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A LEVEL MATHS

(30) Sketching the Graphs of $\sec x$, $\operatorname{cosec} x$ and $\cot x$

WORKING AT D/E

(1) By first drawing the graph of $y = \sin x$, $0 \leq x \leq 360$, draw the graph of $y = \operatorname{cosec} x$ including the 3 vertical asymptotes. Write down the coordinates of the one minimum point and one maximum point.

(2) By first drawing the graph of $y = \cos x$, $0 \leq x \leq 360$, sketch the graph of $y = \sec x$ including the 2 vertical asymptotes. Write down the coordinates of the one minimum point and two maximum points.

(3) (a) Write down an expression for $\cot x$ in terms of $\tan x$.

(b) Write down when $\tan x = 0$ for $0 \leq x \leq 360$

(c) Sketch the graph of $y = \cot x$, $0 \leq x \leq 360$ showing where the graph crosses the x axis and writing down the equations of the vertical asymptotes.

WORKING AT B/C

(1) Sketch the graph of $y = \frac{2}{\sin x}$, $0 \leq x \leq 360$. Write down the coordinates of any turning points and the equations of any asymptotes.

(2) (a) Sketch the graph of $y = 2 + \sec x$, $0 \leq x \leq 360$.
(a) When $\sec x = -2$, what is the value of $\cos x$?
(b) Hence, find where the graph of $y = 2 + \sec x$, $0 \leq x \leq 360$ crosses the x axis.

(3) The graph of $y = 3\operatorname{cosec}(x - 30)$ $0 \leq x \leq 360$ has a minimum point with coordinates (p, q). Write down the values of p and q.

WORKING AT A*/A

(1) The graphs $y = p\sec x$, $p > 0$ and $y = q$ where p and q are constants, don't intersect. Find the possible set of values of q in terms of p.

(2) (a) $f(x) = 1 - \frac{a}{\operatorname{cose}}$, $a > 1$

(a) Sketch the graph of $y = 1 - \frac{a}{\operatorname{cose}}$, for $0 \leq x \leq 360$ including asymptotes.

(b) Explain why there are no roots to the equation $f(x) = 0$

(3) (a) Sketch the graphs of $y = \sec(x)$ and $y = \cot(x)$ for $-\pi \leq x \leq \pi$ on the same set of axes.

(b) Write down the number of points of intersection of the graphs of $y = \sec(x)$ and $y = \cot(x)$ for $-\pi \leq x \leq \pi$

(c) Find the coordinates any points of intersection giving any answers to 3S.F