Mixed practice 10

1. If $\cos(x+180°) = a$ what is the value of $\cos x$?

2. Solve the equation $\tan x = -0.62$ for $x \in (-90°, 270°)$ giving your answers to the nearest 0.1°.

3. Solve the equation $\sqrt{2}\sin\theta + 1 = 0$ for $-360° < \theta < 360°$.

4. Find the values of x in the interval $0° < x < 720°$ for which $2\cos\left(\frac{1}{2}x + 45°\right) = \sqrt{3}$.

5. Solve, to 3 s.f., the equation $7\sin^2\theta = 9\cos^2\theta$ for $-180° \leqslant \theta \leqslant 180°$.

6. i Show that the equation $2\sin^2 x = 5\cos x - 1$ can be expressed in the form $2\cos^2 x + 5\cos x - 3 = 0$.

   ii Hence solve the equation $2\sin^2 x = 5\cos x - 1$, giving all values of x between 0° and 360°.

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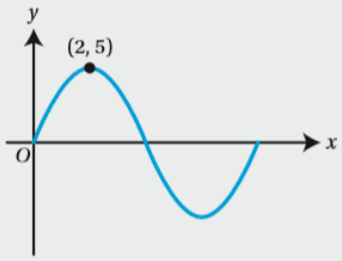
7. a Show that the equation $\cos\theta - 2\sin^2\theta + 2 = 0$ can be expressed in the form $2\cos^2\theta + \cos\theta = 0$.

   b Hence find all values of $\theta \in [0°, 360°]$ for which $\cos\theta - 2\sin^2\theta + 2 = 0$.

8. How many solutions are there to the equation $\sin^2 2x = \frac{1}{4}$ in the interval $-180° < x < 180°$?

9. The diagram shows the graph of the function $f(x) = a\sin(bx)$.
   Find the values of a and b.



10. Solve the equation $6\sin^2 x + \cos x = 4$ for $0° \leqslant x \leqslant 360°$.

    Give your answers to 3 s.f.

11. Prove the identity $\frac{2}{\cos^2 x} - \tan^2 x = 2 + \tan^2 x$.

12. i Show that the equation $2\sin x = \frac{4\cos x - 1}{\tan x}$ can be expressed in the form $6\cos^2 x - \cos x - 2 = 0$.

    ii Hence solve the equation $2\sin x = \frac{4\cos x - 1}{\tan x}$, giving all values of x between 0° and 360°.

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13. Prove the identity $\frac{1}{1+\cos x} + \frac{1}{1-\cos x} = \frac{2}{\sin^2 x}$.

14. i Show that $\frac{\sin^2 x - \cos^2 x}{1 - \sin^2 x} \equiv \tan^2 x - 1$.

    ii Hence solve the equation $\frac{\sin^2 x - \cos^2 x}{1 - \sin^2 x} = 5 - \tan x$, for $0° \leqslant x \leqslant 360°$.

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15. Show that $\tan x + \frac{1}{\tan x} = \frac{\tan x}{\sin^2 x}$.

16. Find all values of x in the interval $-90° < x < 90°$ that satisfy $6\cos^2 2x = \sin 2x + 4$.

17. a Find the values of k for which the equation $4x^2 - kx + 1 = 0$ has a repeated root.

    b Show that the equation $4\sin^2\theta = 5 - k\cos\theta$ can be written as $4\cos^2\theta - k\cos\theta + 1 = 0$.

    c Let $f_k(\theta) = 4\cos^2\theta - k\cos\theta + 1$.

    i State the number of values of $\cos\theta$ that satisfy the equation $f_4(\theta) = 0$.

    ii Find all the values of $\theta \in [-360°, 360°]$ that satisfy the equation $f_4(\theta) = 0$.

    iii Find the value of k for which $x = 1$ is a solution of the equation $4x^2 - kx + 1 = 0$.

    iv For this value of k, find the number of solutions of the equation $f_k(\theta) = 0$ for interval $\theta \in [-360°, 360°]$.

Mixed practice 10

1 $-a$

2 $x = -31.8°, 148.2°$

3 $\theta = -135°, -45°, 225°, 315°$

4 $x = 570°, 690°$

5 $\theta = \pm 48.6°$

6 **a** Proof **b** $60°, 360°$

7 **a** Proof
b $\theta = 90°, 120°, 240°, 270°$

8 Eight

9 $a = 5, b = 45°$

10 $x = 48.2°, 120°, 240°, 312°$

11 Proof

12 **a** Proof
b $x = 48.2°, 120°, 240°, 312°$

13 Proof

14 **a** Proof

b $x = 45°, 99.5°, 225°, 279°$

15 Proof

16 $x = -69.1°, -20.9°, 15°, 75°$

17 **a** $k = \pm 4$
b Proof
c **i** One **ii** $\theta = \pm 60°, \pm 300°$
iii $k = 5$ **iv** Seven