Using the Addition Formulae

Specification: AQA 7357: E3, E6 · Edexcel 9MA0: 5.3, 5.6

INDEPENDENT

You do

A · Exact values No calculator.

1 Find the exact value of:
(a) $\cos 75°$
(b) $\cos 105°$
(c) $\sin 165°$
(d) $\tan 75°$

2 Find the exact value of:
(a) $\cos \frac{\pi}{12}$
(b) $\sin \frac{5\pi}{12}$
(c) $\cos \frac{7\pi}{12}$
(d) $\tan \frac{\pi}{12}$

3 Find the exact values:
(a) $\sin A = \frac{5}{13}$, A acute. Find $\cos A$ and $\tan A$.
(b) $\cos B = -\frac{3}{5}$, B obtuse. Find $\sin B$ and $\tan B$.
(c) $\tan C = \frac{7}{24}$, $180° < C < 270°$. Find $\sin C$ and $\cos C$.

B · Substituting Exact answers. No calculator.

4 $\sin A = \frac{3}{5}$ and $\cos B = \frac{5}{13}$, where A and B are acute.
Find:
(a) $\sin(A + B)$
(b) $\cos(A + B)$
(c) $\tan(A - B)$

5 $\sin A = -\frac{4}{5}$ with $180° < A < 270°$, and $\cos B = -\frac{7}{25}$ with B obtuse. Find:
(a) $\sin(A - B)$
(b) $\cos(A + B)$

6 $\tan A = \frac{1}{2}$ and $\tan B = \frac{1}{3}$, where A and B are acute.
Show that $A + B = 45°$.

C · Reasoning No calculator.

7 $\tan A = 2$ and $\tan B = 3$, where A and B are acute. Find $A + B$. Explain why it is not $45°$.

8 Show that $\sec 15° = \sqrt{6} - \sqrt{2}$.

9 Show that $\cos 75° + \cos 15° = \frac{\sqrt{6}}{2}$.

D · Algebra

10 Given that $\sin(x + y) = 3\cos(x + y)$, express $\tan x$ in terms of $\tan y$.

11 Given that $2\sin(x - y) = \cos(x + y)$, express $\tan x$ in terms of $\tan y$.

12 Given that $\tan(x + 45°) = 3$, find the exact value of $\tan x$.

13 Given that $\tan(x - 60°) = 2$, show that $\tan x = -\frac{8 + 5\sqrt{3}}{11}$.

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

14 (a) Use an appropriate addition formula to show that $\cos 15° = \frac{\sqrt{6} + \sqrt{2}}{4}$. [3 marks]

(b) Hence find the exact value of $\sec^2 15°$, giving your answer in the form $a + b\sqrt{3}$, where a and b are integers. [3 marks]