

YEAR 7 — APPLICATION OF NUMBER

Solving problems with addition and subtraction

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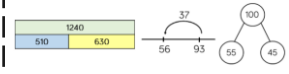
What do I need to be able to do?

- By the end of this unit you should be able to:
- Understand properties of addition/ subtraction
 - Use mental strategies for addition/subtraction
 - Use formal methods of addition/subtraction for integers
 - Use formal methods of addition/subtraction for decimals
 - Solve problems in context of perimeter
 - Solve problems with finance, tables and timetables
 - Solve problems with frequency trees
 - Solve problems with bar charts and line charts

Keywords

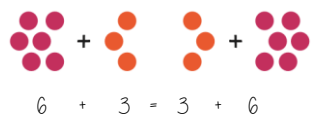
- Commutative:** changing the order of the operations does not change the result
- Associative:** when you add or multiply you can do so regardless of how the numbers are grouped
- Inverse:** the operation that undoes what was done by the previous operation (The opposite operation)
- Placeholder:** a number that occupies a position to give value
- Perimeter:** the distance/ length around a 2D object
- Polygon:** a 2D shape made with straight lines
- Balance:** in financial questions — the amount of money in a bank account
- Credit:** money that goes into a bank account
- Debit:** money that leaves a bank account

Addition/ Subtraction with integers



- Modelling methods for addition/ subtraction
- Bar models
 - Number lines
 - Part/ Whole diagrams

Addition is commutative



The order of addition does not change the result

Subtraction the order has to stay the same

$$360 - 147 = 360 - 100 - 40 - 7$$

- Number lines help for addition and subtraction
- Working in 10's first aids mental addition/ subtraction
- Show your relationships by writing fact families

Formal written methods

	H	T	O
	1	8	7
+	5	4	2

	H	T	O	
		4	2	7
-		2	4	9

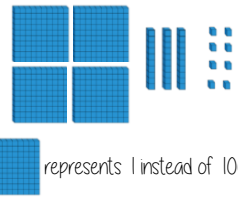
Remember the place value of each column. You may need to move 10 ones to the ones column to be able to subtract

Addition/ Subtraction with decimals

4	.	3	8
7	.	9	0
			+

0 can be used to fill empty places with value

The decimal place acts as the placeholder and aligns the other values

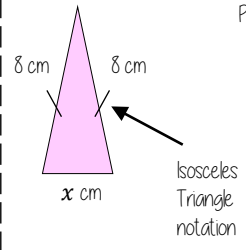


$$5.43 + \frac{8}{10}$$

Revisit Fraction — Decimal equivalence
 $5.43 + 0.8$

Solve problems with perimeter

Perimeter is the length around the outside of a polygon



The triangle has a perimeter of 25cm
Find the length of x

$$8\text{cm} + 8\text{cm} + x\text{cm} = 25\text{cm}$$

$$16\text{cm} + x\text{cm} = 25\text{cm}$$

$$x\text{cm} = 9\text{cm}$$

Solve problems with finance

- Profit = Income - Costs
- Credit — Money coming into an account
- Debit — Money leaving an account

Money uses a two decimal place system
14.2 on a calculator represents £14.20

Check the units of currency — work in the same unit

Tables and timetables

Distance tables

London		Cardiff	Glasgow	Belfast
211	556	493	177	
518		392		

This shows the distance between Glasgow and London
It is where their row and column intersects

Bus/ Train timetables

Harton	1005	1045	1130
Bridge	1024	1106	1147
Avile	1051	1133	1205
Ware	1117	1202	1233

Each column represents a journey each row represents the time the 'bus' arrives at that location

TIME CALCULATIONS — use a number line

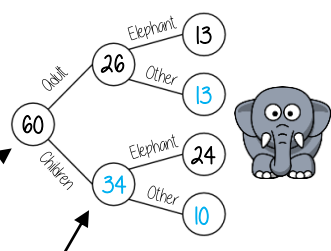
Two-way tables

	H	T
H	HH	HT
T	TH	TT

Where rows and columns intersect is the outcome of that action

Frequency trees

60 people visited the zoo one Saturday morning
26 of them were adults. 13 of the adult's favourite animal was an elephant. 24 of the children's favourite animal was an elephant

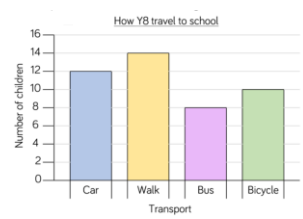


The overall total '60 people'

A frequency tree is made up from part-whole models. One piece of information leads to another

Probabilities or statements can be taken from the completed trees
e.g. 34 children visited the zoo

Bar and line charts



Use addition/ subtraction methods to extract information from bar charts

e.g. Difference between the number of students who walked and took the bus
Walk frequency — bus frequency

When describing changes or making predictions:

- Extract information from your data source
- Make comparisons of difference or sum of values
- Put into the context of the scenario

YEAR 7 — APPLICATION OF NUMBER

Solving problems with multiplication and division

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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.
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

Square numbers have an ODD number of factors

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

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

100s 10s 1s

3 x 100 = 300

0.03 x 100 = 3

Repeated multiplication and division by powers of 10 is commutative

÷ 10 then ÷ 10 → ÷ 100

Metric conversions

Useful Conversions

mm → cm (÷ 10) → m (÷ 100) → km (÷ 1000)

g → kg (÷ 1000)

ml → L (÷ 1000)

÷ 1000 → g

× 1000 → L

Multiplication methods

Long multiplication (column)

Grid method

Repeated addition

Multiplication with decimals

Perform multiplications as integers e.g. 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 = 0.06

Division methods

Short division: 512 ÷ 7 = 3⁵8¹4

Complex division: ÷ 24 = ÷ 6 ÷ 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 ÷ 0.02 → 24 ÷ 0.2 → 240 ÷ 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 → 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: 1/2 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

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