Relationships and Calculus Assessment Standard 1.2

1. Solve algebraically the equation $\sqrt{2}\sin 2x = 1$ for $0 \leq x < \pi$.

2. Solve algebraically the equation $2\sin 2x = \sqrt{3}$ for $0 \leq x < \pi$.

3. Solve algebraically the equation $\sqrt{2}\cos 2x = 1$ for $0 \leq x < \pi$.

4. Solve algebraically the equation $\sqrt{3}\tan 2x = 1$ for $0 \leq x < \pi$.

5.(a) Express $\sin 15^\circ \cos x^\circ + \cos 15^\circ \sin x^\circ$ in the form $\sin(A + B)^\circ$.

(b) Use your answer from part (a) to solve the equation

$$\sin 15^\circ \cos x^\circ + \cos 15^\circ \sin x^\circ = \frac{\sqrt{3}}{2} \text{ for } 0 < x < 360.$$

6.(a) Express $\cos x^\circ \cos 30^\circ - \sin x^\circ \sin 30^\circ$ in the form $\cos(A + B)^\circ$.

(b) Use your answer from part (a) to solve the equation

$$\cos x^\circ \cos 30^\circ - \sin x^\circ \sin 30^\circ = \frac{1}{4} \text{ for } 0 < x < 360.$$

7.(a) Express $\sin x^\circ \cos 20^\circ - \cos x^\circ \sin 20^\circ$ in the form $\sin(A - B)^\circ$.

(b) Hence solve the equation $\sin x^\circ \cos 20^\circ - \cos x^\circ \sin 20^\circ = \frac{4}{9}$ for $0 < x < 180$.

8. Solve the equation $\sin x^\circ \cos 35^\circ + \cos x^\circ \sin 35^\circ = \frac{7}{11}$ for $0 < x < 180$.

9. Solve the following equations for $0 \leq x \leq 360$:

(a) $\sin 2x^\circ - \cos x^\circ = 0$

(b) $\sin 2x^\circ - 3\sin x^\circ = 0$

(c) $\cos 2x^\circ + \sin x^\circ = 0$

(d) $\cos 2x^\circ + \cos x^\circ + 1 = 0$

(e) $\cos 2x^\circ + 3\cos x^\circ + 2 = 0$

(f) $\sin x^\circ - 2\cos 2x^\circ = 1$

10. $\sin x + \sqrt{3}\cos x$ can be written as $2\cos(x - \frac{\pi}{6})$.

Solve $5\sin 2x + 5\sqrt{3}\cos 2x = 5$, where $0 < x < \pi$.

11. $\sqrt{3}\sin x^\circ - \cos x^\circ$ can be written as $2\sin(x - 30)^\circ$.

Solve $4 + 5\cos 2x^\circ - 5\sqrt{3}\sin 2x^\circ = -1$, where $0 \leq x^\circ \leq 90$.

12. $\cos x - \sqrt{3}\sin x$ can be written in the form $2\cos(x + \frac{\pi}{3})$.

Solve $\cos 2x - \sqrt{3}\sin 2x = 1$, $0 \leq x \leq \pi$

Relationships and Calculus Assessment Standard 1.2 Answers

1. $\frac{\pi}{8}, \frac{3\pi}{8}$

2. $\frac{\pi}{6}, \frac{\pi}{3}$

3. $\frac{\pi}{8}, \frac{7\pi}{8}$

4. $\frac{\pi}{12}, \frac{7\pi}{12}$

5. (a) $\sin(x + 15)^\circ$ (b) $x = 45^\circ$ or 105°

6. (a) $\cos(x + 30)^\circ$ (b) $x = 45.5^\circ$ or 254.5°

7. (a) $\sin(x - 20)^\circ$ (b) $x = 46.4^\circ$ or 173.6°

8. 4.5° or 105.5°

9.(a) $\sin 2x - \cos x = 0$

$2 \sin x \cos x - \cos x = 0$

$\cos x (2 \sin x - 1) = 0$

$\cos x = 0$ or $2 \sin x - 1 = 0$

$x^\circ = 30^\circ, 90^\circ, 150^\circ, 270^\circ$

(b) $x^\circ = 0^\circ, 180^\circ, 360^\circ$

(c) $x^\circ = 90^\circ, 210^\circ, 330^\circ$

(d) $x^\circ = 90^\circ, 120^\circ, 240^\circ, 270^\circ$

(e) $x^\circ = 120^\circ, 180^\circ, 240^\circ$

(f) $x^\circ = 48.6^\circ, 131.4^\circ, 270^\circ$

10. $x = \frac{\pi}{4}, \frac{11\pi}{12}$

11. $x^\circ = 30^\circ, 90^\circ$

12. $x = 0, \frac{2\pi}{3}$