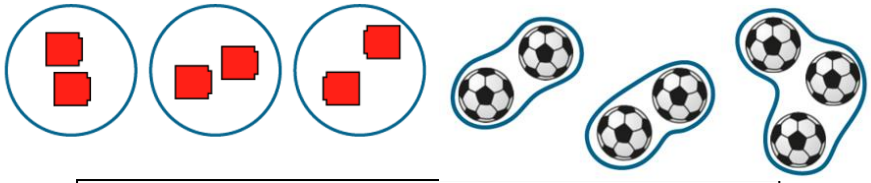
Multiplication and Division

Year 2

Multiplication as Repeated Addition

Vocabulary:

Group Equal Unequal Repeated Addition Multiplication Expression Equation Part Altogether Represents Amount Size



Understand the difference between equal and unequal groups.

The ___ have been grouped.

We can represent equal groups as repeated addition.

There are 3 groups of 5.

5 + 5 + 5

3 × 5

5 + 5 + 5 = 3 × 5

We can represent repeated addition using a multiplication expression.

The 3 represents the number of groups.

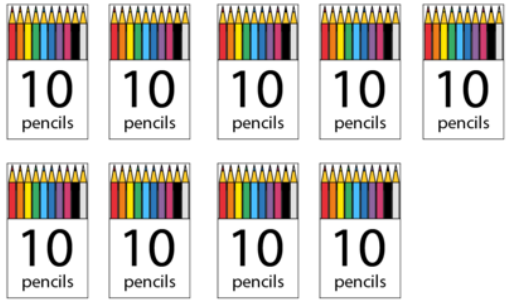
The 5 represents the number of eggs in each group.

15 represents the total number of eggs.

The ___ represents the number of groups.

The __ represents the number of ___ in each group.

___ represents the total number of ___.



9 × 10

We can skip count in multiples of __ to work out the total amount.

10, 20, 30, 40 … there are 90 pencils altogether.

7 × 2

Notice how the representations allow the children to see each of the numbers (i.e. 10 pencils and 9 packets).

Multiplication and Division

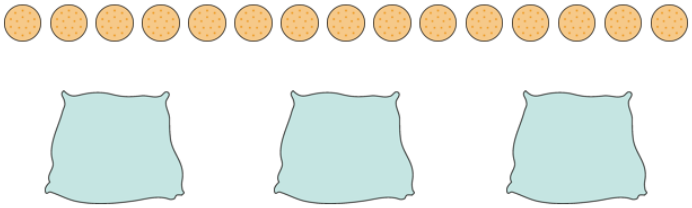
Year 2

Grouping problems: missing factors and division

Vocabulary:

Multiplication Division Factor 'divided by' Represents Skip Counting

Multiplication facts Groups Amount Size



$\boxed{3} \times 5 = 15$

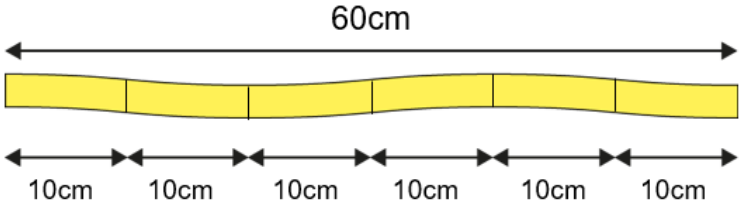
$15 \div 5 = \boxed{3}$

We can solve division problems by finding missing factors.

The 15 represents the number of biscuits.

The 5 represents the number of biscuits in each bag (group).

The 3 represents the number of bag (groups).



$\boxed{6} \times 10 = 60$

$60 \div 10 = \boxed{6}$

The 60cm represents the length of the ribbon.

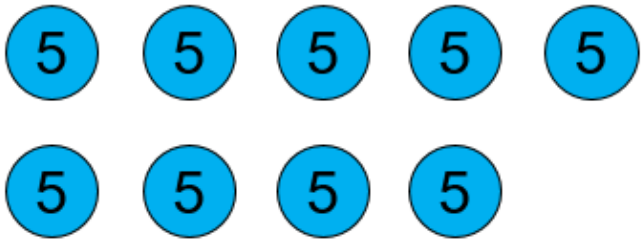
The 10 represents the size of each piece.

The 6 represents the number of pieces we can make.

We can use ÷ to mean 'divided by'

We can use our knowledge of times tables to help solve division problems.

$45 \div 5 = \boxed{9}$



Multiplication and Division

Year 3

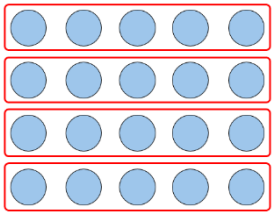
Multiplication and Division Structures

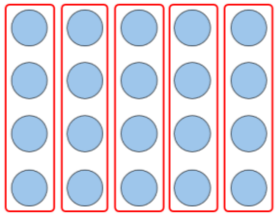
Vocabulary:

Multiplication Division Commutative Grouping (Quotitive) Sharing (Partitive)

'Divided into' 'Divided between' 'Divided by' Equation Factor Product

30	÷	5	=	6
dividend	÷	divisor	=	quotient



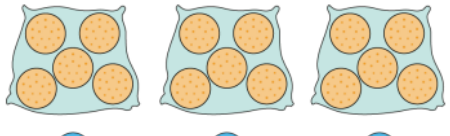


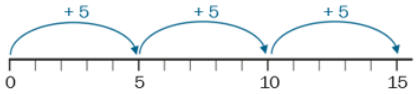
Identify that multiplication is commutative.

4 x 5 = 5 x 4

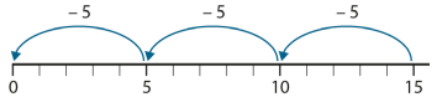
Factor times factor is equal to product.

The order of the factors does not affect the product.





Making groups of



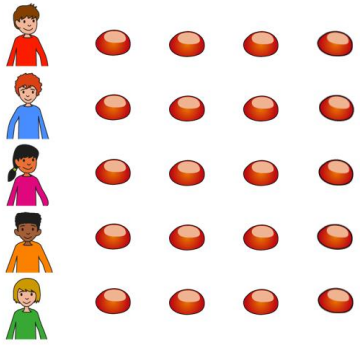
Removing groups of

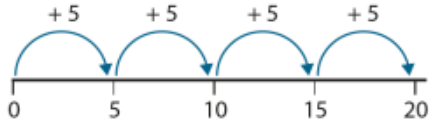
Division equations can be used to represent 'grouping' problems.

We can use multiplication facts to find the number of groups.

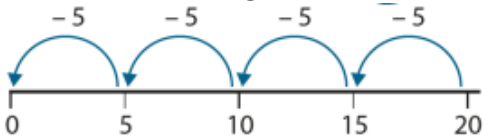
(Quotitive division)

15 divided into groups of 5 is equal to 3.
5 + 5 + 5 = 15
15 – 5- 5 – 5 = 0
15 ÷ 5 = 3





Receiving a share



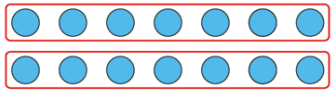
Giving a share

Division equations can be used to represent 'sharing' problems.

We can use multiplication facts to find the size of groups.

(Partitive division)

Four fives are four each.
20 divided between 5 is equal to 4 each.
20 ÷ 5 = 4

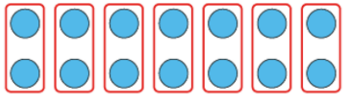


14 ÷ 2 = 7

14	
7	7

The same equation can be represented in both grouping and sharing contexts.

7 times 2 is 14, so 14 ÷ 2 = 7



14 ÷ 2 = 7

14						
2	2	2	2	2	2	2

Multiplication and Division

Year 4

Multiplying and Dividing by 10 and 100

Vocabulary:

Multiply Divide Unitise Ten/Hundred times Bigger Smaller One-tenth the size One-hundredth the size Gattegno chart Factor Product Multiple Groups of Inverse

1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9

1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9

Develop language in order to multiply and divide by 10 or 100.

80 is ten times bigger than 8.
8 is ten times smaller than 80.
80 is ten times the size of 8
8 is one-tenth the size of 80.

800 is one hundred times bigger than 8.
8 is one hundred times smaller than 800.
800 is on hundred times the size of 8
8 is one-hundredth the size of 80.

8 x 1 = 8
8 x 1 ten – 8 tens
8 x 1 hundred = 8 hundreds

Generalisations

All multiples of 10 have a ones digit of zero.

All multiples of 100 have both a tens and ones digit of zero.

To find the inverse of ___times as many, you divide by ____.

If one factor if made ___ times bigger/smaller then the product will be ten times bigger/smaller

8 made ___ times the size is ___.

ten times the size
x10

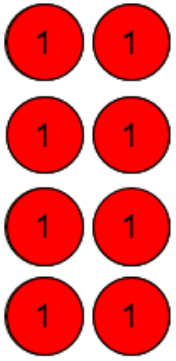
1,000s	100s	10s	1s
			8
		8	0

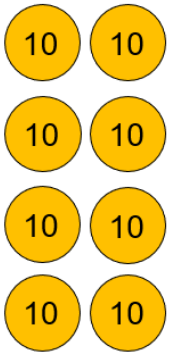
÷10
one-tenth of the size

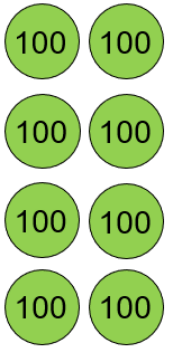
one hundred times the size
x100

1,000s	100s	10s	1s
			8
	8	0	0

÷100
one-hundredth of the size







8 × 1 = 8 **8 × 10 = 80** **8 × 100 = 800**

8 groups of ___ is ___.

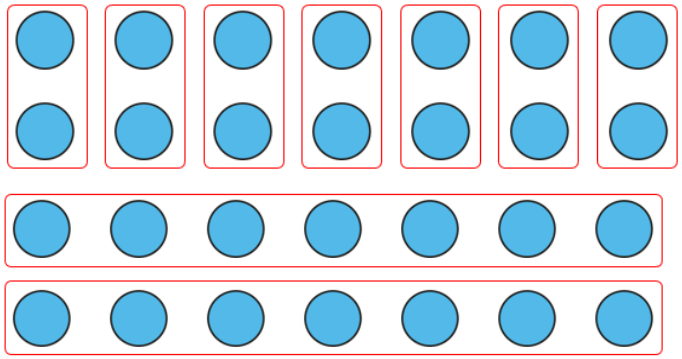
Multiplication and Division

Year 4

Manipulating the Multiplicative Relationship

Vocabulary:

Multiply Divide Commutative Groups of Times Equal to Factors
Product Quotient Dividend Divisor Represents Array



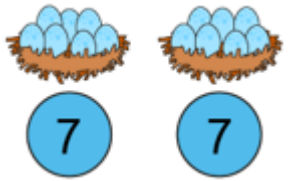
$2 \times 7 = 7 \times 2$

Understand that multiplication is commutative and the factors can be

2 groups of 7 is equal to 14.

2, 7 times is equal to 14.

2 groups of 7 is equal to 7, two times.



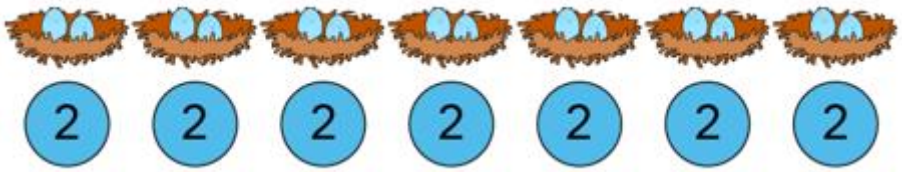
$2 \times 7 = 14$

$7 \times 2 = 14$

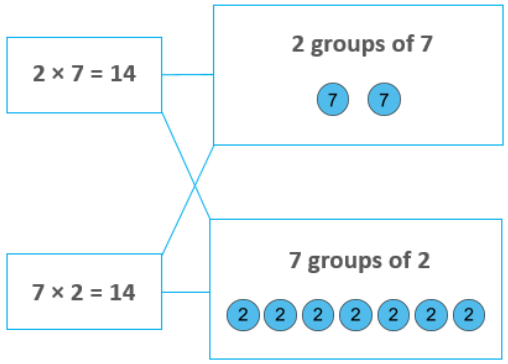
The 2 represents ___.

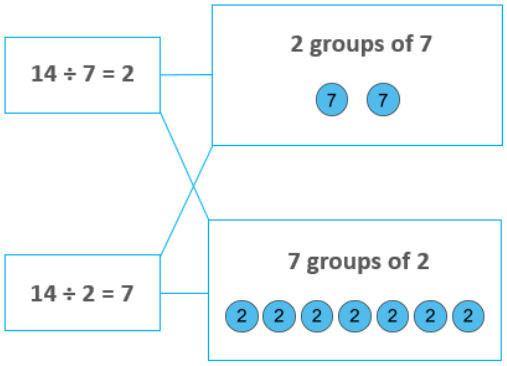
The 7 represents ___.

The 14 represents ___.



Match equations to representations and contexts.





Multiplication and Division

Year 4

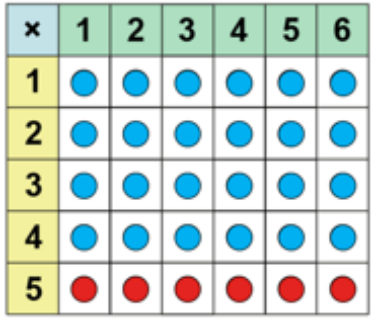
The Distributive Property of Multiplication

Vocabulary:

Multiplication Distributive Law Adjacent Multiples Factors Partitioning
Equations Expressions Arrays Part-whole model Difference

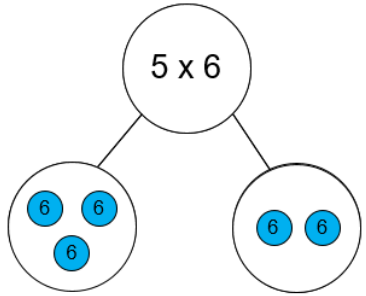
0 × 6 = 0	6 × 0 = 0
1 × 6 = 6 (+ 6)	6 × 1 = 6 (+ 6)
2 × 6 = 12 (+ 6)	6 × 2 = 12 (+ 6)
3 × 6 = 18 (+ 6)	6 × 3 = 18 (+ 6)
4 × 6 = 24 (+ 6)	6 × 4 = 24 (+ 6)
5 × 6 = 30 (+ 6)	6 × 5 = 30 (+ 6)
6 × 6 = 36	6 × 6 = 36
7 × 6 = 42	6 × 7 = 42
8 × 6 = 48	6 × 8 = 48
9 × 6 = 54	6 × 9 = 54
10 × 6 = 60	6 × 10 = 60
11 × 6 = 66	6 × 11 = 66
12 × 6 = 72	6 × 12 = 72

Adjacent multiples of ___ have a difference of ___.



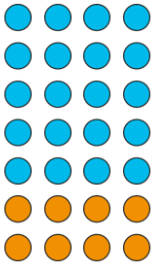
4 × 6 + 6

Five sixes is one more six than four sixes.



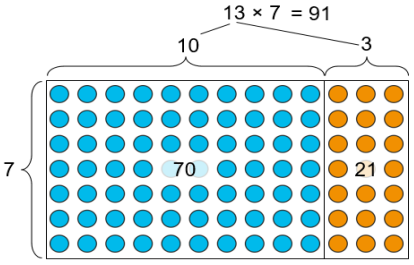
3 x 6 + 2 x 6 = 5 x 6

5 is equal to 3 plus 2, so 5 sixes is equal to 3 sixes plus 2 sixes.

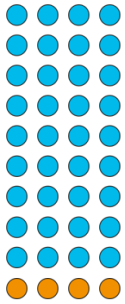


7 = 5 + 2
7 × **4** = 5 × **4** + 2 × **4**
= 20 + 8
= 28

We can partition one of the factors to make calculations easier.

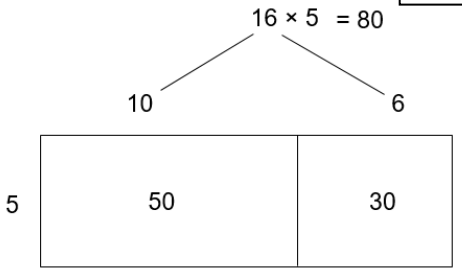


13 × 7 = 10 × 7 + 3 × 7
= 70 + 21
= 91

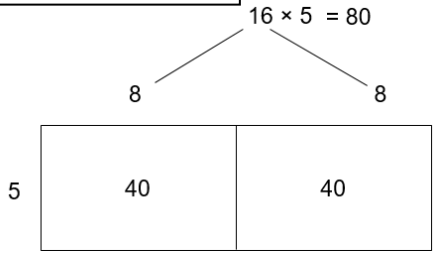


9 = 10 − 1
9 × 4 = **10** × 4 − **1** × 4
= 40 − 4
= 36

We can partition the factors in different ways to make calculations easier.



16 × 5 = 10 × 5 + 6 × 5
= 50 + 30
= 80



16 × 5 = 8 × 5 + 8 × 5
= 40 + 40
= 80

Multiplication and Division

Year 5

Multiplying and Dividing by 10 and 100 (1)

Vocabulary:

Multiply Divide Unitise Ten/Hundred times Bigger Smaller One-tenth the size One-hundredth the size Gattegno chart Factor Product Multiple Groups of Inverse Ones Tens Hundreds Tenths Hundredths

8 ÷ 10 =

0.8 ÷ 10 =

1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

÷ 10
÷ 10
one-tenth the size

0.08 x 10 =

0.8 x 10 =

1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

× 10
× 10
ten times the size

We can multiply and divide a number by 10.

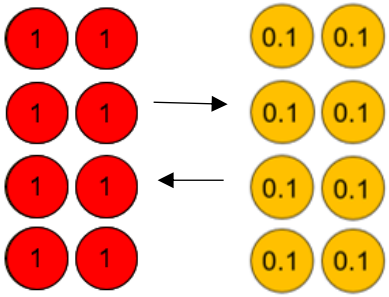
8, made one-tenth the size is 0.8.

8 divided by 10 is 0.8.

First we had 8 ones, now we have 8 tenths.

8 ÷ 10 = 0.8

one-tenth of the size



0.8 x 10 = 8

ten times the size

We can multiply and divide a number by 100. Multiplying by 100 is the same as multiplying/dividing by 10 twice.

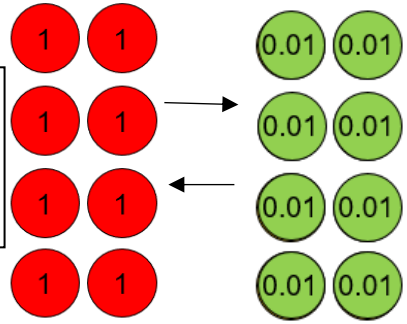
8, made 100 times smaller is 0.08.

8 divided by 100 is 0.08.

First we had 8 ones, now we have 8 hundredths

8 ÷ 100 = 0.08

one-hundredth of the size



0.08 x 100 = 8

one hundred times the size

Multiplication and Division

Year 5

Multiplying and Dividing by 10 and 100 (2)

Vocabulary:

Multiply Divide Unitise Ten/Hundred times Bigger Smaller One-tenth the size One-hundredth the size Gattegno chart Factor Product Multiple Groups of Inverse Ones Tens Hundreds Tenths Hundredths

3.6 × 10 = 36

36 ÷ 10 = 3.6

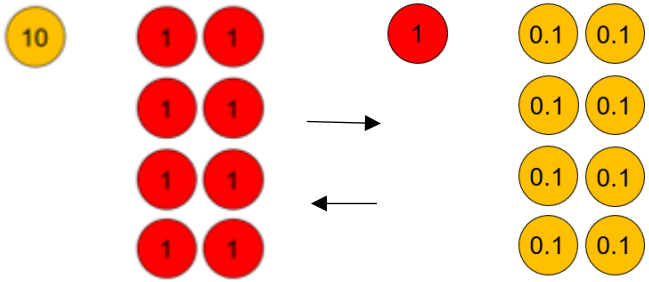
1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

18 ÷ 10 = 1.8

one-tenth of the size

1.8 is one-tenth the size of 18

18 divided by 10 is 1.8.



1.8 × 10 = 18

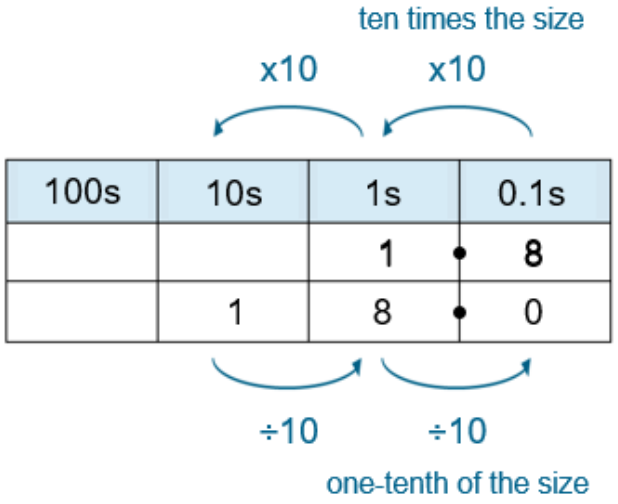
ten times the size

__ divided by 10/100 is equal to__.

__ is one-tenth/hundredth the size of __.

__ multiplied by 10/100 is equal to__.

__ is 10/100 times the size of __.



We can multiply and divide numbers with digits greater than 0 by 10 or 100.

Generalisation

To multiply by 10, move each digit one place to the left.

To multiply by 100, move each digit two places to the left.

To divide by 10, move each digit one place to the right.

Multiplication and Division

Year 5

Multiplying and Dividing by 10 and 100 (3).

Vocabulary:

Multiply Divide Unitise Ten/Hundred times Bigger Smaller One-tenth the size One-hundredth the size Gattegno chart Factor Product Multiple Groups of Inverse Ones Tens Hundreds Tenths Hundredths

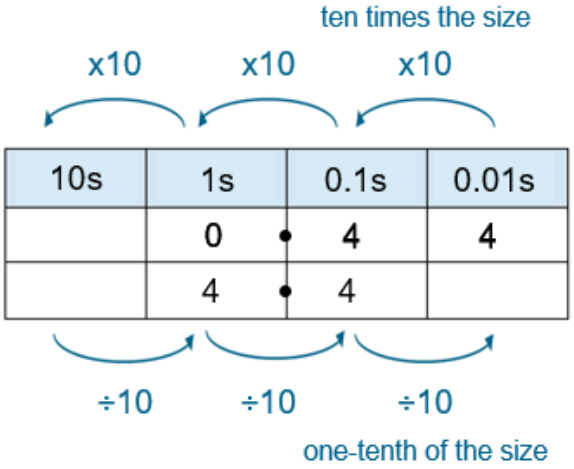
0.27 × 10 = 2.7

2.7 ÷ 10 = 0.27

1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
100	200	300	400	500	600	700	800	900
10	20	30	40	50	60	70	80	90
1	2	3	4	5	6	7	8	9
0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09

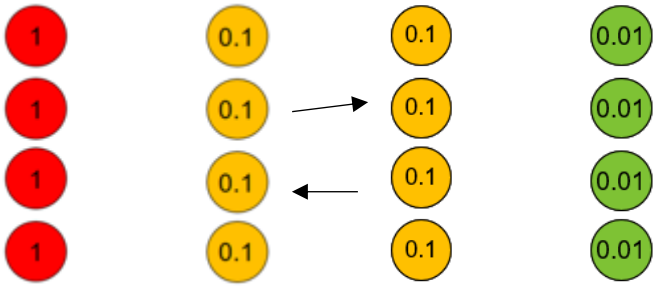
0.27 is one-tenth the size of 2.7

2.7 divided by 10 is 0.27.



4.4 ÷ 10 = 0.44

one-tenth of the size



0.44 × 10 = 4.4

ten times the size

__ divided by 10/100 is equal to__.

__ is one-tenth/hundredth the size of __.

__ multiplied by 10/100 is equal to__.

__ is 10/100 times the size of __.

We can multiply and divide numbers with digits greater than 0 by 10 or 100.

Generalisation

To multiply by 10, move each digit one place to the left.

To multiply by 100, move each digit two places to the left.

To divide by 10, move each digit one place to the right.

Multiplication and Division

Year 5

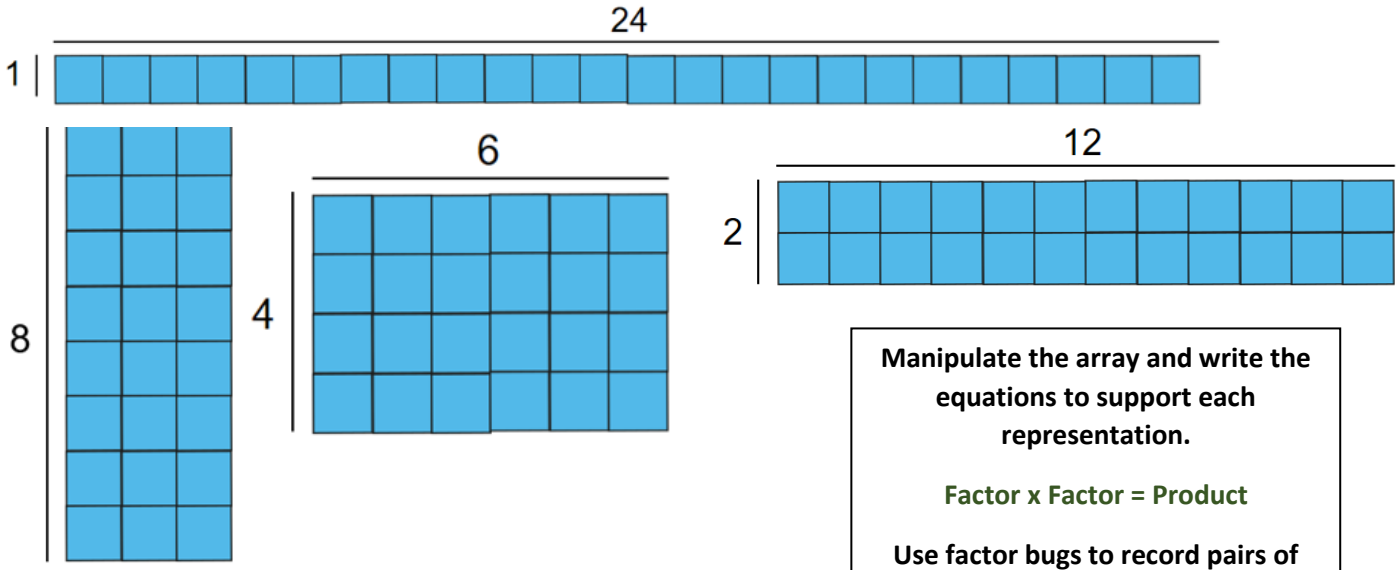
Find Factors and Multiples

Vocabulary:

Factor Multiple Composite Square Prime Common Factor Prime Factor

Factor Bug Array Positive Integer Working Systematically

Factor x Factor = Product Dividend ÷ Divisor = Quotient



8 x 3 = 24

4 x 6 = 24

2 x 12 = 24

1 x 24 = 24

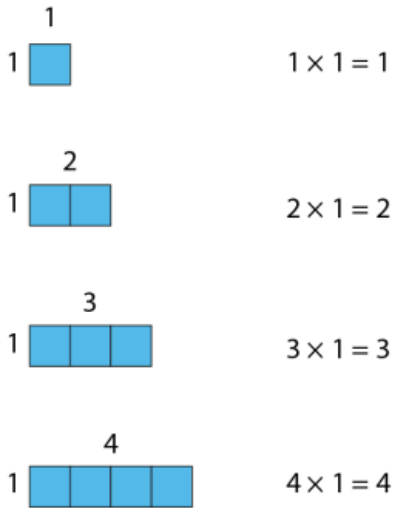
There are ___ tiles. There are ___ rows and ___ columns. So ___ and ___ are factors of ___.

Generalise: Numbers that have more than two factors are composite numbers.

Manipulate the array and write the equations to support each representation.

Factor x Factor = Product

Use factor bugs to record pairs of factors.



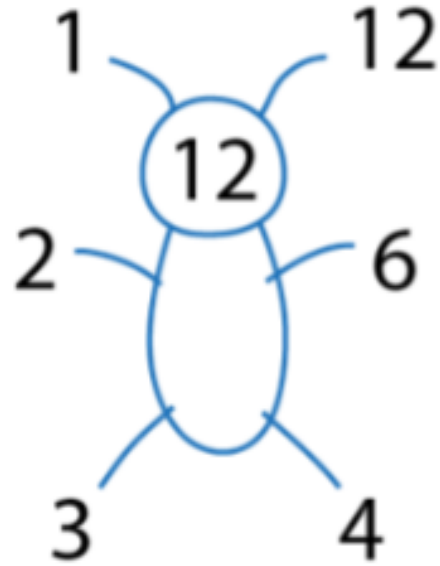
Generalise:

When one is a factor, the product is equal to the other factor.

All positive integers have a factor of 1.

Every positive integer is a factor of itself.

The smallest factor of a positive integer is always 1. The largest factor of a positive integer is always itself.



Multiplication and Division

Year 5

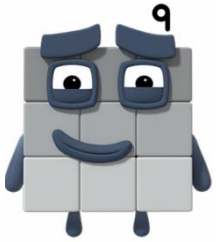
Find Factors and Multiples

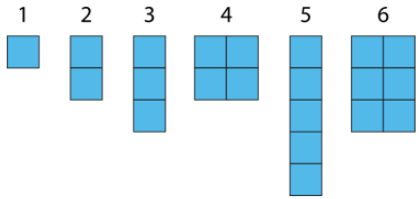
Vocabulary:

Factor Multiple Composite Square Prime Common Factor Prime Factor

Factor Bug Array Positive Integer Working Systematically

Factor x Factor = Product Dividend ÷ Divisor = Quotient





Extend this to square numbers, and prime numbers recognising the number of factors.

×	0	1	2	3	4	5	6	7	8	9	10	11	12
0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10	11	12
2	0	2	4	6	8	10	12	14	16	18	20	22	24
3	0	3	6	9	12	15	18	21	24	27	30	33	36
4	0	4	8	12	16	20	24	28	32	36	40	44	48
5	0	5	10	15	20	25	30	35	40	45	50	55	60
6	0	6	12	18	24	30	36	42	48	54	60	66	72
7	0	7	14	21	28	35	42	49	56	63	70	77	84
8	0	8	16	24	32	40	48	56	64	72	80	88	96
9	0	9	18	27	36	45	54	63	72	81	90	99	108
10	0	10	20	30	40	50	60	70	80	90	100	110	120
11	0	11	22	33	44	55	66	77	88	99	110	121	132
12	0	12	24	36	48	60	72	84	96	108	120	132	144

Make connections with factors and times tables. Make connections with factors of factors

___ is a factor of ___ because it is in the ___ times table.

Nine is a factor of all of these numbers.

Three is a factor of nine which means it is also a factor of all of these numbers.

Is 9 a factor of 54?

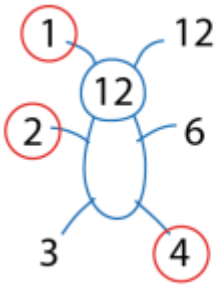
54 ÷ 9 = 6

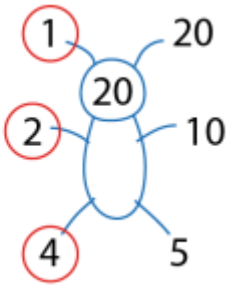
9 and 6 are factors of 54.

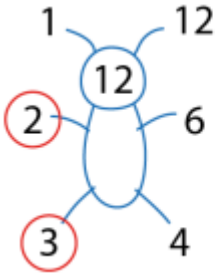
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

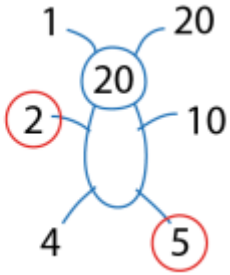
Use factor bugs to find

common factors and prime factors.









Multiplication and Division

Year 5

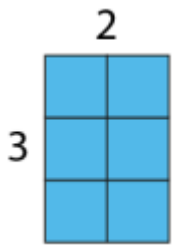
Find Factors and Multiples

Vocabulary:

Factor Multiple Composite Square Prime Common Factor Prime Factor

Factor Bug Array Positive Integer Working Systematically

Factor x Factor = Product Dividend ÷ Divisor = Quotient



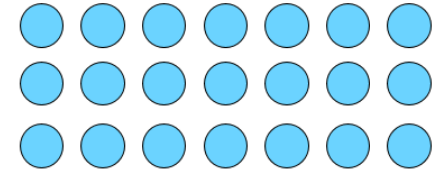
Introduce Multiples

___ is a factor of ___ because ___ x ____ = ____.

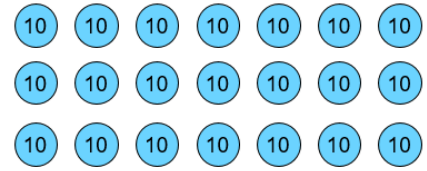
___ is a multiple of ___ because ___ x ___ = ____

___ is a factor of ___ because ___ ÷ ____ = ____.

___ is a multiple of ___ because ___ ÷ ___ = ____



7 × 3 = 21



7 × 30 = 210

70 × 3 = 210

10 x 21 = 210

Make statements about factors and multiples whilst increasing the amount of each counter in the array.

___ represents the number of counters in each row.

___ represents the total value of the counters in each column.

____ represents the total value of the counters.

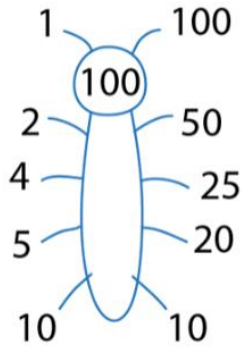
3, 7, 10, 21 and 70 are factors of 210.

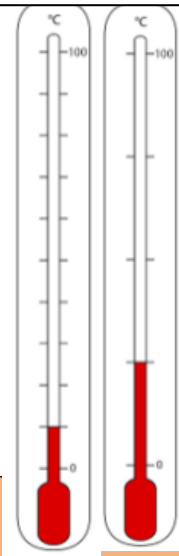
210 is a multiple of 3, 7, 10, 21 and 70.

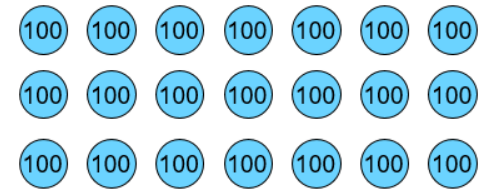
Identify Common Multiples using a 100 square.

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

Factors of 100 can be applied to contexts







7 × 300 = 2,100

700 × 3 = 2,100

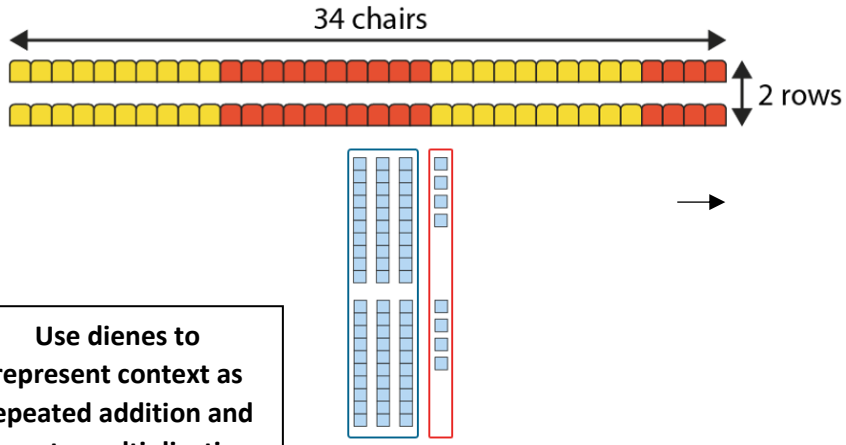
100 x 21 = 2,100

Multiplication and Division

Year 5

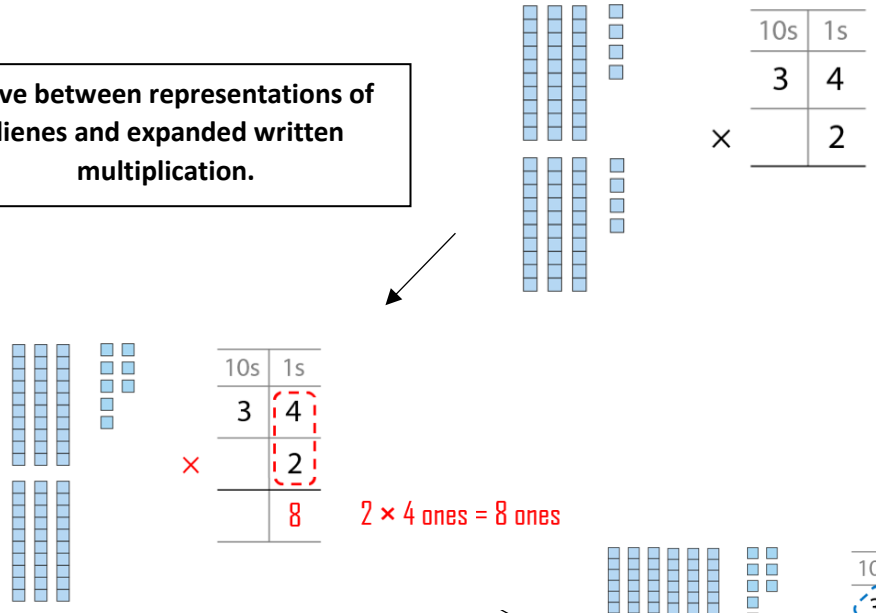
Vocabulary:

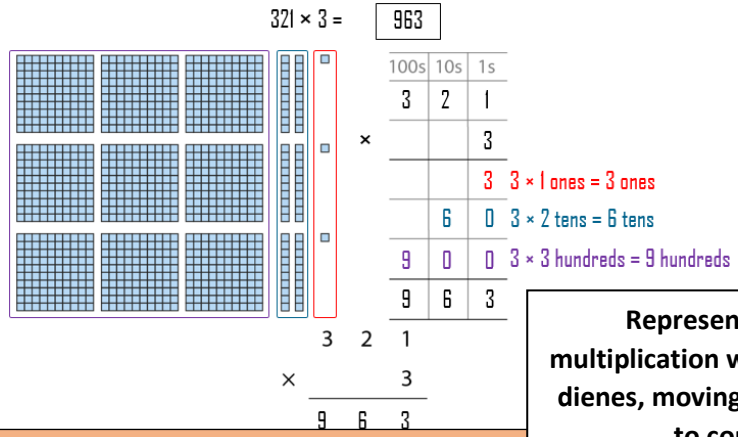
Ones Tens Hundreds Thousands Represents Partition Recombine



Use dienes to represent context as repeated addition and move to multiplication.

Move between representations of dienes and expanded written multiplication.





Represent 3 digit by 1 digit multiplication without exchanges using dienes, moving from expanded layout to compact layout.

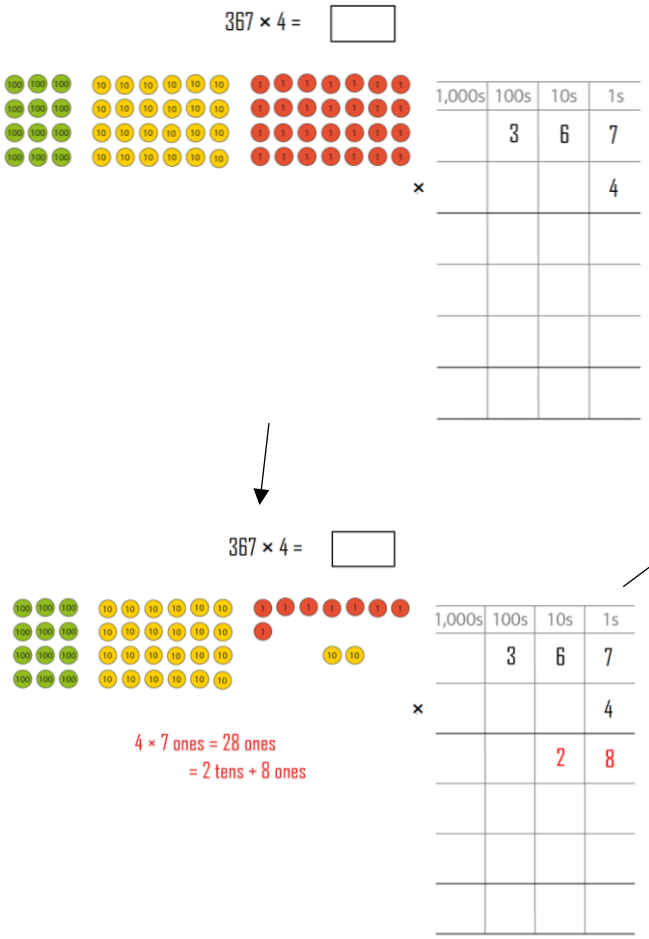
Move between representations of expanded layout and compact layout.

Multiplication and Division

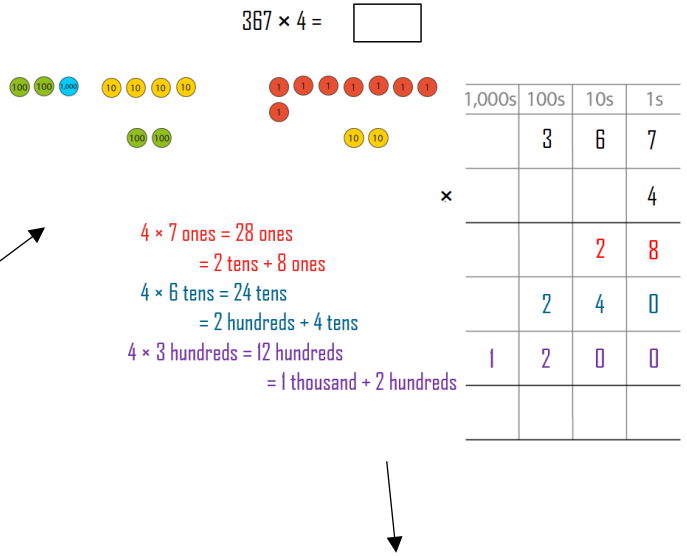
Year 5

Vocabulary:

Ones Tens Hundreds Thousands Represents Partition Recombine



Represent 3 digit by 1 digit multiplication with exchanges using place value counters, moving from expanded layout to compact layout.



Move from expanded layout to compact layout.

367 × 4 = 1,468

$$\begin{array}{r} 3\ 6\ 7 \\ \times\quad 4 \\ \hline 1\ 4\ 6\ 8 \\ \hline {\scriptstyle 2\ 2} \end{array}$$

If there are 10 or more ones, we must regroup ones into tens and ones.

If there are 10 or more tens, we must regroup into hundreds and tens.

If there are 10 or more hundreds, we must regroup into thousands and hundreds.

Multiplication and Division

Year 5

Vocabulary:

Partitive (sharing) Quotitive (grouping) Ones Tens Hundreds Thousands

84	÷	4	=	21	$4\overline{)\begin{array}{cc}2&1\\8&4\end{array}}$
dividend	÷	divisor	=	quotient	$\text{divisor}\overline{)\text{dividend}}^{\text{quotient}}$

Use sticks to represent partitive (sharing) context where the dividend is divisible (to give a whole number). Skip count in multiples of the divisor.

84 sticks shared equally between 4 children. How many sticks each?

84 ÷ 4 = ☐

Step 1 – write the divisor and dividend:

$4\overline{)\begin{array}{cc}\text{10s}&\text{1s}\\8&4\end{array}}$

Step 2 – share the 10s:

$4\overline{)\begin{array}{cc}\text{10s}&\text{1s}\\2&\\8&4\end{array}}$

8 tens ÷ 4 = 2 tens

8 tens divided by 4 is equal to 2 tens.

Remove a group of 4 each time before sharing.

One four is one each. That's four.

Two fours is two each. That's eight.

Eight divided between 4 is equal to two each.

Each child gets two sticks.

Step 3 – share the 1s:

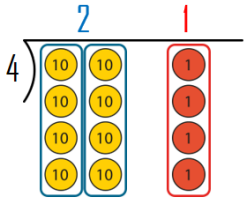
$4\overline{)\begin{array}{cc}\text{10s}&\text{1s}\\2&1\\8&4\end{array}}$

8 tens ÷ 4 = 2 tens

4 ones ÷ 4 = 1 one

Add the partial quotients to find the quotient.

2 tens + 1 one = 21



8 tens ÷ 4 = 2 tens

4 ones ÷ 4 = 1 one

Multiplication and Division

Year 5

Vocabulary:

Partitive (sharing) Quotitive (grouping) Ones Tens Hundreds Thousands

84	÷	4	=	21	$4\overline{)84}$ → 21
dividend	÷	divisor	=	quotient	divisor) dividend → quotient

72 sticks shared equally between 3 children. How many sticks each?

72 ÷ 3 = □

Step 1 – write the divisor and the dividend:

$3\overline{)72}$

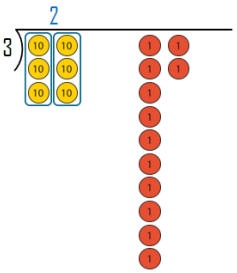
Step 2 – share the 10s:

$3\overline{)72}$ → 2

7 tens ÷ 3 = 2 tens r 1 ten

Step 3 – exchange:

$3\overline{)72}$ → 2, 12

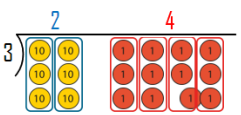


7 tens ÷ 3 = 2 tens r 1 ten

72 ÷ 3 = 24

Step 4 – share the 1s:

$3\overline{)72}$ → 24



7 tens ÷ 3 = 2 tens r 1 ten

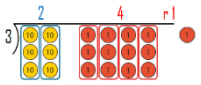
12 ones ÷ 3 = 4 ones

Use sticks and place value counters to represent partitive (sharing) context where the dividend is divisible (to give a whole number) though requires an exchange from the tens. Skip count in multiples of the divisor.

If dividing the tens gives a remainder of one or more ten, we must exchange the remaining tens for ones.

73 ÷ 3 = 24 r 1

$3\overline{)73}$ → 2 4 r1



7 tens ÷ 3 = 2 tens r 1 ten

13 ones ÷ 3 = 4 ones r 1 one

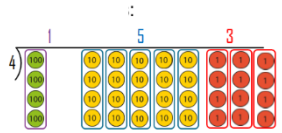
Apply the same representations though this time include a remainder.

Then extend to division of 3 digits by one digit and where there can be no hundreds cannot be shared.

If dividing the hundreds gives a remainder of one or more hundred, we must exchange the remaining hundreds for tens.

612 ÷ 4 = 153

$4\overline{)612}$ → 1 5 3



6 hundreds ÷ 4 = 1 hundred r 2 hundreds

2 hundreds = 20 tens

21 tens ÷ 4 = 5 tens r 1 ten

1 ten = 10 ones

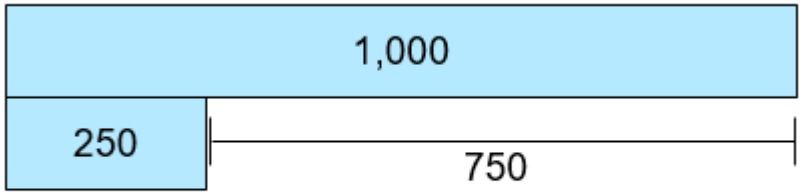
12 ones ÷ 4 = 3 ones

Addition, Subtraction, Multiplication and Division

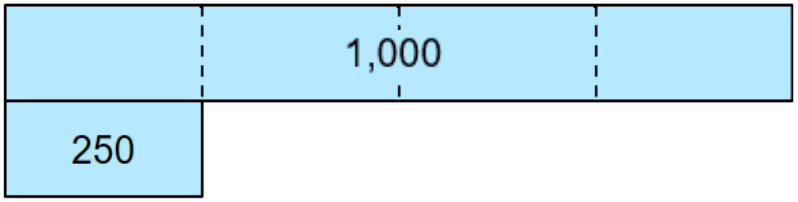
Year 6

Vocabulary:

Additive Multiplicative Relationship Represents Compose Combine Total

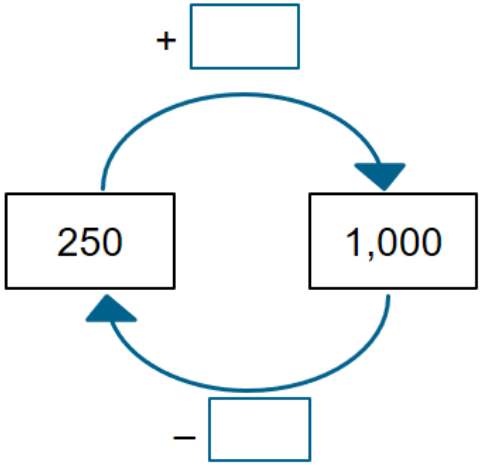


250 + 750 = 1,000 1,000 – 750 = 250



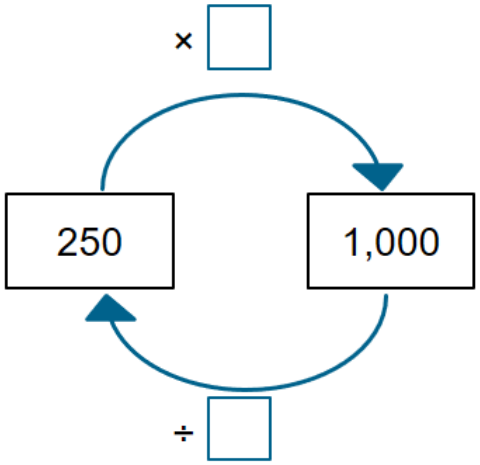
250 x 4 = 1,000 1000 ÷ 4 = 250

The relationship between two numbers can be expressed both additively and multiplicatively.



1000 is ___ more than 250.

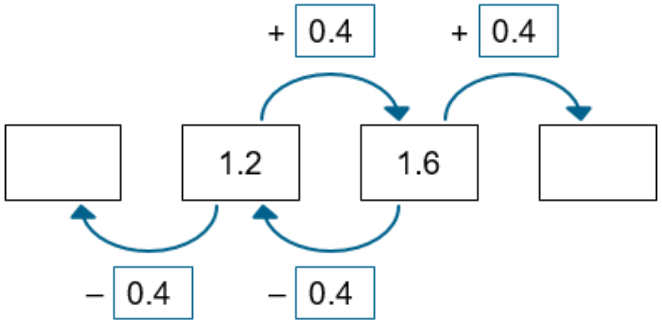
250 is ____ less than 1000.



1000 is ___ times the size of 250.

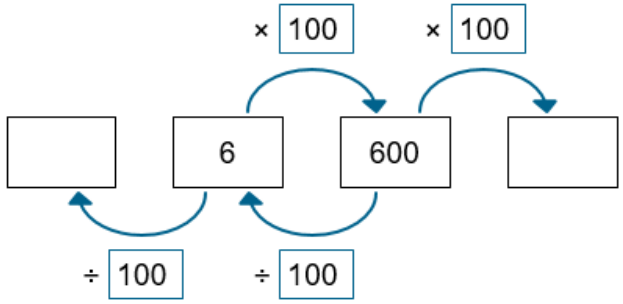
250 is one-_____ of 1000.

To find one-quarter of a number, we divide by 4.



Finding the difference can help calculate the unknown terms in a sequence.

Finding the known multiplier can help calculate the unknown terms in a sequence.

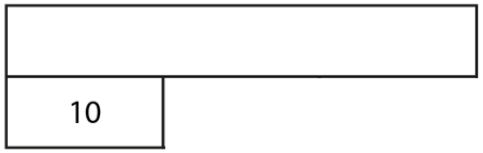


Addition, Subtraction, Multiplication and Division

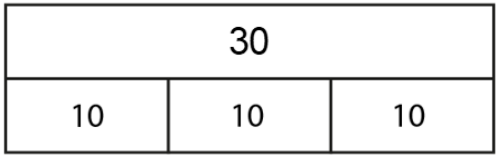
Vocabulary:

Additive Multiplicative Relationship Represents Compose Combine Total

$\frac{1}{3}$ of ?= 10



$\frac{1}{3}$ of ?= 10



$\frac{1}{3}$ of 30 = 10

Calculate the unknown whole by recognising how many parts the whole has been divided into.

Addition and Subtraction

Vocabulary:

Additive Multiplicative Relationship Represents Equation Unknown Re-

$252 = 3 \times 84$	$252 = 3 \times 84$	$252 = 3 \times 84$
$2{,}520 = 30 \times \square$	$\square = 3 \times 85$	$252 = 3 \times 60 + 3 \times \square$

$625 - 148 = 477$	$625 - 148 = 477$	$625 - 148 = 477$
$6{,}250 - 1{,}480 = \square$	$625 - 70 - \square = 477$	$625 - 248 = \square$

$14.8 + 7.6 = 22.4$	$14.8 + 7.6 = 22.4$	$14.8 + 7.6 = 22.4$
$1{,}480 + \square = 2{,}240$	$\square - 7.6 = 14.8$	$12.8 + \square = 22.4$

$4{,}800 \div 25 = 192$	$4{,}800 \div 25 = 192$	$4{,}800 \div 25 = 192$
$25 \times 192 = \square$	$4{,}800 \div 250 = \square$	$4{,}800 \div 5 \div 5 = \square$

Manipulate an equation to solve another. Pupils could:

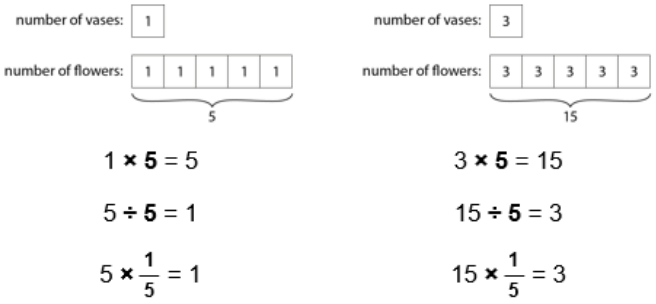
- **rearrange the terms;**
- **rewrite using inverse operations;**
- **apply place value;**
- **use the properties of division that correspond to the commutative, associative or distributive property of multiplication;**
- **use the compensation property.**

Additive examples

Multiplicative examples

Addition and Subtraction

Vocabulary:



Ratio table to compare sets of information.

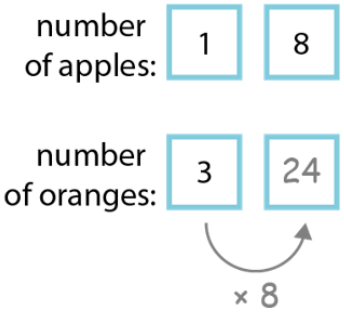
For every ___, there are ___.

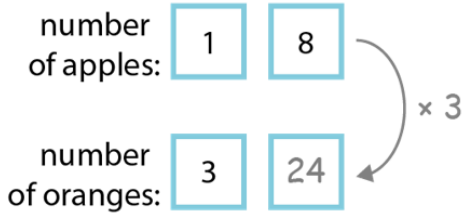
For every 1 litre of petrol, you can drive 7 miles.

For every 7 miles you will drive, you need 1 litre of petrol.

Extend sequences using knowledge of patterns based on ratio table.

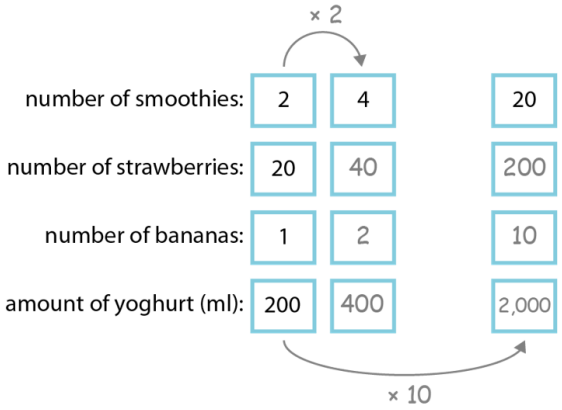
Litres of petrol	1	2	3	4	5	6	7	8	9	10
Miles driven	7	14	21	28	35	42	49	56	63	70





Explore vertical and horizontal relationship between numbers.

For every ___, there are ___.

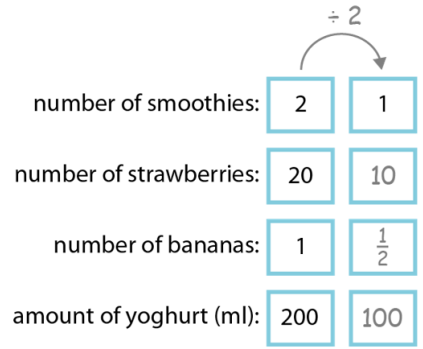


Identify the scale-factor in order to find unknown values.

___ is ___ times the size of ___.

Therefore I must multiply/divide by ___.

___ is one-__ the size of ___.



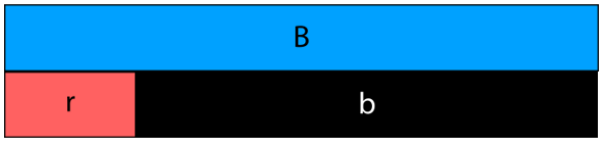
Addition and Subtraction

Year 6

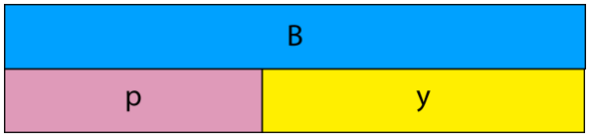
Solve Problems with Two Unknowns

Vocabulary:

Additive Multiplicative Relationship Represents Equation Two Unknowns Scale-factor Ratio ___ times the size one-___ the size of Total Bar Model Structure



$$B = \boxed{r} + \boxed{b}$$



$$B = \boxed{p} + \boxed{y}$$

Use Cuisenaire to find 2 bars of total length that are equal to another.

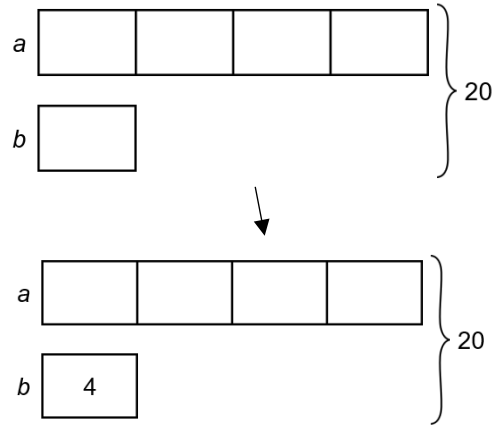
There is more than one solution to the problem.

There can be infinite solutions to a problem.

$$5 \times \square = 10 \times \square$$

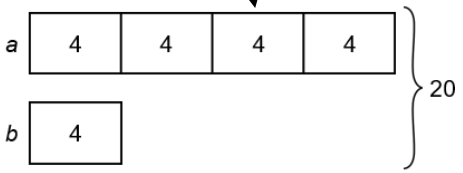
Solve multiplicative problems with two unknowns when the total is known.

v



one part = 20 ÷ 5 = 4

$b = 4$



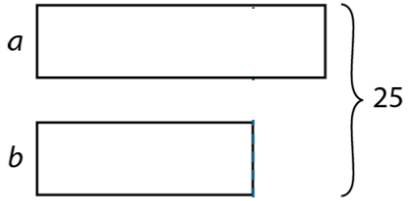
one part = 20 ÷ 5 = 4

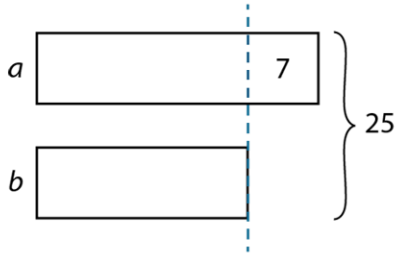
$b = 4$

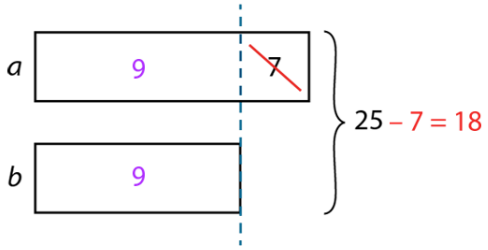
$a = 4 \times 4 = 16$

The two numbers are 16 and 4.

Solve additive problems with two unknowns when the total is known.







$b = 18 \div 2 = 9$

$a = 9 + 7 = 16$

The two numbers are 9 and 16.