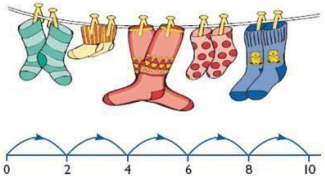
EYFS	
EYFS Early Learning Goals	**Number ELG** • Have a deep understanding of numbers to 10, including the composition of each number. • Recall fluently number bonds up to 5 and some number bonds to 10. • Recognise quantities without counting up to 5. **Numerical Patterns ELG** Children at the expected level of development will: • Count reliably beyond 20, recognising the pattern of the counting system. • Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity. • Explore patterns within numbers to 10, including doubling, halving and sharing.
Year 1	
Basic mathematical vocabulary take away, distance between, difference between, less than. How many more? How much greater? How many fewer? How much more is…? − subtract, take (away), minus, leave, how many are left/left over? how many have gone? one less, two less, ten less… how many fewer is… than…? how much less is…? difference between half, halve = equals, sign, is the same as **Instructional vocabulary** start from, start with, start at look at point, to show me	
National curriculum link: Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.	

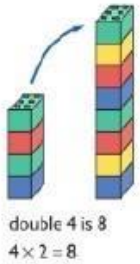
Objectives: To be able to count in 2s, 5s and 10s. Using grouping and arrays children understand multiplication is commutative.		
Concrete	**Pictorial**	**Abstract**

Grouping

2 frogs on each lily pad
Pictures to show 2 groups of 3 or 3 groups of 2 etc.

Doubling
Use practical examples

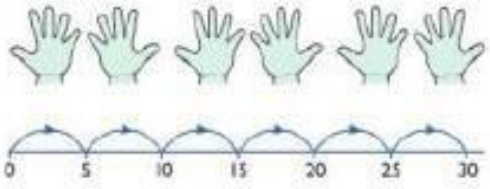




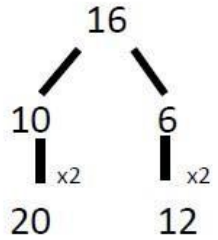
Doubling
Draw pictures to represent doubles

Double 4 is 8

Counting in multiples Draw number lines or pictorial representations to count in multiples e.g. hands, money (2p, 5p, 10p)



Partitioning and recombining to double numbers



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

2, 4, 6, 8, 10
5, 10, 15, 20, 25 , 30

Repeated addition
Write addition number sentences to describe pictures. Link to multiplication.

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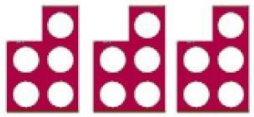
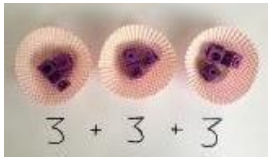
Multiples Count in multiples supported by concrete objects in equal groups.

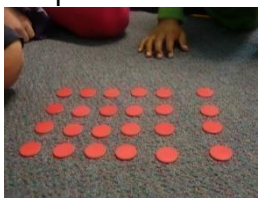
Repeated addition
Add equal groups of objects



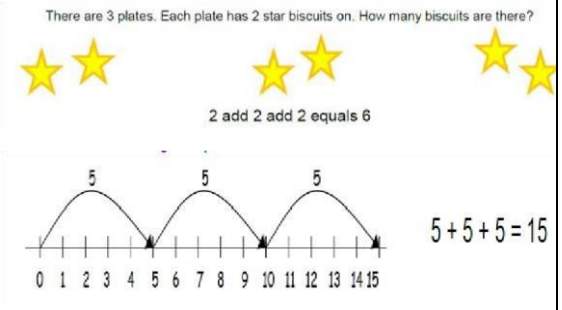


Arrays

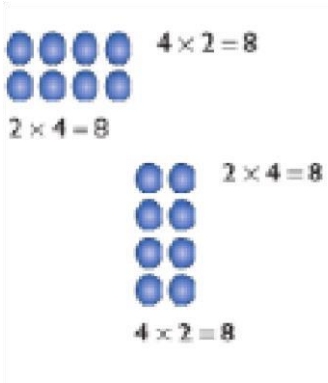
Create arrays using counters/ cubes to show multiplication sentences.

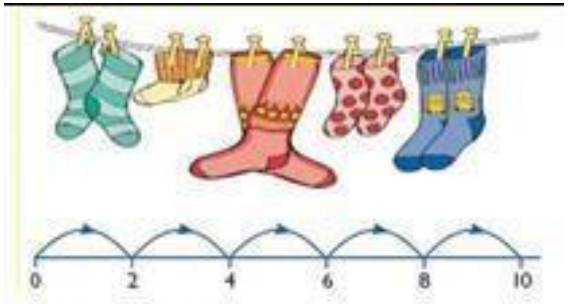


Repeated addition
Pictorial representation and number lines to calculate repeated addition sentences

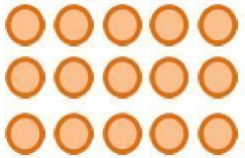


Arrays
Draw arrays in different rotations to find commutative multiplication sentences.





Use an array to write multiplication sentences and reinforce repeated addition



5 x 3 = 15
3 x 5 = 15

5 + 5 + 5 = 15

3 + 3 + 3 + 3 + 3 = 15

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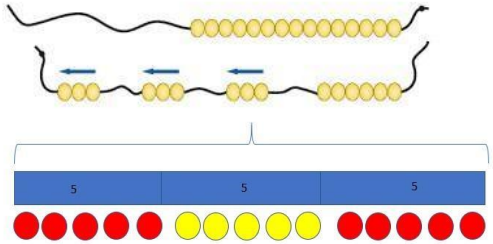
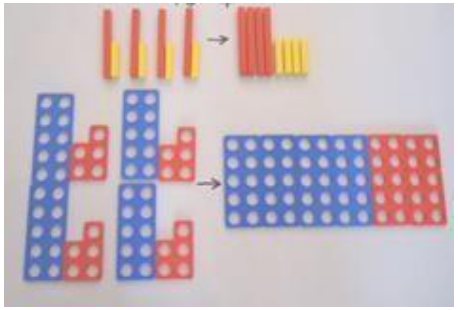
Year 2		
Basic mathematical vocabulary: lots of, groups of ×, times, multiply, multiplied by multiple of once, twice, three times… ten times… times as (big, long, wide… and so on) repeated addition array row, column double, halve share, share equally **Instructional vocabulary:** carry on, continue, repeat, what comes next? predict describe the pattern describe the rule find, find all, find different, investigate		
National curriculum link: Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (x), division (÷) and equals (=) signs. **Objectives:** • Recall and use multiplication facts for 2, 5 and 10 multiplication tables including recognising odd and even numbers. • Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot. • Solve problems involving multiplication, using materials, arrays, repeated addition, mental methods, including problems in contexts.		
Concrete	**Pictorial**	**Abstract**

Grouping

5 frogs on each lily pad 5 x 3 = 15



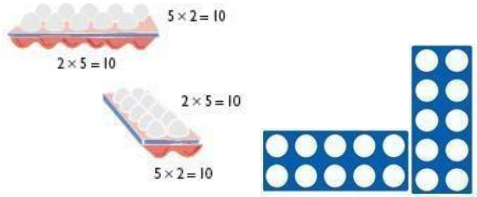
Partition to multiply (use numicon, base 10, Cuisenaire rods)
i.e. 4 x 15



Pictorial representation of arrays

4 x 5 = 20, 5 x 4 = 20.

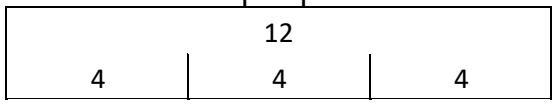
Commutativity



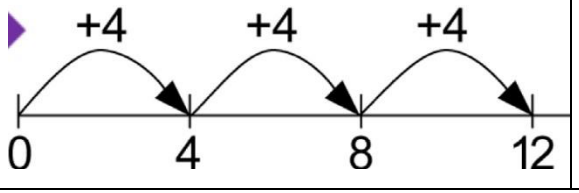
5 x 2 = 2 x 5

Bar Models

Use bar models to represent the whole and the equal parts.

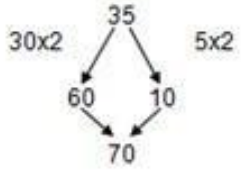


Number line



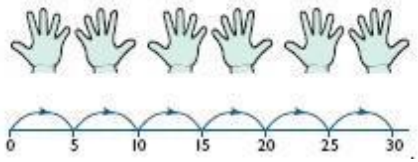
Partitioning strategy for doubling

Double 35



Understand the link between repeated addition and multiplication

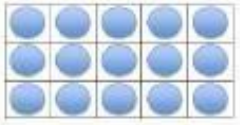
Know that 3 x 4 is the same as 4 + 4 + 4



5 + 5 + 5 + 5 + 5 + 5 = 30
5 × 6 = 30
5 multiplied by 6
6 groups of 5
6 hops of 5

Decision making

How many number sentences can you write to describe this array? Can you use addition, multiplication and division?



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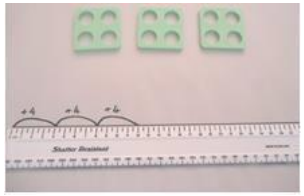
		Explain your answers.

Use number line to show repeated addition. 		

Year 3

Basic mathematical vocabulary

lots of, groups of ×, times, multiply, multiplication, multiplied by multiple of, product once, twice, three times… ten times… times as
(big, long, wide… and so on) repeated addition array row, column double, halve share, share equally one each, two each, three each…

Instructional vocabulary

carry on, continue, repeat what comes next? Predict, describe the pattern, describe the rule, find, find all, find different, investigate, choose, decide, collect

National curriculum link:

Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers.

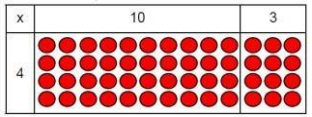
Objectives:

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.
- Solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.

Concrete	**Pictorial**	**Abstract**

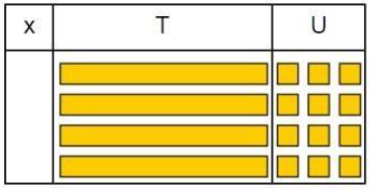
Place value materials to represent calculations

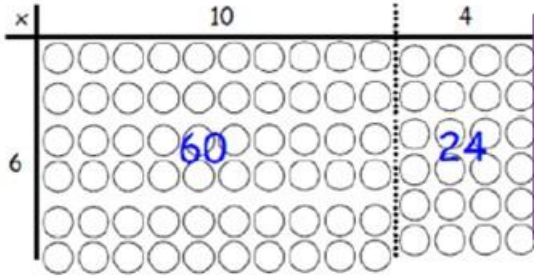
Show the link with arrays to first introduce the grid method.



4 rows of 10
4 rows of 3

Move on to using Base 10/dienes to move towards a more compact method.



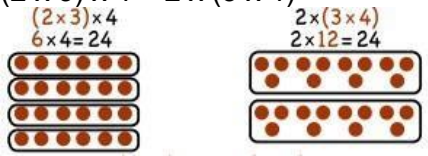


Using known facts

If 3 x 2 = 6, then 30 x 2 = 60, 60 ÷3 = 20 and
30 = 60 ÷ 2.

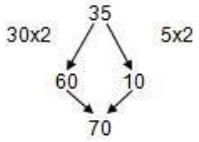
Associativity

(2 x 3) x 4 = 2 x (3 x 4)



Partitioning strategy to double

Double 35



Partitioning

Informal recording of partitioned numbers

15 x 5 = 75
10 x 5 = 50
5 x 5 = 25

27 x 3 = 81
20 x 3 = 60
7 x 3 = 21

"20 multiplied by 3 equals 60 and 7 multiplied by 3 equals 21. 60 add 21 equals 81."

Grid method 23 x 8 =

20 x 8 =160
3 x 8 = 24
23 x 8= 184

x	20	3
8		

Short multiplication – beginning with expanded…

23 x 8
24 (8 x3)
160 (8 x20)
184

Leading to compact:

```
  23
x  8
184
 2
```

Representing problems

A group of aliens live on Planet Xert. Trinions have three legs, Quadions have four legs. The group has 22 legs altogether. How many Trinions and Quadions might there be? Is there more than one solution?

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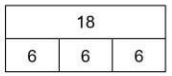
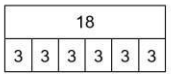
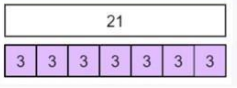
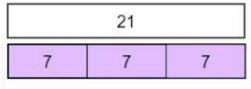
	Children can represent the work they have done with place value counters in a way that they understand. They can draw the counters, using colours to show different amounts or just use circles in the different columns to show their thinking. **Relationships between multiplication, division and fractions**   **6 × 3 = 18** **18 ÷ 6 = 3** **$\frac{1}{6}$ of 18 = 3** **3 × 6 = 18** **18 ÷ 3 = 6** **$\frac{1}{3}$ of 18 = 6**   3 x 7 = 21 21 ÷ 3 = 7 $\frac{1}{3}$ *of* 21 = 7 7 x 3 = 21 21 ÷ 7 = 3 $\frac{1}{7}$ *of* 21 = 3	
Year 4		

Basic mathematical vocabulary
lots of, groups of times, multiply, multiplication, multiplied by multiple of, product once, twice, three times… ten times… times as (big, long, wide… and so on) repeated addition array row, column double, halve, factor, multiple

Instructional vocabulary
carry on, continue, repeat what comes next? predict, describe the pattern, describe the rule pattern, puzzle, calculate, calculation, mental calculation, method, jotting, answer right, correct, wrong, what could we try next? how did you work it out? number sentence, sign, operation, symbol, equation

National curriculum link:

Mutiply two-digit and three-digit numbers by a one-digit using formal written layout.

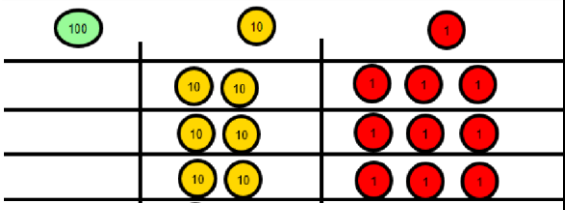
Objectives:

- Recall multiplication and division fact for multiplcation tables up to 12 x 12.
- Recognise and use factor pairs and commutaivity in mental calculations.
- Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiliyng together three numbers.
- Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.

Concrete	**Pictorial**	**Abstract**

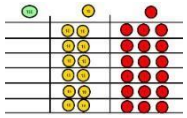
Formal column method with place value counters or base 10 (at the first stage- no exchanging) 3 x 23 Make 23, 3 times. See how many ones, then how many tens	**Using known facts** If 2 x 3 = 6 then 200 x 3 = 600 and 600 ÷3 = 200 **Distributivity** 3 x (2 +4) = 3 x 2 + 3 x 4	**Grid method** (if needed for conceptual understanding) 346 x 9 **Short multiplication -**Expanded

x	300	40	6
9			

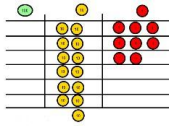


Formal column method with place value counters

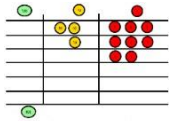
6 x 23



Step 1: get 6 lots of 23

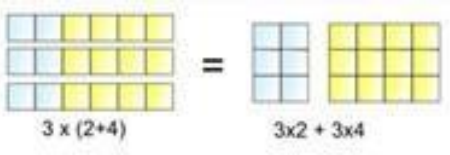


Step 2: 6 x 3 is 18. Can I make an exchange? Yes! Ten ones for one ten….



Step 3: 6 x 2 tens and my extra ten is 13 tens. Can I make an exchange? Yes! Ten tens for one hundred…

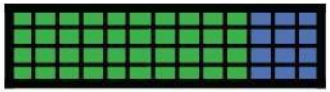
So the '3' can be 'distributed' across

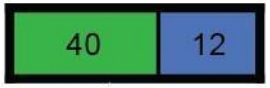


the '2 + 4' into 3 times 2 and 3 times 4

leading to

13 x 4 = 10 x 4 + 3 x 4 = 52





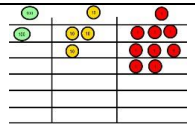
346
X 9
54 (9 x 6)
360 (9 x 40)
2700 (9 x 300)
3114

Leading to compact:

346
X 9
3104
4 5

Representing problems

Multiply a number by itself and then make one factor one more and the other one less.
What do you notice?
Does this always happen?
Eg 4 x 4 = 16 6 x 6= 36
5 x 3 = 15 7 x 5= 35
Try out more examples to prove your thinking.

 **Step 4-** what do I have I each column?		

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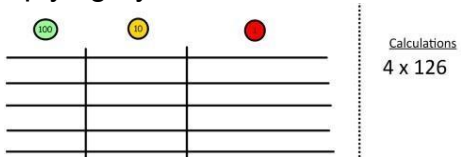
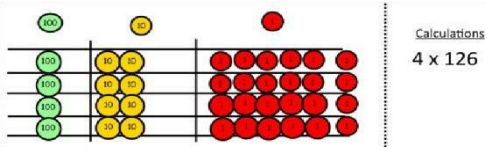
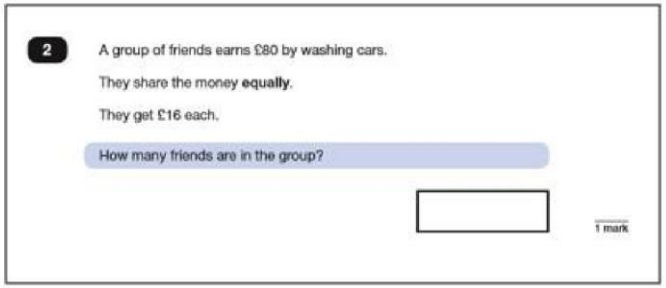
Place value materials to represent calculations Fill each row to make 126. Move on to place value counters to show how we are finding groups of a number.We are multiplying by 4 so we need 4 rows.



Add up each column, starting with the ones making any exchanges needed.





Place <, >, or = in these number sentences to make them correct:

50 x 4 ☐ 4 x 50
4 x 50 ☐ 40 x 5
200 x 5 ☐ 3 x 300

Year 5		
Basic mathematical vocabulary lots of, groups of times, multiply, multiplication, multiplied by multiple of, product once, twice, three times… ten times… times as (big, long, wide… and so on) repeated addition array row, column double, halve share, share equally factor, multiple, prime, composite **Instructional vocabulary** carry on, continue, repeat what comes next? predict, describe the pattern, describe the rule find, find all, find different, investigate		
National curriculum link: Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for twodigit numbers. **Objectives:** • Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers. • Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers. • Multiply numbers mentally drawing upon known facts. • Multiply whole numbers and those involving decimals by 10, 100 and 1000.		
Concrete	**Pictorial**	**Abstract**

Place value materials to represent calculations if needed (see Year 4)	**Grid method** (if needed for conceptual understanding)	**Short multiplication** Use expanded method first if needed to build conceptual understanding

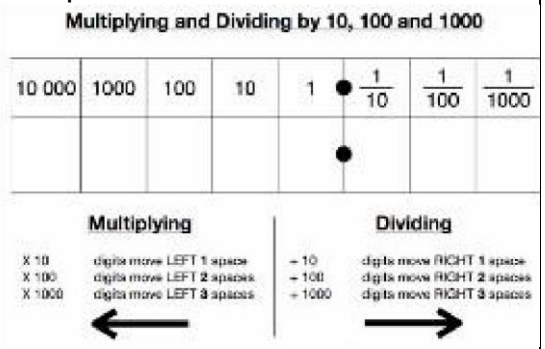
28 x 27

x	20	8
20		
7		

1342 x 18

X	1000	300	40	2
10	10000	3000	400	20
8	8000	2400	320	16

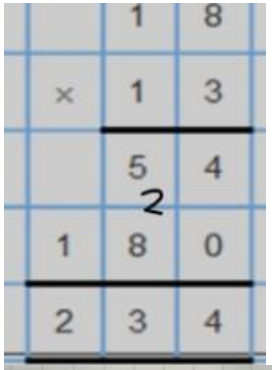
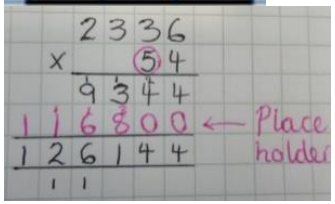
Use a place value resource to assist children in multiplying/dividing by multiples of 10.



4346
x 8
34768
2 3 4

Long multiplication
Expanded
28 x 27
56 (7x8)
140 (7 x20)
160 (20x8)
400 (20x20)
756

Leading to compact:

		  **Representing problems:** 40 cupcakes cost £3.60, How much do 80 cupcakes cost? How much do 120 cupcakes cost?

Year 6

Basic mathematical vocabulary

lots of, groups of times, multiply, multiplication, multiplied by multiple of, product once, twice, three times… ten times… times as (big, long, wide… and so on) repeated addition array row, column double, halve share, share equally factor, multiple, prime, composite

Instructional vocabulary

carry on, continue, repeat what comes next? predict, describe the pattern, describe the rule find, find all, find different, investigate

National curriculum link:

Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication.

Objectives:

- Perform mental calculations, including with mixed operations and large numbers.
- Identify common factors, common multiples and prime numbers.
- Use their knowledge of the order of operations (BODMAS) to carry out calculations involving the four operations.

Using known facts

If 2 x 3 = 6 then 0.2 x 3 =0.6 and 0.02 x 3 = 0.06

Then apply known facts to decimal multiplication 0.75 x 6
0.7 x 6 = 4.2
0.05 x 6 = 0.3
4.2 + 0.3 = 4.5

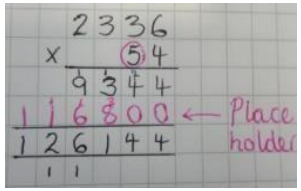
Make explicit links between decimals and money
£2.56 = 256p
Work in pence and convert back at the end of the calculation

Use place value knowledge to remove the decimal for calculation

24.3 x 6 =
Make ten times bigger = 243 x 6 243
x 6 = 1458
Make ten times smaller = 145.8

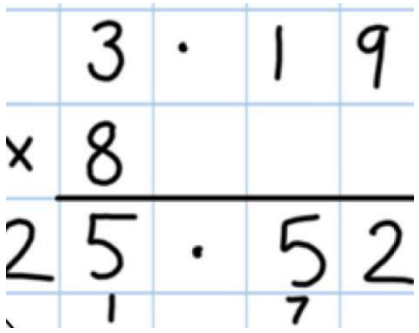
Long multiplication:

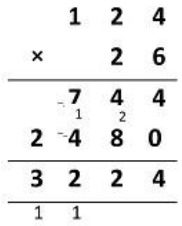
Use expanded method first if needed to build conceptual understanding



Multiplying decimals

Children must understand that the number you are multiplying by needs to be placed under the ones section and the decimal place does not move.

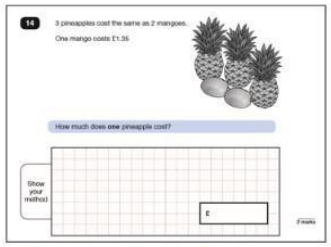


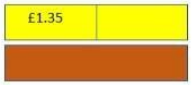


Answer: 3224

Representing problems

Amy is given the calculation 5413 x 600. She says, “I can do this without a written method.” Write down the mental steps you think Amy could do.





11 Ally chooses a whole number.

When she multiplies her number by **4**, the answer is **less than 100**

When she multiplies her number by **5**, the answer is **greater than 100**

Write a number that Ally could have started with.

1 mark

Happy, successful, curious communicators