Q1. Why does an accel $= -\omega^2 x$ represent an accel pointed towards the centre all the time?

	x	accel
$0 \to \varepsilon_2$	+	−
$\varepsilon_2 \to 0$	+	−
$0 \to \varepsilon_1$	−	+
$\varepsilon_1 \to 0$	−	+

Need the minus in $a = -\omega^2 x$ so that the accel and x will always have the opposite sign.

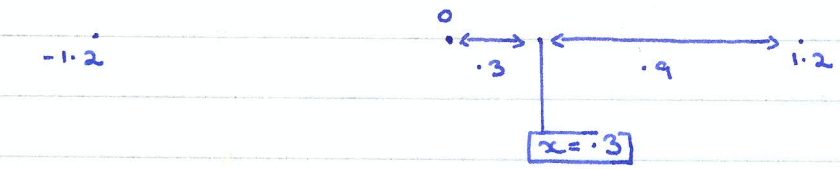
Q2. When is a particle accelerating or decelerating during its SHM motion?

	accel	vel	
$0 \to \varepsilon_2$	−	+	decel
$\varepsilon_2 \to 0$	−	−	accel
$0 \to \varepsilon_1$	+	−	decel
$\varepsilon_1 \to 0$	+	+	accel

When the signs of the velocities and accel are in the same direction the particle is accelerating

Example

Find the acceleration, velocity of a particle undergoing SHM. $A = 1.2$ $\omega = 4$ when it is $.9$ from an extreme position. Find also the time to go from mean to position.



Find $a = -\omega^2 x$

$= -16 \cdot .3$

$= 4.8 \text{ ms}^{-2}$

Speed $= v$ given x

$v^2 = \omega^2 (A^2 - x^2)$

$= 16 (1.2^2 - .3^2)$

$v = \pm 1.44 \text{ ms}^{-1}$