

Trigonometry - Exercises (3 pages; 7/10/18)

(1) Solve the equation $\sin x - \cos x = 0.5$, for $0^\circ < x < 360^\circ$

(2) If the point (x, y) is rotated (anti-clockwise) about the Origin by an infinitesimal angle $\delta\theta$ (radians), show that the changes in the coordinates are given by: $\delta x = -y\delta\theta$ & $\delta y = x\delta\theta$

(3) Given that $\cos^5\theta = \frac{1}{16}(\cos 5\theta + 5\cos 3\theta + 10\cos\theta)$ and

$$\cos^6\theta = \frac{1}{32}(\cos 6\theta + 6\cos 4\theta + 15\cos 2\theta + 10),$$

find expressions for $\sin^5\theta$ and $\sin^6\theta$

(4) Express $-\cos\theta$ in the form $\cos\alpha$ (where α is to be found in terms of θ), using an algebraic method.

(5) Simplify $\sqrt{2(1 - \cos\theta)}$ and $\sqrt{2(1 + \cos\theta)}$

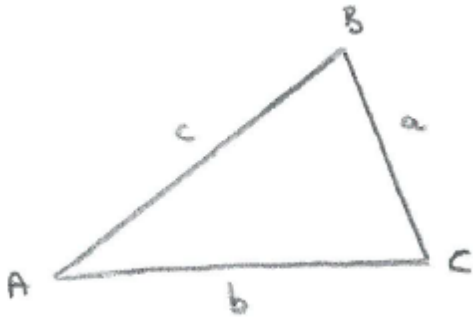
(6) Show that

(i) $\cos^4\theta - \sin^4\theta = \cos 2\theta$

(ii) $\cos^4\theta + \sin^4\theta = 1 - \frac{1}{2}\sin^2(2\theta)$

(7) Sketch $y = \sin(2x + 30^\circ)$

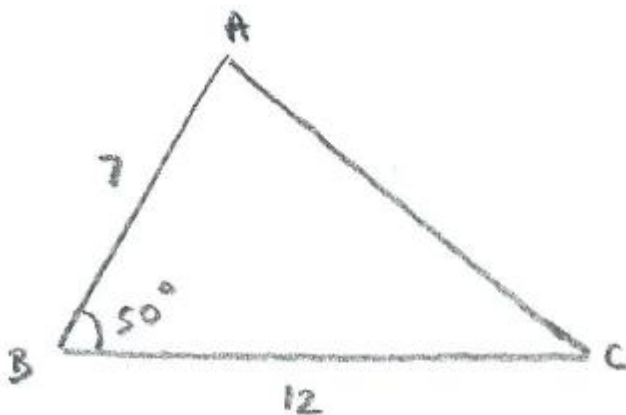
(8) Denote the sides of a triangle by a , b & c , and the angles (opposite these sides respectively) by A , B & C , as in the diagram below.



(i) What combinations of sides and angles will always enable the other sides and angles to be determined uniquely (ie any two triangles thus created will be congruent, so that a reflection in the plane of the paper is allowed)? What combination gives rise to two possibilities in some cases?

(ii) When finding missing lengths and angles, what ambiguous situation can arise (apart from the 2 solutions in IV), and how can it be avoided?

(9) For the triangle below, what is the best strategy for finding angle A ?



(10) If $\sin\theta = 0.6$, where $0 \leq \theta < 360^\circ$, find $\tan\theta$

(11) Find expressions for $\cos^2\theta$ & $\sin^2\theta$ in terms of $\cos 2\theta$

(12) Assuming that $\sin^2\theta + \cos^2\theta = 1$, but without using any compound angle results, show that $\sin\theta\cos\theta \leq \frac{1}{2}$

(13) Show that $\frac{d}{d\phi} \sin\phi = \frac{\pi}{180} \cos\phi$, when ϕ is measured in degrees.