YEAR 10 ROUTE A HANDBOOK

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

Autumn Term

Year										2021									
Week No.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
School Week Commencing		2/09/2021	6/09/2021	13/09/2021	20/09/2021	27/10/2021	4/10/2021	11/10/2021	18/10/201		1/11/2021	8/11/2021	15/11/2021	22/11/2021	29/11/2021	6/12/2021	13/12/2021		
Half Term No.						1								2					
Month		SEPTEMBER				OCTOBER					NOVEMBER				DECEMBER				
YEAR 10 A		NUMBER (year 9 content)	NUMBER				DATA				PROBABILITY				ALGEBRA (YEAR 9 content) EQUATIONS AND INEQUALITIES				
SMSC		Appreciation of visual representations in Maths.	Misleading Statistics								Understanding Risk				Music and algebra				

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

Spring Term

19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
3/01/2021	10/01/2021	17/10/2021	24/01/2021	31/01/2021		7/02/2021	14/02/2021		28/02/2021	7/03/2021	14/03/2021	21/03/2021	28/03/2021	4/04/2021	

3		4	
JANUARY	FEBRUARY	MARCH	APRIL

RATIO AND PROPORTION	RIGHT ANGLE TRIANGLES		QUADRATICS		QUADRATICS	

Science and microscopy (cell biology)

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

Summer Term

33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
		25/04/2021	2/05/2021	9/05/2021	16/05/2021	23/05/2021	30/05/2021		6/06/2021	13/06/2021	20/06/2021	27/06/202	4/07/2021	11/072021	18/07/2021		

5	6

APRIL	MAY	JUNE	JULY

M.R	MULTIPLICATIVE REASONING	TRANSFORMATIONS	CONSTRUCTIONS AND LOCI

| Finacial understanding- business trends and money sense | Appreciation of modern and historical buildings.CCTV coverage and home security.Patterns in religion. | |

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge
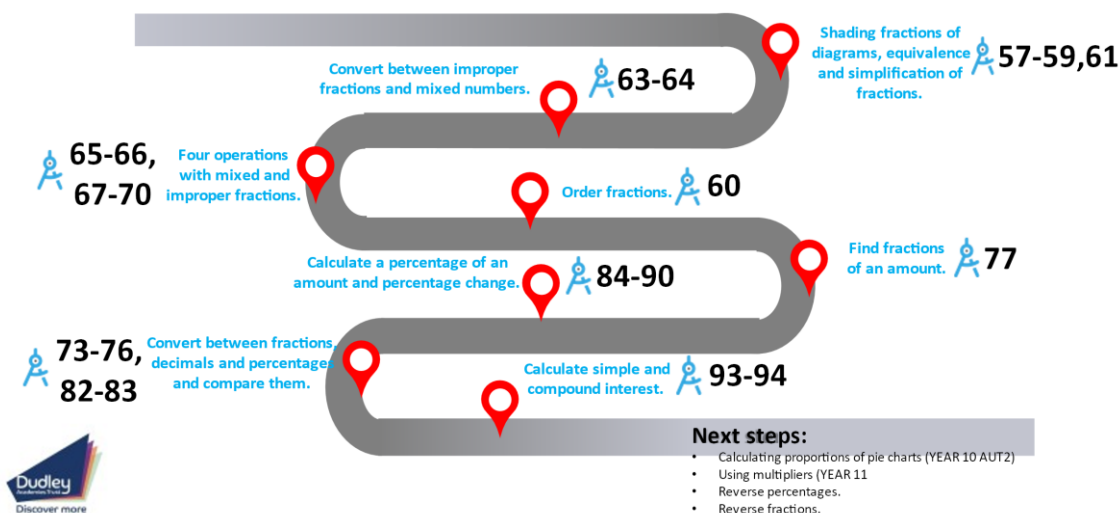
YEAR 10 FRACTIONS, DECIMALS AND PERCENTAGES ROUTE A

Objectives

4a	Use diagrams to describe shaded parts of a diagram and find equivalent fractions. **(P)**
4b	Write a fraction in its simplest form and find equivalent fractions **(P,C)**
4c	Convert between mixed numbers and improper fractions **(P)**
4d	Add and subtract mixed and improper fractions, with the same denominator and different denominators writing the answer as mixed and improper fractions **(P)**
4e	Multiply and divide fraction, including by an integer **(P)**
4f	Order fractions with the same denominator and different denominators **(P,C)**
4g	Find fractions of an amount, and apply this to finding the size of a category from a pie chart using fractions **(P,C)**
4h	Express a number as a percentage of another number **(D,P)**
4i	Find a percentage of a quantity with and without a calculator, including the use of multipliers to increase or decrease **(P,C)**
4j	Convert between fractions, decimals and percentages **(D,P)**
4k	Compare and order fractions, decimals and percentages, including the use of inequality signs **(D,P)**

SMAP

Prerequisite learning:
- Place value (YEAR 7 AUT1)
- Multiplication and division (YEAR 7AUT1/2)
- Ordering integers on number lines. (YEAR 7 SU2)
- Percentage as an amount out of 100. (YEAR 8 AUT1)

YEAR 10 AUTUMN 1: Fractions, decimals and percentages

Shading fractions of diagrams, equivalence and simplification of fractions. **57-59,61**

Convert between improper fractions and mixed numbers. **63-64**

65-66, 67-70 Four operations with mixed and improper fractions.

Order fractions. **60**

Calculate a percentage of an amount and percentage change. **84-90**

Find fractions of an amount. **77**

73-76, 82-83 Convert between fractions, decimals and percentages and compare them.

Calculate simple and compound interest. **93-94**

Next steps:
- Calculating proportions of pie charts (YEAR 10 AUT2)
- Using multipliers (YEAR 11
- Reverse percentages.
- Reverse fractions.

Dudley
Discover more

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

4l	Calculate simple and compound interest **(P,C)**	
4m	Understand percentages greater than 100% **(D,P)**	
4n	Recognise terminating and recurring decimals and convert fractions such as 7/2, 3/8 3/7, 1/3 etc into recurring decimals using division **(P,C)**	

Essential Language

Decimal, **percentage**, **addition**, **multiplication**, **fraction**, **integer,** mixed, improper, recurring, terminating, percentage, VAT, increase, decrease, multiplier, profit, loss

PREREQUISITE AND GREATER DEPTH EXEMPLIFICATION	COMMON MISCONCEPTIONS:
	- The larger the denominator the larger the fraction. - Incorrect links between fractions and decimals, such as thinking that $\frac{1}{5}$ = 0.15, 5% = 0.5, 4% = 0.4 0.2 = ½, etc. - Students think it is not possible to have a percentage greater than 100%.

OPPORTUNITIES FOR REASONING/PROBLEM SOLVING:	MASTERY PEDAGOGY
- Questions that involve rates of overtime pay including simple calculations involving fractional (>1, e.g. 1.5) and hourly pay. - Working out the number of people/things where the number of people/things in different categories is given as a fraction, decimal or percentage. - Sale prices offer an ideal opportunity for solving problems allowing students the opportunity to investigate the most effective way to work out the "sale" price. - Problems that involve consecutive reductions such as: Sale Prices are 10% off the previous day's price. If a jacket is £90 on Monday, what is the price on Wednesday?	**RESOURCES TO SUPPORT LEARNING:** **Bar modelling** **TRANSFERABLE SKILLS- Content in other context** **SCIENCE** https://qualifications.pearson.com/content/dam/pdf/GCSE/Science/2016/teaching-and-learning-materials/Guide-to-Maths-for-Scientists.pdf https://filestore.aqa.org.uk/resources/science/AQA-MATHS-IN-SCIENCE-FACTSHEET-PTT.PDF https://www.stem.org.uk/triplescience/maths https://www.aqa.org.uk/subjects/science/gcse/combined-science-trilogy-8464/planning-resources **GEOGRAPHY**

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

	https://qualifications.pearson.com/content/dam/pdf/GCSE/Geography-A/2016/teaching-and-learning-materials/Edexcel-2016-GCSE-Geography-A-B-Maths-for-Geographers.pdf

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

YEAR 10 DATA HANDLING ROUTE A

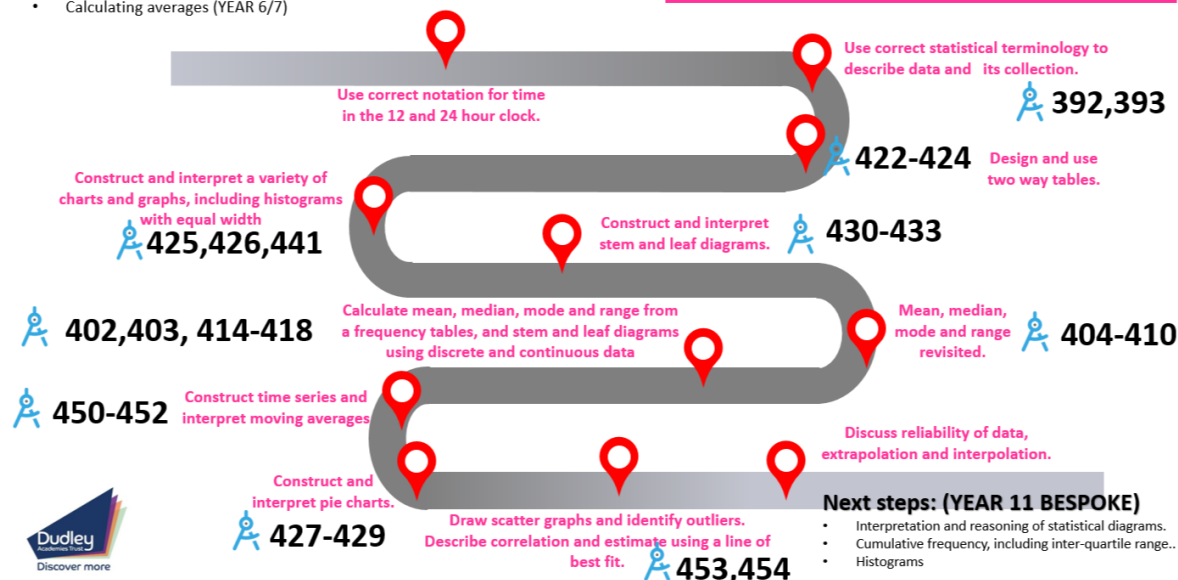| Objectives	
3a	Use suitable data collection techniques (data to be integer and decimal values) **(P,C)**
3b	Design and use data-collection sheets for grouped, discrete and continuous data, use inequalities for grouped data, and introduce ≤ and ≥ signs **(P,C)**
3c	Interpret and discuss the data **(P, C)**
3d	Sort, classify and tabulate data, both discrete and continuous quantitative data, and qualitative data **(D, P)**
3e	Construct tables for time–series data **(P)**
3f	Extract data from lists and tables **(D, P)**
3h	Use correct notation for time, 12- and 24-hour clock **(D, P)**
3i	Work out time taken for a journey from a timetable **(P)**
3j	Design and use two-way tables for discrete and grouped data **(P)**
3k	Use information provided to complete a two-way table **(P)**
3l	Calculate the total frequency from a frequency table **(P)**

SMAP

Prerequisite learning:
- Simple frequency graphs and bar charts (YEAR 3/4)
- Reading tables including timetables (YEAR 4)
- Calculating averages (YEAR 6/7)

DATA HANDLING: YEAR 10 ROUTE A AUT 2

Use correct notation for time in the 12 and 24 hour clock.

Use correct statistical terminology to describe data and its collection. **392,393**

422-424 Design and use two way tables.

Construct and interpret a variety of charts and graphs, including histograms with equal width **425,426,441**

Construct and interpret stem and leaf diagrams. **430-433**

402,403, 414-418 Calculate mean, median, mode and range from a frequency tables, and stem and leaf diagrams using discrete and continuous data

Mean, median, mode and range revisited. **404-410**

450-452 Construct time series and interpret moving averages.

Discuss reliability of data, extrapolation and interpolation.

Construct and interpret pie charts. **427-429**

Draw scatter graphs and identify outliers. Describe correlation and estimate using a line of best fit. **453,454**

Next steps: (YEAR 11 BESPOKE)
- Interpretation and reasoning of statistical diagrams.
- Cumulative frequency, including inter-quartile range..
- Histograms

Dudley Academies Trust
Discover more

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

3m	Read off frequency values from a table **(D,P)**
3n	Read off frequency values from a frequency table **(D,P)**
3o	Find greatest and least values from a frequency table **(D, P)**
3p	Identify the mode from a frequency table **(D, P)**
3q	Identify the modal class from a grouped frequency table **(D, P)**
3r	Plotting coordinates in first quadrant and read graph scales in multiples **(P)**
3s	• Produce and interpret data shown in: ➢ Pictograms ➢ composite bar charts (including the mode) ➢ dual/comparative bar charts for categorical and ungrouped discrete data ➢ bar-line charts ➢ vertical line charts ➢ line graphs ➢ line graphs for time–series data ➢ histograms with equal class intervals stem and leaf (including back-to-back) (Including the mode/median) **(P)**
3t	Calculate total population and identify the greatest and least values from a bar chart or table **(D,P)**
3u	Recognise simple patterns, characteristics, relationships in bar charts and line graphs **(P, C)**
3v	Draw circles and arcs to a given radius **(D)**
3w	Know there are 360 degrees in a full turn, 180 degrees in a half turn, and 90 degrees in a quarter turn **(D)**

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

3x	Measure and draw angles, to the nearest degree **(P)**
3y	Interpret tables; represent data in tables and charts **(C)**
3z	Know which charts to use for different types of data sets **(C)**
3ad	Understand that the frequency represented by corresponding sectors in two pie charts is dependent upon the total populations represented by each of the pie charts. **(C)**
3ae	Draw scatter graphs **(P)**
3af	Interpret points on a scatter graph **(D, P, C)**
3ag	Identify outliers and ignore them on scatter graphs **(P, C)**
3ah	Draw the line of best fit on a scatter diagram by eye, and understand what it represents **(P, C)**
3ai	Distinguish between positive, negative and no correlation using lines of best fit **(P, C)**
3aj	Use the line of best fit make predictions; interpolate and extrapolate apparent trends whilst knowing the dangers of so doing **(P, C)**
3ak	Use a line of best fit to predict values of a variable given values of the other variable **(P, C)**
3al	Interpret scatter graphs in terms of the relationship between two variables **(P, C)**
3am	Interpret correlation in terms of the problem **(P, C)**
3an	Understand that correlation does not imply causality **(C)**

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

3ao	State how reliable their predictions are, i.e. not reliable if extrapolated. **(C)**	

Essential Language

Data, frequency, table, sort, graph, average Mean, median, mode, range, discrete, continuous, qualitative, quantitative, scatter graph, line of best fit, correlation, positive, negative, sample, population, stem and leaf, pie chart, estimate

PREREQUISITE AND GREATER DEPTH EXEMPLIFICATION	COMMON MISCONCEPTIONS:
PREREQUISITE	▪ Students struggle to make the link between what the data in a frequency table represents, so for example may state the 'frequency' rather than the interval when asked for the modal group.
Simple frequency graphs and bar charts	▪ Same size sectors for different sized data sets represent the same number rather than the same proportion.
Reading tables including timetables	▪ Lines of best fit are often forgotten, but correct answers still obtained by sight.
Calculating averages	▪ Interpreting scales of different measurements and confusion between x and y axes when plotting points.
GREATER DEPTH	
Interpretation and reasoning of statistical diagrams.	
Cumulative frequency, including inter-quartile range.	
Histograms	

OPPORTUNITIES FOR REASONING/PROBLEM SOLVING:	MASTERY PEDAGOGY
▪ Misleading tables can provide an opportunity for students to critically evaluate the way information is presented.	**RESOURCES TO SUPPORT LEARNING:**
	Bar Modelling, Numicon,
▪ Misleading graphs or charts can provide an opportunity for students to critically evaluate the way information is presented.	**TRANSFERABLE SKILLS- Content in other context**
	SCIENCE
	https://qualifications.pearson.com/content/dam/pdf/GCSE/Science/2016/teaching-and-learning-materials/Guide-to-Maths-for-Scientists.pdf
	https://filestore.aqa.org.uk/resources/science/AQA-MATHS-IN-SCIENCE-FACTSHEET-PTT.PDF

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

▪ Students should be able to decide what the scales on any axis should be to be able to present information ▪ From inspection of a pie chart, students should be able to identify the fraction of the total represented and know when that total can be calculated and compared with another pie chart. ▪ Many real-life situations that give rise to two variables provide opportunities for students to extrapolate and interpret the resulting relationship (if any) between the variables.	https://www.stem.org.uk/triplescience/maths https://www.aqa.org.uk/subjects/science/gcse/combined-science-trilogy-8464/planning-resources **GEOGRAPHY** https://qualifications.pearson.com/content/dam/pdf/GCSE/Geography-A/2016/teaching-and-learning-materials/Edexcel-2016-GCSE-Geography-A-B-Maths-for-Geographers.pdf

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

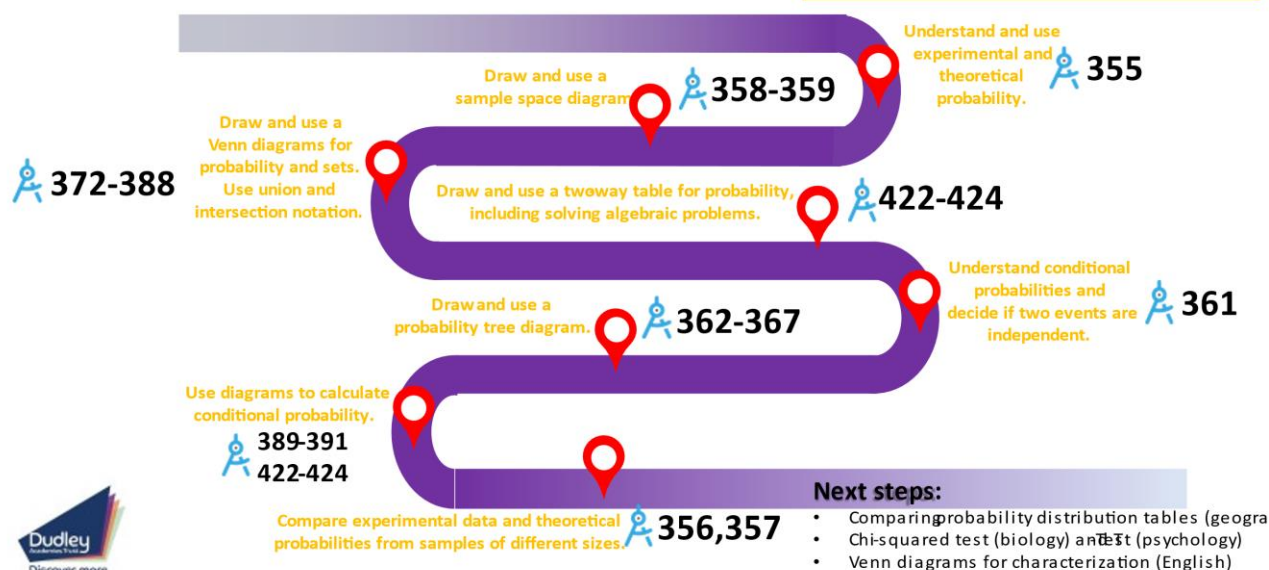## YEAR 10 PROBABILITY ROUTE A

Objectives

13a	Distinguish between events which are impossible, unlikely, even chance, likely, and certain to occur **(D)**
13b	Mark events and/or probabilities on a probability scale of 0 to 1; **(D)**
13c	Write probabilities in words or fractions, decimals and percentages **(D)**
13d	Find the probability of an event happening using theoretical probability **(D,P)**
13e	Use theoretical models to include outcomes using dice, spinners, coins **(D,P)**
13f	List all outcomes for single events systematically **(D, P)**
13g	Work out probabilities from frequency tables **(D, P)**
13h	Work out probabilities from two-way tables **(D,P)**
13i	Record outcomes of probability experiments in tables **(D)**
13j	Add simple probabilities **(P)**
13k	Identify different mutually exclusive outcomes and know that the sum of the probabilities of all outcomes is 1 **(D, P)**
13l	Using $1 - p$ as the probability of an event not occurring where p is the probability of the event occurring **(D, P)**
13m	Find a missing probability from a list or table including algebraic terms **(D, P, C)**

Prior learning:
- Basic probability, including simple vocabulary.
- Calculations with fractions, decimals and percentages.
- Construction of two way tables.

All video clip references belong to **hegartymaths**
www.hegartymaths.com

- Probability, Venn diagrams and tree diagrams

Draw and use a sample space diagram. **358-359**

Understand and use experimental and theoretical probability. **355**

Draw and use a Venn diagrams for probability and sets. Use union and intersection notation. **372-388**

Draw and use a two-way table for probability, including solving algebraic problems. **422-424**

Draw and use a probability tree diagram. **362-367**

Understand conditional probabilities and decide if two events are independent. **361**

Use diagrams to calculate conditional probability. **389-391 422-424**

Compare experimental data and theoretical probabilities from samples of different sizes. **356,357**

Dudley Discover more

Next steps:
- Comparing probability distribution tables (geography)
- Chi-squared test (biology) and test (psychology)
- Venn diagrams for characterization (English)

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

13n	Find the probability of an event happening using relative frequency **(D, P, C)**	
13o	Estimate the number of times an event will occur, given the probability and the number of trials – for both experimental and theoretical probabilities **(D, P, C)**	
13p	List all outcomes for combined events systematically**(D, P)**	
13q	Use and draw sample space diagrams **(D, P)**	
13r	Work out probabilities from Venn diagrams to represent real-life situations and also 'abstract' sets of numbers/values **(D, P, C)**	
13s	Use union and intersection notation **(D)**	
13t	Compare experimental data and theoretical probabilities **(D, P, C)**	
13u	Compare relative frequencies from samples of different sizes **(D, P, C)**	
13v	Find the probability of successive events, such as several throws of a single dice **(D, P, C)**	
13w	Use tree diagrams to calculate the probability of two independent events **(D, P, C)**	
13x	Use tree diagrams to calculate the probability of two dependent events **(D, P, C)**	

Essential Language

Probability, **outcomes, theoretical, experimental, certain, impossible,** likely, unlikely, even chance, dependent, independent, conditional, tree diagrams, sample space, relative frequency, fairness,

PREREQUISITE AND GREATER DEPTH EXEMPLIFICATION	COMMON MISCONCEPTIONS:
PREREQUISITE ▪ **Understanding of basic fractions** ▪ **Basic fraction operations** ▪ **FDP Conversions**	▪ Not using fractions or decimals when working with probability trees. ▪ Describing probabilities instead of calculating them ▪ Not calculating the total frequency to work out the probability of an event.

Number bonds to various numbers **GREATER DEPTH** **If the probability of outcomes are x, 2x, 4x, 3x calculate x.** **Draw a Venn diagram of students studying French, German or both, and then calculate the probability that a student studies French given that they also study German.**	
OPPORTUNITIES FOR REASONING/PROBLEM SOLVING: - Students should be given the opportunity to justify the probability of events happening or not happening. - Lotteries provides a real life link to probability. Work out the probabilities of winning on different lotteries. - Calculating real life odds such as the birthday paradox and the number of ways to order a deck of cards (google 52 factorial)	**MASTERY PEDAGOGY** **RESOURCES TO SUPPORT LEARNING:** **Bar modelling** **Numicon for simple probabilities** **Dienes rods** **TRANSFERABLE SKILLS- Content in other context** **SCIENCE** https://qualifications.pearson.com/content/dam/pdf/GCSE/Science/2016/teaching-and-learning-materials/Guide-to-Maths-for-Scientists.pdf https://filestore.aqa.org.uk/resources/science/AQA-MATHS-IN-SCIENCE-FACTSHEET-PTT.PDF https://www.stem.org.uk/triplescience/maths https://www.aqa.org.uk/subjects/science/gcse/combined-science-trilogy-8464/planning-resources **GEOGRAPHY** https://qualifications.pearson.com/content/dam/pdf/GCSE/Geography-A/2016/teaching-and-learning-materials/Edexcel-2016-GCSE-Geography-A-B-Maths-for-Geographers.pdf

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge
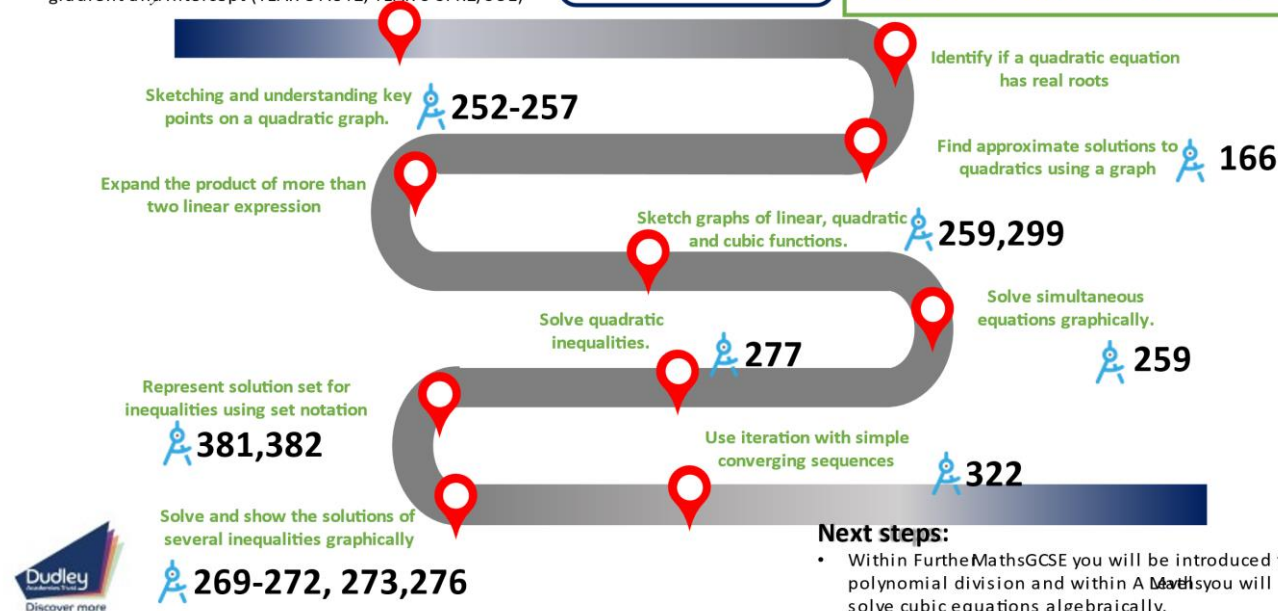
YEAR 10 ALGEBRA ROUTE A

Objectives

5a	Select an expression/equation/formula/identity from a list **(D)**
5b	Write expressions and set up simple equations **(D, P)**
5c	Use function machines **(P)**
5d	Solve simple equations **(P)**
5e	Solve linear equations, with integer coefficients, in which the unknown appears on either side or on both sides of the equation **(P)**
5f	Solve linear equations which contain brackets, including those that have negative signs occurring anywhere in the equation, and those with a negative solution **(P)**
5g	Solve linear equations in one unknown, with integer or fractional coefficients **(P)**
5k	Solve angle or perimeter problems using algebra **(D, P, C)**
5l	Write an equation to solve a word problem **(D, P, C)**
5j	Find an approximate solution to a linear equation using a graph **(D, P)**
5i	Substitute into a formula, and solve the resulting equation **(D, P)**
5h	Rearrange simple equations **(P)**
5p	Use the correct notation to show inclusive and exclusive inequalities **(D, P)**

Prerequisite learning:
- solving equations (YEAR 7 AUT1, YEAR 8 AUT1, YEAR9 SPR1/SU1)
- Drawing linear graphs using a table of results or recognising gradient and intercept (YEAR 8 AUT2, YEAR 9 SPR2/SU1)

All video clip references belong to hegartymaths
www.hegartymaths.com

YEAR 10 Route B AUT1 EQUATIONS AND INEQUALITIES

Sketching and understanding key points on a quadratic graph. **252-257**

Identify if a quadratic equation has real roots

Find approximate solutions to quadratics using a graph **166**

Expand the product of more than two linear expression

Sketch graphs of linear, quadratic and cubic functions. **259,299**

Solve quadratic inequalities. **277**

Solve simultaneous equations graphically. **259**

Represent solution set for inequalities using set notation **381,382**

Use iteration with simple converging sequences **322**

Solve and show the solutions of several inequalities graphically **269-272, 273,276**

Next steps:
- Within FurtherMathsGCSE you will be introduced to polynomial division and within A Levels you will solve cubic equations algebraically.

Dudley
Discover more

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

5m	Show inequalities on number lines **(D, P)**
5n	Write down whole number values that satisfy an inequality **(D, P, C)**
5o	Solve two inequalities in *x*, find the solution sets and compare them to see which value of *x* satisfies both **(D, P, C)**
5q	Construct inequalities to represent a set shown on a number line **(D, P)**
5r	Solve simple linear inequalities in one variable, and represent the solution set on a number line **(D, P)**
5s	Solve an inequality such as $-3 < 2x + 1 < 7$ and show the solution set on a number line **(D, P, C)**
5t	Round answers to a given degree of accuracy **(D, P)**
5u	Use inequality notation to specify simple error intervals due to truncation or rounding **(D, P, C)**
5v	Recognise sequences of odd and even numbers, and other sequences including Fibonacci sequences **(D)**
5w	Use function machines to find terms of a sequence **(D)**
5x	Write the term-to-term definition of a sequence in words **(D)**
5y	Find a specific term in the sequence using position-to-term or term-to-term rules **(D, P)**
5z	Generate arithmetic sequences of numbers, triangular number, square and cube integers and sequences derived from diagrams **(D, P)**
5aa	Recognise such sequences from diagrams and draw the next term in a pattern sequence **(D, P)**
5ab	Find the next term in a sequence, including negative values **(D, P)**
5ac	Find the *n*th term for a pattern sequence **(D, P)**
5ad	Find the *n*th term of a linear (arithmetic) sequence **(D, P)**

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

5ae	Use the *n*th term of an arithmetic sequence to generate terms **(D, P)**
5af	Use the *n*th term of an arithmetic sequence to decide if a given number is a term in the sequence, or find the first term over a certain number **(D, P, C)**
5ag	Use the *n*th term of an arithmetic sequence to find the first term greater/less than a certain number **(D, P, C)**
5ah	Continue a geometric progression and find the term-to-term rule, including negatives, fraction and decimal terms **(D, P, C)**
5ai	Continue a quadratic sequence and use the *n*th term to generate terms **(D, P)**
5aj	Distinguish between arithmetic and geometric sequences **(D)**

Essential Language

Sequence, Equation, Inequality, solve, subject, substitute, Arithmetic, geometric, function, nth term, derive, quadratic, triangular, cube, square, odd, even, change, represent, bracket, expand, linear, balance, accuracy

PREREQUISITE AND GREATER DEPTH EXEMPLIFICATION	COMMON MISCONCEPTIONS:
PREREQUISITE Collecting Like terms Expand Brackets Factorise simple expressions	▪ Rules of adding and subtracting negatives. ▪ Inverse operations can be misapplied. ▪ When solving inequalities, students often state their final answer as a number quantity and either exclude the inequality or change it to =.
GREATER DEPTH Given expressions for the angles on a line or in a triangle in terms of *a*, find the value of *a*. Given expressions for the sides of a rectangle and the perimeter, form and solve an equation to find missing values.	

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

Solve $-3 < 2x + 1$ and show the solution set on a number line. State the whole numbers that satisfy a given inequality. Recognise that measurements given to the nearest whole unit may be inaccurate by up to one half in either direction. Given a sequence, 'Which is the 1st term greater than 50?' What is the amount of money after x months saving the same amount or the height of tree that grows 6 m per year? What are the next terms in the following sequences? 1, 3, 9, … 100, 50, 25, … 2, 4, 8, 16, … Write down an expression for the nth term of the arithmetic sequence 2, 5, 8, 11, … Is 67 a term in the sequence 4, 7, 10, 13, …?	
OPPORTUNITIES FOR REASONING/PROBLEM SOLVING: Problems that: - could be solved by forming equations such as: Pat and Paul have a combined salary of £800 per week. Pat earns £200 per week more than Paul. How much does Paul earn? - involve the application of a formula with conflicting results such as: Pat and Paul are using the formula y = 8n + 4 When n = 2, Pat states that y = 86 and Paul states y = 20. Who is correct? Evaluating statements about whether or not specific numbers or patterns are in a sequence and justifying the reasons.	**MASTERY PEDAGOGY** **RESOURCES TO SUPPORT LEARNING:** **Algebra Tiles** **Bar modelling** **Dienes Rods** **Number Grids** **Scales to demonstrate balancing** **TRANSFERABLE SKILLS- Content in other context** **SCIENCE** https://qualifications.pearson.com/content/dam/pdf/GCSE/Science/2016/teaching-and-learning-materials/Guide-to-Maths-for-Scientists.pdf https://filestore.aqa.org.uk/resources/science/AQA-MATHS-IN-SCIENCE-FACTSHEET-PTT.PDF https://www.stem.org.uk/triplescience/maths https://www.aqa.org.uk/subjects/science/gcse/combined-science-trilogy-8464/planning-resources **GEOGRAPHY** https://qualifications.pearson.com/content/dam/pdf/GCSE/Geography-A/2016/teaching-and-learning-materials/Edexcel-2016-GCSE-Geography-A-B-Maths-for-Geographers.pdf

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

YEAR 10 RATIO AND PROPORTION ROUTE A	

Objectives

11a	Write ratios in their simplest form **(D)**	
11b	Write/interpret a ratio to describe a situation **(D)**	
11c	Understand and express the division of a quantity into a number of parts as a ratio **(D, P)**	
11d	Share a quantity in a given ratio including three-part ratios **(D, P)**	
11e	Solve a ratio problem in context: use a ratio to find one quantity when the other is known use a ratio to compare a scale model to a real-life object use a ratio to convert between measures and currencies problems involving mixing, e.g. paint colours, cement and drawn conclusions **(D, P, C)**	
11f	Compare ratios **(D, P, C)**	
11g	Write ratios in form 1 : *m* or *m* : 1 **(D, P)**	
11h	Write a ratio as a fraction **(D, P)**	
11i	Write a ratio as a linear function **(D, P)**	
11j	Write lengths, areas and volumes of two shapes as ratios in simplest form **(D, P)**	
11k	Express a multiplicative relationship between two quantities as a ratio or a fraction. **(D, P)**	
11l	Understand and use proportion as equality of ratios **(D, P)**	

Prior learning:
- Division and multiplication methods (YEAR 7 AUT2)
- Identifying common factors (YEAR 7 AUT2)
- Simplifying and equivalent fractions (YEAR 7 SPR1)

YEAR 10 A SPR1 Ratio and proportion

Simplify and compare ratios and write ratios as fractions. 328-330

Share a quantity into a given ratio. 332-334

Write ratios in the form 1:*n* and *n*:1 331

Solve problems using a unitary method. 339

Use proportion with recipes. 739-742

Calculate the best value between products. 763-772

Convert currencies using exchange rates. 707-708

Understand direct and inverse proportion. 341-342

Dudley
Discover more

Next steps: YEAR 11 BESPOKE
- Direct and inverse proportion (graphical)
- Compound measures
- Growth and Decay

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

11m	Solve proportion problems using the unitary method **(D, P, C)**	
11n	Work out which product is the better buy **(D, P, C)**	
11o	Scale up recipes **(D, P)**	
11p	Convert between currencies **(D, P)**	
11q	Find amounts for 3 people when amount for 1 given **(D, P, C)**	
11r	Recognise when values are in direct proportion by reference to the graph form **(D)**	
11s	Understand direct proportion ---> relationship $y = kx$ **(D)**	
11t	Understand inverse proportion: as x increases, y decreases (inverse graphs done in later unit) **(D)**	
11u	Solve word problems involving direct and inverse proportion **(D, P, C)**	

Essential Language
Ratio, proportion, share, parts, fraction, compare, function, direct proportion, inverse proportion, graphical, linear

PREREQUISITE AND GREATER DEPTH EXEMPLIFICATION	COMMON MISCONCEPTIONS:
PREREQUISITE: Simple fractiosn Division Multiplication **GREATER DEPTH** Express the statement 'There are twice as many girls as boys' as the ratio 2 : 1 or the linear function y = 2x, where x is the number of boys and y is the number of girls. If it takes 2 builders 10 days to build a wall, how long will it take 3 builders?	▪ Students find three-part ratios difficult. ▪ Using a ratio to find one quantity when the other is known often results in students 'sharing' the known amount.

Scale up recipes and decide if there is enough of each ingredient. Given two sets of data in a table, are they in direct proportion?	
OPPORTUNITIES FOR REASONING/PROBLEM SOLVING: ▪ Problems involving sharing in a ratio that include percentages rather than specific numbers, such as: In a youth club the ratio of the number of boys to the number of girls is 3 : 2. 30% of the boys are under the age of 14, and 60% of the girls are under the age of 14. What percentage of the youth club is under the age of 14? ▪ Problems in context, such as scaling a recipe, or diluting lemonade or chemical solutions, will show how proportional reasoning is used in real-life contexts.	**MASTERY PEDAGOGY** **RESOURCES TO SUPPORT LEARNING:** **Bar modelling** **Times table grids** **Dienes rods** **Numicon or coins for sharing in a ratio** **TRANSFERABLE SKILLS- Content in other context** **SCIENCE** https://qualifications.pearson.com/content/dam/pdf/GCSE/Science/2016/teaching-and-learning-materials/Guide-to-Maths-for-Scientists.pdf https://filestore.aqa.org.uk/resources/science/AQA-MATHS-IN-SCIENCE-FACTSHEET-PTT.PDF https://www.stem.org.uk/triplescience/maths https://www.aqa.org.uk/subjects/science/gcse/combined-science-trilogy-8464/planning-resources **GEOGRAPHY** https://qualifications.pearson.com/content/dam/pdf/GCSE/Geography-A/2016/teaching-and-learning-materials/Edexcel-2016-GCSE-Geography-A-B-Maths-for-Geographers.pdf

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

YEAR 10 RIGHT ANGLED TRIANGLES ROUTE A

Objectives

12a	Understand, recall and use Pythagoras' Theorem in 2D, including leaving answers in surd form **(D, P)**
12b	Calculate the length of the hypotenuse in a right-angled triangle, including decimal lengths and a range of units (Using Pythagoras'), rounding answers to appropriate degree of accuracy **(D, P)**
12c	Find the length of a shorter side in a right-angled triangle (Using Pythagoras'), rounding answers to appropriate degree of accuracy **(D, P)**
12d	Given 3 sides of a triangle, justify if it is right-angled or not **(D, P, C)**
12e	Apply Pythagoras' Theorem with a triangle drawn on a coordinate grid **(D, P, C)**
12f	Calculate the length of a line segment AB given pairs of points **(D, P, C)**
12g	Understand, use and recall the trigonometric ratios sine, cosine and tan, and apply them to find angles and lengths in general triangles in 2D figures, rounding answers to appropriate degree of accuracy **(D)**
12h	Use the trigonometric ratios to solve 2D problems, rounding answers to appropriate degree of accuracy **(D, P)**
12i	Find angles of elevation and depression, rounding answers to appropriate degree of accuracy **(D, P)**
12j	Know the exact values of sin ϑ and cos ϑ for ϑ = 0°, 30°, 45°, 60° and 90°; know the exact value of tan ϑ for ϑ = 0°, 30°, 45° and 60°. **(D)**

Prerequisite learning
- Recall square numbers from 1 up to 15×15 (Year 7 AU2/ Year 8 SPR1).
- Indices and roots with the use of a calculator (Year 9 AUT1)
- Rearranging formulae (YEAR 8 AUT1 YEAR 9 AUT 2)

All video clip references belong to **hegartymaths** www.hegartymaths.com

YEAR 10 SPR1 RIGHT ANGLED TRIANGLES

Calculate the length of a hypotenuse using Pythagoras' Theorem. **498**

Calculate the length of a shorter side using Pythagoras' Theorem. **499**

Apply Pythagoras' theorem to a line on a coordinate grid. **501-502**

Use trigonometric ratios to find angles and lengths in 2D. **509-512**

Calculate angles of elevation and depression. **515**

Know exact values for particular trigonometric ratios. **508**

Dudley
Discover more

Next steps:
- Apply Pythagoras' theorem and simple trigonometry (SOH CAH TOA) in real life context. and within compound 2D shapes.

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

<table>
<tr><td colspan="2" style="background:yellow"> </td></tr>
</table>

Essential Language

Triangle, right angle, angle, Pythagoras' Theorem, Trigonometry, Length, sine, cosine, tan, opposite, hypotenuse, adjacent, ratio, elevation, depression, accuracy

PREREQUISITE AND GREATER DEPTH EXEMPLIFICATION **PREREQUISITE** Angle facts Understanding lengths Squaring and Square rooting **GREATER DEPTH** Does 2, 3, 6 give a right angled triangle? Finding angles of depression/elevation using trigonometry Justify when to use Pythagoras' Theorem and when to use trigonometry.	**COMMON MISCONCEPTIONS:** - Answers may be displayed on a calculator in surd form. - Students forget to square root their final answer or round their answer prematurely. - Misunderstanding where the hypotenuse is (always the "top" side)
OPPORTUNITIES FOR REASONING/PROBLEM SOLVING: - Combined triangle problems that involve consecutive application of Pythagoras' Theorem or a combination of Pythagoras' Theorem and the trigonometric ratios. - In addition to abstract problems, students should be encouraged to apply Pythagoras' Theorem and/or the trigonometric ratios to real-life scenarios that require them to evaluate whether their answer fulfils certain criteria, e.g. the angle of elevation of 6.5 m ladder cannot exceed 65°	**MASTERY PEDAGOGY** **RESOURCES TO SUPPORT LEARNING:** **Bar modelling** **Algebra Tiles** **2D Shapes** **TRANSFERABLE SKILLS- Content in other context** **SCIENCE** https://qualifications.pearson.com/content/dam/pdf/GCSE/Science/2016/teaching-and-learning-materials/Guide-to-Maths-for-Scientists.pdf https://filestore.aqa.org.uk/resources/science/AQA-MATHS-IN-SCIENCE-FACTSHEET-PTT.PDF https://www.stem.org.uk/triplescience/maths https://www.aqa.org.uk/subjects/science/gcse/combined-science-trilogy-8464/planning-resources **GEOGRAPHY** https://qualifications.pearson.com/content/dam/pdf/GCSE/Geography-A/2016/teaching-and-learning-materials/Edexcel-2016-GCSE-Geography-A-B-Maths-for-Geographers.pdf

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

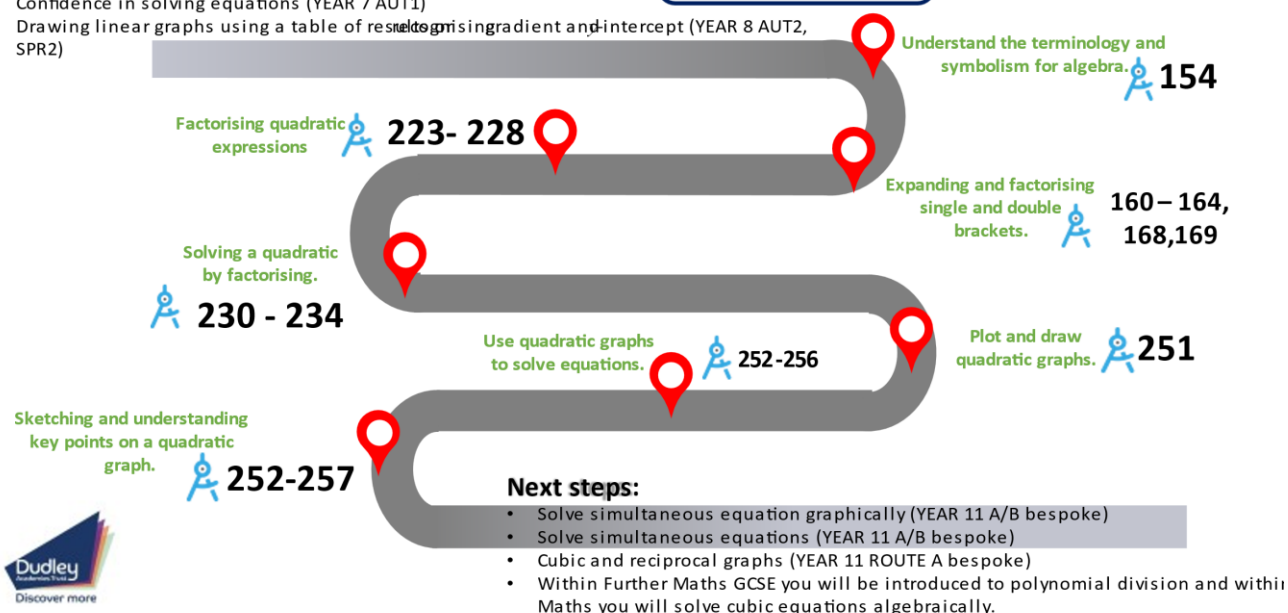## YEAR 10 QUADRATICS ROUTE A

	Objectives
16a	Define a 'quadratic' expression and know the difference between an identity, expression, equation and formula. Understand the not equal ($\neq$) to symbol **(D)**
16b	Recap expansion of x(x+3) etc **(D, P)**
16c	Product of double brackets, including negatives **(D, P)**
16d	Expansion of (x+a)(x-a) **(D, P)**
16e	Square a linear expression, e.g. $(x + 1)^2$; **(D, P)**
16f	Factorise a linear expression **(D, P)**
16g	Factorise quadratic expressions of the form $x^2 + bx + c$ **(D, P)**
16h	Factorise a quadratic expression $x^2 - a^2$ using the difference of two squares; **(D, P)**
16i	Solve quadratic equations by factorising; **(D, P)**
16j	Generate points and plot graphs of simple quadratic functions, **(D, P)**
16k	Identify the line of symmetry of a quadratic graph; **(D, P)**

Prerequisite learning:
- Knowing what 'sum' and 'product' means (YEAR 5, YEAR 7 AUT1)
- Powers and roots (Year 8 SPR2 NUMBER)
- Basic algebraic rules for expressions YEAR 7 AUT1, YEAR 8 AUT1, YEAR 9SPR1)
- Confidence in solving equations (YEAR 7 AUT1)
- Drawing linear graphs using a table of results, recognising gradient and intercept (YEAR 8 AUT2, SPR2)

All video clip references belong to hegartymaths
www.hegartymaths.com

YEAR 10 Route A
SPR2 QUADRATICS

Understand the terminology and symbolism for algebra. **154**

Factorising quadratic expressions **223- 228**

Expanding and factorising single and double brackets. **160 – 164, 168,169**

Solving a quadratic by factorising. **230 - 234**

Use quadratic graphs to solve equations. **252-256**

Plot and draw quadratic graphs. **251**

Sketching and understanding key points on a quadratic graph. **252-257**

Next steps:
- Solve simultaneous equation graphically (YEAR 11 A/B bespoke)
- Solve simultaneous equations (YEAR 11 A/B bespoke)
- Cubic and reciprocal graphs (YEAR 11 ROUTE A bespoke)
- Within Further Maths GCSE you will be introduced to polynomial division and within Maths you will solve cubic equations algebraically.

Dudley
Discover more

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

16l	Solve quadratic equations in the form $x^2 + bx + c = 0$ graphically **(D, P)**	
16m	Identify and interpret roots, intercepts and turning points of quadratic graphs. **(D, P)**	

Essential Language

Quadratic, function, solve, factorise, simplify, expression, graph, curve, factor, coefficient, bracket, turning point, solution, roots, estimate

PREREQUISITE AND GREATER DEPTH EXEMPLIFICATION	COMMON MISCONCEPTIONS:
PREREQUISITE Simple solving equations Factorising simple expressions Expanding single brackets Drawing straight line graphs **GREATER DEPTH** Plotting a graph of the form $ax^2 + bx + c$ where $a > 1$ Finding the turning point and equation of the line of symmetry	- x terms are sometimes be 'collected' with x2. - Squaring negative numbers can be a problem. - When squaring a linear expression, students may only square the two terms in the bracket. Emphasise the need to rewrite the expression as two brackets and then to expand. - Missing out the negative sign when writing negative intercepts. It is important that students check for this mistake. - Students often confuse being asked to factorise and being asked to solve.
OPPORTUNITIES FOR REASONING/PROBLEM SOLVING: - Visual proof of the difference of two squares. - Matching graphs with their respective functions. - Deriving the functions from the graph	**MASTERY PEDAGOGY** **RESOURCES TO SUPPORT LEARNING:** **Algebra Tiles** **Dienes Rods** **TRANSFERABLE SKILLS- Content in other context** **SCIENCE** https://qualifications.pearson.com/content/dam/pdf/GCSE/Science/2016/teaching-and-learning-materials/Guide-to-Maths-for-Scientists.pdf https://filestore.aqa.org.uk/resources/science/AQA-MATHS-IN-SCIENCE-FACTSHEET-PTT.PDF https://www.stem.org.uk/triplescience/maths

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

	https://www.aqa.org.uk/subjects/science/gcse/combined-science-trilogy-8464/planning-resources **GEOGRAPHY** https://qualifications.pearson.com/content/dam/pdf/GCSE/Geography-A/2016/teaching-and-learning-materials/Edexcel-2016-GCSE-Geography-A-B-Maths-for-Geographers.pdf

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

<table>
<tr><td colspan="2">

YEAR 10 MULTIPLICATIVE REASONING ROUTE A

</td></tr>
<tr><td colspan="2">

Objectives

</td></tr>
<tr>
<td>14a</td>
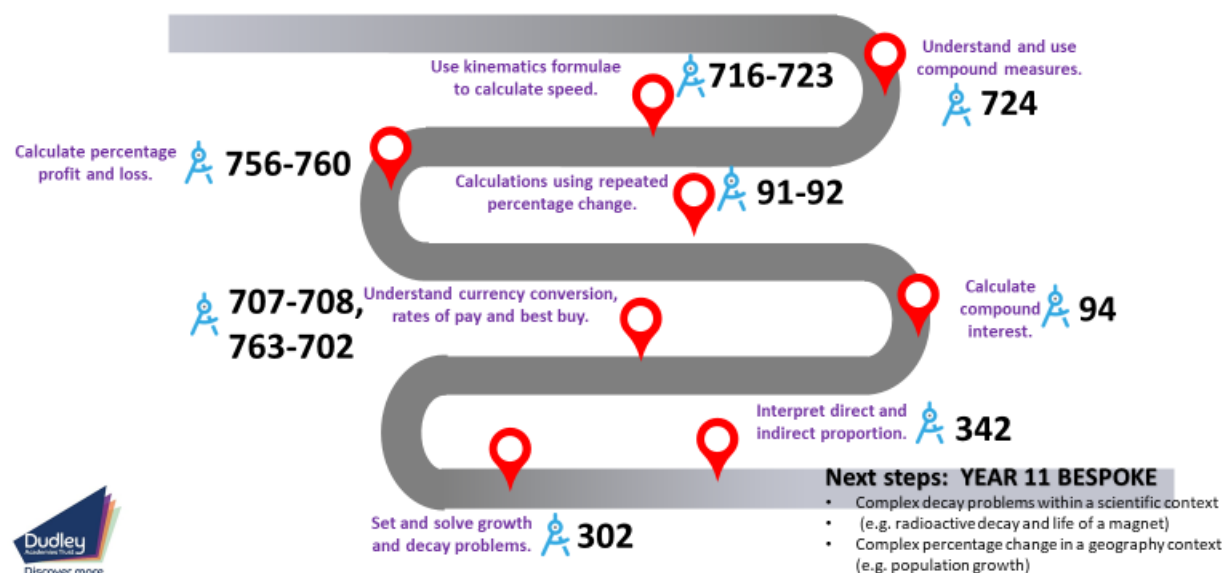<td>

Understand and use compound measures:
- Density
- Pressure
- Speed

(D, P)

</td>
</tr>
<tr>
<td>14b</td>
<td>convert between metric speed measures **(D, P)**</td>
</tr>
<tr>
<td>14c</td>
<td>change d/t in m/s to a formula in km/h, i.e. d/t × (60 × 60)/1000 – with support **(D, P)**</td>
</tr>
<tr>
<td>14d</td>
<td>read values in km/h and mph from a speedometer **(D)**</td>
</tr>
<tr>
<td>14e</td>
<td>calculate average speed, distance, time – in miles per hour as well as metric measures **(D, P)**</td>
</tr>
<tr>
<td>14f</td>
<td>use kinematics formulae to calculate speed, acceleration (with formula provided and variables defined in the question) **(D, P)**</td>
</tr>
<tr>
<td>14g</td>
<td>Express a given number as a percentage of another number in more complex situations **(D, P)**</td>
</tr>
<tr>
<td>14h</td>
<td>Calculate percentage profit or loss **(D, P)**</td>
</tr>
<tr>
<td>14i</td>
<td>Make calculations involving repeated percentage change, not using the formula **(D, P)**</td>
</tr>
<tr>
<td>14j</td>
<td>Find the original amount given the final amount after a percentage increase or decrease **(D, P, C)**</td>
</tr>
<tr>
<td>14k</td>
<td>Use compound interest **(D, P)**</td>
</tr>
<tr>
<td>14l</td>
<td>Use a variety of measures in ratio and proportion problems:</td>
</tr>
</table>

Prior learning:
- Applications of fractions, decimals, percentages (YEAR 7 SPR 1 , YEAR 8 AUT 1
- Ratio, including 1:n and n:1 (YEAR 8 SU1 and YEAR 9 SPR1)
- Linear graphs, including conversion and tariff graphs (YEAR 8 AUT2)

YEAR 10 SUM1 Multiplicative reasoning

Use kinematics formulae to calculate speed. **716-723**

Understand and use compound measures. **724**

Calculate percentage profit and loss. **756-760**

Calculations using repeated percentage change. **91-92**

Understand currency conversion, rates of pay and best buy. **707-708, 763-702**

Calculate compound interest. **94**

Interpret direct and indirect proportion. **342**

Set and solve growth and decay problems. **302**

Next steps: YEAR 11 BESPOKE
- Complex decay problems within a scientific context (e.g. radioactive decay and life of a magnet)
- Complex percentage change in a geography context (e.g. population growth)

Dudley
Discover more

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

	currency conversion rates of pay best value **(D, P)**	
14m	Set up, solve and interpret the answers in growth and decay problems **(D, P, C)**	
14n	Understand that X is inversely proportional to Y is equivalent to X is proportional to $\dfrac{1}{Y}$ **(D, P, C)**	
14o	Interpret equations that describe direct and inverse proportion **(D, P, C)**	

Essential Language

Ratio, proportion, Speed, Density, Pressure, compound measure, best value, proportional change, mass, volume, distance, time, acceleration, velocity, inverse, direct

PREREQUISITE AND GREATER DEPTH EXEMPLIFICATION	COMMON MISCONCEPTIONS:
PREREQUISITE Unit Conversions Basic Percentages **GREATER DEPTH** Writing proportional problems in an equation Calculate problems with multiple stages – speed between three towns A, B, C or combining densities	▪ Incorrect unit conversions ▪ Incorrect applications of formula triangles they have learnt from Science (default to using equations). ▪ Interpreting indirect proportion questions and direct proportion questions. ▪ Thinking that undoing a 20% increase is done by decreasing the new amount by 20%
OPPORTUNITIES FOR REASONING/PROBLEM SOLVING: ▪ Speed/distance type problems that involve students justifying their reasons why one vehicle is faster than another.	MASTERY PEDAGOGY RESOURCES TO SUPPORT LEARNING: **Bar modelling**

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

▪ Calculations involving value for money are a good reasoning opportunity that utilise different skills. ▪ Working out best value of items using different currencies given an exchange rate.	**Dienes rods** **Times Table Grids** **Numericon** **TRANSFERABLE SKILLS- Content in other context** **SCIENCE** https://qualifications.pearson.com/content/dam/pdf/GCSE/Science/2016/teaching-and-learning-materials/Guide-to-Maths-for-Scientists.pdf https://filestore.aqa.org.uk/resources/science/AQA-MATHS-IN-SCIENCE-FACTSHEET-PTT.PDF https://www.stem.org.uk/triplescience/maths https://www.aqa.org.uk/subjects/science/gcse/combined-science-trilogy-8464/planning-resources **GEOGRAPHY** https://qualifications.pearson.com/content/dam/pdf/GCSE/Geography-A/2016/teaching-and-learning-materials/Edexcel-2016-GCSE-Geography-A-B-Maths-for-Geographers.pdf

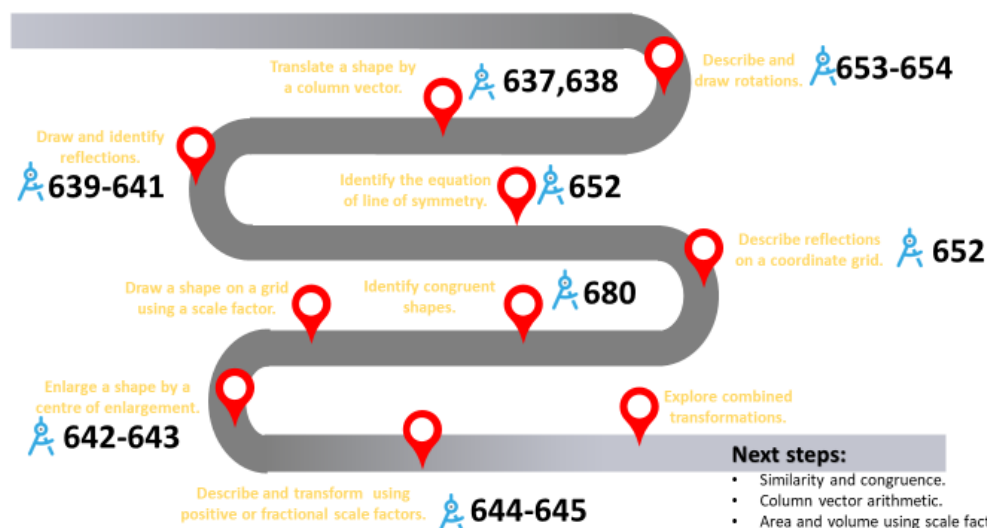## YEAR 10 TRANSFORMATIONS ROUTE A

Objectives	
10a	Understand clockwise and anticlockwise **(D)**
10b	Understand that rotations are specified by a centre, an angle and a direction of rotation **(D)**
10c	Find the centre of rotation, angle and direction of rotation and describe rotations **(D, P)**
10d	Describe a rotation fully using the angle, direction of turn, and centre **(D, P)**
10e	Rotate a shape about the origin or any other point on a coordinate grid **(P)**
10f	Draw the position of a shape after rotation about a centre (not on a coordinate grid) **(P)**
10h	Identify correct rotations from a choice of diagrams **(D)**
10i	Understand that translations are specified by a distance and direction using a vector **(D)**
10j	Translate a given shape by a vector **(D, P)**
10k	Describe and transform 2D shapes using single translations on a coordinate grid and use column vectors to describe translations **(D, P)**
10l	Understand that reflections are specified by a mirror line **(D)**
10m	Identify correct reflections from a choice of diagrams **(D)**
10n	Understand that reflections are specified by a mirror line **(D)**

Prerequisite learning:
- Lines of symmetry and rotational symmetry (Year 8 SPR 1)
- Reading scales on a coordinate axes (Year 8 SPR 1/2)
- Coordinates in four quadrants including direction (Year 8 SPR1/2)

All video clip references belong to hegartymaths www.hegartymaths.com

Year 10 SUM1 Transformations

Translate a shape by a column vector. 637,638

Describe and draw rotations. 653-654

Draw and identify reflections. 639-641

Identify the equation of line of symmetry. 652

Describe reflections on a coordinate grid. 652

Draw a shape on a grid using a scale factor.

Identify congruent shapes. 680

Enlarge a shape by a centre of enlargement. 642-643

Describe and transform using positive or fractional scale factors. 644-645

Explore combined transformations.

Next steps:
- Similarity and congruence.
- Column vector arithmetic.
- Area and volume using scale factors.

Dudley Discover more

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

10o	Identify the equation of a line of symmetry (D)	
10p	Transform 2D shapes using single reflections (including those not on coordinate grids) with vertical, horizontal and diagonal mirror lines (D, P)	
10q	Describe reflections on a coordinate grid (P)	
10r	Identify congruent shapes by eye (D)	
10s	Understand that distances and angles are preserved under rotations, translations and reflections, so that any figure is congruent under either of these transformations (D)	
10t	Scale a shape on a grid (without a centre specified) (P)	
10u	Understand that an enlargement is specified by a centre and a scale factor (D)	
10v	Enlarge a given shape using (0, 0) as the centre of enlargement, and enlarge shapes with a centre other than (0, 0) (P)	
10w	Find the centre of enlargement by drawing (D, P)	
10x	Describe and transform 2D shapes using enlargements by: a positive integer scale factor a fractional scale factor (D, P, C)	
10y	Identify the scale factor of an enlargement of a shape as the ratio of the lengths of two corresponding sides, simple integer scale factors, or simple fractions (D, P, C)	
10z	Understand that similar shapes are enlargements of each other and angles are preserved – define similar in this unit (D)	

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

<table>
<tr><td colspan="2" style="background:#F5C842"></td></tr>
<tr><td colspan="2"><u>Essential Language</u>
Transformation, rotation, reflection, enlargement, translation, similarity, congruence single, combination, scale factor, mirror line, centre of rotation, centre of enlargement, column vector, vector, angle, direction, coordinate, describe</td></tr>
<tr>
<td>PREREQUISITE AND GREATER DEPTH EXEMPLIFICATION

PREREQUISITE
Knowledge of 2D shapes
Familiarity with coordinates and a coordinate grid
Basic angle facts
GREATER DEPTH
Solving equations using similarity
Finding Invariant points after transformations</td>
<td>COMMON MISCONCEPTIONS:
The directions on a column vector often get mixed up.
Student need to understand that the 'units of movement' are those on the axes, and care needs to be taken to check the scale.
Correct language must be used: students often use 'turn' rather than 'rotate'.</td>
</tr>
<tr>
<td>OPPORTUNITIES FOR REASONING/PROBLEM SOLVING:
Students should be given the opportunity to explore the effect of reflecting in two parallel mirror lines and combining transformations.
Finding missing sides in triangles contained within larger triangles, or triangles created by overlapping transversals between parallel lines</td>
<td>MASTERY PEDAGOGY

RESOURCES TO SUPPORT LEARNING:
2D Shapes
Numicon
Dienes Rods

TRANSFERABLE SKILLS- Content in other context
SCIENCE
https://qualifications.pearson.com/content/dam/pdf/GCSE/Science/2016/teaching-and-learning-materials/Guide-to-Maths-for-Scientists.pdf

https://filestore.aqa.org.uk/resources/science/AQA-MATHS-IN-SCIENCE-FACTSHEET-PTT.PDF

https://www.stem.org.uk/triplescience/maths

https://www.aqa.org.uk/subjects/science/gcse/combined-science-trilogy-8464/planning-resources

GEOGRAPHY
https://qualifications.pearson.com/content/dam/pdf/GCSE/Geography-A/2016/teaching-and-learning-materials/Edexcel-2016-GCSE-Geography-A-B-Maths-for-Geographers.pdf</td>
</tr>
</table>

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

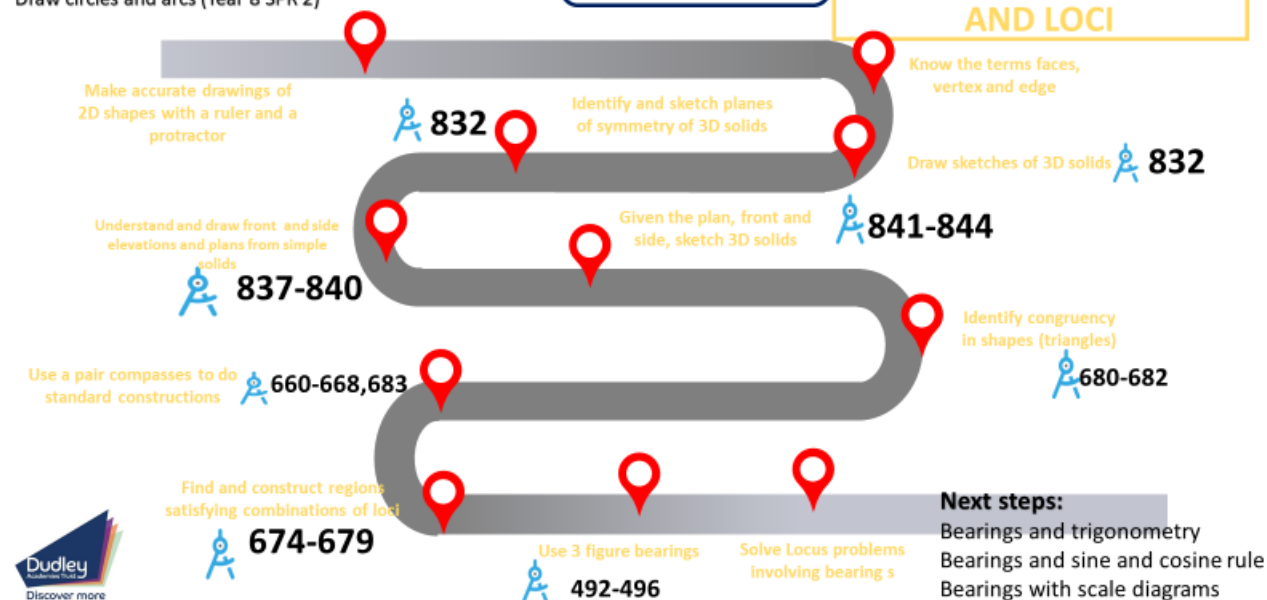## YEAR 10 CONSTRUCTIONS AND LOCI ROUTE A

Objectives

15a	Understand clockwise and anticlockwise **(D)**
15b	Draw circles and arcs to a given radius or given the diameter **(P)**
15c	Measure and draw lines, to the nearest mm **(P)**
15d	Measure and draw angles, to the nearest degree **(P)**
15e	Know and use compass directions **(P)**
15i	Make accurate drawings of triangles and other 2D shapes using a ruler and a protractor **(P)**
15j	Construct diagrams of everyday 2D situations involving rectangles, triangles, perpendicular and parallel lines **(P)**
15g	Know the terms face, edge and vertex **(D)**
15f	Draw sketches of 3D solids **(D)**
15h	Identify and sketch planes of symmetry of 3D solids **(D)**
15k	Understand and draw front and side elevations and plans of shapes made from simple solids **(P)**
15l	Given the front and side elevations and the plan of a solid, draw a sketch of the 3D solid **(P)**
15m	Understand congruence, as two shapes that are the same size and shape **(D)**

Prerequisite learning:
Draw and measure lines and angles (Year 7 SPR1 and SUM 1)
Understand clockwise and anticlockwise (year 8 SPR1)
Draw circles and arcs (Year 8 SPR 2)

All video clip references belong to hegartymaths
www.hegartymaths.com

YEAR 10
SUM2 CONSTRCUTION AND LOCI

Make accurate drawings of 2D shapes with a ruler and a protractor **832**

Identify and sketch planes of symmetry of 3D solids

Know the terms faces, vertex and edge

Draw sketches of 3D solids **832**

Understand and draw front and side elevations and plans from simple solids **837-840**

Given the plan, front and side, sketch 3D solids **841-844**

Use a pair compasses to do standard constructions **660-668,683**

Identify congruency in shapes (triangles) **680-682**

Find and construct regions satisfying combinations of loci **674-679**

Use 3 figure bearings **492-496**

Solve Locus problems involving bearing s

Next steps:
Bearings and trigonometry
Bearings and sine and cosine rule
Bearings with scale diagrams

Dudley
Discover more

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

15n	Visually identify shapes which are congruent **(D)**	
15o	Use straight edge and a pair of compasses to do standard constructions: understand, from the experience of constructing them, that triangles satisfying SSS, SAS, ASA and RHS are unique, but SSA triangles are not construct the perpendicular bisector of a given line construct the perpendicular from a point to a line construct the bisector of a given angle construct angles of 90°, 45° **(P)**	
15p	Draw and construct diagrams from given instructions, including the following: a region bounded by a circle and an intersecting line a given distance from a point and a given distance from a line equal distances from two points or two line segments regions may be defined by 'nearer to' or 'greater than' **(P)**	
15q	Find and describe regions satisfying a combination of loci **(P, C)**	
15r	Use constructions to solve loci problems (2D only) **(P, C)**	
15s	Use and interpret maps and scale drawings **(D, P)**	
15t	Estimate lengths using a scale diagram **(P)**	
15u	Make an accurate scale drawing from a diagram **(P)**	

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

15v	Use three-figure bearings to specify direction **(D)**	
15w	Mark on a diagram the position of point *B* given its bearing from point **(P, C)**	
15x	Give a bearing between the points on a map or scaled plan **(P, C)**	
15y	Given the bearing of a point *A* from point *B*, work out the bearing of *B* from *A* **(D)**	
15z	Use accurate drawing to solve bearings problems **(P, C)**	
15aa	Solve locus problems including bearings **(P, C)**	

Essential Language

Construct, **loci, scale, angles, bearing, region,** circle, arc, sector, face, edge, vertex, two-dimensional, three-dimensional, solid, elevations, congruent, angles, regular, irregular, degree, bisect, perpendicular, map, scale, plan

PREREQUISITE AND GREATER DEPTH EXEMPLIFICATION	COMMON MISCONCEPTIONS:
PREREQUISITE 2D Shapes Angle Facts 3D Shapes Shape Properties **GREATER DEPTH** More complicated constructions such as pentagons Drawing 3D shapes from a set of plans and views	▪ Some pupils may use the wrong scale of a protractor. For example, they measure an obtuse angle as 60° rather than as 120°. ▪ Often 5 sides only are drawn for a cuboid. ▪ Correct use of a compass may be an issue.
OPPORTUNITIES FOR REASONING/PROBLEM SOLVING: ▪ Interpreting scale drawings and maps involving lengths that need to be measured (rather than given in the problem).	**MASTERY PEDAGOGY** **RESOURCES TO SUPPORT LEARNING:** **Bar modelling**

D= Declarative knowledge, P= Procedural knowledge, C= Contextual knowledge

▪ Link problems with other areas of mathematics, such as the trigonometric ratios and Pythagoras' Theorem	**TRANSFERABLE SKILLS- Content in other context** **SCIENCE** https://qualifications.pearson.com/content/dam/pdf/GCSE/Science/2016/teaching-and-learning-materials/Guide-to-Maths-for-Scientists.pdf https://filestore.aqa.org.uk/resources/science/AQA-MATHS-IN-SCIENCE-FACTSHEET-PTT.PDF https://www.stem.org.uk/triplescience/maths https://www.aqa.org.uk/subjects/science/gcse/combined-science-trilogy-8464/planning-resources **GEOGRAPHY** https://qualifications.pearson.com/content/dam/pdf/GCSE/Geography-A/2016/teaching-and-learning-materials/Edexcel-2016-GCSE-Geography-A-B-Maths-for-Geographers.pdf