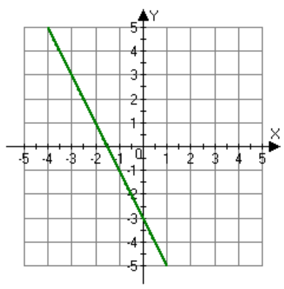
Year 10 Strand 3 Foundation

Topic/Skill	Definition/Tips	Example
1. Change the subject of a formula (rearrange a formula)	**Use inverse operations** on both sides of the formula (balancing method) until you find the expression for the letter.	Make x the subject of $y = mx + c$ Subtract c from both sides $y - c = mx$ Divide both sides by m $\frac{y - c}{m} = x$ We now have x as the subject.
2. Linear Sequence	A number pattern with a **common difference** (same number is added or subtracted between consecutive terms).	2, 5, 8, 11… is a linear sequence
3. Term-to-term rule	A rule which allows you to **find the next term** in a sequence if you **know the previous term**.	First term is 2. Term-to-term rule is 'add 3' Sequence is: 2, 5, 8, 11…
4. Finding the nth term of a linear sequence	A rule which allows you to calculate the term that is in the nth position of the sequence. (Also known as the 'position-to-term' rule.) n refers to the position of a term in a sequence.	nth term is 3n - 1 The 100th term is 3 × 100 - 1 = 299 Find the nth term of: 3, 7, 11, 15… 1. Difference is +4 2. Start with $4n$ 3. $4 \times 1 = 4$, so we need to subtract 1 to get 3. nth term = $4n - 1$
5. Fibonacci type sequences	A sequence where the next number is found by **adding up the previous two terms**	The Fibonacci sequence: $1,1,2,3,5,8,13,21,34 \ldots$ An example of a Fibonacci-type sequence: $4, 7, 11, 18, 29 \ldots$
6. Geometric Sequence	A sequence of numbers where each term is found by **multiplying the previous one** by a number called the **common ratio, r**.	An example of a geometric sequence: $2, 10, 50, 250 \ldots$ The common ratio is 5 Another geometric sequence: $80, -40, 20, -10, 5$ The common ratio is -0.5
7. Midpoint of a Line	Method 1: **add the x coordinates and divide by 2**, **add the y coordinates and divide by 2** Method 2: Sketch the line and find the values half way between the two x and two y values.	Find the midpoint between (2,1) and (6,9) $\frac{2+6}{2} = 4$ and $\frac{1+9}{2} = 5$ So, the midpoint is (4,5)
8. Linear Graph	**Straight line** graph. The general equation of a linear graph is $\boldsymbol{y = mx + c}$ where $\boldsymbol{m}$ **is the gradient** and c **is the y-intercept**.	Example:  Other examples: $x = y$ $y = 4$ $x = -2$ $y = 2x - 7$ $y + x = 10$ $2y - 4x = 12$

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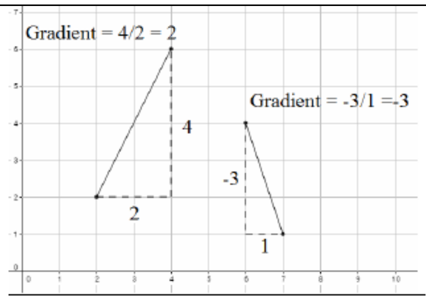
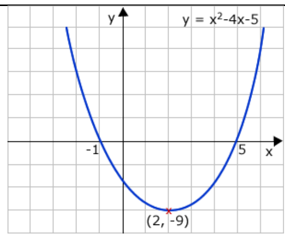
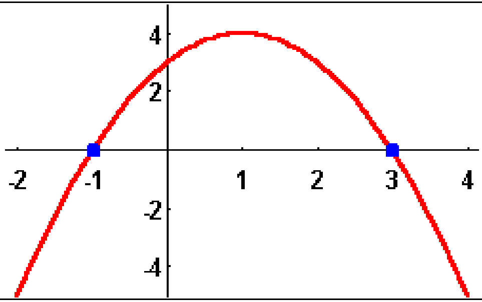
9. Gradient	The gradient of a line is how **steep** it is. **Gradient =** $\frac{\textit{Change in y}}{\textit{Change in x}} = \frac{\textit{Rise}}{\textit{Run}}$ The gradient can be positive (sloping upwards) or negative (sloping downwards)	
10. Parallel Lines	If two lines are **parallel**, they will have the **same gradient**. The value of m will be the same for both lines.	Are the lines $y = 3x - 1$ and $2y - 6x + 10 = 0$ parallel? Rearrange the second equation in to the form $y = mx + c$ $2y - 6x + 10 = 0 \ \rightarrow \ y = 3x - 5$ Since the two gradients are equal (3), the lines are parallel.
11. Quadratic	A quadratic expression is of the form $\boldsymbol{ax^2 + bx + c}$ where a, b and c are numbers, $\boldsymbol{a \neq 0}$	Examples of quadratic expressions: x^2 $8x^2 - 3x + 7$
12. Factorising Quadratics	When a quadratic expression is in the form $x^2 + bx + c$ find the two numbers that **add to give b** and **multiply to give c**.	$x^2 + 2x - 8 = (x + 4)(x - 2)$ (because +4 and -2 add to give +2 and multiply to give -8)
13. Difference of Two Squares	An expression of the form $\boldsymbol{a^2 - b^2}$ can be factorised to give $(\boldsymbol{a} + \boldsymbol{b})(\boldsymbol{a} - \boldsymbol{b})$	$x^2 - 25 = (x + 5)(x - 5)$ $16x^2 - 81 = (4x + 9)(4x - 9)$
14. Solving Quadratics by Factorising ($a = 1$)	**Factorise** the quadratic in the usual way. **Solve = 0** Make sure the equation = 0 before factorising.	Solve $x^2 + 3x - 10 = 0$ Factorise: $(x + 5)(x - 2) = 0$ $x = -5 \ or \ x = 2$
15. 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**.	
16. Roots of a Quadratic	A root is a **solution**. The roots of a quadratic are the $\boldsymbol{x}$**-intercepts of the quadratic graph**.	

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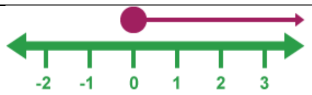
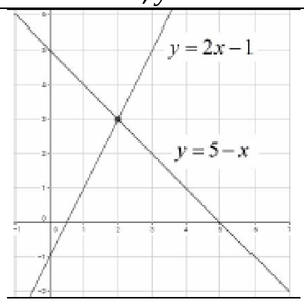
17. Turning Point of a Quadratic	A turning point is the **point where a quadratic turns**. On a **positive parabola**, the turning point is called a **minimum**. On a **negative parabola**, the turning point is called a **maximum**.	
18. Inequality	An inequality says that two values are not equal. a≠b means that a is not equal to b. $x > 2$ means **x is greater than 2** $x < 3$ means **x is less than 3** $x \geq 1$ means **x is greater than or equal to 1** $x \leq 6$ means **x is less than or equal to 6**	State the integers that satisfy $-2 < x \leq 4$. -1, 0, 1, 2, 3, 4
19. Inequalities on a Number Line	Inequalities can be shown on a number line. **Open circles** are used for numbers that are **less than or greater than** $(< or >)$ **Closed circles** are used for numbers that are **less than or equal or greater than or equal** $(\leq or \geq)$	 $x \geq 0$  $x < 2$  $-5 \leq x < 4$
20. Simultaneous Equations	A set of **two or more equations**, each involving **two or more variables** (letters). The **solutions** to simultaneous equations **satisfy both/all of the equations**.	$2x + y = 7$ $3x - y = 8$ Add the two equations: $5x = 15$ $x = 3$ Substitute into one of the equations to find y: 2 x 3 + y = 7 $y = 1$ So x = 3, y = 1
21. Solving Simultaneous Equations (Graphically)	**Draw the graphs** of the two equations. The **solutions** will be **where the lines meet**. The solution can be written as a **coordinate**.	 $y = 5 - x$ and $y = 2x - 1$. They meet at the point with coordinates (2,3) so the answer is $x = 2$ and $y = 3$