## Recurrence Relations

1. Find the next four terms and the limit, if it exists, for each recurrence relation.
a) $U_{n+1}=0.1 U_{n}+4.5, U_{0}=4$
b) $U_{n+1}=-0.2 U_{n}+10, U_{0}=8$
2. It is estimated that the area of a pond affected by algae increases by 5 square metres each week. A gardener clears $25 \%$ of the affected area each week. If the original area affected by the algae was 30 square metres:
a) Write down a recurrence relation that describes the situation above.
(2)
b) Find the limit and explain what it means in the context of the question. (3)
3. John's bank pays $6 \%$ compound interest per annum. He decides to invest $£ 2000$. If $A_{n}$ is the amount after $n$ years:
a) Write down a recurrence relation.
b) Calculate $A_{1}, A_{2}$ and $A_{3}$.
c) Write down a formula for $A_{n}$.
4. Trees are sprayed weekly with the pesticide "Killpest", whose manufactors claim it will destroy $65 \%$ of all pests. Between the weekly sprayings, it is estimated that 500 new pests invade the tree. A new pesticide "Pestkill", comes onto the market. The manufactors claim it will destroy $85 \%$ of existing pests but it is estimated that 650 new pests per week will invade the trees.

Which pesticide will be more effective?
5. The amounts in a bank account at the end of three consecutive years were $£ 1500, £ 1675$ and $£ 1858.75$ respectively. The interest rate remained constant over this period, while an extra fixed amount was also invested each year.
What was the interest rate and the amount invested each year?

## Revision

6. Triangle $A B C$ has vertices $A(-3,-3), B(-1,1)$ and $C(7,-3)$.
a) Show that triangle $A B C$ is right-angled at $B$.
b) The medians $A D$ and $B E$ intersect at $M$.
i) Find the equations of $A D$ and $B E$.
ii) Hence find the coordinates of $M$.
