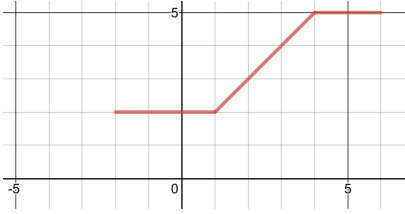
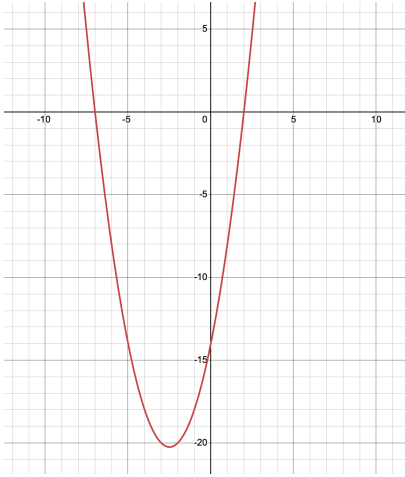
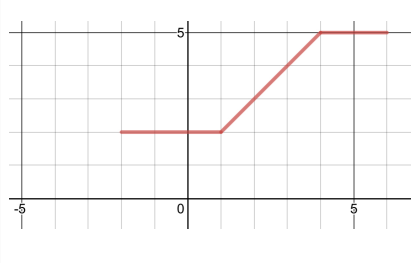
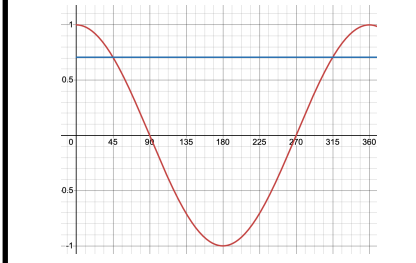
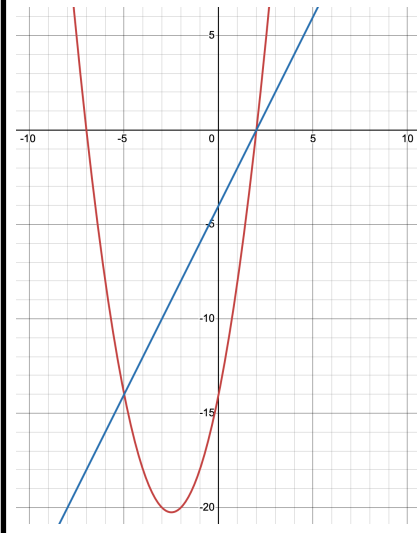
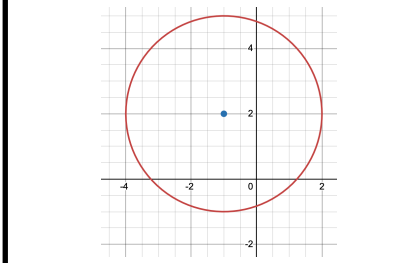


## AQA Level 2 Further Mathematics Warmup - Paper 1 2024

<p>The graph below shows a piece wise function <math>g(x)</math>. Define <math>g(x)</math> stating the domain of each part, and also state the range of <math>g(x)</math></p> 	<p>Find the equation of the line parallel to <math>3x + 5y = 12</math> which passes through <math>(4,4)</math></p>	<p>Find the second derivative of <math>y = x^2(3x + 4)</math></p>	<p>Identify the turning point of the quadratic <math>y = 2x^2 + 5x - 7</math></p>	<p>Using each of these digits no more than once, 1,5,7,2,6,3 a) how many 4 digit numbers can be made? b) How many even 3 digit</p>
	<p>Let <math>f(x) = 2x + 5</math> and <math>g(x) = 7x + 2</math>. Solve <math>fg(x) = 10</math></p>	<p>Simplify <math>\frac{4a^2b^2}{3c} \times \frac{9c^2}{2a^2}</math></p>	<p>Find <math>a</math> and <math>b</math> such that <math>\begin{pmatrix} 3 &amp; 4 \\ 2 &amp; a \end{pmatrix} \begin{pmatrix} 7 \\ 1 \end{pmatrix} = \begin{pmatrix} b \\ 17 \end{pmatrix}</math></p>	<p>Sketch <math>y = \cos(x)</math> and <math>y = \frac{1}{\sqrt{2}}</math>. Solve <math>\cos(x) = \frac{1}{\sqrt{2}}</math></p>
<p>Find the equation of the tangent to the circle <math>(x - 2)^2 + (y + 4)^2 = 25</math> at the point <math>(5,0)</math></p>	<p>Solve the trigonometric equation <math>2 \cos^2(x) - \sin(x) - 1 = 0</math></p>	<p>Expand <math>(2 + 3x)^4</math></p>	<p>Find the equation of the tangent to <math>y = x^2 + 2x</math> at <math>x = 2</math>.</p>	<p>Rationalise <math>\frac{3 - \sqrt{5}}{2 + 2\sqrt{5}}</math></p>
<p>Factorise fully <math>t^{14} - 9t^5</math></p>	<p>A bird flies in a straight line at an angle of elevation <math>13^\circ</math> from the ground to a branch on a tree. Given that the branch is at a height of 15m how far away is the tree.</p>	<p>The graph to the right shows <math>y = x^2 + 5x - 14</math> What is the line of symmetry of the quadratic function shown in the graph to the left?</p>		<p>Sketch the circle <math>(x + 1)^2 + (y - 2)^2 = 9</math></p>
<p>Find the centre and radius of the circle <math>x^2 + 8x + y^2 - 4y + 7 = 0</math></p>	<p>What is the matrix representing a reflection in <math>y = x</math> followed by a rotation <math>90^\circ</math> anticlockwise about the centre.</p>	<p>By plotting a suitable straight line find approximate solutions for <math>x^2 + 3x - 10 = 0</math></p>		<p>The coefficient of <math>x^3</math> in the expansion of <math>(2 + ax)^4</math> is 216. Find <math>a</math>.</p>

# AQA Level 2 Further Mathematics Warmup Solution - Paper 1 2024

$g(x) = \begin{cases} 2 & -2 \leq x \leq 1 \\ x+1 & 1 \leq x \leq 4 \\ 5 & 4 \leq x \leq 6 \end{cases}$ <p>Range of <math>g(x)</math> is <math>2 \leq g(x) \leq 5</math></p>	$3x + 4y = 32$	$\frac{dy}{dx} = 9x^2 + 8x$ $\frac{d^2y}{dx^2} = 18x + 8$	<p>Completing the square we have <math>y = 2\left(x + \frac{5}{4}\right) - \frac{81}{8}</math> so the turning point has coordinate <math>\left(-\frac{5}{4}, -\frac{81}{8}\right)</math></p>	<p>a) 360 b) 24</p>
	$x = \frac{1}{14}$	$6b^2c$	<p><math>a = 3</math> <math>b = 25</math></p>	
$y = -\frac{3}{4}x + \frac{15}{4}$	$x = 30^\circ, 150^\circ \text{ and } 270^\circ$	$16 + 96x + 216x^2 + 216x^3 + 81x^4$	$y = 6x - 4$	$\frac{1}{2}(\sqrt{5} - 2)$
$t^5(t^3 + 3)(t^3 - 3)$	$x = \frac{20}{\tan(13^\circ)}$ $x = 86.6\text{m}$	<p>Line of symmetry: <math>x = -\frac{5}{2}</math></p>		
<p>Centre : <math>(-4, 2)</math> Radius: <math>\sqrt{13}</math></p>	<p>Reflection in <math>y = x</math>: <math>\begin{pmatrix} 0 &amp; 1 \\ 1 &amp; 0 \end{pmatrix}</math> Rotation <math>90^\circ</math>: <math>\begin{pmatrix} 0 &amp; -1 \\ 1 &amp; 0 \end{pmatrix}</math> So combined transformation = <math>\begin{pmatrix} -1 &amp; 0 \\ 0 &amp; 1 \end{pmatrix}</math></p>	<p>Plotting <math>y = 2x - 4</math>. Solutions are <math>x = -5</math> and <math>x = 2</math></p>	$a = 3$	