Graphs of sin, cos and tan

Specification: AQA 7357: E1, E3 · Edexcel 9MA0: 5.1, 5.3

INDEPENDENT **You do**

A · Key features

1 Sketch the graph of $y = \cos\theta$ for $0° \le \theta \le 540°$. Show where it meets the axes.

2 Sketch the graph of $y = \tan\theta$ for $0° \le \theta \le 360°$. Show the asymptotes.

3 Write down the coordinates of every maximum point and every minimum point of $y = \sin\theta$ for $-360° \le \theta \le 360°$.

4 For $-360° \le \theta \le 360°$, write down all the values of θ where
(a) $\cos\theta = 0$
(b) $\tan\theta = 0$
(c) $\tan\theta$ is undefined.

B · Exact values from the symmetry

No calculator for this section.

5 Given that $\sin 60° = \frac{\sqrt{3}}{2}$, find the exact values of
(a) $\sin 120°$
(b) $\sin 240°$
(c) $\sin(-60°)$
(d) $\sin 420°$

6 Given that $\cos 45° = \frac{\sqrt{2}}{2}$, find the exact values of
(a) $\cos 315°$
(b) $\cos(-45°)$
(c) $\cos 135°$
(d) $\cos 225°$

7 Given that $\tan 30° = \frac{1}{\sqrt{3}}$, find the exact values of
(a) $\tan 210°$
(b) $\tan(-30°)$
(c) $\tan 150°$
(d) $\tan 330°$

C · Other angles from the graph

8 Find all the values of θ in the interval $0° \le \theta \le 720°$ for which $\sin\theta = \sin 35°$.

9 Find all the values of θ in the interval $-360° \le \theta \le 360°$ for which $\cos\theta = \cos 70°$.

10 Find all the values of θ in the interval $-180° \le \theta \le 540°$ for which $\tan\theta = \tan 65°$.

11 Find all the values of θ in the interval $-180° \le \theta \le 180°$ for which $\sin\theta = -\sin 50°$.

12 Find all the values of θ in the interval $0° \le \theta \le 360°$ for which $\cos\theta = -\cos 20°$.

D · Reasoning

13 On the unit circle, P is at angle θ and Q is at angle $180° - \theta$.
(a) Explain why Q is the reflection of P in the y-axis.
(b) Hence show that $\sin(180° - \theta) = \sin\theta$ and $\cos(180° - \theta) = -\cos\theta$.

14 How many solutions does each equation have in the interval $0° \le \theta \le 1080°$? Explain using the graph.
(a) $\sin\theta = 0.3$
(b) $\sin\theta = 1$
(c) $\sin\theta = 1.2$

15 Without a calculator, put $\sin 100°$, $\cos 100°$ and $\tan 100°$ in order of size, smallest first. Explain using the unit circle.

E · Exam-style question

Use the mark scheme to self-assess.

16 (a) Sketch the graph of $y = \cos x$ for $-180° \le x \le 360°$. Show the coordinates of the points where the graph meets the axes. [3 marks]
(b) Hence find all the values of x in the interval $-180° \le x \le 360°$ for which $\cos x = -\cos 75°$. [3 marks]