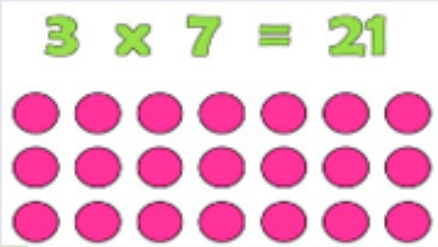


Multiplication

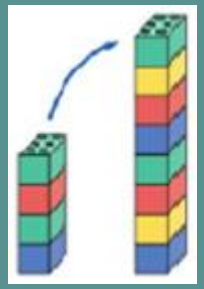
Key Vocabulary:

Multiply, times, equal groups, double, commutative, array, row, column, multiple, factor, product, common factor, common multiple, prime, composite, squared (x^2), cubed (x^3), order of operations, brackets, inverse operation

Teachers need to model the language of factor x factor = product.

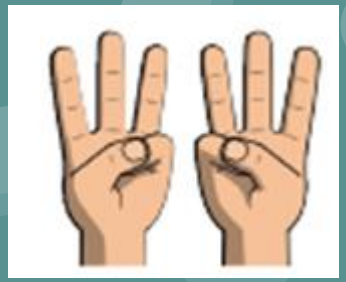
Doubling numbers within 10

Double __
is equal to
____



Double 4
is 8

Draw pictures to show how to double numbers .



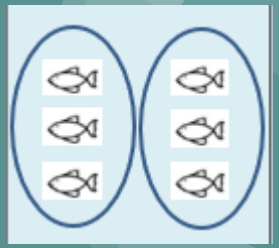
Rolling numbers, step counting and using fingers to double numbers to 10.

Making equal groups

There are __ groups of 3.

There are __ groups, __ in each group.

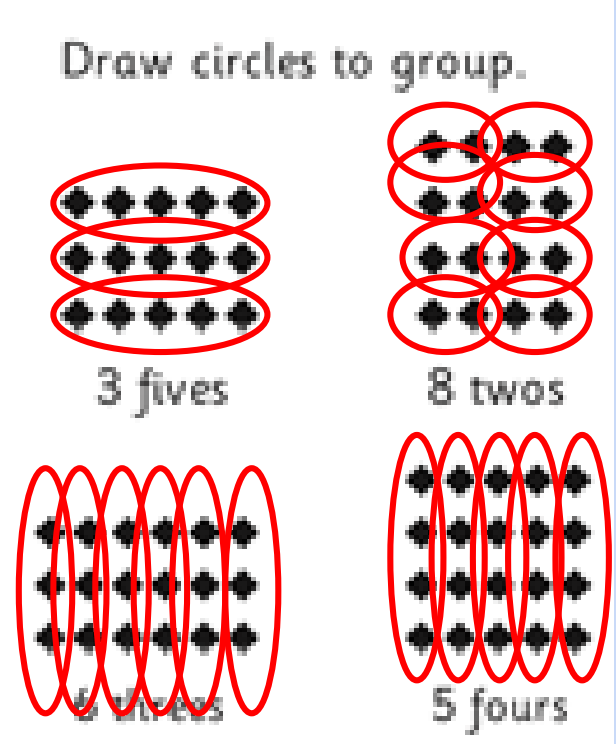
Use manipulatives to create equal groups.



Draw and make representations clearly showing equal groups.

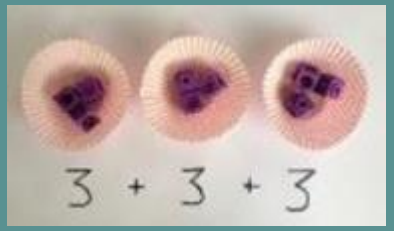
Which activities have groups of 3 and groups of 4?

Guided practice:

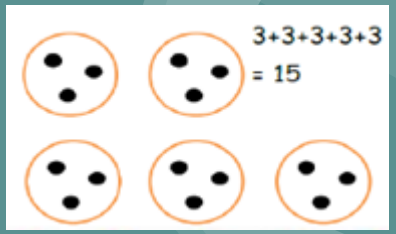


Repeated addition

4 groups of
3 =
__+__+__+_
_



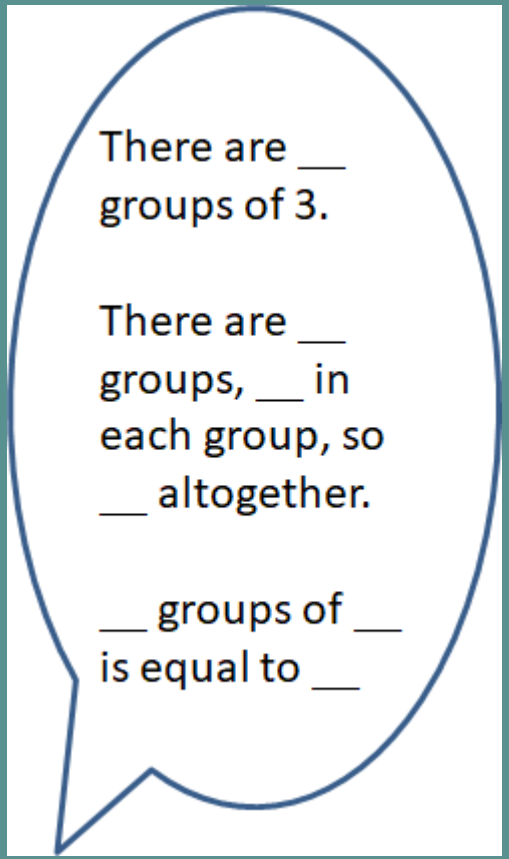
Use different objects to add equal groups.



Use pictorial representations including number lines to solve problems.

Write addition sentences to describe objects and pictures.

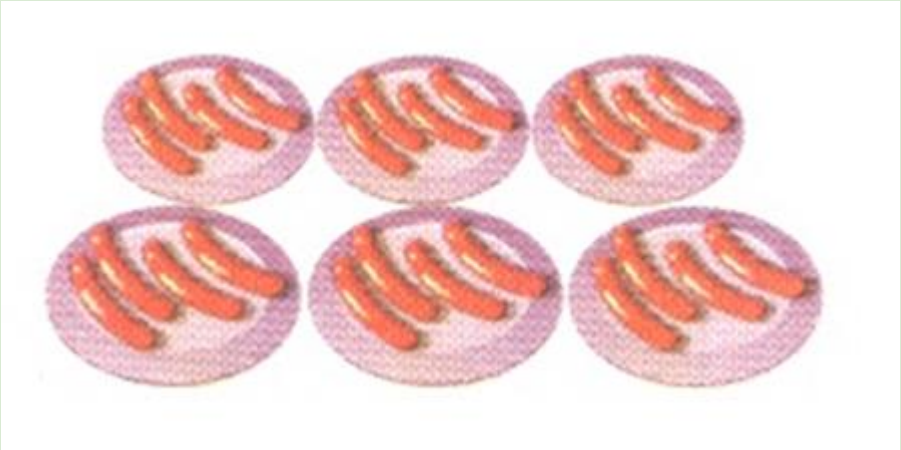
Counting in equal groups to find the product



Addition: 4 + 4 + 4 + 4 + 4 = 20 (people)

Multiplication: 5 x 4 = 20 (people)

There are (**5**) groups, (**4**) people in each group, so (**20**) people altogether.



Addition: (**4**) + (**4**) + (**4**) + (**4**) + (**4**) + (**4**) = (**24**) sausages

Multiplication: (6) x (4) = (24) sausages

Guided practice:

Addition: (3) + (3) + (3) + (3) + (3) = (15) blocks

Multiplication: (5) x (3) = (15) blocks

Addition: 1 + 2 + 4 = 7

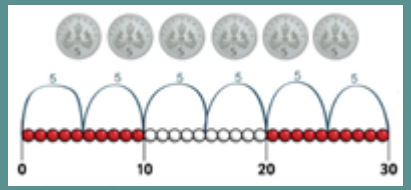
Multiplication:

Can you write a multiplication sentence?

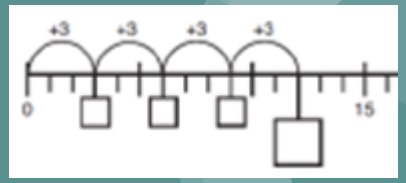
Counting in multiples

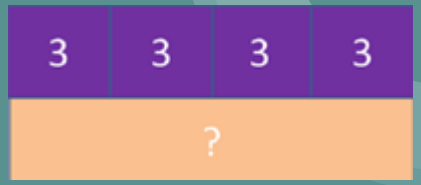
___multiples of ___ are equal to _____

2, __, 6, 8, __, __



Count in multiples supported by concrete objects in equal groups.





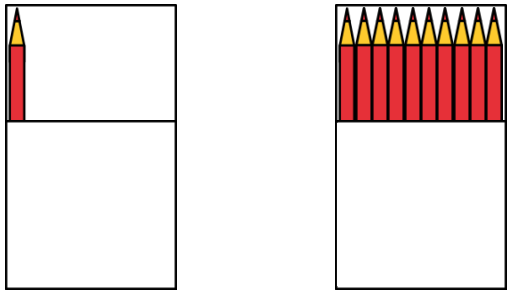
Make representations to show counting in multiples.

Count in multiples of a number aloud.
Write sequences with multiples of numbers.

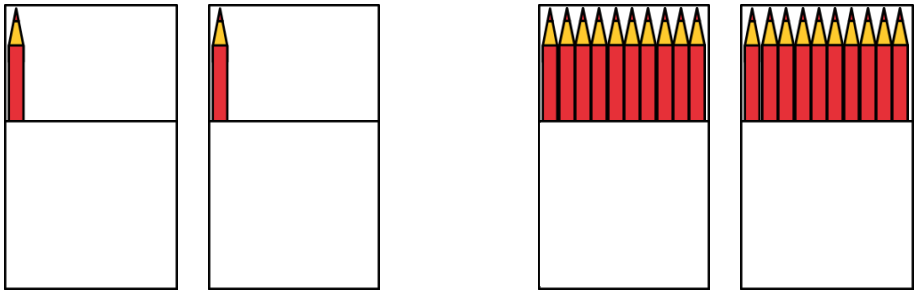
2, 4, 6, 8, 10
3, 6, 9, 12, 15
5, 10, 15, 20, 25, 30

Multiplying by 10, 100, 1000

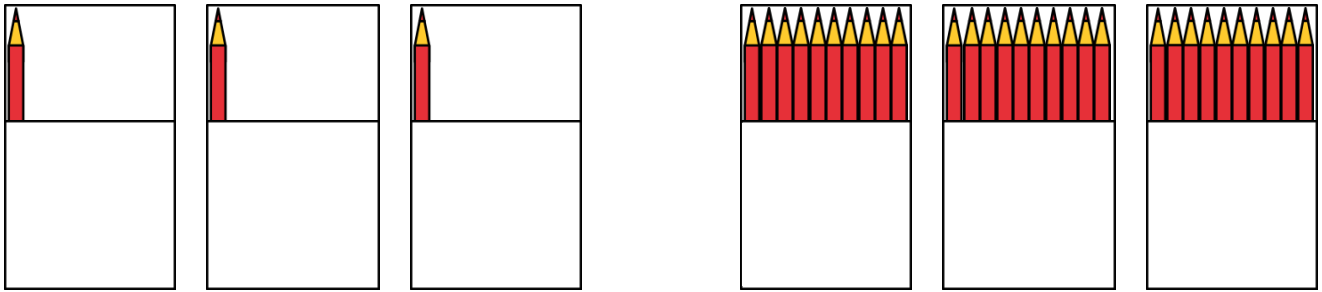
Emily has 1 pencil; Jamie has 10 times as many.
How many pencils does Jamie have?

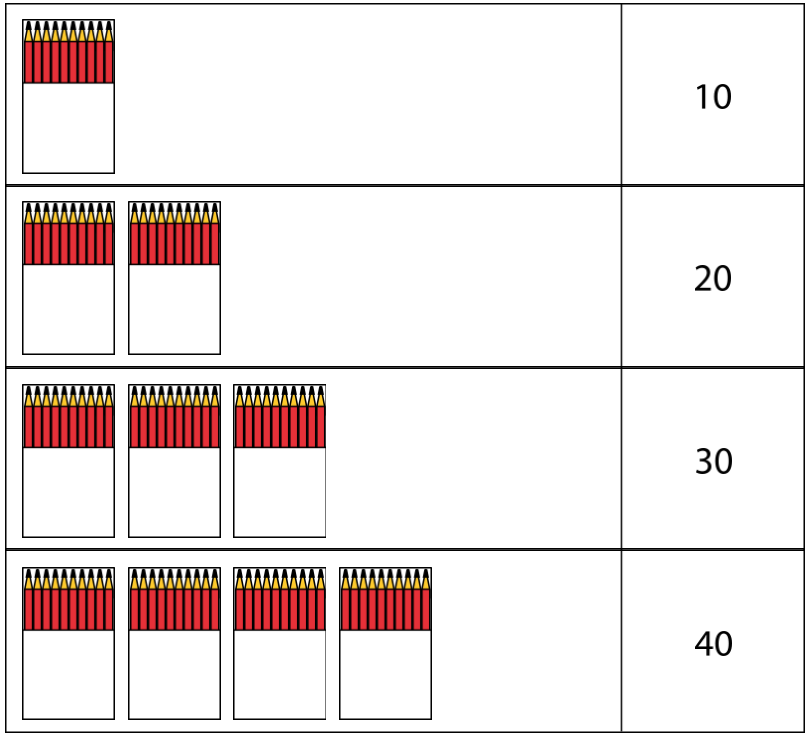


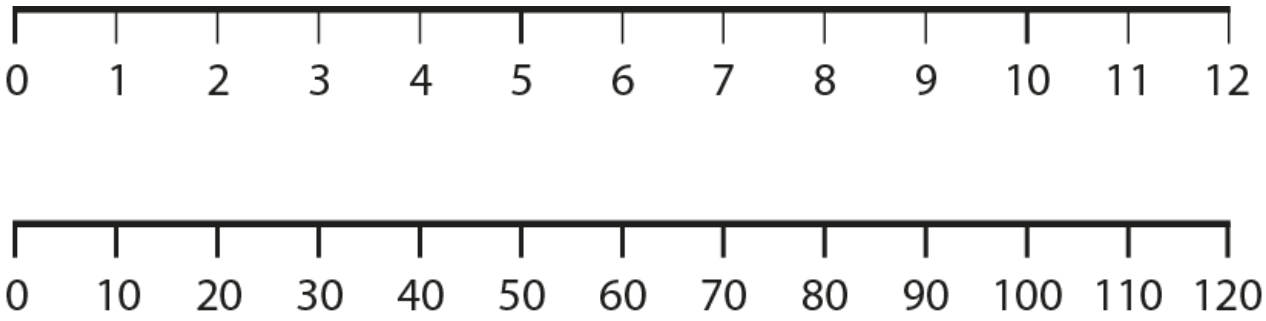
Emily has 2 pencils; Jamie has 10 times as many.
How many pencils does Jamie have?



Emily has 3 pencils; Jamie has 10 times as many.
How many pencils does Jamie have?



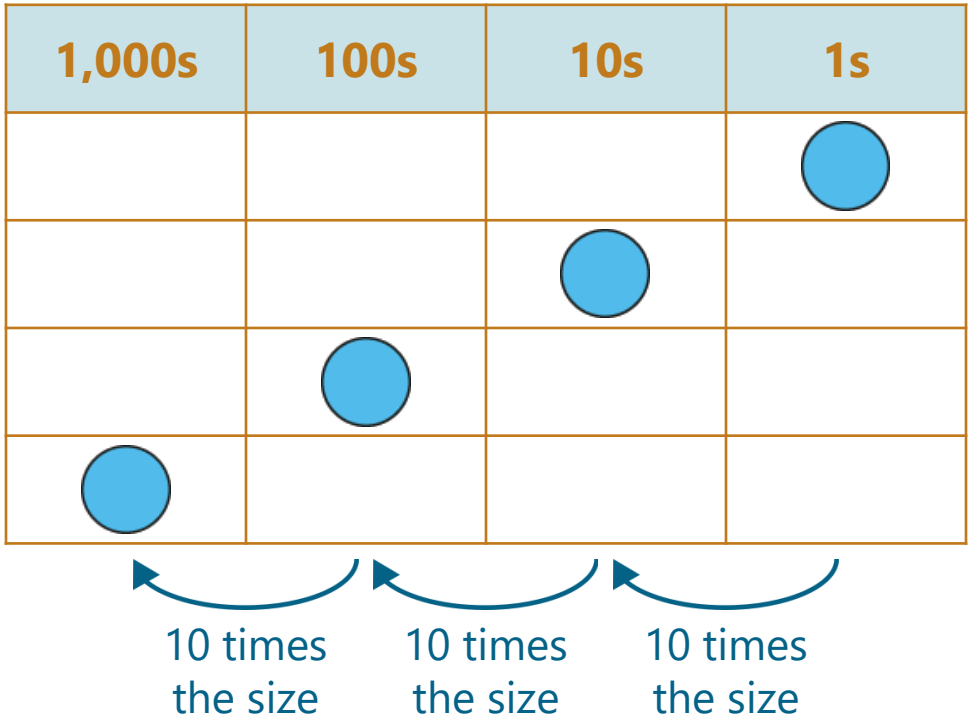




[redacted] × 10 = [redacted]0

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	10	20	30	40	50	60	70	80	90
	1	2	3	4	5	6	7	8	9



1,000s	100s	10s	1s
			1
		1	
	1		
1			

10 times the size

10 times the size

10 times the size

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

1,000s	100s	10s	1s
			6
		6	0

↓ × 10

Think of '6' and make it ten times the size.

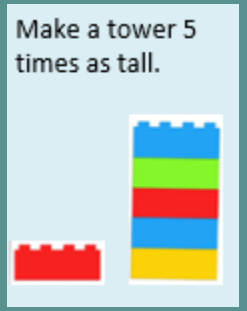
10 times the size

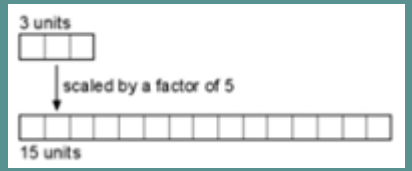
10 times the size

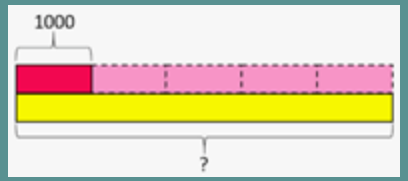
10 times the size

Scaling

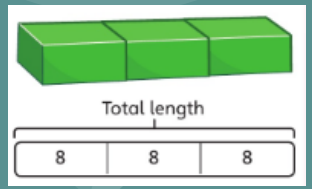
If ___ is increased by a scale factor ___ it is equal to _____







Draw bar models and pictures to show scale factor.
Increase by a scale factor of 5.



Apply the knowledge of the relationship between scaling and multiplication to solve increasingly complex problems.

Correspondence

Introduce the concept of correspondence problems where a number of objects are linked to a number of different objects using real life problems and concrete resources.

1 snowman, 4 hats, 2 scarves. How many combinations?

Correspondence

Draw the solution. Use a ruler and pencil to connect pictures so that they can count the connections.

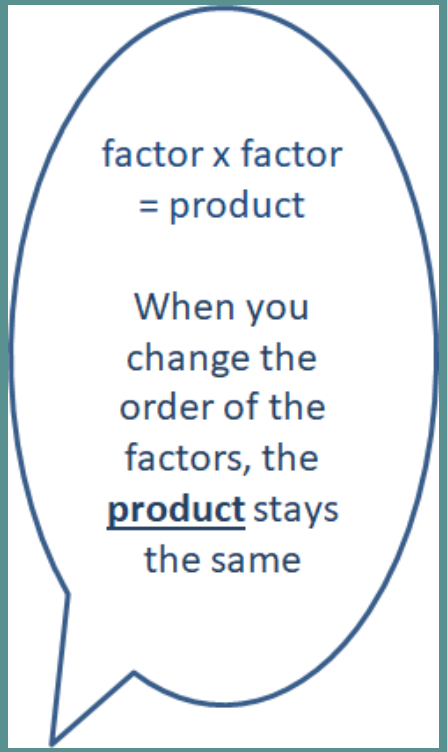
Begin recording the different combinations in a table or similar in a systematic order.

Hat	Scarf
Hat A	Scarf 1
Hat A	Scarf 2
Hat B	Scarf 1
Hat B	Scarf 2
Hat C	Scarf 1
Hat C	Scarf 2
Hat D	Scarf 1
Hat D	Scarf 2

Recognise the corresponding relationship as multiplication.

There are 4 possible hats.
For each hat there could be 2 possible scarves.
The total number of ways to dress the snowman is $4 \times 2 = 8$ ways.

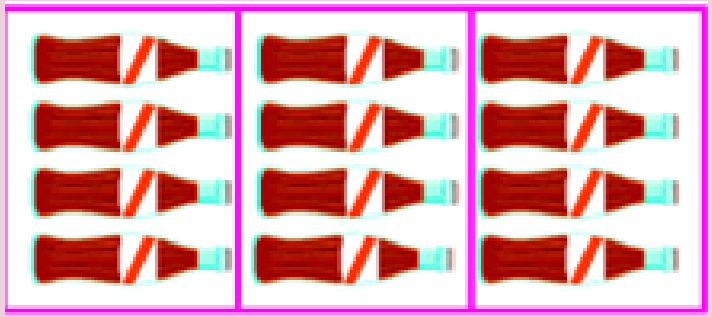
Understanding arrays - showing that multiplication is commutative

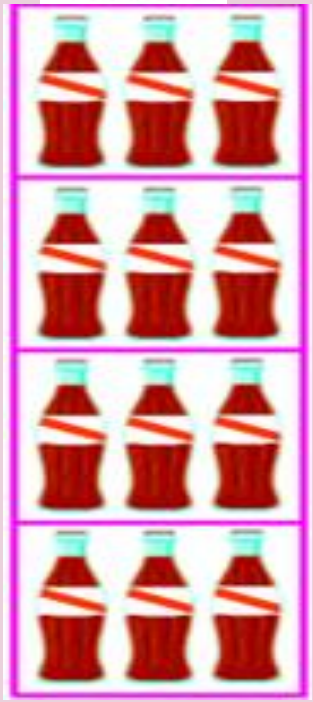


In focus:

Children packed 12 drink bottles into a crate.

Using the counters on your table, can you represent this?





$3 \times 4 = 12$

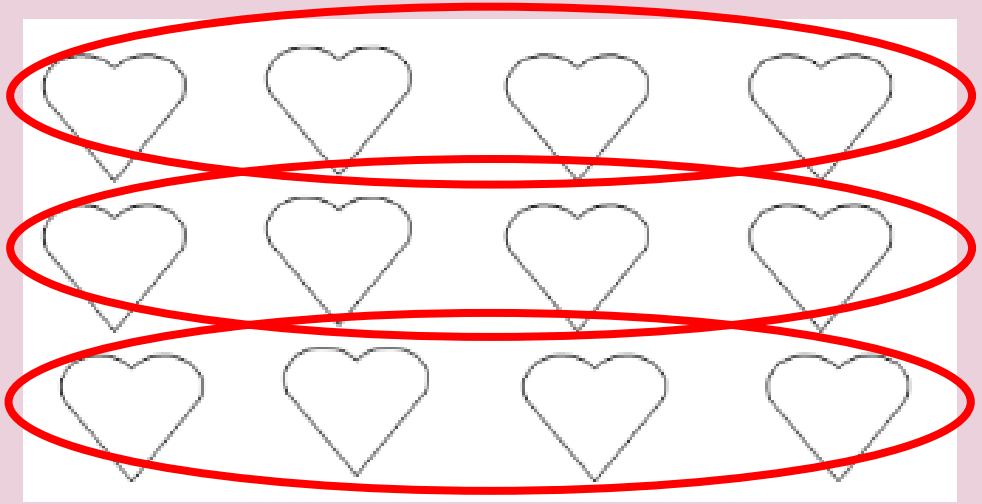
What is the same and what is different?

$3 \times 4 = 4 \times 3$

$4 \times 3 = 12$

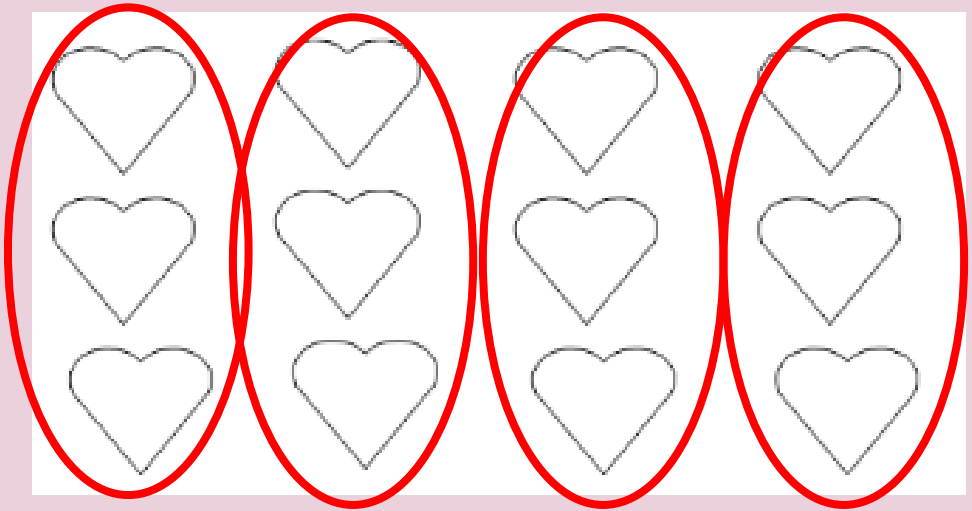
When you exchange the order of the factors the product remains the same.

This is called commutativity.



3 4s are (12)

Multiplication: 3 x 4 = (12)



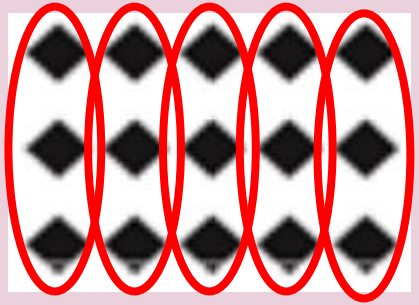
4 3s are (12)

Multiplication: 4 x 3 = (12)

John says I don’t know my 7 times table so how could I work out 7 x 2?

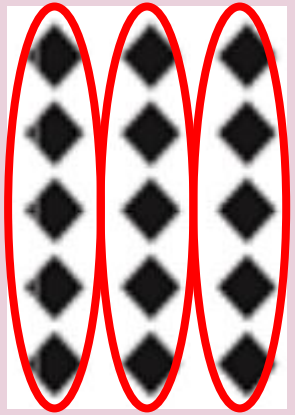
Draw circles to group:

five 3s



5 x 3 = 3 + 3 + 3 + 3 + 3 = 15

three 5s



3 x 5 = 5 + 5 + 5 = 15

5 x 3 = 3 x 5 = 3 + 3 + 3 + 3 + 3 = 5 + 5 + 5 = 15

Multiplying 3 single digits

b) How many stickers are there, in total, on the teacher's desk?

There are 5 rows of 2 stickers.

b)

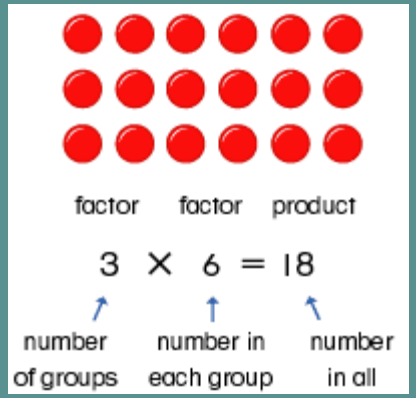
$$5 \times 2 \times 3 = 30$$

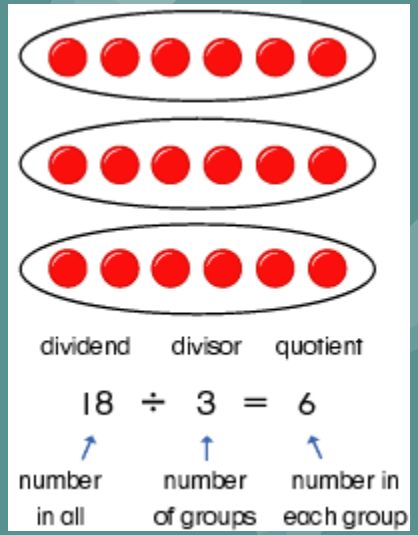
$$10 \times 3 = 30$$

Using the inverse

If I know that factor x factor = product

Then I also know product ÷ factor = factor or dividend ÷ divisor = quotient *





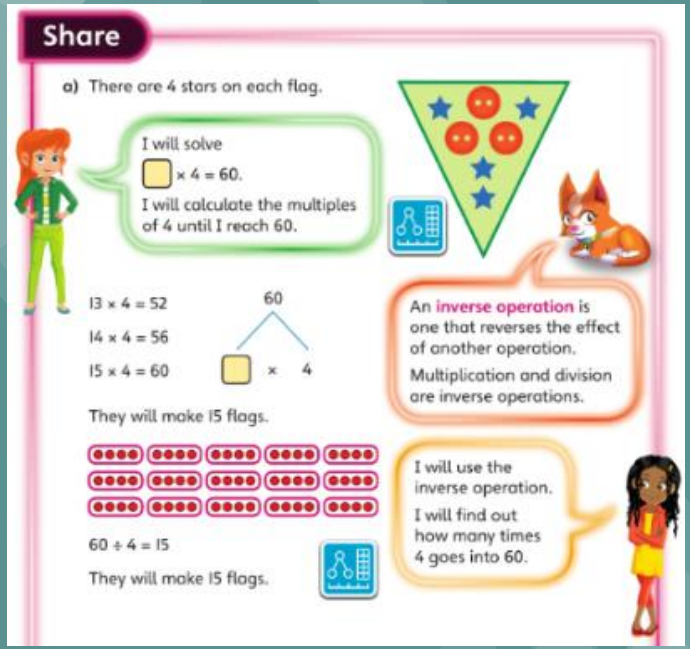
Using the inverse

If I know that factor x factor = product

Then I also know product ÷ factor = factor or dividend ÷ divisor = quotient *

1 a) In total, Emma and Miss Hall need to use 60 stars.

How many flags will they make?



Doubling numbers beyond 10

16 = __ tens and __ ones.

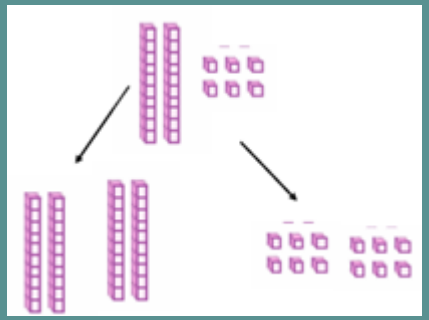
Double 10 = ____

Double 6 = ____

____ + ____ = ____

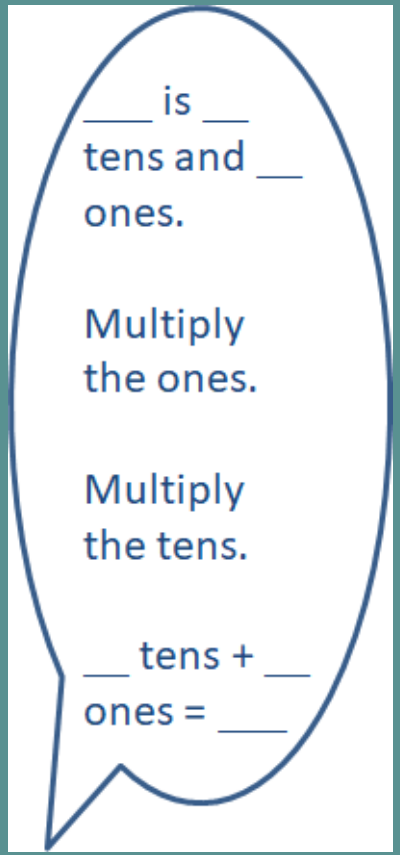
Model doubling using base 10 equipment and place value counters.

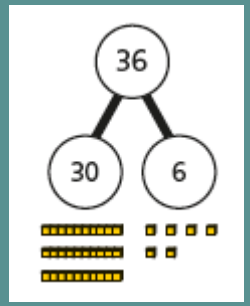
Double 26
Double 20 = 40
Double 6 = 12
40 + 12 = 52



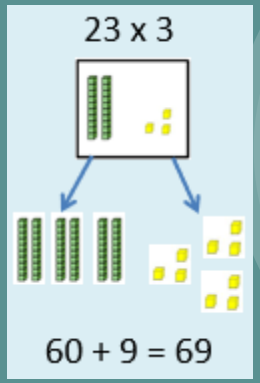
Double 26
Double 20 = 40
Double 6 = 12
40 + 12 = 52

Partitioning to multiply





2 digit x 1 digit
Use base 10, place value counters etc to partition two digit numbers before multiplying.



Record as a number sentence using brackets, partitioning mentally where possible.

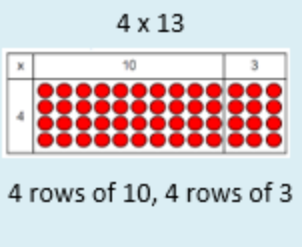
36 x 3 =

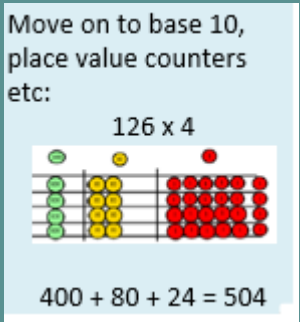
(30 x 3) + (6 x 3) =

90 + 18 = 108

Grid method

Show the links with arrays to first introduce the grid method.





Start with multiplying by one digit numbers, showing the clear addition alongside the grid.

×	30	5
7	210	35

210 + 35 = 245

Step 1: partition the numbers into a grid.

Step 2: multiply each box

Step 3: Add the product of the boxes

Column multiplication (expanded)

Step 1: multiply each digit by the ones

Step 2: multiply each digit by the tens

Step 3: add to find the product

131 x 5 = 5 + 150 + 500

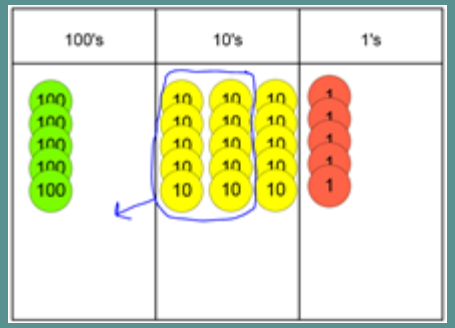
$$
\begin{array}{rl}
 & 32 \\
\times & 24 \\
\hline
 & 8 \quad (4 \times 2) \\
 & 120 \quad (4 \times 30) \\
 & 40 \quad (20 \times 2) \\
 & 600 \quad (20 \times 30) \\
\hline
 & 768
\end{array}
$$

Column multiplication (concise)

Step 1: multiply each digit by the ones (exchange if necessary)

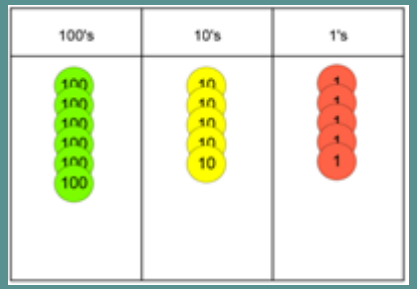
Step 2: Insert place holder and multiply each digit by the tens (regroup if necessary)

Step 3: add to find the product (regroup if necessary)



131 x 5 =
500 + 150 + 5

Regroup 150 as 1 hundred and 5 tens.

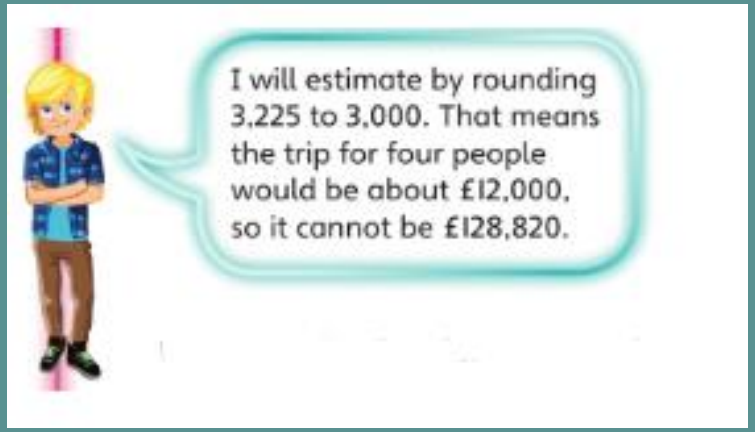


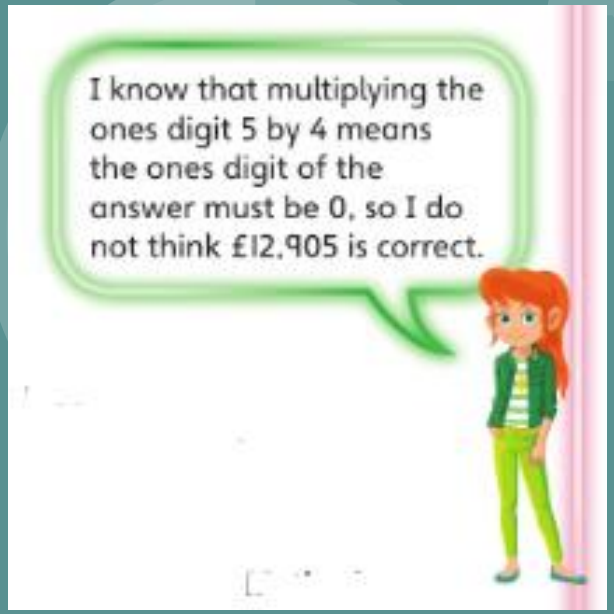
~~+1~~

H	T	O
1	3	1
		5
6	5	5

Discover

1 a) Without calculating, how can you tell which total is more likely to be correct, £128,820 or £12,905?



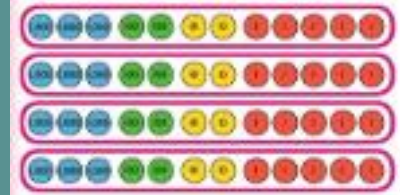


Using rounding to estimate shows that £12,905 is more likely to be correct. However, we know it is not correct because the answer must end in 0.

Discover

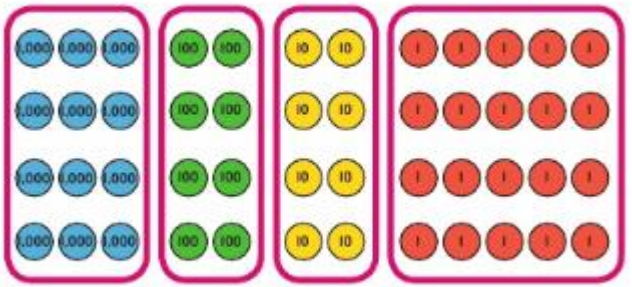
b) How much will the trip actually cost for four people?

Method 1



	3	2	2	5
	3	2	2	5
	3	2	2	5
+	3	2	2	5
1	2	9	0	0
1		1	2	

Method 2



4 × 3,000 4 × 200 4 × 20 4 × 5

12,000 + 800 + 80 + 20 = 12,900

Method 3

	3,000	200	20	5
4	12,000	800	80	20

12,000 + 800 + 80 + 20 = 12,900

Method 4

		+1	+2	
	3	2	2	5
×				4
1	2	9	0	0

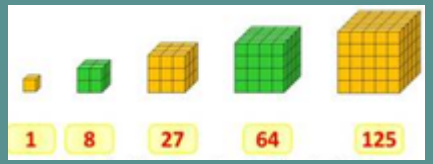
Square, cube, prime and composite numbers

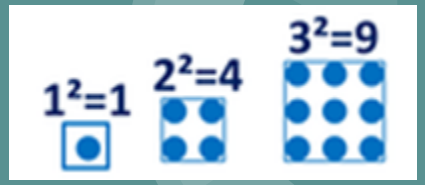
A prime number is___

A composite number is __

A square number is __

A cube number is___





$4^2 = 4 \times 4 = 16$