MARLBOROUGH ROAD ACADEMY

MATHEMATICS CALCULATION POLICY

This Calculation Policy supports the Maths No Problem Singapore Maths scheme that is used in Y1-6 and the EYFS White Rose scheme of work.

Progression within in each area of calculation is in line with the programme of study in the 2014 National Curriculum. This calculation policy should be used to support children to develop a deep understanding of number and calculation.

This policy has been designed to teach children using concrete, pictorial and abstract methods/representations. C-P-A.

Concrete representation - a pupil is first introduced to an idea or a skill by acting it out with real objects. This is a 'hands on' component using real objects and it is the foundation for conceptual understanding.

Pictorial representation - a pupil has sufficiently understood the hands-on experiences performed and can now relate them to representations, such as a diagram or picture of the problem.

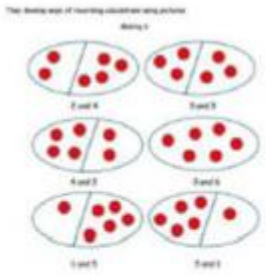
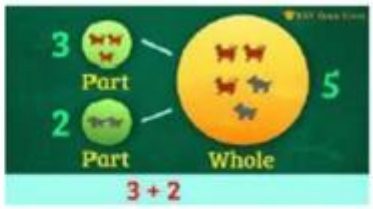
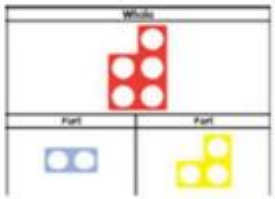
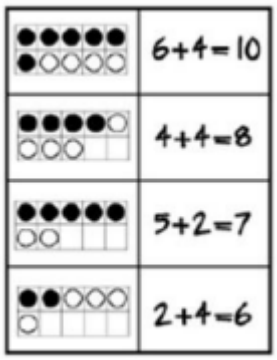
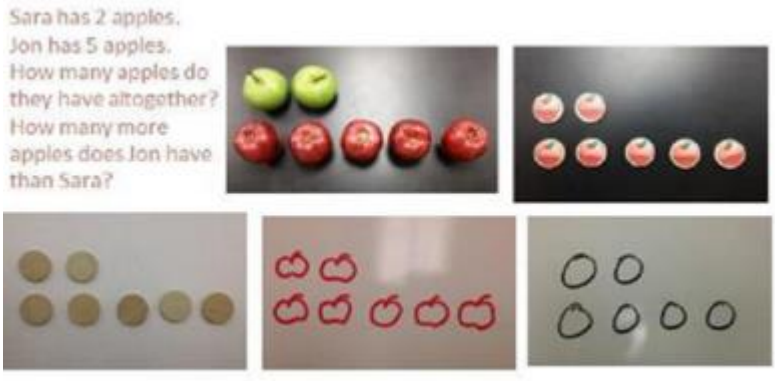
Abstract representation - a pupil is now capable of representing problems by using mathematical notation, for example: 12 ÷ 2 = 6. It is important that conceptual understanding, supported using representation, is secure for all procedures. Reinforcement is achieved by going back and forth between these representations.

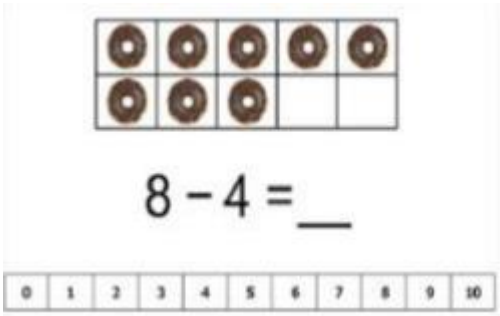
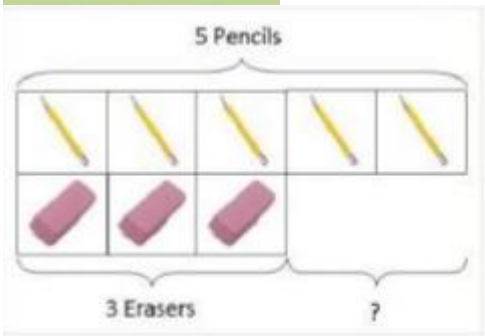
Document Status

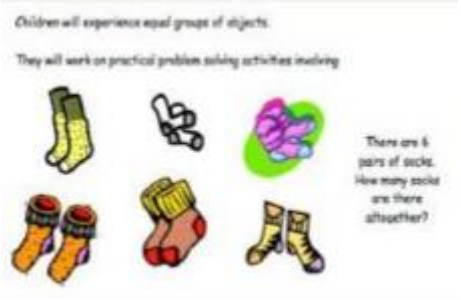
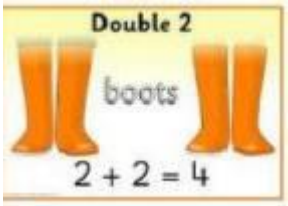
Version	Date	Action
1	October 2019	First Written
2		
3		
4		

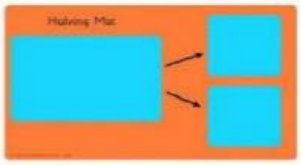
This Policy has been impact assessed to ensure that it does not have an adverse effect on race, gender or disability equality

Reception

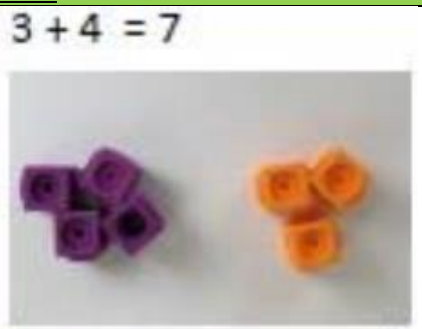
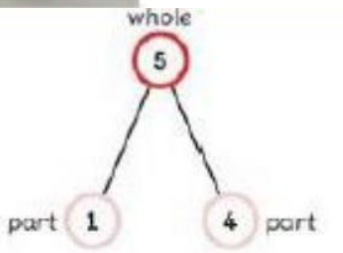
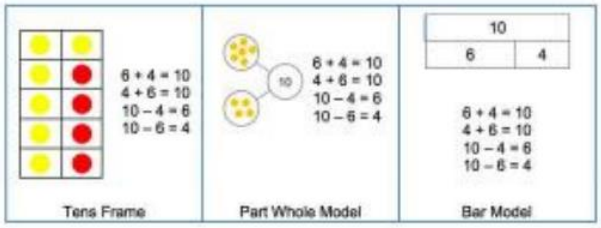
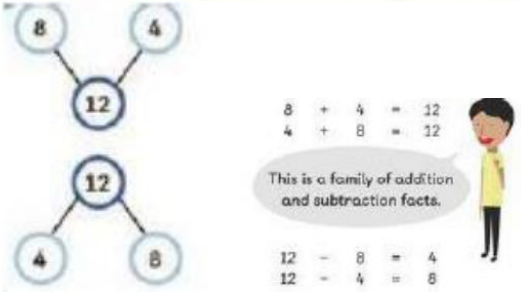
Addition	
Explore part- part –whole relationship: combining 2 parts to make a whole.	  
Using the ten frame to support the addition of 2 numbers: combining two groups.	
Recognise different ways of making numbers.	
Solving problems using concrete and pictorial images.	

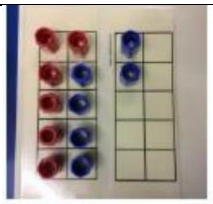
Subtraction	
Using concrete strategies for counting.	Taking away after counting out practical equipment. . Children would be encouraged to physically remove these using touch counting.  By touch counting and dragging in this way, it allows children to keep track of how many they are removing so they don't have to keep recounting. They will then touch count the amount that are left to find the answer. **Those who are ready** may record their own calculations
Using the ten frame to support subtraction by taking away.	 8 − 4 = __ 0 1 2 3 4 5 6 7 8 9 10
Solving problems using concrete and pictorial images.	Peter has 5 pencils and 3 erasers. How many more pencils than erasers does he have?  5 Pencils 3 Erasers ?

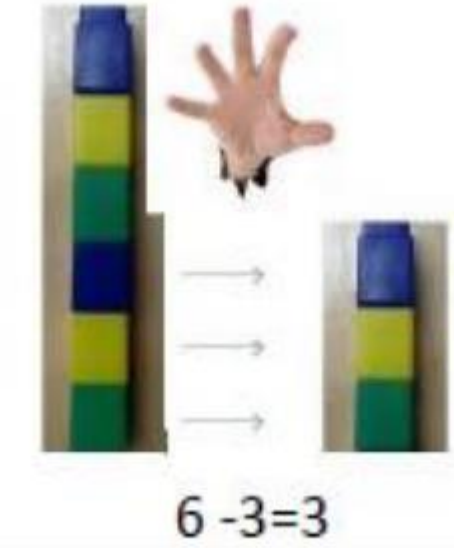
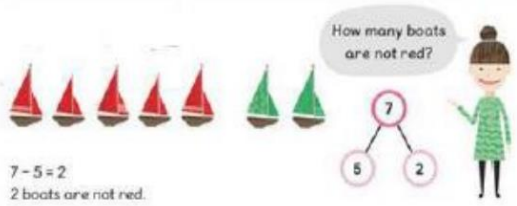
Multiplication	
Identifying and making equal objects of groups.	
Using doubling when solving concrete and pictorial problems.	

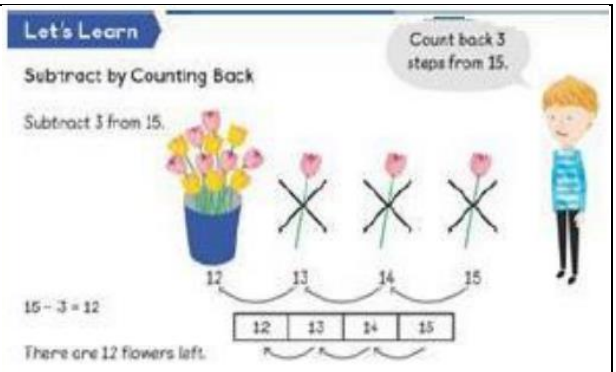
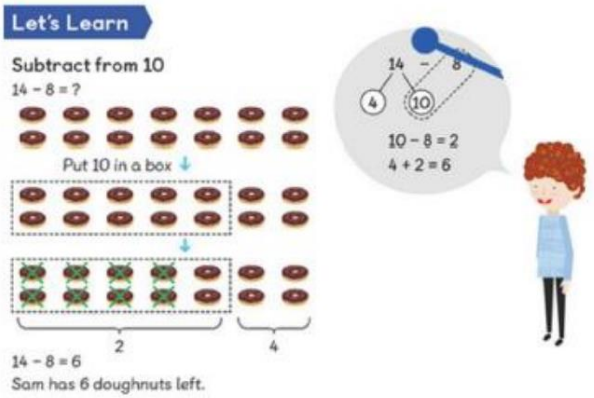
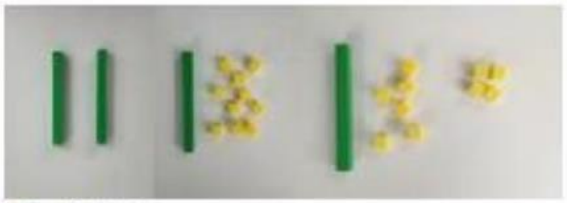
Division	
Sharing objects into equal groups practically and pictorially. **Hearing and being exposed to the language of sharing and halving. Practically exploring halving and seeing pictorial representations.**	 

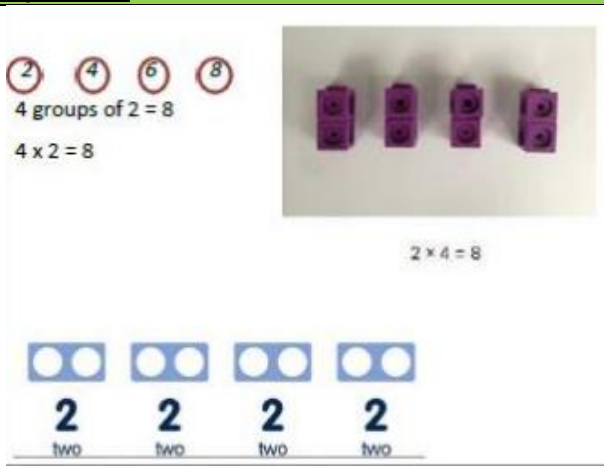
Year 1

Addition	
Combining two parts to make a whole: part-part-whole model. Joining two groups and recounting all of the objects. With a focus on finding and learning number bonds for all numbers to 10- number bond cards are to be used to develop recall alongside the Numbots app.	    
Learn number bonds to 20 and demonstrate an understanding of related facts.	
Add and subtract one digit numbers to and from 2 digit numbers to 20, including zero.	

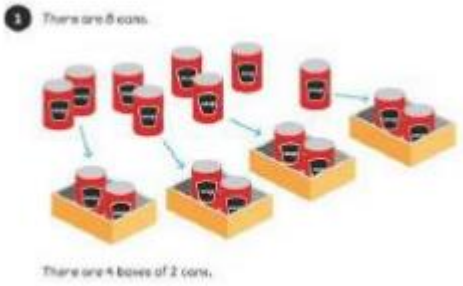
Bridging ten using ten frames, bar models, and number lines. **Children should start with the largest number and see how many more needed to make ten.**	 6 + 6 = 12  Make 9 in one and 3 in the other. Take one from the 3 to make the 9 into a ten....10+2 = 12

Subtraction	
Subtraction as taking away practically using cubes, objects, Dienes etc.	 6 -3=3
Subtract by crossing out	 Subtract by Crossing Out 7 - 2 = 5 5 ladybirds are left.
Subtract using the part-part-whole model (including missing number problems)	 How many boats are not red? 7 5 2 7 - 5 = 2 2 boats are not red.

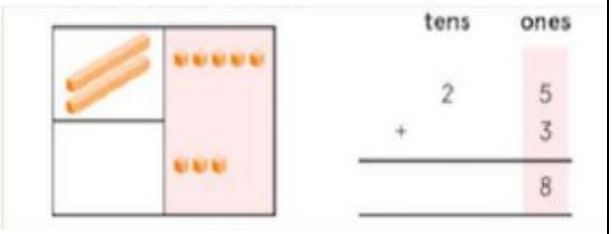
Subtraction by counting back.	
Subtract 1 digit number from a 2 digit number by subtracting from 10.	
Subtract a one digit number from a 2 digit number by renaming / regrouping ten as ten ones, using Deines.	

Multiplication	
Count in multiples of 2,5,and 10 from zero.	

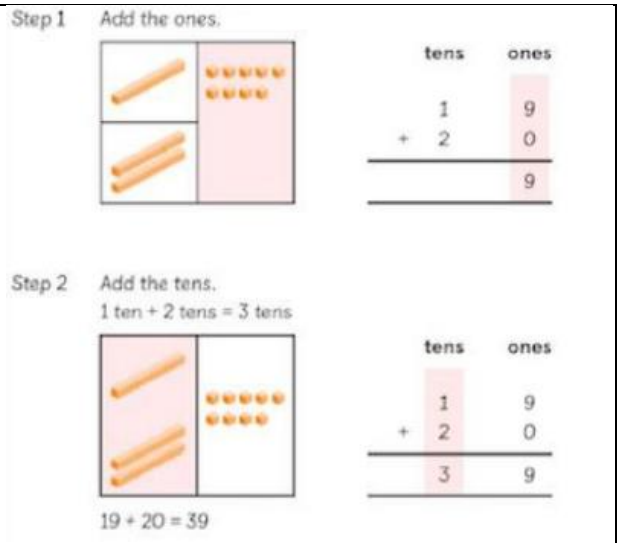
Emphasis the vocabulary in pictorial and written calculations. **Solve multiplication problems using repeated addition.**	 This image represents two groups of 4 or 4 twice   3 + 3 + 3 = 9

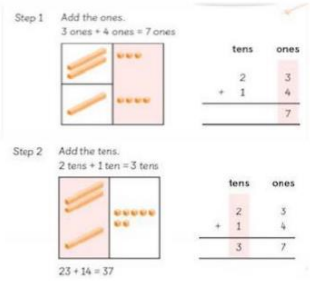
Division	
Pupils should be taught to share practically, and the sharing should be shown beneath the whole, as shown in the image.	10 ÷ 2 = 5 

Year 2

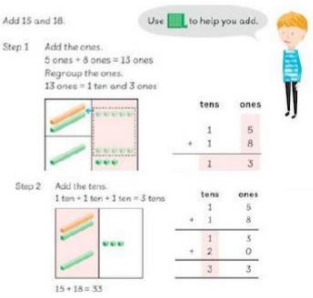
Addition	
Use concrete objects and pictorial representations to add a 1 digit number to a 2 digit number. **Use concrete and pictorial representations to add a multiple of 10 to a 2 digit number.**	

Use concrete and pictorial representations to add two 2 digit numbers.

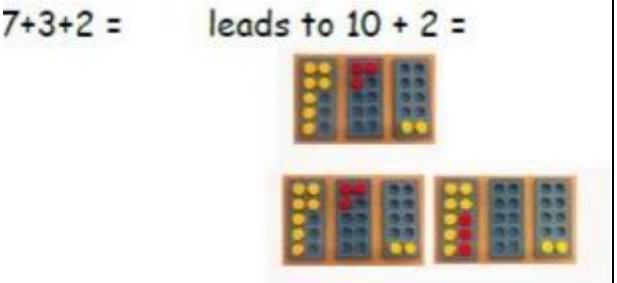




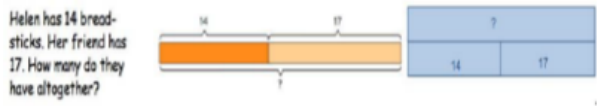
Adding with renaming



Use concrete objects and pictorial objects to add 3 1 digit numbers.

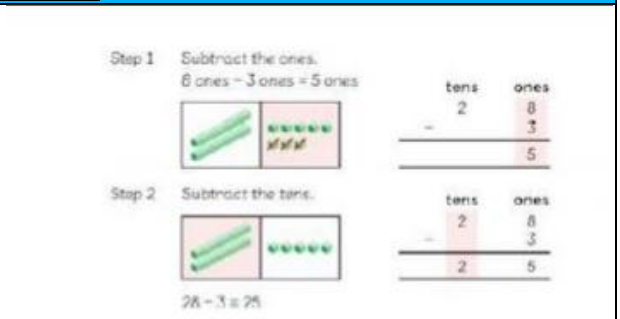


Use bar models to find missing numbers.

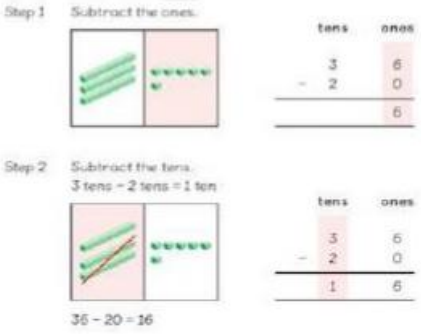


Subtraction

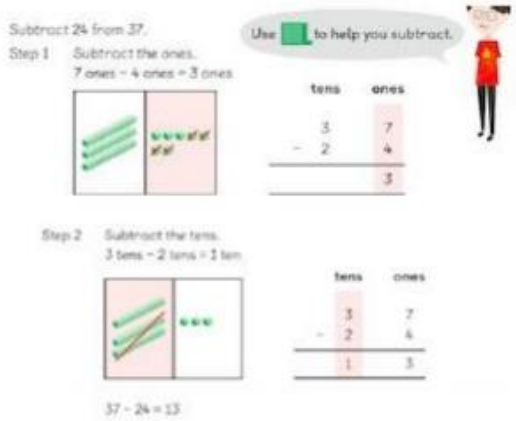
Use concrete objects and pictorial representations to subtract a 1 digit number from a 2 digit number.



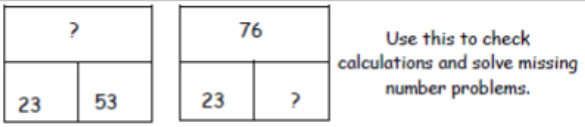
Use concrete and pictorial representations to subtract a multiple of 10 from a 2 digit number.



Use concrete and pictorial representations to subtract 2 digit number from a 2 digit number.



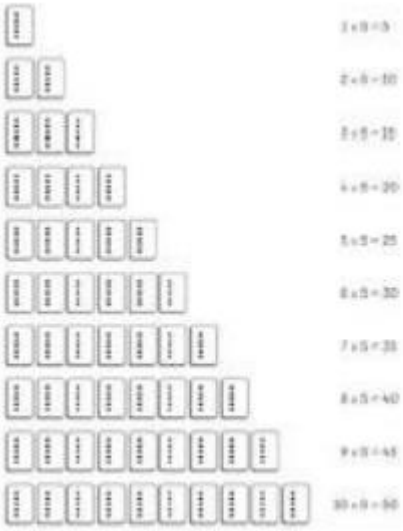
Recognise and use the inverse relationship between addition and subtraction.



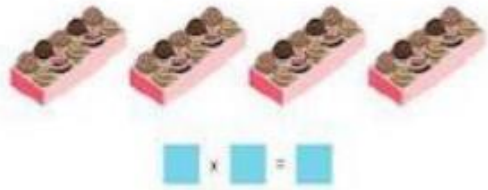
Multiplication

Skip count in multiples of2,3,5 and 10 from 0.

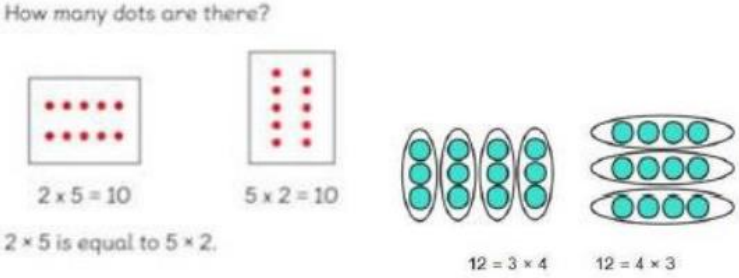
Recall and use multiplication facts for the multiplication tables2, 5 and 10.



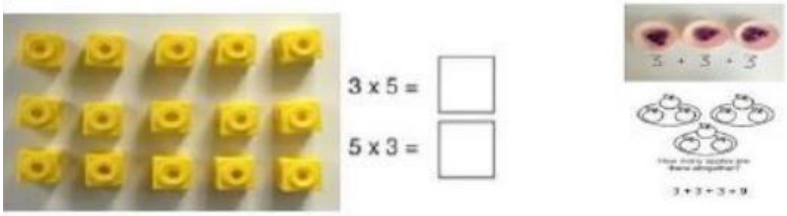
Use the multiplication (x) and equals (=) sign when writing out multiplication calculations.



Understand that multiplication is commutative. Pupils should understand that an array can represent different equations, and that as multiplication is commutative, the order of the multiplication does not affect the answer.

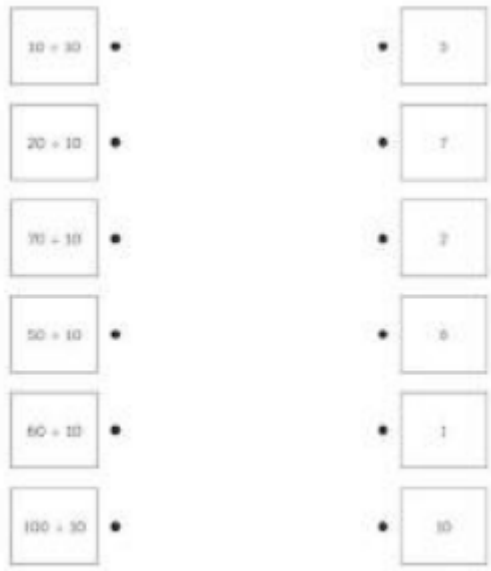


Solve multiplication problems in context using arrays and repeated addition.

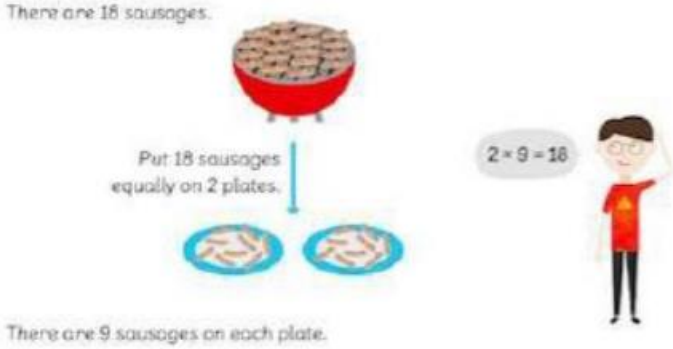


Division

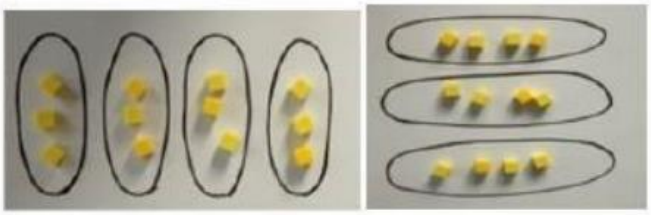
Recall and use division facts for the 2, 5 and 10 times tables.



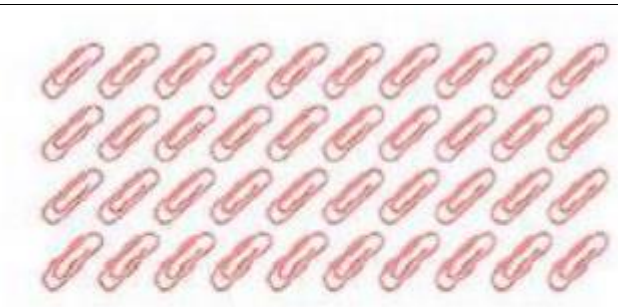
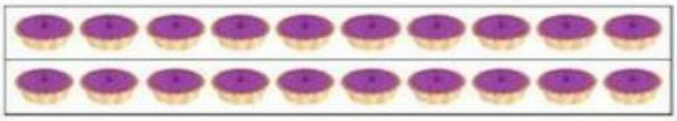
Solve division facts in context, using concrete objects, by sharing.



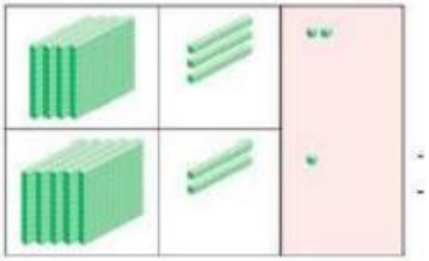
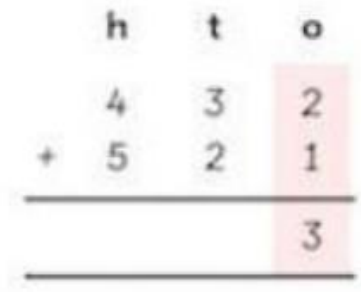
Solve division problems, in context, using arrays.



Solve division problems, in context, by grouping.

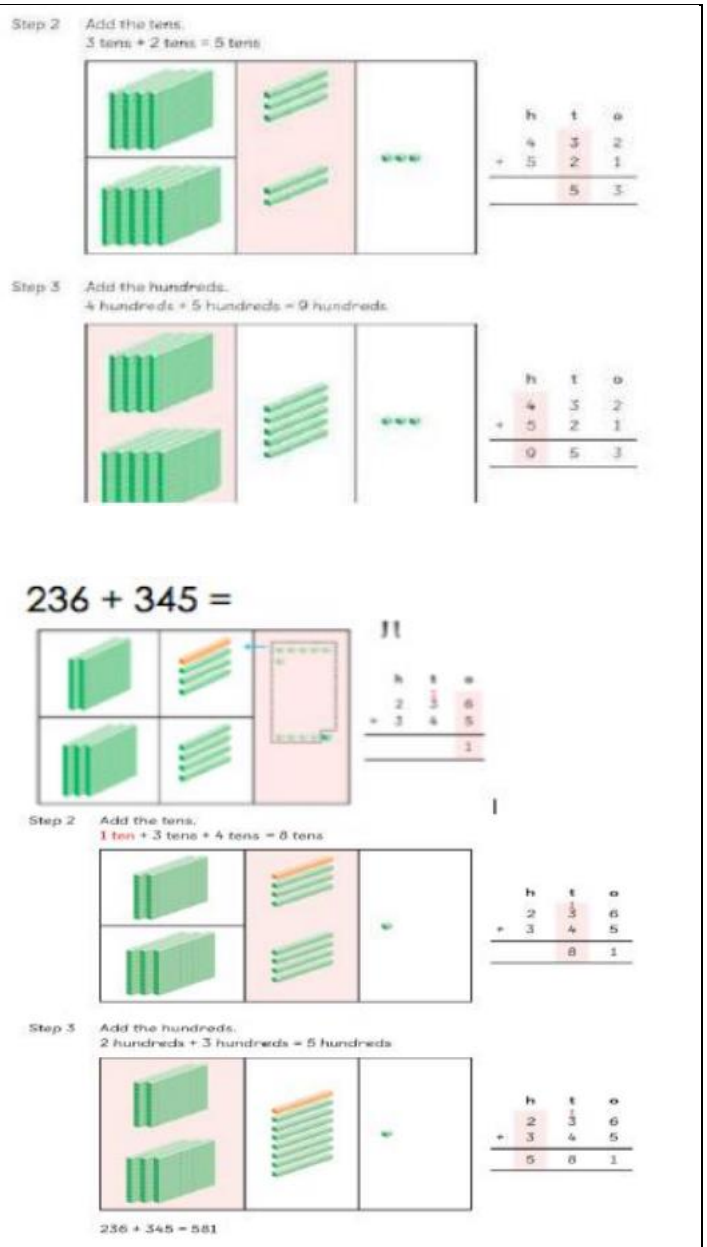
Understand and use the inverse - this should be taught alongside both multiplication and division.	 Put into groups of 5. There are ☐ groups. Make a family of multiplication and division facts.  2 x 10 = 20 ——— 20 ÷ 10 = ☐ 10 x 2 = 20 ——— 20 ÷ 2 = ☐

Year 3

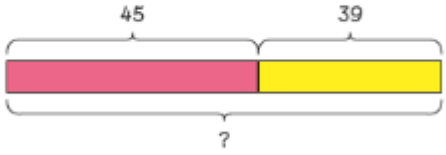
Addition	
Add two three-digit numbers. **Children need to move from concrete, to pictorial, to abstract. Start without renaming and move to with renaming.**	432 + 521 = Step 1 Add the ones. 2 ones + 1 one = 3 ones   h t o 4 3 2 + 5 2 1 3

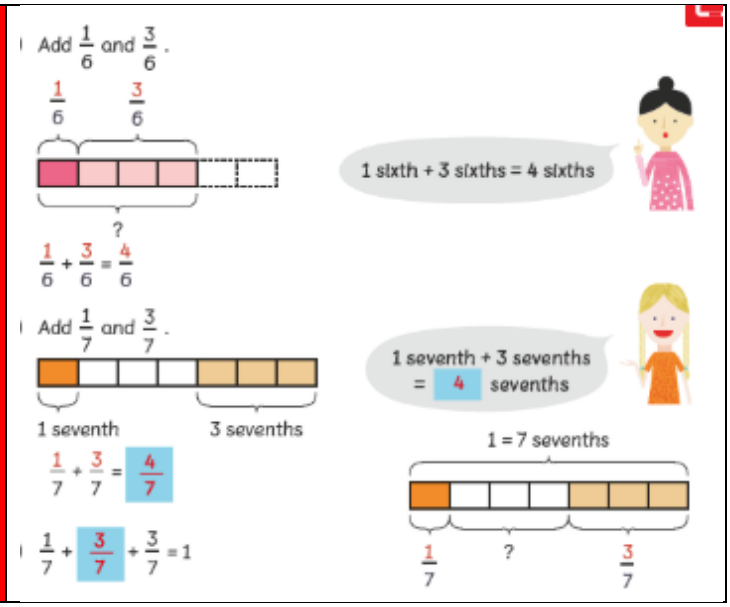
Solve problems using bar modelling.

Add fractions with the same denominator within one whole



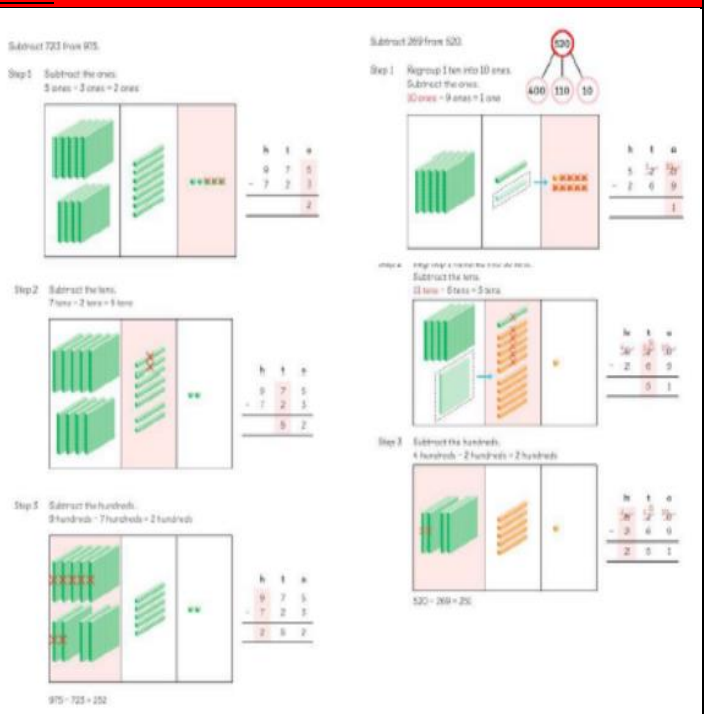
1 Sam had 45 stamps.
His father gave him 39 stamps.
How many stamps did Sam have?



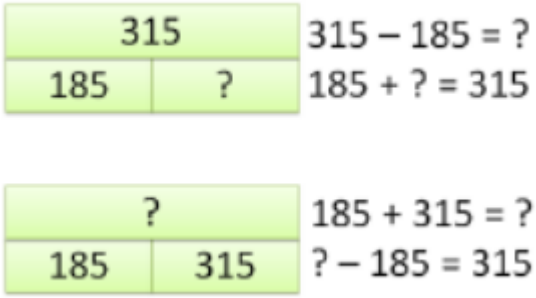


Subtraction

Subtract numbers up to three digits from a 3-digit number. It is very important that children use Dienes alongside a place value chart to support understanding. Only when secure with this, should exchanging be introduced.



Use the bar model to visualise finding missing numbers.



Use bar models to help to solve problems.

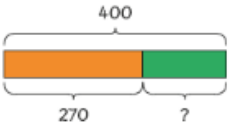
Subtract fractions with the same denominator within one whole.

In Focus

Hannah baked 400 tarts.
She gave 270 tarts away.
How many tarts did Hannah have left?

Let's Learn

Subtract 270 from 400.



	h	t	o
	~~3~~ 4	~~1~~ 0	0
−	2	7	0
	1	3	0

400 − 270 = ☐

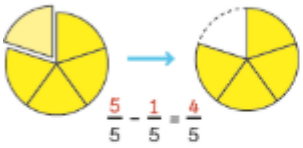
300 − 200 = ☐
100 − 70 = ☐

Hannah had 130 tarts left.

The pizza was cut into 5 equal slices.
Sam ate $\frac{1}{5}$ of the pizza.
Subtract $\frac{1}{5}$ from $\frac{5}{5}$.

$1 = \frac{5}{5}$

5 fifths − 1 fifth
= 4 fifths



$\frac{5}{5} - \frac{1}{5} = \frac{4}{5}$

$\frac{4}{5}$ of the pizza was left.

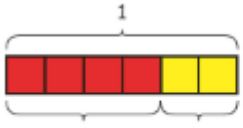
3 thirds − 1 third
= 2 thirds

Subtract $\frac{1}{3}$ from 1.

$1 - \frac{1}{3} = \frac{3}{3} - \frac{1}{3}$
$= \frac{2}{3}$

$1 - \frac{1}{3} = \frac{2}{3}$

3



$\frac{2}{6}$

$1 - \frac{2}{6} = \frac{6}{6} - \frac{2}{6}$
$= \frac{4}{6}$

Multiplication

Children to recall the following times tables:
2, 5 ,10, 3, 4, 8.

$3 \times 4 =$ ☐

$3 \times 8 =$ ☐

$5 \times 4 =$ ☐

$5 \times 8 =$ ☐

$2 \times 8 =$ ☐

$3 \times 8 =$ ☐

$2 \times 8 =$ ☐

$5 \times 8 =$ ☐

$7 \times 8 =$ ☐

Multiply a 2 digit number by a one digit number.

In Focus

There are 23 children in a class.
How many children are there in 2 classes?

Let's Learn

Step 1 Multiply the ones by 2.

3 ones × 2 = 6 ones

	t	o
	2	3
×		2
		6

Step 2 Multiply the tens by 2.

2 tens × 2 = 4 tens

	t	o
	2	3
×		2
		6
	4	0

Step 3 Add the products.

6 + 40 = 46

	t	o
	2	3
×		2
		6
+	4	0
	4	6

23 × 2 = 46

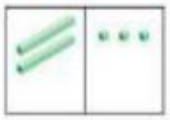
There are 46 children in the 2 classes.

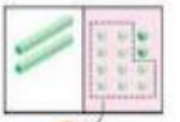
Multiply a 2-digit number by a two-digit number, including regrouping.

Use the bar model to help to solve multiplication problems.

Let's Learn

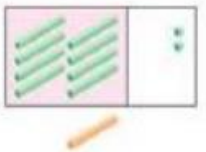
1 There are 4 groups of 23 fish.
How do we multiply 23 by 4?





Step 1 Multiply the ones by 4.

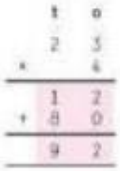
4 ones × 3 = 12 ones
12 ones = 1 ten 2 ones



Step 2 Multiply the tens by 4.

2 tens × 4 = 8 tens

Step 3 Add the products.



12 + 80 = 92

23 × 4 = 92

There are 92 fish in 4 tanks.

In Focus

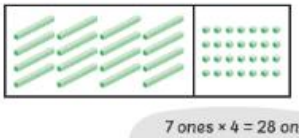
This is how Hannah did 47 × 4.
Is she correct?

	h	t	o
		2 4	7
×			4
	1	8	8

Let's Learn

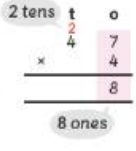
1 This is 47.

47 = 40 + 7



Step 1 Multiply the ones by 4.

7 ones × 4 = 28 ones
28 ones = 2 tens + 8 ones



2 tens
8 ones

Step 2 Multiply the tens by 4.

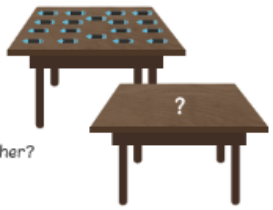
4 tens × 4 = 16 tens
16 tens + 2 tens = 18 tens

47 × 4 = 188

Hannah is correct.

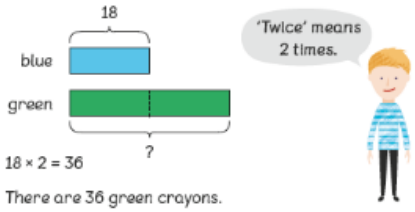
In Focus

There are 18 blue crayons on the table.
There are twice as many green crayons as blue crayons on another table.
(a) How many green crayons are there?
(b) How many crayons are there altogether?



Let's Learn

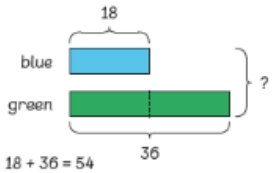
1 (a)



$18 \times 2 = 36$

There are 36 green crayons.

(b)



$18 + 36 = 54$

There are 54 crayons altogether.

Division

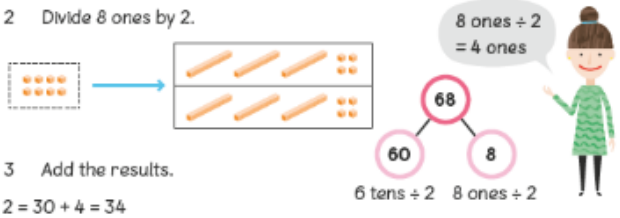
Divide 2-digit numbers by one-digit numbers.

To find the number of sweets each person gets, divide 68 by 2.

$68 \div 2 =$ ☐

Step 1 Divide 6 tens by 2.

Step 2 Divide 8 ones by 2.



Step 3 Add the results.

$68 \div 2 = 30 + 4 = 34$

Each person gets 34 sweets.

Divide by regrouping.

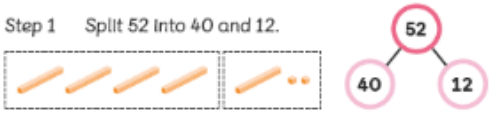
Using the bar model to help solve problems.

Let's Learn

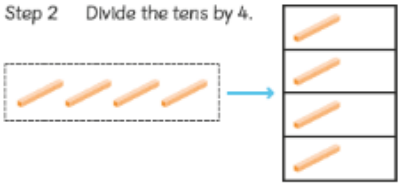
To find the number of ice creams in each box, divide 52 by 4.

$52 \div 4 =$ ☐

Step 1 Split 52 into 40 and 12.

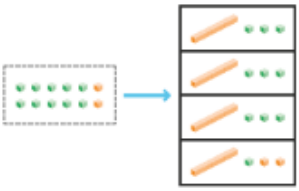


Step 2 Divide the tens by 4.



Step 3 Regroup 1 ten into 10 ones.

Step 4 Divide the ones by 4.

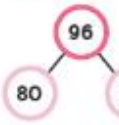


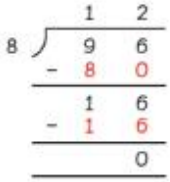
Step 5 Add the results.

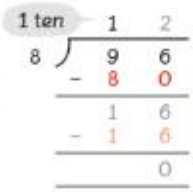
$52 \div 4 = 10 + 3 = 13$

There are 13 ice creams in each box.

Let's Learn







8 tens ÷ 8 = 1 ten

16 ones ÷ 8 = 2 ones

1 ten + 2 ones = 12

96 ÷ 8 = 12

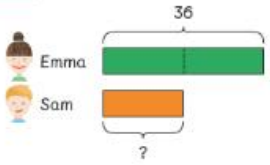
$$\begin{array}{r|l} & 1\ 2 \\ \hline 8 & 9\ 6 \\ & -\ 8\ 0 \\ \hline & 1\ 6 \\ & -\ 1\ 6 \\ \hline & 0 \end{array}$$

2 ones

In Focus

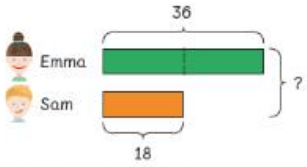
How many beads do the children have altogether?

Let's Learn



36 ÷ 2 = 18

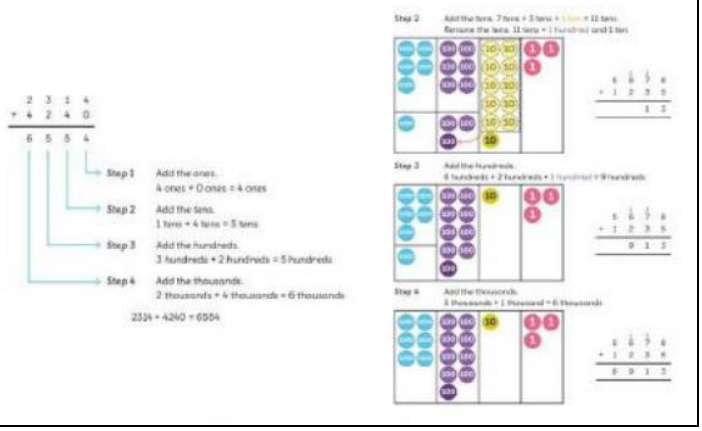
Sam has 18 beads.



36 + 18 = 54

The children have 54 beads altogether.

Year 4

Addition	
Adding numbers with up to 4 digits, including renaming.	

In Focus

Charles uses digit cards to make two numbers.

4	2	5	6

1	9	8	7

Find their sum.

Let's Learn

1 Estimate the sum of 4256 and 1987.

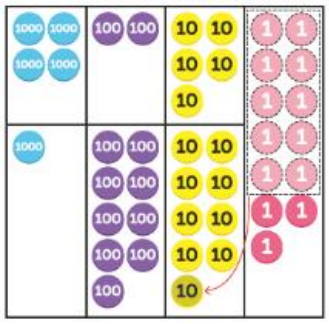
$$\begin{array}{r} 4\ 0\ 0\ 0 \\ +\ 2\ 0\ 0\ 0 \\ \hline 6\ 0\ 0\ 0 \end{array}$$

4000 + 2000 = 6000

2 Find the sum of 4256 and 1987.

Step 1 Add the ones. 6 ones + 7 ones = 13 ones

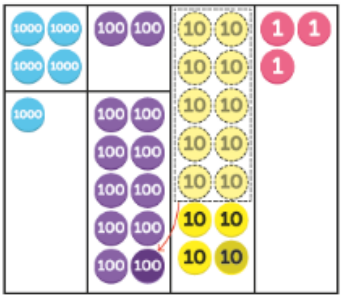
Rename the ones. 13 ones = 1 ten and 3 ones



$$\begin{array}{r} 4\ 2\ \overset{1}{5}\ 6 \\ +\ 1\ 9\ 8\ 7 \\ \hline \qquad\qquad 3 \end{array}$$

Step 2 Add the tens. 5 tens + 8 tens + 1 ten = 14 tens

Rename the tens. 14 tens = 1 hundred and 4 tens

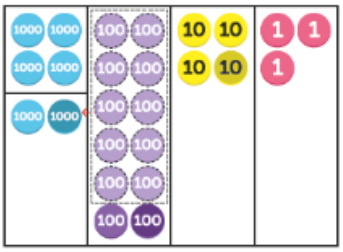


$$\begin{array}{r} 4\ \overset{1}{2}\ \overset{1}{5}\ 6 \\ +\ 1\ 9\ 8\ 7 \\ \hline \qquad\ 4\ 3 \end{array}$$

Step 3 Add the hundreds.

2 hundreds + 9 hundreds + 1 hundred = 12 hundreds

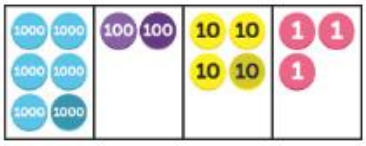
Rename the hundreds. 12 hundreds = 1 thousand and 2 hundreds



$$\begin{array}{r} \overset{1}{4}\ \overset{1}{2}\ \overset{1}{5}\ 6 \\ +\ 1\ 9\ 8\ 7 \\ \hline \qquad 2\ 4\ 3 \end{array}$$

Step 4 Add the thousands.

4 thousands + 1 thousand + 1 thousand = 6 thousands

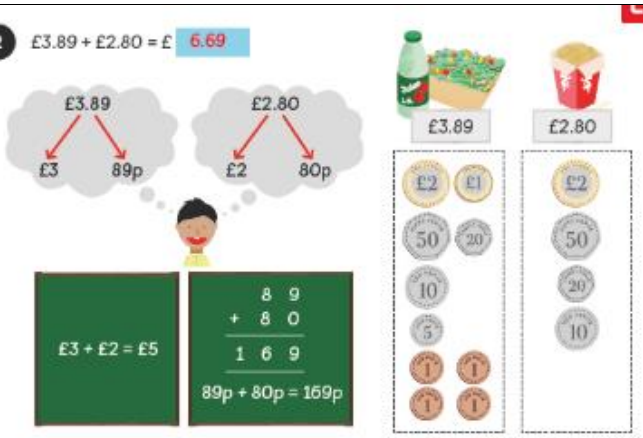


$$\begin{array}{r} \overset{1}{4}\ \overset{1}{2}\ \overset{1}{5}\ 6 \\ +\ 1\ 9\ 8\ 7 \\ \hline 6\ 2\ 4\ 3 \end{array}$$

Use the bar model to help to solve 2 step problems.

Add fractions with the same denominator

2 £3.89 + £2.80 = £ 6.69



Altogether they cost £6 and 69p or £6.69.

169p = £1 and 69p = £1.69

In Focus

On Saturday, 3018 people attended a funfair. 850 more people attended the funfair on Saturday than attended it on Sunday.

Altogether, how many people attended the funfair over the two days?

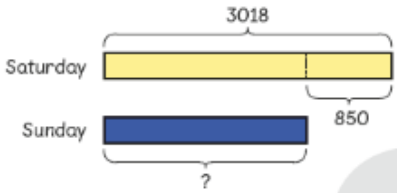
Let's Learn

1 Understand the problem

Who?	people
What?	funfair

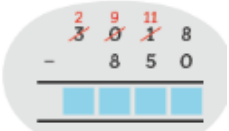
Make a plan

Carry out the plan



3018 − 850 = 2168

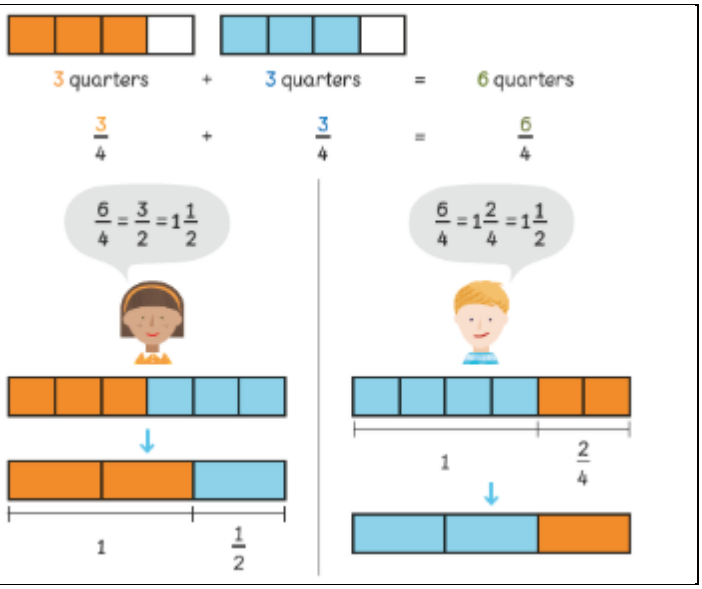
2168 people attended the funfair on Sunday.



Saturday 3 0 1 8
Sunday + 2 1 6 8
5 1 8 6

3018 + 2168 = 5186

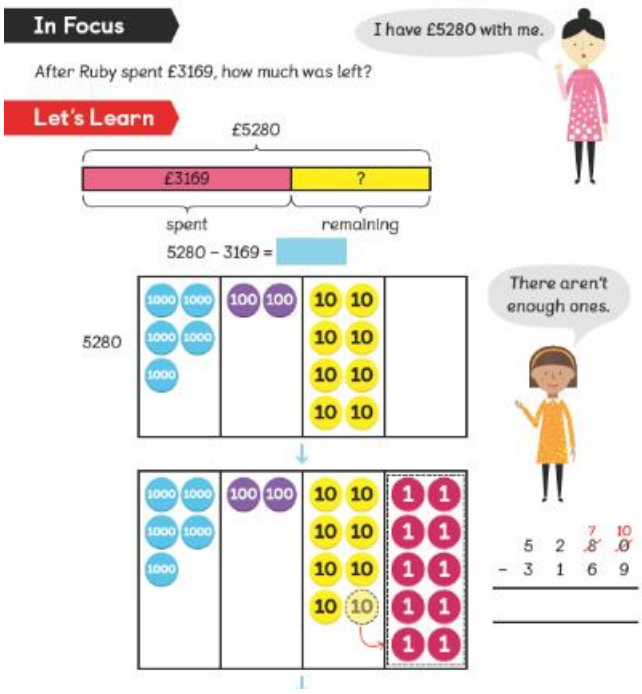
Altogether, 5186 people attended the funfair over the two days.



Subtraction

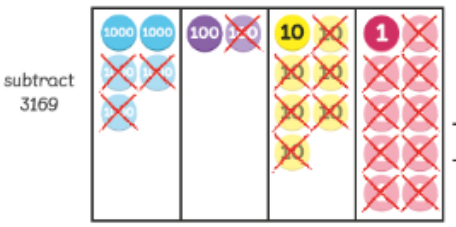
Subtract numbers with up to four digit, including renaming.

Use place value charts and counters to support, before moving to the abstract.

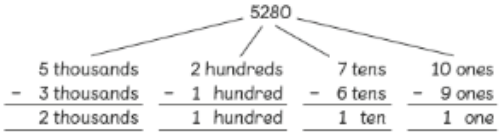


Use the bar model to help to solve 2 step problems.

Subtract fractions with the same denominator.



$$\begin{array}{r} 5\ 2\ \overset{7}{\cancel{8}}\ \overset{10}{\cancel{0}} \\ -\ 3\ 1\ 6\ 9 \\ \hline 2\ 1\ 1\ 1 \end{array}$$



5280 − 3169 = 2111

£2111 was left.

$$\begin{array}{r} 2\ 1\ 1\ 1 \\ +\ 3\ 1\ 6\ 9 \\ \hline 5\ 2\ 8\ 0 \end{array}$$

In Focus

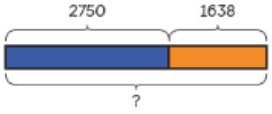
A baker made 2750 chocolate cookies and 1638 vanilla cookies.
He sold 3195 cookies altogether.
How many cookies did he have left?

Let's Learn

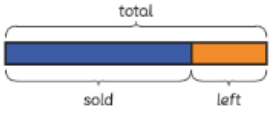
1 Understand the problem

Who?	baker
What?	cookies

Make a plan



Find the total number of cookies he made.



Then, subtract the number of cookies sold.

Carry out the plan

2750 + 1638 = 4388

The baker baked 4388 cookies.

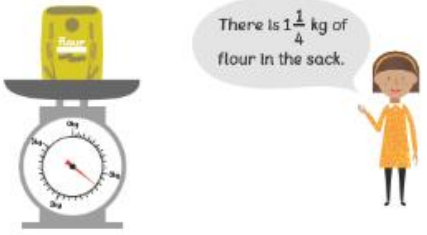
4388 − 3195 = 1193

He had 1193 cookies left.

Check

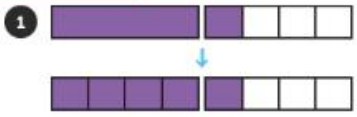
Cookies sold	3195
Cookies left	1193
Cookies baked	4388

In Focus



What is the mass of flour left in the sack after $\frac{3}{4}$ kg is removed?

Let's Learn

1 

$1\frac{1}{4}$

$1\frac{1}{4} = \frac{5}{4}$

$1\frac{1}{4} - \frac{3}{4} = \frac{5}{4} - \frac{3}{4} = \frac{2}{4}$

$1\frac{1}{4} - \frac{3}{4} = \frac{1}{2}$

There is $\frac{1}{2}$ kg of flour left in the sack.

Multiplication

Children to know all times tables to 12 x 12.

Multiply 2 and 3 digit numbers using a formal written method.
Use place value charts and counters to support, before moving to the abstract.

1 $2 \times 12 = 24$

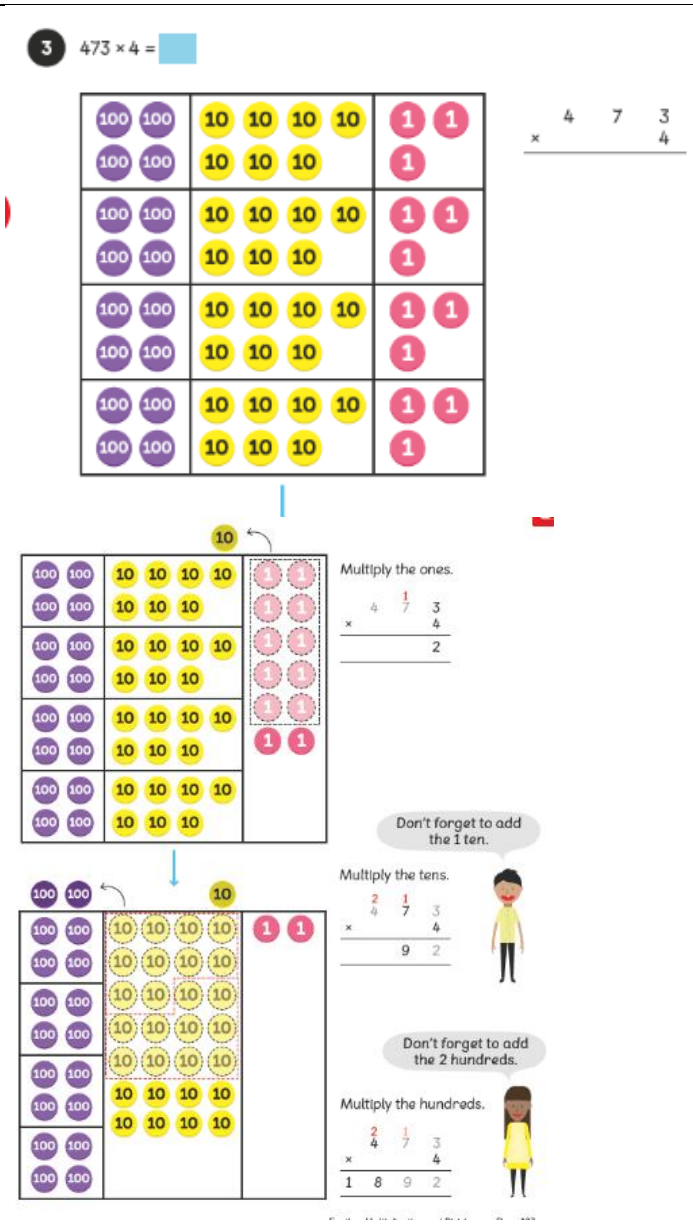
$3 \times 12 =$ ☐

2 $2 \times 12 = 24$

$4 \times 12 =$ ☐

$6 \times 12 =$ ☐

Solve problems involving multiplication using the bar model to help.

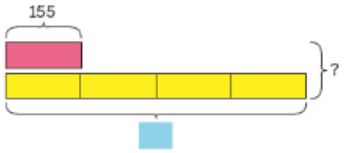


In Focus

Lulu has 155 beads.
Holly has 4 times as many beads as Lulu has.
How many beads do Lulu and Holly have altogether?

Let's Learn

1



Method 1

155 × 4 = ☐

Holly has ☐ beads.

☐ + ☐ = ☐

Lulu and Holly have ☐ beads altogether.

$$\begin{array}{r} 1\ 5\ 5 \\ \times\quad\ 4 \\ \hline \\ \hline \end{array}$$

Method 2

1 unit = 155
5 units = 155 × 5
= ☐

Lulu and Holly have ☐ beads altogether.

$$\begin{array}{r} 1\ 5\ 5 \\ \times\quad\ 5 \\ \hline \\ \hline \end{array}$$

Division

Divide 2 and 3 digit numbers by a one digit number, including remainders.

Solve word problems, using the bar model to help visualise the problem.

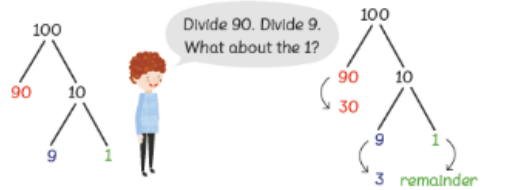
In Focus

A shopkeeper repacks 100 kg of rice into 3-kg bags to sell.
How many bags does he get?

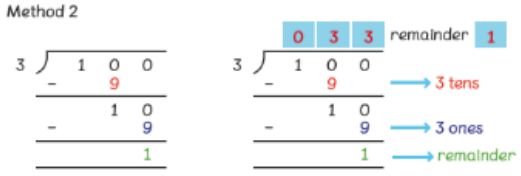
Let's Learn

1 100 ÷ 3 = 33 remainder 1

Method 1

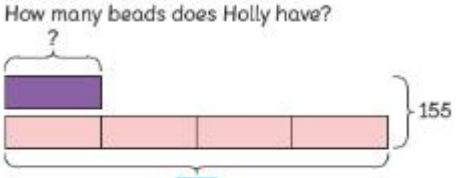


Method 2

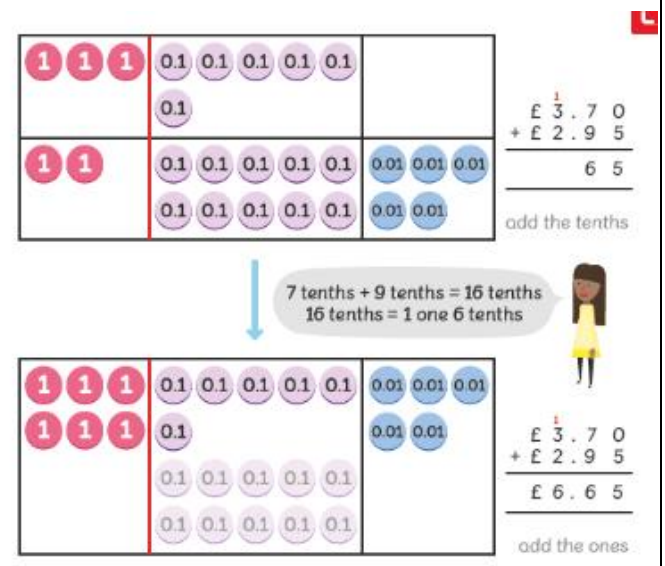


100 ÷ 3 = 33 remainder 1

He gets 33 bags and a remainder of 1 kg of rice.

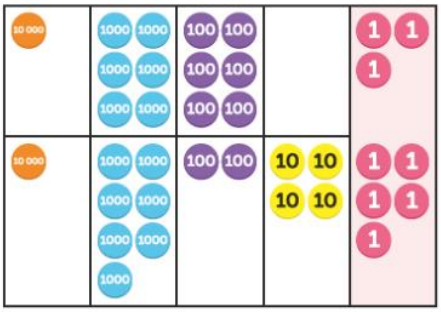
	Holly has 4 times as many beads as Lulu has. Together they have 155 beads. How many beads does Holly have?  155 ÷ 5 = 31 Lulu has 31 beads. 31 × 4 = 124 Holly has 124 beads.

Year 5

Addition	
Adding numbers with more than 4 digits, using formal written methods, including those with decimals. **Use place value charts and counters to support, before moving to the abstract.**	 Together they cost £6.65.

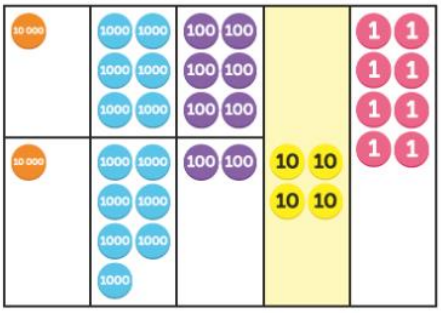
Add fractions with the same denominator and denominators that are multiples of the same number

Step 1 Add the ones.



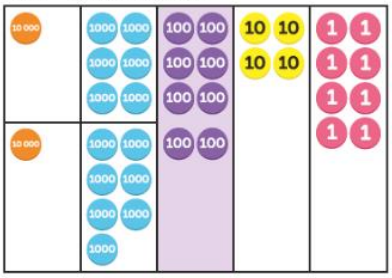
$$\begin{array}{r} 16\,603 \\ +\ 17\,245 \\ \hline 8 \end{array}$$

Step 2 Add the tens.



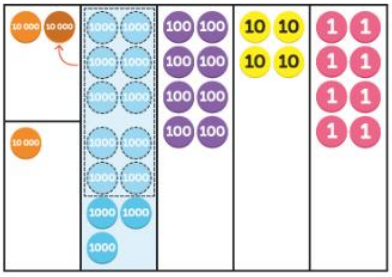
$$\begin{array}{r} 16\,603 \\ +\ 17\,245 \\ \hline 48 \end{array}$$

Step 3 Add the hundreds.

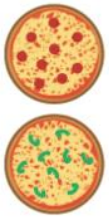


$$\begin{array}{r} 16\,603 \\ +\ 17\,245 \\ \hline 848 \end{array}$$

Step 4 Add the thousands.
6 thousands + 7 thousands = 13 thousands
Regroup the thousands.
13 thousands = 1 ten thousand and 3 thousands



$$\begin{array}{r} {\scriptstyle 1} \\ 16\,603 \\ +\ 17\,245 \\ \hline 3\,848 \end{array}$$



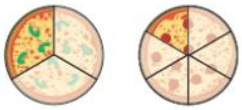
Elliott's mother ordered 2 pizzas of the same size.

Elliott ate $\frac{1}{3}$ of one and $\frac{1}{6}$ of the other.

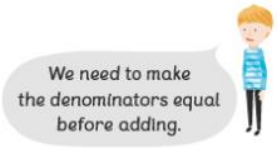
How much pizza did Elliott eat in all?

Let's Learn

1



$\frac{1}{3}$ $\frac{1}{6}$



$\frac{1}{3} = \frac{2}{6}$ $\frac{1}{6}$

$$\frac{1}{3} + \frac{1}{6} = \frac{2}{6} + \frac{1}{6}$$
$$= \frac{3}{6}$$
$$= \frac{1}{2}$$

Elliott ate half a pizza in all.

2 Find the sum of $\frac{1}{6}$, $\frac{1}{2}$ and $\frac{1}{3}$.

Method 1

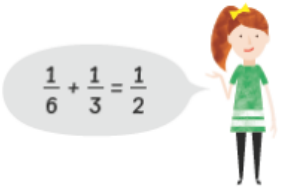
$$\frac{1}{6}+\frac{1}{2}+\frac{1}{3}=\frac{1}{6}+\frac{3}{6}+\frac{2}{6}$$

$$=\frac{6}{6}=1$$

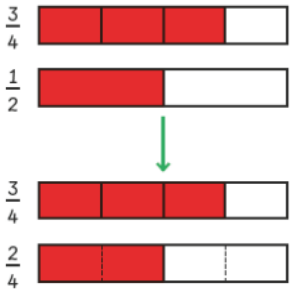
Method 2

$$\frac{1}{6}+\frac{1}{2}+\frac{1}{3}=\frac{1}{2}+\frac{1}{2}$$

$$=1$$



1 $\frac{3}{4}+\frac{1}{2}=$ ☐

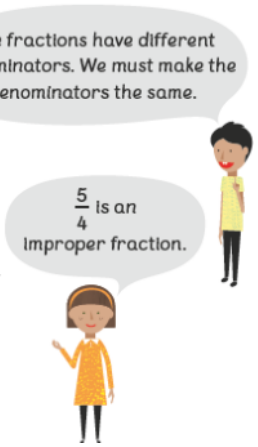


$$\frac{3}{4}+\frac{1}{2}$$

$$=\frac{3}{4}+\frac{2}{4}$$

$$=\frac{5}{4}$$

$$=1\frac{1}{4}$$



2 $\frac{3}{4}+\frac{1}{2}=\frac{3}{4}+\frac{2}{4}$

$\frac{2}{4}$ → $\frac{1}{4}$ $\frac{1}{4}$

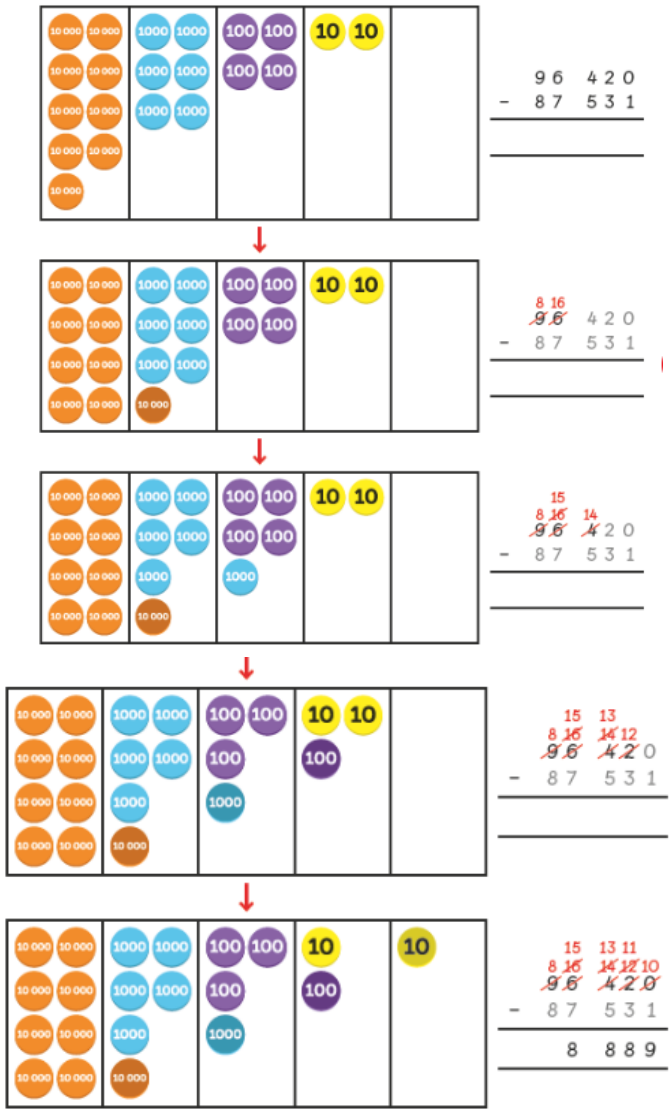
$$=1+\frac{1}{4}$$

$$=1\frac{1}{4}$$

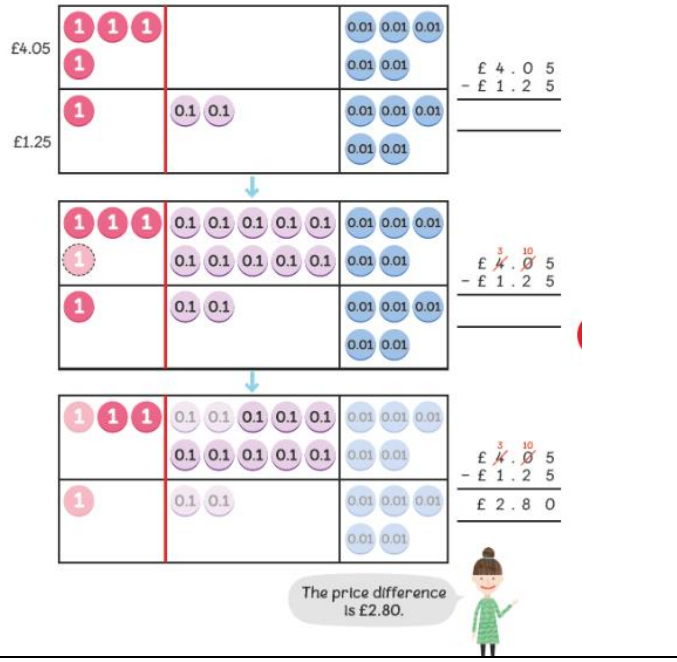
Subtraction

Subtract numbers with at least 4 digits using formal written methods, including decimal numbers.

1 96 420 − 87 531 = 8889



2 picks £4.05 and £1.25 and finds the difference.



Subtract fractions with the same denominator and denominators that are multiples of the same number

In Focus

How much of the pizza is left over?

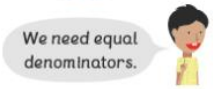
Let's Learn

1

$$1 - \frac{1}{4} = \frac{4}{4} - \frac{1}{4} = \frac{3}{4}$$

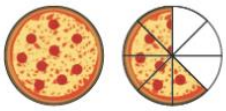
$$\frac{3}{4} = \frac{6}{8}$$

$$\frac{3}{4} - \frac{1}{8} = \frac{6}{8} - \frac{1}{8} = \frac{5}{8}$$



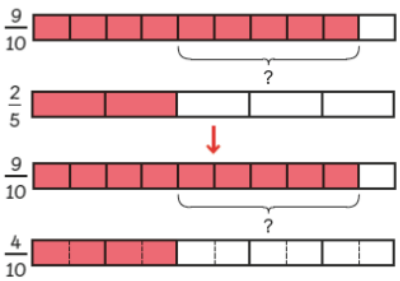
$\frac{5}{8}$ of the pizza is left over after  and  eat their share.

2 Subtract $\frac{3}{8}$ from 2.



$$2 - \frac{3}{8} = 1 + \square = \square$$

2 $\frac{9}{10} - \frac{2}{5} = \square$



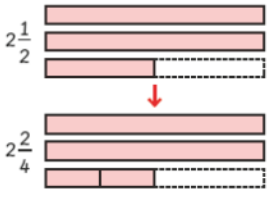
The difference between $\frac{9}{10}$ and $\frac{2}{5}$ is $\square$.

$$\frac{9}{10} - \frac{2}{5} = \frac{9}{10} - \frac{4}{10} = \frac{5}{10} = \frac{1}{2}$$

$$\frac{5}{10} = \frac{1}{2} \quad (\div 5)$$

1 $2\frac{1}{2} - 1\frac{1}{4} = 1\frac{1}{4}$

Method 1

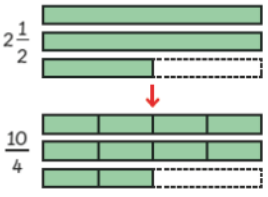


$$2\frac{1}{2} - 1\frac{1}{4} = 2\frac{2}{4} - 1\frac{1}{4} = 1\frac{1}{4}$$

2 − 1

$\frac{2}{4} - \frac{1}{4}$

Method 2



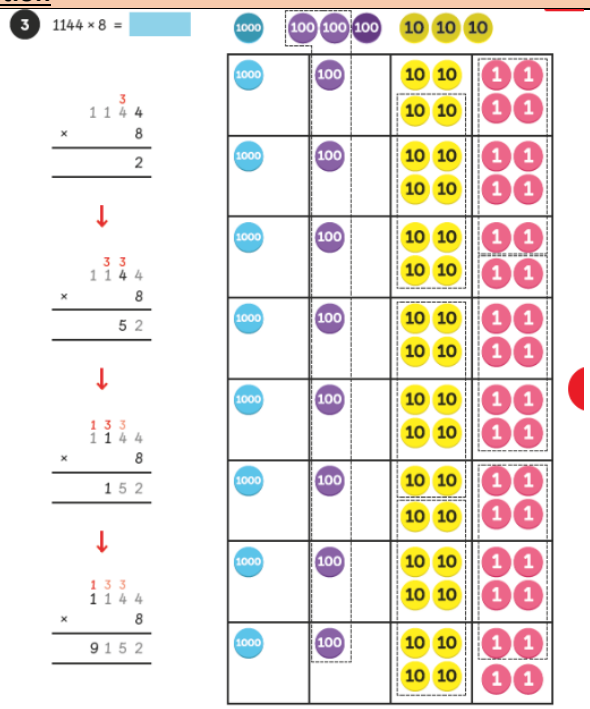
$$2\frac{1}{2} - 1\frac{1}{4} = \frac{10}{4} - \frac{5}{4} = \frac{5}{4} = 1\frac{1}{4}$$

$1\frac{1}{4} = \frac{5}{4}$

Multiplication

Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers

3 1144 × 8 =



12 × 132 = 1584

$$\begin{array}{r} 132 \\ \times\ \ 12 \\ \hline 264 \\ +1320 \\ \hline 1584 \end{array}$$

264 → multiply by 2

1320 → multiply by 10

$$\begin{array}{r} 123 \\ \times\ \ 45 \\ \hline 615 \\ +4920 \\ \hline 5535 \end{array}$$

615 → multiply by 5

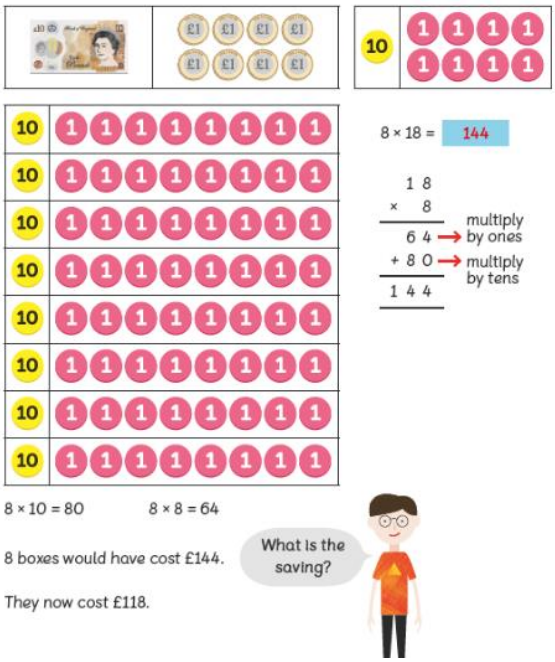
4920 → multiply by 40

123 × 45 = 5535

Solve problems involving multiplication.

Is the offer a good deal?

1 8 × £18 = 144



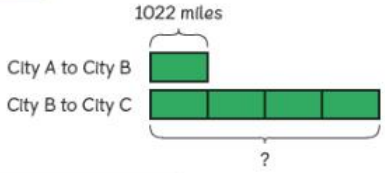
The distance between City A and City B is 1022 miles.

Multiply proper fractions and mixed numbers by whole numbers.

The distance between City B and City C is 4 times the distance between City A and City B. How can we work out the distance between City A and City C?

Let's Learn

1



$1022 \times 4 =$ 4088

$1022 \times 4 = 4088$

Lulu bought eight $\frac{2}{3}$ l bottles of fruit punch.

How much fruit punch did she buy?

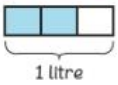
She also bought 8 pies for a party.

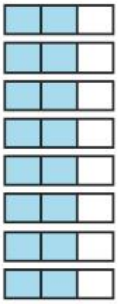
$\frac{2}{3}$ of them were eaten.

How many pies were eaten?

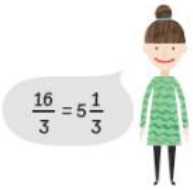
Let's Learn

1





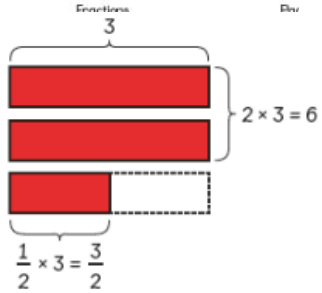
$$8 \times \frac{2}{3} = 8 \times 2 \text{ thirds}$$
$$= 16 \text{ thirds}$$
$$= \frac{16}{3}$$



She bought $5\frac{1}{3}$ litres of fruit punch.

1 $2\frac{1}{2} \times 3 = 6 + \frac{3}{2}$

$$= 6 + 1\frac{1}{2}$$
$$= 7\frac{1}{2}$$



Division

Divide numbers up to 4 digits by a one-digit number using formal written methods and interpret remainders appropriately for the context

3 ⟌ 4 2 → 3 ⟌ 3 12 (4 2)

(a) 98 ÷ 7 = 14

7 ⟌ 9 8

7 ⟌ 1 4 (7 28 / 9 8)

(b) 342 ÷ 6 = 57

6 ⟌ 3 4 2

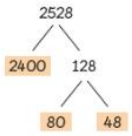
6 ⟌ 0 5 7 (3 30 42 / 4 2)

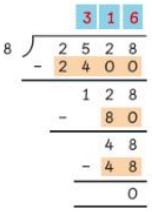
5 ⟌ 3 7 2 6 = 7 5 remainder 1

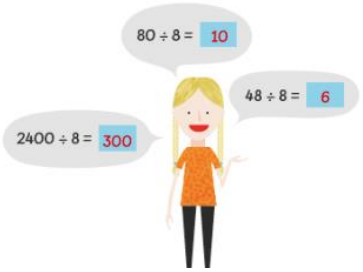
2 's story

2528 ml of juice is put into 8 containers so that each container holds the same volume. What is the volume of juice in each container?

2528 ml ÷ 8 = 316







Solve multip- step / multi -operational problems

Solve addition and subtraction, multiplication and division multi-step problems in contexts, deciding which operations and methods to use and why.

In Focus

baked 6 batches of cupcakes.
Each batch was made up of 8 trays of .
Sam packed the cupcakes into boxes of 4.
Find the number of boxes he got.
What if Sam packed the cupcakes into boxes of 7?

Let's Learn

1 Understand the problem.

How many are there on each tray?

How many trays are there in one batch?

Make a plan.

Find the total number of trays of cupcakes.

Then find the number of .

Carry out the plan.

6 × 8 trays = 48 trays
48 × 12 cupcakes = 576 cupcakes

$$\begin{array}{r} 48 \\ \times\ 12 \\ \hline 96 \\ +\ 480 \\ \hline 576 \end{array}$$

576 ÷ 4 = 144

$$\begin{array}{r|l} & 144 \\ \hline 4 & 576 \\ & -\ 400 \\ \hline & 176 \\ & -\ 160 \\ \hline & 16 \\ & -\ 16 \\ \hline & 0 \end{array}$$

Sam got 144 .

Check your answer.

144 × 4 = 576

100 boxes → 400
50 boxes → 200
150 boxes → 600

144 is just less than 150, so the answer seems reasonable.

$$\begin{array}{r} {\scriptstyle 1\ 1} \\ 144 \\ \times\ \ 4 \\ \hline 576 \end{array}$$

2 What if Sam packed the cupcakes into boxes of 7?

576 ÷ 7 = 82 remainder 2

Sam got 82 boxes and 2 cupcakes left over.

```
      8 2
   ┌─────
7  │ 5 7 6
   - 5 6
   ─────
       1 6
     - 1 4
     ─────
         2
```

In Focus

 and  share the sum of these two amounts so that  gets 3 times as much as .

How much more than  will  get?

Let's Learn

1 Understand the problem.

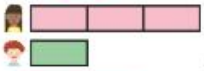
 How much money are they sharing?

 Are they sharing equally?

Make a plan and carry out the plan.

 Add to find the total. £3597 £1259 } £3597 + £1259 = £4856

```
  1 1
  3 5 9 7
+ 1 2 5 9
  ─────
  4 8 5 6
```

 Use a model.  £4856

£4856 ÷ 4 = £1214

```
      ┌─────
4     │ 4 8 5 6
    - 4
    ─────
        8 5 6
      - 8
      ─────
          5 6
        - 4
        ─────
          1 6
        - 1 6
        ─────
            0
```

 £1214 × 3 = £3642

 £1214

 gets £3642 - £1214 = £2428 more than  gets.

Check your answer.

 I get £3642.

 I get £1214.

Are the amounts reasonable?

Percentages

Recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal

In Focus

Whose score is the best?

Let's Learn

1 's method

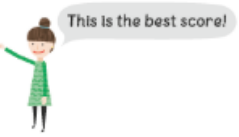
	7
	15
	13

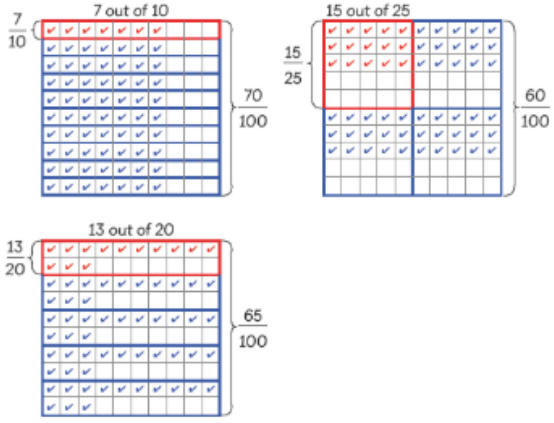
What is wrong with 's method?

When does 's method work?

2 's method

	$\frac{7}{10} = \frac{70}{100} = 70\%$
	$\frac{15}{25} = \frac{60}{100} = 60\%$
	$\frac{13}{20} = \frac{65}{100} = 65\%$

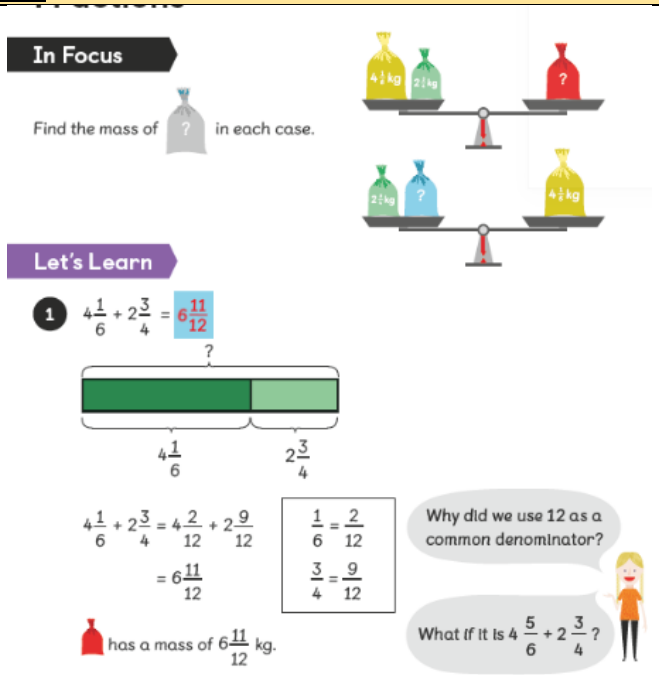
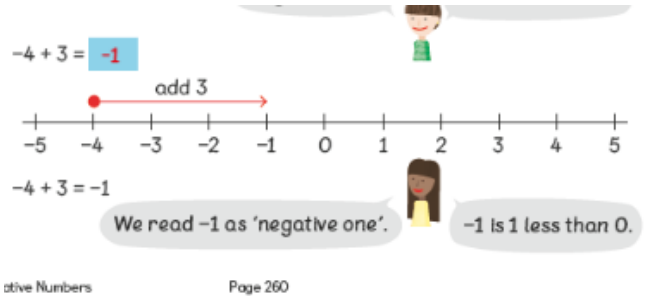
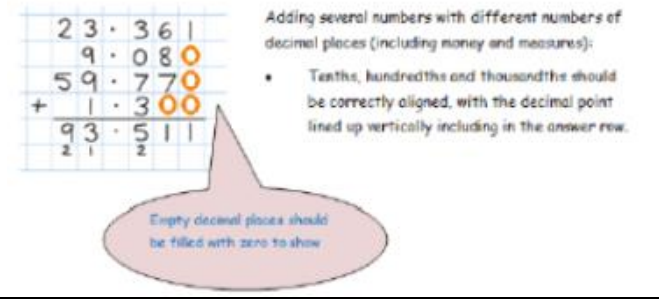




3 's method

	$\frac{7}{10} = 0.7$
	$\frac{15}{25} = \frac{60}{100} = 0.6$
	$\frac{13}{20} = \frac{65}{100} = 0.65$

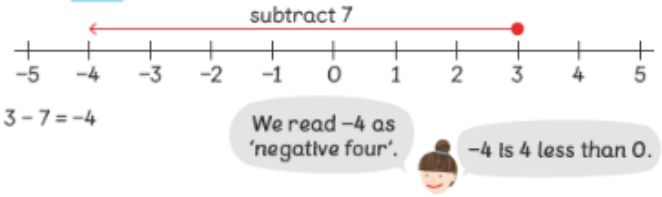
Year 6

Addition	
Add fractions with different denominators and mixed numbers, using the concept of equivalent fractions.	
Add using negative numbers.	
Add increasingly larger numbers using formal column addition, including decimals.	

Subtraction

Subtract using negative numbers.

$3 - 7 = -4$



$3 - 7 = -4$

We read −4 as 'negative four'.

−4 is 4 less than 0.

Subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions.

In Focus

Emma and Elliott have $1\frac{1}{3}$ bars of chocolate between them.

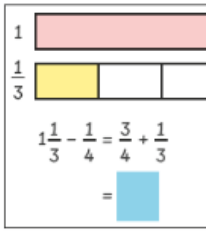
What is left if takes $\frac{1}{4}$ of ?

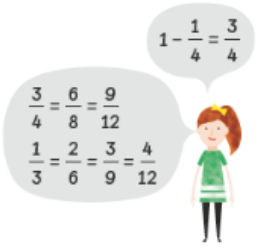
What is left if takes $\frac{3}{4}$ of ?

Let's Learn

1 $1\frac{1}{3} - \frac{1}{4} =$ ☐

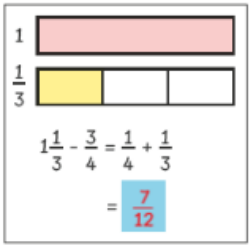
Method 1





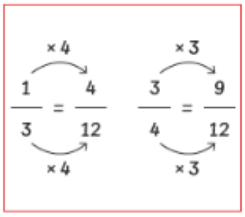
2 $1\frac{1}{3} - \frac{3}{4} = \frac{7}{12}$

Method 1

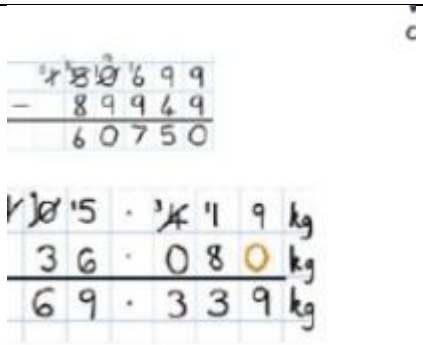


Method 2

$$1\frac{1}{3} - \frac{3}{4} = 1\frac{4}{12} - \frac{9}{12}$$
$$= \frac{16}{12} - \frac{9}{12}$$
$$= \frac{7}{12}$$



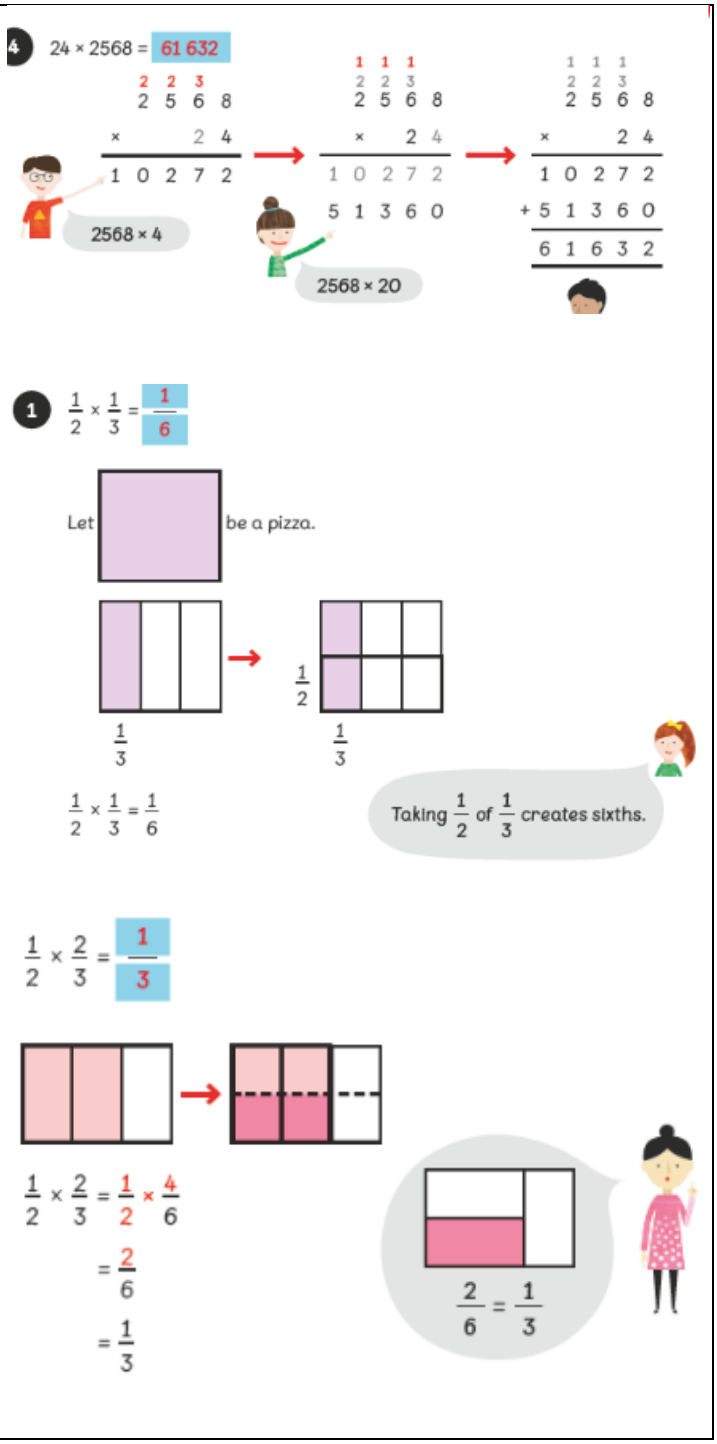
Subtract increasingly large numbers using formal written methods, including decimals.

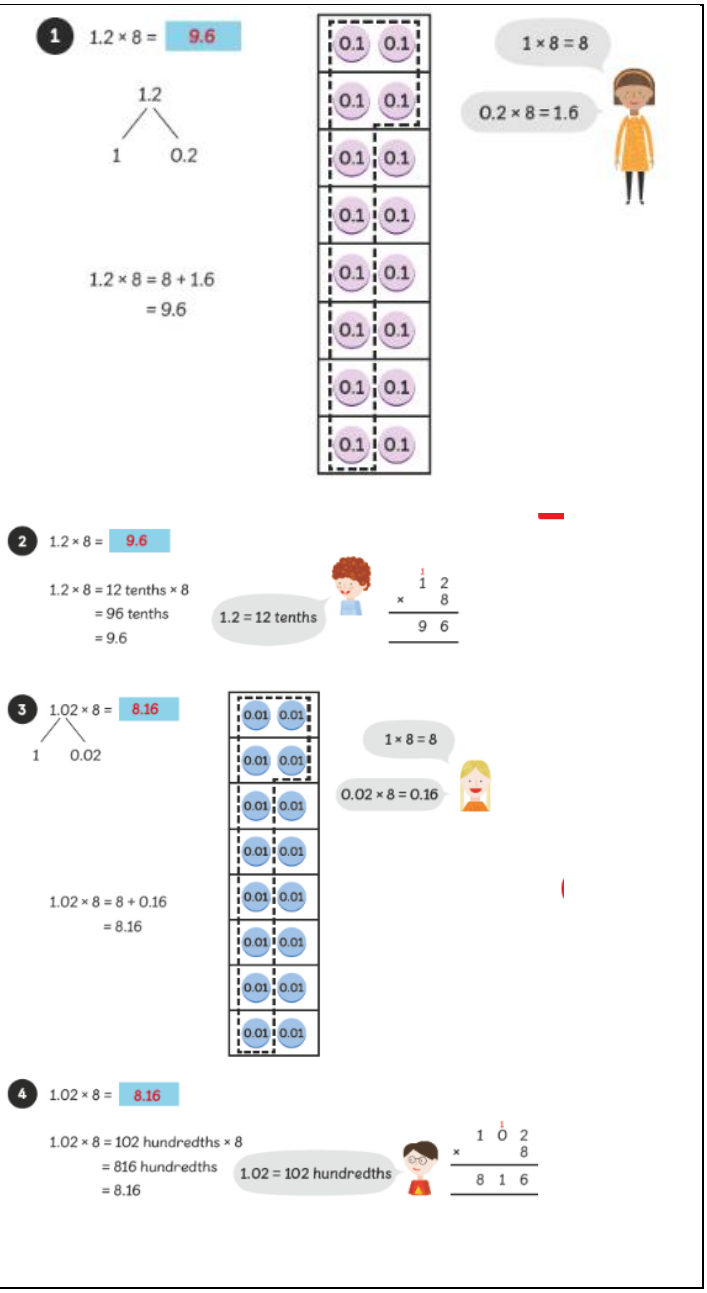
	

Multiplication	
Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication.	12 × 568 = 6816 5 6 8 × 1 2 1 1 3 6 → 568 × 2 + 5 6 8 0 → 568 × 10 6 8 1 6

Multiply simple pairs of proper fractions, writing the answer in its simplest form.

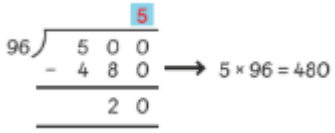
Multiply one-digit numbers with up to two decimal places by whole numbers.





Division

Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context.



Divide proper fractions by whole numbers.

1 £1146 ÷ 24 = £47.75

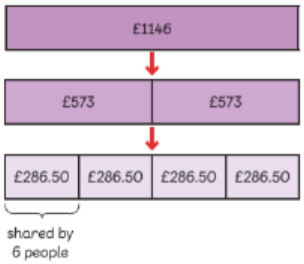
2 £1146 ÷ 24 = £47.75

```
      4 7 . 7 5
   ┌──────────
24 ) 1 1 4 6
   - 9 6 0      → 960 ÷ 24 = 40
   ─────────
       1 8 6
     - 1 6 8    → 168 ÷ 24 = 7
     ─────────
         1 8    → 18 ÷ 24 = 0.75
```

3 £1146 ÷ 24 = £47.75

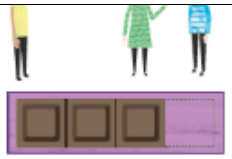
£1146 ÷ 2 = £573
£573 ÷ 2 = £286.50

£1146 ÷ 24 = £573 ÷ 12
= £286.50 ÷ 6



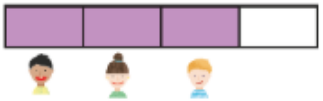

```
      4 7 . 7 5
   ┌──────────
6 ) 2 8 6 . 5 0
   - 2 4 0      → 240 ÷ 6 = 40
   ─────────
       4 6 . 5 0
     - 4 2      → 42 ÷ 6 = 7
     ─────────
         4 . 5 0
```

How can share $\frac{3}{4}$ of a bar of chocolate with 2 friends so that each of them gets the same amount of chocolate?



Let's Learn

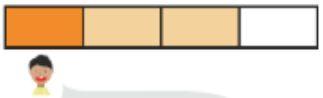
1 $\frac{3}{4} \div 3 = \frac{1}{4}$



$\frac{3}{4} \div 3 = \frac{1}{4}$

Each person gets $\frac{1}{4}$ of the bar of chocolate.

2 $\frac{3}{4} \div 3 = \frac{1}{3} \times \frac{3}{4}$

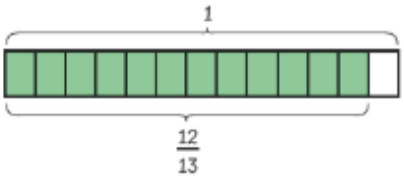


$\frac{3}{4} \div 3 = \frac{1}{3} \times \frac{3}{4} = \frac{1}{4}$

I receive a fraction of $\frac{3}{4}$ of the bar.

Divide.

(a) $\frac{12}{13} \div 2 = \frac{6}{13}$



(b) $\frac{12}{13} \div 3 = \frac{4}{13}$

(c) $\frac{12}{13} \div 4 = \frac{3}{13}$

(d) $\frac{12}{13} \div 6 = \frac{2}{13}$

1 makes $\frac{3}{4} \div 6 = \frac{1}{8}$.

Is she correct?

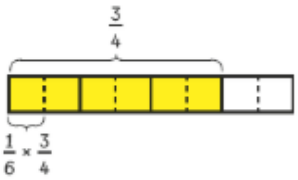
Method 1

$$\frac{3}{4} \div 6 = \frac{6}{8} \div 6$$
$$= \frac{1}{8}$$

$\frac{3}{4} = \frac{6}{8}$

Method 2

$$\frac{3}{4} \div 6 = \frac{1}{6} \times \frac{3}{4}$$
$$= \frac{1}{8}$$



is correct.

Divide a 1-digit number with up to two decimal places by 2-digit whole numbers.

2 makes $\frac{2}{4} \div 3 = \frac{1}{6}$.

Is he correct?

Method 1

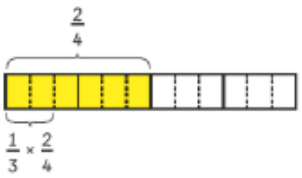
$$\frac{2}{4} \div 3 = \frac{6}{12} \div 3$$
$$= \frac{2}{12}$$
$$= \frac{1}{6}$$

$\frac{2}{4} = \frac{6}{12}$

$\frac{2}{12} = \frac{1}{6}$

Method 2

$$\frac{2}{4} \div 3 = \frac{1}{3} \times \frac{2}{4}$$
$$= \frac{1}{6}$$

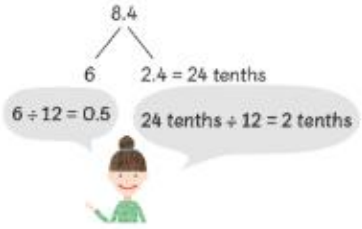


is correct.

1 $8.4 \div 12 =$ 0.7

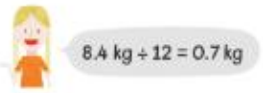
Method 1

$8.4 \div 12 = 0.5 + 0.2$
$= 0.7$



Method 2

8.4 = 84 tenths
84 tenths ÷ 12 = 7 tenths
= 0.7

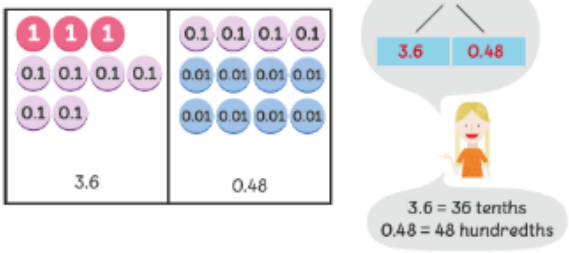


In Focus

How should we rename 4.08 to calculate 4.08 ÷ 12?

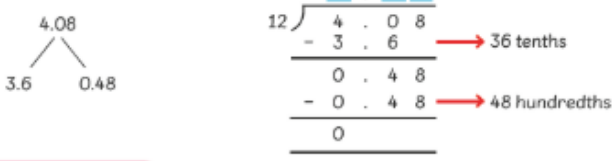
Let's Learn

1 4.08 ÷ 12 = **0.34**



36 tenths ÷ 12 = 3 tenths
= 0.3
48 hundredths ÷ 12 = 4 hundredths
= 0.04
4.08 ÷ 12 = 0.3 + 0.04
= 0.34

2 4.08 ÷ 12 = **0.34**



Problem solving with all four operations

solve problems involving addition, subtraction, multiplication and division

solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why

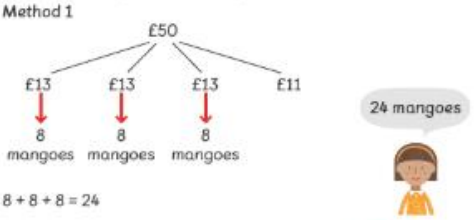
In Focus

What is the greatest number of mangoes that can be bought with £50?

Let's Learn

1 How many mangoes can be bought with £50?

Method 1

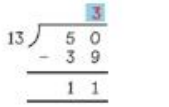


8 + 8 + 8 = 24

Method 2

£50 ÷ £13 = 3 remainder £11

3 × 8 = 24



In Focus

took 1 h 50 min to bake first a sponge cake, then a butter cake and then a brownie. The butter cake took twice as long to bake as the brownie. The brownie took 10 minutes more than the sponge cake.

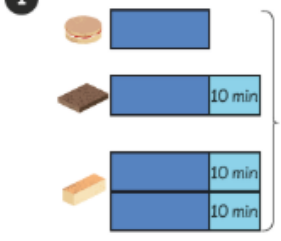
	Baking time
	twice as much time as
	10 minutes more than

Is it possible to find the time it takes to bake a sponge cake?

Let's Learn

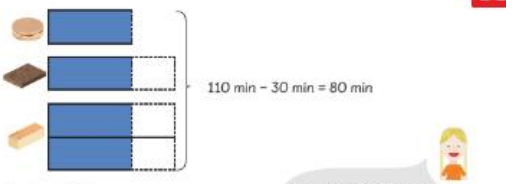
- ☐ Understand
- ☐ Plan
- ☐ Calculate
- ☐ Check

1



1 h 50 min = 60 min + 50 min
= 110 min

1 h = 60 min

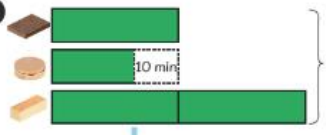


110 min − 30 min = 80 min

4 units = 80 min
1 unit = 80 min ÷ 4
= 20 min
The sponge cake took 20 min to bake.

How long did it take to bake the butter cake and the brownie?

2



1 h 50 min = 110 min

110 min + 10 min = 120 min

4 units = 120 min
1 unit = 120 min ÷ 4
= 30 min
It took 30 min to bake the brownie.
It took 60 min to bake the butter cake.

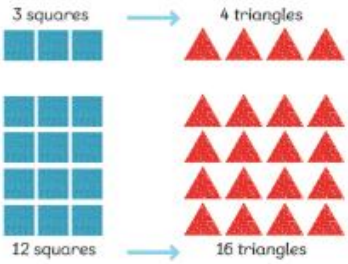
In Focus

wants to make 20 identical squares and 12 identical equilateral triangles using wire.

He has made 12 squares and 9 triangles using 6 m of wire. The length of wire used for 3 squares is the same as that used for 4 triangles. Find the total length of wire needs to make all 20 squares and 12 triangles.

Let's Learn

- ☐ Understand
- ☐ Plan
- ☐ Calculate
- ☐ Check



1 m = 100 cm

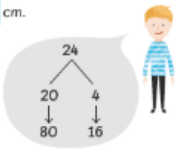
12 squares and 9 triangles need 6 m = 600 cm.
16 triangles and 9 triangles need 600 cm.
25 triangles need 600 cm.

1 triangle needs 600 cm ÷ 25 = 24 cm.

$$\begin{array}{r} 24 \\ 25\overline{)600} \\ -500 \quad \rightarrow 20 \\ \hline 100 \\ -100 \quad \rightarrow 4 \\ \hline 0 \end{array}$$

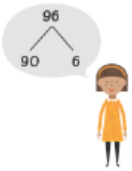
4 triangles need 24 cm × 4 = 96 cm.

$$\begin{array}{r} {\scriptstyle 1}\,2\,4 \\ \times \quad 4 \\ \hline 9\,6 \end{array}$$



3 squares need 96 cm.
1 square needs 96 cm ÷ 3 = 32 cm.

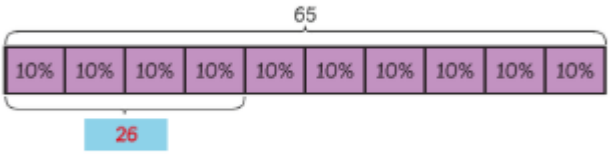
$$\begin{array}{r} 32 \\ 3\overline{)96} \\ -90 \quad \rightarrow 30 \\ \hline 6 \\ -6 \quad \rightarrow 2 \\ \hline 0 \end{array}$$



Percentages

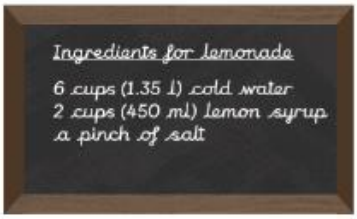
Calculate percentages of quantities and numbers.

2 40% of 65 = 26



10% ⟶ 65 ÷ 10 = 6.5
40% ⟶ 4 × 6.5 = 26

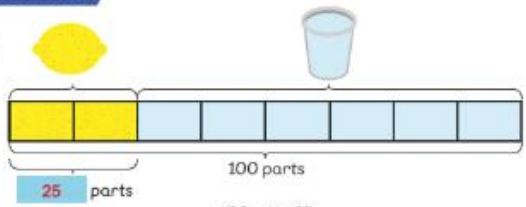
In Focus



mixes the cold water and the lemon syrup. Out of 100, how many parts of the mixture is lemon syrup?

Let's Learn

1



$100 \div 4 = 25$

25 out of 100 parts of the mixture is lemon syrup.

25% of the mixture is lemon syrup.

That means for every 100 ml of mixture, 25 ml is lemon syrup.

2 wants to prepare a 2-litre batch of lemonade. How much lemon syrup does he need?

2 l = 2000 ml

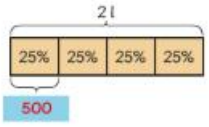
Method 1

For every 100 ml, needs 25 ml of lemon syrup.

For every 1000 ml, needs 250 ml of lemon syrup.

For every 2000 ml, needs 500 ml of lemon syrup.

Method 2



$2\ l \div 4 = 2000\ ml \div 4$

$= 500\ ml$

Method 3

$$25\% \text{ of } 2\ l = \frac{25}{100} \times 2000\ ml$$

$$= \frac{1}{4} \times 2000\ ml$$

$$= 500\ ml$$