# Year 7 – Application of Number
## Solving problems with multiplication and division

Suggested reading

MURDEROUS MATHS — SAVAGE SHAPES
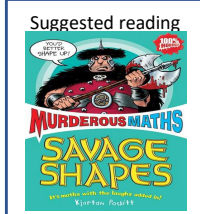
Want to know more? Scan the QR code to visit the curriculum overview for Year 7 Maths, including topic summaries, key words, and books that you may want to read in your own time

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## What do I need to be able to do?

By the end of this unit you should be able to:
- Understand and use factors
- Understand and use multiples
- Multiply/ Divide integers and decimals by powers of 10
- Use formal methods to multiply
- Use formal methods to divide
- Understand and use order of operations
- Solve area problems
- Solve problems using the mean

## Keywords

**Array:** an arrangement of items to represent concepts in rows or columns

**Multiples:** found by multiplying any number by positive integers

**Factor:** integers that multiply together to get another number.

**Mili:** prefix meaning one thousandth

**Centi:** prefix meaning one hundredth

**Kilo:** prefix meaning multiply by 1000

**Quotient:** the result of a division

**Dividend:** the number being divided

**Divisor:** the number we divide by.

## Factors

Arrays can help represent factors

5 x 2 or 2 x 5

Factors of 10
1, 2, 5, 10

10 x 1 or 1 x 10

The number itself is always a factor

Square numbers have an ODD number of factors

Factors of 4
1, 2, 4

Factors of 36
1, 2, 3, 4, 6, 9, 12, 18, 36

Be strategic - Lay factors out in pairs can help you not to miss any

## Multiples

| 4 | 4 | 4 | 4 | 4 |

Bar models can represent by something is a multiple. Eg 20 is a multiple of 4
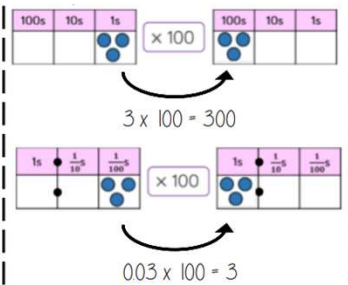
Lowest Common Multiples

| 9 | 9, 18, 27, 36 45, 54 |
| 12 | 12, 24, 36 48, 60 |

LCM of 9 and 12

The first time their multiples match

LCM = 36

9    18    27    36    45
  12    24      36    48
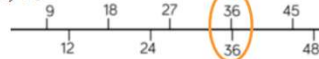
## Multiply/ Divide by powers of 10

$3 \times 100 = 300$

$0.03 \times 100 = 3$

Repeated multiplication and division by powers of 10 is commutative

$\div 10$ then $\div 10$ ⟶ $\div 100$

## Metric conversions

Useful Conversions

mm →(x10) cm →(x100) m →(x1000) km   (mm ←(÷10) cm ←(÷100) m ←(÷1000) km)

g ←(x1000) kg   (g ←(÷1000) kg)

ml →(x1000) L   (ml ←(÷1000) L)

## Multiplication methods

| | H | T | O |
| | 1 | 8 | 7 |
| x | | | 9 |

Long multiplication (column)

| x | 100 | 80 | 7 |
| 9 | | | |

Grid method

Repeated addition
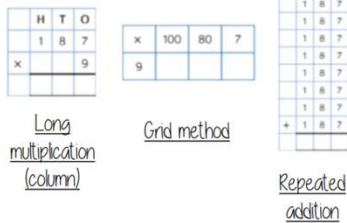
Less effective method especially for bigger multiplication

**Estimations:** Using estimations allows a 'check' if your answer is reasonable

### Multiplication with decimals

Perform multiplications as integers
eg 0.2 x 0.3 ⟶ 2 x 3

Make **adjustments** to your answer to match the question: 0.2 x 10 = 2
0.3 x 10 = 3

Therefore 6 ÷ 100 = 0.6

## Division methods

$3584 \div 7 = 512$

Short division

$7 \overline{) 3\,^3 5\,8\,^1 4}$ = 5 1 2
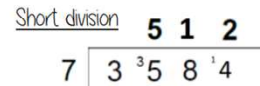
### Complex division

$\div 24 = \div 6 \div 4$

Break up the divisor using factors

### Division with decimals
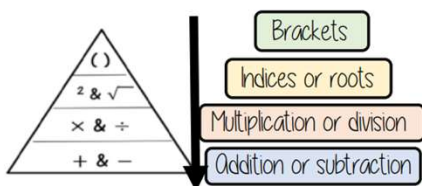
The placeholder in division methods is essential – the decimal lines up on the dividend and the quotient

$24 \div 0.02 ⟶ 24 \div 0.2 ⟶ 240 \div 2$

All give the same solution as represent the same proportion
Multiply the values in proportion until the divisor becomes an integer

## Order of operations

Brackets
Indices or roots ($^2$ & $\sqrt{}$)
Multiplication or division ($\times$ & $\div$)
Addition or subtraction ($+$ & $-$)

If you have multiple operations from the same tier work from left to right

eg $10 - 3 + 5$ ⟶ $10 - 3$ ⟶ $7 + 5$

| 6 x 4 | + | 8 x 2 |
| 24 | + | 16 | = 40 |

## Area problems

**Rectangle**
Base x Perpendicular height
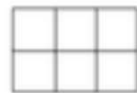
**Parallelogram/ Rhombus**
Base x Perpendicular height

**Triangle**
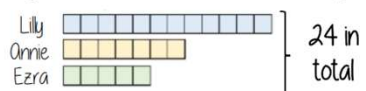½ x Base x Perpendicular height

A triangle is half the size of the rectangle it would fit in

## Mean problems

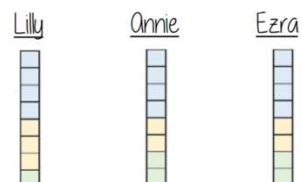Mean – a measure of average
It gives an idea of the central value

Lilly, Annie and Ezra have the following cubes

Lilly
Annie
Ezra

24 in total

Finding the mean amount is the average amount each person would have if shared out equally

Lilly    Annie    Ezra

The mean number of blocks would be 8 each