1. The depth of water on Fripp Island, SC, is modelled by the function $f(t) = p * \cos(qt) + 3.4$, for $0 \leq t \leq 10$, where t is the number of hours after high tide. At high tide, the depth is 6.48 ft. At low tide, which is approximately 6 hours later, is 0.5 ft.

   (a) Find the value of p (2 marks)

   (b) Find the value of q (2 marks)

   (c) Use the model to find the depth of water 10 hours after high tide (2 marks)

Mark scheme:

(a) $\frac{max-min}{2}$

$\frac{6.48-0.5}{2}$ (M1)

$= 2.99$ (A1)

(b) $q = \frac{2\pi}{period}$ (M1)

$= \frac{2\pi}{12} = \frac{\pi}{6}$ (A1)

(c) $f(t) = 2.99\cos\left(\frac{\pi}{6}t\right) + 3.4$

$f(10) = 2.99\cos\left(\frac{\pi}{6}(10)\right) + 3.4$ (M1)

$f(10) = 4.895$ (A1)