Recurrence Relations — Answers

2019 P2 Q4	$\bullet^2$ a limit exists as the recurrence relation is linear and $-1<0{\cdot}973<1$ $\bullet^3$ $L=0{\cdot}973L+30$ or $L=\dfrac{30}{1-0{\cdot}973}$ $\bullet^4$ 1100
2019 P1 Q4	(a) $m=\dfrac{2}{3}$, $c=5$ (b) $4th\ term=\dfrac{37}{3}$ or $12\dfrac{1}{3}$
2017 P2 Q8	(a) Proof (b) $-1<k<5$
2017 P1 Q9	(a) $m=\frac{1}{4}$ (b) (i) a limit exists as the recurrence relation is linear and $-1<\dfrac{1}{4}<1$ (ii) L = 8
2016 P1 Q3	(a) 12 (b) A limit exists as the recurrence relation is linear and $-1<\dfrac{1}{3}<1$ (c) $L=15$
2015 P2	(a) 22.75 (b) $52>50$ *toad will escape*
2013 P2 Q1	$m=3, c=-5$

2011 P2 Q3	**(a)** $u_1 = 8$ and $u_2 = -4$ **(b)** $p = 2$ or $q = -3$ **(c)(i)** $l = 0$ **(ii)** outside interval $-1 < p < 1$
2007 P1 Q7	(*a*) $u_1 = 16$ $u_2 = 20$ $u_3 = 21$ (*b*) (i) $-1 < \frac{1}{4} < 1$ (ii) $\frac{64}{3}$
2006 P1 Q4	(*a*) sequence has limit since $-1 < 0{\cdot}8 < 1$ (*b*) limit = 60
2005 P1 Q6	(*a*) $k = -\frac{1}{4}$ (*b*) (i) $u_1 = 3m + 5$, $u_2 = m(3m + 5) + 5$ (ii) $m = -2$
2004 P2 Q4	(*a*) $-1 < k < 1$ (*b*) $k = \frac{2}{5}$
2003 P1 Q4	(*a*) $p = \frac{1}{3}$, $q = 11$ (*b*) 16½
2002W P2 Q3	(*a*) 100 (*b*) $n = 7$, $u_7 = 52{\cdot}65$
2002 P2 Q4	(*a*) $-1 < 0{\cdot}8 < 1$ and limit = 2·5 metres (*b*) trim 25%
2001 P2 Q3	(*a*) $u_{n+1} = 1{\cdot}015u_n - 300$, $u_0 = 2500$ (*b*) Dec 1st, £290·68

Spec 2 P2 Q4	(a) $-1 < 0{\cdot}2 < 1$ and $-1 < 0{\cdot}6 < 1$ (b) $\text{Limit} = \frac{p}{0 \cdot 8}$ and $\text{Limit} = \frac{q}{0 \cdot 4} \Rightarrow p = 2q$
Spec 2 P2 Q2	(a) $a = 0.96$ $b = 580$ (b) Yes, stabilises at 14,500
Spec 1 P1 Q1	(a) $-1 < 0{\cdot}3 < 1$ (b) $\frac{50}{7}$
Spec 1 P2 Q2	Pestkill