Solving Trigonometric Equations

Specification: AQA 7357: E6, E7 · Edexcel 9MA0: 5.6, 5.7

INDEPENDENT

You do

A · Multiple angles

Exact answers where possible.

1 Solve for $0° \le x < 360°$:

(a) $\sin 2x = \frac{\sqrt{3}}{2}$

(b) $\cos 3x = 0$

(c) $\tan 2x = 1$

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

2 Solve for $0 \le x < 2\pi$. Give exact answers.

(a) $\cos 2x = -\frac{1}{2}$

(b) $\sin 3x = 1$

B · Double-angle equations

Solve for 0° ≤ x < 360° unless stated. Give non-exact answers to 1 decimal place.

3 (a) $\cos 2x = \cos x$

(b) $\cos 2x + \sin x = 0$

4 $3\cos 2x + \cos x + 2 = 0$

5 (a) $\sin 2x = \sin x$, $0° \le x \le 360°$

(b) $2\sin 2x = 3\cos x$

C · Reasoning

6 Show that $\cos 2x + 3\cos x + 3 = 0$ has no real solutions.

7 How many solutions does $\sin 4x = 0.3$ have for $0° \le x < 360°$? Explain without solving.

8 A student solves $\tan 2x = 3\tan x$ by dividing both sides by $\tan x$. Which solutions in $0° \le x < 360°$ are lost?

D · Addition formulae

Solve for 0° ≤ x < 360°. Give answers to 1 decimal place where needed.

9 $\sin(x + 30°) = \cos x$

10 $2\cos(x + 60°) = \sin x$

11 $\tan 2x = 4\tan x$

E · Exam-style question

AQA-style. Use the mark scheme to self-assess.

12 (a) Show that the equation $3\cos 2x + 5\sin x = 4$ can be written as $6\sin^2 x - 5\sin x + 1 = 0$. [2 marks]

(b) Hence solve $3\cos 2x + 5\sin x = 4$ for $0° \le x < 360°$, giving your answers to 1 decimal place. [4 marks]