
CORE MATHEMATICS 2**CHAPTER 6 – RADIAN MEASURE AND ITS APPLICATIONS****EXTRA PRACTICE**

1. Express in terms of $\sin \theta$, $\cos \theta$ or $\tan \theta$ where θ is an acute angle.

a. $\sin(540^\circ - \theta)$

b. $\cos(-\theta)$

c. $\tan(-180^\circ + \theta)$

d. $\cos(\theta - 720^\circ)$

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2. (a) Determine, in degrees, the solutions of the equation

$$\tan x = 5$$

for which $0^\circ \leq x \leq 360^\circ$, giving your answers to the nearest tenth of a degree.

- (b) Determine, in radians, the solutions of the equation

$$3 \cos^2 y + 8 \sin y = 0$$

for which $0 \leq y \leq 2\pi$, giving your answers to 2 decimal places.

(11 marks)

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3. Solve the equation $\sin(\theta - 30^\circ) = 0.7$, giving your answers to the nearest 0.1° in the interval $0^\circ \leq \theta \leq 360^\circ$.

(3 marks)

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4. Prove that $(\cos x + \sin x)^2 + (\cos x - \sin x)^2 = 2$.

(4 marks)

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5. (i) Solve, for $0^\circ < x < 180^\circ$, the equation

$$\sin(2x + 50^\circ) = 0.6,$$

giving your answers to 1 decimal place.

(7)

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6. Determine, in degrees, the solutions of each of the equations

(a) $\sin 2x = \frac{1}{2}$,

(b) $\sin^2\left(\frac{3x}{2}\right) = \frac{1}{2}$,

for which $-180^\circ \leq x \leq 180^\circ$.

(9 marks)

7. (a) Sketch, for $0 \leq x \leq 360^\circ$, the graph of $y = \sin(x + 30^\circ)$. (2)

(b) Write down the coordinates of the points at which the graph meets the axes. (3)

(c) Solve, for $0 \leq x < 360^\circ$, the equation

$$\sin(x + 30^\circ) = -\frac{1}{2}. \quad (3)$$

8. Given that θ is a reflex angle and that $\cos \theta = -\frac{1}{2}$, find the exact values of $\sin \theta$ and $\tan \theta$. Give your answers as surds in their simplest form.

9. (a) Find the coordinates of the point where the graph of $y = 2 \sin(2x + \frac{5}{6}\pi)$ crosses the y -axis.

(b) Find the values of x , where $0 \leq x \leq 2\pi$, for which $y = \sqrt{2}$. (8 marks)

10. Prove the following identities:

a) $(3 \sin x + \cos x)^2 + (\sin x - 3 \cos x)^2 \equiv 10$

b) $\frac{1}{\sin x} - \sin x \equiv \frac{\cos x}{\tan x}$

11. Find all the values of θ in the interval $0 \leq \theta < 360^\circ$ for which

(a) $\cos(\theta - 10^\circ) = \cos 15^\circ$,

(b) $\tan 2\theta = 0.4$,

(c) $2 \sin \theta \tan \theta = 3$.

12. $f(x) = 5 \sin 3x^\circ$, $0 \leq x \leq 180$.

(a) Sketch the graph of $f(x)$, indicating the value of x at each point where the graph intersects the x -axis (3)

(b) Write down the coordinates of all the maximum and minimum points of $f(x)$. (3)

(c) Calculate the values of x for which $f(x) = 2.5$ (4)

13. (a) Given that $3 \sin x = 8 \cos x$, find the value of $\tan x$.

(b) Find, to 1 decimal place, all the solutions of

$$3 \sin x - 8 \cos x = 0$$

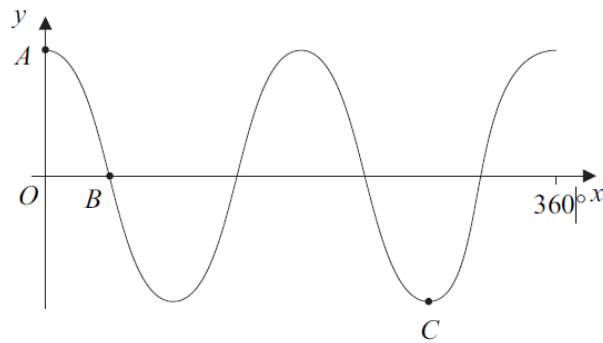
in the interval $0 \leq x < 360^\circ$.

(c) Find, to 1 decimal place, all the solutions of

$$3 \sin^2 y - 8 \cos y = 0$$

in the interval $0 \leq y < 360^\circ$.

14. The diagram shows the graph of $y = \cos 2x$ for $0^\circ \leq x \leq 360^\circ$.



(a) Write down the coordinates of the points A , B and C marked on the diagram.

(4 marks)

(b) Describe the single geometrical transformation by which the curve with equation $y = \cos 2x$ can be obtained from the curve with equation $y = \cos x$.

(2 marks)

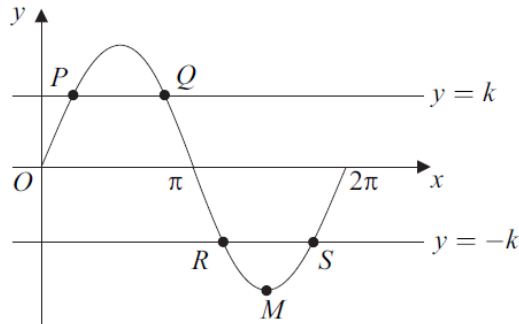
(c) Solve the equation

$$\cos 2x = 0.37$$

giving all solutions to the nearest 0.1° in the interval $0^\circ \leq x \leq 360^\circ$. (No credit will be given for simply reading values from a graph.)

(5 marks)

15. (a) Solve the equation $\sin x = 0.8$ in the interval $0 \leq x \leq 2\pi$, giving your answers in radians to three significant figures. (3 marks)
- (b) The diagram shows the graph of the curve $y = \sin x$, $0 \leq x \leq 2\pi$ and the lines $y = k$ and $y = -k$.



The line $y = k$ intersects the curve at the points P and Q , and the line $y = -k$ intersects the curve at the points R and S .

The point M is the minimum point of the curve.

- (i) Write down the coordinates of the point M . (2 marks)
- (ii) The x -coordinate of P is α .
- Write down the x -coordinate of the point Q in terms of π and α . (1 mark)
- (iii) Find the length of RS in terms of π and α , giving your answer in its simplest form. (2 marks)
- (c) Sketch the graph of $y = \sin 2x$ for $0 \leq x \leq 2\pi$, indicating the coordinates of points where the graph intersects the x -axis and the coordinates of any maximum points. (5 marks)
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