Population Equations

If you are managing a wildlife population, three variables that you want to watch closely are the population *(P)*, the rate of reproduction *(R)*, and the rate of attrition, *(A)*.

Rate of reproduction simply means how many new animals are born as a percentage of the total population. For example, if the population starts out at 60, and the rate of reproduction is 20%, then in one year there will be 20% of 60 = 12 young animals born.

Rate of attrition is the number of animals that die each year, as a percentage of the total population. For example, if the population starts out at 60, and the rate of attrition is 10%, then in that year there would be 10% of 60 = 6 animal deaths.

1. *Make up 3 more examples that show the meaning of "rate of reproduction", and three examples that show the meaning of "rate of attrition."*

If no animals arrive from the outside of the region being studied, and no animals leave to the outside, then the population at the beginning of one year (say, 1996) is related to the population at the beginning of the next year (say, 1997), by this equation:

$$P_{1997} = P_{1996} + P_{1996}\,(R - A)$$

2. *Compute the population for 1997 for each set of values given below:*

	P_{1996}	R	A
a)	500	25%	22%
b)	200	50%	40%
c)	1000	15%	20%
d)	15	30%	25%
e)	1500	40%	40%

3. *Look at your answers to (c), (d), and (e) above, and, for each one, explain why it's a reasonable answer.*

4. *Solve the equation given above to find the missing values in each case:*

	P_{1996}	R	A	P_{1997}
a)	?	20%	18%	714
b)	2500	30%	?	2750
c)	8000	20%	?	7200
d)	?	50%	60%	450
e)	20	?	20%	28
f)	12000	?	15%	11400