

YEAR 7 — APPLICATION OF NUMBER

Fractions and percentages of amounts

@whisto_maths

What do I need to be able to do?

- By the end of this unit you should be able to:
- Find a fraction of a given amount
 - Use a given fraction to find the whole or other fractions
 - Find the percentage of an amount using mental methods
 - Find the percentage of a given amount using a calculator

Keywords

- Fraction:** how many parts of a whole we have
Equivalent: of equal value
Whole: a number with no fractional or decimal part
Percentage: parts per 100 (uses the % symbol)
Place Value: the value of a digit depending on its place in a number. In our decimal number system, each place is 10 times bigger than the place to its right
Convert: change into an equivalent representation, often fraction to decimal to a percentage cycle.

Fraction of a given amount

Find $\frac{2}{5}$ of £205

The bar represents the whole amount

£205

£41

2 out of the 5 equal parts
 $2 \times £41 = \underline{£82}$

$£205 \div 5 = £41$

Each part of the bar model represents £41

90

30 30 30

15 15 15

Use bar models for comparisons

$\frac{1}{3}$ of 90 = 30

$\frac{2}{3}$ of 45 = 30

$\therefore \frac{1}{3}$ of 90 = $\frac{2}{3}$ of 45

Use a fraction of amount

$\frac{2}{3}$ of a value is 70. What is the whole number?

70

35 35 35

$70 \div 2 = 35$

Each part of the bar model represents 35

$35 \times 3 = 105$

The whole number is 105

The wording of the question is important to setting up the bar model

$\frac{3}{4}$ of a number is 63

63

21 21 21 21

Find the whole

What is $\frac{1}{6}$ of the number?

84

14 14 14 14 14 14

Use the whole to find a given part

= 14

Find the percentage of an amount (Mental methods)

The whole represents 100%

10% = $\frac{1}{10}$ of the whole

0% 20% 40% 60% 80% 100%

$10\% = \frac{1}{10}$ of the whole $50\% = \frac{5}{10} = \frac{1}{2}$ of the whole

$20\% = \frac{2}{10} = \frac{1}{5}$ of the whole $5\% = \frac{1}{20}$ of the whole

Find 65% of 80

80

8 8 8 8 8 8 8 8 8 8

Method 1
 $65\% = 10\% \times 6 + 5\%$
 $= (8 \times 6) + 4$
 $= 52$

Method 2
 $65\% = 50\% + 10\% + 5\%$
 $= 40 + 8 + 4$
 $= 52$

For bigger percentages it is sometimes easier to take away from 100%

Find the percentage of an amount (Calculator methods)

Using a multiplier

Find 65% of 80

Fraction, decimal, percentage conversion

$65\% = \frac{65}{100} = 0.65$ ← The multiplier

$0.65 \times 80 = 52$

Using the percent button

Find 65% of 80

Type 65

Press **SHIFT** **C** **(%)**

Press **×** 80 and then press =

This brings up the % button on screen
 You will see 65%

You can also use the calculator to support non calculator methods and find 1% or 10% then add percentages together

"of" can represent 'x' in calculator methods

YEAR 7 — DIRECTED NUMBER

Operations with equations and directed numbers

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What do I need to be able to do?

- By the end of this unit you should be able to:
- Perform calculations that cross zero
 - Add/ Subtract directed numbers
 - Multiply/ Divide directed numbers
 - Evaluate algebraic expressions
 - Solve two-step equations
 - Use order of operations with directed number

Keywords

- Subtract:** taking away one number from another.
Negative: a value less than zero.
Commutative: changing the order of the operations does not change the result.
Product: multiply terms.
Inverse: the opposite function.
Square root: a square root of a number is a number when multiplied by itself gives the value (symbol $\sqrt{\quad}$)
Square: a term multiplied by itself.
Expression: a maths sentence with a minimum of two numbers and at least one math operation (no equals sign)

Perform calculations that cross zero

Number lines are useful to help you visualise the calculation crossing 0

$4 - 6 = -2$

Use the number line to guide subtraction of 6

Start at 4

Find the difference between 6 and -4

From 6 to 0
6
From 0 to -4
4
10 beads between them

$-5 + 5 = 0$ Rearrangements of the same equation $5 - 5 = 0$

Add directed numbers

$2 + -4 = -2$

Zero pair $(-1 + 1 = 0)$

Two -1 's left $= -2$

$8 + -3 = 5$

Partitioning

$8 + -3 = 5$ $5 + 3 + -3 = 5$

Partition the value to create a zero pair calculation

Generalisation $+ - = -$

Subtract directed numbers

Representation for calculation

$2 - -1 = 3$

Take away one

Start with the representation of 2

$2 - -3 = 5$

Generalisation $- - = +$

Multiply/ Divide directed numbers

Two representations of the same calculation $2 \times -3 = -6$

Negative, Negative calculation

-2×-3

This is the negative of 2×-3

$-2 \times -3 = 6$

The act of making counters into their negative is turning them over

Divisions are the inverse operations

Evaluate algebraic expressions

$a = 5$ $b = -4$

$a^2 = 5^2$ $b^2 = (-4)^2$
 $a^2 = 25$ $b^2 = 16$

With negative numbers the brackets are important so that it performs -4×-4 .

Brackets around negative substitutions helps remove calculation errors

$2a - b = 2 \times 5 - (-4) = 10 + 4 = 14$

$3b - 2a = 3(-4) - 2(5) = -12 - 10 = -22$

Two-step equations

Bar Model

$4x + 2 = 10$

Representing the same question (use fact families)

$10 - 4x = 2$

Function machine

$x \rightarrow \times 4 \rightarrow +2 \rightarrow 10$

Inverse operations to find x

Use order of operations

Brackets

Indices or roots

Multiplication or division

Addition or subtraction

Remember square roots have a positive and negative value

x	-3	-2	-1	0	1	2	3
-3	9	6	3	0	-3	-6	-9
-2	6	4	2	0	-2	-4	-6
-1	3	2	1	0	-1	-2	-3
0	0	0	0	0	0	0	0
1	-3	-2	-1	0	1	2	3
2	-6	-4	-2	0	2	4	6
3	-9	-6	-3	0	3	6	9

YEAR 7 — FRACTIONAL THINKING

Addition and subtraction of fractions

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What do I need to be able to do?

- By the end of this unit you should be able to:
- Convert between mixed numbers and fractions
 - Add/Subtract unit fractions (same denominator)
 - Add/Subtract fractions (same denominator)
 - Add/Subtract fractions from integers
 - Use equivalent fractions
 - Add/Subtract any fractions
 - Add/Subtract improper fractions and mixed numbers
 - Use fractions in algebraic contexts

Keywords

- Numerator:** the number above the line on a fraction. The top number. Represents how many parts are taken
- Denominator:** the number below the line on a fraction. The number represent the total number of parts
- Equivalent:** of equal value
- Mixed numbers:** a number with an integer and a proper fraction
- Improper fractions:** a fraction with a bigger numerator than denominator
- Substitute:** replace a variable with a numerical value
- Place value:** the value of a digit depending on its place in a number. In our decimal number system, each place is 10 times bigger than the place to its right

Representing Fractions

$\frac{1}{4}$ is represented in all the images

$1 \div 4$

Mixed numbers and fractions

$\frac{7}{5}$ Improper fraction

$1\frac{2}{5}$ Mixed number

In this model 5 parts make up a whole

Fractions can be bigger than a whole

Odd/Subtract unit fractions

Same denominator

$\frac{1}{12} + \frac{1}{12} - \frac{1}{12} = \frac{2}{12}$

$\frac{1}{4} + \frac{1}{4} = \frac{2}{4}$

With the same denominator ONLY the numerator is added or subtracted

Add/Subtract fractions

Same denominator

$\frac{2}{7} + \frac{3}{7} = \frac{5}{7}$

Sequences

$\frac{1}{3}, 1, 1\frac{2}{3}, 2\frac{1}{3}, 3, \dots$

Represent this on a number line to help

Odd/Subtract from integers

$1 - \frac{2}{6} = \frac{4}{6}$

$3 + \frac{1}{6} = 3\frac{1}{6}$

The denominator indicates the number of parts a whole is made up of

Equivalent fractions

Numerator and denominator have the same multiplier

$\frac{2}{3} = \frac{4}{6}$

$\frac{1}{3} = \frac{2}{6}$

Odd/Subtraction fractions (common multiples)

Addition/Subtraction needs a common denominator

$\frac{3}{5} + \frac{7}{10} = \frac{6}{10} + \frac{7}{10} = \frac{13}{10}$

Odd/Subtraction any fractions

$\frac{4}{5} - \frac{2}{3} = \frac{12}{15} - \frac{10}{15} = \frac{2}{15}$

Use equivalent fractions to find a common multiple for both denominators

Odd/Subtraction fractions (improper and mixed)

$2\frac{1}{5} - 1\frac{3}{10} = 2\frac{2}{10} - 1\frac{3}{10} = \frac{22}{10} - \frac{13}{10} = \frac{9}{10}$

- Convert to an improper fraction
- Calculate with common denominator

Fractions in algebraic contexts

$k - \frac{5}{8} = 2$

Apply inverse operations: $k = 2 + \frac{5}{8}$

Form expressions with fractions: $b + \frac{7}{9} \rightarrow b + \frac{7}{9}$

Substitution: $\frac{5}{8} + \frac{1}{2}$

$p = 5 \quad m = 2$

Fractions and decimals

Example: $\frac{6}{10} + 0.3 = 0.6 + 0.3$

$\frac{1}{10} = 0.1$

$\frac{1}{100} = 0.01$

Remember to use equivalent fractions and common denominators