1.5 Decimal Calculations

- Addition and subtraction can be done using number-lines or in columns with the decimal points lined up vertically. Number-lines are particularly useful where negative numbers are involved. Sometimes "thinking money" is helpful.
- Multiplication is probably easiest by the "gelosia" (boxes) method. You can find the position of the decimal point in the answer by following the decimal points in the two numbers vertically and horizontally until they meet and then travelling down the diagonal.
- Division is sometimes easiest by writing the division as a fraction and multiplying numerator and denominator by 10 (or powers of 10) until they are both integers. Then a normal division method will work. Sometimes repeated subtraction is a simpler process.

1.5.1 Puzzle pictures (colour in the answers to produce a picture).

Often popular and available in books.

1.5.2 Cross-sum puzzles. (It's best to put the decimal points onto the answer grid.)

Pupils can make up their own.
Check answers with a calculator.

1.5.3 Box Method (*gelosia*) multiplication (see sheet).

Answers: ***1.*** *28;* ***2.*** *52;* ***3.*** *18.5;* ***4.*** *1312;* ***5.*** *19.5;* ***6.*** *561.2;* ***7.*** *21.66;* ***8.*** *174;* ***9.*** *0.1746;* ***10.*** *11.56;* ***11.*** *22.792;* ***12.*** *4676.8;* ***13.*** *563.744;* ***14.*** *1529.0854.*

1.5.4 **NEED** "Patterns in numbers" sheet and calculators. The aim is to look for a pattern in multiplying and dividing big and small numbers.

"If you multiply by a number bigger than 1 then the answer is bigger than what you started with." "If you multiply by a number smaller than 1 then the answer is smaller than what you started with." And the opposite way round for dividing.

Ask questions like "if I multiply 17 by 0.3 what can you tell me about the answer?"

Answer: smaller than 17, because multiplying 17 by a number <1, but bigger than 0.3 because multiplying 0.3 by a number >1, etc.

Assume that a and b are both positive, and try to complete a table of inequalities like this.

		ab	$\frac{a}{b}$ and $\frac{b}{a}$
$a>1$	$b>1$	$ab>a$ $ab>b$	$\frac{a}{b}<a$ $\frac{b}{a}<b$
	$b<1$	$ab>b$ $ab<a$	$\frac{a}{b}>a$ $\frac{b}{a}<b$
$a<1$	$b>1$	$ab>a$ $ab<b$	$\frac{a}{b}<a$ $\frac{b}{a}>b$
	$b<1$	$ab<a$ $ab<b$	$\frac{a}{b}>a$ $\frac{b}{a}>b$

Easy to get confused.
Try numbers to check them.

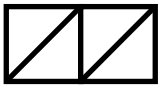
1.5.5 **NEED** "Number Investigation" sheet (2 copies on the sheet).
The aim is to explore the concept of inverses.

A number n and its reciprocal $\frac{1}{n}$ are "multiplicative inverses". Dividing by one of them is equivalent to multiplying by the other.
$n\times\frac{1}{n}=1$

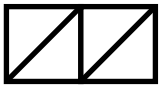
Box Method Multiplication

Use the "box method" to work out these multiplications.
Write the answers after the equals signs.

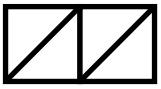
1 14 × 2 =



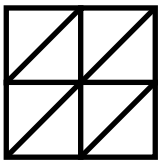
2 13 × 4 =



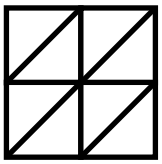
3 3.7 × 5 =



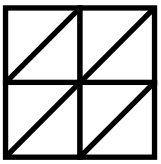
4 82 × 16 =



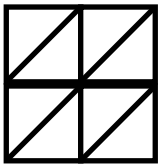
5 7.5 × 2.6 =



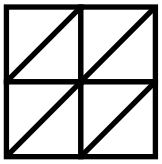
6 92 × 6.1 =



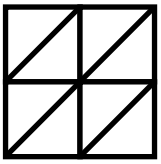
7 0.38 × 57 =



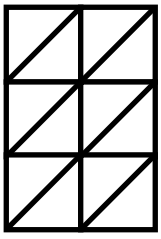
8 2.9 × 60 =



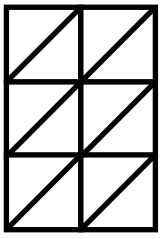
9 0.18 × 0.97 =



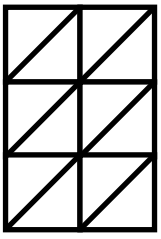
10 8.5 × 1.36 =



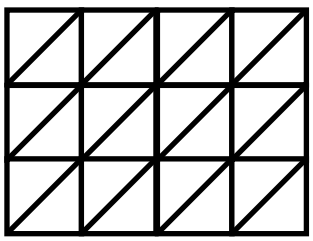
11 4.4 × 5.18 =



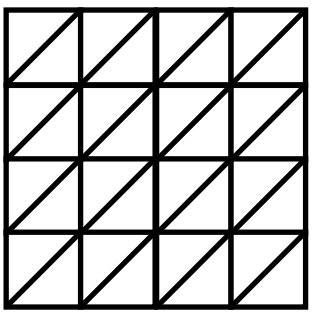
12 63.2 × 74 =
(careful!)



13 178.4 × 3.16 =



14 2.839 × 583.6 =



Patterns in Numbers

600 000 ÷ 0.002 =

6 × 0.2 =

6 × 2 =

6 ÷ 2 =

600 ÷ 0.2 =

0.06 ÷ 20 =

0.6 ÷ 0.2 =

600 ÷ 0.2 =

0.06 × 0.002 =

0.6 × 2000 =

60 × 0.2 =

600 000 × 2 000 =

6000 ÷ 200 =

60 ÷ 20 =

0.6 ÷ 20 =

600 ÷ 200 =

6 × 0.02 =

600 × 200 =

60 ÷ 0.002 =

6 ÷ 0.02 =

0.006 × 20 =

0.6 × 0.2 =

60 × 20 =

Number Investigation

Follow these instructions. Write down your results.
Can you explain what is going on?

- Start with 24.
  Work out 24 ÷ 0.5 and 24 × 2
  What do you notice?

- Now try 24 ÷ 2 and 24 × 0.5
  Write down what you notice.

- Will this always happen or does it work only for 24?
  (Try some other numbers.)

- 0.5 and 2 are a special pair of numbers.
  Can you find another pair of numbers like this?
  Can you find a rule for finding pairs of numbers that do this?

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