

INSTRUCTOR GUIDANCE EXAMPLE: Week Four Discussion

Initial Investment

My best friend and her new husband (Fred and Ethel) just got back from their honeymoon which was a trip down the River Nile in Egypt. They are excited about traveling together as a couple and they want to start saving for a very special trip. My own 25th wedding anniversary falls in the same month as Fred and Ethel's 12th anniversary and they thought it would be fun to plan a trip together. They have done a little research enough to realize we will need about \$8,000 per couple set aside for this trip. Fred also found an investment opportunity which promises to have an average return of about 9% per year if one invests long term. We need to know how much each couple needs to invest now to reach their goal in time.

The desired item is travel.

The cost in 12 years will be about \$8,000.

The average interest rate of the investment is 9%.

The Present Value Formula is $P = A(1 + r)^{-n}$ where P is the present value that will amount to A dollars in n years at interest rate r compounded annually.

Notice that the quantity raised to a **power** has the **negative exponent** of $-n$. According to the **rules of exponents**, this means that once the negative is put into effect, the base quantity will change **position** by dropping down into the denominator where it will be raised to the power of n. Then it will divide A instead of multiplying A as it seems to be doing now.

$$P = A(1 + r)^{-n}$$

$$P = 8000(1 + .09)^{-12}$$
 Here are the relevant numbers are plugged into the formula

$$P = 8000(1.09)^{-12}$$
 Add inside the parenthesis

$$P = \frac{8000}{(1.09)^{12}}$$
 The **negative exponent** creates the **reciprocal** of the base number (in other words, changes its **position** from up top to down below)

$$P = \frac{8000}{2.81266...}$$
 The exponent is applied to the base number

$$P = 2844.28$$

This is the value of P using the formula.

Given these results and knowing the interest rate may not stay exactly at 9% we will begin our investment with \$3000 right now to begin to save for our big twenty-fifth (and twelfth) anniversary trip. This should give us a little cushion for inflation and such.

[Student answers to the last question will vary depending upon their memory and understanding of formulas they have seen in the past.]