

Finding a final amount in a word problem on exponential growth or decay

Growth: $A = P(1 + r)^t$

Decay: $A = P(1 - r)^t$

A = Final Amount

P = Initial Amount

r = rate of increase/decrease

t = time

Examples Growth/Increase:

1. An amount of \$18,000 is borrowed for 6 years at 3.75% interest, compounded annually. If the loan is paid in full at the end of that period, how much must be paid back?

$A = 18,000(1 + 0.0375)^6$ r = 0.0375 converting 3.75% into a decimal.
Now, it's just a calculator exercise.

2. A principal of \$2200 is invested at 6.5% interest, compounded annually. How much will the investment be worth after 15 years?

$A = 2200(1 + 0.065)^{15}$ r = 0.065 converting 3.75% into a decimal.
Now, it's just a calculator exercise.

Examples Decay/Decrease:

1. The half-life of a radioactive isotope is the time it takes for a quantity of the isotope to be reduced to half its initial mass. Starting with 130 grams of a radioactive isotope, how much will be left after 6 half-lives?

$A = 130(1 - 0.5)^6$ r = 0.5 since it is a HALF (1/2) life.
Now, it's just a calculator exercise.

2. A car is purchased for \$30,000. After each year, the resale value decreases by 25%. What will the resale value be after 3 years?

$A = 30,000(1 - 0.25)^6$ r = 0.25 converting 25% to a decimal.
Now, it's just a calculator exercise.

3. A certain forest covers an area of 2500 km². Suppose that each year this area decreases by 4%. What will the area be after 7 years?

$A = 2500(1 - 0.04)^7$ r = 0.04 converting 4% to a decimal.
Now, it's just a calculator exercise.