

YEAR 7 — APPLICATION OF NUMBER

Solving problems with multiplication and division

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.

Mil: 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

Factors of 10: 1, 2, 5, 10

Factors of 4: 1, 2, 4

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

The number itself is always a factor

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

Square numbers have an ODD number of factors

Multiples

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

Lowest Common Multiples

LCM of 9 and 12

LCM = 36

The first time their multiples match

9, 18, 27, 36, 45, 54

12, 24, 36, 48, 60

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 $\div 10 \rightarrow \div 100$

Metric conversions

Useful Conversions

mm $\xrightarrow{\times 10}$ cm $\xrightarrow{\times 100}$ m $\xrightarrow{\times 1000}$ km

g $\xrightarrow{\times 1000}$ kg

ml $\xrightarrow{\times 1000}$ L

Reverse: $\xrightarrow{-10}$, $\xrightarrow{-100}$, $\xrightarrow{-1000}$

Multiplication methods

Long multiplication (column)

Grid method

Repeated addition

Multiplication with decimals

Perform multiplications as integers e.g. $0.2 \times 0.3 \rightarrow 2 \times 3$

Make adjustments to your answer to match the question: $0.2 \times 10 = 2$, $0.3 \times 10 = 3$

Therefore $6 \div 100 = 0.06$

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

Division methods

Short division: $3584 \div 7 = 512$

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

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

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

Multiplication or division

Addition or subtraction

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

e.g. $10 - 3 + 5 \rightarrow 10 - 3 \rightarrow 7 + 5$

$6 \times 4 + 8 \times 2 = 24 + 16 = 40$

Area problems

Rectangle: Base x Perpendicular height

Parallelogram/ Rhombus: Base x Perpendicular height

Triangle: $\frac{1}{2} \times$ 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: 8 cubes, Annie: 8 cubes, Ezra: 8 cubes

24 in total

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

The mean number of blocks would be 8 each