EXCEL IN MATHSCI
HIGHER MATHEMATICS • TOPIC RESOURCE

2026–27
Portfolio 6

Trigonometric Equations

PUPIL WORKSHEET

Skills covered: Sine, cosine and tangent equations; degrees and radians; multiple angles; double-angle formulae; equations reducible to tangent; harmonic form.

Instructions: Attempt all questions. Show sufficient working to justify your answers. Give exact values unless a degree of accuracy is stated. Each section is separate for targeted revision.

Prerequisite core skills revise earlier learning; *topic practice* develops individual techniques; *exam-style and challenge* combines skills.

Pupil: _____ **Date:** _____

SECTION A | Prerequisite core skills

Question 1

[3 marks]

Solve $2\sin x^\circ = \sqrt{3}$ for $0 \leq x < 360$.

Question 2

[3 marks]

Solve $\cos 2x^\circ = 0$ for $0 \leq x < 180$.

Question 3

[3 marks]

Solve $\tan(x + 20)^\circ = 1$ for $0 \leq x < 360$.

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Question 4

[2 marks]

Solve $\sin x^\circ = -\frac{1}{2}$ for $0 \leq x < 360$.

Question 5

[2 marks]

Solve $\cos x = \frac{1}{2}$ for $0 \leq x < 2\pi$.

Question 6

[2 marks]

Solve $\tan x = \sqrt{3}$ for $0 \leq x < \pi$.

SECTION B | Topic practice

Question 7

[4 marks]

Solve $2\sin 2x^\circ = \sqrt{3}$ for $0 \leq x < 360$.

Question 8

[4 marks]

Solve $3\cos 2x^\circ = -\frac{3}{2}$ for $0 \leq x < 360$.

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Question 9

[5 marks]

Solve $\sin 2x^\circ = \sin x^\circ$ for $0 \leq x < 360$.

Question 10

[4 marks]

Solve $2\cos^2 x^\circ - 3\cos x^\circ + 1 = 0$ for $0 \leq x < 360$.

Question 11

[5 marks]

Solve $\cos 2x^\circ = \sin x^\circ$ for $0 \leq x < 360$.

Question 12

[4 marks]

Solve $3\sin x^\circ = 4\cos x^\circ$ for $0 \leq x < 360$. Give answers to one decimal place.

Question 13

[4 marks]

Solve $\sin\left(x + \frac{\pi}{6}\right) = \frac{\sqrt{3}}{2}$ for $0 \leq x < 2\pi$.

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Question 14

[6 marks]

Express $3\sin x^\circ + 4\cos x^\circ$ in the form $R\sin(x+\alpha)^\circ$, with $R > 0$ and $0 < \alpha < 90$. Hence solve $3\sin x^\circ + 4\cos x^\circ = 0$ for $0 \leq x < 360$.

SECTION C | Exam-style and challenge

Question 15

[4 marks]

Solve $2\sin^2 x^\circ + \sin x^\circ - 1 = 0$ for $0 \leq x < 360$.

Question 16

[5 marks]

Solve $2\cos 2x^\circ + 3\cos x^\circ = 0$ for $0 \leq x < 360$. Give answers to one decimal place.

Question 17

[4 marks]

Solve $\sin 2x^\circ = 2\cos x^\circ$ for $0 \leq x < 360$.

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Question 18 [6 marks]

Express $4\sin x^\circ + 3\cos x^\circ$ in the form $R\sin(x+\alpha)^\circ$. Hence solve $4\sin x^\circ + 3\cos x^\circ = 2$, for $0 \leq x < 360$. Give answers to one decimal place.

— End of pupil worksheet —

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