

Self-assessment answers: 9 Circular measure and trigonometric functions

1. (a) $a = 2, b = 3$

(b) $c = 3, d = 60$

[7 marks]

2. Period of $\sin 4x$ is 90° , period of $\sin 6x$ is 60° .Period of the overall function is the LCM of the constituent periods – that is, 180° (π radians).

[3 marks]

3. (a) $h(14) = 9.64$ metres (GDC)

(b) 7.4 metres

(c) $h(t) = 8.1 \Rightarrow t = 6.82, 11.18, 18.82, 23.18$ (GDC)

These correspond to times 06:49, 11:11, 18:49 and 23:11 on the 24 hour clock.

(d) $h(t) > 9 \Rightarrow t \in [0.649, 5.351] \cup [12.649, 17.351]$

These intervals correspond to periods 00:39 to 05:21 and 12:39 to 17:21

[8 marks]

4. (a) $f\left(\frac{\pi}{12}\right) = 3\sin\left(\frac{\pi}{3}\right) = \frac{3\sqrt{3}}{2}$

(b) $f(x) = 0 \Rightarrow \sin\left(x + \frac{\pi}{4}\right) = 0$

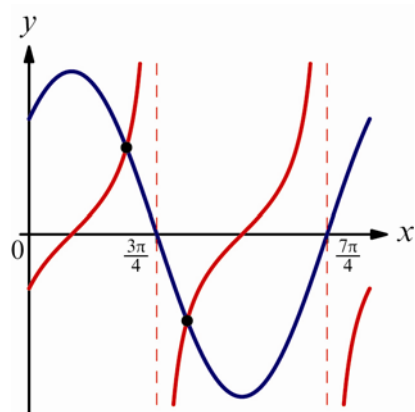
$$\Rightarrow x + \frac{\pi}{4} = \pi, 2\pi$$

$$\Rightarrow x = \frac{3\pi}{4}, \frac{7\pi}{4}$$

(c) $f(x)$ takes values in $[-3, 3]$, so the minimum value of $5 - f(x)$ is 2.

(d) $g\left(\frac{\pi}{2}\right) = \tan\left(\frac{\pi}{4}\right) = 1$

(e)



2 solutions

[12 marks]