Trig - graphing and transformations Answers

1)

(a) (i) evidence of finding the amplitude ***(M1)***

$e.g.\ \dfrac{7+3}{2}$, amplitude $= 5$

$p = -5$ ***A1*** ***N2***

(ii) period $= 8$ ***(A1)***

$q = 0.785 \quad \left(= \dfrac{2\pi}{8} = \dfrac{\pi}{4}\right)$ ***A1*** ***N2***

(iii) $r = \dfrac{7-3}{2}$ ***(A1)***

$r = 2$ ***A1*** ***N2***

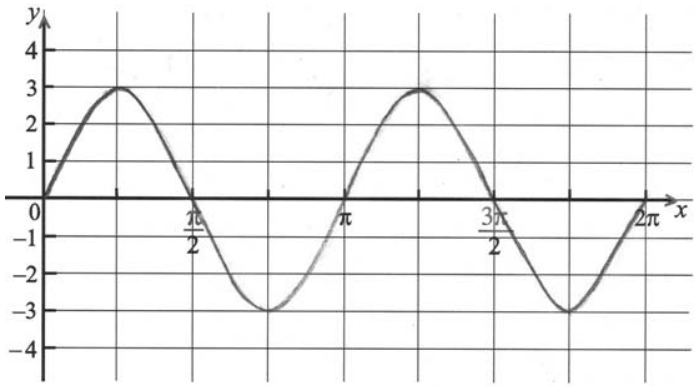
(b) $k = -3$ (accept $y = -3$) ***A1*** ***N1***

[7 marks]

2)

(a) period $= \pi$ ***A1*** ***N1***

(b)



A1A1A1 ***N3***

Note: Award ***A1*** for amplitude of 3, ***A1*** for **their** period,
A1 for a sine curve passing through $(0,0)$ and $(0,2\pi)$.

(c) evidence of appropriate approach ***(M1)***

e.g. line $y = 2$ on graph, discussion of number of solutions in the domain

4 (solutions) ***A1*** ***N2***

[6 marks]

3)

(a) (i) 7 ***A1*** ***N1***

(ii) 1 ***A1*** ***N1***

(iii) 10 ***A1*** ***N1***

[3 marks]

(b) (i) evidence of appropriate approach ***M1***

e.g. $A = \frac{18-2}{2}$

$A = 8$ ***AG*** ***N0***

(ii) $C = 10$ ***A2*** ***N2***

(iii) **METHOD 1**

period $= 12$ ***(A1)***

evidence of using $B \times \text{period} = 2\pi$ (accept 360°) ***(M1)***

e.g. $12 = \frac{2\pi}{B}$

$B = \frac{\pi}{6}$ (accept 0.524 or 30) ***A1*** ***N3***

METHOD 2

evidence of substituting ***(M1)***

e.g. $10 = 8\cos 3B + 10$

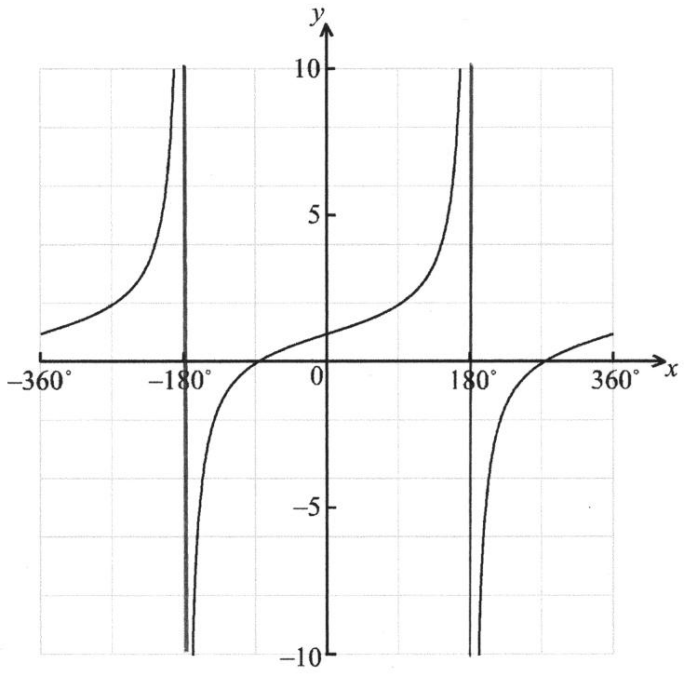
simplifying ***(A1)***

e.g. $\cos 3B = 0 \left(3B = \frac{\pi}{2}\right)$

$B = \frac{\pi}{6}$ (accept 0.524 or 30) ***A1*** ***N3***

[6 marks]

4) (a)



Correct asymptotes ***A1A1*** ***N2***

(b) (i) Period $= 360^\circ$ (accept 2π) ***A1*** ***N1***

(ii) $f(90^\circ) = 2$ ***A1*** ***N1***

(c) $270^\circ, -90^\circ$ ***A1A1*** ***N1N1***

Notes: Penalise ***1 mark*** for any additional values.
Penalise ***1 mark*** for correct answers given in radians $\left(\frac{3\pi}{2}, -\frac{\pi}{2}, \text{ or } 4.71, -1.57\right)$.

5) $a = 4, b = 2, c = \frac{\pi}{2}$ $\left(\text{or } \frac{3\pi}{2} \text{ } etc.\right)$ ***A2A2A2*** ***N6***

6) (a) (i) attempt to substitute ***(M1)***

$e.g.\ a = \frac{29-15}{2}$

$a = 7$ (accept $a = -7$) ***A1*** ***N2***

(ii) period $= 12$ ***(A1)***

$b = \frac{2\pi}{12}$ ***A1***

$b = \frac{\pi}{6}$ ***AG*** ***N0***

(iii) attempt to substitute ***(M1)***

$e.g.\ d = \frac{29+15}{2}$

$d = 22$ ***A1*** ***N2***

(iv) $c = 3$ (accept $c = 9$ from $a = -7$) ***A1*** ***N1***

Note: Other correct values for c can be found, $c = 3 \pm 12k$, $k \in \mathbb{Z}$.

[7 marks]