Answers

Exercise 1

1 $\sqrt{3}/2, -\sqrt{3}/2, -\sqrt{3}/2, \sqrt{3}/2$.

3 $(-180°, -90°)$; $(30°, 90°)$; $(150°, 180°)$; or $(-\pi, -\pi/2)$; $(\pi/6, \pi/2)$; $(5\pi/6, \pi)$.

4 (a) 227·7° and 312·3°; (b) 63·3° and 296·7°; (c) 110·2° and 290·2°; (d) 255·2°.

6 (a) 30, 150; (b) 135, 315.

7 48·2, 311·8, 120, 240.

8 (a) $2(\sin^2\theta \neq 1)$; (b) $\sec^2\theta (\sin\theta \neq 0)$.

9 $\pi/10, \pi/2, 9\pi/10, 13\pi/10, 17\pi/10, 7\pi/6, 11\pi/6$.

10 $2n\pi/3 + \pi/6, (4n + 1)\pi/2, (n \in \mathbb{Z})$.

11 $\pi/18, 5\pi/18, 13\pi/18, 17\pi/18, 25\pi/18, 29\pi/18$.

14 $n\pi + \pi/4 \pm \beta$.

15 $\pi/4$.

16 336·3°; 143·7°.

17 $n\pi \pm \pi/6, n \in \mathbb{Z}$.

18 $2n\pi \pm \pi/6, n \in \mathbb{Z}$.

Exercise 2

1 (a) 416/425; (b) 87/425; (c) 416/87; (d) −304/425; (e) −297/425; (f) 304/297.

4 (a) $(1 + \sqrt{3})/2\sqrt{2}$; (b) $(\sqrt{3} - 1)/2\sqrt{2}$; (c) $(1 - \sqrt{3})/(1 + \sqrt{3})$.

9 (a) $x = 2y^2 - 1$; (b) $(1 - y^2)x = 2y$.

11 $(-1/8), (-31/32)$.

13 0·6, 0·8.

14 −16/63.

15 $-\frac{1}{4}\pi < \theta < \frac{1}{4}\pi$.

16 $\frac{1}{4}\pi - \frac{1}{2}\alpha$.

18 3 or 1/3.

19 23·2°, 203·2°, 135°, 315°

23 −1·53, −0·35, 1·88

Exercise 3

1 (a) $\sqrt{2}, 7\pi/4$; (b) 2, $\pi/6$; (c) $\sqrt{2}, \frac{1}{4}\pi$; (d) $\sqrt{10}$, $\tan\gamma = -1/3$ and $3\pi/2 \leqslant \gamma \leqslant 2\pi$.

3 (a) 45°; (b) 306·9°; (c) 97·3° and 230·2°.

4 (a) Max $\sqrt{13}$, 33·7°; Min $-\sqrt{13}$, 213·7°; (b) Max 18, 67·4°; Min 8, 337·4°, (c) Max $-1/\sqrt{2}$, 112·5°, 292·5°; Min $1/\sqrt{2}$, 22·5°, 202·5°; (d) Max 25, 36·9°, 216·9°; Min 0, 126·9°, 306·9°.

5 (a) $360\ n° \pm 80·4°(n \in \mathbb{Z})$; (b) $180\ n°$ and $180\ n° + (-1)^n 30°(n \in \mathbb{Z})$; (c) $180\ n°$ and $360\ n° \pm 120°(n \in \mathbb{Z})$; (d) $180\ n° + 35·3°$ and $180\ n° - 35·3°(n \in \mathbb{Z})$; (e) $180\ n° + (-1)^n 90°$ and $180\ n° + (-1)^n 41·8°(n \in \mathbb{Z})$.

6 (a) 72°, 144°, 180°, 216°, 288°; (b) 20°, 90°, 100°, 140°, 220°, 260°, 270°, 340°; (c) 60°, 105°, 120°, 165°, 180°, 240°, 285°, 300°, 345°.

8 $\pi/2, 3\pi/2, \pi/8, 5\pi/8, 9\pi/8, 13\pi/8$.

9 $2\pi n \mp 2\pi/3, (n \in \mathbb{Z})$.

10 $\mp 1/\sqrt{3}$.

11 Least value at $\theta = 143·1°$; greatest value at $\theta = -36·9°$; zero at $\theta = 0°$.

Exercise 4

1 (a) $(3/2) - (\theta^2/16)$, (b) $-(3\theta/2)$, (c) $\frac{1}{2} - \theta^2/24$.

2 $\frac{1}{2}\cos x$.

3 2.

4 (a) 45°; (b) 60°; (c) 180°; (d) 19·5°.

6 $x = \pm\sqrt{(2/3)}$.

7 $b = 8·26$ cm, area = 34·95 cm^2.

8 $A = 35·3°, B = 43·9°, C = 100·8°$, area = 58·9 cm^2.

10 angle $DAB = 120°$, angle $BCD = 60°$.

12 $\frac{3}{5}$.

15 $\frac{1}{3}\sqrt{3}$.

17 48·89 m.

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