Application Exercise 1

Most packaged goods have the quantity printed on the package. Often, the number of items is included along with the weight.

Sometimes, the number of items does not make it easy to share. For example, original Tim Tam biscuits come in packets of 11, which is a prime number and could only be evenly shared by eleven people (or one!) unless sharing multiple packets.

Which number of items in a packet would be best for sharing?

(A)   6
(B)   10
(C)   12
(D)   60

Minimum evidence: How many factors does each number have? When would each number be useful? What are some examples?

Team names: _____

Application Exercise 2

Memorising times tables is very useful for all sorts of mathematics and its applications but we use other strategies for numbers larger than 12. Some strategies can be better for mental multiplication and even faster than reaching for a calculator.

Long (or column) multiplication is the most common method taught in primary school and would be the one people are most used to:

$$
\begin{array}{r}
^{4\,5}28 \\
\times\ 57 \\
\hline
196 \\
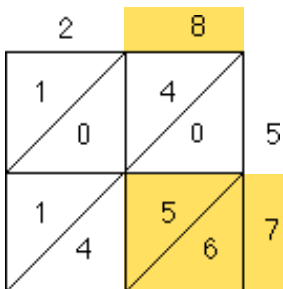\underline{1400} \\
1596
\end{array}
$$

Which of these is easiest to multiply using long multiplication?

(A) 82 × 49   (B) 23 × 21   (C) 63 × 56   (D) 37 × 101

Lattice multiplication is a similar method that better organises each part (or 'partial product') using a lattice shape:
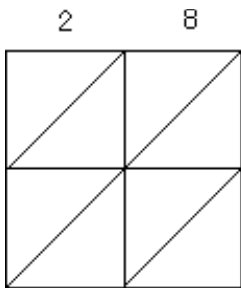

As 28 and 57 have two digits each, a lattice is set out with two columns and two rows. The diagonals are drawn in each cell. 28 is written above the lattice and 57 is written to the right, with the 10s and 1s in separate columns/rows.

Each row and column is multiplied, with the product written in the corresponding cells (with the tens above the diagonal and ones below).
For the shaded example, 8 × 7 (= 56).
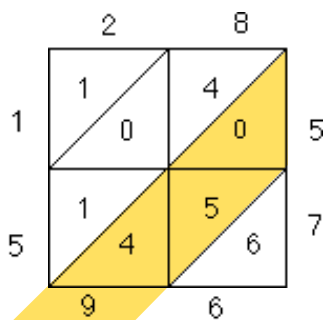
Adding along the diagonals gives the answer to the multiplication. For the shaded example, 0 + 5 + 4 = 9. Reading down the left and along the bottom gives the answer: 1596.

Which of these is easiest to multiply using lattice multiplication?

(A) 82 × 49   (B) 23 × 21   (C) 63 × 56   (D) 37 × 101

Grid multiplication represents the partial products visually:

	20	8
50	1000	400
7	140	56
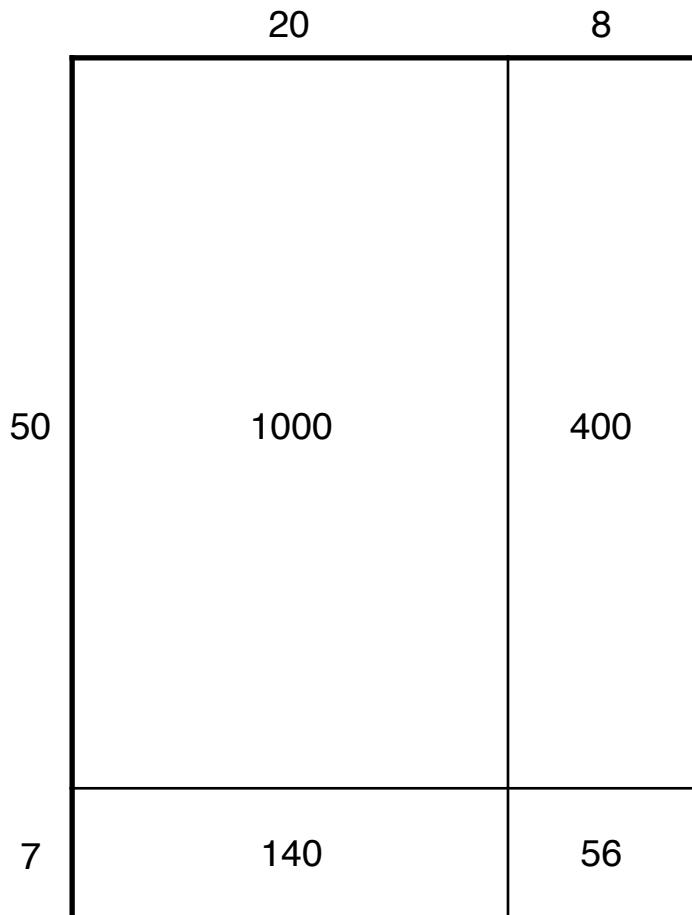
The answer is represented as the area of a rectangle with sides 28 and 57.

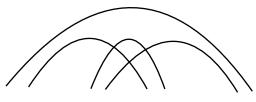The sides of the rectangle are divided into intervals based on place value.

The products in each of the regions are worked out separately and then added at the last step.

$$28 \times 57 = 1000 + 400 + 140 + 56$$
$$= 1596$$

This method can also be used for decimals, fractions and algebra.

Which of these is easiest to multiply using grid multiplication?

(A) 82 × 49   (B) 23 × 21   (C) 63 × 56   (D) 37 × 101

Multiplication by **grouping** can help efficiency by simplifying the question before working it out. This can be done mentally or written out like an algebraic equation:

$$28 \times 57 = (20 + 8)(50 + 7) \quad \leftarrow \textit{four partial products}$$
$$= 1000 + 400 + 140 + 56$$
$$= 1596$$

Some equations can be simplified. Look for numbers that are close to the nearest ten or hundred. In this example, 28 is close to 30 so instead of 'twenty-eight 57s', the equation could be rewritten as 'thirty 57s take away two 57s':

$$28 \times 57 = 30(50 + 7) - 2(57) \quad \leftarrow \textit{gives the same result}$$
$$= 1500 + 210 - 114 \quad \textit{with less to multiply or add}$$
$$= 1596$$

Which of these is easiest to multiply using grouping?

(A) 82×49 (B) 23×21 (C) 63×56 (D) 37×101

Which multiplication method is the most efficient?

      (A)   Column

      (B)   Lattice

      (C)   Grid

      (D)   Grouping

Minimum evidence: Did you notice all methods use 'partial products' (the multiplication is broken into parts) and the same numbers keep coming up? Which methods require the most writing? Which can be done mentally?