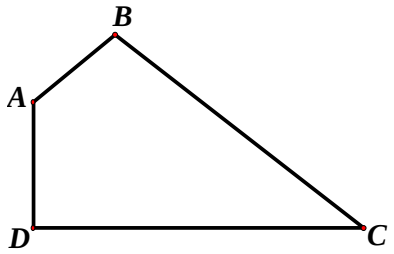
Year 4 Math Assignment 5: Further Trigo **Time: 90 mins**

Q1 $ABCD$ is a quadrilateral with $AB = 1$ cm, $BC = 7$ cm, $\angle ABC = \angle ADC = 90°$.

(i) Show that the perimeter of the quadrilateral is given by $8 + 6\cos\theta + 8\sin\theta$ where $\theta = \angle BCD$.

(ii) Find the maximum value of the perimeter as θ varies**.**



Q2 Find all the solutions to the equation $3\cos 2x + \sqrt{3}\sin 2x = -1$ for $0° < x < 180°$.

Q3 Express $3\sin\theta + 4\cos(60° - \theta) = 2$ in the form $a\sin\theta + b\cos\theta = c$. Hence, solve the given equation for value(s) of θ between $0°$ and $360°$.

Q4 Show that $\sin 2\theta + \cos 2\theta - 1 = 2\sqrt{2}\sin\theta\cos(\theta + 45°)$.

Hence or otherwise, solve the equation $\sin 2\theta + \cos 2\theta = 1$ for $0° \le \theta \le 360°$.

Q5 On separate diagrams, sketch the graph of the following functions, for $0 \le x \le 360°$, indicating clearly the intercepts at the axes and the turning points.

(a) $f(x) = \sqrt{2}\cos x - \sqrt{2}\sin x$

(b) $f(x) = \sin 2x - \sqrt{3}\cos 2x$

(c) $f(x) = \sin x + \cos x + \sqrt{2}$

Q6 Given that the maximum value and minimum value of the function $y = a\cos x + b$ are 1 and -7 respectively, where a, b are constants. Find the maximum value of $y = 3 + ab\sin x$.