Angles in All Four Quadrants and Exact Values

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

INDEPENDENT **You do**

A · Quadrants, signs and the axes No calculator.

1 State the quadrant of each angle θ and the signs of $\sin\theta$, $\cos\theta$ and $\tan\theta$.
(a) $250°$
(b) $-30°$
(c) $400°$
(d) $-250°$

2 Positive or negative?
(a) $\sin 200°$
(b) $\cos 300°$
(c) $\tan 100°$
(d) $\cos(-120°)$

3 Write down the values of
(a) $\sin 450°$
(b) $\cos(-270°)$
(c) $\tan 540°$
(d) $\cos 900°$

4 Write each one as a trigonometric ratio of an acute angle.
(a) $\sin 320°$
(b) $\cos 200°$
(c) $\tan 160°$
(d) $\sin(-240°)$

B · Exact values No calculator.

5 Find the exact values of
(a) $\sin 120°$
(b) $\cos 315°$
(c) $\tan 240°$
(d) $\sin 330°$

6 Find the exact values of
(a) $\cos 210°$
(b) $\tan(-135°)$
(c) $\sin 390°$
(d) $\cos 480°$

7 Find the exact values of
(a) $\tan 300°$
(b) $\sin 225°$
(c) $\cos(-330°)$
(d) $\tan 210°$

8 Find the exact value of
(a) $\sin 150° + \cos 240°$
(b) $\tan 120° \times \tan 210°$
(c) $2\cos 315°$
(d) $\sin 60° \div \cos 60°$

C · Reasoning No calculator for this section.

9 An angle θ has $\sin\theta < 0$ and $\tan\theta > 0$.
(a) Which quadrant is θ in?
(b) Give one possible value of θ between 0° and 360°.

10 (a) List the four angles between 0° and 360° whose related acute angle is 40°.
(b) For which of them is $\cos\theta = -\cos 40°$?

11 P is on the unit circle at angle θ and Q is at angle $180° + \theta$.
(a) Explain why Q is the image of P under a half-turn about O.
(b) Hence show that $\sin(180° + \theta) = -\sin\theta$ and $\tan(180° + \theta) = \tan\theta$.

12 (a) Use the triangle with angles 30°, 60° and 90° to explain why $\sin 30° = \cos 60°$.
(b) Write $\cos 20°$ as the sine of an acute angle.

D · Exact multi-step No calculator.

13 Show that $\sin 60°\cos 30° - \cos 60°\sin 30° = \sin 30°$.

14 In triangle ABC, $AB = 4$ cm, $BC = 6$ cm and angle $ABC = 150°$.
(a) Find the exact area of the triangle.
(b) Find the exact value of AC^2.

15 Find the exact value of $\tan 30° + \tan 60°$. Write it as a single fraction with a rational denominator.

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

16 (a) Show that $\cos 150° = -\dfrac{\sqrt{3}}{2}$. [2 marks]
(b) Triangle PQR has $PQ = 2\sqrt{3}$ cm, $PR = 4$ cm, angle $QPR = 150°$. Find the exact length QR. [3 marks]
(c) Find its exact area. [2 marks]