

PURE 20 SOLUTIONS (TRIG IDENTITIES, HARDER)

Section 1

1)  $30^\circ, 150^\circ$  2)  $120^\circ, -120^\circ$  3)  $60^\circ, 240^\circ$  4)  $30^\circ, 60^\circ, 210^\circ, 240^\circ$

5) a)  $H = 4.8 \cos(T/12 \times 360^\circ) + 5.1$   $\Rightarrow 4.8 \cos(T \times 30^\circ) + 5.1$  ( $T = \text{time in hours}$ )  
 b)  $3 = 4.8 \cos(T \times 30^\circ) + 5.1$  ( $H = \text{height in feet}$ )  
 $T = 3\text{h}52\text{mins}, 8\text{h}8\text{mins}, 15\text{h}52\text{min}, 20.8\text{mins}$

Section 2

1) a)  $\sin x (\sin^2 x + \cos^2 x) = \sin x$  b)  $(\cos^2 x - \sin^2 x)(\cos^2 x + \sin^2 x) = \cos^2 x - \sin^2 x$

c)  $\frac{\sin x \times \sin x}{\cos x} + \frac{\cos^2 x}{\cos x} = \frac{(\sin^2 x + \cos^2 x)}{\cos x} = \frac{1}{\cos x}$

2) a)  $2(1 - \sin^2 x) = 1 + \sin x \Rightarrow 2\sin^2 x + \sin x - 1 = 0$

b)  $(2\sin x - 1)(\sin x + 1) = 0$   
 $\sin x = 1/2$   $\sin x = -1$

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

3) a)  $2 + \cos x = 2(1 - \cos^2 x) \Rightarrow 2\cos^2 x + \cos x = 0$

b)  $\cos x (2\cos x + 1) = 0 \Rightarrow \begin{cases} \cos x = 0 & x = 90^\circ, 270^\circ \\ \cos x = -1/2 & x = 120^\circ, 240^\circ \end{cases}$

4) a)  $\frac{2\sin x}{\cos x} = 3 \Rightarrow \tan x = 3/2$

b)  $x = 56.3^\circ, 236.3^\circ$  (OR DEGREES)

5) a)  $5(1 - \sin^2 x) = 3(1 + \sin x) \Rightarrow 0 = 5\sin^2 x + 3\sin x - 2$

b)  $(5\sin x - 2)(\sin x + 1) = 0 \Rightarrow \begin{cases} \sin x = 2/5 & x = 23.6^\circ, 156.4^\circ \\ \sin x = -1 & x = 270^\circ \end{cases}$

6) a)  $x - 20^\circ = 115.9^\circ, 244.1^\circ$   $x = 136^\circ, 264^\circ$

b)  $3\sin \theta = 2\cos^2 \theta = 2(1 - \sin^2 \theta) \Rightarrow 2\sin^2 \theta + 3\sin \theta - 2 = 0$   
 $(2\sin \theta - 1)(\sin \theta + 2) = 0 \Rightarrow \begin{cases} \sin \theta = 1/2 & \theta = 30^\circ, 150^\circ \\ \sin \theta = -2 & \text{No Answers} \end{cases}$

50

SECTION 3 1)  $13.3^\circ, 103.3^\circ, 193.3^\circ, 283.3^\circ$  2)  $36.5^\circ, 83.5^\circ, 156.5^\circ$