

Finding the Balance in an Increasing Annuity

An **increasing annuity** is a savings account in which you make repeated deposits. This type of savings account is often used to create retirement funds.

Balance in an Increasing Annuity

The balance A in an increasing annuity with a monthly deposit of M , for n months at an annual percentage rate of r (in decimal form), compounded monthly is

$$A = M \left[\frac{[1 + (r/12)]^n - 1}{r/12} \right].$$

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You can access increasing annuity calculators at *Math.andYou.com*.

EXAMPLE 3 Creating a Retirement Plan

You start your working career when you are 22 years old. Each month, you deposit \$100 into a pension plan. You continue making deposits into the plan until you are 72 years old. What is the balance when the plan earns

- a. 4%, compounded monthly?
- b. 6%, compounded monthly?
- c. 8%, compounded monthly?

SOLUTION

a. $A = 100 \left[\frac{1 + (0.04/12) \quad 12(50)}{(1.00333)^{600} - 1}{0.00333} \right] = \$190,935.64 \quad (4\%)$

b. $A = 100 \left[\frac{1 + (0.06/12) \quad 12(50)}{(1.005)^{600} - 1}{0.005} \right] = \$378,719.11 \quad (6\%)$

c. $A = 100 \left[\frac{1 + (0.08/12) \quad 12(50)}{(1.00667)^{600} - 1}{0.00667} \right] = \$793,172.75 \quad (8\%)$



In 2010, there was an estimated \$15 trillion invested in private retirement plans in the United States.

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Suppose that you continue to make the monthly deposits for only 45 years, instead of 50 years. What is the balance when the plan earns

- d. 4%, compounded monthly?
- e. 6%, compounded monthly?
- f. 8%, compounded monthly?