Question			Answer	Mark	Guidance
4	(a)		6000	B1 [1]	
4	(b)		2000	B1f [1]	ft their (a) − 4000
4	(c)		Oscillates or Goes up and down. oe Fluctuates. Moves in a cycle	B1 [1]	Ignore all else NOT "Increases for 1st 6 months then decreases"
4	(d)		$30t = 360$ Time to return to initial size = 12 months	M1 A1 [2]	May be implied by answer Allow $t = 12$, or $t = 12$ months, or just 12
4	(e)		$4500 = 5000 - 1000\cos(30t)^\circ$ $\cos(30t)^\circ = 0.5$ $30t = 60$ or 300 (both) 2nd time $P = 4500$ is when $t = 10$	M1 A1 M1 A1	Substitute $P = 4500$ May be implied by next line Correct rearrangement Attempt $30t = \cos^{-1}$(their 0.5), giving α and $360 - \alpha$. Condone $30t = \frac{\pi}{3}, \frac{5\pi}{3}$ or after 10 months. Allow $t = 10$ months, or just 10 SC. (If not gained 1st M1A1)Correct answer with no or inadequate working and/or T&I: $t = 10$ stated: B2; $t = 10$ embedded: B1B0
			Alternative methods for 2nd M1A1 $30t = 60$ or -60 (both) (t = 2 or −2) 2nd time $P = 4500$ is when $t = -2 + 12 = 10$	 M1 A1	 $30t = 60$ ($t = 2$) (end of 1st cycle at $t = 12$) 2nd time $P = 4500$ is when $t = 12 - 2 = 10$
			$30t = 60$ ($t = 2$) $6 - 2 = 4$; $t = 6 + 4 = 10$	M1 A1	
				[4]	
4	(f)		eg $P = 5000 - 1000e^{-t}\cos(30t)^\circ$ $P = 5000 - 1000e^{-kt}\cos(30t)^\circ$ ($k > 0$) Answers in words must be equivalent to one of these	B1 [1]	or other good answers eg $P = 5000 - (1000\cos(30t)^\circ)^{1/t}$ $P = 5000 - \frac{1000}{t}\cos(30t)^\circ$. ($t > 0$)