Trigonometric Graphs - Lesson 2

Equations of Trigonometric Graphs (Translations)

LI

- Find equations of trigonometric graphs in the form $y = \sin(x \pm b)^\circ$, $y = \cos(x \pm b)^\circ$ and $y = \tan(x \pm b)^\circ$ and $y = \sin x^\circ \pm b$, $y = \cos x^\circ \pm b$ and $y = \tan x^\circ \pm b$.

SC

- Basic graphs of $y = \sin x^\circ$, $y = \cos x^\circ$ and $y = \tan x^\circ$ between 0° and 360°.

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A graph is vertically translated by b units if the whole graph is shifted up/down the y - axis :

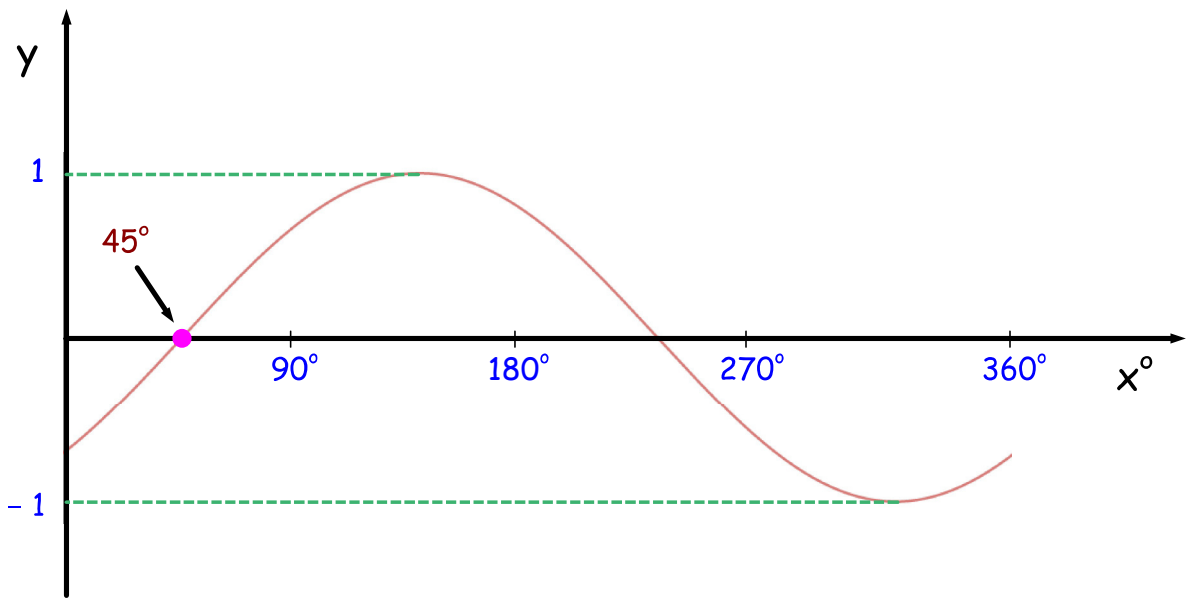
$$y = f(x) \pm b : \quad + \text{ means up, } - \text{ means down.}$$

A graph is horizontally translated by b units if the whole graph is shifted right/left along x - axis :

$$y = f(x \pm b) : \quad - \text{ means right, } + \text{ means left.}$$

Example 1

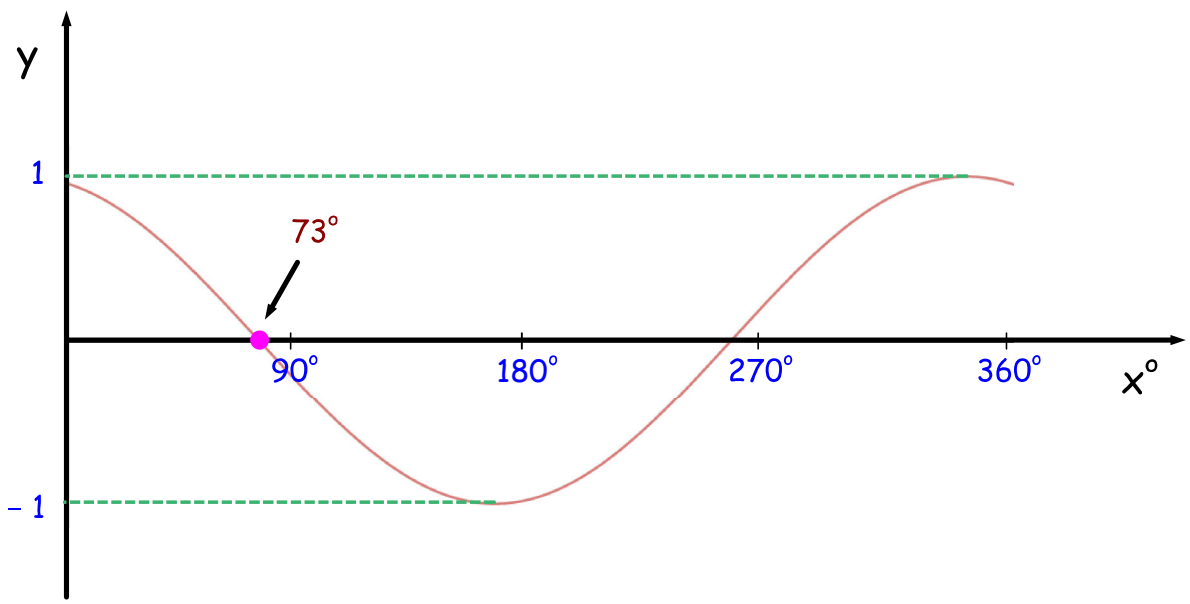
State the equation of the following graph :



$$y = \sin(x - 45)^\circ$$

Example 2

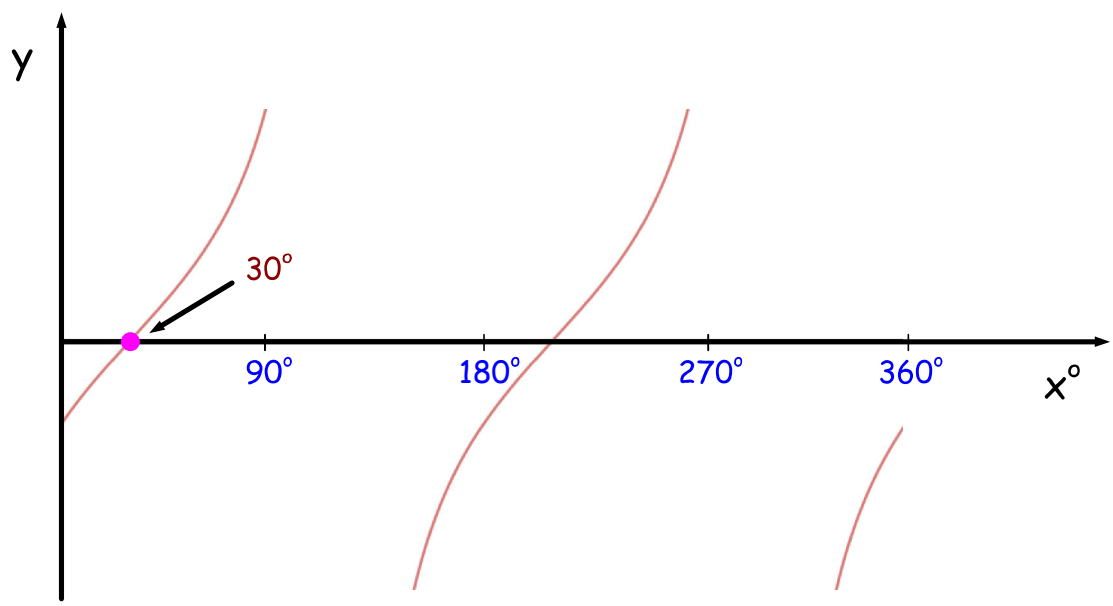
State the equation of the following graph :



$$y = \cos(x + 17)^\circ$$

Example 3

State the equation of the following graph :



$$y = \tan(x - 30)^\circ$$

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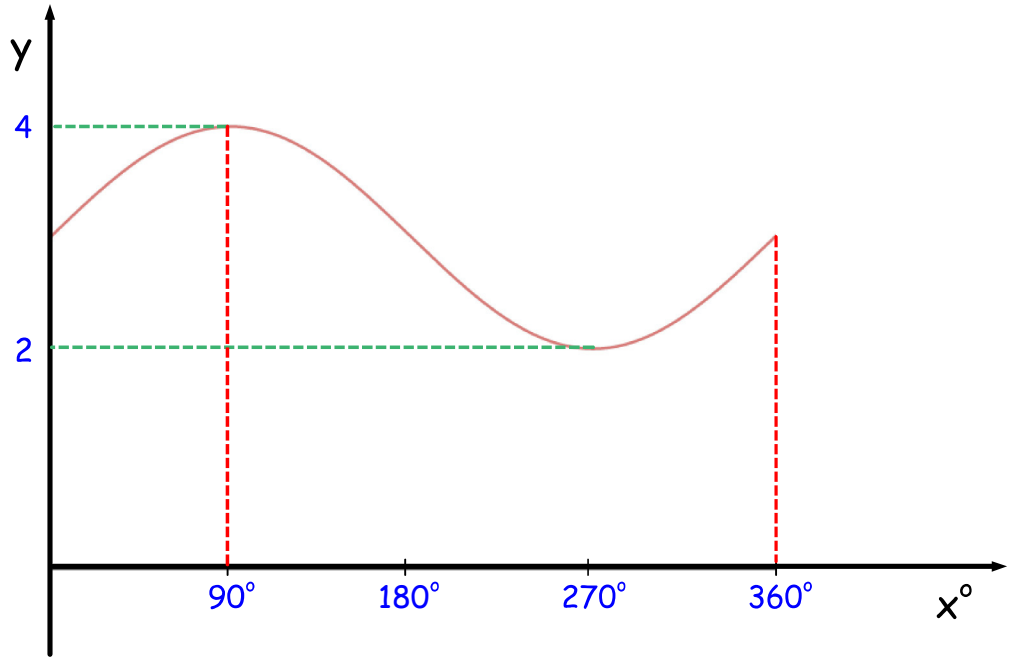
Example 4

State the equation of the following graph :



$$y = \sin x^\circ + 3$$

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Questions

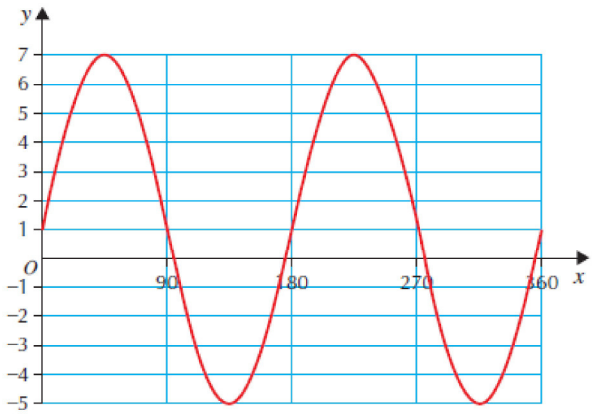
1) Sketch the graphs of the following for $0 \leqslant x \leqslant 360$.

a $y = \sin 2x° + 3$ b $y = 4\cos 3x° - 1$ c $y = 3\cos 2x° + 5$

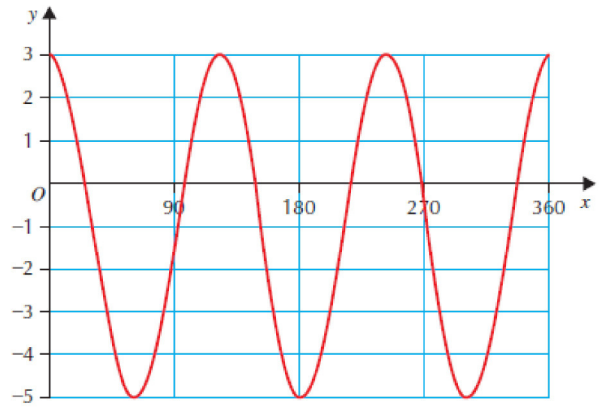
d $y = 3\sin x° - 5$ e $y = 2\sin 3x° - 1$ f $y = 5\cos \frac{1}{2}x° + 2$

g $y = 4\sin 2x° + 3$ h $y = 5 + 3\cos x°$ i $y = 3 + \cos 2x°$

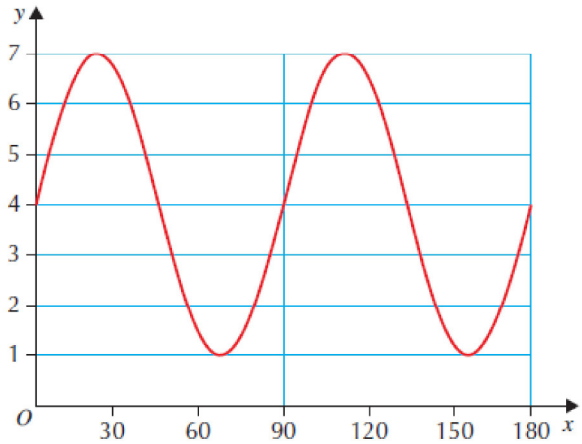
2) a



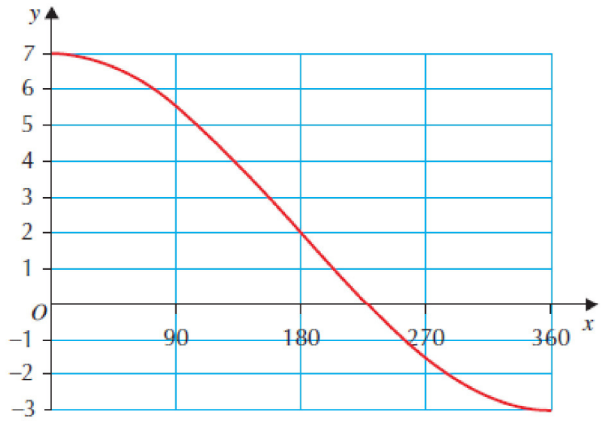
b



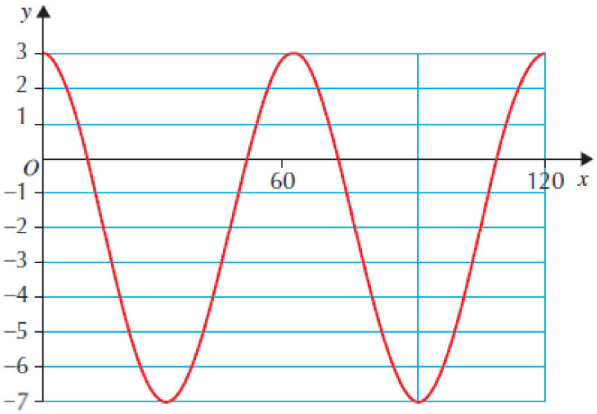
c



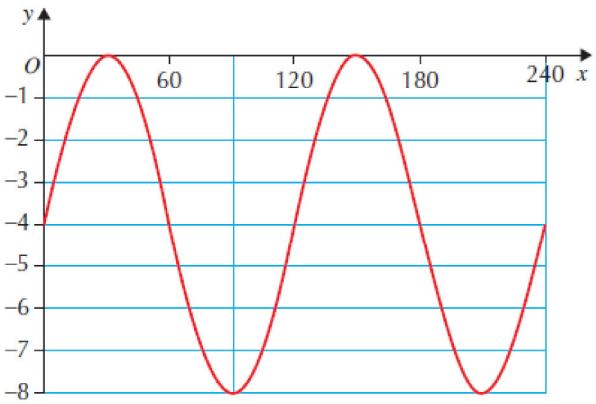
d



e



f



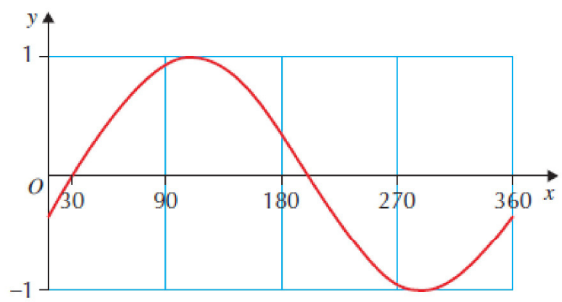
3) Sketch the graphs of the following for $0 \leqslant x \leqslant 360$.

a $y = \sin(x + 45)°$ **b** $y = \cos(x + 30)°$ **c** $y = \cos(x - 15)°$

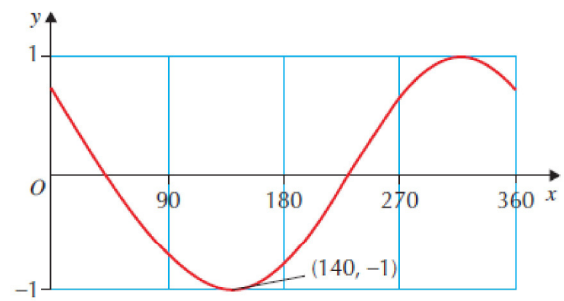
d $y = \sin(x - 60)°$ **e** $y = \tan(x - 90)°$ **f** $y = \tan(x + 30)°$

4) The following graphs are of the form $y = \sin(x + d)°$, $y = \cos(x + d)°$ or $y = \tan(x + d)°$, $-90 < d < 90$. Write down their equations.

a



b



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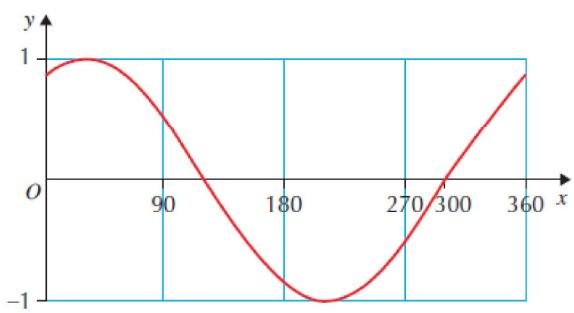
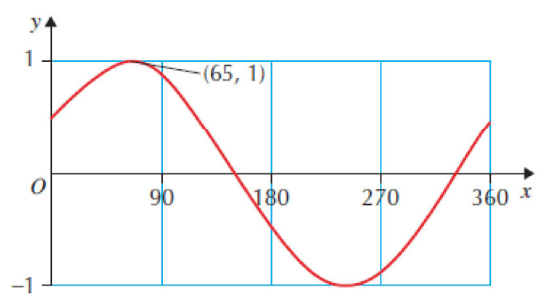
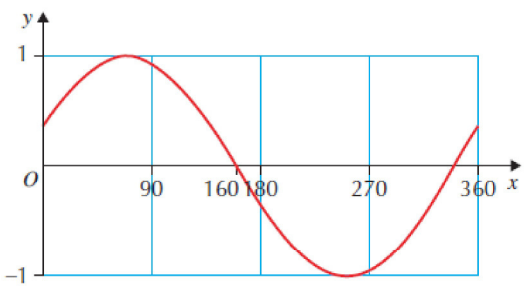


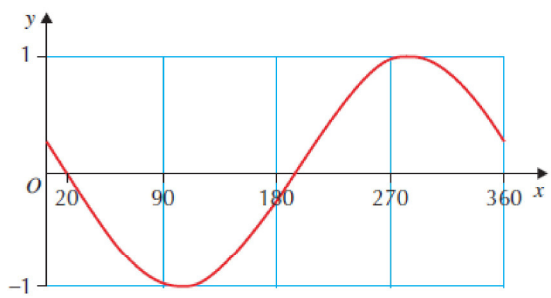
d



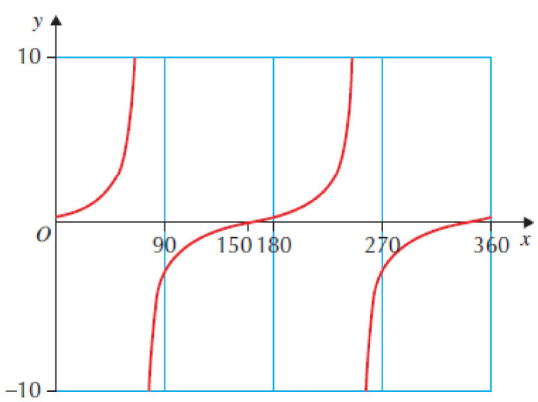
e



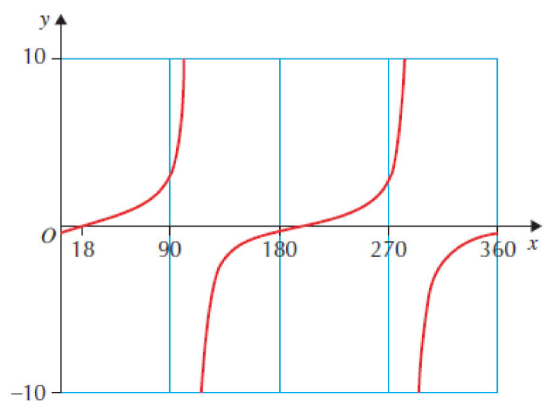
f



g



h



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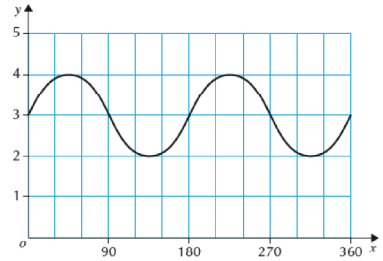
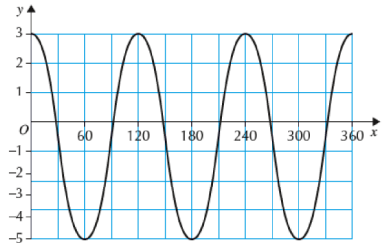
Answers

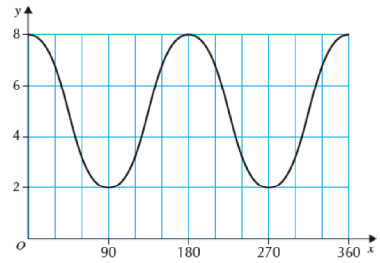
1) (a)



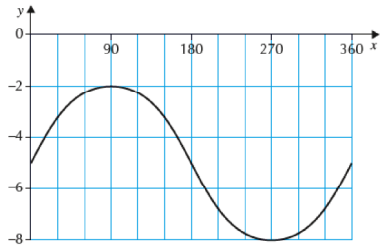
(b)



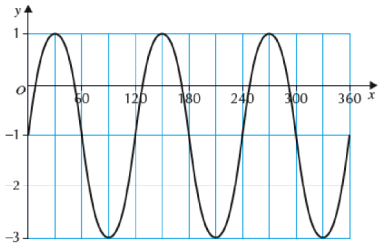
(c)



(d)



(e)



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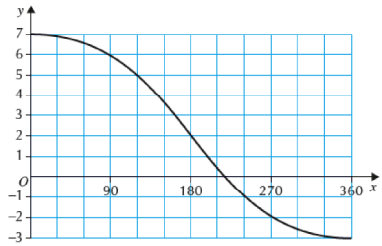
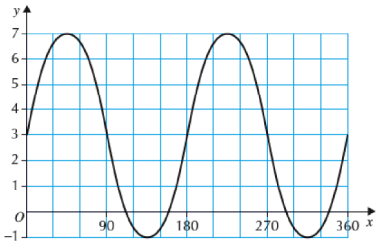
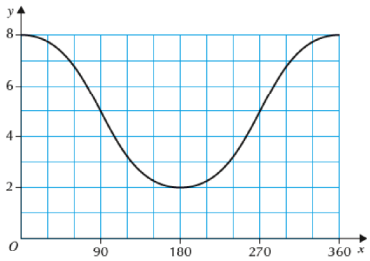


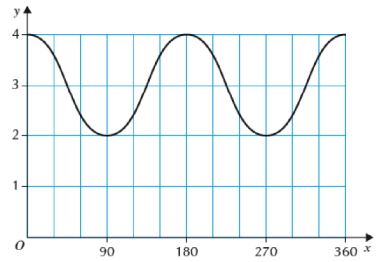
(g)



(h)



(i)



2) (a) $y = 1 + 6 \sin 2x^\circ$ (b) $y = -1 + 4 \cos 3x^\circ$

(c) $y = 4 + 3 \sin 4x^\circ$ (d) $y = 2 + 5 \cos (1/2)x^\circ$

(e) $y = -2 + 5 \cos 6x^\circ$ (f) $y = -4 + 4 \sin 3x^\circ$

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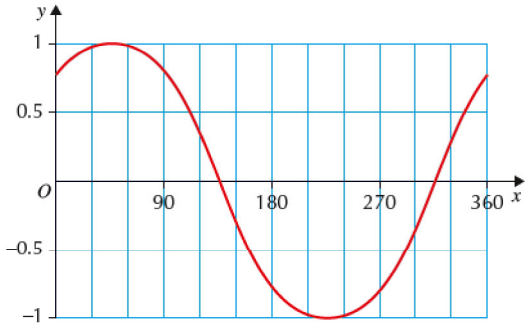
3) (a)



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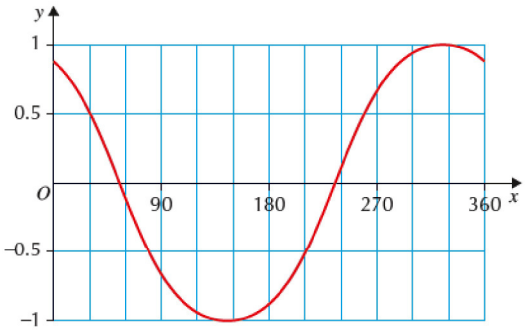

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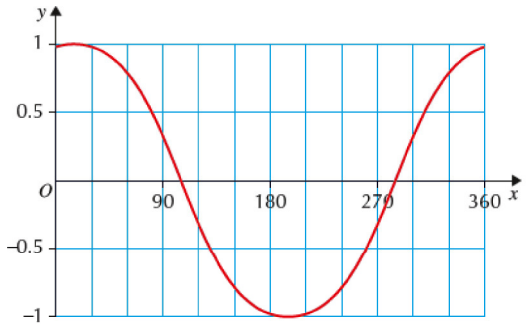
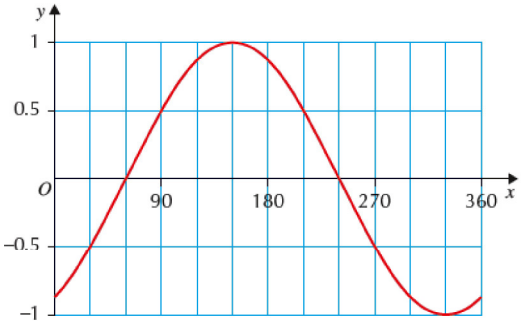


(d)



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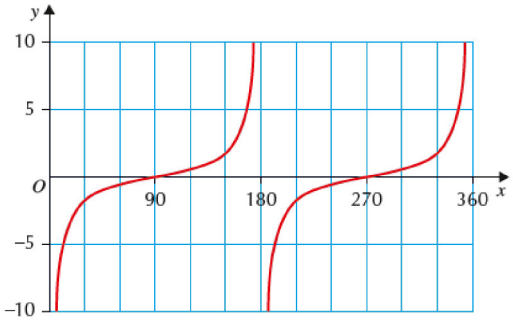
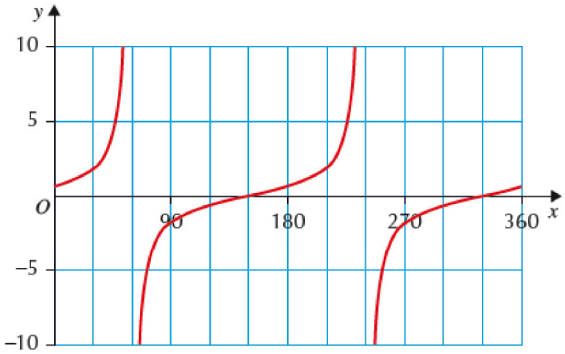


(f)



4) (a) $y = \sin(x - 30)^\circ$ (b) $y = \cos(x + 40)^\circ$

(c) $y = \cos(x - 30)^\circ$ (d) $y = \sin(x + 25)^\circ$

(e) $y = \sin(x + 20)^\circ$ (f) $y = \cos(x + 70)^\circ$

(g) $y = \tan(x + 30)^\circ$ (h) $y = \tan(x - 18)^\circ$