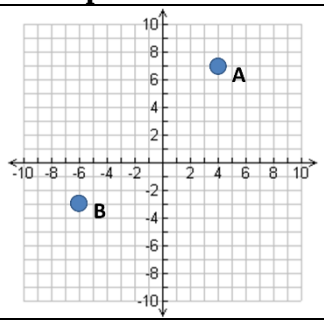
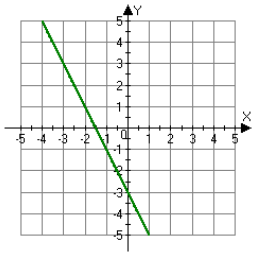
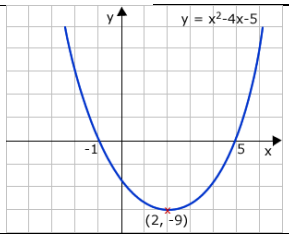
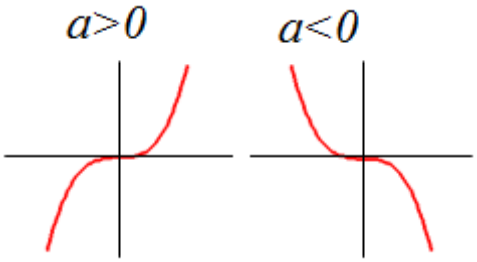
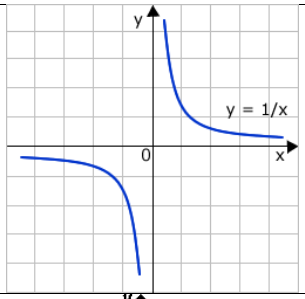
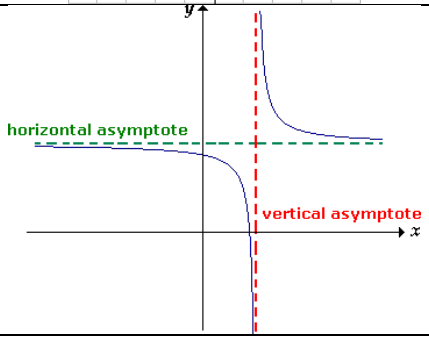
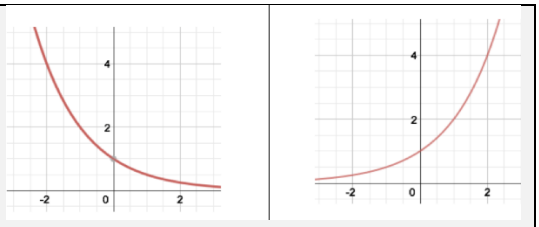
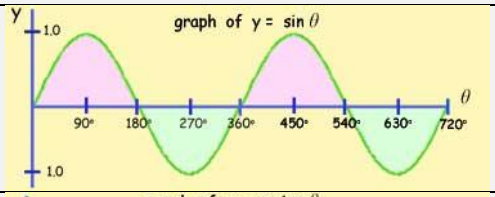
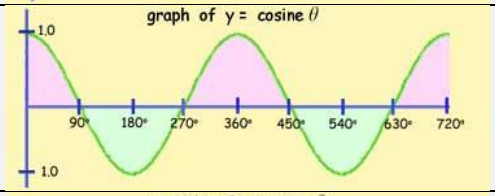
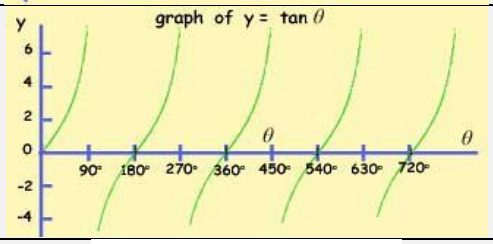
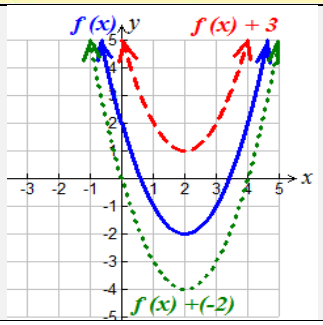
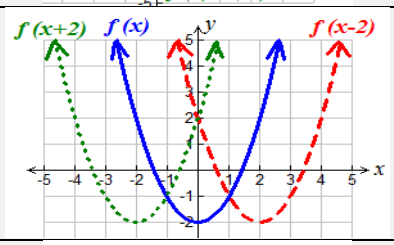
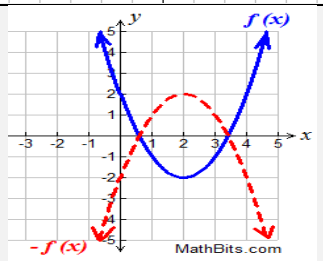
Subject: Maths **Topic: Graphs and Graph Transformations**

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**)	 A: (4,7) B: (-6,-3)
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 $y = \boldsymbol{ax^2 + bx + c}$, where a, b and c are numbers, $\boldsymbol{a \neq 0}$. If $\boldsymbol{a < 0}$, the parabola is **upside down**.	
4. Cubic Graph	The equation is of the form $\boldsymbol{y = ax^3 + k}$, where $\boldsymbol{k}$ **is an number**. If $\boldsymbol{a > 0}$, the curve is **increasing**. If $\boldsymbol{a < 0}$, the curve is **decreasing**.	
5. Reciprocal Graph	The equation is of the form $\boldsymbol{y = \frac{A}{x}}$, where $\boldsymbol{A}$ **is a number** and $\boldsymbol{x \neq 0}$. The graph has **asymptotes** on the **x-axis and y-axis**.	
6. Asymptote	A **straight line** that a graph **approaches** but **never touches**.	

7. Exponential Graph	The equation is of the form $\boldsymbol{y = a^x}$, where a is a number called the **base**. If $\boldsymbol{a > 1}$ the graph **increases**. If $\boldsymbol{0 < a < 1}$, the graph **decreases**. The graph has an **asymptote** which is the **x-axis**.	
8. $y = \sin x$	Key Coordinates: $(\boldsymbol{0,0}), (\boldsymbol{90,1}), (\boldsymbol{180,0}), (\boldsymbol{270,-1}), (\boldsymbol{360,0}$ y is never more than 1 or less than -1. Pattern repeats every 360°.	
9. $y = \cos x$	Key Coordinates: $(\boldsymbol{0,1}), (\boldsymbol{90,0}), (\boldsymbol{180,-1}), (\boldsymbol{270,0}), (\boldsymbol{360,1}$ y is never more than 1 or less than -1. Pattern repeats every 360°.	
10. $y = \tan x$	Key Coordinates: $(\boldsymbol{0,0}), (\boldsymbol{45,1}), (\boldsymbol{135,-1}), (\boldsymbol{180,0}),$ $(\boldsymbol{225,1}), (\boldsymbol{315,-1}), (\boldsymbol{360,0})$ **Asymptotes** at $\boldsymbol{x = 90}$ and $\boldsymbol{x = 270}$ 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**.