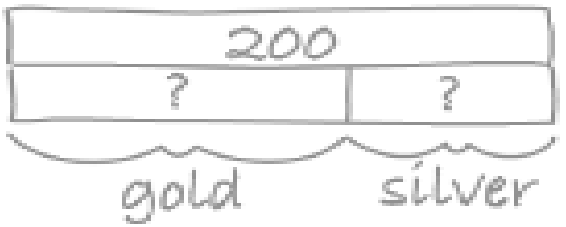
170 ÷ 2 = 85

Child D:

gold	silver	difference
150	50	100
140	60	80
130	70	60
120	80	40
110	90	20
115	85	30

115 stars are gold

Child E:



You dont have enough information to solve it

Let's discuss each model together. Can we decide which is wrong/ correct and why.

Child A:

$\frac{1}{2}$ of 200 = 100

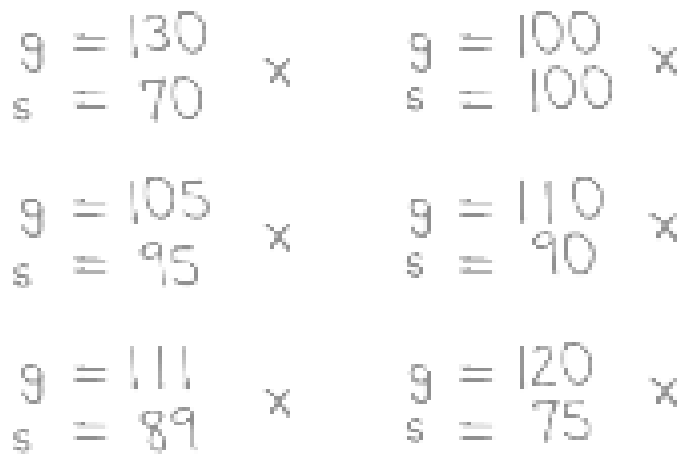
100 + 30 = 130

130 stars are gold

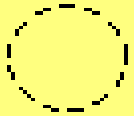
'Year 6 have earnt 200 stars; the stars are either gold or silver. They have 30 more gold stars than silver. How many are gold?'

Let's discuss each model together. Can we decide which is wrong/ correct and why.

Child B:



'Year 6 have earnt 200 stars; the stars are either gold or silver. They have 30 more gold stars than silver. How many are gold?'



Let's discuss each model together. Can we decide which is wrong/ correct and why.

Child C:

200 – 30 = 170

170 ÷ 2 = 85

'Year 6 have earnt 200 stars; the stars are either gold or silver. They have 30 more gold stars than silver. How many are gold?'

Let's discuss each model together. Can we decide which is wrong/ correct and why.

Child D:

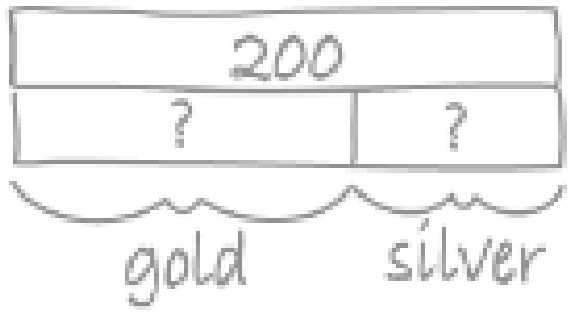
gold	silver	difference
150	50	100
140	60	80
130	70	60
120	80	40
110	90	20
115	85	30

115 stars are gold

'Year 6 have earnt 200 stars; the stars are either gold or silver. They have 30 more gold stars than silver. How many are gold?'

Let's discuss each model together. Can we decide which is wrong/ correct and why.

Child E:



You don't have enough information to solve it

'Year 6 have earnt 200 stars; the stars are either gold or silver. They have 30 more gold stars than silver. How many are gold?'

Structure 1
Additive with different parts.

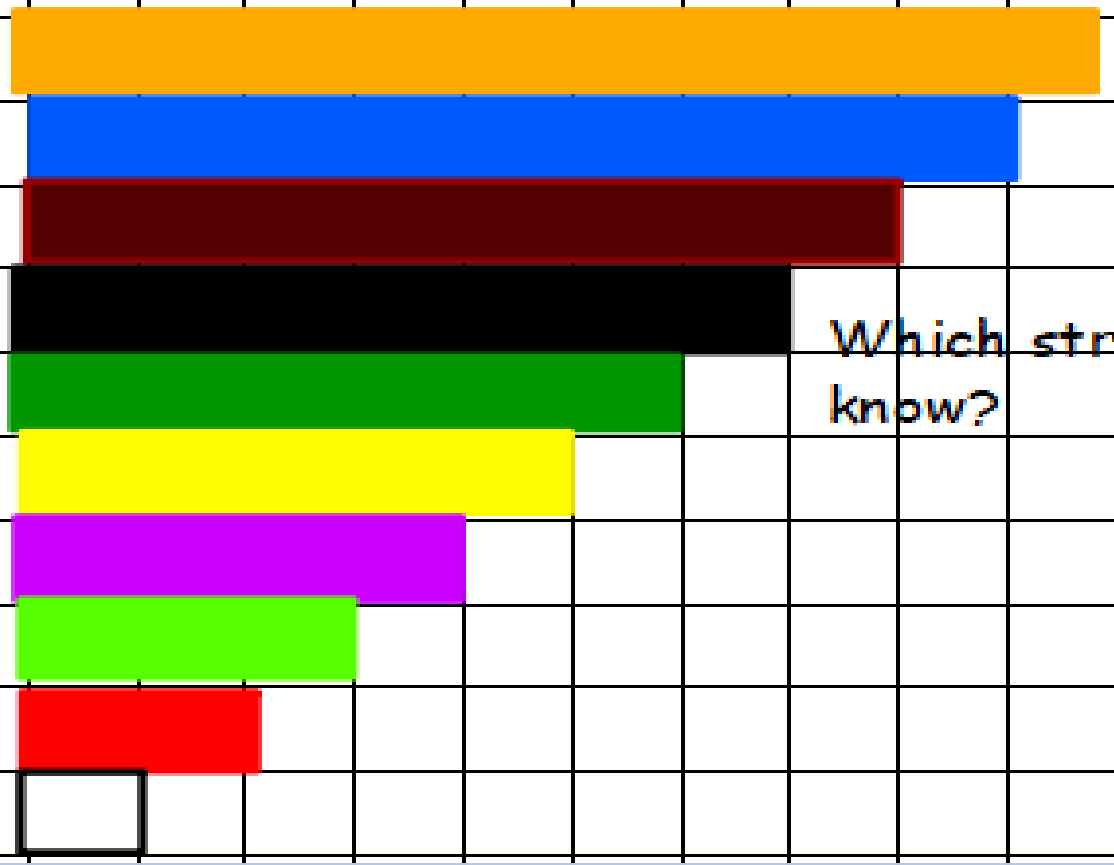
Structure 2
Comparative bar models- Additive

Structure 3
Multipicative or Repeat Addition

Structure 4
Combining additive and multiplicative

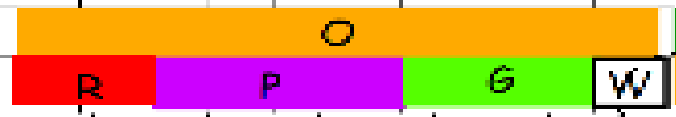
How could we solve this?

'Year 6 have earnt 200 stars; the stars are either gold or silver. They have 30 more gold stars than silver. How many are gold?'



Which structure are we using and how do we know?

Structure 1
Additive with different parts.



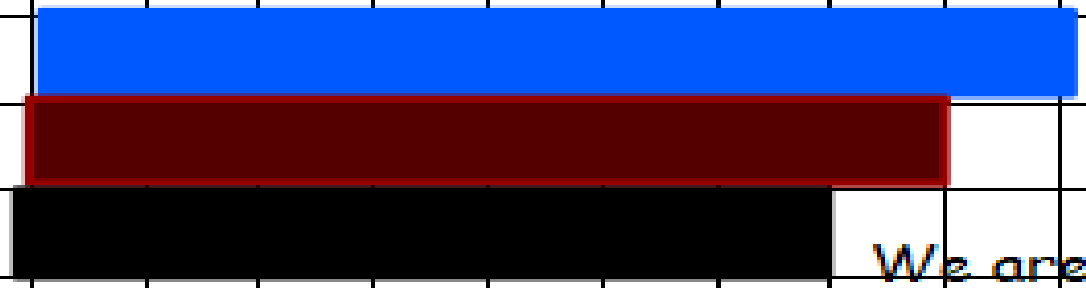
Structure 2
Comparative bar models- Additive

Structure 3
Multipicative or Repeat Addition

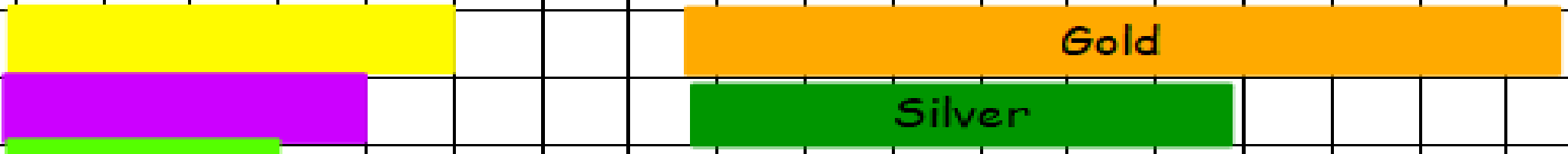
Structure 4
Combining additive and multiplicative

How could we solve this?

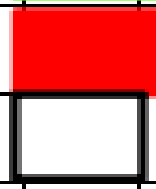
'Year 6 have earnt 200 stars; the stars are either gold or silver. They have 30 more gold stars than silver. How many are gold?'



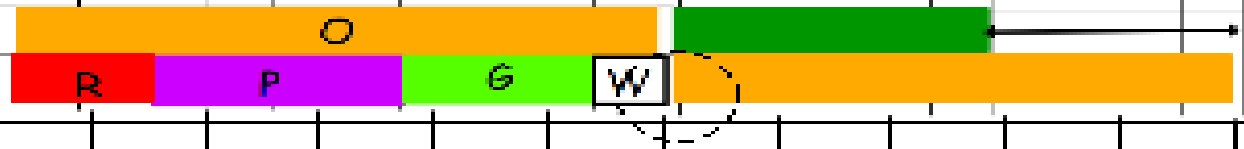
We are comparing two amounts.



What's wrong with my bar model?



Structure 1
Additive with different parts.



Structure 2
Comparative bar models- Additive

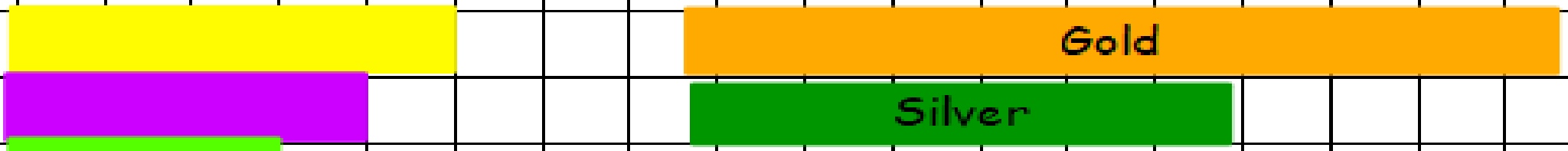
Structure 3
Multipicative or Repeat Addition

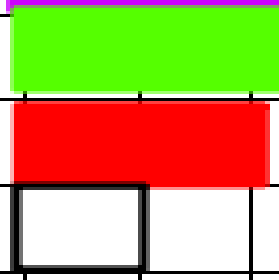
Structure 4
Combining additive and multiplicative

How could we solve this?

'Year 6 have earnt 200 stars; the stars are either gold or silver. They have 30 more gold stars than silver. How many are gold?'

We are comparing two amounts.



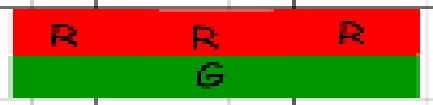


What's wrong with my bar model?

Structure 1
Additive with different parts.

Structure 2
Comparative bar models- Additive

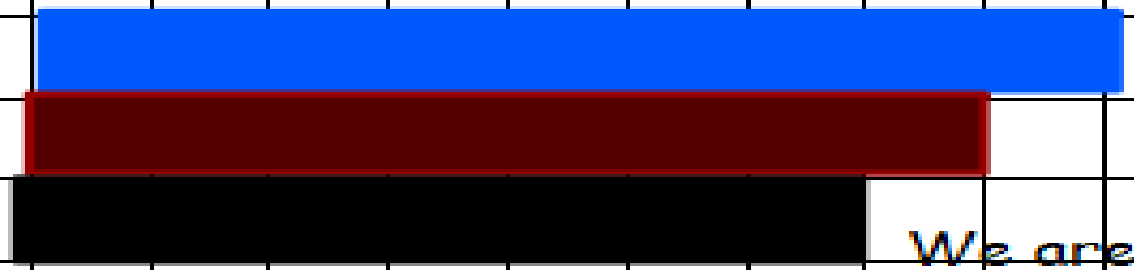
Structure 3
Multipicative or Repeat Addition



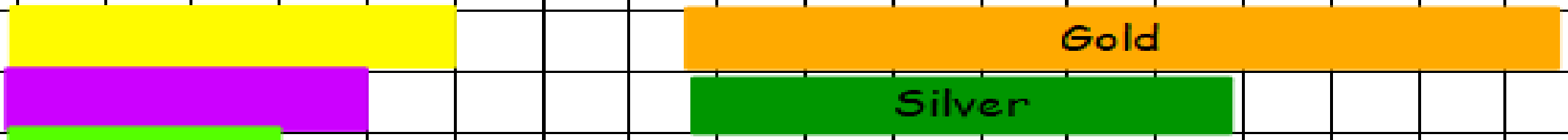
Structure 4
Combining additive and multiplicative

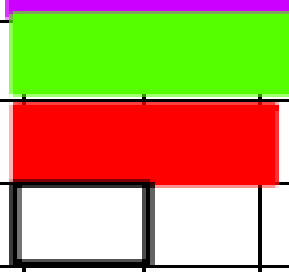
How could we solve this?

'Year 6 have earnt 200 stars; the stars are either gold or silver. They have 30 more gold stars than silver. How many are gold?'



We are comparing two amounts.





What's wrong with my bar model?

Structure 1
Additive with different parts.

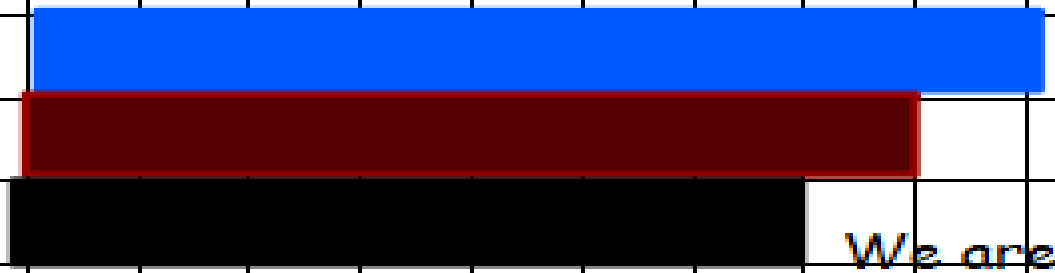
Structure 2
Comparative bar models- Additive

Structure 3
Multipicative or Repeat Addition

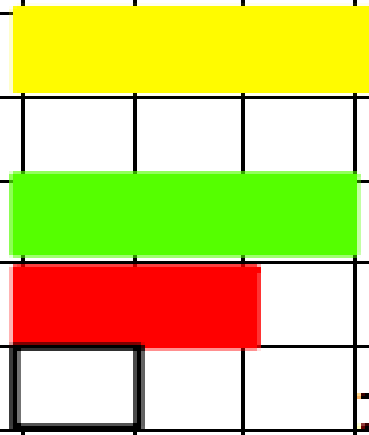
Structure 4
Combining additive and multiplicative

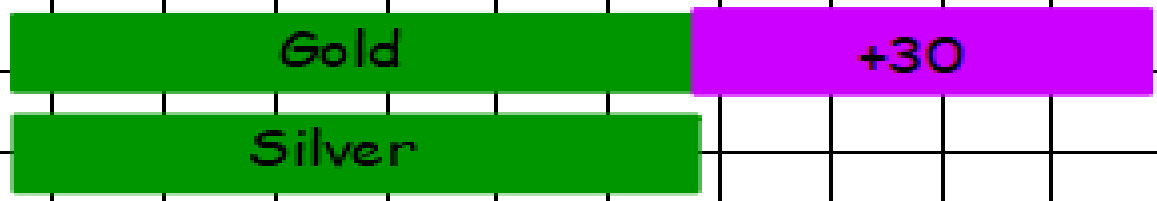
How could we solve this?

'Year 6 have earnt 200 stars; the stars are either gold or silver. They have 30 more gold stars than silver. How many are gold?'



We are comparing two amounts. We know there are 30 **more** gold than silver.





If we took 30 off then what would we have?

Structure 1
Additive with different parts.

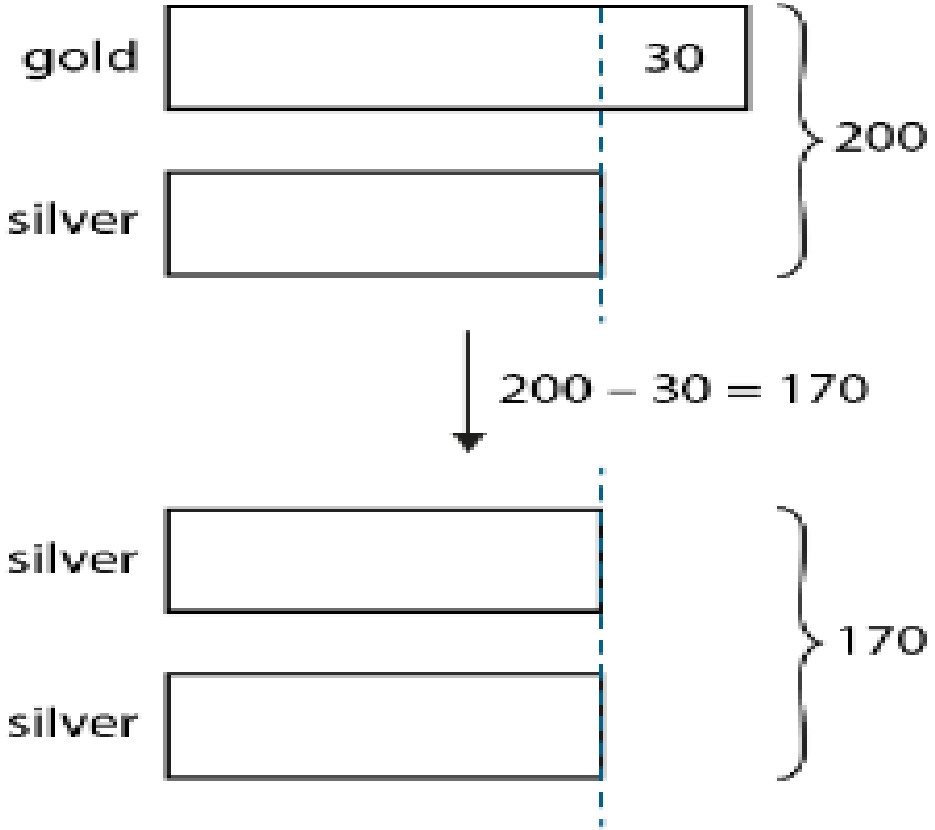
Structure 2
Comparative bar models- Additive

Structure 3
Multipicative or Repeat Addition

Structure 4
Combining additive and multiplicative

How could we solve this?

'Year 6 have earnt 200 stars; the stars are either gold or silver. They have 30 more gold stars than silver. How many are gold?'



Child A:

$\frac{1}{2}$ of 200 = 100

100 + 30 = 130

130 stars are gold

Child B

g = 130 s = 70	×	g = 100 s = 100	×	
g = 105 s = 95	×	g = 110 s = 90	×	
g = 111 s = 89	×	g = 120 s = 75	×	

Child C:

200 − 30 = 170

170 ÷ 2 = 85

Child D:

gold	silver	difference
150	50	100
140	60	80
130	70	60
120	80	40
110	90	20
115	85	30

115 stars are gold

Child E:

You don't have enough information to solve it

What do we think of the strategies now?

1. *'Child D has used the best strategy because they are the only one to get the right answer.'*
2. *'Child A is the only one who has used an incorrect approach.'*
3. *'If Child B hadn't given up they would have got the right answer.'*
4. *'The bar models by Child C and Child E show the same information.'*
5. *'Child B and Child D have used the same strategy.'*
6. *'Child D is the only one who has shown the difference between the number of gold stars and the number of silver stars.'*

Task

With a partner, talk through, discuss and solve the problems below:

1.) Represent the problem with Cuisenaire
2.) Draw a bar model
3.) Write the calculations
4.) Solve
5.) Check

'Anna and Ellen have £70 in total. Anna has £16 more than Ellen. How much money do they each have?'

Model with Cuisenaire

Draw Bar Model

Calculations

Check

'Steven is 29 years younger than Reuben. The sum of their ages is 77 years. How old is each person?'

Model with Cuisenaire

Draw Bar Model

Calculations

Check

LO: To identify two unknowns

LSCWC

Example

'Year 6 have earnt 30 stars; the stars are either gold or silver. They have 2 more gold stars than silver. How many are gold?' 14+2 =16 gold stars

'Year 6 have earnt 40 stars; the stars are either gold or silver. They have 10 more gold stars than silver. How many are gold?'

'Year 6 have earnt 50 stars; the stars are either gold or silver. They have 6 more gold stars than silver. How many are gold?'

Example

30-2=28

28 ÷ 2 = 14

Structure 1
Additive with different parts.

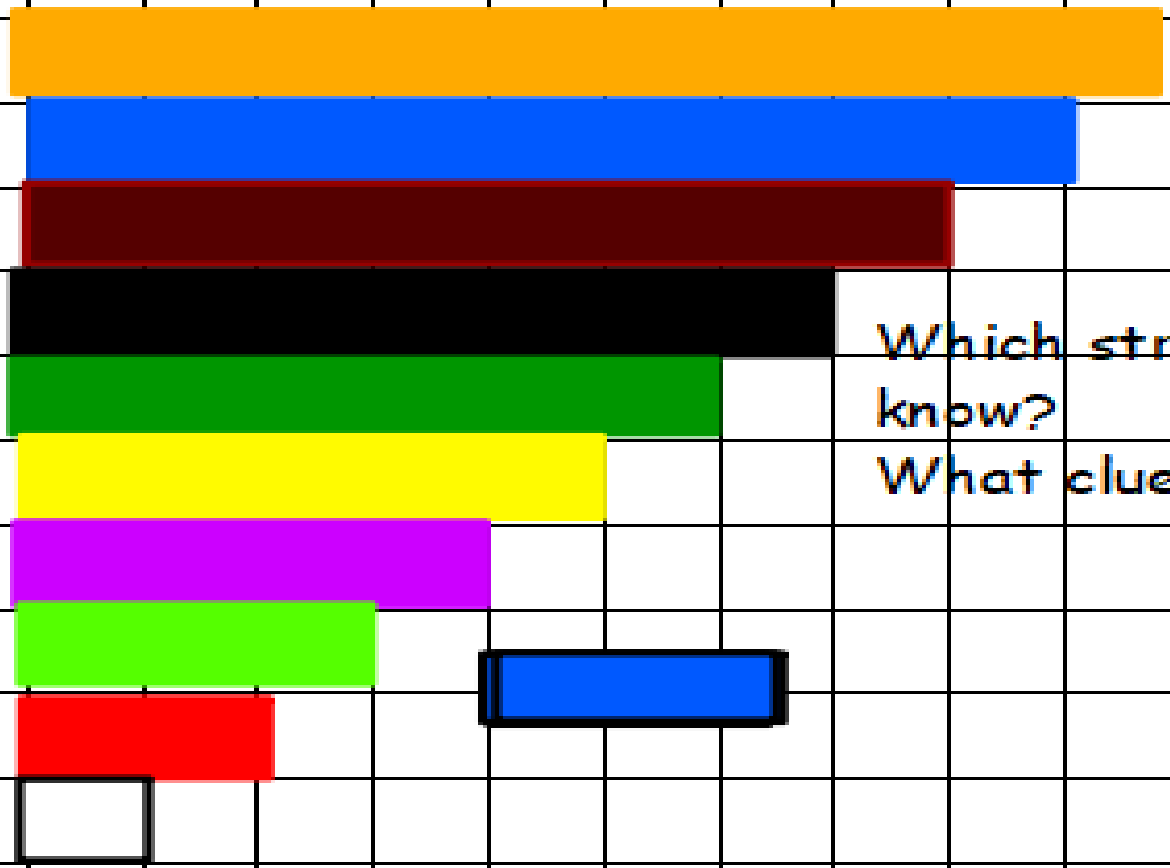
Structure 2
Comparative bar models- Additive

Structure 3
Multipicative or Repeat Addition

Structure 4
Combining additive and multiplicative

How could we solve this?

'The sum of two numbers is 20. One number is four times the other number. What are the two numbers?'



Which structure are we using and how do we know?
What clues are there in the language?

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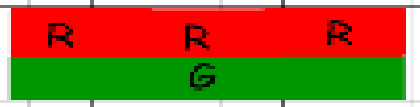
Additive with different parts.

Structure 2
Comparative bar models- Additive

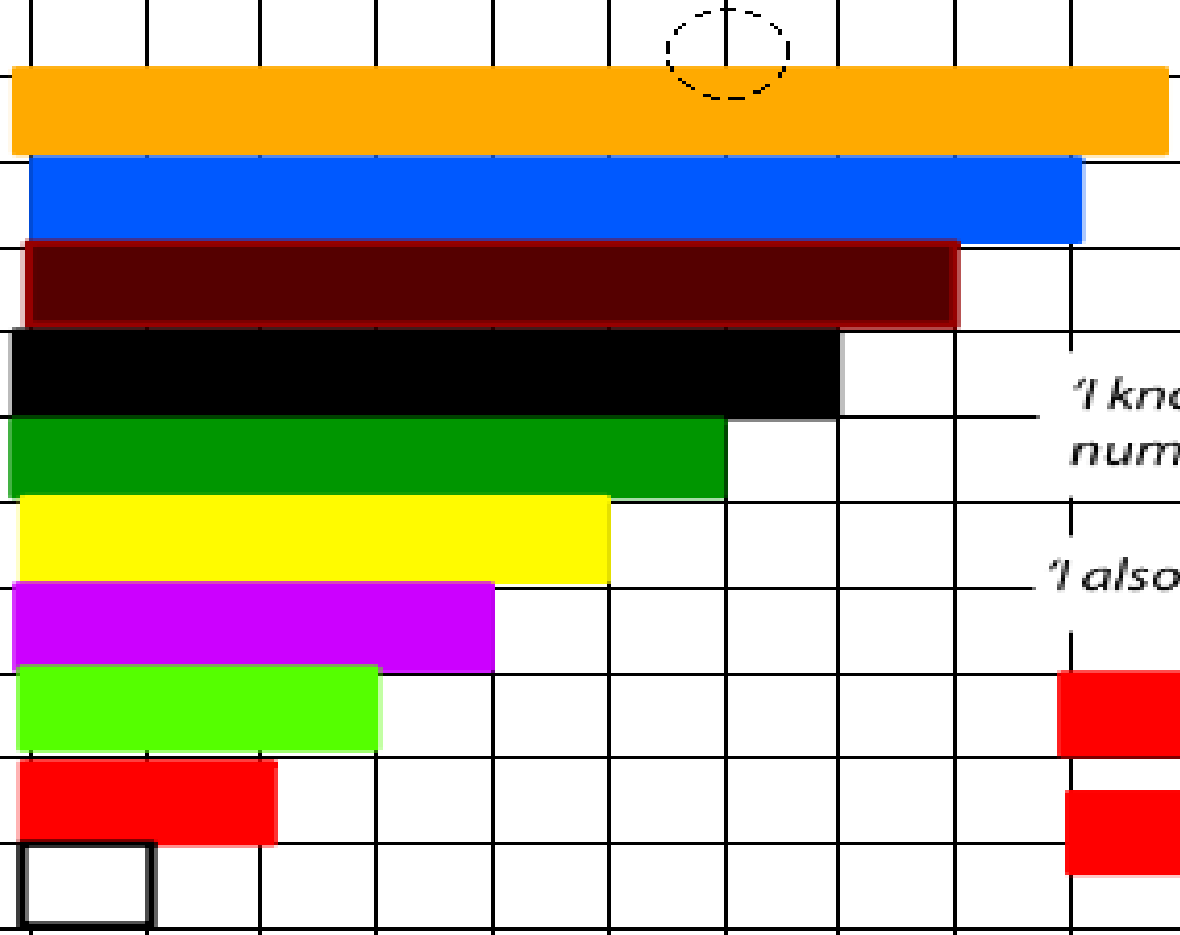
Structure 3
Multipicative or Repeat Addition



Structure 4
Combining additive and multiplicative

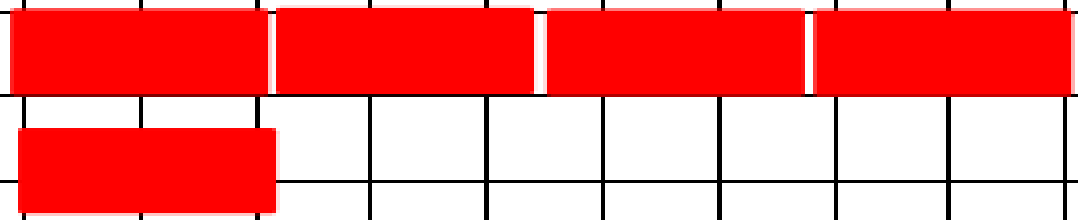
How could we solve this?

'The sum of two numbers is 20. One number is four times the other number. What are the two numbers?'



'I know that one number (a) is four times the other number (b).'

'I also know that the two numbers sum to twenty.'



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Additive with different parts.

Structure 2
Comparative bar models- Additive

Structure 3
Multipicative or Repeat Addition

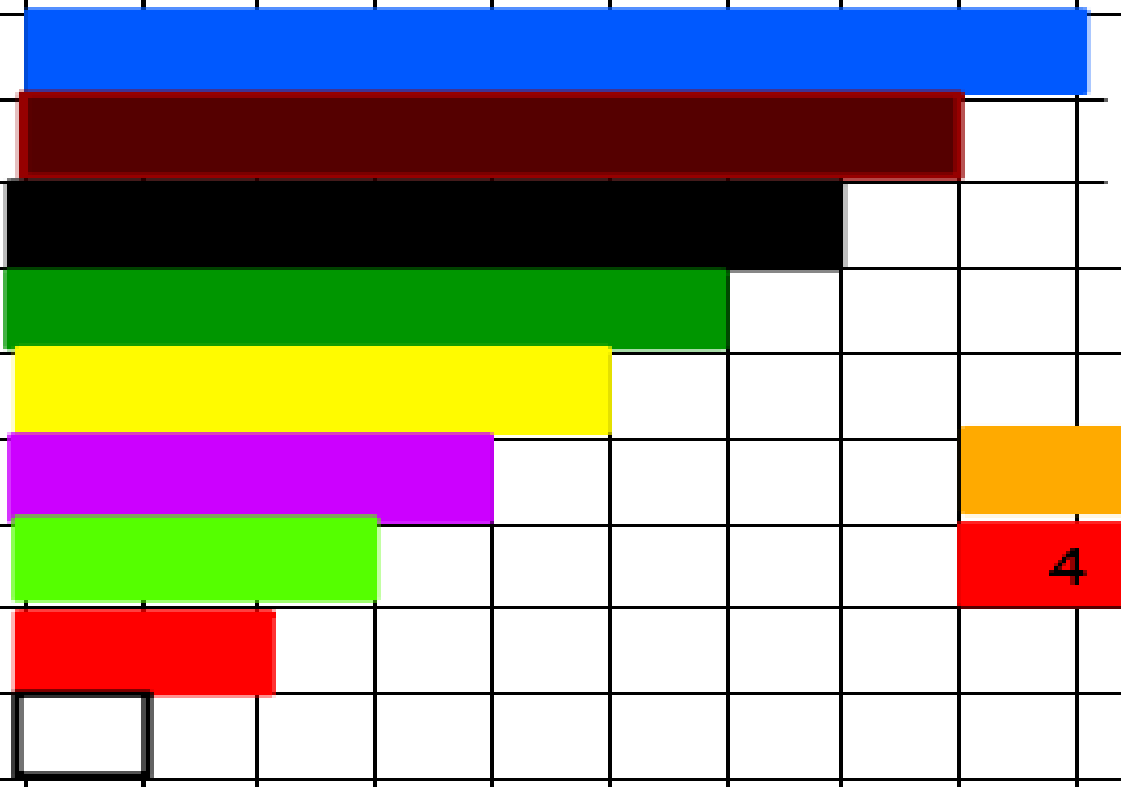
Structure 4
Combining additive and multiplicative

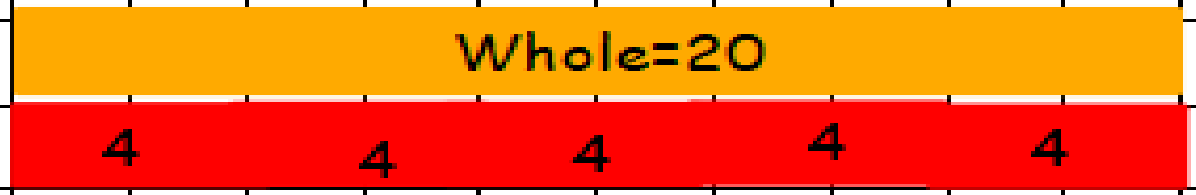
How could we solve this?

'The sum of two numbers is 20. One number is four times the other number. What are the two numbers?'

'I know that one number (a) is four times the other number (b).'

'I also know that the two numbers sum to twenty.'





Structure 1
Additive with different parts.

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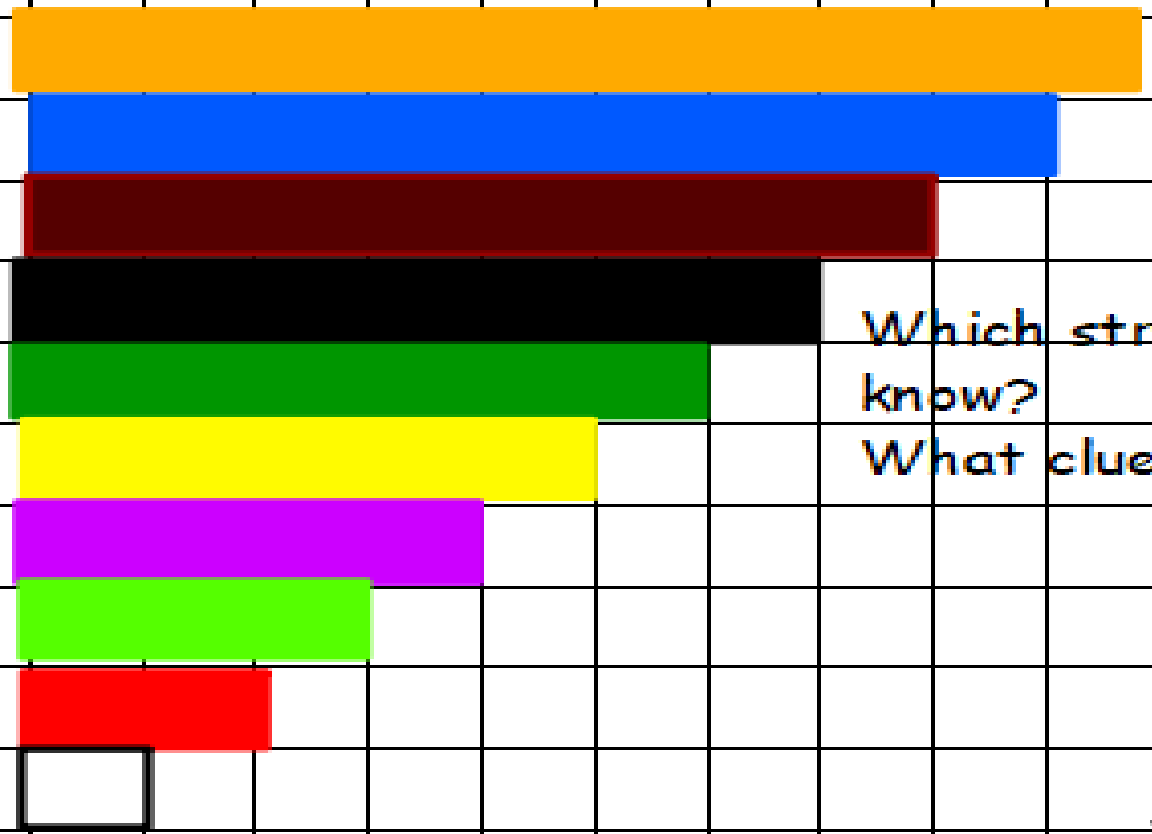
Structure 3
Multipicative or Repeat Addition

Structure 4
Combining additive and multiplicative

How could we solve this?

'The sum of two numbers is 48. One number is one-fifth of the other number. What are the two numbers?'



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Multipicative or Repeat Addition

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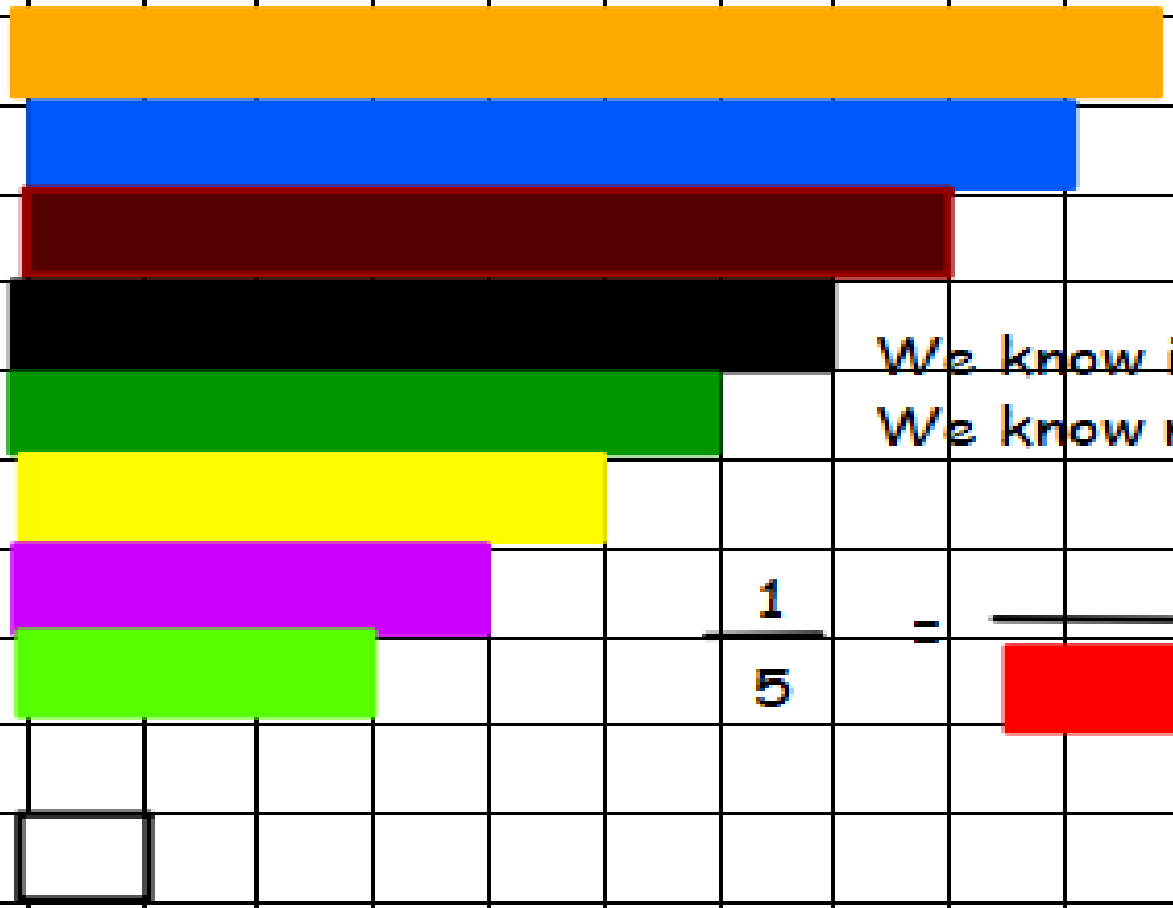
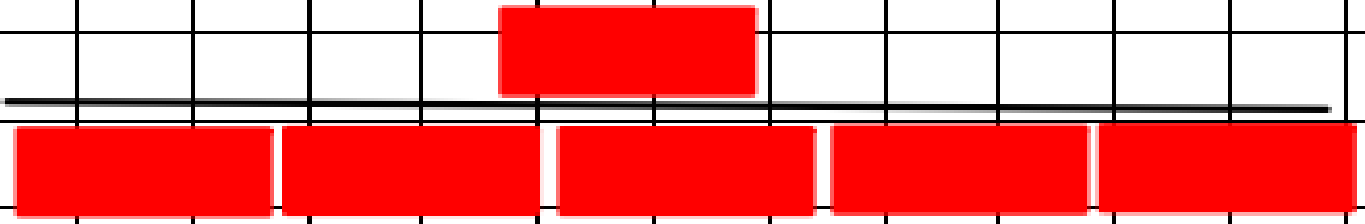
'The sum of two numbers is 48. One number is one-fifth of the other number. What are the two numbers?'



We know in total there is 48

We know number one is 1/5 of number two.

$\frac{1}{5}$ =



Structure 1
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Comparative bar models- Additive

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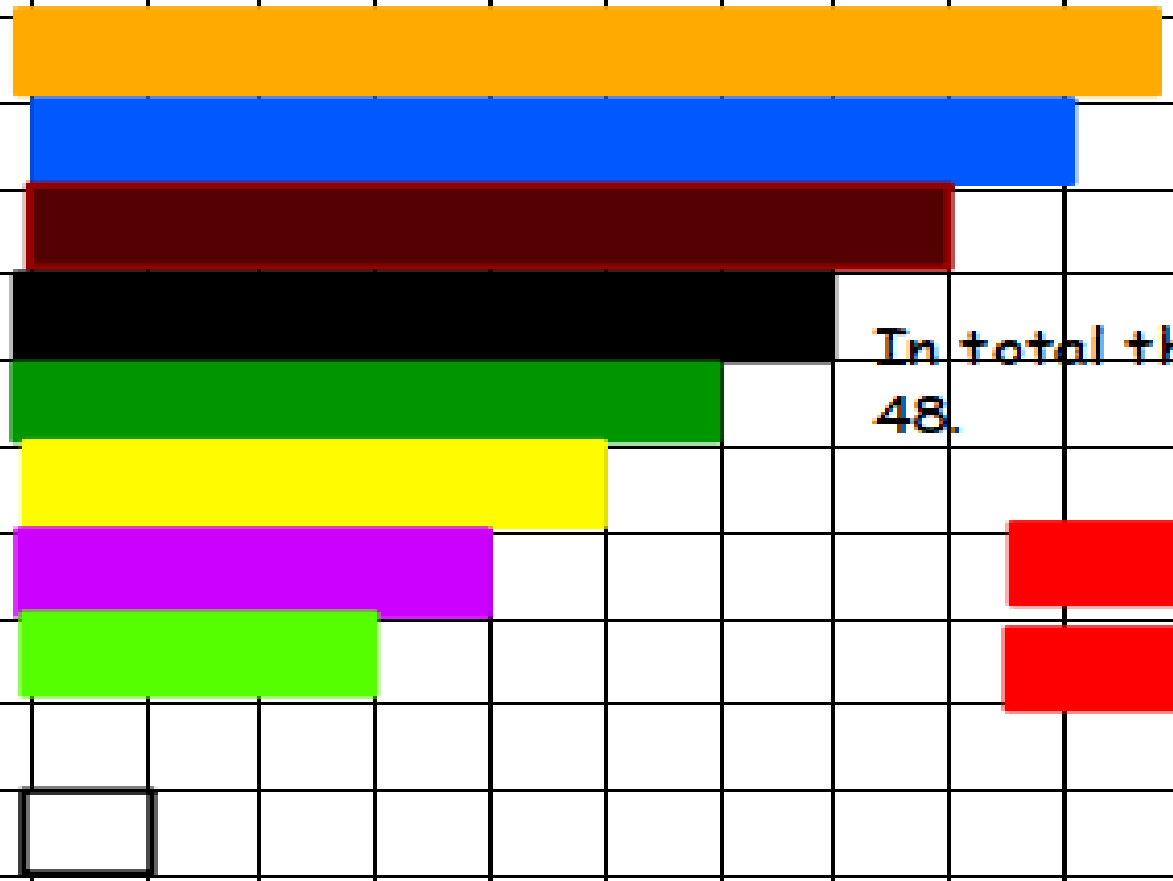
Multipicative or Repeat Addition

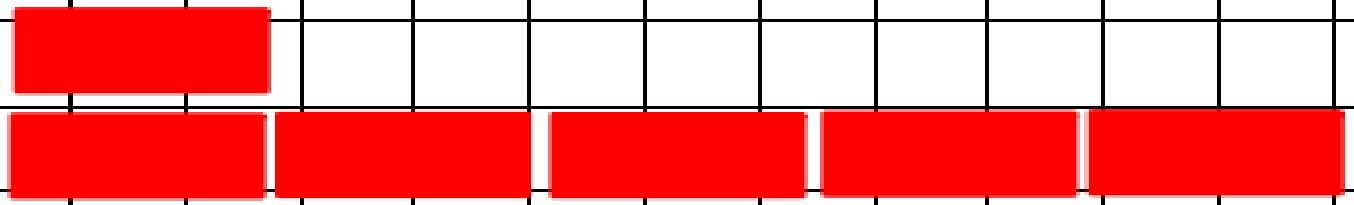
Structure 4
Combining additive and multiplicative

How could we solve this?

The sum of two numbers is 48. One number is one-fifth of the other number. What are the two numbers?



In total there are six parts. These are equal to 48.



Structure 1
Additive with different parts.

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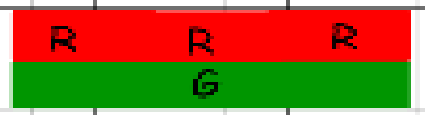
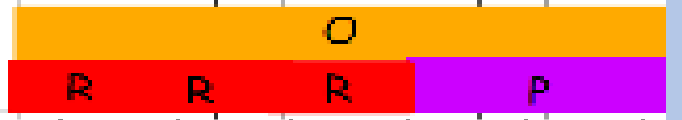
Structure 3
Multipicative or Repeat Addition

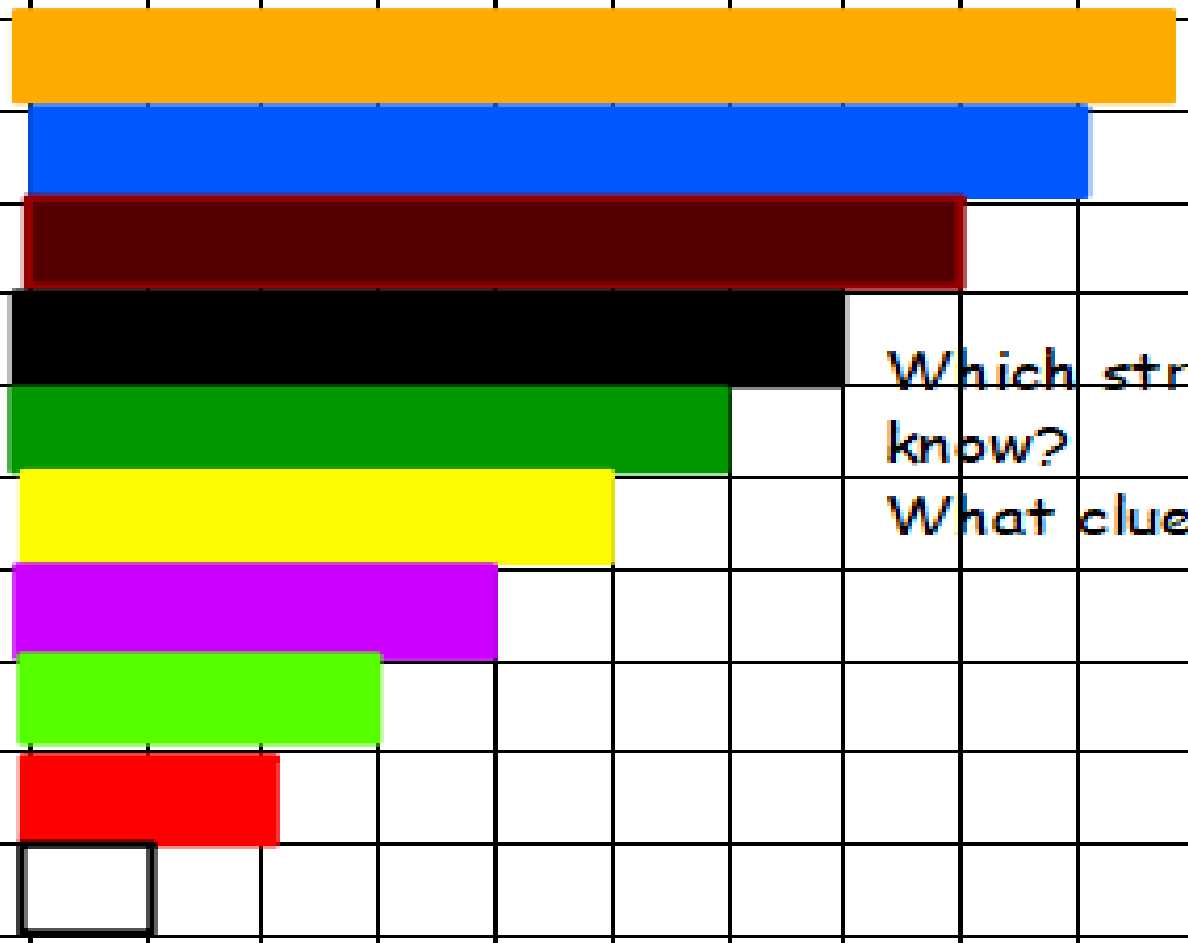


Structure 4
Combining additive and multiplicative



How could we solve this?

'Bill earnt £60 doing odd-jobs one weekend. He earnt three times as much on Saturday as he did on Sunday. How much did Bill earn each day?'



Which structure are we using and how do we know?

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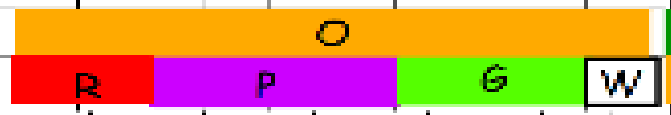
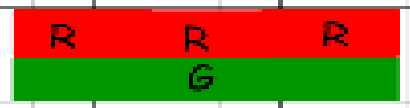
Additive with different parts.



Structure 2
Comparative bar models- Additive

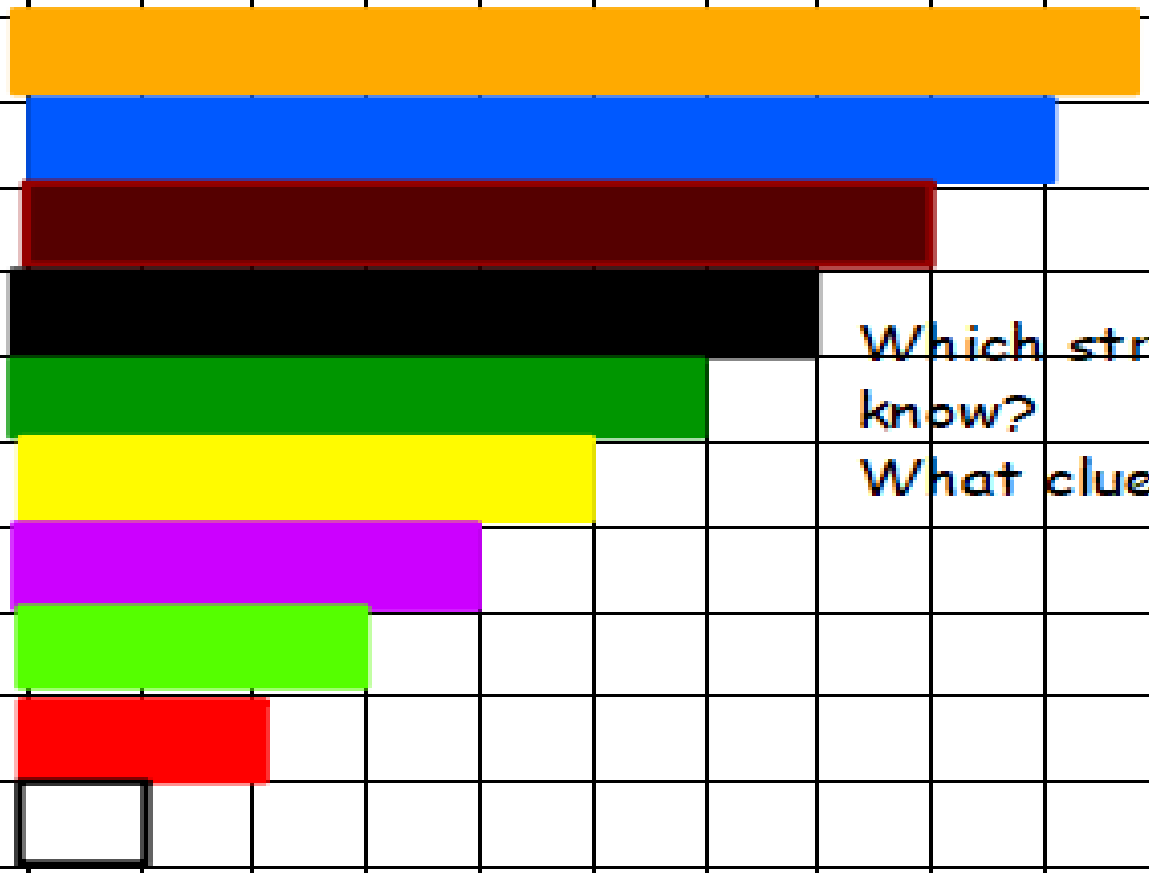
Structure 3
Multipicative or Repeat Addition



Structure 4
Combining additive and multiplicative

How could we solve this?

'Between them, Josie and Ellie swam 1.25 km during swimming training. Josie swam $\frac{1}{4}$ of the distance that Ellie swam. How far did each of them swim?'



Which structure are we using and how do we know?

What clues are there in the language?

Task

Choose a problem. Use the layout on the left in your books to solve:

- *'Two numbers have a total of 360. One is three times the other. What are the two numbers?'*
- *'Two numbers have a difference of 5.6 and a sum of 8. What are the two numbers?'*
- *'My dad and I have a combined mass of 96 kg. My dad's mass is three times as much as my mass. How much is each of our masses?'*
- *'It costs £2.65 to buy a watermelon and a pineapple. The pineapple costs 85 p less than the watermelon. What is the cost of each?'*
- *'My garden has an area of 78 m^2. The patio takes up one-third of the area of the garden. The rest is grass. What is the area of the grass?'*
- *'Work out the values of a and b, if* $a + b = 1{,}000$ *and* $a - b = 100$*'*

Are you being asked to compare amounts (then find the difference) or are you being asked to compare multiples of the same amount?

Model with Cuisenaire

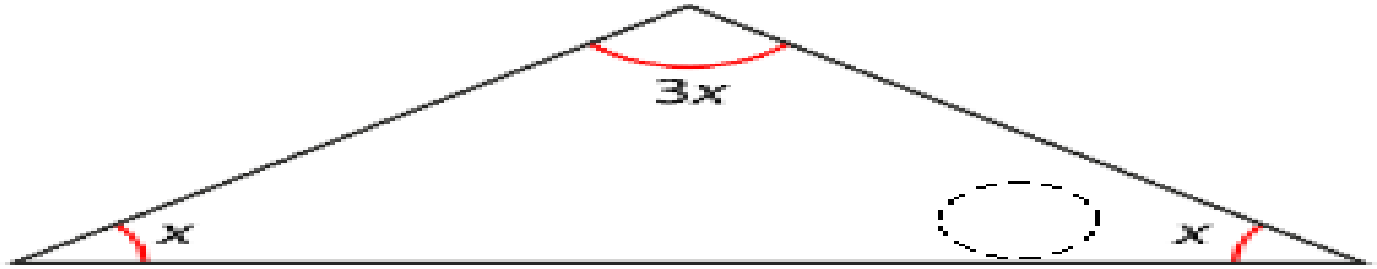
Draw Bar Model

Calculations

Check

Challenge

'Work out the value of each angle in this triangle.'



'The ages of Anna, Bella and Cara total 18 years. Anna is two years younger than Bella. Bella is two years younger than Cara.'

- 'How old is each of them?'
- 'How many years is it until their ages total 50?'

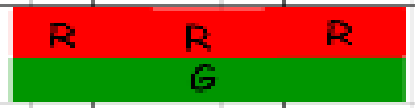
'Together Jess, Safa and Amy ran 25 km between them. Jess ran three times as far as Amy and 3 km further than Safa. How far did Jess run?'

LO: To identify sum and difference problems

Structure 1
Additive with different parts.

Structure 2
Comparative bar models- Additive

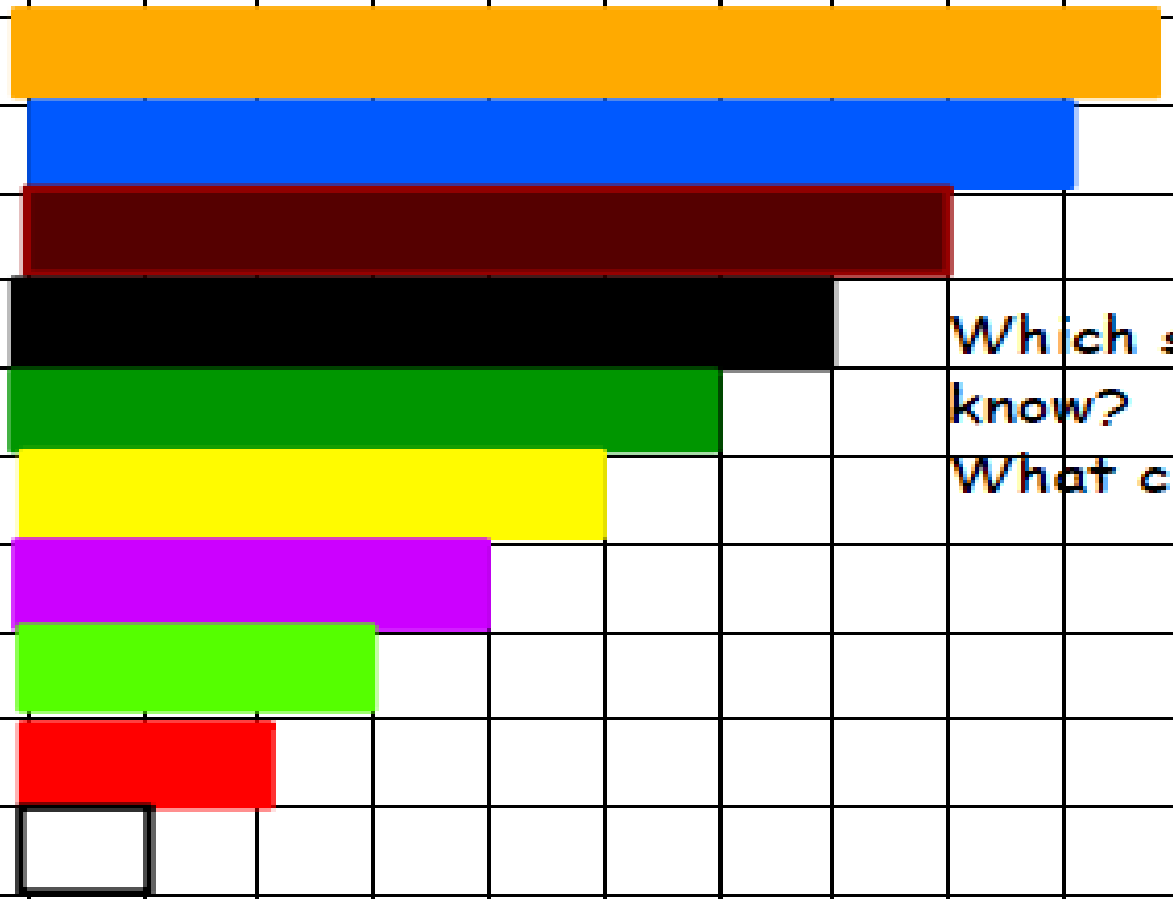
Structure 3
Multipicative or Repeat Addition



Structure 4
Combining additive and multiplicative

How could we solve this?

*'**4 pears** and 5 lemons cost £3.35.*
__4 pears__ and 2 lemons cost £2.30.
How much does one pear cost?
How much does one lemon cost?'



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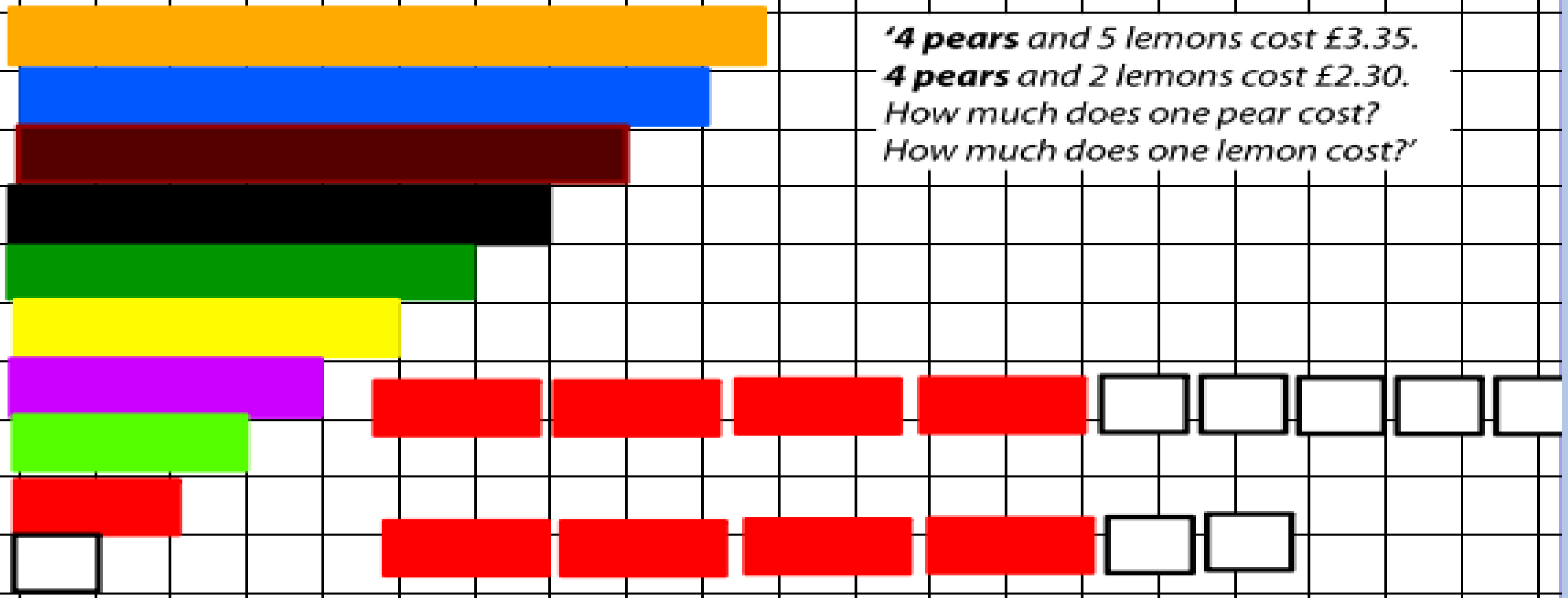
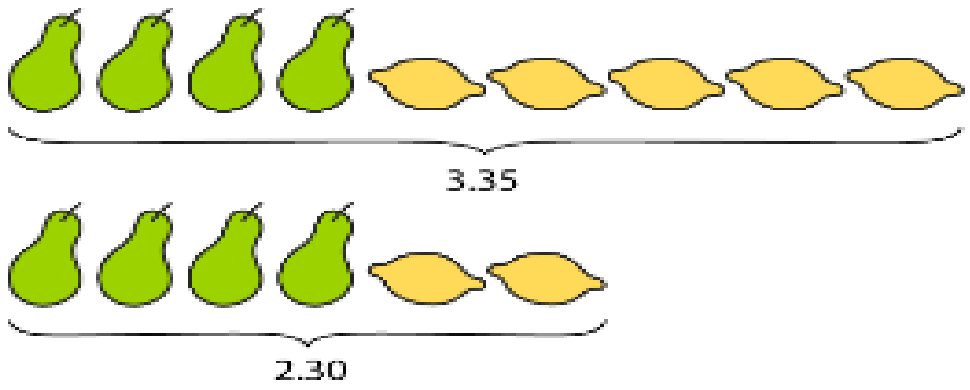
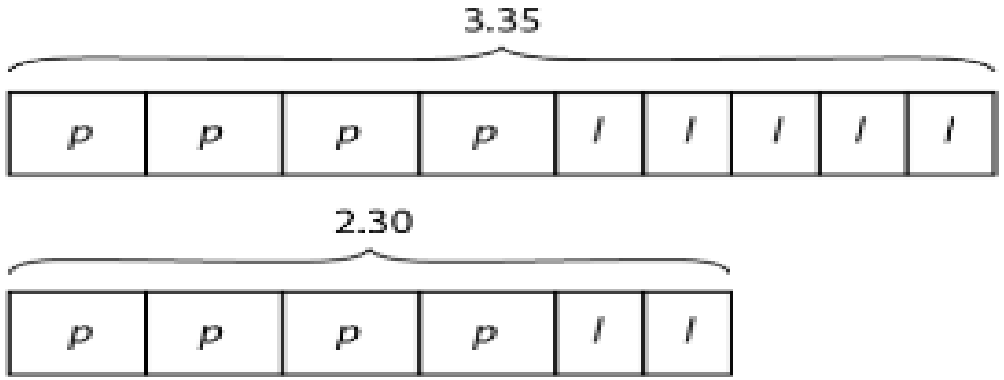



3.35
2.30


3.35
p p p p l l l l l
2.30
p p p p l l

Structure 1
Additive with different parts.

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Multipicative or Repeat Addition

Structure 4
Combining additive and multiplicative

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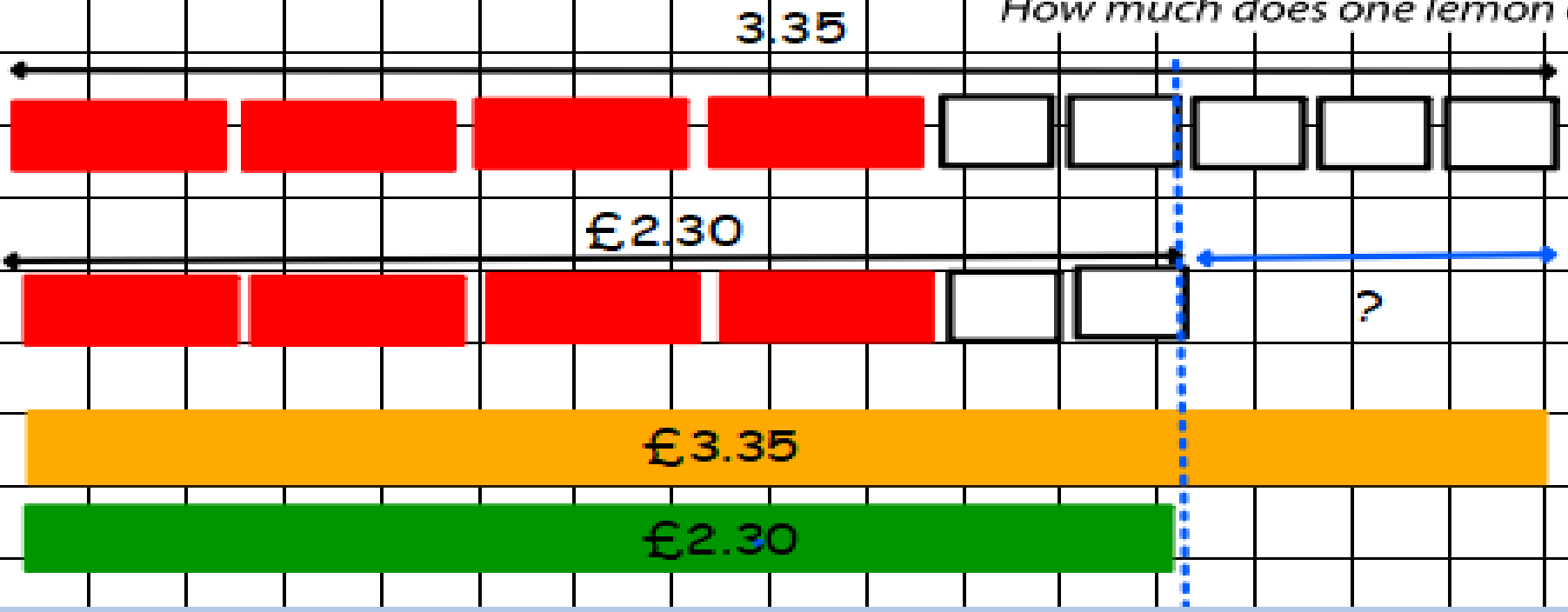

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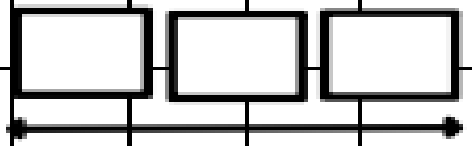
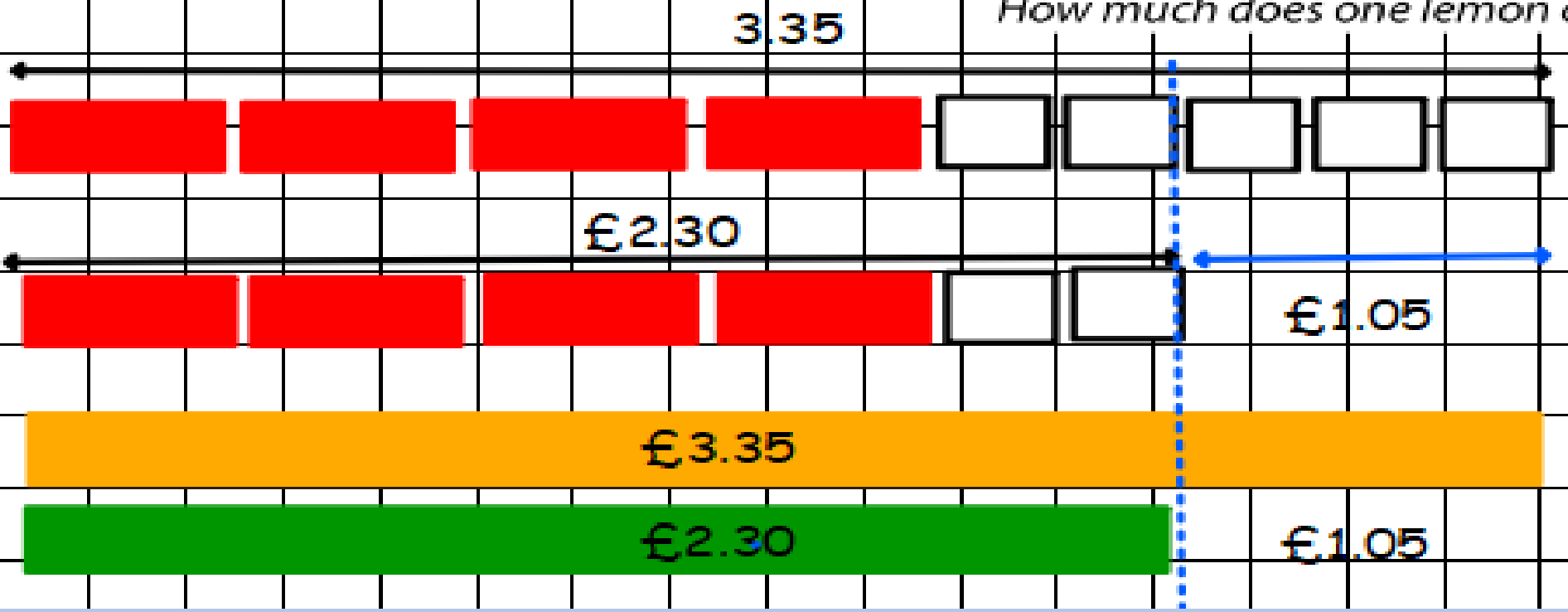
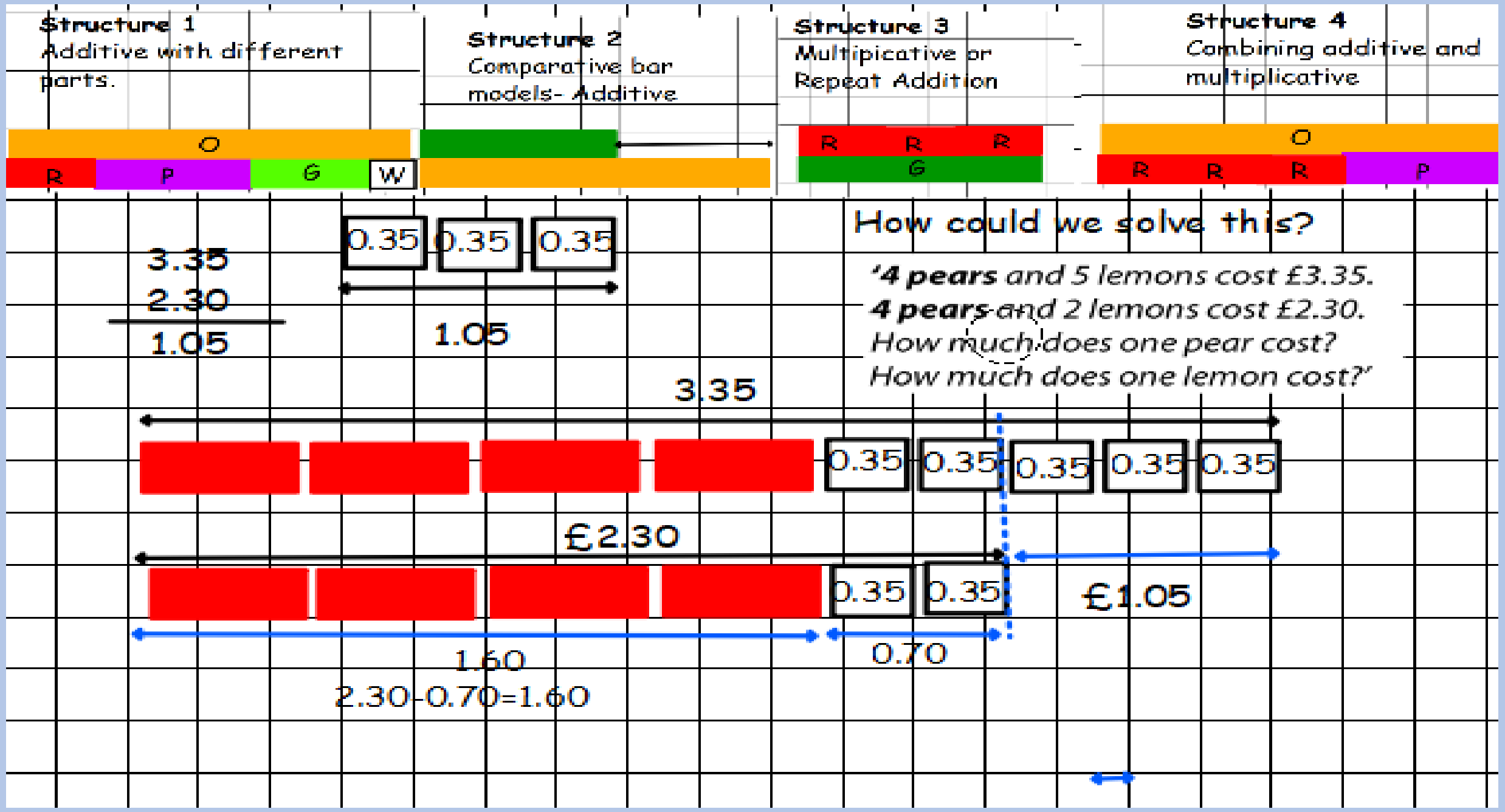
How could we solve this?

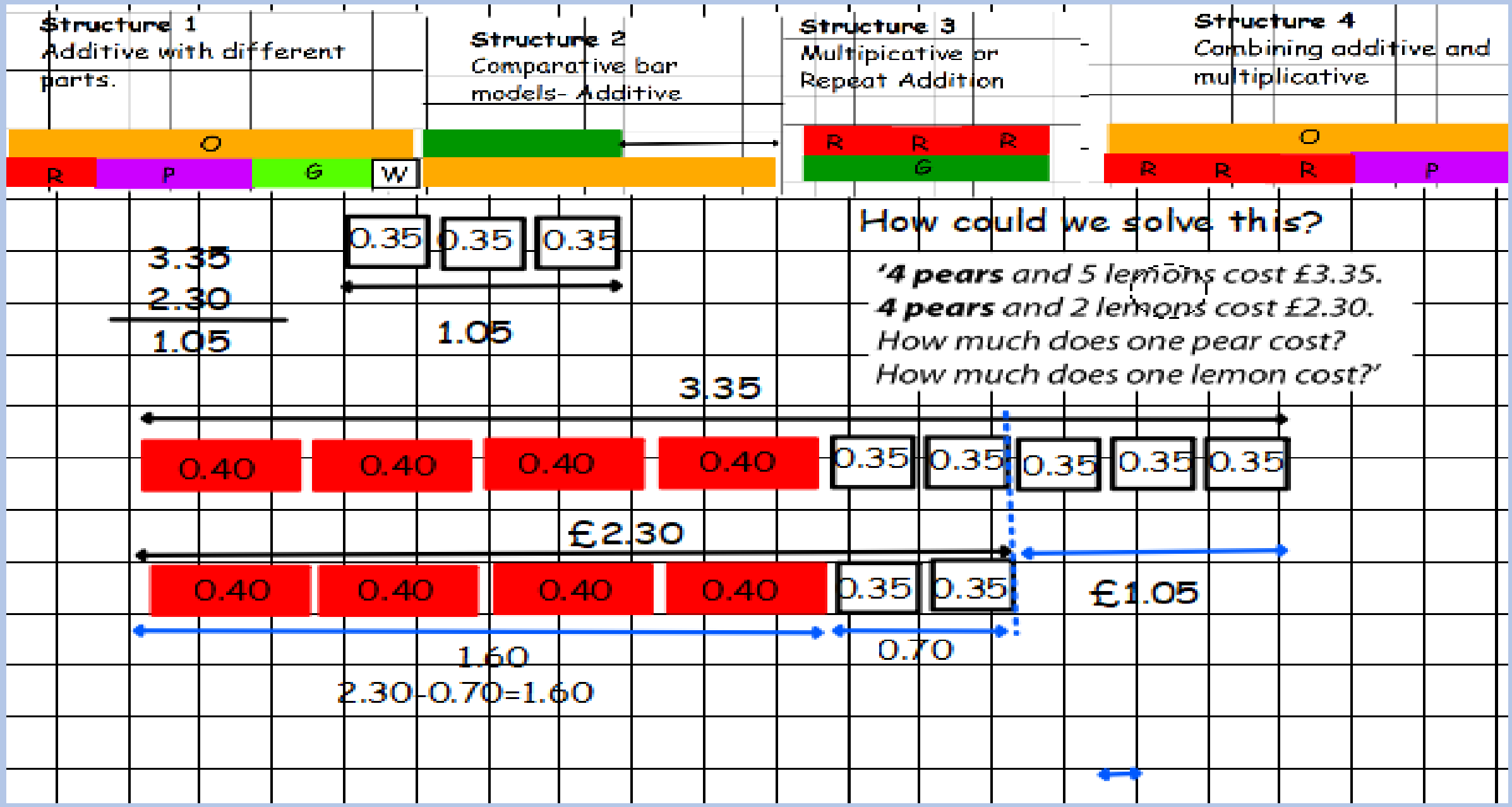
*'**4 pears** and 5 lemons cost £3.35.*
__4 pears__ and 2 lemons cost £2.30.
How much does one pear cost?
How much does one lemon cost?'

3.35
2.30
1.05






Structure 1
Additive with different parts.
O
R
P
G
W
Structure 2
Comparative bar models- Additive
Structure 3
Multipicative or Repeat Addition
R R R
G
Structure 4
Combining additive and multiplicative
O
R R R
P
How could we solve this?
'4 pears and 5 lemons cost £3.35.
4 pears and 2 lemons cost £2.30.
How much does one pear cost?
How much does one lemon cost?'
0.35 0.35 0.35
3.35
2.30
1.05
1.05
3.35
0.35 0.35 0.35 0.35 0.35
£2.30
0.35 0.35
£1.05
1.60
0.70
2.30-0.70=1.60


Structure 1
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O
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R
R
R
P
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0.35
0.35
0.35
3.35
2.30
1.05
1.05
3.35
0.40
0.40
0.40
0.40
0.35
0.35
0.35
0.35
0.35
€2.30
0.40
0.40
0.40
0.40
0.35
0.35
€1.05
1.60
0.70
2.30-0.70=1.60

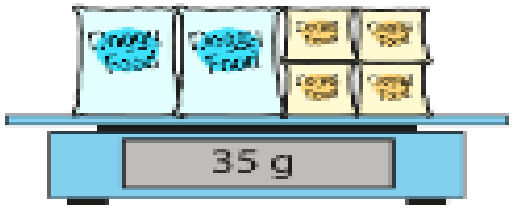
Structure 1
Additive with different parts.

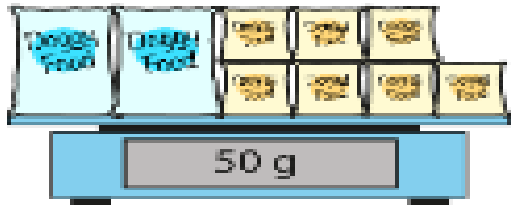
Structure 2
Comparative bar models- Additive

Structure 3
Multipicative or Repeat Addition

Structure 4
Combining additive and multiplicative

The scales show the masses of some large and small bags of dog food.'



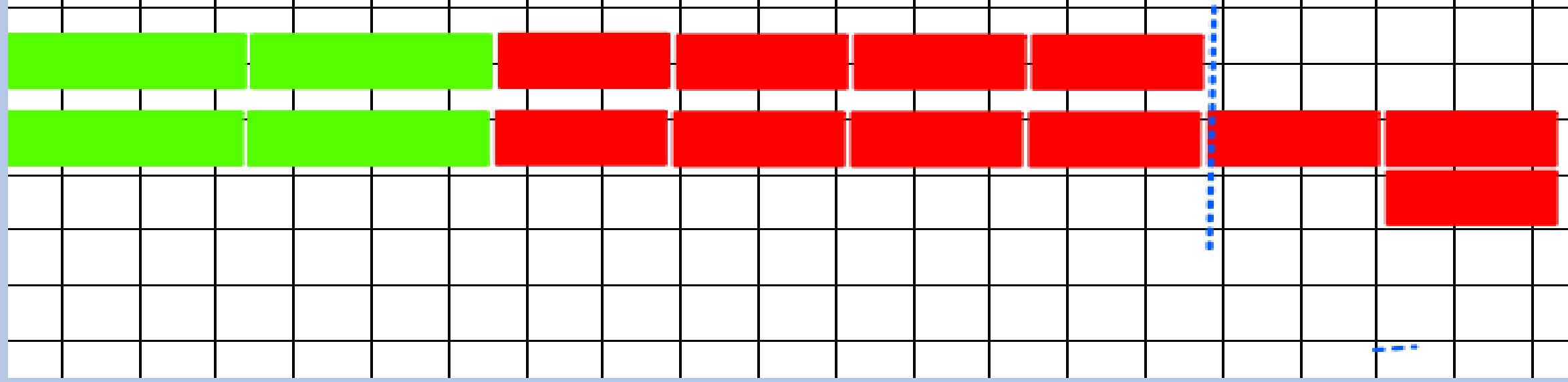


How could we solve this?

Which structure are we us
know?

What clues are there in th

'What is the mass of each of the two different sized bags?'



Task

1.)

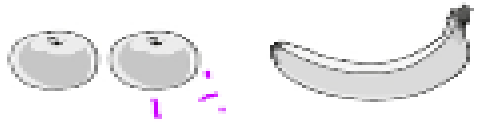
A shop sells fruit.

Chen buys 2 apples and 3 bananas.

He pays £2.35

Megan buys 2 apples and 1 banana.

She pays £1.35



How much does one banana cost?

2.) Zinzi has a rod **15** cubes long.

She breaks it into two pieces.

One piece is **1** cube longer than the other.

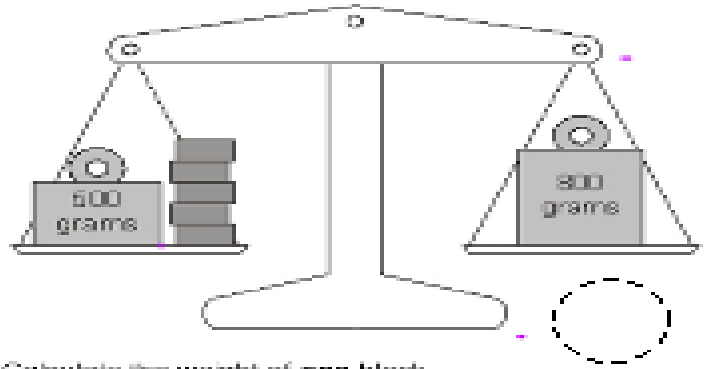
How many cubes are in **each** piece?

_____ **cubes** and _____ **cubes**

3.)

Lin has five blocks which are all the same.

She balances them on the scale with two weights.



Calculate the weight of **one block**.

4.)

A shop sells notebooks and pens.

Hassan bought **a notebook** and **a pen**.

He paid **£1.10**

Katie bought **a notebook** and **2 pens**.

She paid **£1.45**

Calculate the cost of **a notebook**.

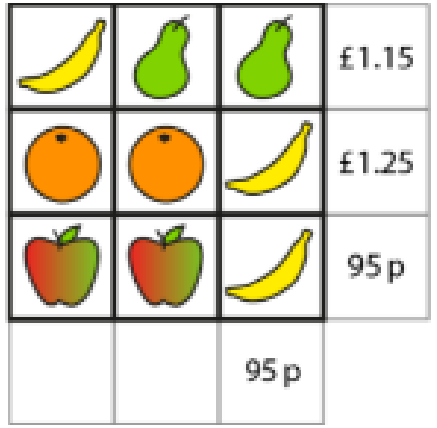
Extension

'Two mugs of hot chocolate and a sandwich costs £6.80.

Two sandwiches and a mug of hot chocolate costs £7.15.

- *How much does a sandwich cost?*
- *How much does a mug of hot chocolate cost?'*

'The diagram shows the total cost of the items in each row and column. Fill in the two missing costs.'



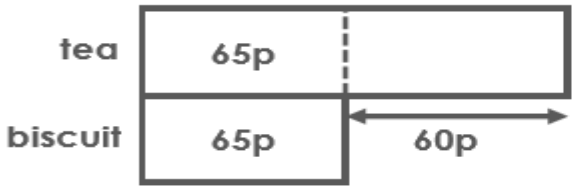
A cup of tea and a biscuit costs £1.30.

A cup of tea costs 60p more than a biscuit.

How much does a biscuit cost?

EXPLAIN

Explain the mistake:



£1.30 ÷ 2 = 65p

Tea = £1.05

Biscuit = 65p

EXTEND

A cup of coffee and an apple costs £1.80.

The cup of coffee costs three times as much as the apple.

How much does a cup of coffee cost?

The sum of four whole numbers is 23.

The difference between the smallest and the largest number is 6.

All four numbers are different.

What could the four numbers be?

*Find **all the possible answers** to this question.*

EXPLAIN

Explain how you know that this statement is correct:

'The largest number must be more than 7'

EXTEND

The sum of four numbers is 25. All four numbers are different.

The difference between the smallest and the largest number is 4.

All four numbers are multiples of 0.5

What could the four numbers be?

*Find **all the possible answers** to this question.*

One answer: 4, 5.5, 7.5, 8

LO: To solve addition and subtraction problems in context

5.

1. Choose 2 numbers to make a subtraction sentence from (Check that you are subtracting from the larger number)
2. Estimate what you expect your answer to be
3. Calculate
4 Check by using the inverse operation

540,000

297,865

16,506

5,709

63,289

764

Write a word problem on lined paper
SWap with a partner
Draw a bar model for the problem in your exercise book
Solve the subtraction calculation
Check with addition

Challenge
Can you create two-step problems

Class Member	4,567 3,871 17,029 19,515 21,001 2,010	Cakes apples footballs attended a football/ rugby match goals scored pages read	What is the difference...? How much more...? How much less...?

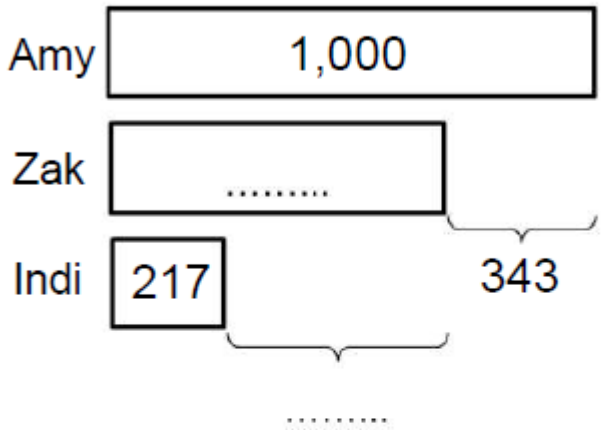
1. Liam makes £4,567 selling cakes in March and £3,871 in April. How much more did she make in March?
2. Kiana eats 3,096 apples in 2018 and 2,871 in 2017. What is the difference in the two amounts?

Deeper Thinking

Amy, Zak and Indi collect pennies.

Their amounts are shown in the diagram.

Complete the missing values.



Complete the sentences.

Amy has ..... pennies.

Zak has 343 ..... pennies than Amy.

Zak has ..... more pennies than Indi.

Amy has .... pennies than Indi.

They have ..... pennies altogether.

<u>Star Challenge</u>

How much money do they have altogether in pounds and pence?

LO: To solve decimal subtraction problems in context

6.

On whiteboards...

Draw me a bar model to represent this problem and the associated empty box number sentences.

The shop keeper has 15.78 metres of ribbon. She sells 8.4 metres - how many metres does she have left?

Can you spot this child's error? Explain where they have gone wrong to your partner.

15.78 - 8.4 =

$$\begin{array}{r} 15.78 \\ 8.4 \\ \hline 8 \\ \hline \end{array}$$

Remind me how we can solve this calculation:

8.002 - 5.99 =

Choose 2 numbers to make a subtraction number sentence.
Write the number sentence.
Calculate and then check using the inverse

13.89 124.14

5.67

3.7

3.234 0.09 8.4

When you have done 6 successfully collect a problem solving sheet from the front of the class.

Thinking Deeply 1

Write the number sentence out and find the missing number

1. 57.46 — ☐ = 28.9
2. 101.34 = ☐ + 56.07
3. ☐ = 567 - 342.25
4. 13.45 - ☐ = 5.82— ☐

Thinking Deeply 2

Fill in the missing numbers:

9	☐	4	☐
☐ .	2	☐	4
1	9	3	8

Fill in the missing digits in this calculation:

$$\square 8 \square + 3 \square 5 = 1052$$

EXPLAIN

Which of these calculations can be done **in more than one way?**

$$\begin{array}{r} \square\,6\,\square \\ +\,\square\,\square\,3 \\ \hline 3\,4\,5 \end{array} \qquad \begin{array}{r} \square\,\square\,7 \\ +\,\square\,3\,\square \\ \hline 5\,8\,6 \end{array} \qquad \begin{array}{r} \square\,5\,\square \\ +\,4\,\square\,8 \\ \hline 1\,1\,4\,8 \end{array}$$

EXTEND

Write a missing digits addition question. Requirements:

- The calculation is a 3-digit number plus a 3-digit number.
- At least 3 of the digits are hidden. The sum is shown.
- Your question can be answered in more than one way.

Example: $\square 8 \square + \square\,\square 3 = 544$

Possible answers: 181+363=544, 281+263=544, 381+163=544

Fill in the missing digits in this calculation:

$$6\square 2 - \square 3\square = 243$$

EXPLAIN

Complete these missing digit questions.

Which question did you find the most difficult? Explain your choice.

Question A:

$$3\square 7 - \square 5\square = 183$$

Question B:

$$8\square 9 - \square 2\square = 237$$

EXTEND

Complete the subtraction calculation using every digit 0-9.
Position the digits 0 and 8 as shown:

$$\square\,0\,\square\,8 - \square\square\square = \square\square\square$$

LO: To identify common factors

8.

What do we know about this number sentence?

5x0=

Can we show it with cuisenaire?

What about 5x5=?

What is the same/ different about this and 5x0?

Show me 5x5 with cuisenaire:

5x5=

'5 repeated/ replicated 5 times'

25

5x1=

'5 repeated/ replicated 1 time'

5

5x0=

'5 repeated/ replicated 0 times'

0

Can you show the relationship between these numbers and 16 are there any that are difficult to do this for?

160

32

2

16

8

1

16

7

3

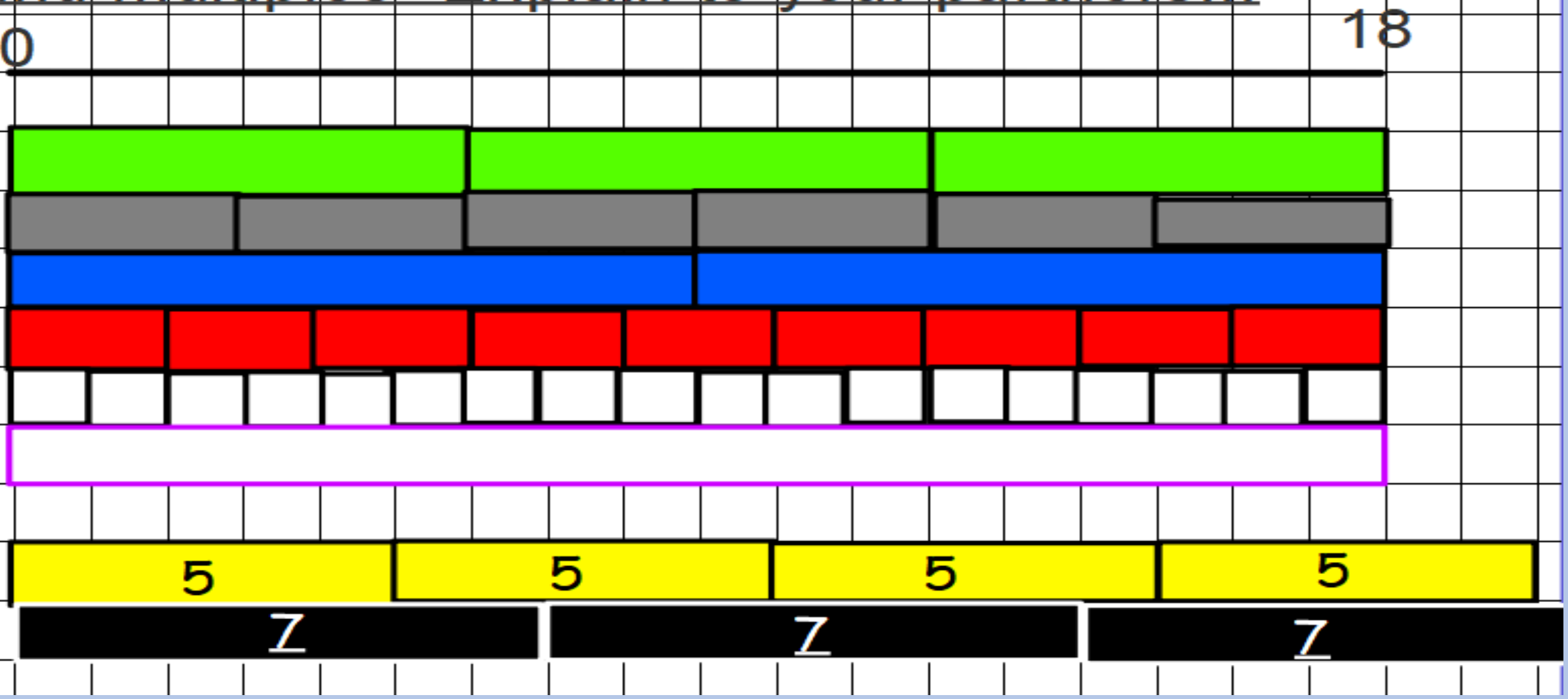
Use number link boards to support

Who can now show me with your cuisenaire tracks, why 7 and 3 are not factors of 16

Use the rods to find the factors of 18

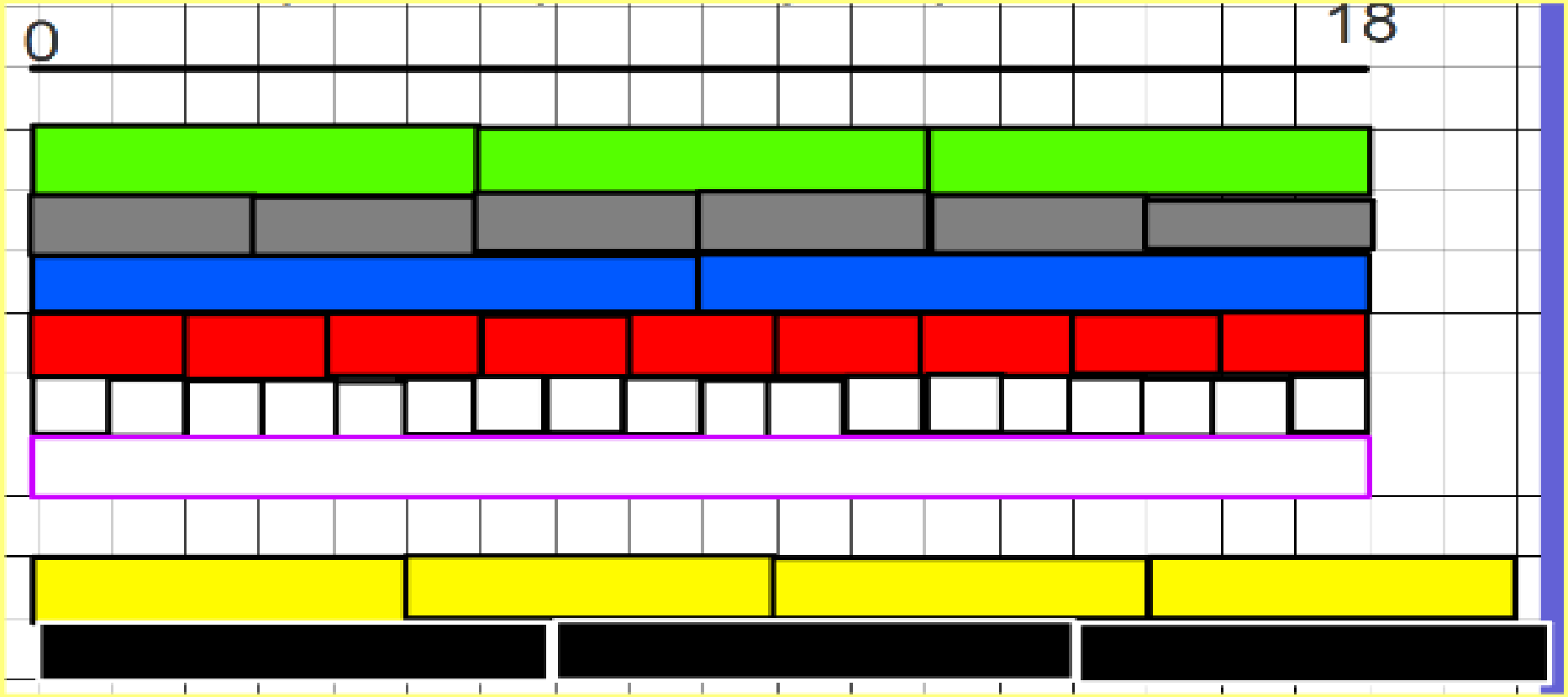
18

Use the images below to support an explanation of the different between factors and multiples- Explain to your partners...



Factors- A number that divides exactly into another number e.g. 6x3=18 18 divided by 6=3. 18 divided by 3=6.

Multiples- The numbers in a specific times table. e,g, 5, 10, 15, 20 etc...
Multiples of 5



Investigate the following statements

The larger the number the more factors it will have.

Even numbers have more factors than odd numbers

1. Start by writing what you think you will find out and why.
2. Investigate systematically to see if you are correct

I think that... because...

number	factors	number of factors

LO: To investigate prime numbers and factorisation

Bar Modelling:

Please stick in and complete in the back of your maths exercise books:

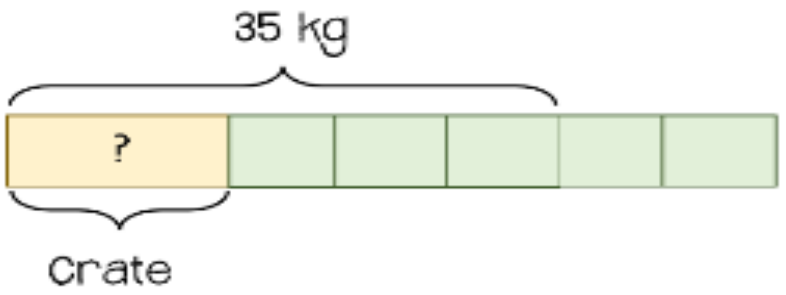
A crate contains 3 identical metal balls.

The mass of the crate and the balls is 35 kg.

Two more identical balls are added to the crate.

The mass of the crate and balls is now 47 kg.

What is the mass of the crate?



Additive/ Comparative

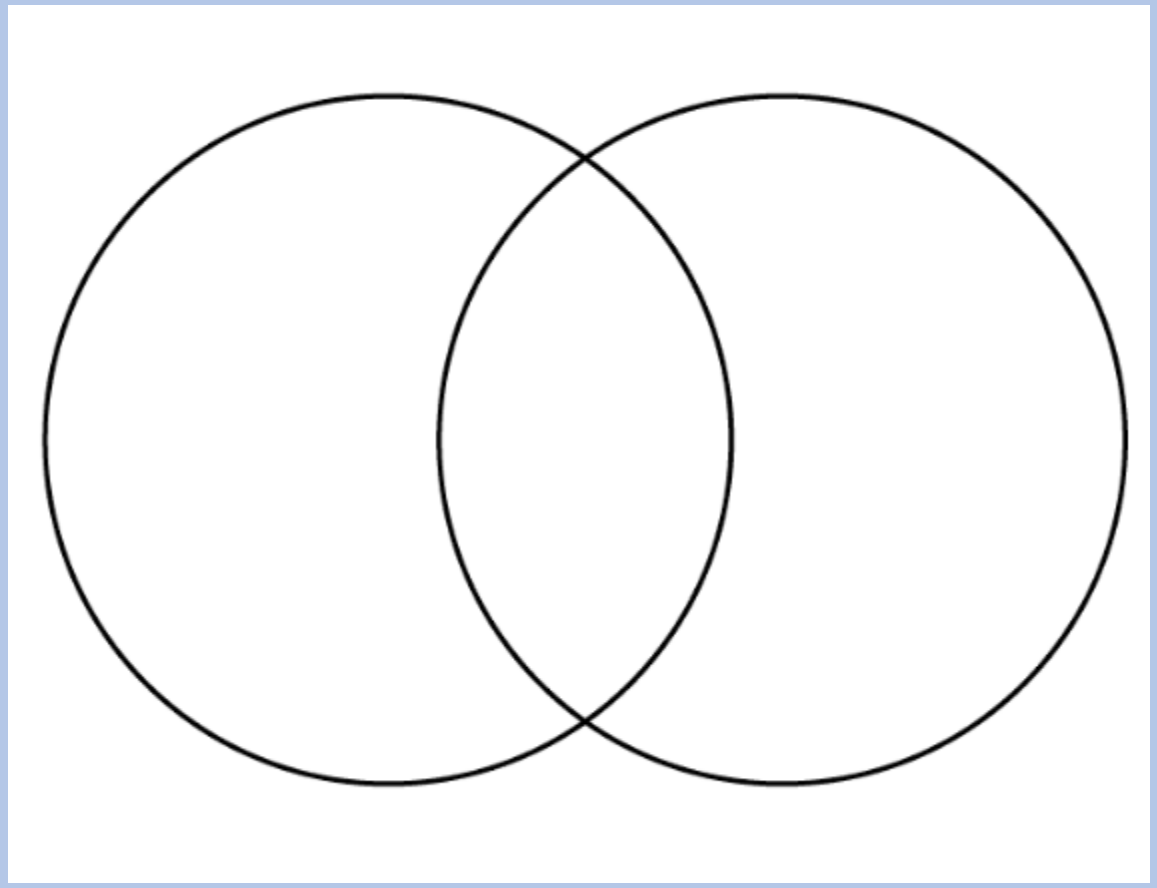
Lucy has some bottles.

There are 4 times as many clear bottles as green ones.

Lucy has 70 bottles in total.

How many more clear bottles than green bottles does Lucy have?

Comparative



Sort the following numbers onto the diagram:

A prime number:
Is a number that is divisible by only itself and the number 1.

2 is the first prime number and the only even prime number

https://www.youtube.com/watch?v=cRz4hW9SPPc

LO: To use Eratosthenes Sieve to find prime numbers to 100

Find all the prime numbers by colouring all multiples of 2, 3, 5 and 7. You need to start from the **second** multiple and you also need to colour the number 1. Why do you think this is? Why do you not need to worry about the multiples of 4, 6, 8 and 9? Start with the two times table. You should then be left with all the prime numbers up to 100 uncoloured. This is Eratosthenes Sieve!

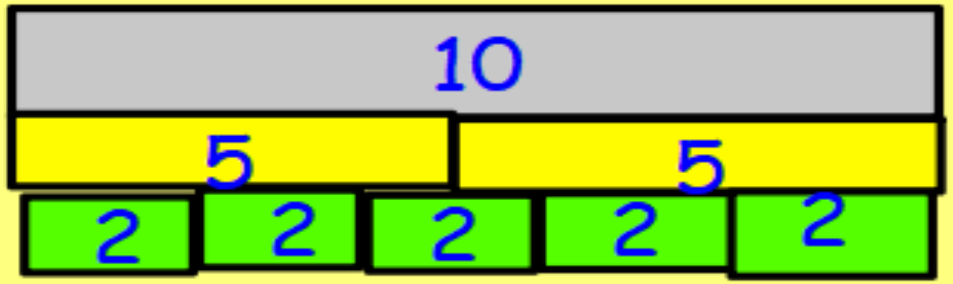
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

https://www.youtube.com/watch?v=V08g_lkKj6Q

If a prime number is a number only divisble by itself and one, what is a prime factor?

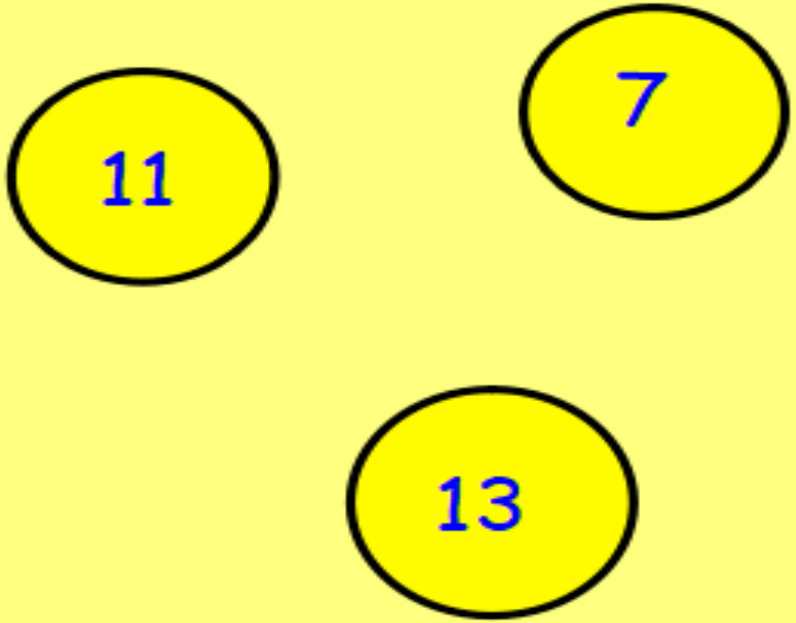
Is it...

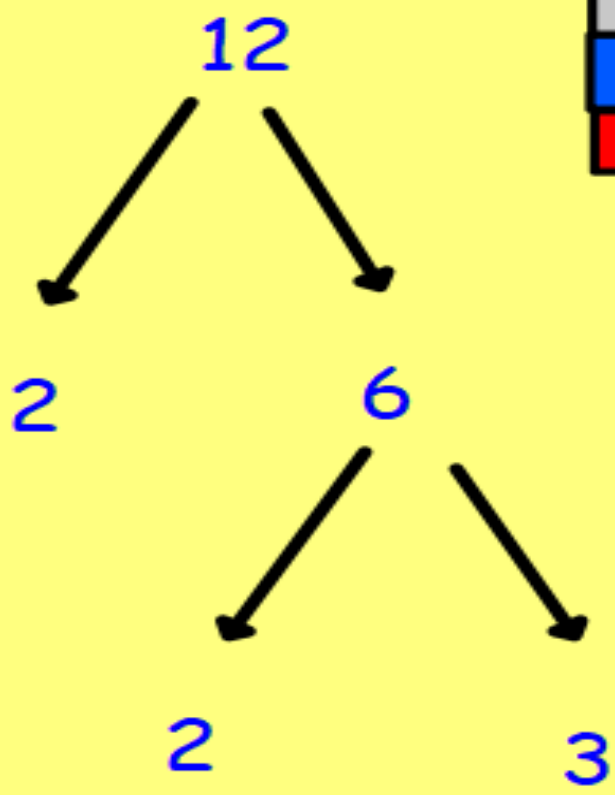
A factor of a number only divisible by itself and one?

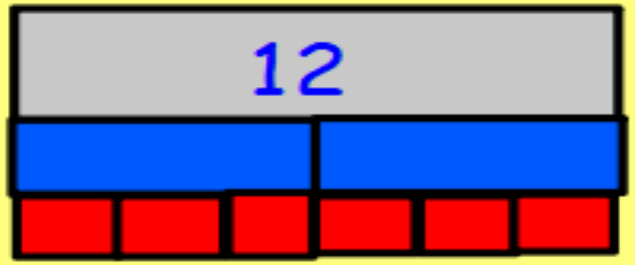


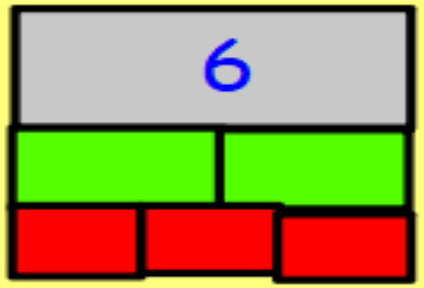
Or...

A prime number that is odd...









How do we know w
have found our
Prime Factors?

Therefore...

2x2x3=12

Can anybody think of a different factor tree for 12?

1. Choose a number from below to create a factorisation tree and then write down the prime factors.

2. See if you can factorise the number in a different way.

3. When you have done a 2 digit and a 3 digit number see if you can explain how you work out what the prime factors of a number are.

20 48 35 120 512

Deeper Thinking

The number 24 has eight factors. (1, 2, 3, 4, 6, 8, 12 and 24)
Write another number, less than 50, that has exactly eight factors and list them.

Explain your choice...