KLA Year 11 FOUNDATION Term 1 Maths Knowledge Organisers

Year 11 – Foundation Knowledge Organiser Half Term 1

Key Topics and Vocabulary

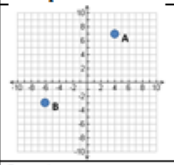
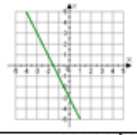
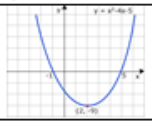
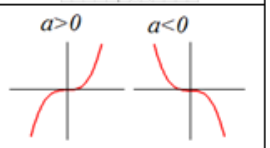
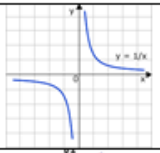
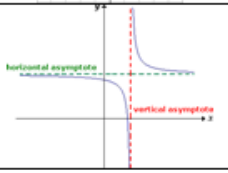
Sketching graphs

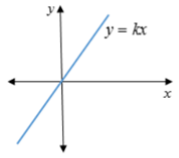
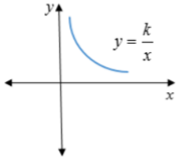
Coordinates
Linear Graph
Quadratic Graph
Cubic Graph
Reciprocal Graph
Asymptote
Exponential Graph

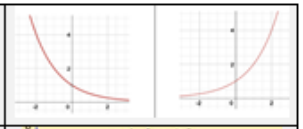
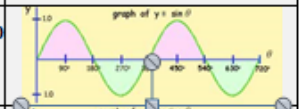
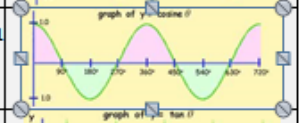
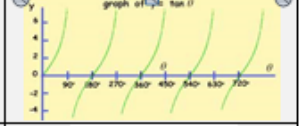
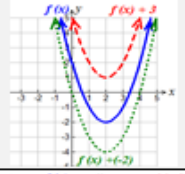
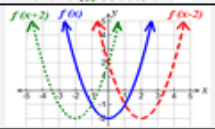
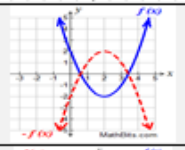
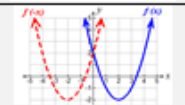
$y = \sin x$
$y = \cos x$
$y = \tan x$
$f(x) + a$
$f(x + a)$
$-f(x)$
$f(-x)$

Direct and inverse proportion

Direct Proportion
Inverse Proportion
Using proportionality formulae
Direct Proportion with powers
Inverse Proportion with powers

Topic/Skill	Definition/Tips	Example
1. Coordinates	Written in **pairs**. The **first** term is the **x-coordinate** (movement **across**). The **second** term is the **y-coordinate** (movement **up or down**)	
2. Linear Graph	**Straight line** graph. The **equation** of a linear graph can contain an **x-term**, a **y-term** and a **number**.	Example:  Other examples: $x = y$ $y = 4$ $x = -2$ $y = 2x - 7$ $y + x = 10$ $2y - 4x = 12$
3. Quadratic Graph	A '**U-shaped**' curve called a **parabola**. The equation is of the form $y = ax^2 + bx + c$, where a, b and c are numbers, $a \neq 0$. If $a < 0$, the parabola is **upside down**.	
4. Cubic Graph	The equation is of the form $y = ax^3 + k$, where k **is an number**. If $a > 0$, the curve is **increasing**. If $a < 0$, the curve is **decreasing**.	
5. Reciprocal Graph	The equation is of the form $y = \frac{A}{x}$, where A **is a number** and $x \neq 0$. The graph has **asymptotes** on the **x-axis and y-axis**.	
6. Asymptote	A **straight line** that a graph **approaches** but **never touches**.	

Topic/Skill	Definition/Tips	Example
1. Direct Proportion	If two quantities are in direct proportion, **as one increases**, the **other increases** by the **same percentage**. If y is directly proportional to x, this can be written as $y \propto x$ An equation of the form $y = kx$ represents direct proportion, where k **is the constant of proportionality**.	
2. Inverse Proportion	If two quantities are inversely proportional, **as one increases**, the **other decreases** by the **same percentage**. If y is inversely proportional to x, this can be written as $y \propto \frac{1}{x}$ An equation of the form $y = \frac{k}{x}$ represents inverse proportion.	

7. Exponential Graph	The equation is of the form $y = a^x$, where a is a number called the **base**. If $a > 1$ the graph **increases**. If $0 < a < 1$, the graph **decreases**. The graph has an **asymptote** which is the **x-axis**.	
8. $y = \sin x$	Key Coordinates: $(0,0), (90,1), (180,0), (270,-1), (360,0$ y is never more than 1 or less than -1. Pattern repeats every 360°.	
9. $y = \cos x$	Key Coordinates: $(0,1), (90,0), (180,-1), (270,0), (360,1$ y is never more than 1 or less than -1. Pattern repeats every 360°.	
10. $y = \tan x$	Key Coordinates: $(0,0), (45,1), (135,-1), (180,0), (225,1), (315,-1), (360,0)$ **Asymptotes** at $x = 90$ and $x = 270$ Pattern repeats every 360°.	
11. $f(x) + a$	**Vertical translation** up a units. $\begin{pmatrix} 0 \\ a \end{pmatrix}$	
12. $f(x + a)$	**Horizontal translation** left a units. $\begin{pmatrix} -a \\ 0 \end{pmatrix}$	
13. $-f(x)$	**Reflection** over the **x-axis**.	
14. $f(-x)$	**Reflection** over the **y-axis**.	

Year 11 - Foundation

Maths

Knowledge Questions

Below are a series of questions.

Use these to apply your knowledge and practice.

Algebra quadratics, rearranging formula and identities

Which letter is the subject of the formula? How do you know?

Algebra and graphs

What features of a graph help us to identify its equation?
Which types of graphs do you find easier to identify? Why?

Ratio and proportion

If we know how much 2 items cost how can I work out how much 6 items cost? What about 1 item?

Direct and inverse proportion

Does a graph showing direct proportion always have to start at the origin?

Trigonometry

How do we know which trigonometric ratio to use?
Why do we always label the hypotenuse first?

Solving quadratic equations

How can we check whether the solutions are correct?

Year 11 - Foundation

Maths

Knowledge Checklist

	KNOWLEDGE CHECKLIST	KNOWLEDGE PROGRESS R	A	G
1	Algebra quadratics, rearranging formula and identities			
2	Algebra and graphs			
3	Ratio and proportion			
4	Direct and inverse proportion			
5	Trigonometry			
6	Solving quadratic equations			
7	Quadratic graphs			
8	Growth and decay			
9				
10				

Growth and decay

If you reduced a number by 50% twice a row, why is the answer not 0?

High Flyers - Enrichment Task

A circular clock face has centre O.
The long hand is OA and 6 cm in length.
The short hand is OB and 4 cm in length.
The time is 4 o'clock.
Find the distance from A to B.

Year 11 - Higher

Maths

Knowledge Questions

Below are a series of questions.

Use these to apply your knowledge and practice.

Raito and proportion

If we know how much 2 items cost how can I work out how much 6 items cost? What about 1 item?

Sine and cosine rules

How do we know which angle to substitute into the sine rule?

Algebraic fractions

What's the same/different about e.g. $\frac{1}{2}a$ and $\frac{a}{2}$?

What does 'in terms of m' mean? Is it possible to get a numeric answer?

Vectors

What's the same and what's different about a translation and a drawing representing a vector?
What do the numbers in the column vector represent?

Gradients and rate of change

Is the gradient positive or negative? How do you know?

What is the gradient of the line? How do you know?

Transforming functions

How do we know which direction to translate the object in?
Why is it important to consider the scales of axes when giving a vector of translation?

Year 11 - Higher

Maths

Knowledge Checklist

	KNOWLEDGE CHECKLIST	KNOWLEDGE PROGRESS R	A	G
1	Ratio and proportion			
2	Sine and cosine rules			
3	Algebraic fractions			
4	Vectors			
5	Gradients and rate of change			
6	Transforming functions			
7	Further equations and graphs			
8				
9				
10				

Further equations and graphs

What features of a graph help us to identify its equation?
Which types of graphs do you find easier to identify?
Why?

High Flyers - Enrichment Task

Esther earns £28 000 a year.

She pays 20% tax on earnings over £12 500

She pays 12% National Insurance on earnings over £8632

Work out Esther's monthly take-home salary.