Year 8
01 Ratio

Year 8
- Understand and use ratio notation
- Solve problems involving ratios of the form 1 : n
- Divide in a given ratio
- Express ratios in their simplest integer form

Learning Journey

Keywords

Ratio: a statement of how two numbers compare

Equal Parts: all parts in the same proportion, or a whole shared equally

Proportion: a statement that links two ratios

Order: to place a number in a determined sequence

Part: a section of a whole

Equivalent: of equal value

Factors: integers that multiply together to get the original value

Scale: the comparison of something drawn to its actual size

Dr Frost Key Skills

224a-j – Simplifying ratios and forming ratios from a given context

227a-j -Combining ratios and proportions into a single ratio

Key Knowledge

Find the **Highest common factor** that goes into all parts of the ratio

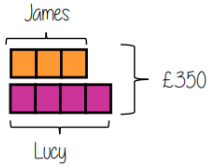
Simplifying ratios

$\div 8$ ($8 : 64$ / $1 : 8$) $\div 8$

Sharing a whole into a given ratio

James and Lucy share £350 money in the ratio 3 : 4.
Work out how much each person earns

1) Model the question

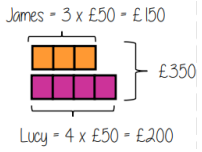


2) Find the value of one part

£350 ÷ 7 = £50

□ = one part
= £50

3) Put back into question



Find one share of a ratio given another

Juice is made from cordial and water in the ratio 2 : 5

Kevin has 250 ml of water, how much cordial should he add to make the juice?

Cordial : Water

$\times 50$ ($2 : 5$ / $100 : 250$) $\times 50$

Year 8
02 Multiplicative Change

Keywords

Direct Proportion: A relationship between two quantities such that as one increases, the other increase

Variable: A part that the value can be changed

Axes: Horizontal and vertical lines that a graph is plotted around

Approximation: An estimate for a value

Scale Factor: The multiple that increases/ decreases a shape in size

Currency: The system of money used in a particular country

Conversion: The process of changing one variable to another.

Scale: The comparison of something drawn to its actual size

Exchange Rate: The value of one currency for the purpose of conversion to another.

Dr Frost Key Skills

177 Exchange Rates
176 Multiplicative Scaling and Numerical proportion and best value problems
178 Conversion Graphs
283 Scale Drawings including map scales

Year 8

- Understand and use ratio notation
- Solve problems involving ratios of the form 1 : n
- Divide in a given ratio
- Express ratios in their simplest integer form

Learning Journey

Key Knowledge

Direct Proportion

5 apples cost £1.50.
What is the cost of 12 apples?

Apples	Cost (£)
5	£1.50
1	£0.30
12	£3.60

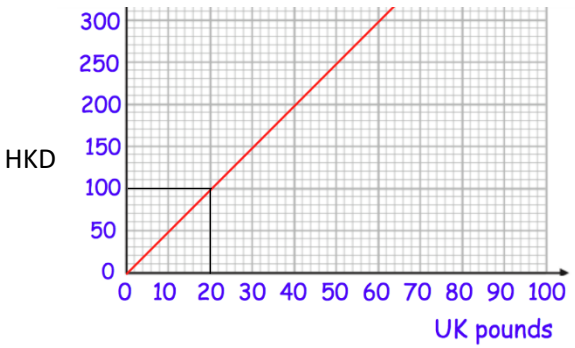
÷ 5, × 12 (Apples); ÷ 5, × 12 (Cost)

Always work out what one unit is

Using Conversion Graphs

What is £20 worth in Hong Kong Dollars?

100 HKD



Currency Conversion

Katie is going on holiday to Poland.
The exchange rate is £3 = 6 Zloty

How much Zloty would Katie get if she exchanged £110?

£	Zloty
£3	6 Zloty
£1	2 Zloty
£110	£220

÷ 3, × 110 (£); ÷ 3, × 110 (Zloty)

Always write down what you know

Currency Conversion

Katie is coming back to the UK
The exchange rate is £3 = 6 Zloty

How much Pounds would Katie get back if she exchanged 400 Zloty?

£	Zloty
£3	6 Zloty
£1	2 Zloty
£200	£400

÷ 3, × 200 (£); ÷ 3, × 200 (Zloty)

Year 8
03 Multiplication and Division in Fractions

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..

Whole: A positive number including zero without any decimal or fractional parts.

Commutative: An operation is commutative if changing the order does not change the result.

Unit Fraction: A fraction where the numerator is one and denominator a positive integer.

Non-unit Fraction: A fraction where the numerator is larger than one.

Dividend : The amount you want to divide up.

Divisor: The number that divides another number.

Reciprocal: A pair of numbers that multiply together to give 1.

Dr Frost Key Skills

119 Multiplying Fractions and Mixed numbers by an integer
120 Multiplying Proper Fractions with no Simplifying
121 Dividing Fractions by Integers
165 Dividing Proper Fractions
165 Multiplying Proper Fractions
167, 168 Multiplying and Dividing involving a mixed number

Year 8
Multiply a fraction by an integer
Find the product of a pair of unit fractions
Find the product of a pair of any fractions
Divide an integer by a fraction
Divide a fraction by a unit fraction
Understand and use the reciprocal
Divide any pair of fractions
Multiply and divide improper and mixed fractions

Learning Journey

Key Knowledge

Multiplying non-unit fractions

Parts Shaded

Simplify your answer if possible!

$$\frac{3}{4} \times \frac{2}{3} = \frac{3\times2}{4\times3} = \frac{6}{12} = \frac{1}{2}$$

Total number of parts in the diagram

Finding Reciprocals

When you multiply a number by its reciprocal the answer is always 1

The reciprocal of 3 is $\frac{1}{3}$

$3 \times \frac{1}{3} = 1$

The reciprocal of $\frac{2}{5}$ is $\frac{5}{2}$

$\frac{2}{5} \times \frac{5}{2} = 1$

Dividing any fractions

To divide a fraction by a fraction.

We multiply the first fraction with the reciprocal of the second fraction.

$$\frac{3}{4} \div \frac{1}{3} = \frac{3}{4} \times \frac{3}{1} = \frac{3\times3}{4\times1} = \frac{9}{4} = 2\frac{1}{4}$$

Change your answer to a mixed number if asked!

Year 8
Representing Data

Keywords

Relationship: The link between two variables (items). E.g. Between sunny days and ice cream sales

Correlation: The mathematical definition for the type of relationship.

Origin: Where two axes meet on a graph.

Line of best fit: A straight line on a graph that represents the data on a scatter graph.

Outlier: A point that lies outside the trend of graph.

Quantitative: Numerical data

Qualitative: Descriptive information, colours, genders, names, emotions etc.

Continuous: Quantitative data that has an infinite number of possible values within its range.

Discrete: Quantitative or qualitative data that only takes certain values.

Frequency: The number of times a particular data value occurs.

Interpolation: This is where you use the line of best fit to estimate values inside our data point

Extrapolation - This is where we use our line of best fit to predict information outside of our data

Dr Frost Key Skills

27 Reading values from a table of discrete or categorial data
235 Reading and Interpreting ungrouped frequency table
238 Two-Way Tables
244 Scatter Graphs
245 Line of Best Fit
248e Determine a probability using a Two-Way table

Learning Journey

Year 7
Calculate the probability of single events

Year 8
Draw and interpret scatter graphs
Draw and use line of best fit
Identify different types of data
Read and interpret grouped frequency tables
Read and interpret ungrouped frequency tables
Construct and Interpret Two Way tables

Key Knowledge

Two-way tables

Two-way tables can be used to represent discrete information in a visual way that allows you to make conclusions, find probability or find totals of subgroups.

There are 2 green rectangles

	Rectangles	Circles	Total
Green	2	1	3
Blue	2	2	4
Total	4	3	7

There are 7 total shapes

Using your Two-way tables

We could use the Two-way tables to calculate probabilities?

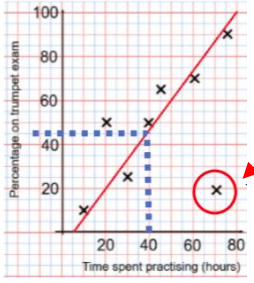
a) What fraction of the items are **green**?
We have 3 green items but 7 in total = $\frac{3}{7}$

Make sure you have read the question!

b) What fraction of the **rectangles** are **green**?
We have 2 green rectangles but 4 rectangles in total = $\frac{2}{4}$

Line of Best Fit

When drawing **a line of best fit**, draw a line that roughly goes through the middle of all the scatter points on the data



This point is an outlier because it stands apart from the data.

Year 8
Working in the cartesian plane

Keywords

Gradient:
The steepness of a line

Intercept:
This is where two lines cross

The y-intercept:
This is where the line meets the y-axis

Parallel:
Two lines that never meet with the same gradient

Co-ordinate:
A set of values that show an exact position on a graph

Substitute:
When a letter is replaced by a number

Reciprocal:
A pair of numbers that multiply together to give 1

Perpendicular:
Two lines that meet at a right angle. The gradients multiplied equals to -1

Coefficient:
A number or quantity placed with a variable.

Dr Frost Key Skills

267-Plotting a straight line from a table of values
268 -Relationship between a line and its equation
269 -x and y intercepts of the line
270A-L -Gradients of the line
273 -Drawing a line from its equation
274 -Equation of parallel lines
445a-c – Equations of perpendicular lines

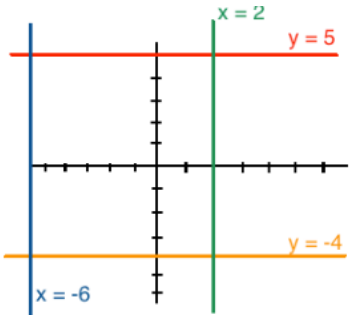
Year 8
- Generate sequences given a rule in words
- Generate sequences given a simple algebraic rule

Generate sequences given a complex algebraic rule
Find the rule for the nth term of a linear sequence

Learning Journey

Key Knowledge

Lines parallel to the axis



Lines parallel to the **y axis** take the form **x = a** and are **vertical**

Lines parallel to the **x axis** take the form **y = a** and are **horizontal**

$$y = mx + c$$

The coefficient of x (the number in front of x) tells us the **gradient** of the line

$y = mx + c$

Y and x are **coordinates**

The value of c is the point at which the line crosses the y-axis.
Y intercept

Plotting Straight Line graphs

To plot a straight line graph,
you may be given a table or you may need to draw one.

Plot the graph of $y = 4x - 2$ for the values of x from -3 to 3

1) Draw a table of values if you have not been given one

x	-3	-2	-1	0	1	2	3
y							

2) Substitute in your x values to y = 4x – 2, this will give the corresponding y values

x	-3	-2	-1	0	1	2	3
y	-14	-10	-6	-2	2	6	10

3) Plot the points on the graph.

E.g. (-3, -14), (-2, -10), (-1, -6), (0, -2), …. etc

Year 8
Tables and Probability

Keywords

Outcomes: The result of an event that depends on probability.

Probability: The chance that something will happen.

Set: A collection of objects.

Chance: The likelihood of a particular outcome.

Event: The outcome of a probability – a set of possible outcomes.

Biased: A built-in error that makes all values wrong by a certain amount.

Union: Notation 'U' meaning the set made by comparing the elements of two sets.

Sample Space: This a collection or a set of possible outcomes of a random experiment.

Year 7

Interpret and create Venn diagrams
Understand and use the intersection of sets
Understand and use the union of sets
Generate sample spaces for single events
Calculate the probability of a single event
Understand and use the complement of a set (H)

Year 8 **Learning Journey**

Construct sample spaces for one or more events
Find probabilities from a sample space
Find probabilities from two-way tables
Find probabilities from Venn diagrams
Use the product rule for finding the total number of possible outcomes

Key Knowledge

Construct Sample Space Diagrams

Sample space diagrams provide a systematic way to display outcomes from events

The possible outcomes from rolling a dice

The possible outcomes from tossing a coin	1	2	3	4	5	6
H	1,H	2,H	3,H	4,H	5,H	6,H
T	1,T	2,T	3,T	4,T	5,T	6,T

This is the set notation to list the outcomes S =

In between the { } are a; the possible outcomes

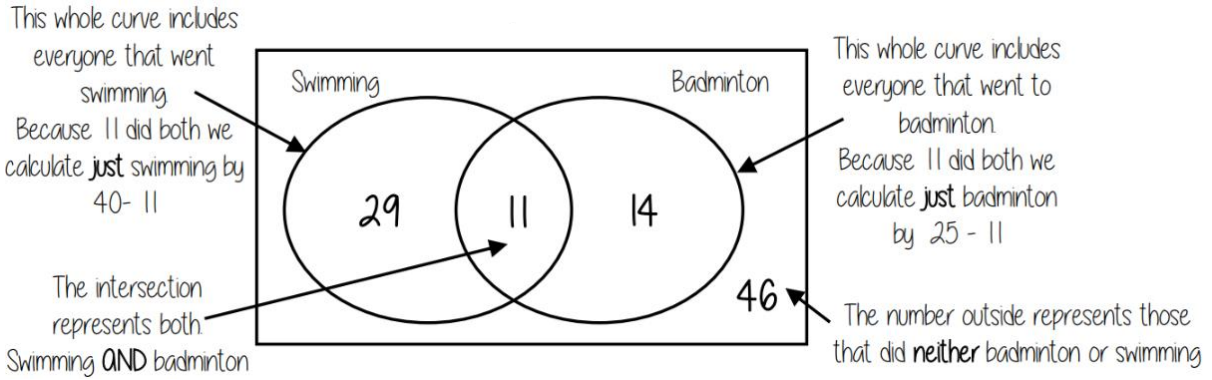
S = { 1H, 2H, 3H, 4H, 5H, 6H, 1T, 2T, 3T, 4T, 5T, 6T }

What is the probability that an outcome has an even number and a tails?

$$P(Even\ Number\ and\ Tails) = \frac{3}{12}$$

Probability from Venn Diagram

100 students were questioned if they played badminton or went to swimming club.
40 went swimming.
25 went to badminton and 11 went to both.



Dr Frost Key Skills

355 Probabilities from Venn Diagram
356 Probabilities from Venn Diagram using Set notation
242 Construct a Venn Diagram
243 Union, Intersection and sets
249 Sample Space Diagrams

Year 8 Sequences

Keywords

Sequence: Items or numbers put in a pre-decided order

Term: A single number or variable

Position: The place something is located

Linear: The difference between terms increases or decreases (+ or -) by a constant value each time

Non-linear: The difference between terms increases or decreases in different amounts, or by x or ÷

Difference: The gap between two terms

Arithmetic: A sequence where the difference between the terms is constant

Geometric: Sequence where each term is found by multiplying the previous one by a fixed nonzero number

Nth term
A rule to a sequence of numbers. The n stands for the term number

Fibonacci Sequence
A sequence in which each number is the sum of the two preceding ones.

Dr Frost Key Skills

202 Distinguishing between different types of sequences
203 Describing, generating and continuing sequences using term to term rule
204 Generating terms of a sequence given a position-to-term rule.
205 nth term formula for an arithmetic sequence
206 Determining if a term belongs in an arithmetic sequence

Year 7
Describe and continue sequences
Predict and check next term(s)
Linear and non-linear sequences
Continue linear sequences
Continue non-linear sequences
Explain the term-to-term rule
Find missing terms (H)

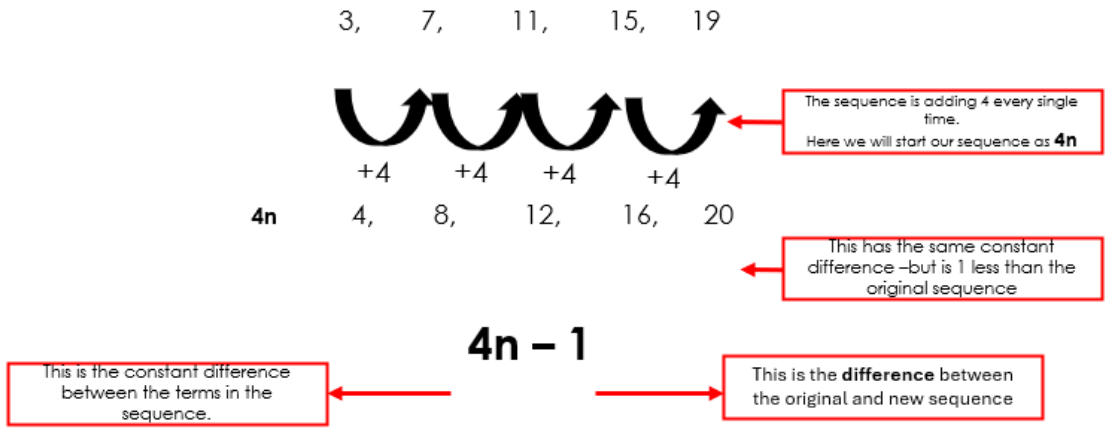
Learning Journey

Year 8
Generate sequences given a rule in words
Generate sequences give a simple algebraic rule
Generate sequences given a complex algebraic rule
Find the rule for the nth term of a linear sequence

Key Knowledge

Find the nth term

Find the nth term for the following sequence 3, 7, 11, 15, 19



Finding terms using the nth term

$2n - 1$

Substitute the number of the term you are looking for in place of n

e.g.

1st term = $2(\mathbf{1}) - 1 = 1$

50th term = $2(\mathbf{50}) - 1 = 99$

100th term= $2(\mathbf{100}) - 1 = 199$

Year 8
Brackets, Equations and Inequalities

Keywords

Simplify: Grouping and combining similar terms

Substitute: Replace a variable with a numerical value

Equivalent: Something of equal value

Coefficient: A number used to multiply a variable

Product: It is the result of multiplying two or more terms together

Highest Common Factor (HCF): This is the largest whole number which is shared by given numbers.

Factorise : Finding what to multiply to get an expression.

Expand: Multiply each term in the bracket by the expression outside the bracket.

Dr Frost Key Skills

252 Expanding a single bracket
299 Expanding two Brackets
199 Solving linear equations
200 Solving equations with powers and roots
254 Solving Linear equations with brackets
257 Solving linear equations where unknowns on both sides
259 Forming and solving equation
253 Factorise out a single term
339 Solving linear inequalities
340 Solving inequalities where unknowns on both side
342 forming and solving inequalities

Year 8
Form algebraic expressions
Multiply out a single bracket
Factorise into a single bracket
Expand multiple single brackets and simplify
Expand a pair of binomials
Solve equations, including with brackets
Form and solve equations with brackets
Understand and solve simple inequalities
Solve equations and inequalities with unknowns on both sides (H)
Form and solve equations and inequalities with unknowns on both sides

Learning Journey

Year 7
Solve two-step equations
Introduction to two-step equations
Solve one-step linear equations involving +/- using inverse operations
Solve one-step linear equations involving x/÷ using inverse operations

Directed numbers

+ + → +

− − → +

+ − → −

− + → −

e.g.
a = -5 and b =2

$a^2 = a \times a = -5 \times -5 = \mathbf{25}$

$b + a = 2 + -5 = \mathbf{-3}$

Multiply Single Brackets

Expand $3(2x + 4)$

	2x	4
3	$\mathbf{3 \times 2x = 6x}$	$\mathbf{3 \times 4 = 12}$

$6x + 12$

Multiply the terms inside the bracket with the term on the outside.

$3(2x + 4) = 6x + 12$

Factorise into single brackets

Factorise

$14 - 7y$

1) Find the highest common factor of each of the terms in the expression

Factors of 14:
1, 14, 2, 7

Factors of 7:
1, 7

2) Write the highest common factor (HCF) in front of the bracket

$7(\ -\ )$

3) Fill in each term in the bracket by multiplying out.

$7(2\ -\ y)$

What do I need to multiply 7 by to give 14?

What do I need to multiply 7 by to give me 7y?

Fully Factorise

$18x^2 + 12x$

1) Find the highest common factor of each of the terms in the expression

Factors of 18:
1, 18, 2, 9, 3, 6

Factors of 12:
1, 12, 2, 6, 3,4

2) Write the highest common factor (HCF) in front of the bracket **(Both terms has an x variable)**

$6x(\ -\ )$

3) Fill in each term in the bracket by multiplying out.

$6x(3x + 2)$

Year 8 Indices

Keywords
Base: The number that gets multiplied by a power

Power: The exponent – or the number that tells you how many times to use the number in multiplication

Indices: The power

Coefficient: The number used to multiply a variable

Simplify: To reduce a power to its lowest term

Product: Multiply

Cube: A cube number is the result of multiplying a number by itself twice.

Expression : An expression is a combination of numbers, variables, functions (such as addition, subtraction, multiplication or division etc.)

Dr Frost Key Skills

88 Power notation and Calculate Simple Powers
157 Roots and Further Powers
158 Numerical Index Laws
194 Algebraic Index Laws

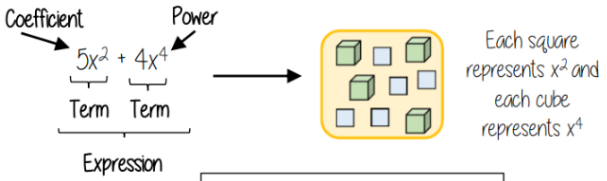
Learning Journey

Year 7
Understand the meaning of like and unlike terms
Simplify algebraic expressions by collecting like terms using the ≡ symbol

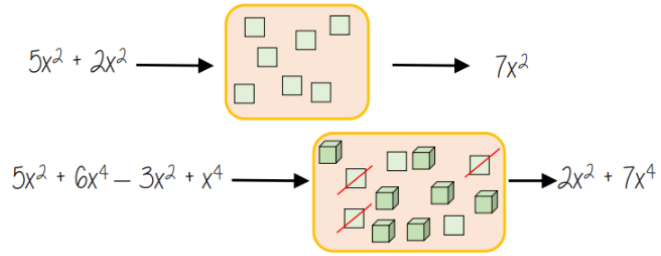
Year 8
Adding and Subtracting with Indices
Simplifying Algebraic expressions by multiplying indices
Simplifying Algebraic expressions by dividing indices
Using the addition law for indices
Using the addition and subtraction law for indices
Exploring powers of powers (H)

Key Knowledge

Addition and subtraction with indices



Only similar terms can be simplified
If they have different powers, they are unlike terms



Multiplication and Dividing with Indices

Multiplication Law:
When multiplying with the same base, **we add the powers.**

$$a^m \times a^n = a^{m+n}$$

Examples

$2^5 \times 2^7 = 2^{12}$

$a^3 \times a^5 = a^8$

Division law:
When dividing with the same base (number/letter) **we subtract the powers.**

$$a^m \div a^n = a^{m-n}$$

Examples

$2^{14} \div 2^9 = 2^5$

$a^3 \div a^5 = a^{-2}$

Year 8
Fractions and Percentages

Keywords

Percent: Parts per 100 – Written using the % symbol.

Decimal: A number that consists of a whole and a fractional part

Fraction: A fraction represents how many parts of a whole value you have.

Equivalent: Of equal value.

Reduce: To make smaller in value.

Growth: To increase/ to grow.

Integer:
Whole number, can be positive, negative or zero.

Invest:
Putting money into something to earn a financial gain.

Profit:
Money that is earned in a trade after paying the costs of producing and selling the goods

Dr Frost Key Skills

130 Percentage of an amount
215 Percentage change
217 Percentage of an amount greater than 100%
219 Percentage of amount using decimal multiplier
220 Percentage increase or decrease
222 Reverse percentages (finding the original amount)
223 Reverse Percentages (using decimal multiplier

Year 7
Understand the meaning of percentage using a hundred square

Convert fluently between simple fractions, decimals and percentages

Percentages of amounts using proportion method

Year 8

Learning Journey

Percentage of an amount
Convert fluently between key fractions decimals and percentages
Calculate key fractions, decimals and percentages of an amount without a calculator
Calculate percentage increase and decrease using a multiplier
Express one number as a fraction or a percentage of another without a calculator
Work with percentage change
Find the original amount given the percentage less than 100%
Find the original amount given the percentage greater than 100%

Key Knowledge

Percentage of an amount (Non-Calculator)

To calculate any percentage, it is useful to start with 10%

30% of 120: 10% = 120 ÷ 10 = 12 ← To find 10% we divide by 10.

30% = 3 x 12 = 36 ← To find 30% we multiply 10% by 3.

Percentage of an amount (Calculator)

To calculate any percentage, we will use a decimal multiplier.

Change the percentage to a decimal multiplier and then multiply

83% of 120: 83% = 0.83

83% of 120= 0.83 x 120= 99.6

Percentage Increase and Decrease (Non-Calculator)

Increase:
To calculate a percentage increase, we calculate the percentage and add the value on to the original amount

Increase 70 by 65%

10% = 70 ÷ 10 = 7 5%= 7 ÷ 2 = 3.5

60% = 6 x 7 = 42

65%= 60% + 5% = 42 + 3.5 = 45.5

70 +45.5 =115.5

Percentage Increase and Decrease (Calculator)

Increase:
To calculate a percentage increase, calculate 65% using the decimal multiplier and add it on

Increase 70 by 65%

65% of 70 65% = 0.65

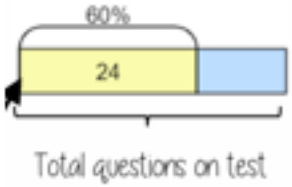
65% of 70= 0.65 x 70 = 45.5

70 + 45.5 = 115.5

Finding the original amount

In a test Lucy scored 60% of her questions correctly.
Her score was 24.
How many questions were on the test?

Always draw a bar model to illustrate the question



60% = 24
÷ 60 ÷ 60
1% = 0.4
× 100 × 100
100% = 40

Year 8
Standard Index Form

Keywords

Standard form – A number written in the form $A \times 10n\ where\ 1 \leq A < 10$ and n is an integer.

Commutative: An operation is commutative if changing the order does not change the result.

Base: The number that gets multiplied by a power

Power: The exponent – or the number that tells you how many times to use the number in multiplication

Exponent: The power – or the number that tells you how many times to use the number in multiplication

Indices: The power or the exponent.

Negative: A value below zero.

Place Value : Place value is the value of a digit according to its position in the number such as ones, tens, hundreds

Dr Frost Key Skills

301 Conversion of large numbers to and from standard form
302 Conversion of small numbers to and from standard form
303 Adding and Subtracting of Standard form
304 Multiplying and Dividing of standard form

Year 8

Investigate positive powers of 10
Work with numbers greater than 1 in standard form
Investigate negative powers of 10
Work with numbers between 0 and 1 in standard form
Add and subtract numbers in standard form
Multiply and divide numbers in standard form

Learning Journey

Key Knowledge

Converting with Standard Form

Ordinary numbers: To change between ordinary numbers and standard form we need to use a power of 10.

This number need to be bigger than 1 and less than 10 to be in standard form

$8400000 = 8.4 \times 10^6$

Positive power = Bigger Number
Negative Power = Smaller Number

$0.0007 = 7 \times 10^{-4}$

Standard form: To change numbers from standard form back to ordinary numbers we multiply by the power of 10

$4.21 \times 10^5 = 421000$

5 to the right → The power tells us how many places to move **not how many zeros to add**

$2.21 \times 10^{-3} = 0.0221$

3 to the left

Adding and subtracting with standard form

1) Convert both numbers to standard form
2) Do the calculation
3) Convert back to standard form (depending on the question)

$$6 \times 10^5 + 8 \times 10^4$$
$$= 600000 + 80000$$
$$= 680000$$
$$= 6.8 \times 10^5$$

Year 8 Number Sense

Year 7
Round a number to 1 significant figure
Round integers to the nearest power of ten
Use estimation as a method for checking mental calculations

Year 8
Round numbers to powers of 10 and 1 significant figure
Round numbers to a given number of decimal places
Estimate the answer to a calculation
Understand and use error interval notation (H)

Learning Journey

Calculate using the order of operations
Calculate with money
Convert metric measures of lengths
Convert metric units of area (H)

Keywords

Significant: Place value of importance

Round: Making a number simpler but keeping its value close to what it was.

Decimal: Place holders after the decimal point.

Overestimate: Rounding up – gives a solution higher than the actual value

Underestimate: Rounding down – gives a solution lower than the actual value.

Metric: A system of measurement.

Balance: The amount of money in a bank account

Deposit: Putting money into a bank account.

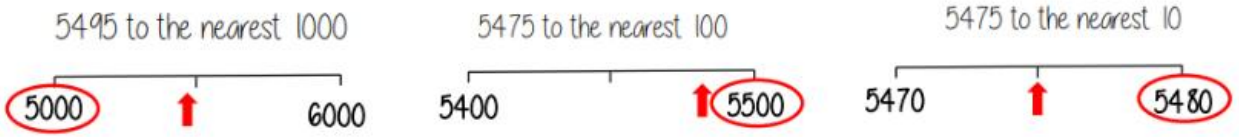
Dr Frost Key Skills

37 Rounding to powers of 10
75 Rounding to decimal places
187 Rounding a number to a given number of significant figures
188 Estimation
115 Order of Operations
107 Converting between metric units of measure
323 Converting between units of area and volume

Key Knowledge

Round to powers of 10 and 1 significant figure

If the number is halfway between, we "**roundup**"



370 to 1 significant figure is 400
37 to 1 significant figure is 40
37 to 1 significant figure is 4
037 to 1 significant figure is 04
000037 to 1 significant figure is 0.0004

Round to the first non-zero number

When rounding using significant figures, look at the place value of the number

Estimation

$$\frac{348+692}{0.526} \approx \frac{300+700}{0.5} = \frac{1000}{0.5} = 2000$$

To estimate you should round each number in a calculation to 1 significant figure, then calculate.

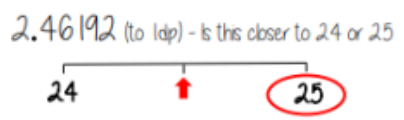
This is an **underestimate** because both values were rounded down

Round to decimal places

2.46192

Focus on the number after the decimal point

Round to 1 decimal place- To one number after the decimal.



Round to 2 decimal place- To one number after the decimal.

Year 8
Angles in Parallel Lines and Polygons

Year 7
Understand angles of turn
Classify angles
Draw and Measure angles up to 360 degrees
Angles in a triangle, quadrilateral and polygon
Investigate angles in parallel lines
Vertically Opposite angles
Understand and use the sum of angles at a point
Angles on a straight line

Year 8 **Learning Journey**
Identify and calculate with alternate and corresponding angles
Identify and calculate with co-interior, alternate and corresponding angles
Solve complex problems with parallel line angles
Investigate the properties of special quadrilaterals
Understand and use the sum of exterior angles of any polygon
Understand and use the sum of the interior angles in any polygon
Calculate missing interior angles in regular polygons

Keywords
Parallel: Straight lines that never meet

Angle: The figure formed by two straight lines meeting (measured in degrees)

Transversal: A line that cuts across two or more other (normally parallel) lines

Isosceles: Two equal size lines and equal size angles (in a triangle or trapezium)

Polygon: A 2D shape made with straight lines

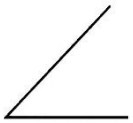
Sum: Addition (total of all the interior angles added together)

Regular polygon: All the sides have equal length; all the interior angles have equal size.

Dr Frost Key Skills
77 Types of Quadrilaterals and triangles
147 Vertically Opposite Angles
151 Sum of angles in Quadrilaterals
261 Interior and Exterior angles of regular and irregular polygons
262 Alternate, Corresponding and Co-interior angles

Key Knowledge

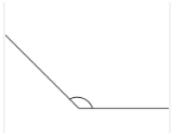
Basic angle rules



Acute Angle
$0° < angle < 90°$

Right Angle
$90°$

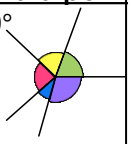
Angles on a Straight Line
$180°$

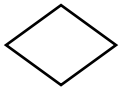


Obtuse Angle
$90° < angle < 180°$

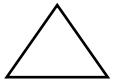
Reflex Angle
$180° < angle < 360°$

Angles around a point
$360°$

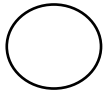




Quadrilateral
$360°$

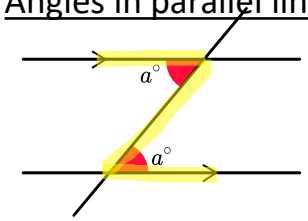


Triangle
$180°$



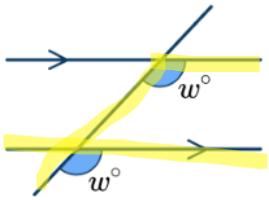
Circle
360

Angles in parallel lines



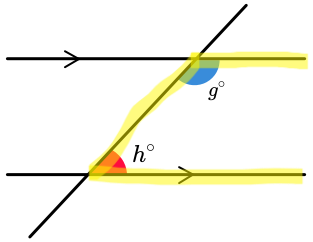
Alternate Angles are **Equal**

Look for a Z shape



Corresponding Angles are **Equal**

Look for a F shape



Co-interior angles add up to 180°

Vertically Opposite Angles are **Equal**

Year 8
Area of Trapezia and Circles

Year 7
Area of Rectangles and Parallelograms
Area of Triangles
Solve problems using the area of Trapezia

Year 8 — **Learning Journey**
Calculate the area of triangles, rectangles and parallelograms
Calculate the area of a trapezium
Calculate the perimeter and area of compound shapes
Calculate the area of a circle and parts of a circle

Keywords
Congruent: The same

Area: Space inside a 2D Shape

Perimeter: Length around the outside of a 2D shape

Pi(π): The ratio of a circle's circumference to its diameter

Perpendicular: At an angle of 90° to a given surface

Formula: A mathematical relationship/ rule given in symbols

Sector: A part of the circle enclosed by two radii and an arc

Compound Shape: Any shape that is made up of two or more geometric shapes.

Diameter: The diameter is the distance from one point of the circle through the centre of the circle to another point on the circle.

Radius: A line segment extending from the centre of a circle to the circumference of the circle

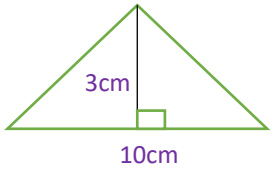
Dr Frost Key Skills
138 Area of Rectangle
139 Area of Parallelogram
140 Area of Triangle
182 Area of Composite shapes
184 Area of Trapezium
210 Area of Full Circle
213 Area of Composite Shapes including Circles
319 a Area of Sector

Key Knowledge

Area of Rectangles, Triangles and Parallelograms

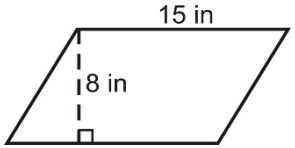
Find the area of the rectangle
Area = Base X Height

Area = $12cm \times 5cm = 60cm^2$



Find the area of the triangle
Area = $\frac{Base \times Height}{2}$

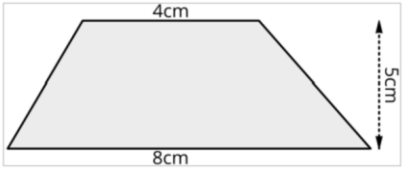
Area = $\frac{10cm \times 3cm}{2} = 15cm^2$



Find the area of the parallelogram
Area = $Base \times Height$

Area =15 in × 8 in = $120in^2$

Area of Trapezium and Circle

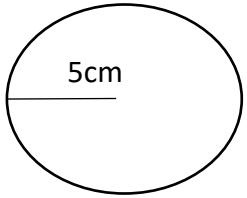


Why?
Two congruent trapeziums make a parallelogram

Area = $\frac{1}{2} \times (a + b) \times Height$

Area = $\frac{1}{2} \times (4 + 8) \times 5$

Area = $30cm^2$



Area = $\pi \times r^2$

Area = $\pi \times 5^2$

Area = 25π *or* 78.5398 ……

Check whether the question asks you to leave your answer in Pi

Year 8
Line Symmetry and Reflection

Keywords

Mirror line: A line that passes through the centre of a shape with a mirror image on either side of the line

Reflect: Mapping of one object from one position to another of equal distance from a given line.

Vertex: A point where two or more-line segments meet.

Perpendicular: Lines that cross at 90°

Horizontal: A straight line from left to right (parallel to the x axis)

Vertical: A straight line from top to bottom (parallel to the y axis)

Line of Symmetry: A line of symmetry is a line that cuts a shape exactly in half.

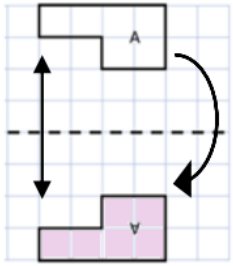
Year 8 — **Learning Journey**

Recognise line symmetry
Reflect a shape in a horizontal or vertical line 1 (shapes touching the line)
Reflect a shape in a horizontal or vertical line 2 (shapes not touching the line)
Reflect a shape in a diagonal line 1 (shapes touching the line)
Reflect a shape in a diagonal line 2 (shapes not touching the line)

Key Knowledge

Reflecting horizontally and vertically

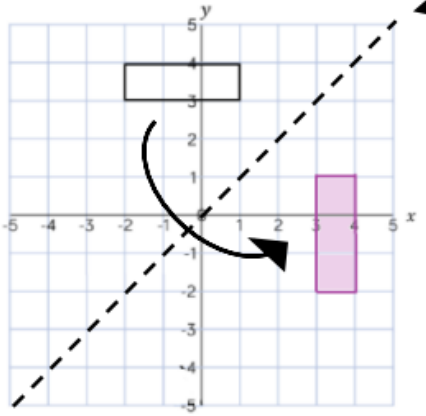
All points need to be the same distance away from the line of reflection



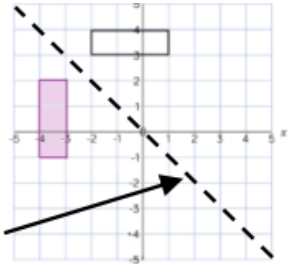
Lines parallel to the x and y axis
REMEMBER
Lines parallel to the x-axis are y = ____
Lines parallel to the y-axis are x = ____

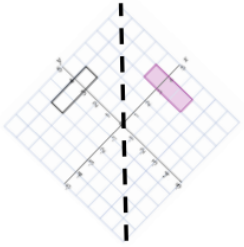
Reflecting Diagonally

This is the line **y = x** (every y coordinate is the same as the x coordinate along this line)



This is the line **y = - x**
The x and y coordinate have the same value but opposite sign





Turn your image

If you turn your image it becomes a vertical/ horizontal reflection (also good to check your answer this way)

Dr Frost Key Skills

81 Reflecting a shape in a mirror line
153 Reflecting a shape on axes using given mirror line
278 Reflecting a shape in line with given equations
279 Describing a reflection

Year 8
Measures of Location

Year 7
Find the range of a set of numbers
Find the median of a set of numbers

Learning Journey

Year 8
Understand and use the mean, median and mode
Choose the most appropriate average
Find the mean from an ungrouped and grouped frequency table
Identify outliers
Compare distributions using averages and the range

Keywords

Spread: The distance/ how spread out/ variation of data.

Average: A measure of central tendency – or the typical value of all the data together

Total: All the data added together

Frequency: The number of times the data values occur

Represent: Something that shows the value of another

Outlier: A value that stands apart from the data set

Consistent: A set of data that is similar and doesn't change very much

Corelation: A mutual relationship or connection between two or more things

Line of Best fit: A sensible straight line that goes as centrally as possible through the coordinates plotted

Dr Frost Key Skills
132 Mean as an average
207 Mode, median, range from listed data
208 Combining means or dealing with changes to mean
236 Means from ungrouped frequency table
244 Scatter Graph and Corelation
312 Estimating the mean from Grouped Frequency table

Key Knowledge

Averages from List

24, 8, 11, 4, 8

Mean
1) Find the sum of the data
2) Divide the overall total by how pieces of data there are

24 + 8 + 11 + 4 + 8 = 55

Median
1) Arrange the numbers in order
2) Find the value in the middle

4, 8, 8 ,11, 24

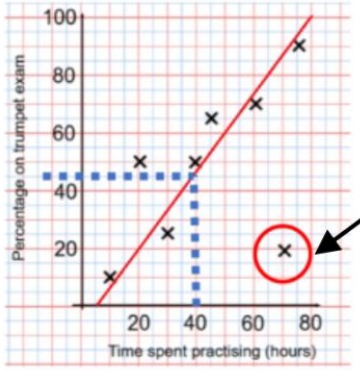
~~4~~, ~~8~~, (8), ~~11~~, ~~24~~

Mode
This is the number OR the item that occurs the most
8 is the answer here as the number appears TWICE!

NOTE:
If there is no single middle value find the mean of the two numbers left

Identify Outliers
Outliers are values that stand well apart from the rest of the data
They can have a **big** impact on the **range** and the **mean.**
But have less impact on the **median** and the **mode.**

Sometimes it is best to not use an outlier in calculations



Outliers can also be identified graphically e.g on scatter graphs