Simple Trigonometric Equations

Specification: AQA 7357: E7 · Edexcel 9MA0: 5.7

INDEPENDENT

You do

A · Principal values and when solutions exist

No calculator.

1 Write down the principal value of
(a) $\sin^{-1}(\frac{1}{2})$
(b) $\cos^{-1}(-\frac{1}{2})$
(c) $\tan^{-1}(-1)$
(d) $\sin^{-1}(-\frac{\sqrt{3}}{2})$

2 Which of these equations have solutions? Explain.
(a) $\sin\theta = 0.95$
(b) $\cos\theta = -1.2$
(c) $\tan\theta = 40$
(d) $3\sin\theta = 4$
(e) $2\cos\theta + 3 = 0$

B · Solving in 0° ≤ θ ≤ 360°

Calculator, except question 6.

3 Solve each equation for $0° \le \theta \le 360°$. Give angles to 1 d.p. unless exact.
(a) $\sin\theta = 0.7$
(b) $\cos\theta = 0.25$

4 Solve each equation for $0° \le \theta \le 360°$. Give angles to 1 d.p. unless exact.
(a) $\tan\theta = 1.8$
(b) $\sin\theta = -0.35$

5 Solve each equation for $0° \le \theta \le 360°$. Give angles to 1 d.p. unless exact.
(a) $\cos\theta = -0.9$
(b) $\tan\theta = -0.6$

6 Without a calculator, solve each equation for $0° \le \theta \le 360°$. Give exact angles.
(a) $\cos\theta = -\frac{\sqrt{3}}{2}$
(b) $\tan\theta = \sqrt{3}$

7 Solve each equation for $0° \le \theta \le 360°$. Give angles to 1 d.p. unless exact.
(a) $4\sin\theta + 1 = 0$
(b) $5\cos\theta = 2$

C · Other intervals and reasoning

Calculator for 8 and 9. No calculator for 10 and 11.

8 Solve $\sin\theta = 0.45$ for $-180° \le \theta \le 180°$. Give angles to 1 d.p. unless exact.

9 Solve $\cos\theta = 0.3$ for $0° \le \theta \le 720°$. Give angles to 1 d.p. unless exact.

10 Without a calculator, solve $\tan\theta = -1$ for $-360° \le \theta < 0°$. Give exact angles.

11 How many solutions does each equation have in $0° \le \theta \le 360°$? No calculator: explain with the graph.
(a) $\sin\theta = \frac{1}{2}$
(b) $\sin\theta = 1$
(c) $\sin\theta = 0$

D · a sin θ = b cos θ

Show that cos θ ≠ 0 before you divide. Calculator for 12 and 13; no calculator for 14.

12 Solve $4\sin\theta = 3\cos\theta$ for $0° \le \theta \le 360°$. Give angles to 1 d.p. unless exact.

13 Solve $\sin\theta + 2\cos\theta = 0$ for $-180° \le \theta \le 180°$. Give angles to 1 d.p. unless exact.

14 Without a calculator, solve $\sqrt{2}\sin\theta = \sqrt{6}\cos\theta$ for $0° \le \theta \le 360°$. Give exact angles.

E · Exam-style question

Calculator. 6 marks.

15 *Exam-style.*
(a) Show that $3\sin x = 2\cos x$ can be written as $\tan x = \frac{2}{3}$, explaining why you may divide by $\cos x$. [2 marks]
(b) Hence solve $3\sin x = 2\cos x$ for $0° \le x \le 360°$, giving your answers to 1 d.p. [3 marks]
(c) How many solutions does $3\sin x = 2\cos x$ have for $0° \le x \le 1080°$? [1 mark]