

MA 12

1. State the exact value of each ratio.

- a) $\sin \frac{\pi}{2}$ b) $\csc \frac{\pi}{3}$ c) $\cos \frac{\pi}{6}$ d) $\tan 0$ e) $\sec \frac{\pi}{3}$ f) $\cot \frac{\pi}{4}$
 g) $\csc \frac{\pi}{4}$ h) $\cos \frac{\pi}{4}$ i) $\tan \frac{\pi}{3}$ j) $\sin \frac{\pi}{3}$ k) $\cot \frac{\pi}{2}$ l) $\sec 0$

2. State the exact value of each ratio, where possible.

- a) $\sec \frac{3\pi}{4}$ b) $\sin \frac{5\pi}{6}$ c) $\tan \pi$ d) $\cos \frac{7\pi}{3}$ e) $\cot \frac{5\pi}{4}$ f) $\csc 2\pi$
 g) $\cos \frac{9\pi}{4}$ h) $\sec \frac{10\pi}{3}$ i) $\csc \frac{8\pi}{3}$ j) $\sin \frac{3\pi}{2}$ k) $\tan \frac{11\pi}{6}$ l) $\cot \frac{7\pi}{3}$

3. Evaluate.

- a) $\tan^2 \frac{\pi}{3}$ b) $\csc^2 \frac{5\pi}{6}$ c) $\cos^2 \frac{2\pi}{3}$ d) $\sec^2 \frac{11\pi}{6}$ e) $\sin^3 \frac{7\pi}{4}$ f) $\cot^2 \frac{4\pi}{3}$

B

4. Find each value of θ for $0 < \theta < 2\pi$.

- a) $\sin \theta = -\frac{1}{2}$ b) $\cos \theta = \frac{1}{\sqrt{2}}$ c) $\tan \theta = -\sqrt{3}$ d) $\csc \theta = 2$
 e) $\sec \theta = \sqrt{2}$ f) $\tan \theta = -1$ g) $\sin \theta = \frac{1}{\sqrt{2}}$ h) $\cot \theta = \sqrt{3}$
 i) $\cos \theta = \frac{1}{2}$ j) $\csc \theta = -1$ k) $\sec \theta = -2$ l) $\cot \theta = -\frac{1}{\sqrt{3}}$

5. Find the values of each angle θ if $0 < \theta < 2\pi$.

- a) $\sin^2 \theta = \frac{1}{2}$ b) $\tan^2 \theta = 3$ c) $\sec^2 \theta = 2$ d) $\cot^2 \theta = \frac{1}{3}$
 e) $\csc^2 \theta = \frac{4}{3}$ f) $\sec^3 \theta = -8$ g) $\sin^3 \theta = -\frac{1}{8}$ h) $\tan^2 \theta = 1$

6. State the values of the other five trigonometric ratios for each angle θ .

- a) $\sin \theta = -\frac{\sqrt{3}}{2}$ b) $\tan \theta = \sqrt{3}$ c) $\sec \theta = -\frac{2}{\sqrt{3}}$

Solve by Factoring.

- 1) a) $x^2 - 4x + 3 = 0$ b) $y^2 + 8y + 15 = 0$ c) $m^2 - m - 56 = 0$
 d) $2a^2 + a - 15 = 0$ e) $x^2 - 64 = 0$ f) $9m^2 - 12m + 4 = 0$

- 2) a) $5x^2 - x - 18 = 0$ b) $6z^2 - 5z - 4 = 0$
 c) $3y^2 + 15y - 18 = 0$ d) $6x^2 + 17x - 14 = 0$
 e) $2t^2 - 24t + 72 = 0$ f) $25m^2 - 36 = 0$

3) Find the roots to 2 decimal places

- a) $2b^2 - 13b + 10 = 0$ b) $2z^2 - 7z + 4 = 0$
 c) $3x^2 - x - 5 = 0$ d) $2a^2 - 9a - 1 = 0$
 e) $5t^2 - 3t - 1 = 0$ f) $2y^2 + 5y + 1 = 0$

Handwritten solutions for quadratic equations:

1) a) $x^2 - 4x + 3 = 0 \rightarrow (x-1)(x-3) = 0 \rightarrow x=1, 3$
 b) $y^2 + 8y + 15 = 0 \rightarrow (y+3)(y+5) = 0 \rightarrow y=-3, -5$
 c) $m^2 - m - 56 = 0 \rightarrow (m-8)(m+7) = 0 \rightarrow m=8, -7$
 d) $2a^2 + a - 15 = 0 \rightarrow (2a+5)(a-3) = 0 \rightarrow a=-2.5, 3$
 e) $x^2 - 64 = 0 \rightarrow (x-8)(x+8) = 0 \rightarrow x=8, -8$
 f) $9m^2 - 12m + 4 = 0 \rightarrow (3m-2)^2 = 0 \rightarrow m=2/3$

2) a) $5x^2 - x - 18 = 0 \rightarrow (5x+9)(x-2) = 0 \rightarrow x=-1.8, 2$
 b) $6z^2 - 5z - 4 = 0 \rightarrow (2z+1)(3z-4) = 0 \rightarrow z=-0.5, 1.33$
 c) $3y^2 + 15y - 18 = 0 \rightarrow (y+6)(y-1) = 0 \rightarrow y=-6, 1$
 d) $6x^2 + 17x - 14 = 0 \rightarrow (2x+7)(3x-2) = 0 \rightarrow x=-3.5, 0.67$
 e) $2t^2 - 24t + 72 = 0 \rightarrow (t-6)(t-6) = 0 \rightarrow t=6$
 f) $25m^2 - 36 = 0 \rightarrow (5m-6)(5m+6) = 0 \rightarrow m=1.2, -1.2$

3) a) $2b^2 - 13b + 10 = 0 \rightarrow (2b-5)(b-2) = 0 \rightarrow b=2.5, 2$
 b) $2z^2 - 7z + 4 = 0 \rightarrow (2z-4)(z-1) = 0 \rightarrow z=2, 1$
 c) $3x^2 - x - 5 = 0 \rightarrow x = \frac{1 \pm \sqrt{1+60}}{6} = \frac{1 \pm \sqrt{61}}{6} \approx 1.3, -1.3$
 d) $2a^2 - 9a - 1 = 0 \rightarrow a = \frac{9 \pm \sqrt{81+8}}{4} = \frac{9 \pm \sqrt{89}}{4} \approx 5.1, -0.1$
 e) $5t^2 - 3t - 1 = 0 \rightarrow t = \frac{3 \pm \sqrt{9+20}}{10} = \frac{3 \pm \sqrt{29}}{10} \approx 0.8, -0.2$
 f) $2y^2 + 5y + 1 = 0 \rightarrow (2y+1)(y+1) = 0 \rightarrow y=-0.5, -1$

Answers

1. a) 1 b) $\frac{2}{\sqrt{3}}$ c) $\frac{\sqrt{3}}{2}$ d) 0 e) 2 f) 1
 g) $\sqrt{2}$ h) $\frac{1}{\sqrt{2}}$ i) $\sqrt{3}$ j) $\frac{\sqrt{3}}{2}$ k) 0
 l) 1
2. a) $-\sqrt{2}$ b) $\frac{1}{2}$ c) 0 d) $\frac{1}{2}$ e) 1
 f) Undefined g) $\frac{1}{\sqrt{2}}$ h) -2 i) $\frac{2}{\sqrt{3}}$
 j) -1 k) $-\frac{1}{\sqrt{3}}$ l) $\frac{1}{\sqrt{3}}$
3. a) 3 b) 4 c) $\frac{1}{4}$ d) $\frac{4}{3}$ e) $-\frac{1}{2\sqrt{2}}$ f) $\frac{1}{3}$
4. a) $\frac{7\pi}{24}, \frac{11\pi}{24}$ b) $\frac{\pi}{4}, \frac{7\pi}{4}$ c) $\frac{2\pi}{3}, \frac{4\pi}{3}$ d) $\frac{\pi}{6}, \frac{5\pi}{6}$
 e) $\frac{\pi}{4}, \frac{7\pi}{4}$ f) $\frac{2\pi}{4}, \frac{7\pi}{4}$ g) $\frac{\pi}{3}, \frac{2\pi}{3}$ h) $\frac{\pi}{6}, \frac{7\pi}{6}$
 i) $\frac{2\pi}{3}, \frac{4\pi}{3}$ j) $\frac{2\pi}{4}, \frac{7\pi}{4}$ k) $\frac{\pi}{3}, \frac{2\pi}{3}$ l) $\frac{2\pi}{3}, \frac{4\pi}{3}$
5. a) $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$ b) $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$ c) $\frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$
 d) $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$ e) $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$ f) $\frac{2\pi}{3}, \frac{4\pi}{3}$
 g) $\frac{2\pi}{3}, \frac{4\pi}{3}$ h) $\frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$
6. a) $\csc \theta = -\frac{\sqrt{3}}{2}$, $\cos \theta = \pm \frac{1}{2}$, $\sec \theta = \pm 2$,
 $\tan \theta = \pm \sqrt{3}$, $\cot \theta = \pm \frac{1}{\sqrt{3}}$
 b) $\cot \theta = \frac{1}{\sqrt{3}}$, $\sin \theta = \pm \frac{\sqrt{3}}{2}$, $\csc \theta = \pm \frac{2}{\sqrt{3}}$
 $\cos \theta = \pm \frac{1}{2}$, $\sec \theta = \pm 2$
 c) $\cos \theta = -\frac{\sqrt{3}}{2}$, $\sin \theta = \pm \frac{1}{2}$
 $\csc \theta = \pm 2$, $\tan \theta = \pm \frac{1}{\sqrt{3}}$, $\cot \theta = \pm \sqrt{3}$