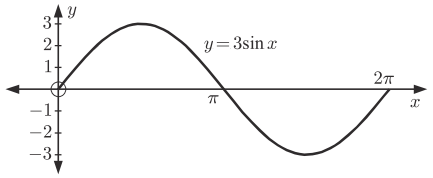
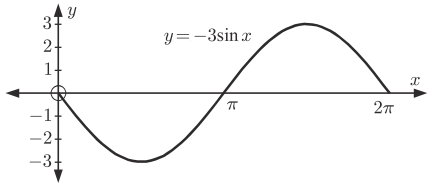
EXERCISE 10B.1

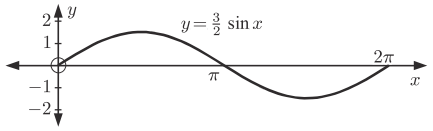
1 a



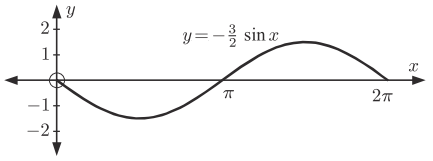
b



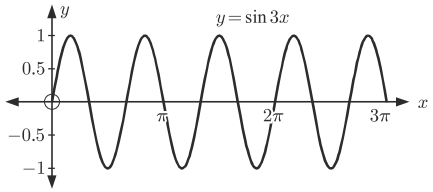
c



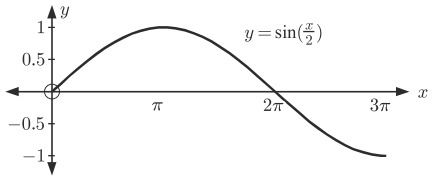
d



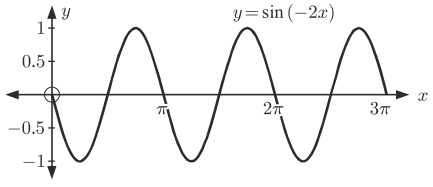
2 a



b



c

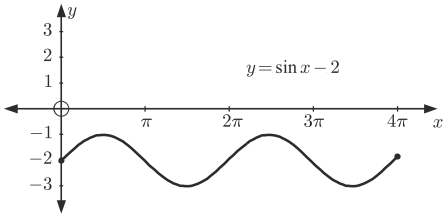


3 a $\frac{\pi}{2}$ **b** $\frac{\pi}{2}$ **c** 6π **d** $\frac{10\pi}{3}$

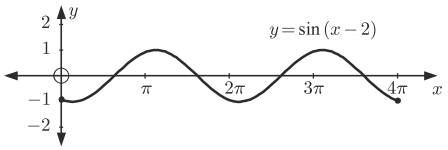
4 a $b = \frac{2}{5}$ **b** $b = 3$ **c** $b = \frac{1}{6}$ **d** $b = \frac{\pi}{2}$ **e** $b = \frac{\pi}{50}$

EXERCISE 10B.2

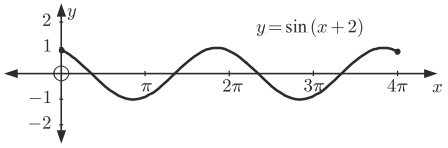
1 a



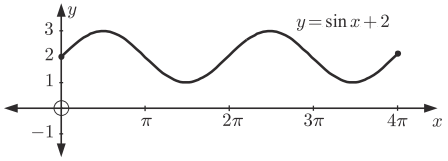
b



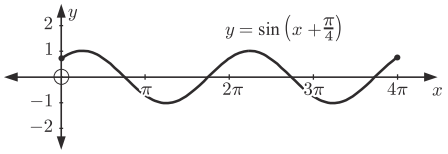
c



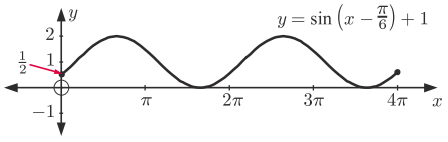
d



e



f



2 a $\frac{2\pi}{5}$ **b** 8π **c** π **3 a** $\frac{2}{3}$ **b** 20 **c** $\frac{1}{50}$ **d** $\frac{\pi}{25}$

4 a vert. translation -1 **b** horiz. translation $\frac{\pi}{4}$ right

c vert. stretch, factor 2 **d** horiz. stretch, factor $\frac{1}{4}$

e vert. stretch, factor $\frac{1}{2}$ **f** horiz. stretch, factor 4

g reflection in the x-axis **h** translation $\begin{pmatrix} -2 \\ -3 \end{pmatrix}$

i vert. stretch, factor 2, followed by a horiz. stretch, factor $\frac{1}{3}$

j translation $\begin{pmatrix} \frac{\pi}{3} \\ 2 \end{pmatrix}$

EXERCISE 10C

1 a $T \approx 6.5 \sin \frac{\pi}{6}(t - 4.5) + 20.5$

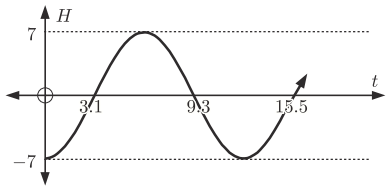
2 a $T \approx 4.5 \sin \frac{\pi}{6}(t - 10.5) + 11.5$

3 a $T \approx 9.5 \sin \frac{\pi}{6}(t - 10.5) - 9.5$

b A reasonable fit but not perfect.

4 a $H \approx 7 \sin 0.507(t - 3.1)$

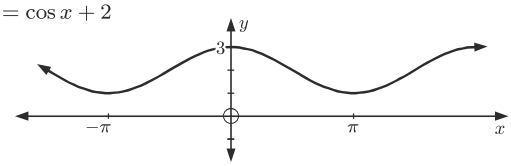
b



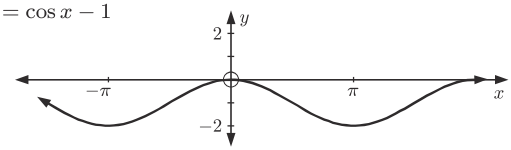
5 $H = 10\sin(\frac{\pi}{50}(t-25)) + 12$

EXERCISE 10D

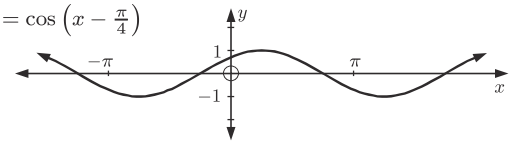
1 **a** $y = \cos x + 2$



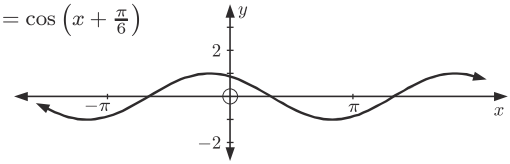
b $y = \cos x - 1$



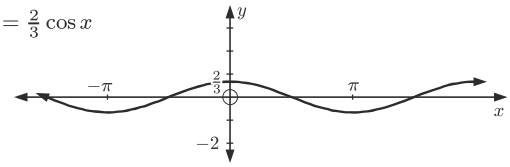
c $y = \cos\left(x - \frac{\pi}{4}\right)$



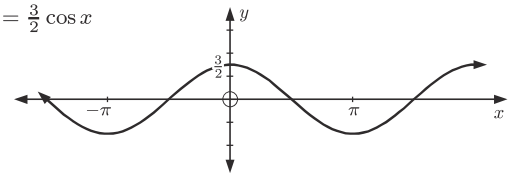
d $y = \cos\left(x + \frac{\pi}{6}\right)$



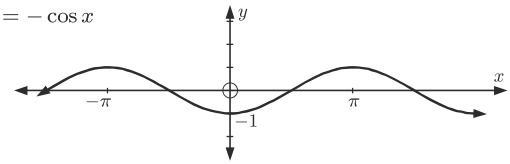
e $y = \frac{2}{3}\cos x$



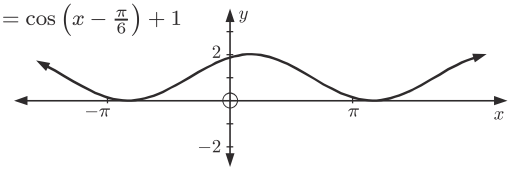
f $y = \frac{3}{2}\cos x$



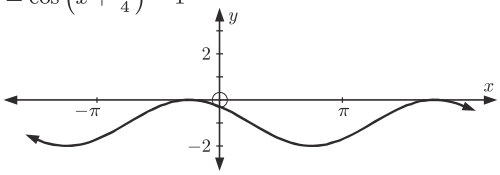
g $y = -\cos x$



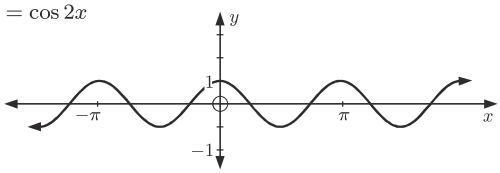
h $y = \cos\left(x - \frac{\pi}{6}\right) + 1$



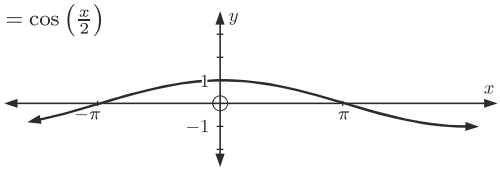
i $y = \cos\left(x + \frac{\pi}{4}\right) - 1$



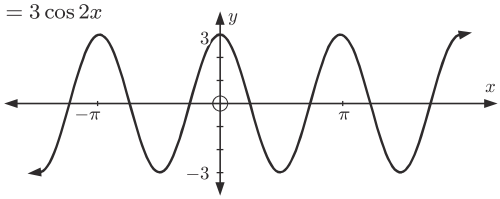
j $y = \cos 2x$



k $y = \cos\left(\frac{x}{2}\right)$



l $y = 3\cos 2x$



2 **a** $\frac{2\pi}{3}$ **b** 6π **c** 100

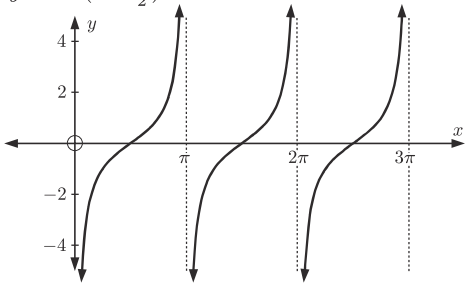
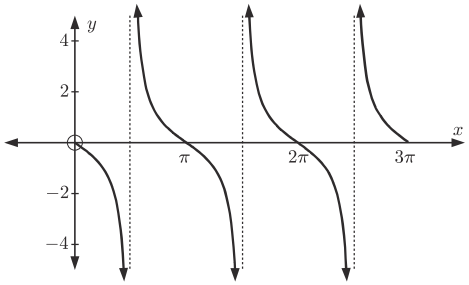
3 $|a|$ = amplitude, $b = \dfrac{2\pi}{\text{period}}$, c = horizontal translation, d = vertical translation

4 **a** $y = 2\cos 2x$ **b** $y = \cos\left(\frac{x}{2}\right) + 2$

c $y = -5\cos\left(\frac{\pi}{3}x\right)$

EXERCISE 10E

1 **a** **i** $y = \tan(x - \frac{\pi}{2})$



ii $y = -\tan x$