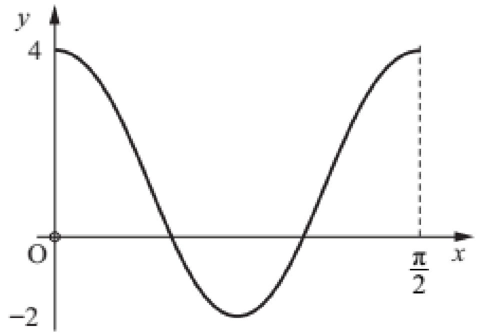
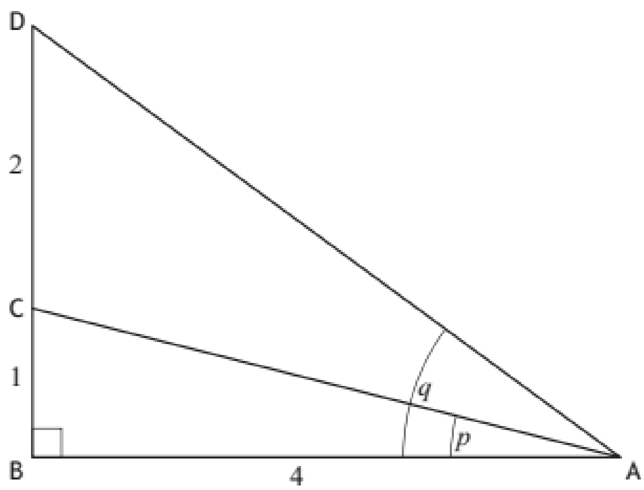
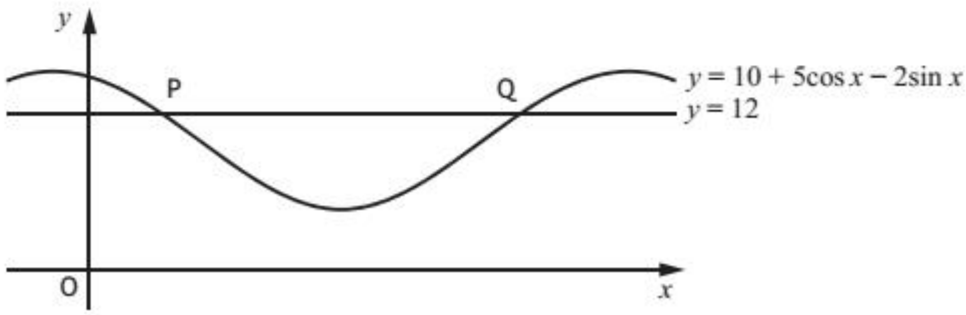
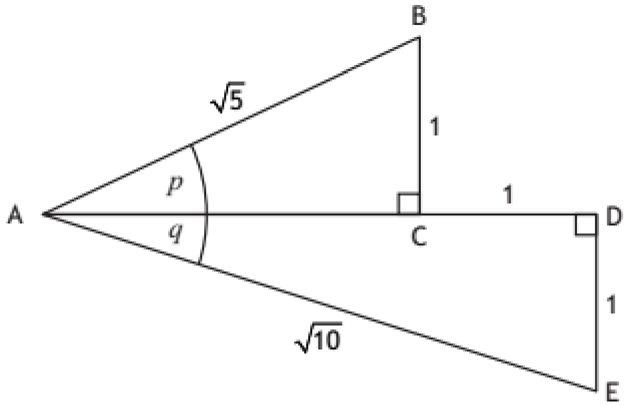
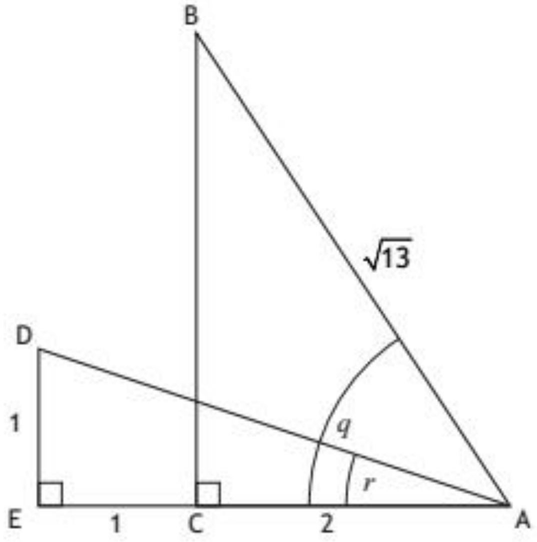
Y	Q	P	TRIG
15	4	1	The diagram shows part of the graph of the function $y = p\cos qx + r$.  Write down the values of p, q and r. **3**
15	10	1	` Given that $\tan 2x = \frac{3}{4},\ 0 < x < \frac{\pi}{4}$, find the exact value of (a) $\cos 2x$ **1** (b) $\cos x$. **2**
15	9	2	The blades of a wind turbine are turning at a steady rate. The height, h metres, of the tip of one of the blades above the ground at time, t seconds, is given by the formula $h = 36\sin(1{\cdot}5t) - 15\cos(1{\cdot}5t) + 65.$ Express $36\sin(1{\cdot}5t) - 15\cos(1{\cdot}5t)$ in the form $k\sin(1{\cdot}5t - a)$, where $k > 0$ and $0 < a < \frac{\pi}{2}$, and hence find the **two** values of t for which the tip of this blade is at a height of 100 metres above the ground during the first turn. **8**
16	13	1	Triangle ABD is right-angled at B with angles BAC = p and BAD = q and lengths as shown in the diagram below.  Show that the exact value of $\cos(q-p)$ is $\frac{19\sqrt{17}}{85}$. **5**

16	8	2	a) Express $5\cos x - 2\sin x$ in the form $k\cos(x+a)$, where $k>0$ and $0<a<2\pi$. **4** b) The diagram shows a sketch of part of the graph of $y = 10 + 5\cos x - 2\sin x$ and the line with equation $y = 12$. The line cuts the curve at the points P and Q.  Find the x-coordinates of P and Q. **4**
16	11	2	(a) Show that $\sin 2x \tan x = 1 - \cos 2x$, where $\frac{\pi}{2} < x < \frac{3\pi}{2}$. **4**
17	14	1	(a) Express $\sqrt{3}\sin x° - \cos x°$ in the form $k\sin(x-a)°$, where $k>0$ and $0<a<360$. **4** (b) Hence, or otherwise, sketch the graph with equation $y = \sqrt{3}\sin x° - \cos x°$, $0 \le x \le 360$. **3**
17	6	2	Solve $5\sin x - 4 = 2\cos 2x$ for $0 \le x < 2\pi$. **5**
18	3	1	Given $h(x) = 3\cos 2x$, find the value of $h'\left(\frac{\pi}{6}\right)$. **3**
18	6	2	Functions, f and g, are given by $f(x) = 3 + \cos x$ and $g(x) = 2x$, $x \in \mathbb{R}$. (a) Find expressions for (i) $f(g(x))$ and **2** (ii) $g(f(x))$. **1** (b) Determine the value(s) of x for which $f(g(x)) = g(f(x))$ where $0 \le x < 2\pi$. **6**

18	8	2	(a) Express $2\cos x° - \sin x°$ in the form $k\cos(x-a)°$, $k>0$, $0<a<360$. (b) Hence, or otherwise, find (i) the minimum value of $6\cos x° - 3\sin x°$ and (ii) the value of x for which it occurs where $0 \le x < 360$.	4 1 2
19	13	1	Triangles ABC and ADE are both right angled. Angles p and q are as shown in the diagram.  (a) Determine the value of (i) $\cos p$ (ii) $\cos q$. (b) Hence determine the value of $\sin(p+q)$.	 1 1 3
19	15	1	(a) Solve the equation $\sin 2x° + 6\cos x° = 0$ for $0 \le x < 360$. (b) Hence solve $\sin 4x° + 6\cos 2x° = 0$ for $0 \le x < 360$.	4 1
19	6	2	(a) Express $2\cos x° - 3\sin x°$ in the form $k\cos(x+a)°$ where $k>0$ and $0 \le a < 360$. (b) Hence solve $2\cos x° - 3\sin x° = 3$ for $0 \le x < 360$.	4 3

22	7	1	Triangles ABC and ADE are both right angled. Angle BAC $= q$ and angle DAE $= r$ as shown in the diagram.  (a) Determine the value of: (i) $\sin r$ — 1 (ii) $\sin q$. — 1 (b) Hence determine the value of $\sin(q-r)$. — 3
22	9	1	Solve the equation $\cos 2x° = 5\cos x° - 3$ for $0 \le x < 360$. — 5
22	12	1	Given that $f(x) = 4\sin\left(3x - \frac{\pi}{3}\right)$, evaluate $f'\left(\frac{\pi}{6}\right)$. — 3
22	3	1	(a) Express $4\sin x + 5\cos x$ in the form $k\sin(x+a)$ where $k > 0$ and $0 < a < 2\pi$. — 4 (b) Hence solve $4\sin x + 5\cos x = 5.5$ for $0 \le x < 2\pi$. — 3