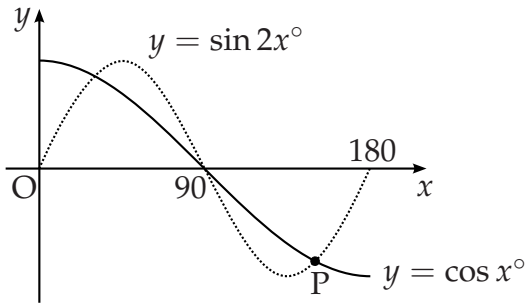
Exact Values (Non-Calculator)

[SQA] 1. (*a*) Solve the equation $\sin 2x^\circ - \cos x^\circ = 0$ in the interval $0 \leq x \leq 180$. **4**

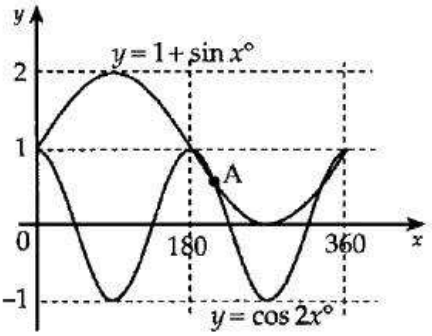
(*b*) The diagram shows parts of two trigonometric graphs, $y = \sin 2x^\circ$ and $y = \cos x^\circ$.

Use your solutions in (*a*) to write down the coordinates of the point P. **1**



[SQA] 2. The diagram shows two curves with equations $y = \cos 2x^\circ$ and $y = 1 + \sin x^\circ$ where $0 \leq x \leq 360$. **4**

Find the x-coordinate of the point of intersection at A.



[SQA] 3. Solve the equation $\sin 2x^\circ + \sin x^\circ = 0$, $0 \leq x < 360$. **5**

[SQA] 4.

(*a*) Solve $\cos 2x^\circ - 3\cos x^\circ + 2 = 0$ for $0 \leq x < 360$. **5**

(*b*) Hence solve $\cos 4x^\circ - 3\cos 2x^\circ + 2 = 0$ for $0 \leq x < 360$

5. How many solutions does the equation

$$(4\sin x - \sqrt{5})(\sin x + 1) = 0$$

have in the interval $0 \leq x < 2\pi$?

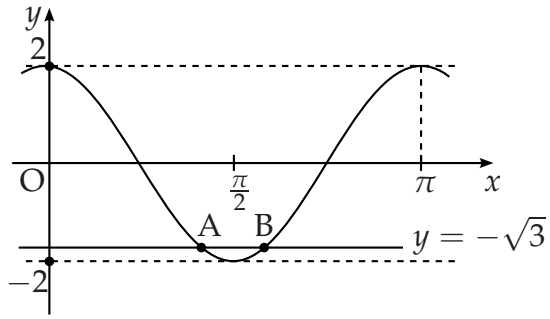
A. 4

B. 3

C. 2

D. 1 **2**

[SQA] 6. The diagram shows the graph of a cosine function from 0 to π.



(*a*) State the equation of the graph. **1**

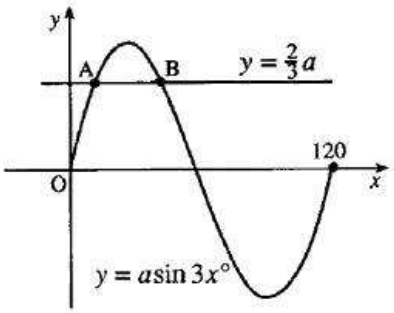
(*b*) The line with equation $y = -\sqrt{3}$ intersects this graph at point A and B.

Find the coordinates of B. **3**

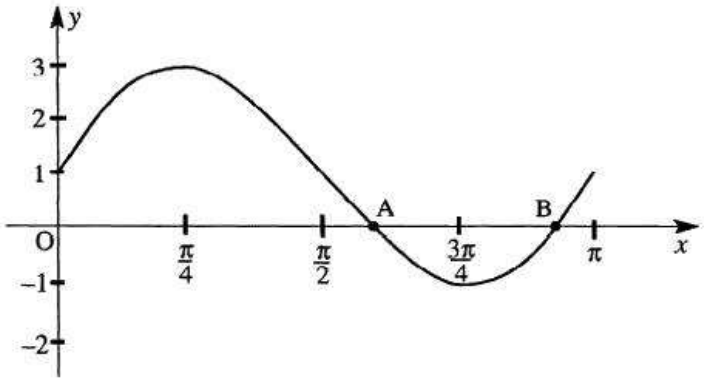
[SQA] 7. Find the values of t, where $0 < t < 2\pi$, for which $4\cos\left(2t - \frac{\pi}{4}\right)$ has its maximum value. **4**

[SQA] 8. The diagram shows part of the graph of $y = a\sin 3x°$ and the line with equation $y = \frac{2}{3}a$.

Find the x-coordinates of A and B. **4**



[SQA] 9. The diagram below shows the graph of $y = 2\sin 2x + 1$ for $0 \le x \le \pi$.



(*a*) Find the coordinates of A and B (as shown in the diagram) by solving an appropriate equation algebraically. **(5)**

(*b*) The points (0, 2) and (π, 0) are joined by a straight line l. In how many points does l intersect the given graph? **(1)**

(*c*) C is the point on the given graph with an x-coordinate of $\frac{\pi}{2}$. Explain whether C is above, below or on the line l. **(3)**

10. Solve $2\cos x = \sqrt{3}$ for x, where $0 \leq x < 2\pi$.

A. $\frac{\pi}{3}$ and $\frac{5\pi}{3}$

B. $\frac{\pi}{3}$ and $\frac{2\pi}{3}$

C. $\frac{\pi}{6}$ and $\frac{5\pi}{6}$

D. $\frac{\pi}{6}$ and $\frac{11\pi}{6}$ **2**

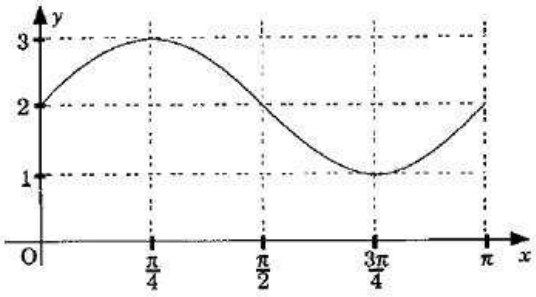
[SQA] 11. Solve $2\sin 3x^\circ - 1 = 0$ for $0 \leq x \leq 180$. **4**

[SQA] 12. Solve the equation $2\cos^2 x = \frac{1}{2}$, for $0 \leq x \leq \pi$. **3**

[SQA] 13. The diagram shows the graph of the function $y = a + b\sin cx$ for $0 \leq x \leq \pi$.

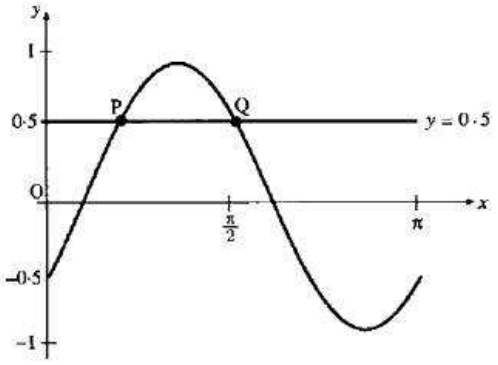
(a) Write down the values of a, b and c. **3**

(b) Find algebraically the values of x for which $y = 2{\cdot}5$. **3**



[SQA] 14. The diagram shows a sketch of the graph of $y = \sin\left(2x - \frac{\pi}{6}\right)$, $0 \leq x \leq \pi$, and the straight line $y = 0{\cdot}5$.
These graphs intersect at P and Q.

Find algebraically the coordinates of P and Q. **4**



[SQA] 15. Solve the equation $2\sin\left(2x - \frac{\pi}{6}\right) = 1$, $0 \leq x < 2\pi$. **4**

[SQA] 16.

(*a*) Using the fact that $\frac{7\pi}{12} = \frac{\pi}{3} + \frac{\pi}{4}$, find the exact value of $\sin\left(\frac{7\pi}{12}\right)$. **3**

(*b*) Show that $\sin(A + B) + \sin(A - B) = 2\sin A \cos B$. **2**

(*c*) (i) Express $\frac{\pi}{12}$ in terms of $\frac{\pi}{3}$ and $\frac{\pi}{4}$.

(ii) Hence or otherwise find the exact value of $\sin\left(\frac{7\pi}{12}\right) + \sin\left(\frac{\pi}{12}\right)$. **4**

[END OF QUESTIONS]