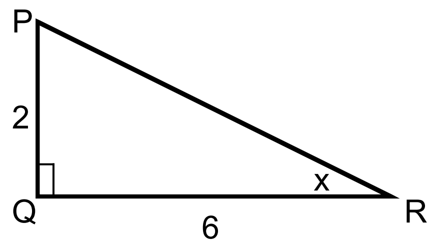
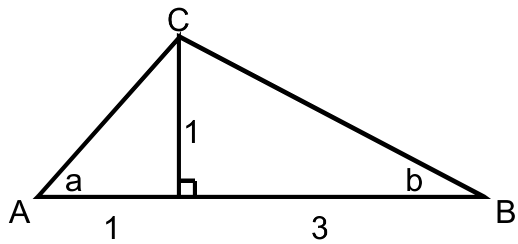
Trigonometry – Revision

1. $\tan x = 4\sin\frac{\pi}{3}\cos^2\frac{\pi}{4}$. Find the exact value of x.

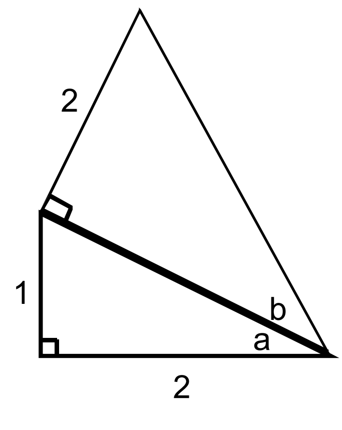
2. In triangle PQR show that $\cos 2x = \frac{4}{5}$.



3. In triangle ABC, show that the exact value of $\sin(a + b)$ is $\frac{2}{\sqrt{5}}$.



4. For the diagram opposite, show that $\cos(a + b)$ is $\frac{2\sqrt{5} - 2}{3\sqrt{5}}$.



5. Given $\tan x = \frac{1}{7}$, show that $\sin 2x$ is $\frac{7}{25}$.

6. (a) Solve the equation $2\sin^2 x - 1 = 0$, $0 \leq x \leq 360$

   (b) Solve the equation $3\tan^2 x = 1$, $0 \leq x \leq 2\pi$

7. Solve, for $0 \leq x \leq 360$

   (a) $2\cos 2x + 1 = 0$

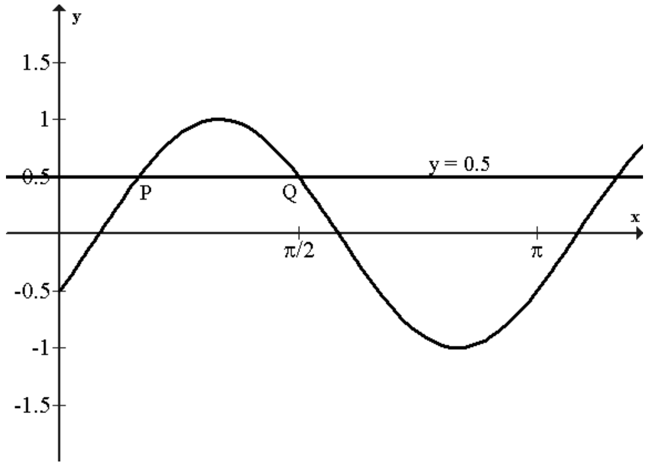
   (b) $4(\tan 2x - 1) = 4$

   (c) $3\cos(x - 40) = 1$

   (d) $\sqrt{2}\sin(2x - 10) = 1$

8. Solve, for $0 \leq x \leq \pi$

(a) $2\sin 2x - \sqrt{3} = 0$ (b) $\sqrt{3}\tan\left(2x - \frac{\pi}{3}\right) + 1 = 0$



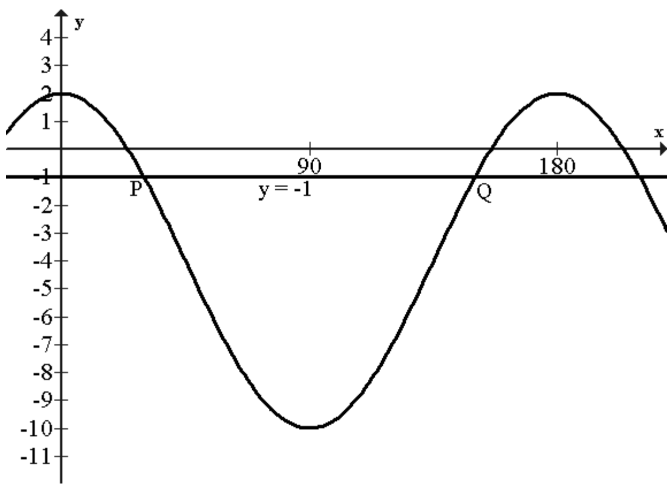
9. The diagram shows a sketch of the graph $y = \sin\left(2x - \frac{\pi}{6}\right)$ and the straight line $y = 0.5$. Find the coordinates of P and Q.

10. Solve, for $0 \leq x \leq 360$

(a) $2\sin 2x + \cos x = 0$ (b) $\cos 2x = 3\sin x + 1$ (c) $\cos 2x = \cos x$

(d) $\cos 2x - 2\sin^2 x = 0$ (e) $5\cos 2x - \cos x + 2 = 0$

11. (a) Show that $3\cos 2x - 4\cos^2 x = -1 - 2\sin^2 x$
(b) Hence solve $3\cos 2x - 4\cos^2 x = 3\sin x$, $0 \leq x \leq 360$

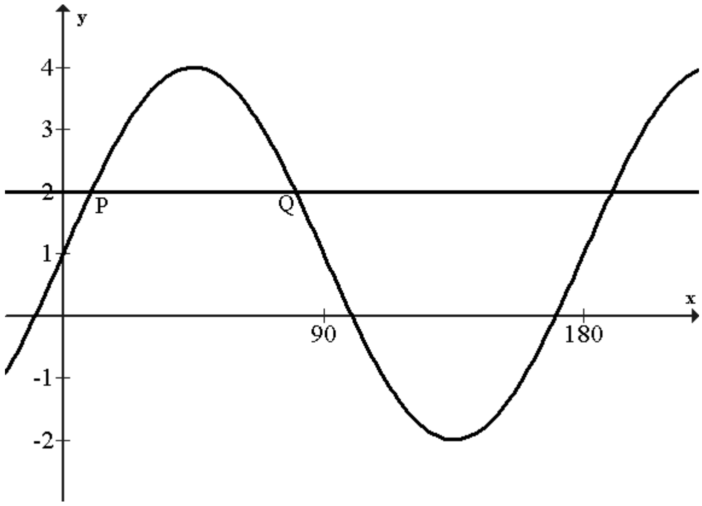


12. (a) The diagram opposite shows the graph of $y = a\cos bx + c$. Write down the values of a, b and c.

(b) Find the coordinates of P and Q, the points of intersection of the graph in (a) with the line $y = -1$.

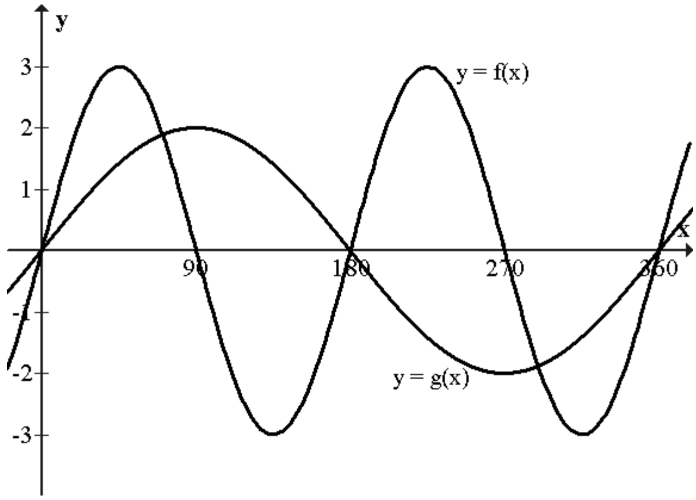
13. (a) The graph opposite has equation $y = a\sin bx + c$. Write down the values of a, b and c.

(b) Find the x-coordinates of P and Q.



14. The diagram shows the graphs of $f(x) = a\sin bx$ and $g(x) = c\sin x$.

(a) State the values of a, b and c.
(b) Find the points of intersection of f(x) and g(x).



15. Express $\cos x - \sin x$ in the form $k\cos(x - \alpha)$, where $k > 0$ and $0 \le \alpha \le 360$.

16. Express $3\sin x - 4\cos x$ in the form $k\sin(x + a)$, where $k > 0$ and $0 \le a \le 360$.

17. (a) Express $2\cos x + 3\sin x$ in the form $k\cos(x - a)$, where $k > 0$ and $0 \le a \le 360$.

(b) Hence solve $2\cos x + 3\sin x = 2$, $0 \le x \le 360$.

18. Solve $4\sin x + 3\cos x = 2.5$, $0 \le x \le 180$.

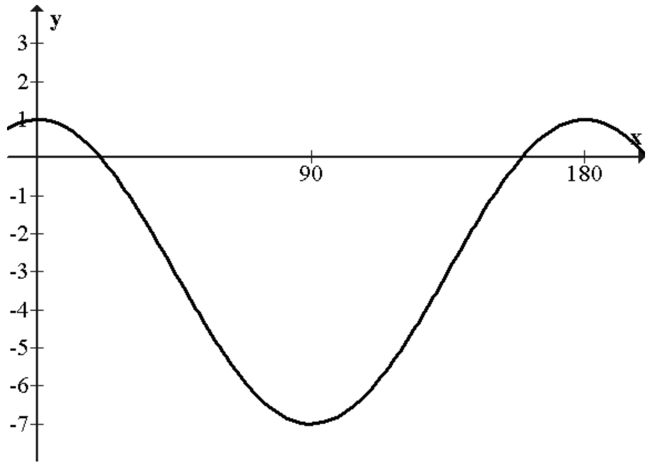
19. (a) Express $2\cos x + 2\sin x$ in the form $k\cos(x - \alpha)$, where $k > 0$ and $0 \le \alpha \le 360$.

(b) Write down the maximum value of $2\cos x + 2\sin x$ and the value of x for which it occurs.

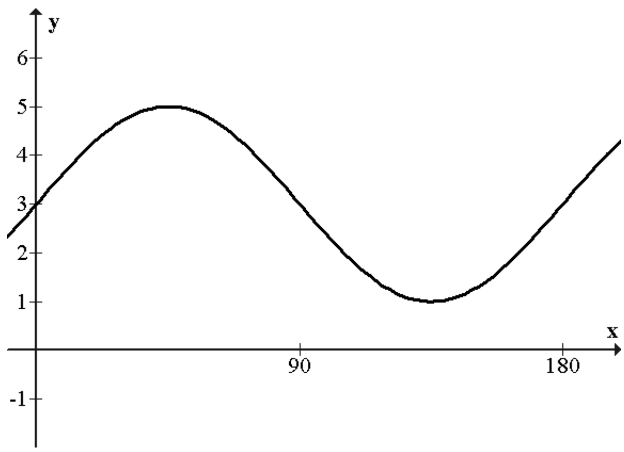
20. (a) Express $\sqrt{5}\sin x - 2\cos x$ in the form $k\sin(x + a)$, where $k > 0$ and $0 \le a \le 360$.

(b) Write down the minimum value of $\sqrt{5}\sin x - 2\cos x$ and the value of x for which it occurs.

21. (a) The diagram shows the graph of $f(x) = a\cos bx + c$. Write down the values of a,b and c.



(b) The diagram shows the graph of $g(x) = p\sin qx + r$. Write down the values of p, q and r.



(c) Express $f(x) + g(x)$ in the form $k\cos(2x - a)$.

(d) Hence solve $f(x) + g(x) = \sqrt{15}$, $0 \le x \le 360$.

22. Sketch the following graphs

(a) $y = 2\sin x - 1$ $\quad 0 \le x \le 360$
(b) $y = 3\cos 2x + 2$ $\quad 0 \le x \le 180$
(c) $y = 4\sin(x - 40)$ $\quad 0 \le x \le 2\pi$
(d) $y = 2\cos(2x + 10) - 1$ $\quad 0 \le x \le \pi$