At-Home Investigation

How many different arrays can we make with 60 squares or blocks?

Draw the arrays and label them

Use the grid paper to draw as many unique arrays using 60 squares as you can. In this activity, 6x10 is considered to be the same as 10x6, so you only need to draw it once. You will probably need multiple sheets of grid paper and will also need to cut it and stick it together to make the right sizes.

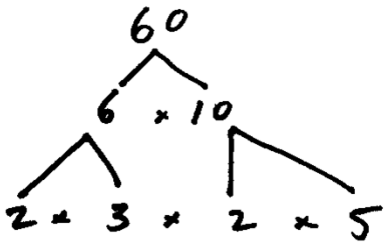
For each array, label the factors (the sides). Write each set of factors here:

Think it through

Can you find 2 other numbers between 50 and 100 that have as many or more factors than 60? Write the numbers and sketch the arrays and list the factors here:

Apply your thinking:

The factors of 60 can be broken down further into prime factors using a factor tree. The more prime factors a number has, the more factors it will have in general. Look at the factor tree below for 60. Use the same thinking to make a prime factor tree for the numbers you looked at for the previous question.



What happens if you multiply the prime factors in a different order? Can you change the result? What do you find?

This is called the **Commutative Property** of multiplication and has important links to algebra.

Multiplication practice grids:

	2	3	4	5	6	7	8	9	10
2									
3									
4									
5									
6									
7									
8									
9									
10									

	2	3	4	5	6	7	8	9	10
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Multiplying two-digit numbers

Use your previous knowledge of multiplication to help you to solve the following problems.

What we already know how to do:

$$\begin{array}{rr} & 34 \\ \times & 3 \text{ ones} \\ \hline & \\ \hline \end{array}$$

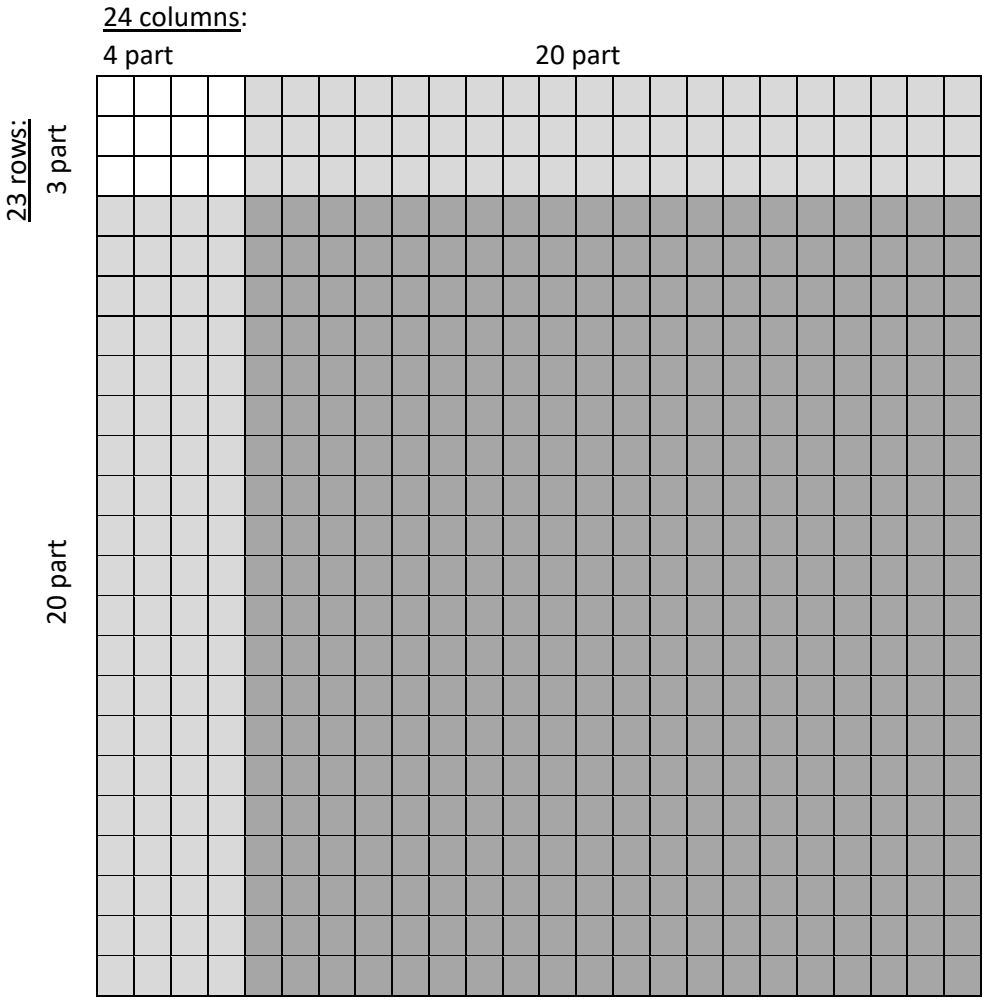
Sketch what this looks like, and break your array into the tens and ones parts. You do not need to show every single square, just make the rectangle into roughly the right proportions.

What about if we were multiplying by tens instead of ones?

$$\begin{array}{rr} & 34 \\ \times & 3 \text{ tens} \\ \hline & \text{tens} \\ \hline \end{array} \qquad \begin{array}{rr} & 34 \\ \times & 30 \text{ ones} \\ \hline & \text{ones} \\ \hline \end{array}$$

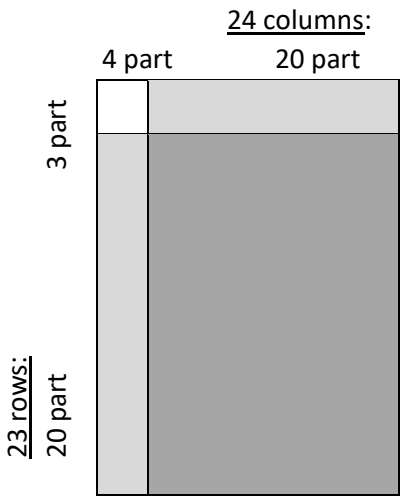
What would it look like to multiply 34 by three tens and also by three ones (34 x 33)?
Use the space below to sketch this very simply and work it out:

Here is an array for 24 x 23. Use the parts to see if you can work out what the answer is.



Work out how many squares there are in each different part of the diagram above.
Do you need to count every square or is there an easy way to work out how many there are?
Use the space below to show your calculations for each part of the array, then work out how many squares there are altogether.

Using a simplified array or written strategies is faster than drawing all of the boxes in an array. Look at the simplified array below and the written strategy. See if you can work out how they are related. Draw lines between the parts in the written strategy that relate to the array.



Written Strategy:

$$\begin{array}{r} 24 \\ \times\ 23 \\ \hline 12 \\ 60 \\ 80 \\ 400 \\ \hline \mathbf{552} \end{array}$$

Explain how the written strategy works using your own words:

Try solving the questions below. Check that you are right by sketching a simplified array.

$$\begin{array}{r} 35 \\ \times\ 23 \\ \hline \\ \\ \\ \\ \hline \\ \hline \end{array} \qquad \begin{array}{r} 28 \\ \times\ 35 \\ \hline \\ \\ \\ \\ \hline \\ \hline \end{array} \qquad \begin{array}{r} 34 \\ \times\ 21 \\ \hline \\ \\ \\ \\ \hline \\ \hline \end{array} \qquad \begin{array}{r} 25 \\ \times\ 43 \\ \hline \\ \\ \\ \\ \hline \\ \hline \end{array}$$

D12. Decimals in multiplying

TR p92

Multiplying with decimal numbers is very similar to multiplying with whole numbers. Examine the following examples and see if you can find the pattern between the decimals in the terms and the decimals in the answer.

Example 1:

12.4	$1^{1}9.3$	$2^{1}6.3$	$2^{1}4.2$
x 2	x 2	x 3	x 4
24.8	38.6	78.9	96.8

What is the pattern?

Apply this pattern to answer the questions below.

16.3	32.5	17.6	15.3
x 2	x 2	x 4	x 7

Example 2:

1.24
x 2
2.48

What is the pattern?

Apply this pattern to answer the following questions:

1.63	2.73	1.35	2.87
x 2	x 2	x 4	x 5

Make up a rule to describe how to know where to put the decimal points when multiplying:

Backwards Question:

Put the decimal points into the following equation. What other possibilities are there? Write as many as you can:

1 2 4 x 2 = 0. 2 4 8

D13. Decimals in multiplying 2

TR p93

Multiplying with decimal numbers is very similar to multiplying with whole numbers. Examine the following examples and see if you can find the pattern between the decimals in the terms and the decimals in the answer.

Examples:

5.4	0.54	54	54
x 2.3	x 2.3	x 2.3	x 0.23
162	162	162	162
1080	1080	1080	1080
12.42	1.242	124.2	12.42

What is the pattern?

Apply this pattern to answer the questions below.

56	57	5.6	7.4
x 0.43	x 5.8	x 0.82	x 6.3

Check your answers with a calculator. If you are still having difficulty seeing the pattern, go back and look at the examples again. Compare the total number of decimal places in the question with the total number of decimal places in the answer. Show your answers to your teacher before continuing.

Make up a rule to describe how to know where to put the decimal points when multiplying:

Backwards Question:

Put the decimal points into the following equation. What other possibilities are there? Write as many as you can:

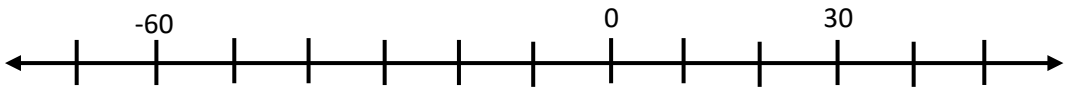
54 x 23 = 1.242

Interleaved practice

Number:

Number:

1. Add the missing numbers to the number line



2. 523 – (147 + 292) = ☐ 523 – 147 + 292 = ☐

   What is the same about these equations and what is different?

3. Write the numbers 20 to 35 in the correct box.

Prime Numbers	Composite Numbers

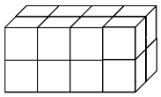
4. Round these numbers to two decimal places:
   4.7359 127.903823 15.01494 23.40975

5. Write 5 multiples for these numbers:
   15: _____ _____ _____ _____ _____

   32: _____ _____ _____ _____ _____

Measurement/Geometry:

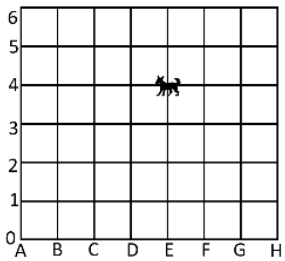
6. The small cubes in this 3D object are 1cm^3. What is the volume of the whole object?



7. You need to catch a bus to school from Main Road and be there in time for sports practice at 8:30am. Use the timetable to decide when you need to be at your bus stop and why.

Stops	Central line	Central line	Central line	Central line
Junction Street	7:46am	8:01am	8:16am	8:31am
Main Road	7:48am	8:03am	8:18am	8:33am
Anzac Avenue	7:52am	8:07am	8:22am	8:37am
Central School	7:55am	8:10am	8:25am	8:40am
Central Shopping Centre	8:01am	8:16	8:31am	8:46am

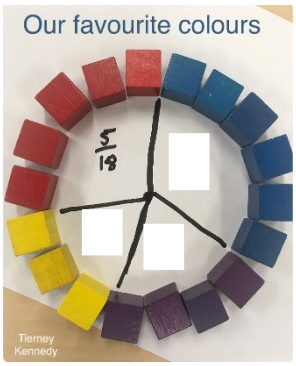
8. Write the grid reference for the dog.
   Draw another dog at C,2 on the grid.



Chance/Data:

8. In this graph, each block represents 5 people.
   How many people like each colour?
   What fraction of the sample (group of people asked) like each of the colours: Blue, Yellow or Purple?

Which two colours together were chosen by 50% of the sample?



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D4. Mental partitioning and multiplication

TR p89

Often using mental strategies when multiplying is quicker than using a calculator. Look at the following example, find the pattern, and use it to solve the problems below.

What you already know… 44 x 5 = (40 x 5) + (4 x 5) = 200 + 20 = 220

This is called the *distributive law*. Use it to try the following questions, then extend it to include multiples of ten and decimal numbers in the questions below.

Try these:

34 x 5 = ( ) + ( ) = _____ + _____ = _____

62 x 3 = ( ) + ( ) = _____ + _____ = _____

Extending the distributive law for multiplication:

Multiples of ten:

340 x 5 = ( ) + ( ) = _____ + _____ = _____

620 x 30 = ( ) + ( ) = _____ + _____ = _____

304 x 5 = ( ) + ( ) = _____ + _____ = _____

602 x 30 = ( ) + ( ) = _____ + _____ = _____

Decimals:

3.4 x 5 = ( ) + ( ) = _____ + _____ = _____

6.2 x 3 = ( ) + ( ) = _____ + _____ = _____

Check your answers with your teacher or with a calculator to make sure that you have found an appropriate process to use before continuing.

What patterns or processes have you found that work for all of the questions above?

What do you think the distributive law does?

BACKWARDS QUESTIONS:

6.02 x 3 =

3.4 x ☐ = 1.7

☐ x 0.3 = 1.86

