

Trigonometry - Exercises: Part 1 (2 pages; 6/2/20)**Key to difficulty:**

* easier

** moderate

*** harder

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

(2**) 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 $\sin^6 \theta$

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

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

(5***) Show that

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

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

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

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

(8*) Show that each of (i)-(v) is true, by two methods:

(a) using the results (A)-(E) below

(b) applying translations and/or reflections to graphs

(i) $\sin(\theta + 180) = -\sin\theta$

(ii) $\cos(180 - \theta) = \cos(180 + \theta)$

(iii) $\cos(90 - \theta) = -\cos(90 + \theta)$

(iv) $\sin(\theta - 180) = \cos(\theta + 90)$

(v) $\sin(\theta + 90) = \cos\theta$

(A) $\sin(-\theta) = -\sin\theta$

(B) $\sin(360 + \theta) = \sin\theta$

(C) $\sin(180 - \theta) = \sin\theta$

(D) $\sin\theta = \cos(90 - \theta)$

(E) $\cos(-\theta) = \cos\theta$