

Present Value of an Annuity

Scenario: Suppose you wanted to go on a trip once a year for 10 years. For each trip you will need \$1000. You open an account that pays 7%/a compounded annually. You deposit enough money today so that you can withdraw \$1000 at the end of each year for the next 10 years. How much money do you need to deposit today?

Present Value of an Annuity: an amount invested today that will create a series of equal payments in the future.

Example 1: Determine the amount needed for the 10 trips above.

Solution: Use the timeline to visualize what the present value of each payment is worth.



Total Amount you need
to deposit now =

reverse the sum:

This looks like a _____ with a first term of = _____
and a common ratio = _____ and n = _____.

Therefore use the formula: $S_n =$

Or we can use the formula:

Present Value of an Annuity Formula

$$P = \frac{R[1 - (1 + i)^{-n}]}{i}$$

R = payment withdrawn at each interval

i = interest rate per compounding period

n = total number of payments/deposits

Example 2: You just signed a 2-year lease for a new apartment where rent is \$600/month, with the first payment due in a month. How much do you need in an account today at 6%/a compounded monthly to cover all the payments?

$P =$

$R =$

$i =$

$n =$

Example 3: Sue needs to borrow \$7500 to purchase a used car. The car dealer arranges with a finance company to lend Sue the money at 2.9%/a compounded monthly for 3 years. What will Sue's monthly payment be?

$P =$

$R =$

$i =$

$n =$

Example 4: Jane is 25 years old now. She wants to be able to withdraw \$4000 on a monthly basis for 20 years when she retires at age 55. She found an account that pays 10%/a compounded monthly. How much should she put into the account today?

Tip: there are 2 different investments, draw a timeline.

U8D3 Practice: p. 541 #4, 5, 8, 10, 12, **17** Note: If you choose to do Number 9, reword so it is compounded monthly with monthly withdrawals beginning in one month to get answer in back of text.

REVIEW: Worksheet, Extra Review Practice: 572 – 576 #1-6, 8, 10-12, 15-17