

For these problems, use the formula $A = Pe^{rt}$, where r is rate, t is time, and P is principal.

- 1) If Bartlett grows at a continuous rate of 3.25% each year and there are 5,000 people who live there, how many people will be there after eight years pass?
- 2) Wheaton has a continuous growth rate of 5% per year. If there are 7,500 people who live there now, how many people will be there in the year 2030?
- 3) If Aurora grows at a continuous rate of 6.5% each year and there are 100,000 people who live there, how many people will be there in 10 years?
- 4) A certain state has 3 million people. What must its growth rate be in order to get to a population of 4 million in 30 years?

For these problems, use the formula $A = A_0 \left(\frac{1}{2}\right)^{\frac{t}{H}}$, where H is half-life, t is time, and A_0 is the initial amount.

- 5) Polonium has a half-life of 140 days. How much will be left of 200g of Polonium in 1000 days?
- 6) Carbon-14 (used to determine the age of fossils) has a half-life of 5730 years. How much will be left of 20 milligrams, if it decays for 100,000 years?
- 7) Radium-226 (used to treat cancer) has a half-life of 1600 years. If 0.01 milligrams decays for 5 years, how much will be left?
- 8) Americium-241 (used in smoke detectors) has a half-life of 432 years. How long will it take for 3 grams to decay to decay to 0.1 grams?
- 9) Radon-222 (found in homes) has a half-life of 3.8 days. How long will it take 2 kilograms to decay to 0.2 kilograms?