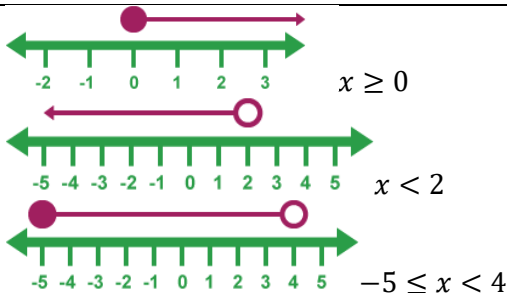


Topic: Algebra 2 Higher

Topic/Skill	Definition/Tips	Example
Inequality	An inequality says that two values are not equal . $a \neq b$ means that a is not equal to b.	$7 \neq 3$ $x \neq 0$
Inequality symbols	$x > 2$ 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
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 to or greater than or equal to ($\leq$ or $\geq$)	
Solve 2 linear inequalities	Solve each side of the inequality to find the range of values for x	$17 \leq 3x + 8 < 26 \qquad 5 \leq \frac{x+2}{3} \leq 7$ $\begin{array}{l} -8 \\ 9 \leq 3x < 18 \end{array} \qquad \begin{array}{l} \times 3 \\ 15 \leq x + 2 \leq 21 \end{array}$ $\begin{array}{l} \div 3 \\ 3 \leq x < 6 \end{array} \qquad \begin{array}{l} -2 \\ 13 \leq x \leq 19 \end{array}$
Expanding more than two bracket	Expand the first set using FOIL Now multiply the resulting quadratic by the third bracket	$(y+2)(y+3)(y-4)$ F: $y \times y = y^2$ O: $y \times 3 = 3y$ I: $2y \times y = 2y^2$ L: $2 \times 3 = 6$ $y^2 + 3y + 2y + 6 = y^2 + 5y + 6$ $(y-4)(y^2 + 5y + 6) =$ $y^3 + 5y^2 + 6y - 4y^2 - 20y - 24$ $y^3 + y^2 - 14y - 24$
Change the Subject	Use inverse operations on both sides of the formula (balancing method) until you find the expression for the letter.	Make x the subject of $y = \frac{2x-1}{z}$ Multiply both sides by z $yz = 2x - 1$ Add 1 to both sides $yz + 1 = 2x$ Divide by 2 on both sides $\frac{yz + 1}{2} = x$ We now have x as the subject.
Algebraic Fraction	A fraction whose numerator and denominator are algebraic expressions .	$\frac{6x}{3x-1}$
Adding/Subtracting Algebraic Fractions	For $\frac{a}{b} \pm \frac{c}{d}$, the common denominator is bd $\frac{a}{b} \pm \frac{c}{d} = \frac{ad}{bd} \pm \frac{bc}{bd} = \frac{ad \pm bc}{bd}$	$\frac{1}{x} + \frac{x}{2y}$ $= \frac{1(2y)}{2xy} + \frac{x(x)}{2xy}$

		$= \frac{2y + x^2}{2xy}$
Multiplying Algebraic Fractions	Multiply the numerators together and the denominators together. $\frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$	$\frac{x}{3} \times \frac{x+2}{x-2}$ $= \frac{x(x+2)}{3(x-2)}$ $= \frac{x^2 + 2x}{3x - 6}$
Dividing Algebraic Fractions	Multiply the first fraction by the reciprocal of the second fraction. $\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc}$	$\frac{x}{3} \div \frac{2x}{7}$ $= \frac{x}{3} \times \frac{7}{2x}$ $= \frac{7x}{6x} = \frac{7}{6}$
Simplifying Algebraic Fractions	Factorise the numerator and denominator and cancel common factors.	$\frac{x^2 + x - 6}{2x - 4} = \frac{(x+3)(x-2)}{2(x-2)} = \frac{x+3}{2}$
Solve quadratics arising from algebraic fractions	Multiply through by the denominators Rearrange into a quadratic, multiplying out any brackets as you go Solve, either using factorising, completing the square or the quadratic formula	$\frac{6}{x-2} - \frac{6}{x+1} = 1$ $x = -4, \quad x = 5$
Change the subject involving factorising	Re-arrange to get all of the required letter on one side of the equals Factorise to isolate that letter Divide through by the bracket to change the subject	Make x the subject: $x - 5y = 2xy - 4u$ $x - 2xy = 5y - 4u$ $x(1 - 2y) = 5y - 4u$ $x = \frac{5y - 4u}{1 - 2y}$ Make u the subject: $\frac{1}{f} = \frac{1}{u} + \frac{1}{v}$ Multiply through to eliminate the denominator $\frac{u}{f} = \frac{1}{v} + \frac{u}{v}$
Function notation	$f(x)$ x is the input value $f(x)$ is the output value.	$f(x) = 3x + 11$ Suppose the input value is $x = 5$ The output value is $f(5) = 3 \times 5 + 11 = 26$

Inverse function	$f^{-1}(x)$ A function that performs the opposite process of the original function. 1. Write the function as $y = f(x)$ 2. Rearrange to make x the subject. 3. Replace the y with x and the x with $f^{-1}(x)$	$f(x) = (1 - 2x)^5$. Find the inverse. $y = (1 - 2x)^5$ $\sqrt[5]{y} = 1 - 2x$ $1 - \sqrt[5]{y} = 2x$ $\frac{1 - \sqrt[5]{y}}{2} = x$ $f^{-1}(x) = \frac{1 - \sqrt[5]{x}}{2}$
Composite function	A combination of two or more functions to create a new function. $fg(x)$ is the composite function that substitutes the function $g(x)$ into the function $f(x)$. $fg(x)$ means ' do g first, then f ' $gf(x)$ means ' do f first, then g '	$f(x) = 5x - 3, g(x) = \frac{1}{2}x + 1$ What is $fg(4)$? $g(4) = \frac{1}{2} \times 4 + 1 = 3$ $f(3) = 5 \times 3 - 3 = 12 = fg(4)$ What is $fg(x)$? $fg(x) = 5\left(\frac{1}{2}x + 1\right) - 3 = \frac{5}{2}x + 2$