

POPULATION EQUATIONS
(Skill Set)
Teaching Guidelines

Subject: Mathematics

Topics: Algebra, Expressions and Equations

Grades: 6 - 12

Knowledge and Skills:

- Can evaluate expressions by substituting values for variables
- Can simplify expressions using correct order of operations
- Can do basic operations on both sides of an equation in such a way as to preserve the equality

Procedure: This project should be done by students individually or teams of two.

Distribute the handout and ensure that students understand the task.

Answers

1. Answers vary

2.

	P_{1996}	R	A	P_{1997}
a)	500	25%	22%	515
b)	200	50%	40%	220
c)	1000	15%	20%	950
d)	15	30%	25%	16
e)	1500	40%	40%	1500

3. (c) Population decreases because $A > R$
 (d) Answer rounded to nearest whole
 (e) Population doesn't change when $A = R$

4.

	P_{1996}	R	A	P_{1997}
a)	700	20%	18%	714
b)	2500	30%	20%	2750
c)	8000	20%	30%	7200
d)	500	50%	60%	450
e)	20	60%	20%	28
f)	12000	10%	15%	11400

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 = 10 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