Double-Angle Formulae

Specification: AQA 7357: E6, E5 · Edexcel 9MA0: 5.6, 5.5

INDEPENDENT

You do

A · Single trig ratios No calculator.

1 Write each as a single trig ratio:
(a) $2\sin 40^\circ \cos 40^\circ$
(b) $\cos^2 70^\circ - \sin^2 70^\circ$
(c) $1 - 2\sin^2 35^\circ$
(d) $\dfrac{2\tan 10^\circ}{1 - \tan^2 10^\circ}$
(e) $4\sin 3\theta \cos 3\theta$
(f) $\cos^2 \dfrac{\theta}{2} - \sin^2 \dfrac{\theta}{2}$

2 Find the exact value of:
(a) $2\sin 15^\circ \cos 15^\circ$
(b) $1 - 2\sin^2 \dfrac{\pi}{12}$
(c) $\cos^2 22.5^\circ - \sin^2 22.5^\circ$
(d) $\dfrac{2\tan \dfrac{\pi}{12}}{1 - \tan^2 \dfrac{\pi}{12}}$

B · Given one ratio Exact answers.

3 $\sin A = \dfrac{3}{5}$, A acute. Find $\sin 2A$, $\cos 2A$ and $\tan 2A$.

4 $\cos B = -\dfrac{2}{3}$, B obtuse. Find $\sin 2B$ and $\cos 2B$.

5 $\tan C = 2$, C acute. Find $\tan 2C$ and $\cos 2C$.

6 Given that $\cos 2x = \dfrac{7}{25}$, find the possible values of $\sin x$.

C · Reasoning

7 Show that $(\sin x + \cos x)^2 \equiv 1 + \sin 2x$.

8 Given that $\cos 2A = \dfrac{1}{9}$ and A is acute, find the exact value of $\cos A$.

9 Explain why the graph of $y = \cos 2x$ crosses the x-axis at $x = 45^\circ$, but $y = 2\cos x$ does not.

D · Algebra

10 Eliminate θ: $x = 3\cos\theta, y = 2\cos 2\theta$.

11 Eliminate θ: $x = \tan\theta, y = \tan 2\theta$.

12 Given that $p = 2\sin\theta$ and $q = 3\cos 2\theta$, express q in terms of p.

13 Write $\cos^4 x - \sin^4 x$ as a single trig ratio.

E · Exam-style question AQA-style. Use the mark scheme to self-assess.

14 θ is obtuse and $\cos\theta = -\dfrac{1}{4}$.
(a) Find the exact value of $\sin 2\theta$. [3 marks]
(b) Show that $\tan 2\theta = \dfrac{\sqrt{15}}{7}$. [3 marks]
(c) Find the exact value of $\cos 4\theta$. [2 marks]