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.

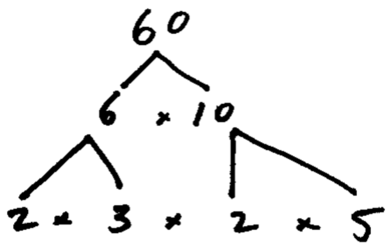
For each array, label the factors (the sides). Write each set of factors here:

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.



Multiplication practice grids:

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

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

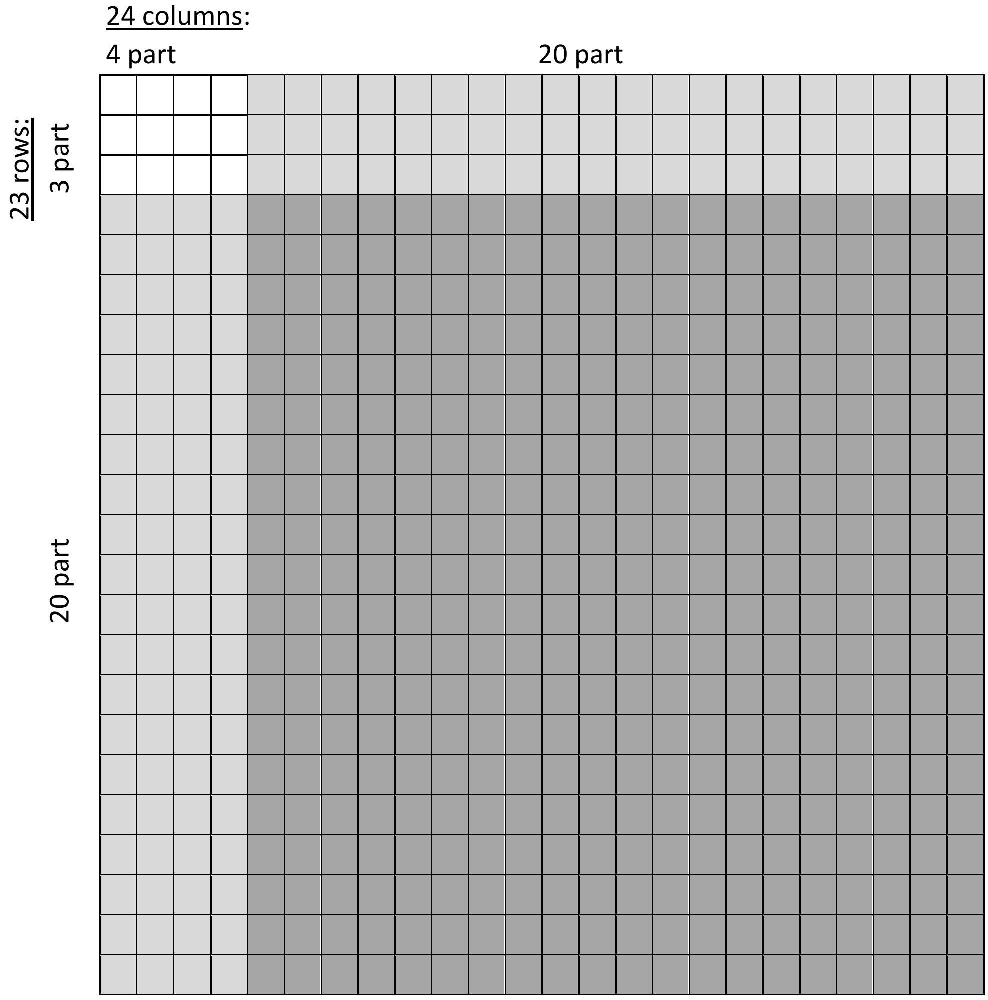
Sketch what this looks like, and break your array into the tens and ones parts. You do not need to show every single square, just make the rectangle into roughly the right proportions.

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

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

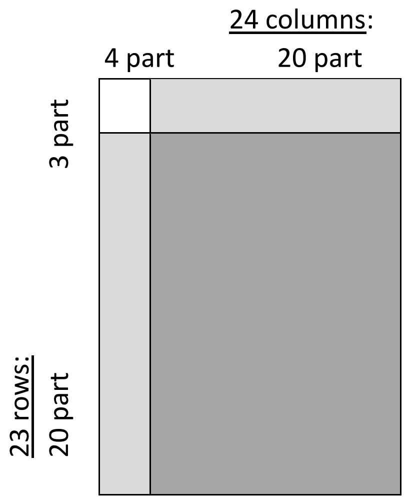
What would it look like to multiply 34 by three tens and also by three ones (34 x 33)?
Use the space below to sketch this very simply and work it out:

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:

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

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.

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

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:

$$\begin{array}{r} 12.4 \\ \times\ 2 \\ \hline 24.8 \\ \hline \end{array} \qquad \begin{array}{r} 1^{1}9.3 \\ \times\ 2 \\ \hline 38.6 \\ \hline \end{array} \qquad \begin{array}{r} 2^{1}6.3 \\ \times\ 3 \\ \hline 78.9 \\ \hline \end{array} \qquad \begin{array}{r} 2^{1}4.2 \\ \times\ 4 \\ \hline 96.8 \\ \hline \end{array}$$

What is the pattern?

Apply this pattern to answer the questions below.

$$\begin{array}{r} 16.3 \\ \times\ 2 \\ \hline \\ \hline \end{array} \qquad \begin{array}{r} 32.5 \\ \times\ 2 \\ \hline \\ \hline \end{array} \qquad \begin{array}{r} 17.6 \\ \times\ 4 \\ \hline \\ \hline \end{array} \qquad \begin{array}{r} 15.3 \\ \times\ 7 \\ \hline \\ \hline \end{array}$$

Example 2:

$$\begin{array}{r} 1.24 \\ \times\ 2 \\ \hline 2.48 \\ \hline \end{array}$$

What is the pattern?

Apply this pattern to answer the following questions:

$$\begin{array}{r} 1.63 \\ \times\ 2 \\ \hline \\ \hline \end{array} \qquad \begin{array}{r} 2.73 \\ \times\ 2 \\ \hline \\ \hline \end{array} \qquad \begin{array}{r} 1.35 \\ \times\ 4 \\ \hline \\ \hline \end{array} \qquad \begin{array}{r} 2.87 \\ \times\ 5 \\ \hline \\ \hline \end{array}$$

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:

$$\begin{array}{r} 5.4 \\ \times\ 2.3 \\ \hline 162 \\ 1080 \\ \hline 12.42 \\ \hline \end{array} \qquad \begin{array}{r} 0.54 \\ \times\ 2.3 \\ \hline 162 \\ 1080 \\ \hline 1.242 \\ \hline \end{array} \qquad \begin{array}{r} 54 \\ \times\ 2.3 \\ \hline 162 \\ 1080 \\ \hline 124.2 \\ \hline \end{array} \qquad \begin{array}{r} 54 \\ \times\ 0.23 \\ \hline 162 \\ 1080 \\ \hline 12.42 \\ \hline \end{array}$$

What is the pattern?

Apply this pattern to answer the questions below.

$$\begin{array}{r} 56 \\ \times\ 0.43 \\ \hline \end{array} \qquad \begin{array}{r} 57 \\ \times\ 5.8 \\ \hline \end{array} \qquad \begin{array}{r} 5.6 \\ \times\ 0.82 \\ \hline \end{array} \qquad \begin{array}{r} 7.4 \\ \times\ 6.3 \\ \hline \end{array}$$

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:

1. Complete the following number sequence and describe the rule used:

   8.73, 8.83, _______, ________, ________, 9.23, _______,

2. 52 342 - _______ = 30 527

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

Prime Numbers	Composite Numbers

4. Read this number and say it: 4 051 738. Round it to the nearest 10, the nearest 100, the nearest 1000, and the nearest 10 000.

5. What is $^{3}/_{5}$ of 30? Work it out in two different ways.

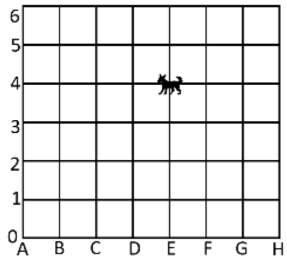
Measurement/Geometry:

6. Use a measuring jug from your kitchen. Find one container that holds less than your measuring jug and one that holds more than it. Use the measuring jug to find out how much water, each container will hold. Record your findings in millilitres and then in litres.

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 else can you tell from the information in the graph? Write 2 **true** statements.

	3	4	6	7	8
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	3	4	6	7	8
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	3	4	6	7	8
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D8. Distributive Law

TR p89

Often using mental strategies when multiplying is quicker than using a calculator. Look at the following examples, and work out how the 'distributive law' is being applied.

Distributive Law: Used when breaking up an equation into smaller parts makes it easier.

Examples:

- 19 x 5 = (9 x 5) + (10 x 5) = 45 + 50 = 95
- 36 x 9 = (30 x 9) + (6 x 9) = 270 + 54 = 324

Try these:

33 x 4 = ( ) + ( ) = ________ + _______ = ________

23 x 5 = ( ) + ( ) = ________ + _______ = ________

35 x 7 = ( ) + ( ) = ________ + _______ = ________

54 x 6 = ( ) + ( ) = ________ + _______ = ________

37 x 2 = ( ) + ( ) = ________ + _______ = ________

What do you think the distributive law does?

How do you know?

Where could you use this?

Backwards Questions:

Try to use the distributive law together with what you have learned about extending multiplication facts to solve the following:

330 x 4 = ( ) + ( ) = ________ + _______ = ________

23 x 50 = ( ) + ( ) = ________ + _______ = ________

350 x 70 = ( ) + ( ) = ________ + _______ = ________

Look up the Distributive Law using a mathematical dictionary and write a definition for it using your own words: