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DESC Mathematics KS4 Higher Year 11

OVERVIEW & REVISION GUIDE

Unit 1

Unit 1 Overview

1.1 Decimals and Estimation

1.1 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Converting between fractions, decimals and percentages **Dr Frost Code: E31**	Adding and subtracting decimals **Dr Frost Code: E20**	Using a calculator effectively **Dr Frost Code: 104**	Rounding to a given number of decimal places **Dr Frost Code: K39a**	Rounding to significant figures **Dr Frost Code: E122**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
1.1a Product Rule for Counting*					
1.1b Converting Recurring Decimals to Fractions*					
1.1c Multiply and Divide Decimals*					
1.1d Related Calculations					
1.1e Estimate Calculations by Rounding*					
1.1f Truncate a Number					
1.1g Error Intervals*					
1.1h Calculating with Bounds*					

1.2 Angles

1.1 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Angles on a Straight Line, Around a Point and Vertically Opposite Angles **E66, E67**	Angles in a Triangle Sum to 180 **E68**	Angles in a Quadrilateral Sum to 360 **K153a**
Draw and Measure Angles Using a Protractor **K63b, K63d**	Use Angle Notation to Describe an Angle **K151a**	Solving Equations Including Unknowns on Both Sides **K182a**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
1.2a Solve Problems Involving Angles in Triangles and Quadrilateral					
1.2b Angles in Parallel Lines*					
1.2c Angles in Polygons*					
1.2d Form and Solve Equations with Angle Facts*					
1.2f Draw and Measure Bearings					
1.2g Calculate Bearings Using Angle Facts					

* Commonly assessed topics

1.3 Averages & The Range

1.1 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Calculate the mean, median, mode and range from a list of data **K58a, K128a, K128b, K128c**	Interpret ungrouped and grouped frequency tables **K131a, K131b, K131c, K131d**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
1.3a Combined Means*					
1.3b Find the Mean, Median, Mode and Range from Ungrouped Frequency Tables*					
1.3c Estimate the Mean and Find the Interval Containting the Median and Mode in Grouped Frequency Tables*					
1.3d Calculate Quartiles and Inter-Quartile Range from Listed Data					
1.3e Draw and Interpret Box Plots*					
1.3f Compare Two Sets of Data					
1.3g Draw and Interpret Cumulative Frequency Graphs*					

Unit 1 Revision Checklist

I have reviewed my feedback quizzes and used the videos and practice questions from the Unit 1 Overview to secure my gaps	
I have attended revision session 1 in ..... on	
I have finished the Dr Frost tasks set from revision session 1 at home.	
I have attended revision session 2 in ..... on	
I have finished the Dr Frost tasks set from revision session 2 at home.	
I have memorised the required facts and formulae for Unit 1 from the memorise sheet.	

Important Note:

The Dr Frost revision tasks are split into Cautious and Confident. You will be set **all** tasks.

- Cautious targets grades 4-6
- Confident targets grades 7+

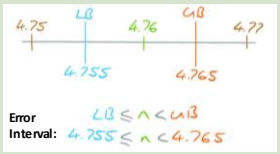
If you are aiming for grades 7+, you should be completing **both** the cautious and confident tasks.

* Commonly assessed topics

Unit 1 Memorise Sheet

Error Intervals:

A number, n, is rounded to 4.76 correct to 2 decimal places.



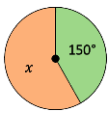
The inequality signs always go this way

Calculating With Bounds:

Addition	Subtraction
$UB = UB + UB$ $LB = LB + LB$	$UB = UB - LB$ $LB = LB - UB$
Multiplication	**Division**
$UB = UB \times UB$ $LB = LB \times LB$	$UB = \frac{UB}{LB}$ $LB = \frac{LB}{UB}$

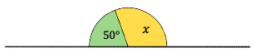
Basic Angle Facts:

Angles around a point add up to 360°



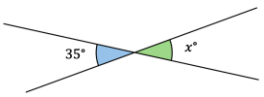
$x + 150 = 360$

Angles on a straight line add up to 180°



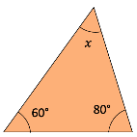
$x + 50 = 180$

Vertically opposite angles are equal.



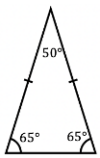
$x = 35$

Angles in a triangle add up to 180°

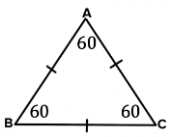


$x + 60 + 80 = 180$

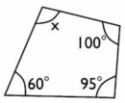
Base Angles in an Isosceles Triangle are Equal



Angles in an Equilateral Triangle Are All Equal

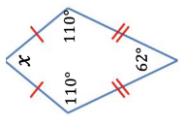


Angles in a quadrilateral add up to 360°



$x + 100 + 95 + 60 = 360$

A Kite Has One Line of Symmetry and One Pair of Equal, Opposite Angles



Angles in Parallel Lines

Alternate angles are equal

Co-Interior angles add up to 180°

Corresponding angles are equal

Angles in Polygons

For ANY Polygon:

Sum of the Interior Angles = $(n-2) \times 180$
Where n is the number of sides.

For REGULAR Polygons Only:

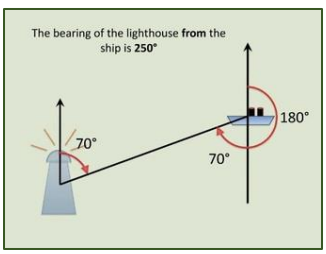
One Exterior Angle = $\frac{360}{n}$

One Interior Angle = $\frac{(n-2)\times 180}{n}$

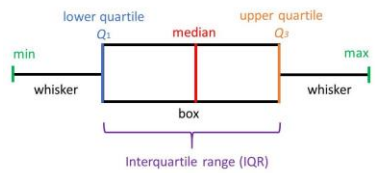
Bearings:

- Measured from North
- Anti-Clockwise
- Given as 3 figures.

The bearing of the ship **from** the lighthouse is 070°



Box Plots – Key Points:



- IQR = UQ – LQ
- IQR represents the middle 50% of data
- 25% of the data is below the LQ
- 25% of the data is above the UQ

Comparing Data Sets:

When comparing two sets of data, you must always compare:

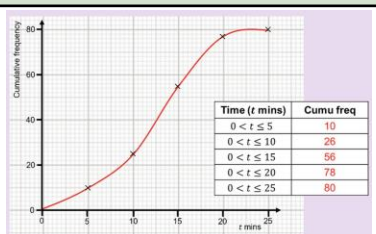
1. The **medians** and explain this comparison **in context**. *E.g The median for boys (164cm) was higher than for girls (157cm). On average, boys were taller than girls.*
2. The **range** or **IQR** and explain this comparison **in context**. *Eg. The IQR for girls (23cm) was lower than for boys (39cm). This means that the girls' heights were more **consistent**.*

REMEMBER: Smaller range/IQR means more consistent!

Cumulative Frequency Graphs:

- The cumulative frequency column is a **running total** of the frequencies.
- To plot the points

1. Plot the smallest possible value on the x-axis
2. Use the **end points** of the class intervals and plot **with** the **cumulative frequency.**



Time (t mins)	Cumu freq
$0 < t \leq 5$	10
$0 < t \leq 10$	26
$0 < t \leq 15$	56
$0 < t \leq 20$	78
$0 < t \leq 25$	80

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OVERVIEW & REVISION GUIDE

Unit 2

Unit 2 Overview

2.1 Manipulating Expressions

2.1 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Simplify Expressions by Collecting Like Terms **K80f**	Expand Single Brackets Including Addition and Subtraction of Brackets **K83c, K83d, K83e**	Factorise Into a Single Bracket **K178c**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
2.1a Expand the Product of Two Brackets*					
2.1b Expand the Product of Triple Brackets*					
2.1c Factorise Quadratics of the Form $x^2 + bx + c$ *					
2.1d Factorise Quadratics of the Form $ax^2 + bx + c$ by Splitting the Middle Term*					
2.1e Factorise Expressions Using Difference of Two Squares*					
2.1f Factorise Harder Expressions Requiring a Combination of Techniques or Factorising Out a Bracket					

2.2 Fractions

2.2 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Simplify and Find Equivalent Fractions **K29b, K29c**	Order Fractions **K29d**	Convert Between Fractions and Mixed Numbers **K97a, K97b**	Find a Fraction of an Amount Without a Calculator **K101b**	Add, Subtract, Multiply and Divide fractions (excluding mixed numbers) **K94c, K95a, K95b, K96a**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
2.2a Calculate the Reciprocal of a Fraction, Integer, Mixed Number or Decimal					
2.2b Add and Subtract Mixed Numbers*					
2.2c Multiply Mixed Numbers*					
2.2d Divide Mixed Numbers*					
2.2e Calculate a Fraction of an Amount, Including a Fraction of a Fraction*					
2.2f Given a Fraction of a Quantity, Find the Original Value					
2.2g Solve Problems Involving Fractions					

* Commonly assessed topics

2.3 Pythagoras and Trigonometry

2.3 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Pythagoras' Theorem **K228a, K228b**	Use Trigonometry to Find Missing Sides in Right-Angled Triangles **E241**	Use Trigonometry to Find Missing Angles in Right-Angled Triangles **E242**	Area of 2D Shapes **K71a, K73a, K74a, K146a, K144a**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
2.3a Apply Pythagoras' Theorem to Solve Problems Involving Right-Angled Triangles*					
2.3a Apply Trigonometry to Solve Problems Involving Right-Angled Triangles*					
2.3b Work With Bearings and Angles of Elevation and Depression in Right-Angled Triangles					
2.3c Use Pythagoras' Theorem and Trigonometry in 3D*					

2.4 Solving Linear Equations

2.4 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Solving 2-Step Equations **K181c**	Solving Equations With Unknowns on Both Sides **K182a**	Solving Equations With Unknowns on Both Sides Including Brackets **K182b**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
2.4a Solve Equations Involving Fractions*					
2.4b Forming and Solving Linear Equations*					

Unit 2 Revision Checklist

I have reviewed my feedback quizzes and used the videos and practice questions from the Unit 2 Overview to secure my gaps	
I have attended revision session 1 in ..... on	
I have finished the Dr Frost tasks set from revision session 1 at home.	
I have attended revision session 2 in ..... on	
I have finished the Dr Frost tasks set from revision session 2 at home.	
I have memorised the required facts and formulae for Unit 2 from the memorise sheet.	

Important Note:

The Dr Frost revision tasks are split into Cautious and Confident. You will be set **all** tasks.

- Cautious targets grades 4-6
- Confident targets grades 7+

If you are aiming for grades 7+, you should be completing **both** the cautious and confident tasks.

* Commonly assessed topics

Unit 2 Memorise Sheet

Expanding Triple Brackets:

1. Expand and simplify the first two brackets
2. Multiply the answer by the third bracket

Expand and simplify $(x + 3)(x + 2)(x + 4)$

Multiply the first 2 brackets: $(x + 3)(x + 2) = x^2 + 5x + 6$
Multiply this expression by $(x + 4) = (x^2 + 5x + 6)(x + 4)$
$= x^3 + 5x^2 + 6x + 4x^2 + 20x + 24$
$= x^3 + 9x^2 + 26x + 24$

DOTS (Difference of Two Squares):

$$a^2 - b^2 = (a+b)(a-b)$$

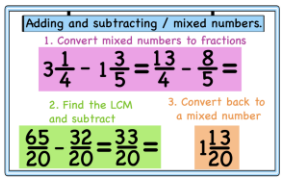
Examples:

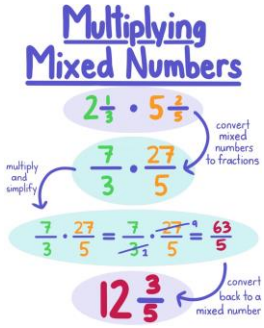
$9x^2 - 4$
$= (3x)^2 - 2^2$
$= (3x+2)(3x-2)$

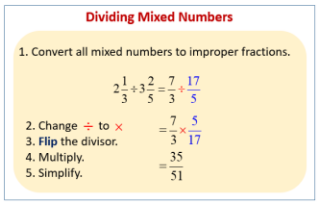
$3x^2 - 75$
$= 3(x^2 - 25)$
$= 3(x^2 - 5^2)$
$= 3(x+5)(x-5)$

Calculating with Mixed Numbers:

1. Convert all mixed numbers to improper fractions first
2. Complete the calculation
3. Convert answer back to a mixed number







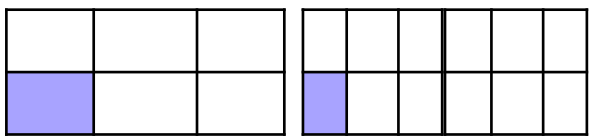
Fraction of an Amount:

1. Divide by the denominator
2. Multiply by the numerator

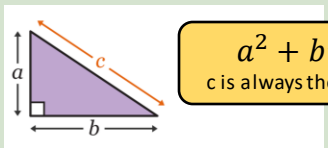
examples

$\frac{1}{3}$ of 33 = 33÷3 = 11	$\frac{1}{4}$ of £6 = £6÷4 = £1.50	$\frac{2}{5}$ of 45 = (45÷5)×2 = 9×2 = 18	$\frac{3}{10}$ of 52 = (52÷10)×3 = 5.2 × 3 = 15.6	$\frac{2}{5}$ of 6 = (6÷5)×2 = 1.2 × 3 = 3.6

Fraction of a Fraction: $\frac{1}{2}\ of\ \frac{1}{6} = \frac{1}{2} \times \frac{1}{6} = \frac{1}{12}$

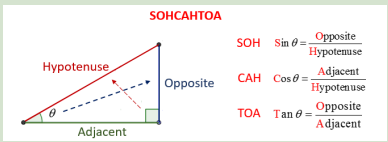


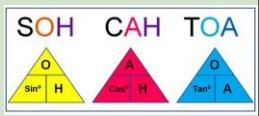
Pythagoras' Theorem:



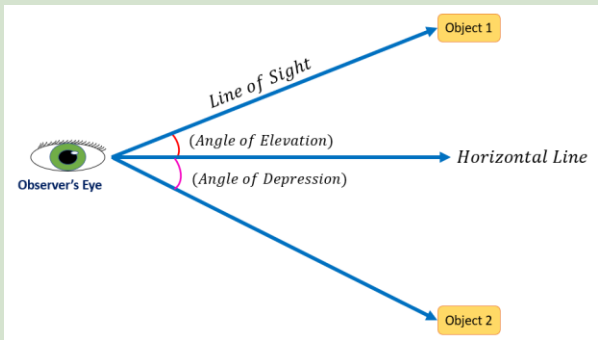
$a^2 + b^2 = c^2$
c is always the hypotenuse

Trigonometry (SOHCAHTOA)





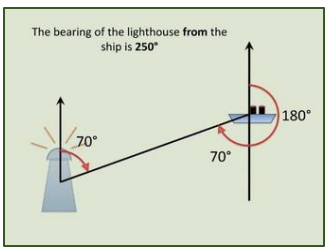
Angles of Elevation and Depression:



Bearings:

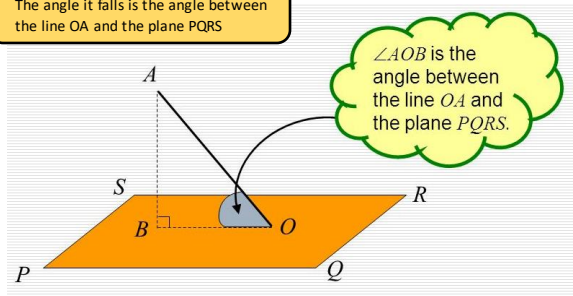
- Measured from North
- Anti-Clockwise
- Given as 3 figures.

The bearing of the ship **from** the lighthouse is 070°



Identifying the Angle Between the Line and the Plane:

Imagine OA is dropped to the floor.
The angle it falls is the angle between the line OA and the plane PQRS



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OVERVIEW & REVISION GUIDE

Unit 3

Unit 3 Overview

3.1 Number System

3.1 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Identify Squares, Cubes and Roots **K16b, K16c, K17a**	Order of Operations (BIDMAS) **E103**	Identify Prime Numbers **K37a**	List Factors and Multiples of a Number **K33a, K33c**	Find the HCF and LCM of Two Numbers by Listing **K115a, K115b**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
3.1a Represent a Number as a Product of Its Prime Factors*					
3.1b Find the HCF and LCM of Two or More Numbers Using Venn Diagrams*					
3.1c Use the Basic Index Laws for Multiplication, Division, Power to a Power and Power of Zero*					
3.1d Fractional and Negative Indices*					
3.1e Changing the Base With Indices					
3.1f Working in Standard Form*					
3.1g Multiply and Divide Surds*					
3.1h Simplify, Add and Subtract Surds*					
3.1i Expand Brackets Involving Surds*					
3.1j Rationalise Simple Denominators*					
3.1k Rationalise Harder Denominators					

3.2 Sequences

3.2 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Continue a Sequence **E85**	Identify the Term-to-Term Rule of a Sequence **K85a**	Substitute into an Expression **K79c, K79d**	Solve a Linear Equation **K181c, K182a**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
3.2a Generating Sequences Using the Nth Term					
3.2b Recognise and Continue Special Sequences					
3.2c Nth Term of an Arithmetic Sequence*					
3.2d Nth Term of a Quadratic Sequence*					
3.2e Apply Skills to Patterns and Real-Life Contexts					

* Commonly assessed topics

3.3 Percentages

3.3 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Find a Percentage of an Amount Without a Calculator **K108c**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
3.1a Increase and Decrease an Amount by a Percentage Without a Calculator*					
3.1b Use Multipliers to Find, Increase and Decrease by a Percentage Using a Calculator*					
3.1c Express Quantities as a Percentage and Calculate a Percentage Change*					
3.1d Reverse Percentages*	Non-Calc Calc				
3.1e Calculate with Compound Interest and Depreciation*					
3.1f Repeat Percentage Change Problems*					
3.1g Analyse Mixed Percentage Problems to Identify and Apply the Correct Skill*					

Unit 3 Revision Checklist

I have reviewed my feedback quizzes and used the videos and practice questions from the Unit 3 Overview to secure my gaps	
I have attended revision session 1 in ..... on	
I have finished the Dr Frost tasks set from revision session 1 at home.	
I have attended revision session 2 in ..... on	
I have finished the Dr Frost tasks set from revision session 2 at home.	
I have memorised the required facts and formulae for Unit 3 from the memorise sheet.	

Important Note:

The Dr Frost revision tasks are split into Cautious and Confident. You will be set **all** tasks.

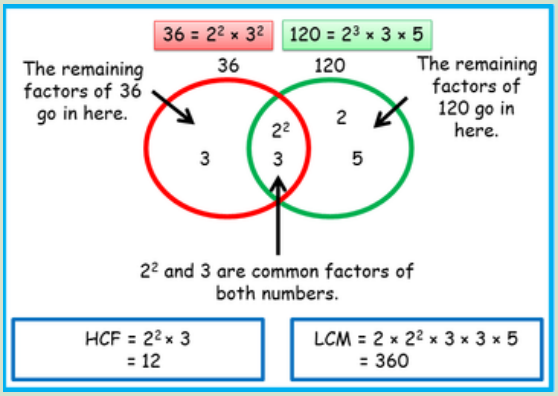
- Cautious targets grades 4-6
- Confident targets grades 7+

If you are aiming for grades 7+, you should be completing **both** the cautious and confident tasks.

* Commonly assessed topics

Unit 3 Memorise Sheet

HCF and LCM from Venns:



Index Laws

- $a^m \times a^n = a^{m+n}$
- $a^m \div a^n = a^{m-n}$
- $(a^m)^n = a^{mn}$
- $(ab)^n = a^n b^n$
- $a^1 = a$
- $a^0 = 1$
- $a^{\frac{1}{m}} = \sqrt[m]{a}$
- $a^{\frac{m}{n}} = \sqrt[n]{a^m}$
- $a^{-m} = \frac{1}{a^m}$

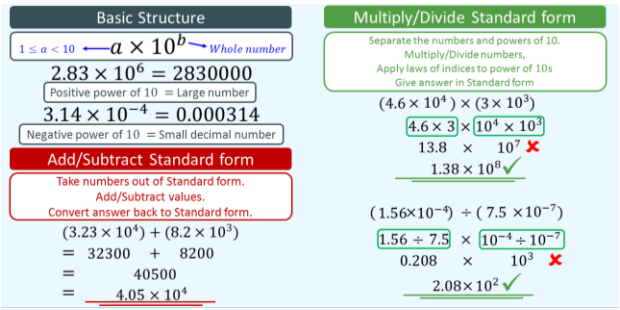
INDEX NOTATION:

a^n

THIS IS THE BASE

THIS IS THE INDEX (ALSO CALLED THE POWER OR EXPONENT)

Standard Form:

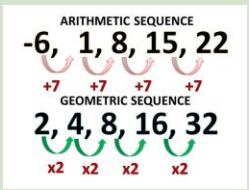


Surd Laws and Rationalising Surds:

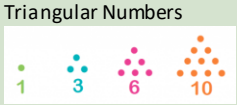
$$a\sqrt{c} + b\sqrt{c} = (a+b)\sqrt{c}$$
$$\sqrt{a} \times \sqrt{b} = \sqrt{ab}$$
$$\sqrt{a} \times \sqrt{a} = \sqrt{a^2} = a$$
$$a\sqrt{b} \times c\sqrt{d} = ac\sqrt{bd}$$

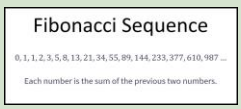
$$\frac{\sqrt{a}}{\sqrt{b}} = \sqrt{\frac{a}{b}}$$
$$\frac{\sqrt{a}}{\sqrt{b}} = \frac{\sqrt{a}}{\sqrt{b}} \cdot \frac{\sqrt{b}}{\sqrt{b}} = \frac{\sqrt{ab}}{b}$$
$$\frac{a}{\sqrt{b}} = \frac{a}{\sqrt{b}} \cdot \frac{\sqrt{b}}{\sqrt{b}} = \frac{a\sqrt{b}}{b}$$

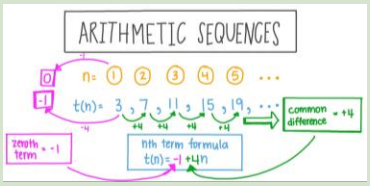
Special Sequences and Types of Sequences:

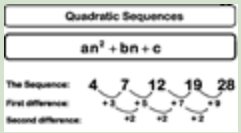


Triangular Numbers

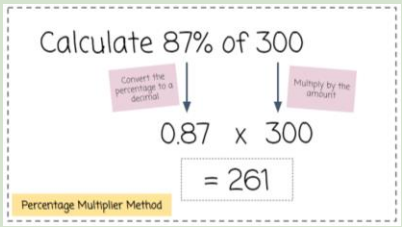








Percentage Multipliers:



Increase £42 by 3%	Decrease £42 by 3%
100% of 42 + 3% of 42 = 103% of 42	100% of 42 − 3% of 42 = 97% of 42
42 × 1.03 = £43.26	42 × 0.97 = £40.74

Percentage Change:

$$\text{Percentage Change} = \frac{\text{Change in Value}}{\text{Original Value}} \times 100$$

Compound Interest and Depreciation:

COMPOUND INTEREST:

$$A = P\left(1 + \frac{r}{100}\right)^n$$

where :

A = *total amount after n years*
P = *principal or original value*
r = *rate of interest per annum*
n = *number of years the money is invested*

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OVERVIEW & REVISION GUIDE

Unit 4

Unit 4 Overview

4.1 Area and Volume 1

4.1 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Find the Perimeter of 2D Shapes **K69a, K72b**	Area of Rectangles, Triangles and Parallelograms **K71a, K73a, K74a**	Area and Circumference of a Circle **K143a, K144a**	Find the Area of a Trapezium **K146a**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
4.1a Form and Solve Equations Involving Area and Perimeter*					
4.1b Find the Area and Perimeter of Compound Shapes*		Circles			
4.1c Area and Perimeter of a Sector*					
4.1d Nets of 3D Shapes					
4.1e Plans and Elevations					
4.1f Volume of Prisms*					

4.2 Linear Graphs

4.2 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Use the links below to secure your skills:

Plot and Read Coordinates in All Four Quadrants **E75**	Substitute Into an Expression **K79c, K79d**	Pythagoras' Theorem **K228a, K228b**	Change the Subject of a Formula **E186**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
4.2a Solve Problems Involving Coordinates					
4.2b Find the Midpoint of Two Coordinates	Midpoint Ratios				
4.2c Find the Length of a Line Segment					
4.2d Recognise and Draw Horizontal, Vertical and Simple Diagonal Lines					
4.2e Use the Equation of a Line*					
4.2f Draw a Linear Graph Using an xy Table*					
4.2g Find the Equation of a Straight Line from a Graph*					
4.2h Find the Equation of a Straight Line Between Two Points*					
4.2i Equations of Parallel Lines*					
4.2j Equations of Perpendicular Lines*					

* Commonly assessed topics

Unit 4 Revision Checklist

I have reviewed my feedback quizzes and used the videos and practice questions from the Unit 4 Overview to secure my gaps	
I have attended revision session 1 in ..... on	
I have finished the Dr Frost tasks set from revision session 1 at home.	
I have attended revision session 2 in ..... on	
I have finished the Dr Frost tasks set from revision session 2 at home.	
I have memorised the required facts and formulae for Unit 4 from the memorise sheet.	

Important Note:

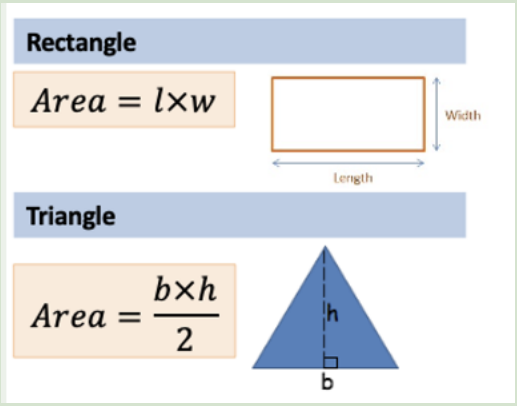
The Dr Frost revision tasks are split into Cautious and Confident. You will be set **all** tasks.

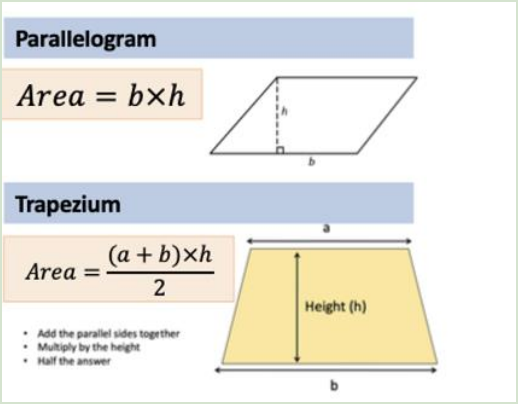
- Cautious targets grades 4-6
- Confident targets grades 7+

If you are aiming for grades 7+, you should be completing **both** the cautious and confident tasks.

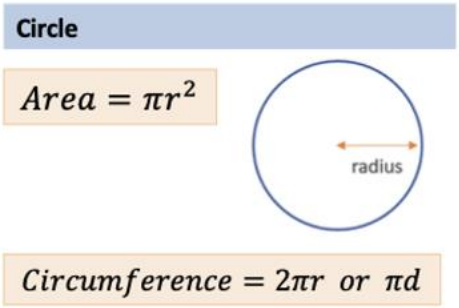
Unit 4 Memorise Sheet

Area of Rectangles, Triangles, Parallelograms and Trapezia:

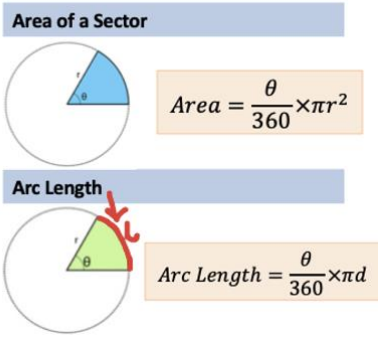




Area and Circumference of a Circle:

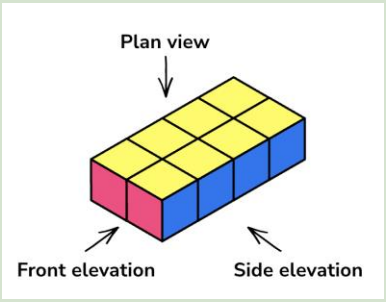


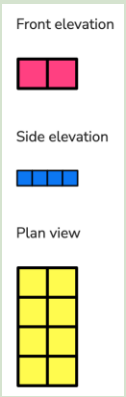
Area and Perimeter of a Sector:



Unit 4 Memorise Sheet Continued

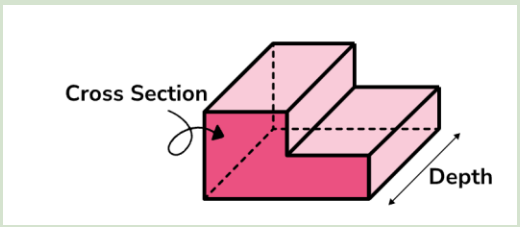
Plans and Elevations:





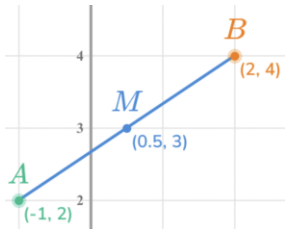
Volume of a Prism

Volume of Prism =
$Area\ of\ Cross\ Section \times Depth$



Midpoint of Two Coordinates:

$$midpoint = \left(\frac{x_1 + y_1}{2}, \frac{x_2 + y_2}{2}\right)$$

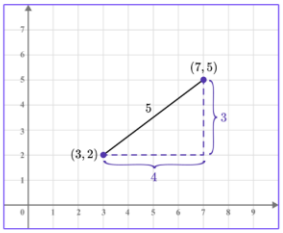


$$\left(\frac{-1+2}{2}, \frac{2+4}{2}\right)$$

Midpoint = $(0.5, 3)$

Length of a Line Segment:

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$



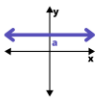
$$d = \sqrt{(7-3)^2 + (5-2)^2}$$
$$= \sqrt{4^2 + 3^2}$$
$$= \sqrt{16 + 9}$$
$$= \sqrt{25}$$
$$= 5$$

You are just using Pythagoras!

Horizontal, Vertical and Simple Diagonal Lines:

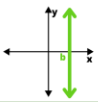
Equation of a Horizontal Line

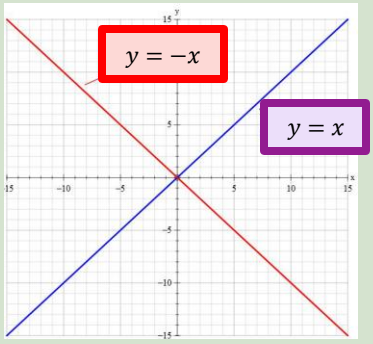
$y = a$



Equation of a Vertical Line

$x = b$





Equation of a Straight Line:

$$y = mx + c$$

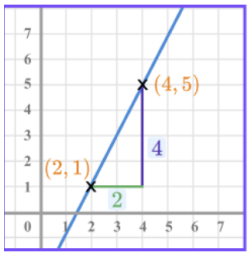
gradient — y-intercept

Gradient of a Line:

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Example

$$m = \frac{5-1}{4-2} = \frac{4}{2} = 2$$



Parallel and Perpendicular Lines:

Parallel lines have the **same gradient**

Perpendicular lines:

- The gradient of one is the **negative reciprocal** of the other $m_1 = -\frac{1}{m_2}$
- The gradients multiply to make -1 $m_1 \times m_2 = -1$

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OVERVIEW & REVISION GUIDE

Unit 5

Unit 5 Overview

5.1 Ratio and Proportion 1

5.1 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Use Ratio Notation **K105e**	Simplify Ratios and Find Equivalent Ratios **K105a**	Find a Percentage of an Amount **K108c**	Find a Fraction of an Amount **K101b**	Convert Between Units of Measure **K62a-f**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
5.1a Convert between ratios, fractions, percentages and linear functions*					
5.1b Solve Problems By Scaling Ratios					
5.1c Combine Ratios*					
5.1d Share Into a Ratio*					
5.1e Subdivide Ratios					
5.1f Form and Solve Linear Equations Given Two Equivalent Ratios					
5.1g Solve Problems Involving a Change in Value from One Ratio to Another Using Algebra					
5.1h Map Scales and Scale Diagrams					
5.1i Use Direct Proportion to Solve Problems Involving Best Buys and Exchange Rates*					
5.1j Recipes					
5.1k Worded Inverse Proportion*					

5.2 Simultaneous Equations

5.2 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Substitute Into Expressions **K79c, K79d**	Drawing Linear Graphs **K188**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
5.2a Solve Two Linear Simultaneous Equations by Elimination*					
5.2b Form and Solve Linear Simultaneous Equations from Context*					
5.2c Solve Linear Simultaneous Equations Graphically*					

* Commonly assessed topics

5.3 Quadratic Equations

5.3 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Expanding Double Brackets **K179d**	Factorise Quadratic Expressions by Splitting the Middle Term **K195c**	Find the Area of 2D Shapes **K71a, K73a, K74a, K146a, K144a**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
5.3a Solve Quadratic Equations by Factorising*					
5.3b Solve Quadratic Equations Using the Quadratic Formula*					
5.3c Form and Solve Quadratic Equations from a Range of Mathematics Contexts*					
5.3d Complete the Square for Quadratic Expressions of the Form x^2+bx+c *					
5.3e Find the Turning Point of a Quadratic Function by Completing the Square *					
5.3f Sketch Quadratic Graphs					
5.3g Solve Non-Linear Simultaneous Equations*					

Unit 5 Revision Checklist

I have reviewed my feedback quizzes and used the videos and practice questions from the Unit 5 Overview to secure my gaps	
I have attended revision session 1 in ..... on	
I have finished the Dr Frost tasks set from revision session 1 at home.	
I have attended revision session 2 in ..... on	
I have finished the Dr Frost tasks set from revision session 2 at home.	
I have memorised the required facts and formulae for Unit 5 from the memorise sheet.	

Important Note:

The Dr Frost revision tasks are split into Cautious and Confident. You will be set **all** tasks.

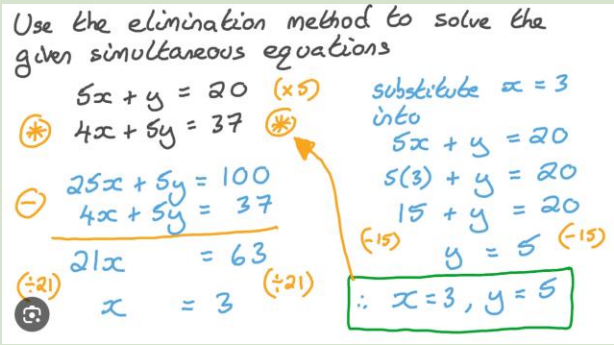
- Cautious targets grades 4-6
- Confident targets grades 7+

If you are aiming for grades 7+, you should be completing **both** the cautious and confident tasks.

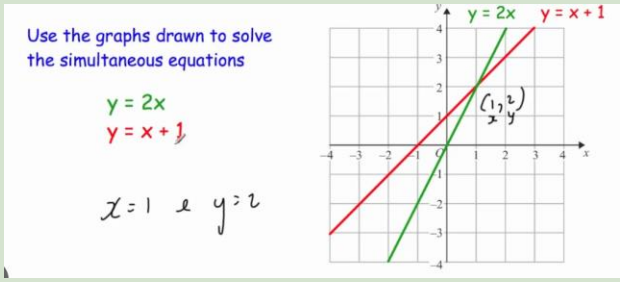
* Commonly assessed topics

Unit 5 Memorise Sheet

Simultaneous Equations (Same Sign Subtract):



Solving Simultaneous Equations Graphically:



Quadratic Formula

Hint: When a question asks you to Solve.. And states **leave your answer to 2 decimal places or 3 sig fig** you must use the quadratic formula to solve it.

$$ax^2 + bx + c = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Complete the Square:

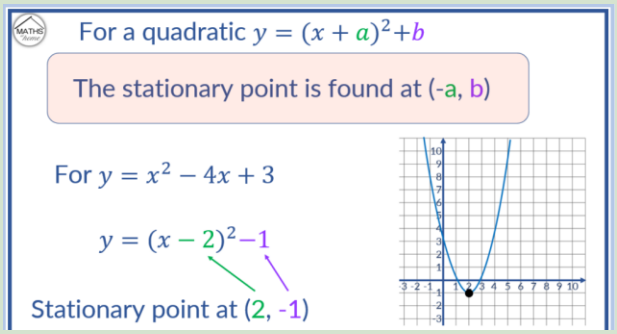
$$y = (x + \tfrac{b}{2})^2 + c - (\tfrac{b}{2})^2$$

$$y = x^2 + 6x + 4$$

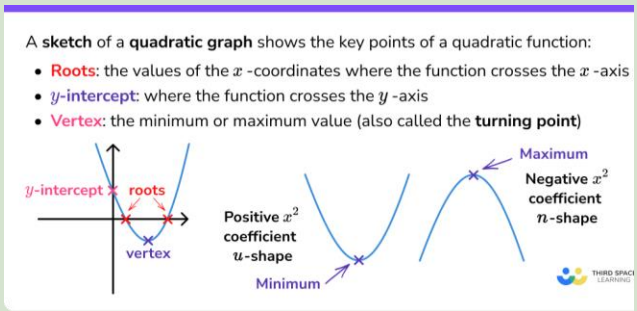
$$y = (x + 3)^2 + 4 - 3^2$$

$$y = (x + 3)^2 - 5$$

Turning Point:



Sketching Quadratic Graphs:



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OVERVIEW & REVISION GUIDE

Unit 6

Unit 6 Overview

6.1 Probability

6.1 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Probability Scale **K53b**	Calculate Basic Theoretical Probabilities **K55a**	Multiplying and Adding Fractions and Decimals **E22, K20a, K95a, K94c**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
6.1a Calculate the Probability of Mutually Exclusive Events*					
6.1b Relative Frequency and Expected Outcomes					
6.1c Use Sample Space Diagrams to Calculate Probabilities					
6.1d Draw and Use Two-Way Tables to Calculate Probabilities					
6.1e Draw and Use Frequency Trees to Calculate Probabilities					
6.1f Probability Trees for Independent Events*					
6.1g Probability Trees for Dependent Events*					
6.1h Calculate the Probability of Successive Events					

6.2 Units of Measure

6.2 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Convert Between Metric Units of Measure for Length, Capacity and Mass **K62a-f**	Convert Units of Time **K42a-f**	Calculate the Volume of a Prism **K163a**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
6.2a Convert Between Units of Area and Volume*					
6.2b Calculate with Speed/Distance/Time Without a Calculator*					
6.2c Calculate with Speed/Distance/Time With a Calculator*					
6.2d Calculate with Density/Mass/Volume*					
6.2e Calculate with Pressure/Force/Area					
6.2f Solve Multi-Stage Problems with Speed and Density*					

* Commonly assessed topics

6.3 Area and Volume 2

6.3 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Area of 2D Shapes **K71a, K73a, K74a, K146a, K144a**	Volume of Prisms Including Cylinders **K163a, K164a**	Substituting into Expressions **K79c, K79d**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
6.3a Calculate the Volume of Spheres, Cones and Pyramids*					
6.3b Calculate the Volume of Compound Shapes*					
6.3c Calculate the Surface Area of a Prism*					
6.3d Calculate the Surface area of Spheres, Cones and Pyramids*					
6.3e Solve Problems Involving Volume and Surface Area*					

Unit 6 Revision Checklist

I have reviewed my feedback quizzes and used the videos and practice questions from the Unit 6 Overview to secure my gaps	
I have attended revision session 1 in ..... on	
I have finished the Dr Frost tasks set from revision session 1 at home.	
I have attended revision session 2 in ..... on	
I have finished the Dr Frost tasks set from revision session 2 at home.	
I have memorised the required facts and formulae for Unit 6 from the memorise sheet.	

Important Note:

The Dr Frost revision tasks are split into Cautious and Confident. You will be set **all** tasks.

- Cautious targets grades 4-6
- Confident targets grades 7+

If you are aiming for grades 7+, you should be completing **both** the cautious and confident tasks.

* Commonly assessed topics

Unit 6 Memorise Sheet

Theoretical Probability:

$$\text{Theoretical Probability} = \frac{\text{Number of favorable (desired) outcomes}}{\text{Total number of possible outcomes}}$$

Relative Frequency and Expected Outcomes:

Expected Frequency

- Expected Frequency:

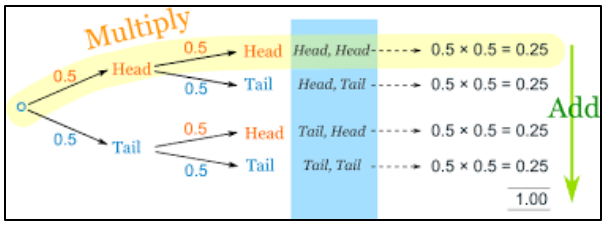
  Probability OR Relative Frequency X No. of Trials

- Example:

  A dice is rolled 300 times, how many times would expect to land on the number 3?

  - 1/6 x 300 = 50

Probability Trees:



...with replacement:
The item is returned before another is chosen.
The probability of each event on each trial is fixed.

...without replacement:
The item is not returned.
•Total decreases by 1 each time.
•Number of items of this type decreases by 1.

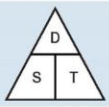
Note that if the question doesn't specify which, e.g. "You pick two sweets from a bag", then PRESUME WITHOUT REPLACEMENT.

Compound Measures

Compound measures

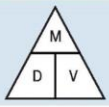
Speed

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$



Density

$$\text{density} = \frac{\text{mass}}{\text{volume}}$$

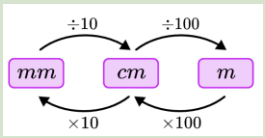


Pressure

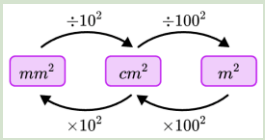
$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

Converting Units of Area and Volume

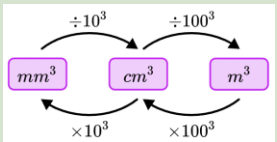
Converting Units of Length



Converting Units of Area

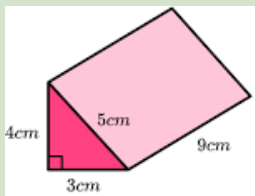


Converting Units of Volume



Surface Area of Prisms:

Find the area of each surface and add the areas together



Face	Area
Front	½ x 3 x 4 = 6
Back	6
Bottom	3 x 9 = 27
Left side	4 x 9 = 36
Right side	5 x 9 = 45

Total surface area = 6 + 6 + 27 + 36 + 45

= 120cm²

Volume of a Pyramids

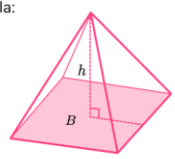
Volume of a Pyramid

Volume of a pyramid is the volume of a three dimensional pyramid.

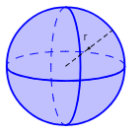
To calculate the volume of a pyramid, we use the formula:

$$V = \frac{1}{3}Bh$$

Where:
V represents the volume of the pyramid,
B represents the area of the base of the pyramid,
h represents the perpendicular height of the pyramid.



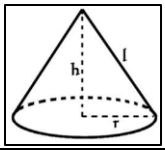
Volume and Surface Area Formulae Given in the Exam:



Volume of Sphere

$$= \frac{4}{3}\pi r^3$$

Surface Area of a sphere $= 4\pi r^2$



Volume of a cone $= \frac{1}{3}\pi r^2 h$

$Area\ of\ curved\ surface = \pi rl$

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DESC Mathematics KS4

OVERVIEW & REVISION GUIDE

Unit 7

Unit 7 Overview

7.1 Sets and Venn Diagrams

7.1 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Calculate Basic Probabilities **K55a**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
7.1a Draw and Interpret Venn Diagrams*					
7.1b Set Notation*					

7.2 Inequalities and Formulae

7.2 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Solve linear equations including unknowns on both sides **K182a**	Draw linear graphs **K188**	Find the equation of a line from a graph **K191b**	Solve quadratic equations by factorising **E265**	Sketch quadratic graphs **K205**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
7.2a Inequalities on a Number Line					
7.2b Solve Linear Inequalities*					
7.2c Form Linear Inequalities from Context					
7.2d Graphical Inequalities					
7.2e Solve Quadratic Inequalities*					
7.2f Change the Subject of a Simple Formula*					
7.2g Change the Subject of a Formula Where the Subject Appears More Than Once*					

* Commonly assessed topics

7.3 Non-Linear Graphs

7.3 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Substitute into an expression **K79c, K79d**	Draw linear graphs (horizontal, vertical and diagonal) **K188b**	Complete the square for a quadratic of the form $x^2 + bx + c$ **K266a, K266b**	Equations of perpendicular lines **K263d**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
7.3a Equation of Circle					
7.3b Draw Non-Linear Graphs Using an x-y Table*		 	 		
7.3c Match Graphs to Their Equations*					
7.3d Find Approximate Solutions to an Equation from a Graph*					
7.3e Complete the Square for Quadratics of the Form ax^2 + bx + c					
7.3f Sketch Quadratic Functions Using the Turning Point					
7.3g Equation of a Tangent to a Circle*					

7.4 Transformations

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
7.4a Perform and Describe Translations*					
7.4b Perform and Describe Reflections*					
7.4c Perform and Describe Rotations*					
7.4d Enlargements with Positive Scale Factors*					
7.4e Enlargements with Negative Scale Factors*					
7.4f Perform Combinations of Transformations*					
7.4g Identify Points of Invariance					

* Commonly assessed topics

Unit 7 Revision Checklist

I have reviewed my feedback quizzes and used the videos and practice questions from the Unit 7 Overview to secure my gaps	
I have attended revision session 1 in ..... on	
I have finished the Dr Frost tasks set from revision session 1 at home.	
I have attended revision session 2 in ..... on	
I have finished the Dr Frost tasks set from revision session 2 at home.	
I have memorised the required facts and formulae for Unit 7 from the memorise sheet.	

Important Note:

The Dr Frost revision tasks are split into Cautious and Confident. You will be set **all** tasks.

- Cautious targets grades 4-6
- Confident targets grades 7+

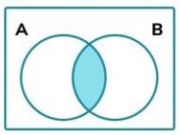
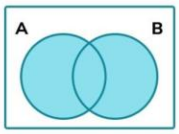
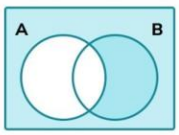
If you are aiming for grades 7+, you should be completing **both** the cautious and confident tasks.

Unit 7 Memorise Sheet

Set Notation and Venn Diagram Regions:

Set Notation	Description
ξ	The universal set
A	Set A
A'	Not Set A (the complement of Set A)
B	Set B
B'	Not Set B (the complement of Set B)
$A \cap B$	A and B (A intersection B)
$(A \cap B)'$	Not A and B (the complement of A intersection B)
$A \cup B$	A or B (A union B)
$(A \cup B)'$	Not A or B (the complement of A union B)

$\varnothing$ Null or Empty Set

$A \cap B$	'A and B' The intersection of A and B. The elements in both sets A and B.	
$A \cup B$	'A or B' The union of A or B. Any element in set A or set B.	
A'	'Not A' The complement of A. Any element not in A.	

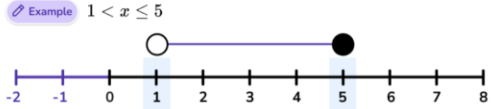
Inequalities on a Numberline:

> means greater than
< means less than
≥ means greater than or equal to
≤ means less than or equal to

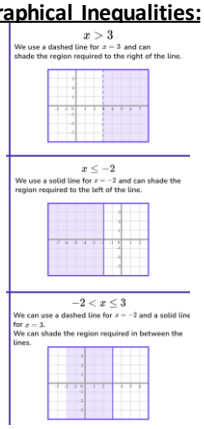
An open circle ○ shows that the value is not included - i.e.

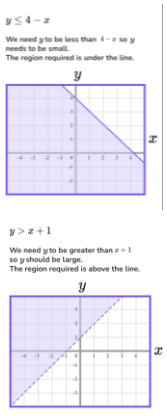
A closed circle ● shows that the value is included - i.e.

Example $1 < x \leq 5$



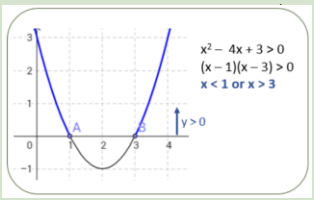
Graphical Inequalities:

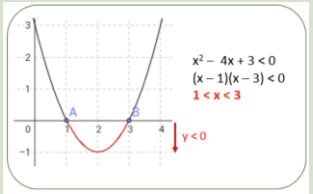




Unit 7 Memorise Sheet Continued

Quadratic Inequality Sketches:





Equation of a Circle:

For a circle with centre (0,0) and radius r, the equation is:

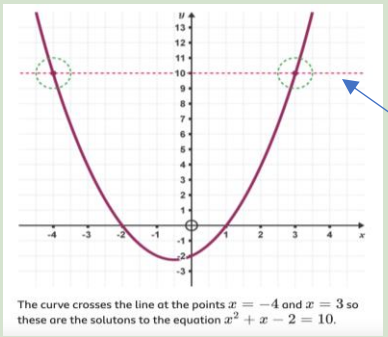
$$x^2 + y^2 = r^2$$

Non-Linear Graphs (Matching Graphs to Equations):

You just need to KNOW these general shapes!

Linear	Quadratic	Cubic	Reciprocal	Exponential
$y = x$	$y = x^2$	$y = x^3$	$y = \frac{1}{x}$	$y = k^x$
$y = -x$	$y = -x^2$	$y = -x^3$	$y = -\frac{1}{x}$	$y = -k^x$

Approximating Solutions from a Graph:



Using the graph $y = x^2 + x - 2$

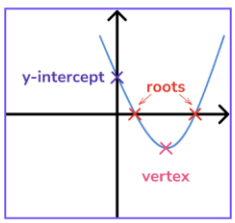
Solve $x^2 + x - 2 = 10$

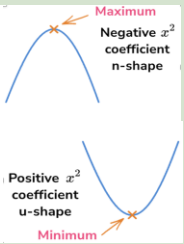
Draw the line $y = 10$

Sketching Quadratics:

The turning point of a quadratic graph is its minimum point or its maximum point.
The key points of a quadratic function are:

- The roots;
- The y-intercept;
- The vertex.





Transformations:

Type 1: Translation

Translation is the process of moving a shape.

Translations are often described using vectors, $\begin{pmatrix} x \\ y \end{pmatrix}$, where the top value represents the movement in x (positive means right, negative means left), and the bottom value represents the movement in y (positive means up, negative means down).

For example, the vector

$$\begin{pmatrix} -3 \\ 2 \end{pmatrix}$$

means moving "**3** spaces **left**, and **2** spaces **up**". Let's see an example.

Type 2: Rotation

The next type of transformation is **rotation**.

To rotate a shape or describe a rotation you need these three details:

- The **centre of rotation** (co-ordinates, or the origin)
- The **direction** you're rotating (clockwise/anti-clockwise)
- The **angle of rotation** (90°, 180°, or 270°)

Type 3: Reflection

To **reflect** a shape, all you need is a mirror line (e.g $x = 3$ or the y axis.)

Type 4: Enlargement

The next type of transformation is **Enlargement**.

To enlarge a shape or describe an enlargement you need these two details:

- The **Scale factor** $\left(\text{Scale factor} = \frac{\text{New Length}}{\text{Old Length}}\right)$
- The **centre of enlargement** (co-ordinates)

Scale factors tell us how much bigger or smaller a shape will become when it is enlarged.

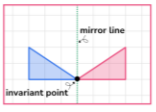
If the scale factor is **between 0 and 1**, the shape gets **smaller**.

If the scale factor is **greater than 1**, the shape gets **larger**.

Invariant points are points which have stayed in the same place after a transformation.

E.g.

Here is a reflection. The invariant point is labelled.



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DESC Mathematics KS4

OVERVIEW & REVISION GUIDE

Unit 8

Unit 8 Overview

8.1 Ratio and Proportion 2

8.1 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Substitute into expressions **K79c, K79d**	Change the subject of a formula **E186**	Match non-linear graphs to their equations **K281a**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
8.1a Algebraic Direct Proportion*					
8.1b Algebraic Inverse Proportion*					
8.1c Graphs Representing Proportional relationships					
8.1d 3-Part Proportional Relationships					

8.2 Pythagoras and Trigonometry 2

8.2 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Pythagoras' Theorem **K228a, K228b**	Use Trigonometry to Find Missing Sides in Right-Angled Triangles **E241**	Use Trigonometry to Find Missing Angles in Right-Angled Triangles **E242**	Area of 2D Shapes **K71a, K73a, K74a, K146a, K144a**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
8.2a Use Pythagoras and Trigonometry to Solve Problems Involving Right-Angled Triangles					
8.2b Find the Area of Any Triangle Using $\frac{1}{2}absinC$					
8.2c Sine Rule					
8.2d Cosine Rule					
8.2e Mixed Trigonometry Problems	Combined Sectors Bearings				
8.2f Exact Trigonometric Values					

* Commonly assessed topics

8.3 Representing and Interpreting Data

8.3 Representing and Interpreting Data
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Draw and interpret bar charts and bar-line graphs **K49a, K49b**	Calculate the mean from a grouped frequency table **K132b**	Draw and measure angles using a protractor **K63b, K63d**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
8.3a Sampling Data					
8.3b Capture-Recapture					
8.3c Draw and Interpret Pie Charts		Draw Interpret	Draw Interpret		
8.3d Draw and Interpret Scatter Graphs*					
8.3e Draw and Interpret Frequency Polygons*					
8.3f Draw and Interpret Histograms*					
8.3g Averages from Histograms					

Unit 8 Revision Checklist

I have reviewed my feedback quizzes and used the videos and practice questions from the Unit 8 Overview to secure my gaps	
I have attended revision session 1 in ..... on	
I have finished the Dr Frost tasks set from revision session 1 at home.	
I have attended revision session 2 in ..... on	
I have finished the Dr Frost tasks set from revision session 2 at home.	
I have memorised the required facts and formulae for Unit 8 from the memorise sheet.	

Important Note:

The Dr Frost revision tasks are split into Cautious and Confident. You will be set **all** tasks.

- Cautious targets grades 4-6
- Confident targets grades 7+

If you are aiming for grades 7+, you should be completing **both** the cautious and confident tasks.

* Commonly assessed topics

Unit 8 Memorise Sheet

Direct and Inverse Proportion

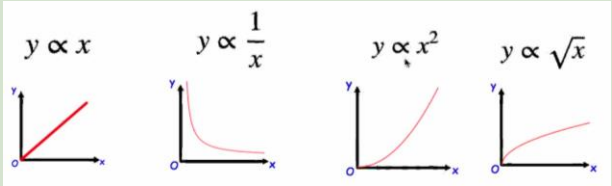
Direct Proportion:

$$y \propto x \rightarrow y = kx$$
$$y \propto x^2 \rightarrow y = kx^2$$
$$y \propto \sqrt[3]{x} \rightarrow y = k\sqrt[3]{x}$$

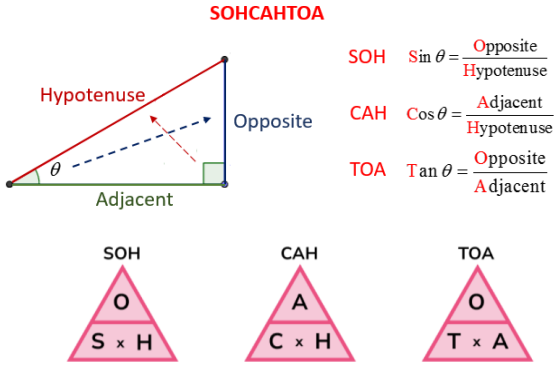
Inverse Proportion:

$$y \propto \frac{1}{x} \rightarrow y = \frac{k}{x}$$
$$y \propto \frac{1}{x^3} \rightarrow y = \frac{k}{x^3}$$
$$y \propto \sqrt{x} \rightarrow y = k\sqrt{x}$$

Proportional Graphs

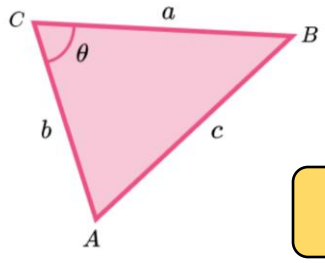


SOHCAHTOA (Trigonometry with Right-Angled Triangles):



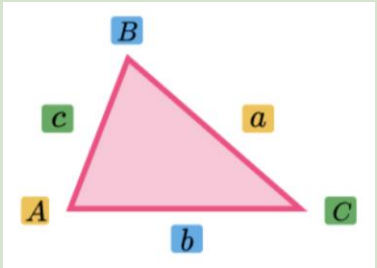
Area of Angle Triangle:

Area of a triangle $= \frac{1}{2}abSinC$



C must be between a and b

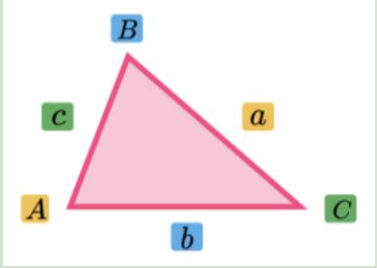
Sine Rule:



Finding a missing side: $\frac{a}{sinA} = \frac{b}{sinB} = \frac{c}{\sin C}$

Finding a missing angle: $\frac{sinA}{a} = \frac{sinB}{b} = \frac{\sin C}{c}$

Cosine Rule:



Finding a missing side: $a^2 = b^2 + c^2 - 2bccos(A)$

Finding a missing angle: $\cos(A) = \frac{b^2+c^2-a^2}{2bc}$

When to Use the Trigonometric Formulae:

What it would look like...	*What you should use...*
Two pairs of opposite sides and angles. You are looking for one of the sides.	Sine Rule $\frac{a}{\sin A} = \frac{b}{\sin B}$
Two pairs of opposite sides and angles. You are looking for one of the angles.	Sine Rule $\frac{\sin A}{a} = \frac{\sin B}{b}$
Three sides and an angle. You are looking for the side opposite the angle.	Cosine Rule $a^2 = b^2 + c^2 - 2bc\cos A$
Three sides and an angle. You are looking for the angle.	Cosine Rule $\cos A = \frac{b^2 + c^2 - a^2}{2bc}$
Two sides and the angle between them. You are looking for the area.	Area of a Triangle $Area = \frac{1}{2}ab\sin C$

Exact Trigonometric Values:

	0°	30°	45°	60°	90°
$\sin(\theta)$	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
$\cos(\theta)$	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
$\tan(\theta)$	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	*undefined*

Unit 8 Memorise Sheet

Capture-Recapture:

$$\frac{Total\ Marked}{Total\ Population} = \frac{Marked\ in\ Sample}{Sample\ Size}$$

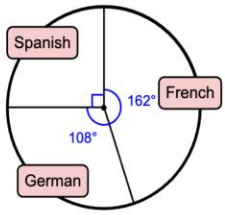
Pie Charts:

Language	Frequency
French	54
German	36
Spanish	30
Total	120

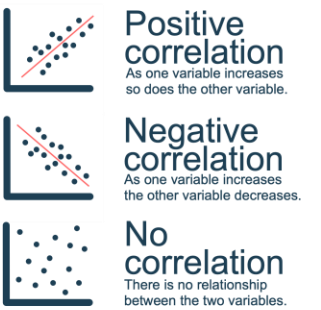
$\frac{54}{120} \times 360 = 162°$

$\frac{36}{120} \times 360 = 108°$

$\frac{30}{120} \times 360 = 90°$



Scatter Graphs (Correlation and Relationships):

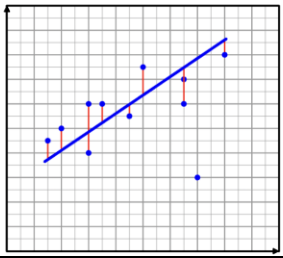


Positive correlation
As one variable increases so does the other variable.

Negative correlation
As one variable increases the other variable decreases.

No correlation
There is no relationship between the two variables.

Drawing a good line of best fit.

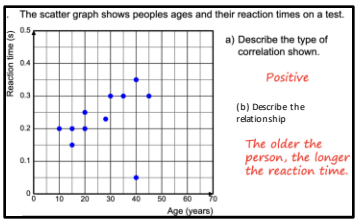


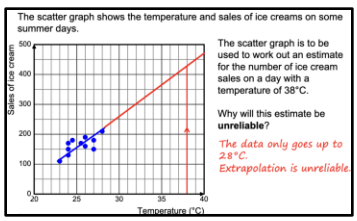
Ignore any outliers.

Try to have roughly the same number of points on each side of the line.

Only draw the line to the edge of the data - **not** the edge of the grid.

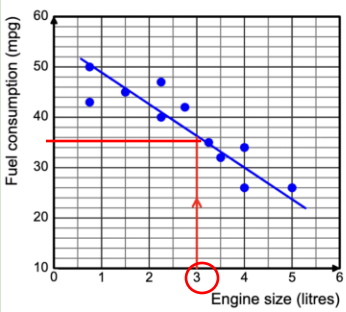
(Advanced)
Try to minimise the total length of these red lines.





Estimating from Scatter Graphs:

The scatter graph shows the engine size and fuel consumption rate of some cars.



Another car has an engine size of 3 litres.

Use the scatter graph to work out an estimate of the fuel consumption rate of this car.

36 mpg

You must **draw a line of best fit** when estimating!

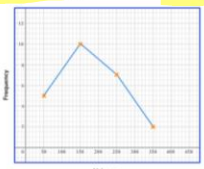
Frequency Polygons:

Midpoint Mountains!
(Use the midpoints and they are pointy so look like mountains)

To construct a **frequency polygon** we use grouped data. We use the midpoints of the class intervals to plot points with the frequencies and then join up the points with straight lines.

E.g.

Values, x	Frequency
$0 \le x < 100$	5
$100 \le x < 200$	10
$200 \le x < 300$	7
$300 \le x < 400$	2

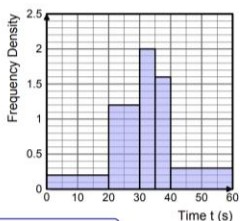


Drawing Histograms:

- $Frequency\ Density = \frac{Frequency}{Class\ Width}$
- Label the y-axis as frequency density!

example

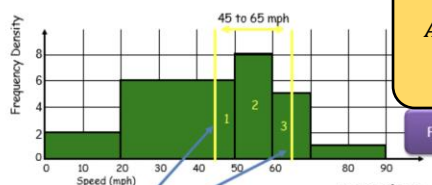
Time, t (s)	Frequency	Class Width	Frequency Density
$0 < t \le 20$	4	20	0.2
$20 < t \le 30$	12	10	1.2
$30 < t \le 35$	10	5	2
$35 < t \le 40$	8	5	1.6
$40 < t \le 60$	6	20	0.3



The class width is the range of times included in the row.

Frequency Density = $\frac{Frequency}{Class\ Width}$

Interpreting Histograms:



$Area\ of\ Bar = Frequency$

Frequency = F.D. × C.W.

Draw lines on where your values are from and to. This helps you find the width of your rectangles

Estimate the number of people whose average speed was 45 to 65 mph

Rectangle 1:
5 × 6 = 30 people
Rectangle 2:
10 × 8 = 80 people
Rectangle 3:
5 × 5 = 25 people

So 135 people in totall

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OVERVIEW & REVISION GUIDE

Unit 9

Unit 9 Overview

9.1 Algebraic Fractions

9.1 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Factorise quadratic expressions by splitting the middle term **K195c**	Factorise quadratic expressions using difference of two squares **K194a**	Four operations with fractions **K94c, K95a, K96a**	Solve quadratic equations by factorising **E265**	Solve quadratic equations using the quadratic formula **E267**	Form and use probability trees **E259, E260**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
9.1a Simplify Algebraic Fractions*					
9.1b Add and Subtract Algebraic Fractions*					
9.1c Multiply and Divide Algebraic Fractions*					
9.1d Solve Equations Involving Algebraic Fractions*					
9.1e Algebraic Probability Trees*					

9.2 Algebraic Proof

9.2 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Expand double brackets **K179d**	Expand triple brackets **K180b**	Complete the square **266a, 266b**	Factorise a quadratic expression **K195c**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
9.2a Solve Problems Involving Identities					
9.2b Algebraic Proof*					

* Commonly assessed topics

9.3 Congruence and Similarity

9.3 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

9.3PR2 Find the volume of a prism	9.3PR2 Find the volume of a prism	9.3PR3 Find the volume of spheres, cones and pyramids	9.3PR4 Find the surface area of spheres, cones and pyramids

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
9.3a Congruent Triangles*					
9.3b Similar Shapes (Lengths)*					
9.3c Similar Shapes (Area and Volume)*					
9.3d Frustums					

9.4 Circle Theorems

9.4 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

9.4PR1 Name different parts of a circle	9.4PR2 Angles in Triangles and Quadrilaterals	9.4PR3 Angles in Parallel Lines

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
9.4a Know and Use the Circle Theorems*	Basics Problems				
9.4b Prove the Circle Theorems					

9.5 Construction and Loci

9.5 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Use a protractor to draw and measure angles **K63b, K63d**	Use map scales **E250**	Draw and measure bearings **K156c-e**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
9.5a Construct Triangles					
9.5b Construct Perpendicular Lines					
9.5c Bisect Angles					
9.5d Construct Angles					
9.5e Loci					
9.5f Scale Diagrams and Bearings					

* Commonly assessed topics

Unit 9 Revision Checklist

I have reviewed my feedback quizzes and used the videos and practice questions from the Unit 9 Overview to secure my gaps	
I have attended revision session 1 in ..... on	
I have finished the Dr Frost tasks set from revision session 1 at home.	
I have attended revision session 2 in ..... on	
I have finished the Dr Frost tasks set from revision session 2 at home.	
I have memorised the required facts and formulae for Unit 9 from the memorise sheet.	

Important Note:

The Dr Frost revision tasks are split into Cautious and Confident. You will be set **all** tasks.

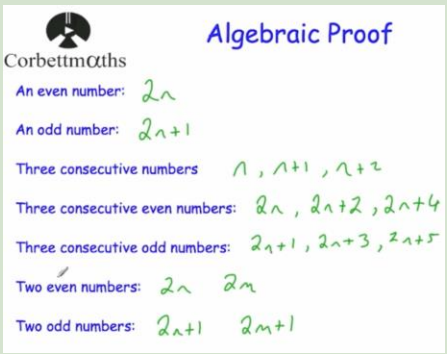
- Cautious targets grades 4-6
- Confident targets grades 7+

If you are aiming for grades 7+, you should be completing **both** the cautious and confident tasks.

Unit 9 Memorise Sheet

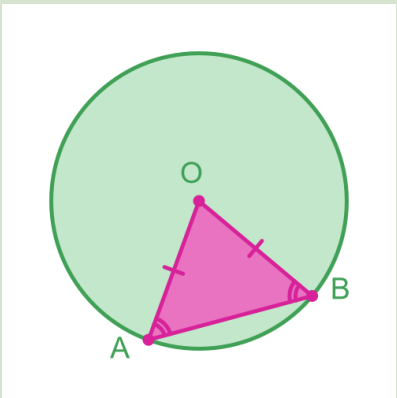
Algebraic Proof:

Algebraic Proof is the process of showing something is true in every case, using algebra.
A "**multiple of *k***" means it can be written as *k*(.....), ie. $k \times ...$
To prove something is even, show that the algebraic result can be written as $2 \times (...)$

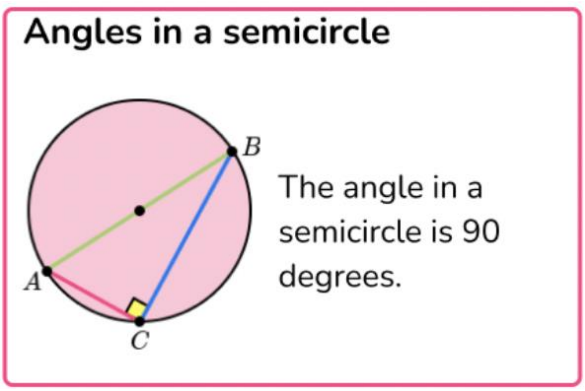


Circle Theorems 2 Radii:

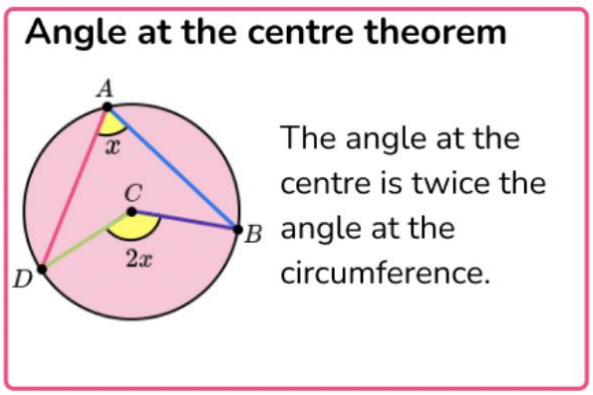
Two radii makes an isosceles triangle



Circle Theorem 1:



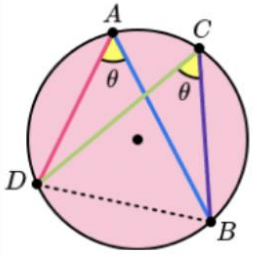
Circle Theorem 2:



Unit 9 Memorise Sheet Continued

Circle Theorem 3:

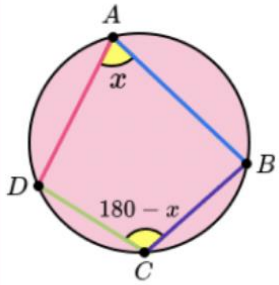
Angles in the same segment theorem



Angles in the same segment are equal.

Circle Theorem 4:

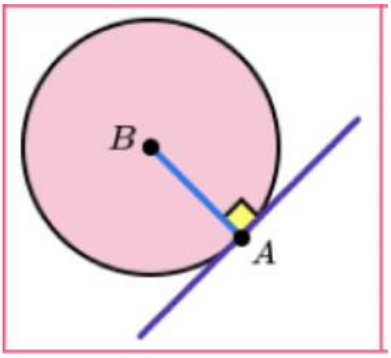
Cyclic quadrilateral



The opposite angles in a cyclic quadrilateral total 180°.

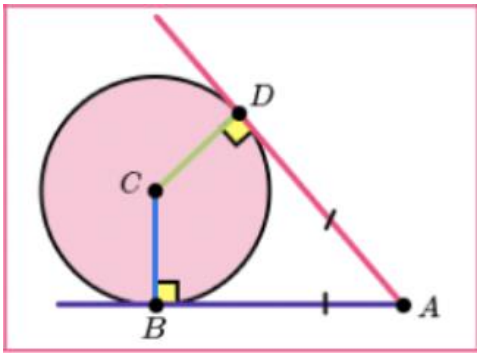
Circle Theorem 5:

The angle between a tangent and radius is 90 degrees



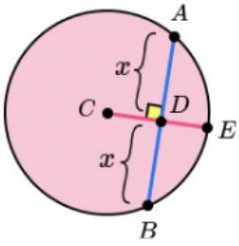
Circle Theorem 6:

Tangents which meet at the same point are equal in length



Circle Theorem 7:

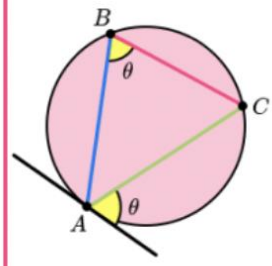
Chord of a circle



The perpendicular from the centre of a circle to a chord bisects the chord (splits the chord into two equal parts).

Circle Theorem 8:

Alternate segment theorem



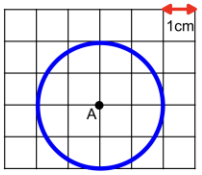
The angle that lies between a tangent and a chord is equal to the angle subtended by the same chord in the alternate segment.

Common Loci:

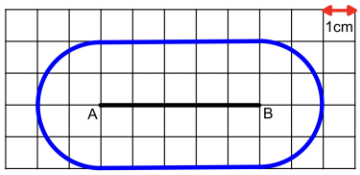
A pair of compasses help us to draw circles and arcs.
This allows us to draw points that are a fixed distance from a particular point.
A set of points that follow a rule is called a **locus**.

examples

Draw the locus of points that are 2cm away from A



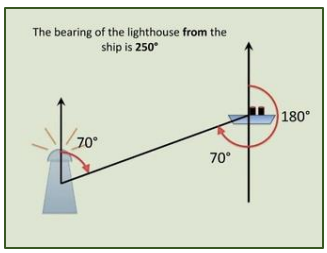
Draw the locus of points that are 2cm away from AB.



Bearings:

- Measured from North
- Anti-Clockwise
- Given as 3 figures.

The bearing of the ship **from** the lighthouse is 070°



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OVERVIEW & REVISION GUIDE

Unit 10

Unit 10 Overview

10.1 Functions and Transformations

10.1 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Substitute into an expression **K79c, K79d**	Change the subject of a simple formula **E186**	Change the subject where the subject appears more than once **E262**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
10.1a Use Function Notation*					
10.1b Composite Functions*					
10.1c Inverse Functions*					
10.1d Graph Transformations: Translations*					
10.1e Graph Transformations: Reflections*					
10.1f Trigonometric Graphs					

10.2 Rates of Change

10.2 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Find the gradient of a straight line from a graph **K189b**	Calculate with speed, distance and time **E231**	Find the area of a trapezium **K146a**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
10.2a Interpret Real-Life Graphs*					
10.2b Distance-Time Graphs					
10.2c Velocity Time Graphs					
10.2d Estimate Gradients from a Graph*					
10.2e Estimate Area Under a Graph*					

10.3 Iteration

10.3 Pre-requisite knowledge
The following skills are expected to be secure going into this unit. Type the codes below into the Dr Frost search bar to secure your skills:

Evaluate functions **K274a**	Change the subject of a formula **E186**

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
10.3a Iteration*					

* Commonly assessed topics

10.4 Vectors

Objective	Video Lesson	Practice Questions	Answers	FB Quiz Secure?	Unit Assessment Secure?
10.4a Column Vectors*					
10.4b Vector Proofs*					

Unit 10 Revision Checklist

I have reviewed my feedback quizzes and used the videos and practice questions from the Unit 10 Overview to secure my gaps	
I have attended revision session 1 in ..... on	
I have finished the Dr Frost tasks set from revision session 1 at home.	
I have attended revision session 2 in ..... on	
I have finished the Dr Frost tasks set from revision session 2 at home.	
I have memorised the required facts and formulae for Unit 10 from the memorise sheet.	

Important Note:

The Dr Frost revision tasks are split into Cautious and Confident. You will be set **all** tasks.

- Cautious targets grades 4-6
- Confident targets grades 7+

If you are aiming for grades 7+, you should be completing **both** the cautious and confident tasks.

Unit 10 Memorise Sheet

Composite Functions:

Composite Functions

A composite function is created when one function is substituted into another function.

Example:

Given f(x) = 3x + 2 and g(x) = x + 5

f(g(x)) = f(x+5)
= 3(x+5) +2
= 3x + 15 + 2
= 3x + 17

g(f(x)) = g(3x+2)
= (3x + 2) + 5
= 3x + 7

Inverse Functions:

Find the Inverse of a Function

- Write as $y =$
- Swap the x and y
- Make y the subject
- Swap y with $f^{-1}(x)$

Example:

Given $f(x) = \frac{4x+2}{5}$ find the inverse of $f(x)$

$f(x) = \frac{4x+2}{5}$

$y = \frac{4x+2}{5}$ Write as $y =$

$x = \frac{4y+2}{5}$ Swap the x and y

$5x = 4y + 2$

$5x - 2 = 4y$ Make y the subject

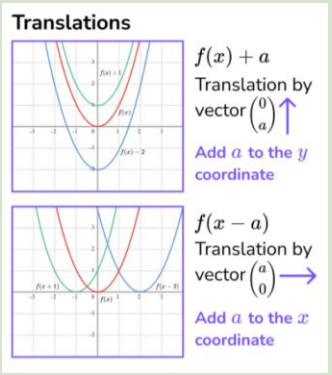
$y = \frac{5x-2}{4}$

$f^{-1}(x) = \frac{5x-2}{4}$ Swap y with $f^{-1}(x)$

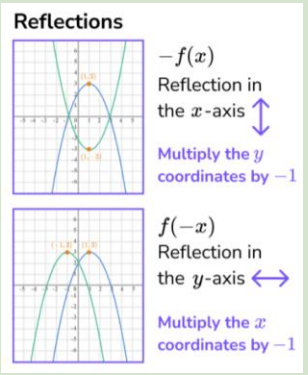
* Commonly assessed topics

Unit 10 Memorise Sheet

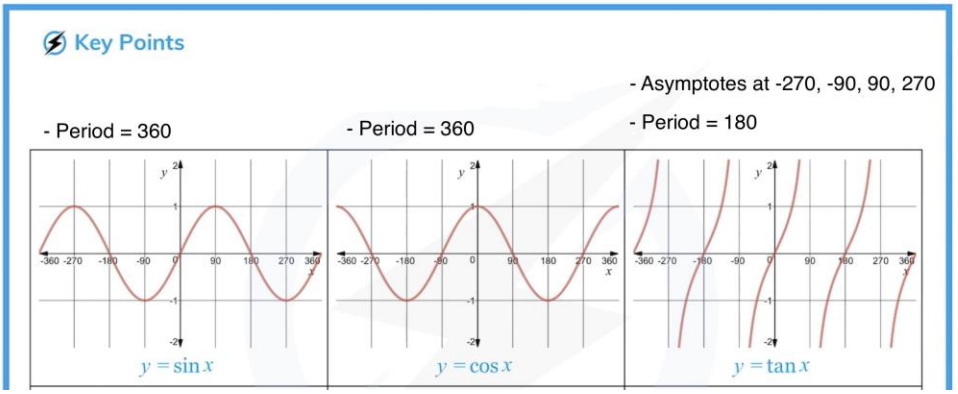
Graph Transformations (Translations):



Graph Transformations (Reflections):



Trigonometric Graphs:



Real-Life Graphs

1. Look carefully at both **axis** to see what the variables are
2. Look at the **scale** carefully so you can accurately read the graph
3. Look at the **gradient** of the graph:
   - What does a horizontal line mean?
   - What does a positive/negative slope mean?
4. Always **read** the question extremely careful and **check** your answer!

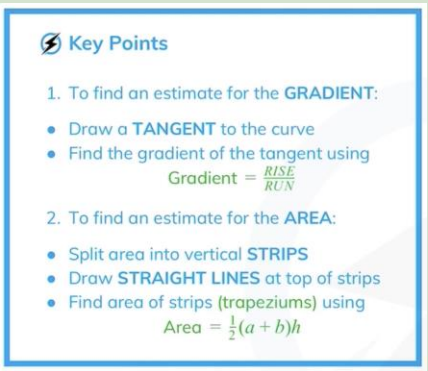
Distance-Time Graph

1. DISTANCE-TIME graphs show distance from a fixed point at different times.
2. GRADIENT = Speed
   Speed $= \frac{RISE}{RUN} = \frac{DISTANCE}{TIME}$
3. STRAIGHT line = Steady Speed
4. HORIZONTAL line = Stationary

Speed/Velocity-Time Graph

1. SPEED-TIME graphs show speed at different times.
2. GRADIENT = Acceleration
   Acceleration $= \frac{RISE}{RUN} = \frac{SPEED}{TIME}$
3. AREA under graph = Distance covered

Estimating Gradients and Areas:



Column Vectors:

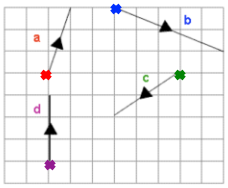
- Vectors are just a posh (and quite convenient) way of describing how to get from one point to another
- Starting from the tail of the vector, the number on the top tells you how far right/left to go, and the number on the bottom tells your how far up/down

$\begin{pmatrix}3\\4\end{pmatrix}$

If this number is positive, you move right, if it is negative, you move left

If this number is positive, you move up, if it is negative, you move down

Examples:



a $\begin{pmatrix}1\\3\end{pmatrix}$ Move 1 right and 3 up.

b $\begin{pmatrix}5\\-2\end{pmatrix}$ Move 5 right and 2 down.

c $\begin{pmatrix}-3\\-2\end{pmatrix}$ Move 3 left and 2 down.

d $\begin{pmatrix}0\\3\end{pmatrix}$ Don't move left or right, only move 3 up.

Vector Proofs: