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A LEVEL MATHS

# (50) Transforming Graphs (Trigonometry)

## WORKING AT D/E

(1) On separate sets of axes, draw each graph for $0 \leq x \leq 360$ showing where the graph meets or crosses the coordinate axes. On your graph include the coordinates of any maximum or minimum points and the equations of any asymptotes.

(a) $y = 2\sin(x)$
(b) $y = \cos(x) + 1$
(c) $y = -\tan(x)$
(d) $y = \sin(x - 30)$
(e) $y = 3\cos(x)$
(f) $y = \cos(x + 60)$
(g) $y = -\cos(x)$
(h) $y = \sin(2x)$
(i) $y = \cos(0.5x)$
(j) $y = 2 + \sin(x)$
(k) $y = \tan(-x)$
(l) $y = 1 - \cos(x)$

(2) The graph of $y = \cos(x) + k$ , where $k$ is a positive constant, doesn't meet the $x$ axis. Explain why $k > 1$.

## WORKING AT B/C

(1) The graph of $y = kcos(x)$ has a maximum point with coordinates $(360, \sqrt{2})$
(a) Find the value of $k$
(b) Find the coordinates of the first minimum point on the graph for $x > 0$

(2) The graph of $y = \tan(x - a)$ where $a$ is a positive constant has an asymptote when $x = 120^0$
(a) Explain why $a$ could be $30^0$
(b) Give any other possible value of $a$

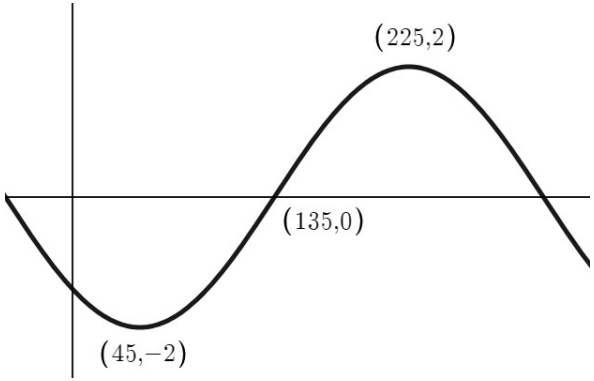
(3) Sketch the graph of $y = \sin(x) + a$, for $a > 1$ in the interval $0 \leq x \leq 360$.
Show the coordinates of the minimum and maximum point and where the graph crosses the $y$ axis giving your answers in terms of $a$

## WORKING AT A*/A

(1) (a) The graph of $y = \sin(ax)$ , where $a$ is a positive constant, meets the $x$ axis in 7 places in the interval $0 \leq x \leq 360$. Find the value of $a$.

(b) The graph of $y = \sin(bx)$ , where $b$ is a positive constant, doesn't meet the $x$ axis in the interval $0 < x \leq 360$. Find the possible set of values for the constant $b$.

(2) The diagram below shows the part of the graph of $y = a\cos(x + b)$ where $a$ and $b$ are constants.




Find possible values for $a$ and $b$:
(a) If $a$ is positive and $b$ is negative
(b) If $a$ is negative and $b$ is negative
(c) If $a$ is positive and $b$ is positive
(d) If $a$ is negative and $b$ is positive

(3) Alan says that the graph of $y = tan(kx)$ where $k$ is a positive constant has a single asymptote in the interval $0 \leq x \leq 90^o$. Find the set of values of $k$ that would satisfy this statement.