

CALCULATION POLICY

What is maths mastery?

Teaching maths for mastery is a transformational approach to maths teaching which stems from high performing Asian nations such as Singapore. When taught to master maths, children develop their mathematical fluency without resorting to rote learning and are able to solve non-routine maths problems without having to memorise procedures.

Concrete, pictorial, abstract (CPA)

Concrete, pictorial, abstract (CPA) is a highly effective approach to teaching that develops a deep and sustainable understanding of maths. Developed by American psychologist, Jerome Bruner, the CPA approach is essential to maths teaching in Singapore.

Pupils build on their existing knowledge by introducing abstract concepts in a concrete and tangible way. It involves moving from concrete materials, to pictorial representations, to abstract symbols and problems.

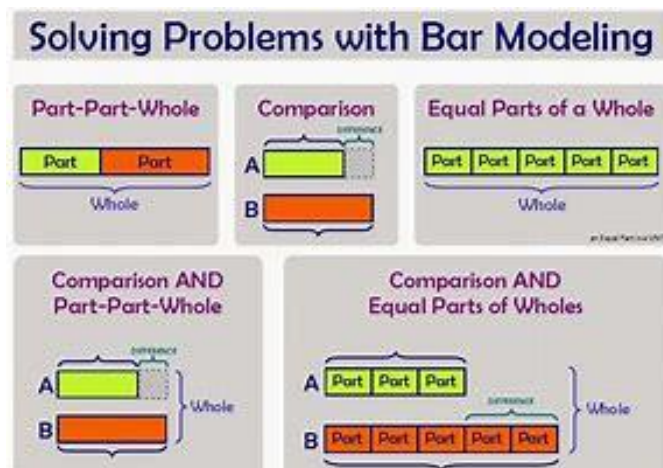
Concrete is the “doing” stage. During this stage, students use concrete objects to model problems. This approach brings concepts to life by allowing children to experience and handle physical (concrete) objects. With the CPA framework, every abstract concept is first introduced using physical, interactive concrete materials.

Pictorial is the “seeing” stage. Here, visual representations of concrete objects are used to model problems. This stage encourages children to make a mental connection between the physical object they just handled and the abstract pictures, diagrams or models that represent the objects from the problem and makes it far easier for them to grasp difficult abstract concepts.

Abstract is the “symbolic” stage, where children use abstract symbols to model problems. Pupils will not progress to this stage until they have demonstrated that they have a solid understanding of the concrete and pictorial stages of the problem. The abstract stage involves the teacher introducing abstract concepts (for example, mathematical symbols). Children are introduced to the concept at a symbolic level, using only numbers, notation, and mathematical symbols (for example, +, −, x, /) to indicate addition, multiplication or division.

Bar modelling

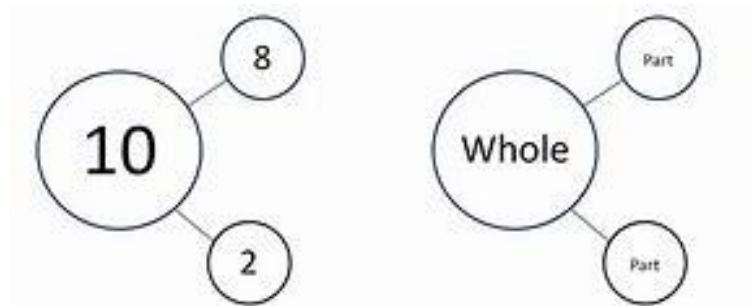
The bar model method is a strategy used by children to visualise mathematical concepts and solve problems. The method is a way to represent a situation in a word problem, usually using rectangles.



Number bonds

Number bonds are a way of showing how numbers can be combined or split up. They are used to reflect the 'part-part-whole' relationship of numbers. A lot of emphasis is put into number bonds from the early year foundation stages so that children can build up their number sense prior to learning addition and subtraction. In the early stages students would be introduced to number bonds with concrete experiences, for example children could be given 6 linking cubes and guided to understand that 2 and 4 make 6, but that 1 and 5 also make 6.

The mastery of number bonds is an important foundation required in subsequent mathematical learning and as a basis in the development of mental strategies. A strong number sense allows students to decide what action to take when trying to solve problems in their head.



YEAR 1

PLACE VALUE - COUNTING

Counting to 10:

We can count on....



Count on from 1.

1, 2, 3, 4, 5



We can count back....



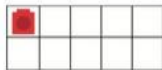
Count back from 10.

10, 9, 8, 7, 6, 5, 4

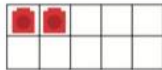


Then we learn about 0.

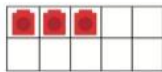
Counting with objects:



1



2

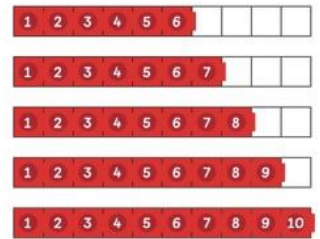
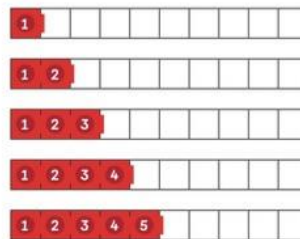


3

Physical objects

Tens squares

Counting with objects:



Counting with number lines:



Three



3, 2, 1, 0

3, 4, 5, 6, 7, 8, 9, 10

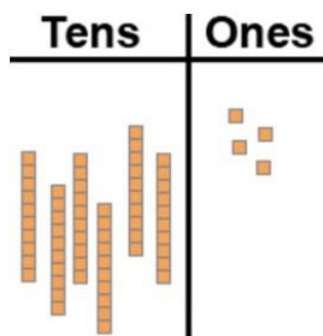


Using multilink cubes

YEAR 1

PLACE VALUE

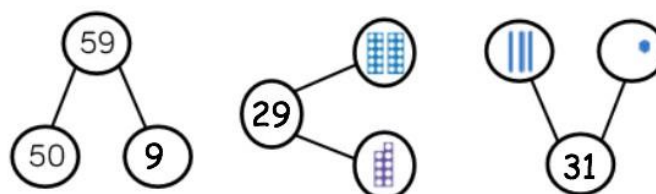
Dienes to represent numbers:



The dienes show
6 tens and 4 ones.

This shows the
number 64.

Number bond method:

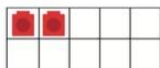


Separating the numbers apart like this is called
partitioning.

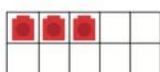
Writing numbers to 10:



1
one

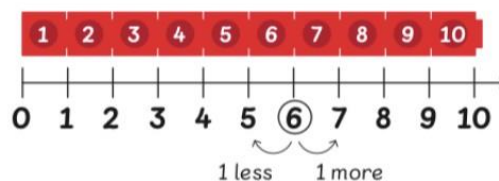


2
two



3
three

Ordering numbers:



5 

6 

We can find 1 more
and 1 less than.

Comparing numbers:

There are 3 cupcakes.



There are 5 cookies.



There are 7 doughnuts.



Which number is more than the others?
Which number is less than the others?



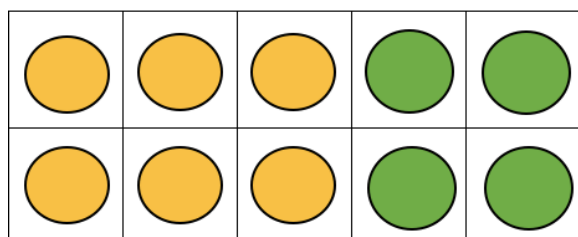
7 is more than 5.
7 is more than 3.
7 is the greatest.

3 is less than 7.
3 is less than 5.
3 is the smallest.

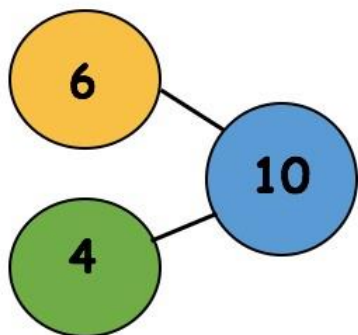
YEAR 1

ADDITION

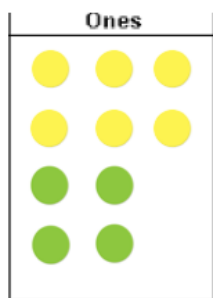
Tens frame:



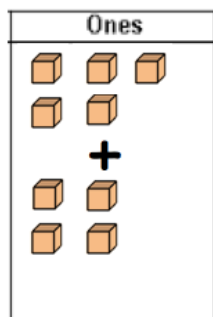
Number bond method:



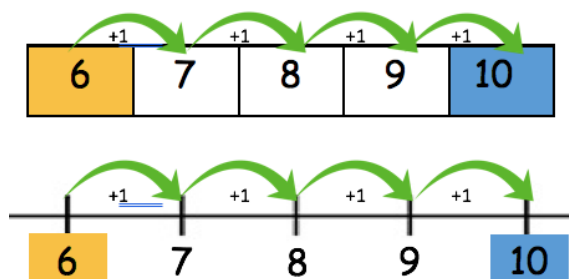
Counters method:



Base 10 method:



Number line method:



Tens strip:



Count on from the biggest number:

$$6 + 4 = 10$$

Number bond method:



Picture method:



Abstract calculations:

Commutative	Inverse
$2 + 5 = 7$	$7 - 5 = 2$
$5 + 2 = 7$	$7 - 2 = 5$

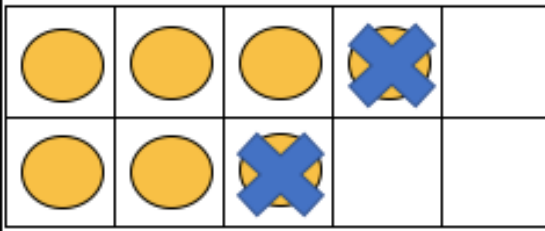
Bar model:



YEAR 1

SUBTRACTION

Tens frame:



Tens strip:



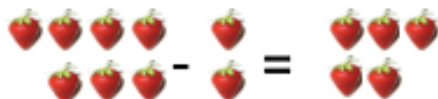
Count back from the biggest number:

$$7 - 2 = 5$$

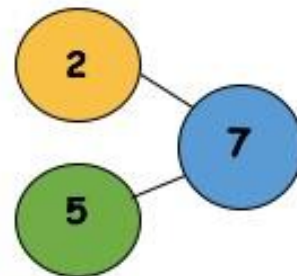
Number bond method:



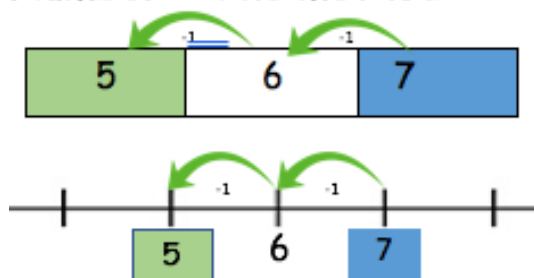
Picture method:



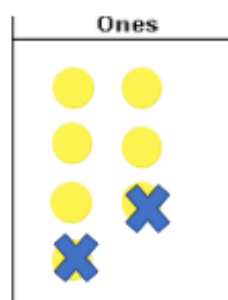
Number bond method:



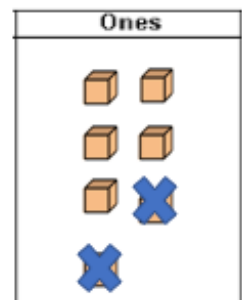
Number line method:



Counters method:



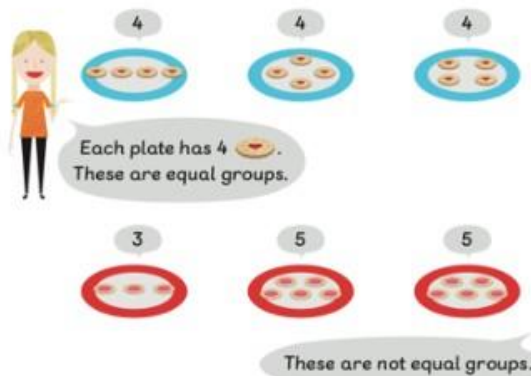
Base 10 method:



YEAR 1

MULTIPLICATION & DIVISION

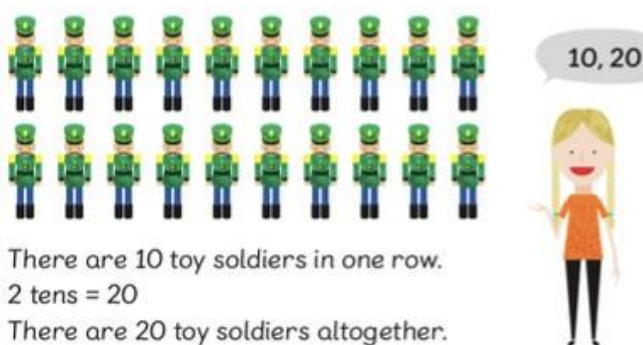
Making equal groups



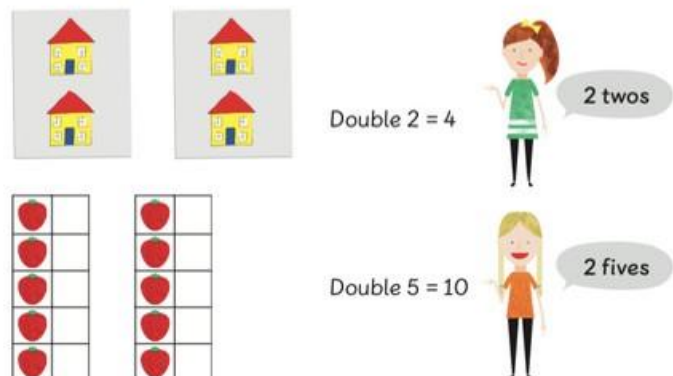
Adding equal groups



Making equal rows



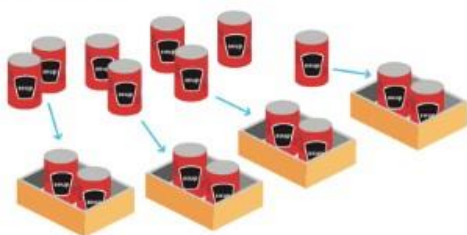
Making doubles



DIVISION

Grouping equally

There are 8 cans.



There are 4 boxes of 2 cans.

Sharing equally

There are 6 cookies and 3 children.
Each child takes one cookie.



Each child takes one more cookie.



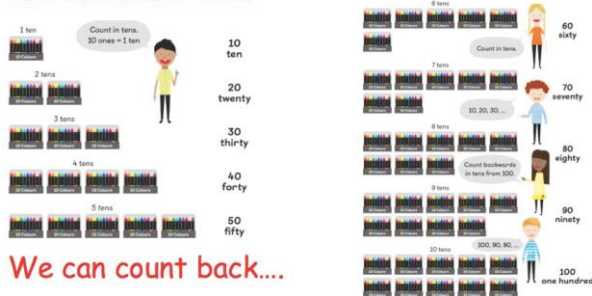
Each child gets 2 cookies.

YEAR 2

PLACE VALUE

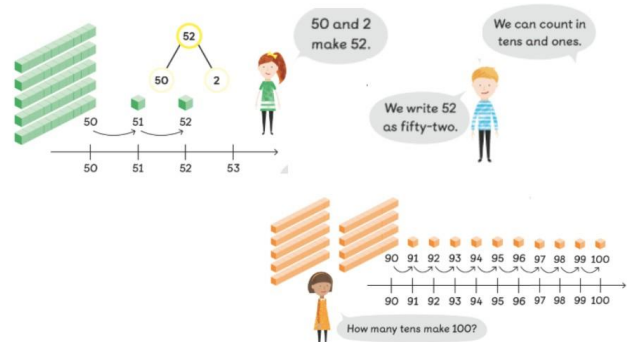
Counting in tens to 100:

We can count on....



We can count back....

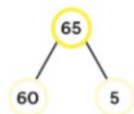
Counting in tens and ones:



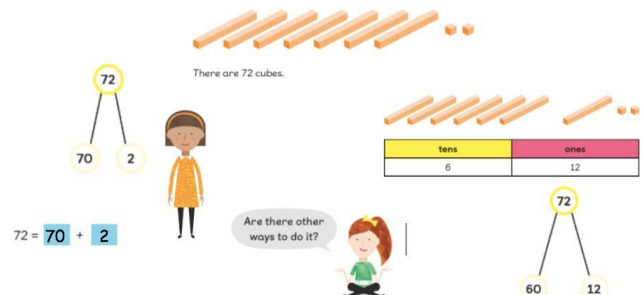
We can represent two-digit numbers in these ways:



tens	ones
6	5



We can make numbers using different number bonds:



Comparing numbers:

7 tens is more than 6 tens.
75 is more than 63.
75 is more than 69.
75 is the greatest.

3 ones is less than 9 ones.
63 is less than 69.
63 is the smallest.

75 > 63

63 < 69

Using the < > signs

75 > 69

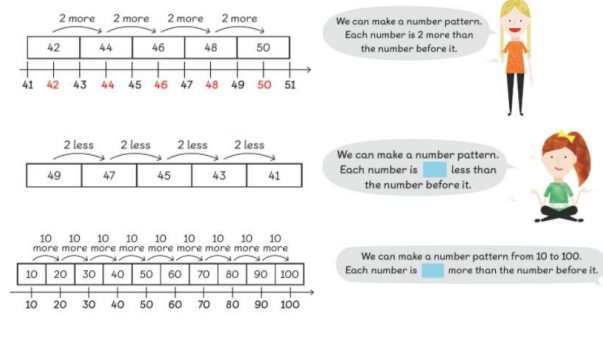
Is it < or >?

We can arrange the numbers in order.

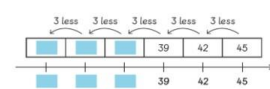
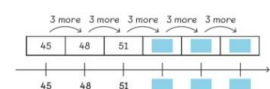
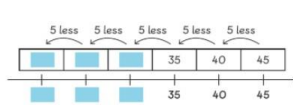
75, 69, 63
greatest → smallest

63, 69, 75
smallest → greatest

We can extend number patterns:



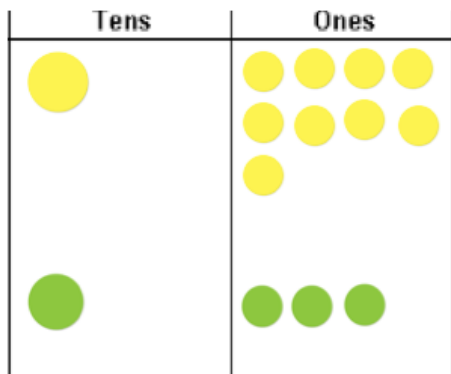
We can find the missing numbers in patterns:



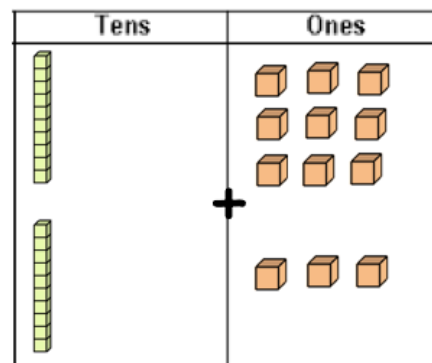
YEAR 2

ADDITION

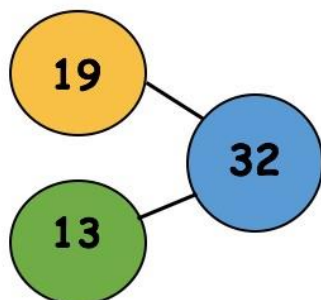
Counters method:



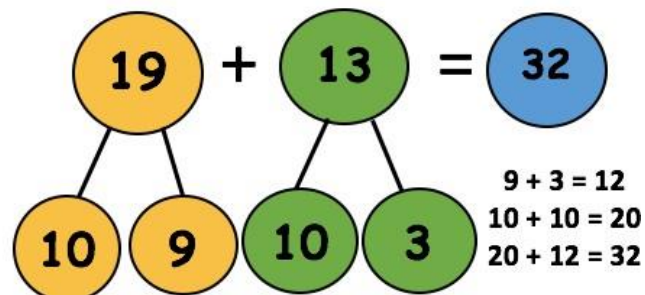
Base 10 method:



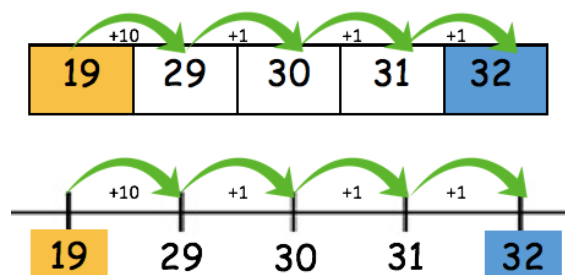
Number bond method:



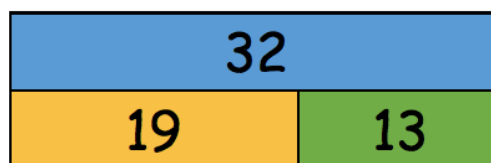
Number bond method:



Number line method:



Bar model:



Column addition:

Without renaming:

$$\begin{array}{r} 18 \\ + 11 \\ \hline 29 \end{array}$$

With renaming:

$$\begin{array}{r} 19 \\ + 13 \\ \hline 32 \\ 1 \end{array}$$

Expanded method:

$$\begin{array}{r} 19 \\ + 13 \\ \hline 12 \\ 20 \\ \hline 32 \end{array}$$

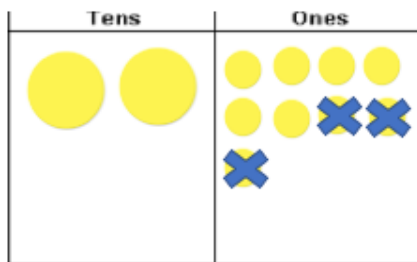
Abstract calculations:

Commutative	Inverse
$19 + 13 = 32$	$32 - 13 = 19$
$13 + 19 = 32$	$32 - 19 = 13$

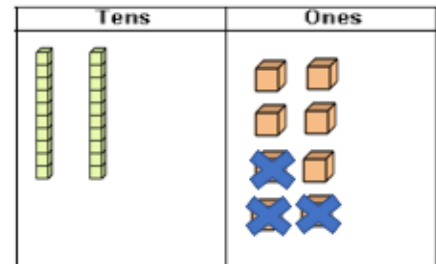
YEAR 2

SUBTRACTION

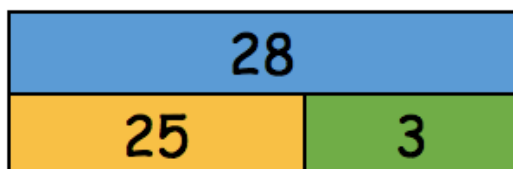
Counters method:



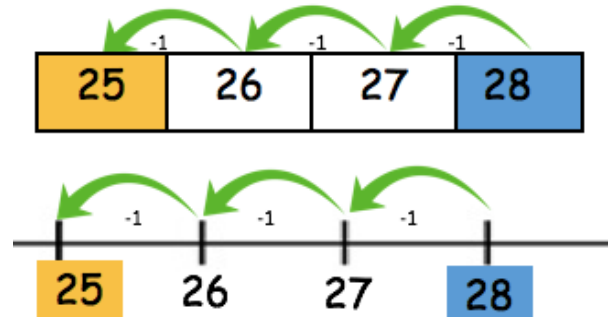
Base 10 method:



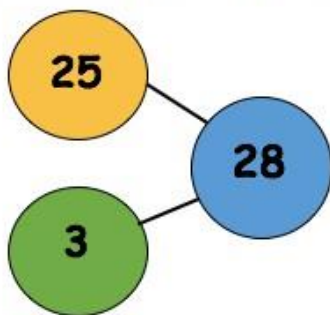
Bar model:



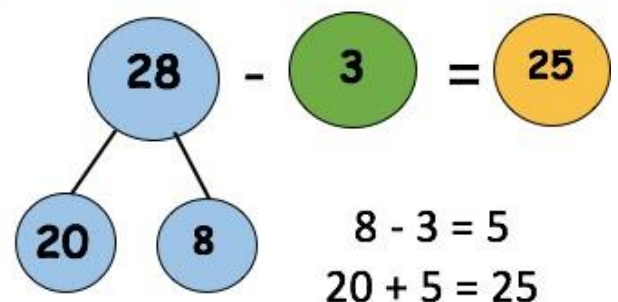
Number line method:



Number bond method:



Number bond method:



Column subtraction:

Without renaming: With renaming: Expanded method:

$$\begin{array}{r}
 28 \\
 - 3 \\
 \hline
 25
 \end{array}
 \quad
 \begin{array}{r}
 \overset{1}{2}\overset{13}{3} \\
 - 19 \\
 \hline
 4
 \end{array}
 \quad
 \begin{array}{r}
 29 \\
 -14 \\
 \hline
 5 \\
 10 \\
 \hline
 15
 \end{array}$$

Abstract calculations:

Commutative	Inverse
$25 + 3 = 28$	$28 - 3 = 25$
$3 + 25 = 28$	$28 - 25 = 3$

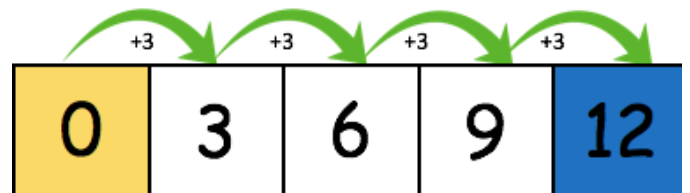
YEAR 2

MULTIPLICATION

Repeated addition:

$$3 + 3 + 3 + 3 = 12$$

Number line method:



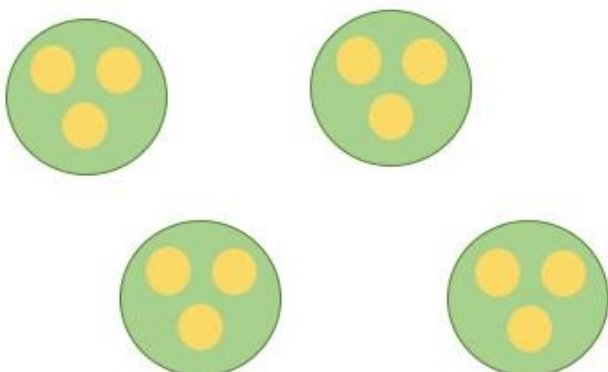
Groups of:

$$4 \text{ groups of } 3 \text{ is } 12$$

Multiplication:

$$4 \times 3 = 12$$

Grouping Method:



Abstract calculations:

Commutative

$$3 \times 4 = 12$$

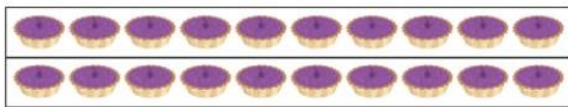
$$4 \times 3 = 12$$

YEAR 2

DIVISION

Make a family of multiplication and division facts:

Look at the picture.
Make a family of multiplication and division facts.



$$\begin{array}{l} 2 \times 10 = 20 \quad \text{---} \quad 20 \div 2 = 10 \\ 10 \times 2 = 20 \quad \text{---} \quad 20 \div 10 = 2 \end{array}$$

Solving Problems

Ruby has 15 marshmallows.
She packs 5 marshmallows into each bag.
How many bags does Ruby need?

Method 1 Use  to stand for .

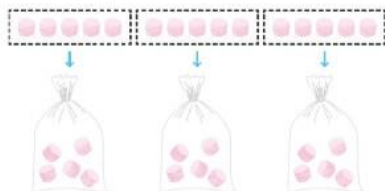
Use  for each bag.



Solving Problems:

Ruby has 15 marshmallows.
She packs 5 marshmallows into each bag.
How many bags does Ruby need?

Method 2 Draw a picture.



Solving Problems:

Ruby has 15 marshmallows.
She packs 5 marshmallows into each bag.
How many bags does Ruby need?

Method 3 Use a division equation.

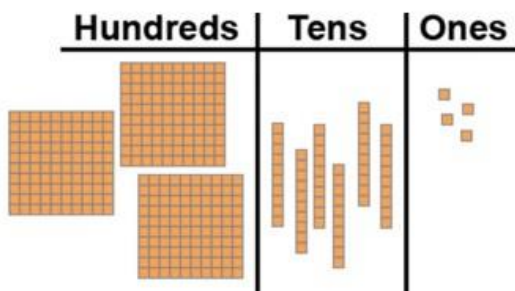
$$15 \div 5 = 3$$

Ruby needs **3** bags.

YEAR 3

PLACE VALUE

Base ten or dienes blocks:



Value of digits:

hundreds	tens	ones
4	2	7

$427 = 4 \text{ hundreds} + 2 \text{ tens} + 7 \text{ ones}$

$427 = 400 + 20 + 7$

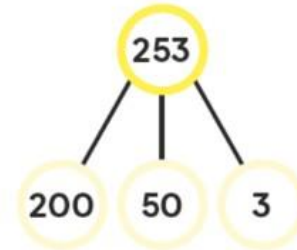
The digit 4 stands for 4 hundreds or 400.

The digit 2 stands for 2 tens or 20.

The digit 7 stands for 7 ones or 7.

We write 427 as four hundred and twenty-seven.

Number bond method:

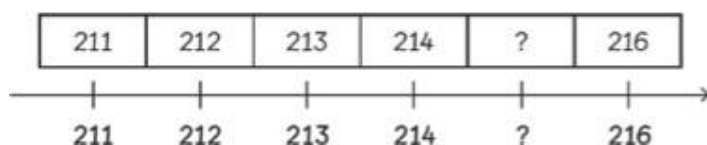


Place value cards:

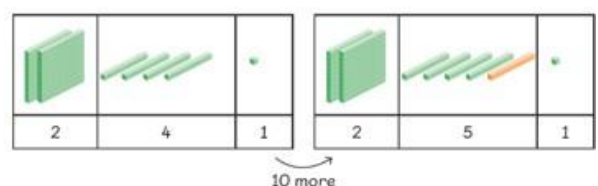


Separating the numbers apart like this is called **partitioning**.

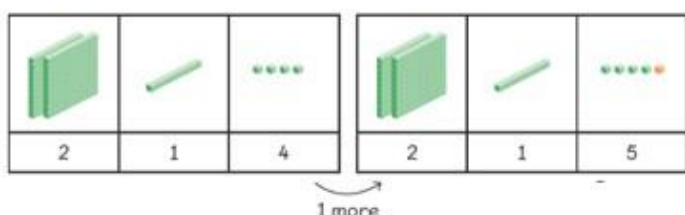
Number lines:



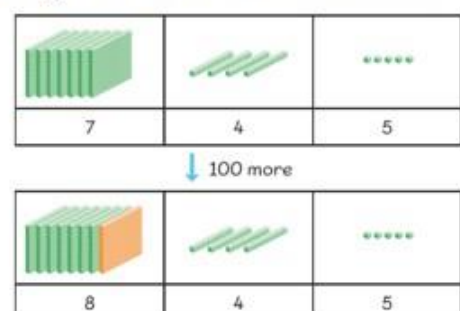
Finding 10 more or less than:



Finding 1 more or less than:



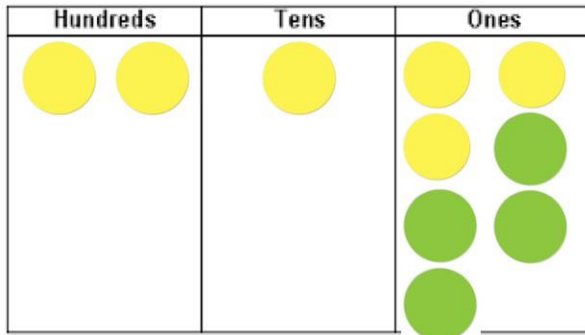
Finding 100 more or less:



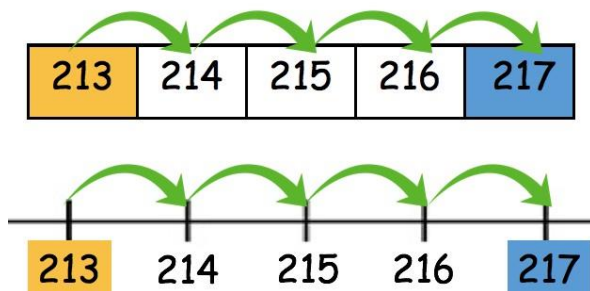
YEAR 3

ADDITION

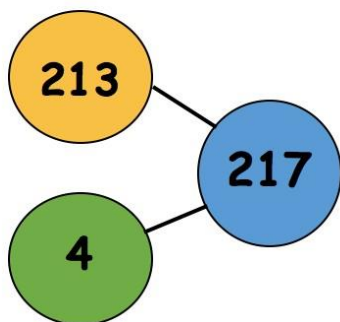
Counters method:



Number line method:



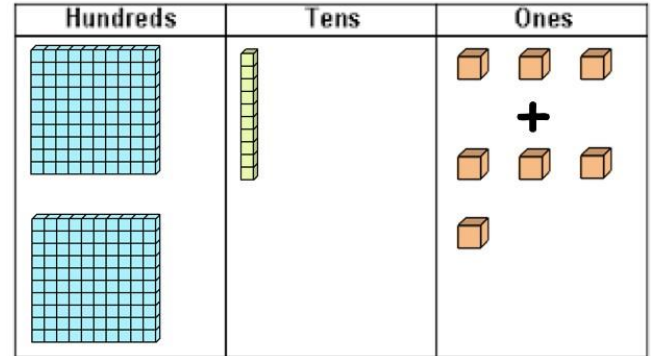
Number bond method:



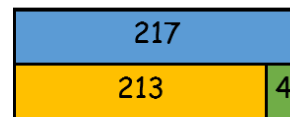
Abstract calculations:

Commutative	Inverse
$213 + 4 = 217$	$217 - 4 = 213$
$4 + 213 = 217$	$217 - 213 = 4$

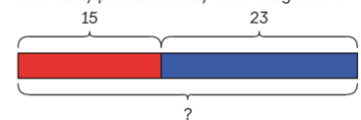
Base 10 method:



Bar model:



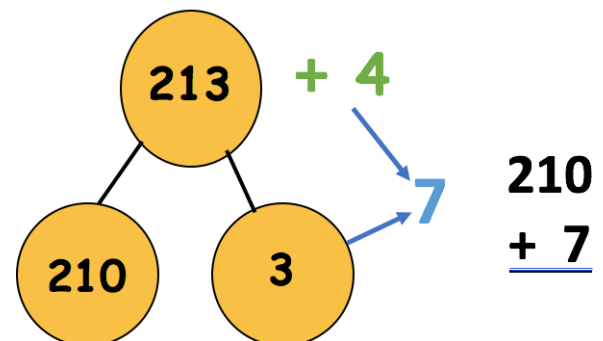
How many pencils do they have altogether?



$$15 + 23 = 38$$

They have 38 pencils altogether.

Number bond method:



Column addition:

Without renaming:

$$\begin{array}{r} 213 \\ + 4 \\ \hline 217 \end{array}$$

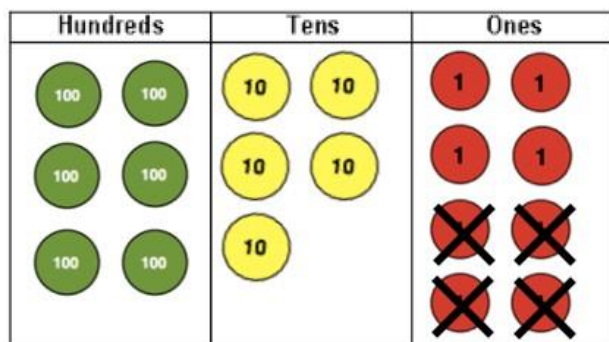
With renaming:

$$\begin{array}{r} 1 \quad 1 \\ 213 \\ + 497 \\ \hline 710 \end{array}$$

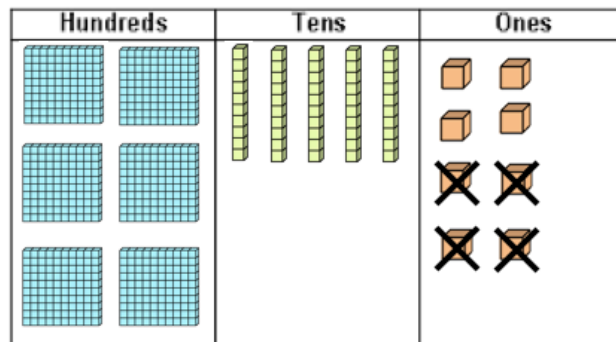
YEAR 3

SUBTRACTION

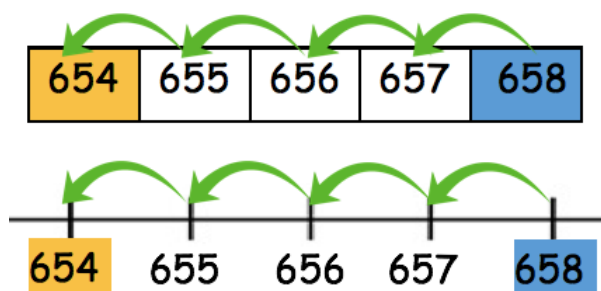
Counters method:



Base 10 method:



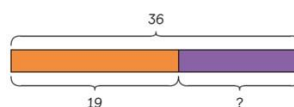
Number line method:



Bar models:

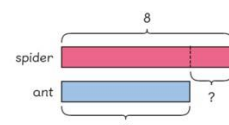
Bar model:

There are 36 children in the school band.
19 of them are boys.
How many girls are there?



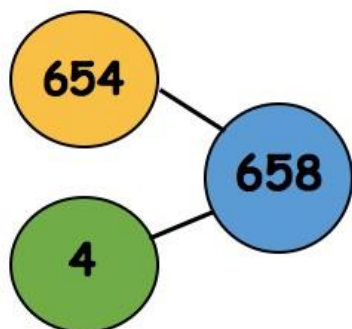
Comparative model:

A spider has 8 legs.
An ant has 6 legs.

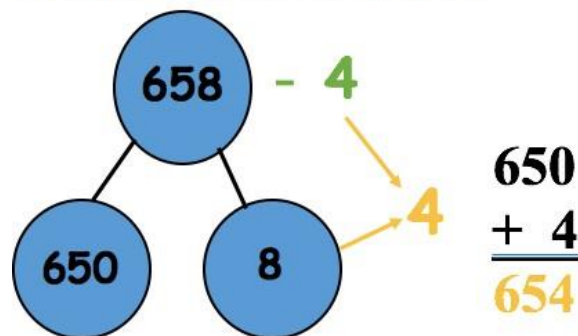


$8 - 6 = 2$
A spider has 2 more legs than an ant.

Number bond method:



Number bond method:



Abstract calculations:

Commutative	Inverse
$658 - 4 = 654$	$654 + 4 = 658$
$658 - 654 = 4$	$4 + 654 = 658$

Column subtraction:

Without renaming:

$$\begin{array}{r} 658 \\ - 4 \\ \hline 654 \end{array}$$




With renaming:

$$\begin{array}{r} 6\overset{4}{\cancel{5}}\overset{1}{8} \\ - 349 \\ \hline 309 \end{array}$$

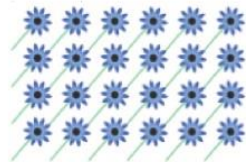
YEAR 3

MULTIPLICATION

Arrays:

3 times tables	4 times tables	8 times tables
		
$3 \times 5 = 15$	$4 \times 5 = 20$	$8 \times 5 = 40$ (doubling the 4 times tables)

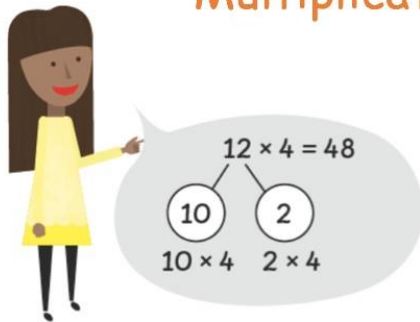
Make a family of multiplication and division facts:



$$\begin{array}{l} 6 \times 4 = 24 \\ 4 \times 6 = 24 \end{array} \quad \begin{array}{l} 24 \div 6 = 4 \\ 24 \div 4 = 6 \end{array}$$

Number bond strategy:

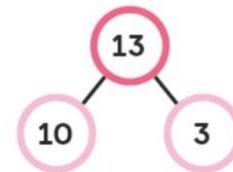
Multiplication



Bridged column method:

Without renaming

$13 \times 3 = 39$



	t	o
	1	3
x		3
		9
+	3	0
	3	9

Bridged column method:

With renaming

Multiply the ones by 4.

	t	o
	2	5
x		4
	2	0

5 ones $\times 4 = 20$ ones
20 ones = 2 tens

Multiply the tens by 4.

	t	o
	2	5
x		4
	2	0
	8	0

2 tens $\times 4 = 8$ tens

Add the products.

	h	t	o
		2	5
x			4
		2	0
+		8	0
	1	0	0

20 + 80 = 100

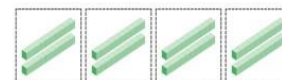
Short multiplication:

Without renaming

$2 \times 4 = 8$



$2 \times 40 = 80$



	t	o
	2	0
x		4
	8	0

Short multiplication:

With renaming

Multiply the ones by 4.

	2 tens	t	o
		2	7
x		4	4
		8	8

8 ones

7 ones $\times 4 = 28$ ones
28 ones = 2 tens + 8 ones

Multiply the tens by 4.

	h	t	o
		2	7
x		4	4
	1	8	8

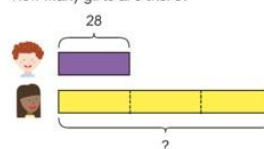
4 tens $\times 4 = 16$ tens
16 tens + 2 tens = 18 tens

Solving word problems:

Bar model

There are 28 boys in a group.
There are 3 times as many girls as there are boys.

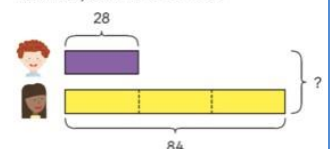
(a) How many girls are there?



$28 \times 3 = 84$

There are 84 girls.

(b) How many children are there?



$28 + 84 = 112$

There are 112 children altogether.

YEAR 3

DIVISION

Grouping: 'groups of'

Put 8  into groups of 4.



$$8 \div 4 = 2$$

2 plates are needed.

"I have made groups of 4.
There are 2 equal groups.
There are 4 in each group.
2 equal groups of 4 equals 8."

Grouping: 'equal groups'

Put 8  into 4 equal groups.



$$8 \div 2 = 4$$

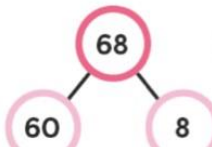
4 trays are needed.

"There are 4 equal groups.
There are 2 in each group.
4 equal groups of 2 equals 8."

Number bond strategy: Division

6 tens $\div 2$
= 3 tens

$$68 \div 2 = 34$$



6 tens $\div 2$

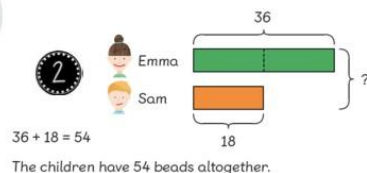
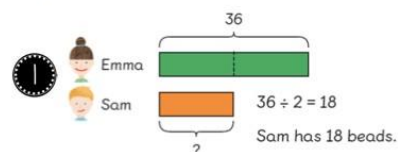
8 ones $\div 2$

8 ones $\div 2$
= 4 ones



Solving word problems: Bar model

How many beads do the children have altogether?



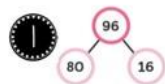
Make a family of multiplication and division facts:



$$6 \times 4 = 24 \quad \text{---} \quad 24 \div 6 = 4$$

$$4 \times 6 = 24 \quad \text{---} \quad 24 \div 4 = 6$$

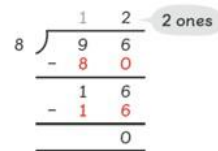
Number bond and long division:



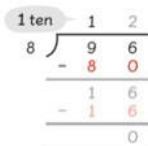
First, I take 80 from 96.
Then, I take 16 from the remaining 16.



16 ones $\div 8 = 2$ ones

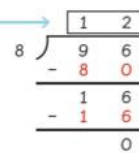


8 tens $\div 8 = 1$ ten



1 ten + 2 ones = 12

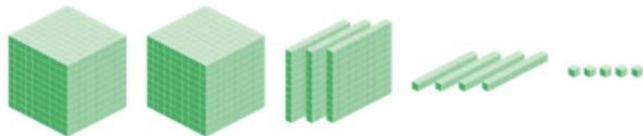
96 $\div 8 = 12$



YEAR 4

PLACE VALUE

Base ten or dienes blocks: Thousands/Hundreds/Tens/Ones



2 thousands + 3 hundreds + 4 tens + 5 ones

Value of digits:

2 thousands + 3 hundreds + 4 tens + 5 ones

thousands	hundreds	tens	ones
2	3	4	5

$2345 = 2 \text{ thousands} + 3 \text{ hundreds} + 4 \text{ tens} + 5 \text{ ones}$

$2427 = 2000 + 300 + 40 + 5$

The digit 2 stands for 2 thousand or 2000.

The digit 3 stands for 3 hundreds or 300.

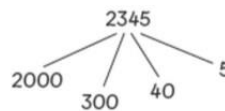
The digit 4 stands for 4 tens or 40.

The digit 5 stands for 5 ones or 5.

We write 2345 as two thousand, three hundred and forty-five.

Partitioning:

$$2345 = 2000 + 300 + 40 + 5$$



We write 2345 as two thousand, three hundred and forty-five.

2345 is a 4-digit number.



Place value cards:

2 thousands + 3 hundreds + 4 tens + 5 ones

2 0 0 0

3 0 0

4 0

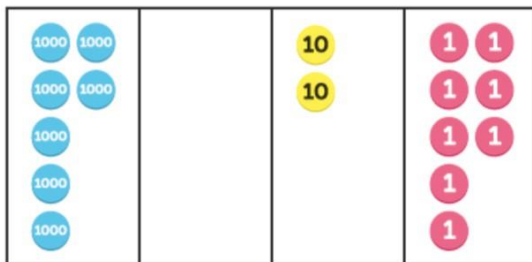
5



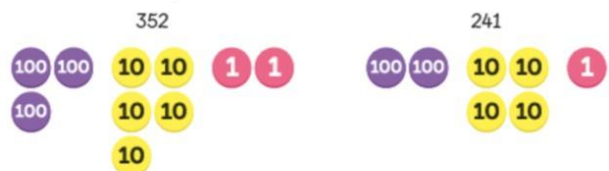
Separating the numbers like this is called **partitioning**.

Place value counters:

7 thousands + 0 hundreds + 2 tens + 8 ones = 7028



Comparing numbers:



352 is more than 241

352 is greater than 241

$$352 > 241$$

Number patterns:

What number is 1 more than 1485?

1 4 8 5



This digit changes because we add 1.

$$1485 + 1 = 1486$$

What number is 10 more than 1485?

1 4 8 5



This digit changes because we add 10.

$$1485 + 10 = 1495$$

What number is 100 less than 1485?

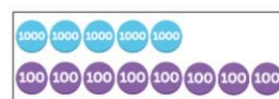
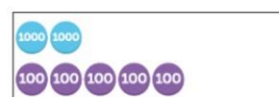
1 4 8 5



This digit changes because we subtract 100.

$$1485 - 100 = 1395$$

Comparing numbers:



thousands	hundreds	tens	ones
2	5	0	0

thousands	hundreds	tens	ones
5	8	0	0

2500 is less than 5800.
 $2500 < 5800$


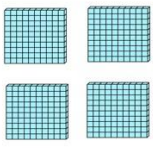

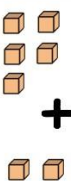


2500 is less than 5800

$$2500 < 5800$$







YEAR 4

ADDITION

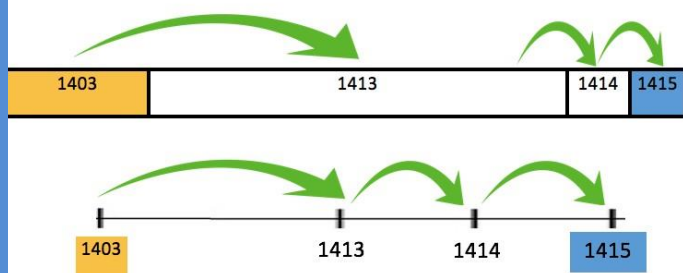
Base 10 method:

Thousands	Hundreds	Tens	Ones
			
		+	+
			

Counters method:

Thousands	Hundreds	Tens	Ones
			
		+	+
			

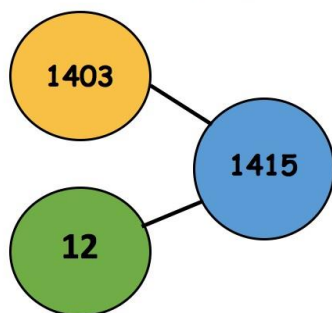
Number line method:



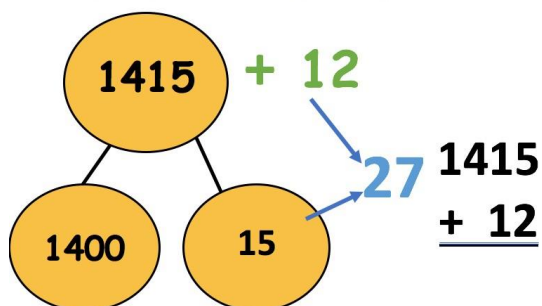
Abstract calculations:

Commutative	Inverse
$1415 + 12 = 1427$	$1427 - 12 = 1415$
$12 + 1415 = 1427$	$1427 - 1415 = 12$

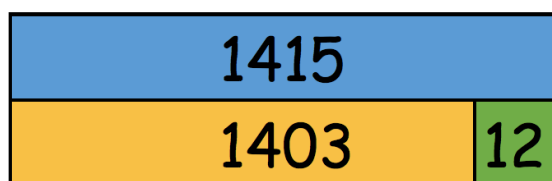
Number bond method:



Number bond method:



Bar model:



Column addition:

Without renaming:

$$\begin{array}{r} 1415 \\ + \quad 12 \\ \hline 1427 \end{array}$$

With renaming:

$$\begin{array}{r} 1 \quad 1 \\ 1415 \\ + \quad 96 \\ \hline 1511 \end{array}$$

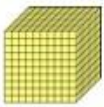
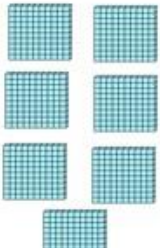
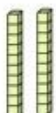
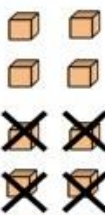
YEAR 4

SUBTRACTION

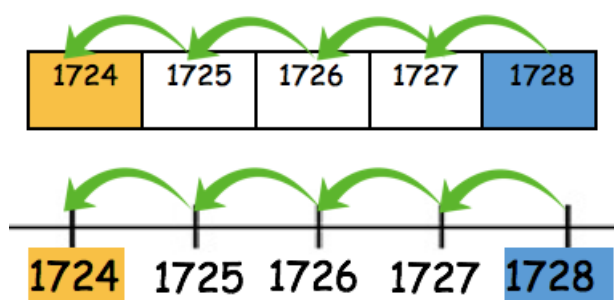
Counters method:

Thousands	Hundreds	Tens	Ones
1000	100 100 100 100 100 100	10 10	1 1 1 1 X X X X

Base 10 method:

Thousands	Hundreds	Tens	Ones
			

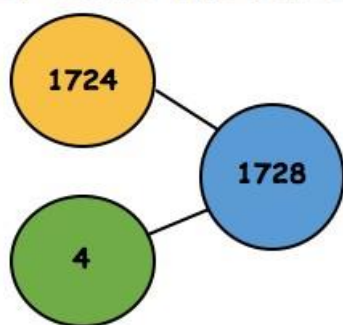
Number line method:



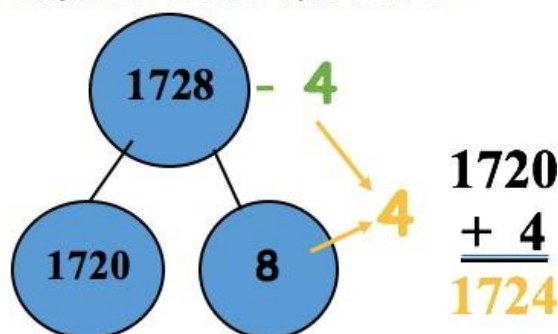
Abstract calculations:

Commutative	Inverse
$1728 - 4 = 1724$	$1724 + 4 = 1728$
$1728 - 1724 = 4$	$4 + 1724 = 1728$

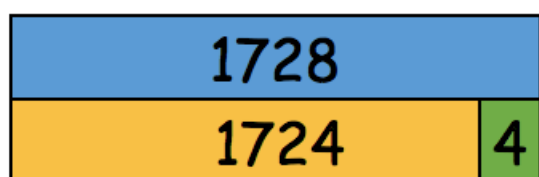
Number bond method:



Number bond method:



Bar model:



Column subtraction:

Without renaming:

$$\begin{array}{r} 1728 \\ - \quad 4 \\ \hline 1724 \end{array}$$

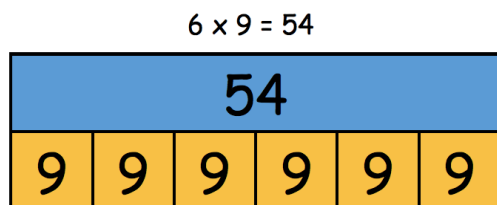
With renaming:

$$\begin{array}{r} 6 \quad 11 \quad 18 \\ 1 \quad 7 \quad 2 \quad 8 \\ - \quad 3 \quad 4 \quad 9 \\ \hline 3 \quad 7 \quad 9 \end{array}$$

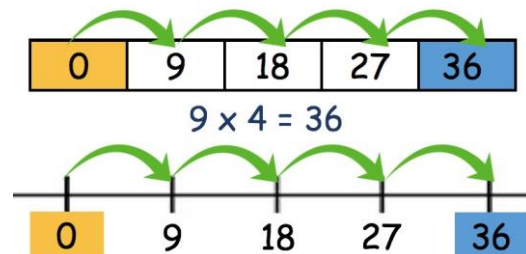
YEAR 4

MULTIPLICATION

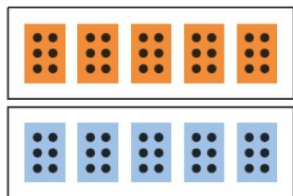
Bar model:



Number line method:

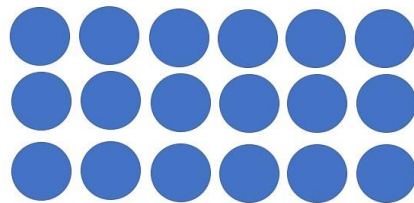


Multiply 3 numbers:



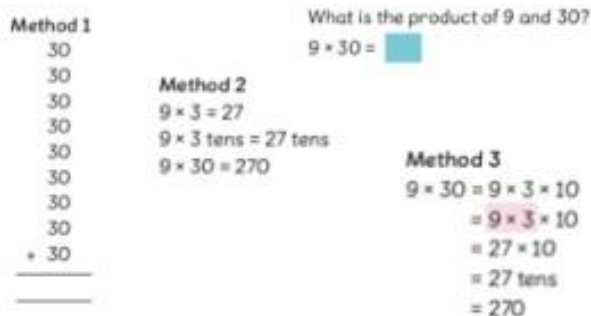
$$2 \times 5 \times 6 = 10 \times 6 = 60$$

Array method:

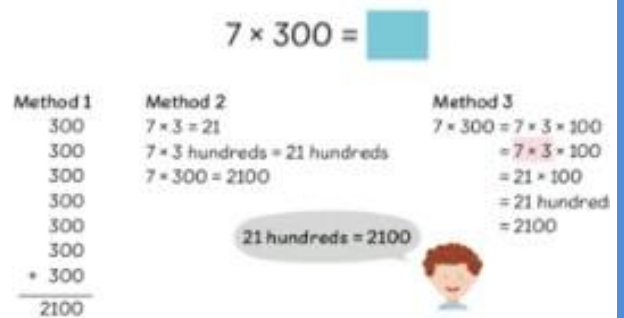


$$6 \times 3 = 18 \quad \text{OR} \quad 3 \times 6 = 18$$

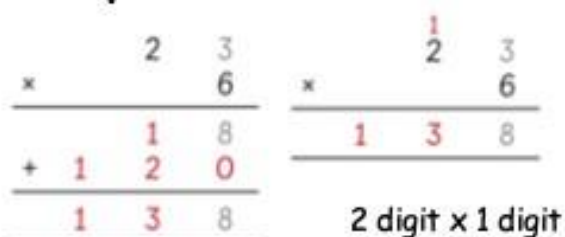
Multiplying by 10:



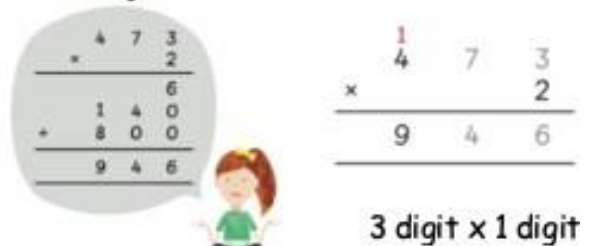
Multiplying by 100:



Bridged and short multiplication:



Bridged and short multiplication:

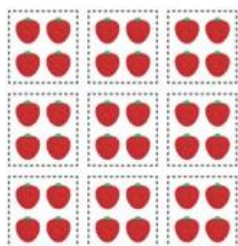


YEAR 4

DIVISION

Division by grouping:

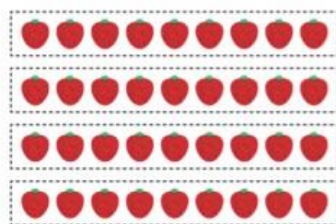
Placing into 9 equal groups



$$36 \div 9 = 4$$

Each group has 4 strawberries.

Placing in groups of 9

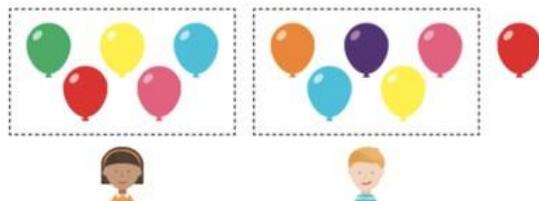


$$36 \div 9 = 4$$

There are 4 groups.

Grouping with remainders:

There were 11 balloons.



$$11 \div 2 = 5 \text{ remainder } 1$$

The quotient is 5 and the remainder is 1.
Each friend got 5 balloons.
There was 1 balloon left over.

Divide using multiplication:

$$24 \div 3 = \underline{8}$$

$$3 \times \underline{8} = 24$$

Dividing by 1, 10 and 100:

$$4 \div 4 = \square$$

$$4 \div 4 = 1$$

$$40 \div 4 = \square$$

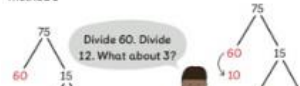
$$40 \div 4 = 10$$

$$400 \div 4 = \square$$

$$400 \div 4 = 100$$

Divide with remainders:

Method 1



Part-part-whole method

Number patterns:

What number is 1 more than 1485?

1 4 8 5



This digit changes because we add **1**.

$$1485 + 1 = 1486$$

What number is 10 more than 1485?

1 4 8 5



This digit changes because we add **10**.

$$1485 + 10 = 1495$$

What number is 100 less than 1485?

1 4 8 5



This digit changes because we subtract **100**.

$$1485 - 100 = 1385$$

Divide without remainders:

Method 1



Divide 400. Divide 8.

Part-part-whole method

Method 2

$$4 \overline{) 408}$$

$$4 \overline{) 408}$$

$$4 \overline{) 408}$$

Long division

4 hundreds \div 4 = 100

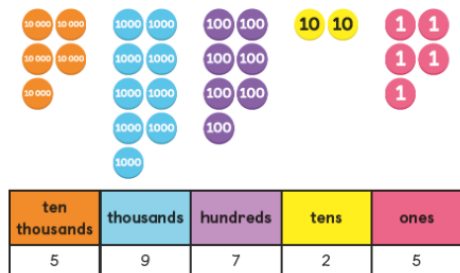
8 ones \div 4 = 2

YEAR 5

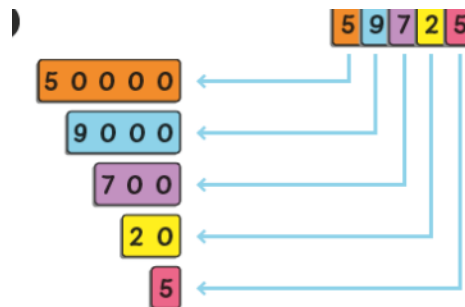
PLACE VALUE

Value of digits / place value counters.
place value charts

Show 59 725 using number discs.



Reading numbers - place value cards



The digit 5 is in the **ten thousands** place.
It stands for **50 thousands** or **50 000**.

The digit 9 is in the **thousands** place.
It stands for **9 thousands** or **9 000**.

The digit 7 is in the **hundreds** place.
It stands for **7 hundreds** or **700**.

The digit 2 is in the **tens** place.
It stands for **2 tens** or **20**.

$$59\,725 = 50\,000 + 9\,000 + 700 + 20 + 5$$

We read 59 725 as fifty-nine thousand, seven hundred and twenty-five.

Reading numbers -
place value charts

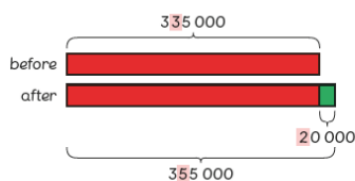
hundred thousands	ten thousands	thousands	hundreds	tens	ones
1	1 1		1	1	



One hundred and twenty thousand, one hundred and ten

120 110

Comparing Numbers



20 000 is
2 ten thousands.



The digit in the ten thousands place increases by 2.

Who made a smaller number?

8 9 7 5 2 0

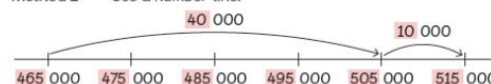
8 9 5 1 0 3

Is greater than
Is less than

8 9 7 or 8 9 5
or ?

Comparing Numbers

Method 2 Use a number line.



50 000
40 000 10 000



Number Patterns

25 160, 65 160, 105 160, 145 160, ...

What is the next number in this number pattern?

Each number is 4 ten thousands more than the number before it.

Add 40 thousand to get the next number.

Look at the ten thousands.

2 4
6 4
10 4
14 4

Look at the thousands.

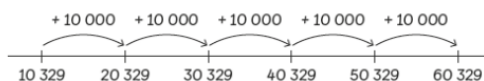
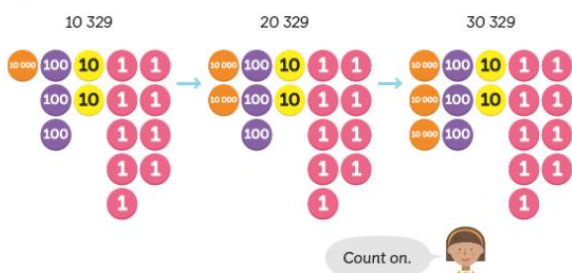
25 40
65 40
105 40
145 40

YEAR 5

ADDITION

Count on to add

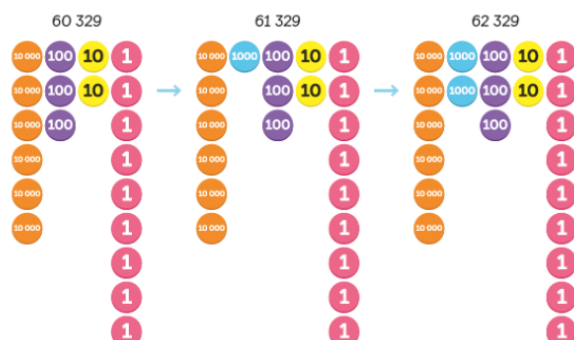
1 $10\ 329 + 50\ 000 =$



10 329, 20 329, 30 329, 40 329, 50 329, 60 329



$60\ 329 + 2000 =$



Mental Calculation

$150\ 000 + 150\ 000 = 300\ 000$



I round each amount to the nearest 10 000.



$$\begin{array}{r} 50\ 000 \\ + 50\ 000 \\ \hline 100\ 000 \end{array}$$



$$\begin{array}{r} 40\ 000 \\ 40\ 000 \\ + 40\ 000 \\ \hline 120\ 000 \end{array}$$

Find the total cost of a two-night stay at the hotel and a ticket for a domestic return flight.

$240\ 000 + 140\ 000 =$

$$\begin{array}{r} 240\ 000 \\ + 140\ 000 \\ \hline \end{array}$$

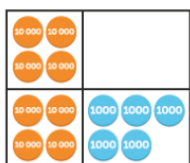
Column Method



$240 + 140 =$

Place value counters

Taxi fare for 14th September:



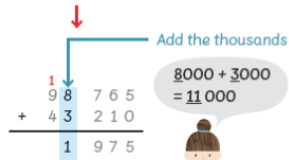
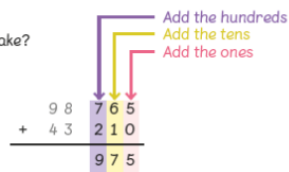
$40\ 000 + 45\ 000 =$

$$\begin{array}{r} 40\ 000 \\ + 45\ 000 \\ \hline 85\ 000 \end{array}$$



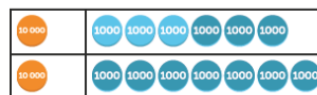
makes 9 8 7 6 5.

Is this the largest total we can make?

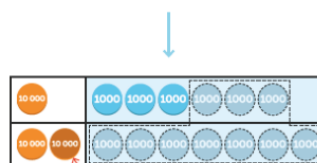


Addition with renaming

$16\ 000 + 17\ 000 =$



$$\begin{array}{r} 16\ 000 \\ + 17\ 000 \\ \hline \end{array}$$



$$\begin{array}{r} 16\ 000 \\ + 17\ 000 \\ \hline 3\ 000 \end{array}$$

$$\begin{array}{r} 16\ 000 \\ + 17\ 000 \\ \hline 33\ 000 \end{array}$$

YEAR 5

SUBTRACTION

$$\begin{array}{r} 47\ 720 \\ 30\ 000\ 17\ 000\ 726 \end{array}$$

$$\begin{array}{r} 3\ 17\ 726 \\ - 28\ 723 \\ \hline 19\ 003 \end{array}$$

Count back

Subtraction using partitioning

2 The number is 546 203.
Count back by 10 000s.



546 203, 536 203, 526 203, 516 203

$$546\ 203 - 30\ 000 =$$

Method 1

$$\begin{array}{r} 600 \\ 400 \\ - 345 \\ \hline 55 \end{array}$$

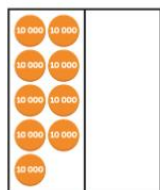
$$600 - 345 = 200 + 55$$

Method 2

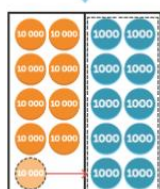
$$\begin{array}{r} 600 \\ 500\ 90\ 10 \\ - 300\ -40\ -5 \\ \hline 200\ 50\ 5 \end{array}$$

$$600 - 345 = 200 + 50 + 5$$

Subtraction with renaming



There are not enough 1000s to subtract 4000.

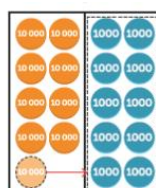


Rename 90 000.

$$\begin{array}{r} 90\ 000 \\ 80\ 000\ 10\ 000 \end{array}$$

Subtract.

$$\begin{array}{r} 8\ 10\ 000 \\ - 54\ 000 \\ \hline \end{array}$$



Rename 90 000.

$$\begin{array}{r} 90\ 000 \\ 80\ 000\ 10\ 000 \end{array}$$

Subtract.

$$\begin{array}{r} 8\ 10\ 000 \\ - 54\ 000 \\ \hline 36\ 000 \end{array}$$

Column subtraction

$$80\ 123 - 79\ 654 =$$

$$\begin{array}{r} 80\ 123 \\ - 79\ 654 \\ \hline \end{array}$$

$$\begin{array}{r} 79\ 11\ 23 \\ - 79\ 654 \\ \hline \end{array}$$

$$\begin{array}{r} 79\ 10\ 12\ 3 \\ - 79\ 654 \\ \hline \end{array}$$

$$\begin{array}{r} 79\ 10\ 11\ 13 \\ - 79\ 654 \\ \hline 469 \end{array}$$

Take 1 thousand from 80 thousands to make 11 hundreds.

Take 1 hundred from 11 hundreds to make 12 tens.

Take 1 ten from 12 tens to make 13 ones.

$$53\ 279 - 29\ 035 =$$

$$\begin{array}{r} 53\ 000 \\ - 29\ 000 \\ \hline \end{array}$$

$$\begin{array}{r} 279 \\ - 35 \\ \hline \end{array}$$

$$\begin{array}{r} 53\ 279 \\ - 29\ 035 \\ \hline \end{array}$$

This is easy.

This needs a bit of thinking.



$$\begin{array}{r} 4\ 13\ 279 \\ - 29\ 035 \\ \hline 24\ 244 \end{array}$$

$$\begin{array}{r} 279 \\ - 35 \\ \hline 244 \end{array}$$

$$\begin{array}{r} 4\ 13\ 279 \\ - 29\ 035 \\ \hline 24\ 244 \end{array}$$

$$53\ 279 - 29\ 035 = 24\ 244$$

Check by estimating.
50 000 - 30 000 = 20 000

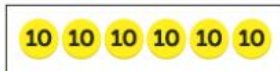
YEAR 5

MULTIPLICATION

Multiplying by 10 100 and 1000

Using Place value counters

1 $6 \times 10 =$



$$6 \times 10 = 6 \times 1 \text{ ten} \\ = 6 \text{ tens}$$

60



3 $6 \times 1000 =$



$$6 \times 1000 = 6 \times 1 \text{ thousand} \\ = 6 \text{ thousands}$$

6000



2 $6 \times 100 =$



$$6 \times 100 = 6 \times 1 \text{ hundred} \\ = 6 \text{ hundreds}$$

600



Multiply 3 digit by 1 digit and 4 digit by 1 digit

$3 \times \text{£}118 =$

This shows 118.



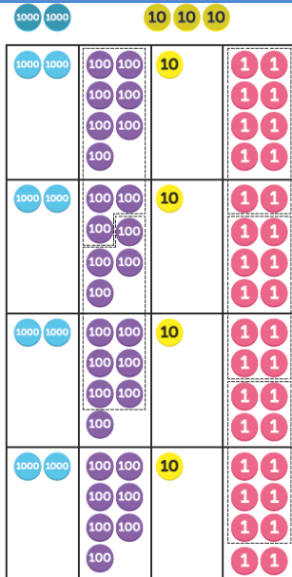
$$\begin{array}{r} 3 \times 8 = 24 \\ 3 \times 10 = 30 \\ 3 \times 100 = 300 \\ \hline 3 \times 118 = 354 \end{array}$$

$$\begin{array}{r} 118 \\ \times 3 \\ \hline 24 \rightarrow \text{multiply by ones} \\ 30 \rightarrow \text{multiply by tens} \\ + 300 \rightarrow \text{multiply by hundreds} \\ \hline 354 \end{array}$$

Three sets of 8 boxes cost £354.

3 $2718 \times 4 =$

$$\begin{array}{r} 2718 \\ \times 4 \\ \hline 1152 \\ 1792 \\ \hline 10872 \end{array}$$



1 $2718 \times 4 =$

$$\begin{array}{l} 2000 \times 4 = 8000 \\ 700 \times 4 = 2800 \\ 10 \times 4 = 40 \\ 8 \times 4 = 32 \\ \hline 2718 \times 4 = 10872 \end{array}$$



2 $2718 \times 4 =$

$$\begin{array}{r} 2718 \\ \times 4 \\ \hline 1152 \\ 1792 \\ \hline 10872 \end{array}$$

Estimate.
3 thousand $\times 4 = 12$ thousand



$2718 \times 4 = 10872$

Using partitioning

$1022 \times 4 =$

4

$1000 \times 4 = 4000$

$20 \times 4 = 80$

$2 \times 4 = 8$

$1022 \times 4 = 4088$

$$\begin{array}{r} 1022 \\ \times 4 \\ \hline 8 \\ 80 \\ 0 \\ + 4000 \\ \hline 4088 \end{array}$$

8 \rightarrow multiply by ones

80 \rightarrow multiply by tens

0 \rightarrow multiply by hundreds

+ 4000 \rightarrow multiply by thousands

Using PV counters for 2digit by 2 digit

1 $14 \times 12 =$



14×10
 $= 14 \times 1 \text{ ten}$
 $= 14 \text{ tens}$

140



$14 \times 2 = 28$

$14 \times 10 = 140$

$14 \times 2 = 28$

$14 \times 12 = 168$

$14 \times 12 = 168$

2 $14 \times 22 =$



14×20
 $= 14 \times 2 \text{ tens}$
 $= 28 \text{ tens}$

280



$14 \times 2 = 28$

$14 \times 20 = 280$

$14 \times 2 = 28$

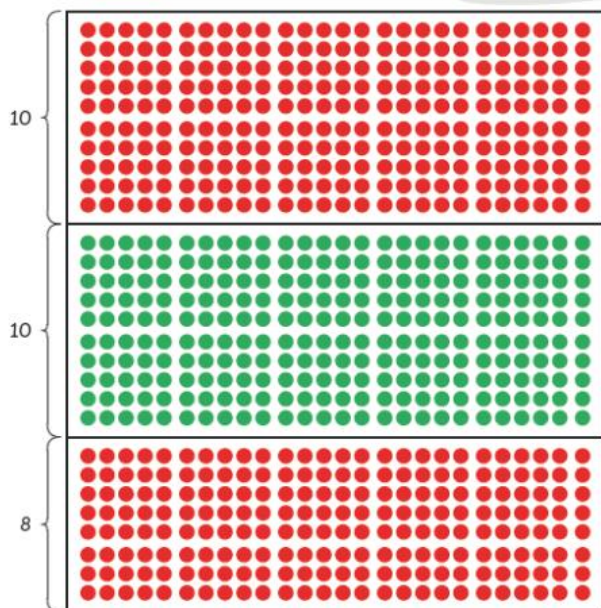
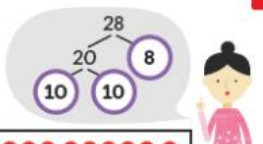
$14 \times 22 = 308$

$14 \times 22 = 308$

Partitioning 2d by 2d (grid method)

- 2 There are 28 rows.
Each row consists of 26 seats.

$$28 \times 26 = \boxed{}$$



$$10 \times 26 = 260$$

$$10 \times 26 = 260$$

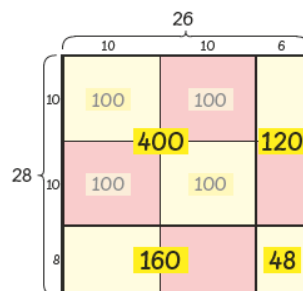
$$8 \times 26 = 208$$

$$28 \times 26 = 728$$

There are 728 seats.

$$\begin{array}{r} 26 \\ \times 28 \\ \hline 208 \\ 520 \\ \hline 728 \end{array}$$

- 1 There are 28 rows.
Each row consists of 26 seats.



There are 728 seats.

$$\begin{aligned} 28 \times 26 &= 400 + 160 + 120 + 48 \\ &= 728 \end{aligned}$$



3 $28 \times 26 = \boxed{}$

$$20 \times 26 = 520$$

$$8 \times 26 = 208$$

$$\underline{\underline{28 \times 26 = 728}}$$

$$\begin{aligned} 26 \times 2 &= 52 \\ \text{So, } 26 \times 20 &= 520 \end{aligned}$$

$$\begin{aligned} 26 \times 2 &= 52 \\ 26 \times 4 &= 104 \\ 26 \times 8 &= 208 \end{aligned}$$



Formal written method 2d by 2d

4 $28 \times 26 =$



$$\begin{array}{r} 4 \\ 28 \\ \times 26 \\ \hline 8 \end{array} \quad \rightarrow \quad \begin{array}{r} 4 \\ 28 \\ \times 26 \\ \hline 168 \end{array}$$

$$\begin{array}{r} 1 \\ 28 \\ \times 26 \\ \hline 168 \\ 56 \\ \hline \end{array} \quad \rightarrow \quad \begin{array}{r} 1 \\ 28 \\ \times 26 \\ \hline 168 \\ 56 \\ \hline \end{array}$$

$$\begin{array}{r} 1 \\ 4 \\ 28 \\ \times 26 \\ \hline 168 \rightarrow 28 \times 6 \\ + 56 \rightarrow 28 \times 20 \\ \hline 728 \end{array}$$

Using known facts

5 $28 \times 26 =$



I can also do it this way.

$$30 \times 26 = 260 + 260 + 260$$

$$30 \times 26 = 780$$

$$28 \times 26 = 780 -$$

Can you continue her method?

6 $28 \times 26 =$



I can also do it another way.

$$28 \times 25 = 700$$

$$28 \times 26 =$$

25	25	25	25
25	25	25	25
25	25	25	25
25	25	25	25
25	25	25	25
25	25	25	25
25	25	25	25

28 of 25 = 700

Can you continue his method?

Partitioning 3d by 2d

$12 \times 132 =$



2 times	200	60	4	264
10 times	1000	300	20	1320

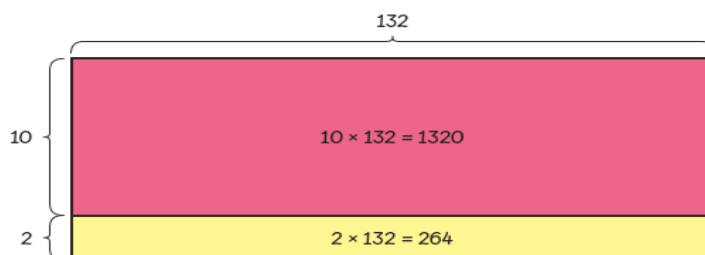
$$12 \times 132 = 1320 + 264$$

$$= 1584$$

It costs about 1584 Hong Kong dollars.

Grid method 3d by 2d

$12 \times 132 =$



$$12 \times 132 = 1320 + 264$$

$$= 1584$$

Formal written method

3 $12 \times 132 =$


$$\begin{array}{r} 132 \\ \times 12 \\ \hline 264 \rightarrow \text{multiply by 2} \\ + 1320 \rightarrow \text{multiply by 10} \\ \hline 1584 \end{array}$$

YEAR 5

Division

Dividing by 10, 100 and 1000

Partitioning

How many  can we get from 4792?

 contains 1000 pieces.



How many
1000s in 4000?

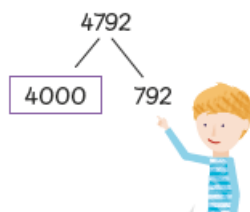
There are 4  in 4000.

$$4000 \div 1000 = 4$$

$$4 \text{ thousands} \div 1 \text{ thousand} = 4$$



There are 4 groups
of 1000 in 4000.



Here is the
remainder.

2 How many  can we get from 4792?

 contains 100 pieces.



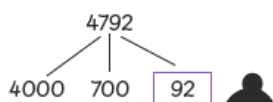
How many
100s in 4700?

$$4700 \div 100 = 47$$

$$47 \text{ hundreds} \div 1 \text{ hundred} = 47$$



There are 47 groups
of 100 in 4700.



Here's the
remainder.

3 How many  can we get from 4792?

 contains 10 pieces.



How many
10s in 4790?

$$4790 \div 10 = 479$$

$$479 \text{ tens} \div 1 \text{ ten} = 479$$

There are 479 groups
of 10 in 4790.



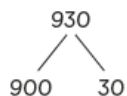
Here's the
remainder.



Dividing 3 digit and 4 digit by 1 digit

Using place value counters to partition

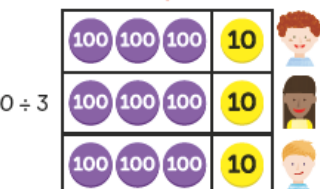
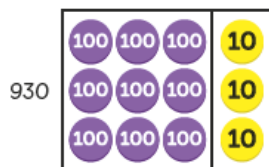
$$930 \div 3 = \boxed{}$$



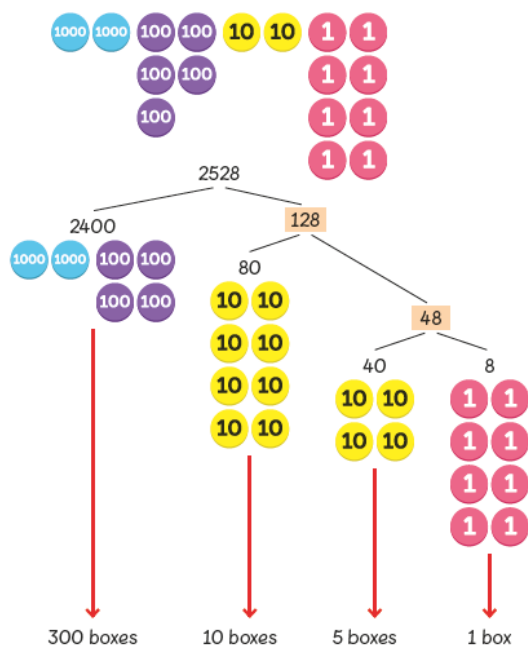
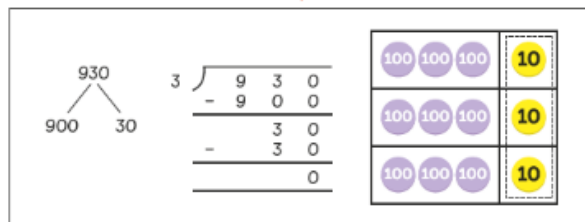
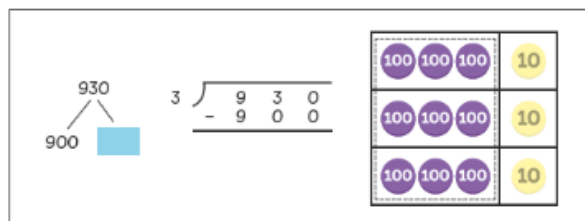
$$30 \div 3 = 10$$

$$900 \div 3 = 300$$

$$930 \div 3 = 310$$



$$2 \quad 930 \div 3 = \boxed{}$$

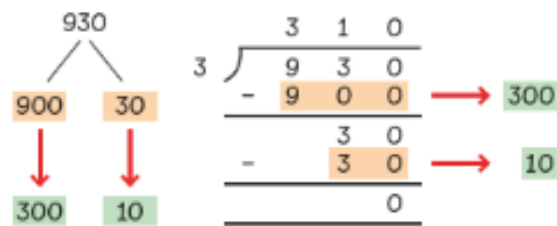


$$2528 \div 8 = 300 + 10 + 5 + 1$$

$$= 316$$

316 boxes are needed.

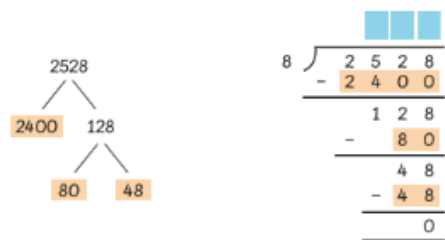
Abstract written methods



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 =



80 ÷ 8 =

48 ÷ 8 =

2400 ÷ 8 =

Dividing with remainder

Using PV counters

1 376 ÷ 5 =

5 $\overline{) 376}$

This refers to 26.

She moved 20 to the 6 to make 26.

She could write 37 tens → 35 tens, 6 → 26.

376 = 370 + 6
= 350 + 26

dividing 35 tens by 5
dividing 26 ones by 5

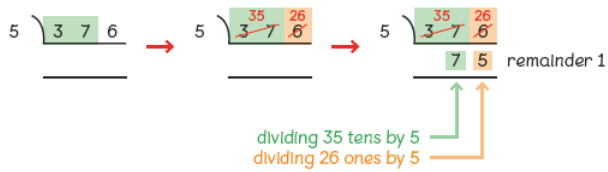
remainder 1

376 ÷ 5 = 75 remainder 1

What should we do with the remainder 1?

With written methods

2 $376 \div 5 =$



My father did not write down $37 \rightarrow 35$. He did it mentally.

$$\begin{array}{r} 5 \overline{) 376} \\ \underline{75} \\ 1 \end{array}$$

- 3 376 children in a school are put into 5 equal groups.
Is this possible?

$$376 \div 5 = 75 \text{ remainder } 1$$

It is not possible.

There will always be one child left over, who does not belong to any group.

As a fraction

- 4 376 ml of liquid soap is poured into 5 bottles.
Each bottle contains the same amount of soap.
Find the volume of soap in each bottle.

$$376 \text{ ml} \div 5 = 75 \frac{1}{5} \text{ ml}$$

$$\begin{array}{r} 5 \overline{) 376} \\ \underline{350} \\ 26 \\ \underline{25} \\ 1 \end{array}$$



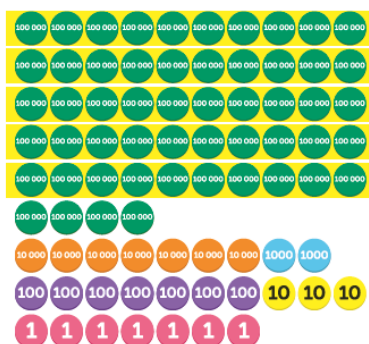
$$1 \text{ ml} \div 5 = \frac{1}{5} \text{ ml}$$

YEAR 6

Place Value

With counters and PV cards

1 Show 5 472 737 using number discs.

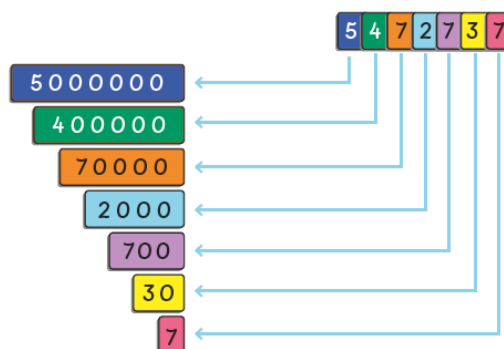


Ten 100 000 make 1 million.

2 Show 5 472 737 on a place-value chart.

millions	hundred thousands	ten thousands	thousands	hundreds	tens	ones
5	4	7	2	7	3	7

3 $5\,472\,737 = \square + \square + \square + \square + \square + \square + \square$



Using vocabulary

The digit **5** is in the **millions** place.
It stands for **5 millions** or **5 000 000**.

The digit **4** is in the **hundred thousands** place.
It stands for **4 hundred thousands** or **400 000**.

The digit **7** appears more than once.
7 is in the **ten thousands** place.
It stands for **70 000**.

7 is also in the **hundreds** place.
It stands for **700**.

7 is also in the **ones** place.
It stands for **7**.

The digit **2** is in the **thousands** place.
It stands for **2000**.

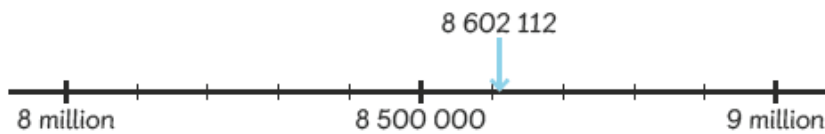
The digit **3** is in the **tens** place.
It stands for **30**.

$$5\,472\,737 = 5\,000\,000 + 400\,000 + 70\,000 + 2000 + 700 + 30 + 7$$

We write 5 472 737 as five million, four hundred and seventy-two thousand, seven hundred and thirty-seven.

Rounding using numberlines

- 2 Round 8 602 112 to the nearest million.



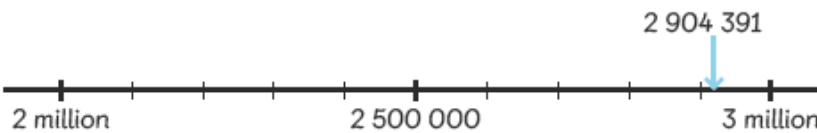
8 602 112 is closer to 9 million than to 8 million.

$8\,602\,112 \approx 9 \text{ million}$

- 3 Round 2 904 391...



... to the nearest million.

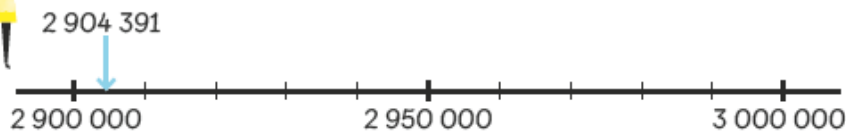


2 904 391 is closer to 3 million than to 2 million.

$2\,904\,391 \approx 3 \text{ million}$



... to the nearest 100 000.



2 904 391 is closer to 2 900 000 than to 3 000 000.

$2\,904\,391 \approx 2\,900\,000$ (to the nearest 100 000)

YEAR 6

Mixed Operations

2

$1 + 2 + 3$

7×7

This expression describes the method.



$$7 \times 7 - 4 \times (1 + 2 + 3) = \boxed{}$$

Step 1: Perform the calculation in ().

Step 2: Multiply.

Step 3: Subtract.

$$\begin{aligned} 1 + 2 + 3 &= 6 \\ 7 \times 7 &= 49 \\ 4 \times 6 &= 24 \\ 49 - 24 &= 25 \end{aligned}$$



Are there other ways to express the number of ● in the diagram? Write expressions to describe these ways.

1 wrote this expression:

$$6 + 5 - 1 - 2 - 3 - 4$$

$$6 + 5 - 1 - 2 - 3 - 4 = 1$$

When there are only + and -, calculate from left to right.



$$6 + 5 = 11$$



2 wrote this expression:

$$3 \times 4 + 2 - (6 + 5 + 1)$$

$$\begin{aligned} 3 \times 4 + 2 - (6 + 5 + 1) \\ &= 3 \times 4 + 2 - 12 \\ &= 12 + 2 - 12 \\ &= 14 - 12 \\ &= 2 \end{aligned}$$

Perform the calculations in () first.



For + and -, calculate from left to right.

Multiply before adding.

$$3 \times 4 + 2 - (6 + 5 + 1) = 2$$



3 wrote this expression:

$$2 \times 3 \times 6 \div 4 - 5 - 1$$

For \times and \div , calculate from left to right.



$$\begin{aligned} 2 \times 3 \times 6 \div 4 - 5 - 1 \\ &= 6 \times 6 \div 4 - 5 - 1 \\ &= 36 \div 4 - 5 - 1 \\ &= 9 - 5 - 1 \\ &= 3 \end{aligned}$$

Subtract from left to right.



$$2 \times 3 \times 6 \div 4 - 5 - 1 = 3$$

Can you make an expression that has the value of 4? How about the values of 5 or 6?



4 made a different expression that has the value of 3.

$$(1 + 2) \div 3 \times 4 + 5 - 6$$

Step 1: Perform the calculation in the brackets first.

Step 2: Multiply or divide whichever comes first.

Step 3: Add or subtract whichever comes first.

$$(1 + 2) \div 3 \times 4 + 5 - 6 = 3$$

$$\begin{aligned} 1 + 2 &= 3 \\ 3 \div 3 &= 1 \\ 1 \times 4 &= 4 \\ 4 + 5 &= 9 \\ 9 - 6 &= 3 \end{aligned}$$



YEAR 6

Multiplication

Multiplying by multiples of 10

Using counters

1 $414 \times 10 =$

100 100 100 100 becomes 1000 1000 1000 1000

10 becomes 100

1 1 1 1 becomes 10 10 10 10

$$414 \times 10 = 4000 + 100 + 40 = 4140$$



414 tens = 4140

Using informal jottings

2 $414 \times 20 =$

Method 1

$$414 \times 10 = 4140$$

$$414 \times 20 = 4140 + 4140 = 8280$$

Method 2

$$414 \times 20 = 414 \times 2 \times 10 = 828 \times 10 = 8280$$

3 $1414 \times 20 =$

Method 1

$$1414 \times 20 = 20\,000 + 8280 = 28\,280$$

Method 2

$$1414 \times 10 = 14\,140$$

$$1414 \times 20 = 14\,140 \times 2 = 28\,280$$

Method 3

$$1414 \times 20 = 1414 \times 2 \times 10 = 2828 \times 10 = 28\,280$$

$414 \times 20 = 8280$

$1000 \times 20 =$



Building to written methods

Using counters

1 $20 \times 113 =$

100 $\times 10 \rightarrow$ 1000

10 $\times 10 \rightarrow$ 100

1 1 1 $\times 10 \rightarrow$ 10 10 10

$$10 \times 113 = 1130$$

$$20 \times 113 = 2260$$

$10 \times 113 = 1130$



using partitioning

2 $23 \times 113 =$

$$20 \times 113 = 2260$$

$$3 \times 113 = 339$$

$$23 \times 113 = 2599$$

23 boxes contain 2599 apples.

$20 \times 113 =$

$3 \times 113 =$



3 $23 \times 113 =$

1 1 3	1 1 3	1 1 3	1 1 3
$\times 20$	$\times 3$	$\times 23$	$\times 23$
2 2 6 0	3 3 9	2 2 6 0	3 3 9
+	+	+	+
2 2 6 0	3 3 9	2 2 6 0	3 3 9
2 5 9 9	2 5 9 9	2 5 9 9	2 5 9 9

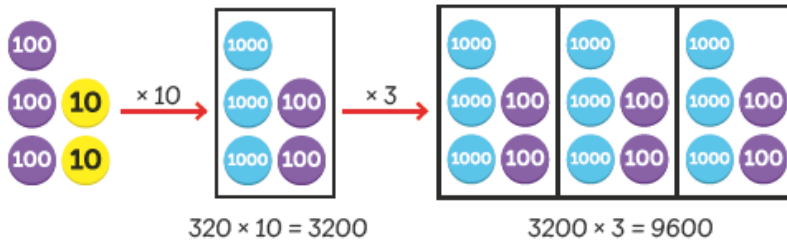
23 boxes contain 2599 apples.

There are enough apples in 23 boxes.

Estimate 23×113 by calculating 23×100 .



1 $320 \times 31 =$

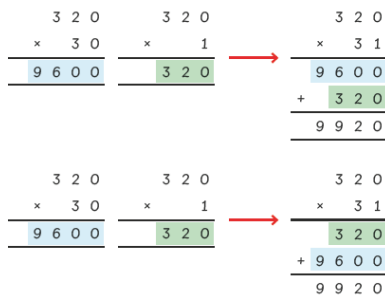


$$320 \times 30 = 9600$$

$$320 \times 1 = 320$$

$$\hline 320 \times 31 = 9920$$

2 $320 \times 31 =$



3 $320 \times 31 =$

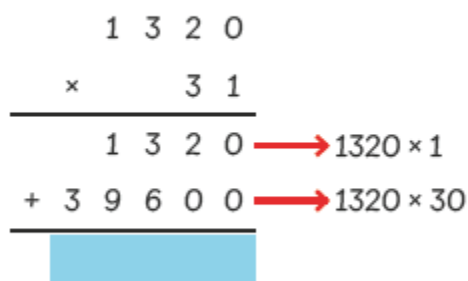
$$\begin{array}{r} 300 \times 31 = 9300 \\ 20 \times 31 = 620 \\ \hline 320 \times 31 = 9920 \end{array}$$



Estimate 320×31 by calculating 300×30 .

Formal written method

5 $1320 \times 31 =$



$$\begin{array}{l} 1320 \times 1 = 1320 \\ 1320 \times 10 = 13200 \\ 1320 \times 30 = 39600 \end{array}$$



Using known facts

1 $114 \times 12 =$ $114 \times 24 =$



$$\begin{array}{r} 114 \times 10 = 1140 \\ 114 \times 2 = 228 \\ \hline 114 \times 12 = 1368 \end{array}$$

$$\begin{array}{r} 114 \times 20 = 2280 \\ 114 \times 4 = 456 \\ \hline 114 \times 24 = 2736 \end{array}$$

	1	
1	1	4
×		4
		6



I can also use 114×12 to find 114×24 .

2 $114 \times 24 =$



$$\begin{array}{r} 100 \times 24 = 2400 \\ 10 \times 24 = 240 \\ 4 \times 24 = 96 \\ \hline 114 \times 24 = 2736 \end{array}$$

$$\begin{array}{l} 2 \times 24 = 48 \\ 4 \times 24 = 96 \end{array}$$

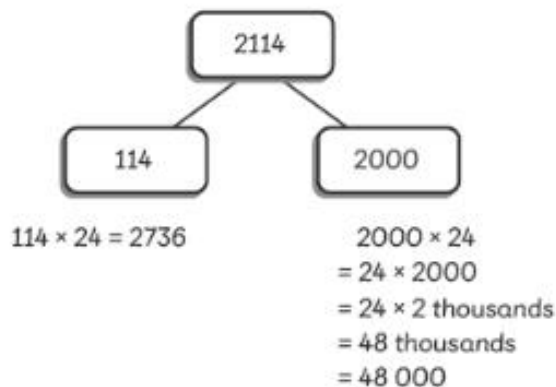


3 $114 \times 24 =$

$\begin{array}{r} 114 \\ \times 20 \\ \hline 2280 \end{array}$	$\begin{array}{r} 114 \\ \times 4 \\ \hline 456 \end{array}$	→	$\begin{array}{r} 114 \\ \times 24 \\ \hline 2280 \\ + 456 \\ \hline 2736 \end{array}$
			$\xrightarrow{114 \times 20}$ $\xrightarrow{114 \times 4}$

$\begin{array}{r} 114 \\ \times 20 \\ \hline 2280 \end{array}$	$\begin{array}{r} 114 \\ \times 4 \\ \hline 456 \end{array}$	→	$\begin{array}{r} 114 \\ \times 24 \\ \hline 456 \\ + 2280 \\ \hline 2736 \end{array}$
			$\xrightarrow{114 \times 4}$ $\xrightarrow{114 \times 20}$

4 Given that $114 \times 24 = 2736$, find the value of 2114×24 .



$$2114 \times 24 = 48\,000 + 2736 = 50\,736$$

Estimate by calculating 2000×24 .



Estimating

3

$$24 \times 568 = \boxed{}$$



$$\begin{array}{r} 24 \\ \times 568 \\ \hline 2272 \end{array}$$



$$\begin{array}{r} 11 \\ 23 \\ \times 568 \\ \hline 2272 \\ 11360 \end{array}$$



$$\begin{array}{r} 11 \\ 23 \\ \times 568 \\ \hline 2272 \\ 11360 \\ + 11360 \\ \hline 13632 \end{array}$$

$$\begin{array}{r} 568 \\ \times 4 \\ \hline \end{array}$$

$$\begin{array}{r} 568 \\ \times 20 \\ \hline \end{array}$$



$$24 \times 568 = 13\,632$$



$$\text{Estimate } 20 \times 600 = \boxed{}$$

Add the products.

4

$$24 \times 2568 = \boxed{}$$



$$\begin{array}{r} 223 \\ 2568 \\ \times 24 \\ \hline 10272 \end{array}$$



$$\begin{array}{r} 111 \\ 223 \\ \times 2568 \\ \hline 10272 \\ 51360 \end{array}$$



$$\begin{array}{r} 111 \\ 223 \\ \times 2568 \\ \hline 10272 \\ 51360 \\ + 51360 \\ \hline 61632 \end{array}$$

$$2568 \times 4$$

$$2568 \times 20$$

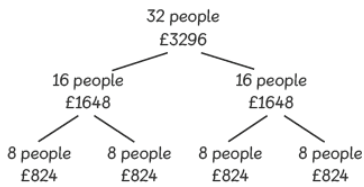
$$24 \times 2568 = 61\,632$$



$$\text{Estimate } 20 \times 3000 = \boxed{}$$

Add the products.

2 $3296 \div 32 =$



$3296 \div 32 = 1648 \div 16$
 $= 824 \div 8$

$$\begin{array}{r}
 103 \\
 8 \overline{) 824} \\
 \underline{- 800} \\
 24 \\
 \underline{- 24} \\
 0
 \end{array}$$

$800 \div 8 = 100$
 $24 \div 8 = 3$



We can calculate $824 \div 8$ to find the value of $3296 \div 32$.

12 tens 12 tens 12 tens

$360 \div 12 = 30$

$10 + 10 + 10$

Using known facts

2 $360 \div 12 =$

$360 = 36 \text{ tens}$

$$\begin{array}{r}
 30 \\
 12 \overline{) 360} \\
 \underline{- 36} \\
 0
 \end{array}$$

$360 = 36 \text{ tens}$

3 tens

$$\begin{array}{r}
 30 \\
 12 \overline{) 360} \\
 \underline{- 36} \\
 0
 \end{array}$$



3 tens

Share equally by 12.



$36 \text{ tens} \div 12 = 3 \text{ tens}$
 $360 \div 12 = 30$

3 $36 \div 12 =$



36 shared equally by 12

$360 \div 12 =$



36 tens shared equally by 12

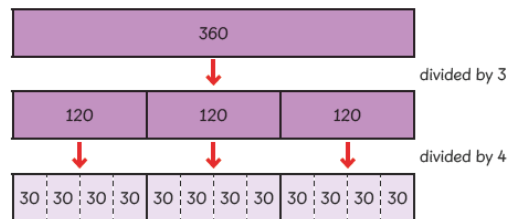
$3600 \div 12 =$



36 hundreds shared equally by 12

Using bar models

4 $360 \div 12 =$



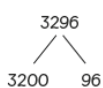
$\div 12$



$\div 3 \div 4$

Using Partitioning

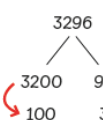
1 $3296 \div 32 =$



$$\begin{array}{r}
 103 \\
 32 \overline{) 3296} \\
 \underline{- 3200} \\
 96 \\
 \underline{- 96} \\
 0
 \end{array}$$



It is possible to share £3296 equally among 32 people. Each would receive £103.

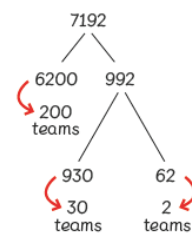
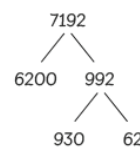


$$\begin{array}{r}
 103 \\
 32 \overline{) 3296} \\
 \underline{- 3200} \\
 96 \\
 \underline{- 96} \\
 0
 \end{array}$$

$3200 \div 32 = 100$

$96 \div 32 = 3$

2 $7192 \div 31 =$

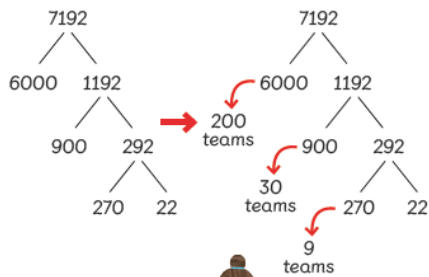


We can put 7192 participants into 232 teams of 31.

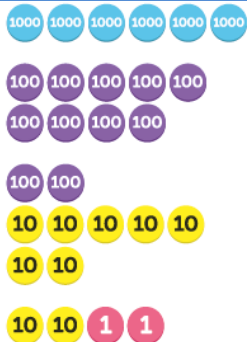


$7192 \div 31 = 232$

1 $7192 \div 30 =$

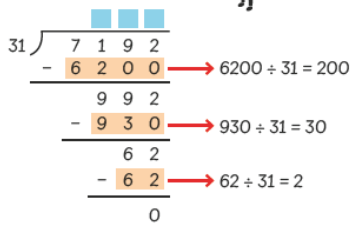
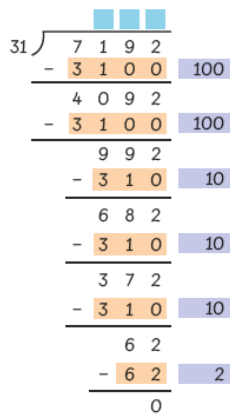


Teams of 30 won't work.

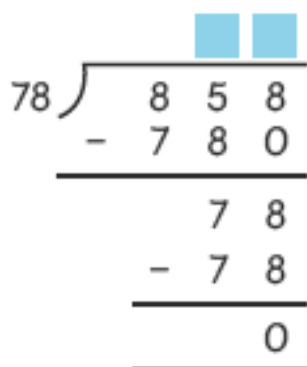


Using grouping

3 $7192 \div 31 =$



Formal written method



Recording with remainders

As a number

Each tray contains 108 apricots.

$$4 \times 108 = 432$$

$$500 - 432 = 68$$

$$500 \div 108 = 4 \text{ remainder } 68$$

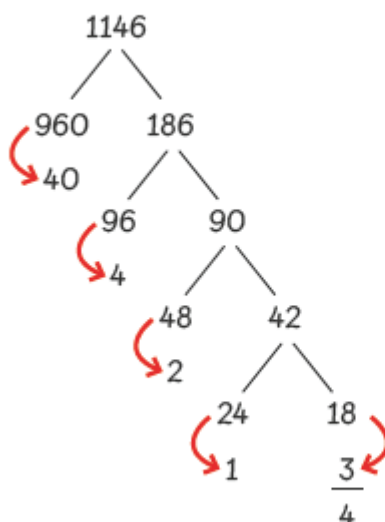
4 trays are needed to pack 500 apricots.

There are 68 apricots left over.

As fractions and decimals

1

$$£1146 \div 24 =$$



$$18 \div 24 = \frac{18}{24} = \frac{3}{4}$$



$$£1146 \div 24 = £47.75$$