Exercise 14B

(For questions 1 and 2 you may want to refer to the table on page 47.)

1 Simplify each of the following, giving each of your answers as a fraction of integers or surds.

a) $\sin 135°$ **b)** $\cos 330°$ **c)** $\tan 210°$ **d)** $\sin 300°$

e) $\sec 150°$ **f)** $\cot 120°$ **g)** $\sin 270°$ **h)** $\tan 240°$

i) $\operatorname{cosec} 225°$ **j)** $\cos 390°$ **k)** $\sec 765°$ **l)** $\sin(-30°)$

2 Solve each of the following equations for $0° \leqslant \theta \leqslant 360°$.

a) $\sin\theta = \dfrac{\sqrt{3}}{2}$ **b)** $4\cos^2\theta = 1$ **c)** $\tan\theta = -1$

d) $\sin\theta = -\frac{1}{2}$ **e)** $\tan^2\theta = 3$ **f)** $\cos\theta = -\dfrac{\sqrt{3}}{2}$

g) $\cot 3\theta = 1$ **h)** $\tan 2\theta = \sqrt{3}$ **i)** $\cos 4\theta = -\frac{1}{2}$

j) $\tan(\theta + 48°) = \sqrt{3}$ **k)** $\sin(2\theta - 14°) = 1$ **l)** $\sec(3\theta + 12°) = -\dfrac{2}{\sqrt{3}}$

3 Given that θ is acute and that $\sin\theta = \frac{2}{3}$, express each of the following in surd form.

a) $\cos\theta$ **b)** $\tan\theta$ **c)** $\cot\theta$

4 Given that θ is acute and that $\cos\theta = \frac{1}{4}$, express each of the following in surd form.

a) $\sin\theta$ **b)** $\tan\theta$ **c)** $\operatorname{cosec}\theta$

5 Given that θ is acute and that $\tan\theta = 3$, express each of the following in surd form.

a) $\sin\theta$ **b)** $\sec\theta$ **c)** $\operatorname{cosec}\theta$

6 Given that θ is acute and that $\sec\theta = \frac{5}{3}$, express each of the following in surd form.

a) $\sin\theta$ **b)** $\tan\theta$ **c)** $\cot\theta$

***12** Given that

$$1 + 4\sin\theta(3\sin\theta - 4) = \operatorname{cosec}\theta(\operatorname{cosec}\theta - 4)$$

calculate the four possible values of $\sin\theta$.

***13** Given that

$$\cos\theta = \frac{20\sin^4\theta - 24\sin^2\theta + 6}{10\sin^3\theta - 7\sin\theta}$$

calculate the possible values of $\tan\theta$.

Exercise 14B

1 a) $\frac{1}{\sqrt{2}}$ **b)** $\frac{\sqrt{3}}{2}$ **c)** $\frac{1}{\sqrt{3}}$ **d)** $-\frac{\sqrt{3}}{2}$ **e)** $-\frac{2\sqrt{3}}{3}$ **f)** $-\frac{1}{\sqrt{3}}$ **g)** -1 **h)** $\sqrt{3}$ **i)** $-\sqrt{2}$ **j)** $\frac{\sqrt{3}}{2}$ **k)** $\sqrt{2}$ **l)** $-\frac{1}{2}$

2 a) 60°, 120° **b)** 60°, 300°, 120°, 240° **c)** 135°, 315° **d)** 210°, 330° **e)** 60°, 240°, 120°, 300° **f)** 150°, 210°

2 g) 15°, 75°, 135°, 195°, 255°, 315° **h)** 30°, 120°, 210°, 300° **i)** 30°, 60°, 120°, 150°, 210°, 240°, 300°, 330° **j)** 12°, 192°

2 k) 52°, 232° **l)** 46°, 66°, 166°, 186°, 286°, 306° **3 a)** $\frac{\sqrt{5}}{3}$ **b)** $\frac{2}{\sqrt{5}}$ **c)** $\frac{\sqrt{5}}{2}$ **4 a)** $\frac{\sqrt{15}}{4}$ **b)** $\sqrt{15}$ **c)** $\frac{4}{\sqrt{15}}$ **5 a)** $\frac{3}{\sqrt{10}}$

5 b) $\sqrt{10}$ **c)** $\frac{\sqrt{10}}{3}$ **6 a)** $\frac{4}{5}$ **b)** $\frac{4}{3}$ **c)** $\frac{3}{4}$ **7 a)** 71.6°, 251.6° **b)** 59.0°, 239.0° **c)** 135°, 315° **d)** 33.7°, 213.7° **e)** 63.4°, 243.4°

7 f) 149.0°, 329.0° **g)** 0°, 180°, 360°, 78.7°, 258.7° **h)** 90°, 270°, 23.2°, 203.2° **i)** 26.6°, 206.6°, 153.4°, 333.4°

7 j) 18.4°, 198.4°, 161.6°, 341.6° **k)** 51.3°, 231.3°, 128.7°, 308.7° **l)** 63.4°, 243.4° **8 a)** 90°, 30°, 150° **b)** ±70.5°

8 c) ±41.4°, ±60° **d)** 41.8°, 138.2° **e)** 53.1°, 126.9° **f)** ±90°, ±120° **g)** ±90°, 30°, 150° **h)** ±90°, −138.2°, −41.8°, 23.6°, 156.4°

9 a) 71.6°, 251.6°, 116.6°, 296.6° **b)** 63.4°, 243.4°, 166.0°, 346.0° **c)** 48.5°, 98.6°, 228.5°, 278.6° **d)** 63.4°, 243.4°, 143.1°, 323.1°

9 e) 48.6°, 131.4° **f)** 70.5°, 289.5° **g)** 14.0°, 194.0°, 104.0°, 284.0° **h)** 0°, 180°, 360°, 26.6°, 206.6° **i)** 0°, 360°, 109.5°, 250.5°

9 j) 45°, 225°, 153.4°, 333.4° **10 a)** −160.5°, −19.5°, −90°, 30°, 150° **b)** 0°, ±60°, ±120°

10 c) −116.6°, 63.4°, −45°, 135°, −108.4°, 71.6° **d)** 0°, ±75.5°, ±109.5° **e)** 19.5°, 160.5°, 90°

10 f) −108.4°, 71.6°, −63.4°, 116.6°, −26.6°, 153.4° **11 a)** 14.3°, 50.3°, 86.3°, 122.3°, 158.3° **b)** 7.3°, 82.8°, 99.8°, 170.3°

11 c) 4.6°, 49.6°, 94.6°, 139.6°, 27.1°, 72.1°, 117.1°, 162.1° **d)** 16.2°, 43.8°, 136.2°, 163.8°, 30°, 90°, 150° **e)** 30°, 150°, 39.2°, 140.8°

11 f) 4.9°, 40.1°, 22.5°, 112.5°, 94.9°, 130.1° **12** $-\frac{1}{2}, \frac{1}{3}, \frac{1}{2}, 1$ **13** $-2, -\frac{1}{2}, 1, 3$