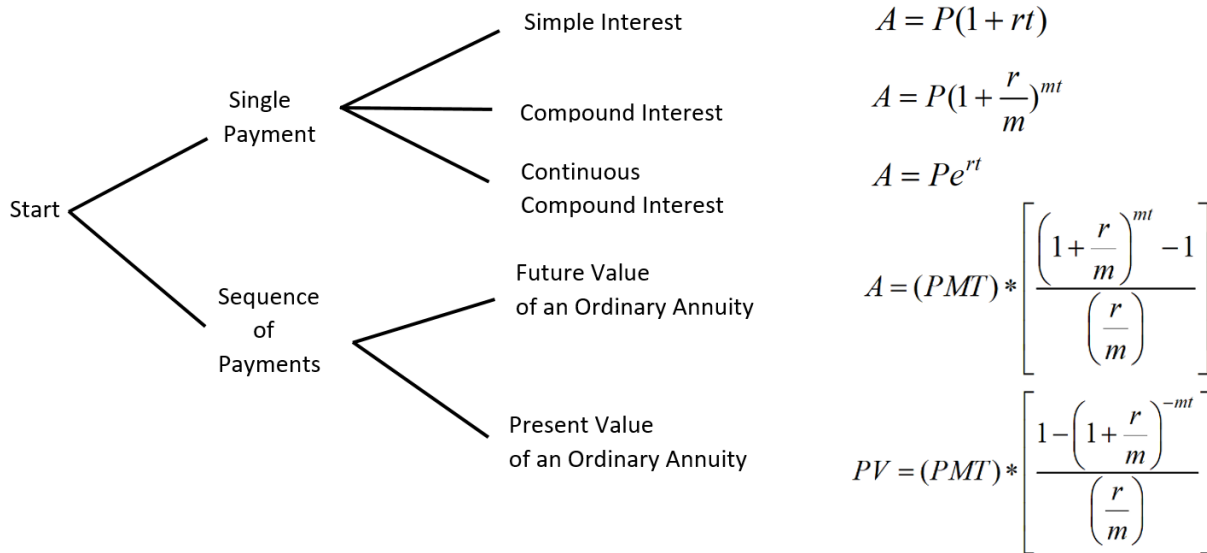


## Solving Finance Problems - Intermediate

### Objective 1: Determine which Finance Formula to use when Solving Finance Problems

The following illustration can be used to help determine which of the five basic finance formulas to use when solving a finance problem.



Where:

$A$	= amount after $t$ years (or future value)
$P$	= principal (or present value)
$r$	= annual interest rate (written as a decimal)
$t$	= time in years
$m$	= number of compounding periods per year
$PV$	= present value
$PMT$	= periodic payment

### Guideline for Solving Finance Problems:

- Decide whether the finance problem involves a single payment or a sequence of equal periodic payments.
- If a single payment is involved, decide whether simple interest, compound interest, or continuous compound interest is used. Simple interest is often used for time of a year or less.
- If a sequence of payments is involved, decide whether the payments are being made into an account that is increasing in value (a future value problem) or the payments are being made out of an account that is decreasing in value (a present value problem).

**Amortization problems** always involve the present value of an ordinary annuity.

Amortization is the process of paying off a loan or debt. You make periodic payment that go toward both the principal and interest. You buy a house for \$400,000. So the present value is \$400,000. You are amortizing \$400,000. You make payments towards reducing that debt until it is paid off.

**Sinking fund** problems always involve the future value of an ordinary annuity. You are saving towards a goal. You are depositing periodic payments with the intent to build up the account to pay for something. For example, suppose you know you want to buy furniture that costs \$2000 in a year so you want to make monthly payments into an annuity to accumulate the funds to have \$2000 at the end of the year.

**Example:** Decide which of the five basic finance formulas to use and write down the formula. If \$8000 is invested at 12.5% compounded continuously, what is the amount after 10 years?

**Example:** Decide which of the five basic finance formulas to use and write down the formula. Lincoln Benefit Life offered an annuity that pays 4.5% compounded monthly. What equal monthly deposit should be made into this annuity in order to have \$60,000 in 8 years?

**Example:** Decide which of the five basic finance formulas to use and write down the formula. If \$200 is invested at 4% compounded quarterly, what is the amount after 8 years?

**Example:** Decide which of the five basic finance formulas to use and write down the formula. A sailboat costs \$25,000. You pay 0% down and amortize the \$25,000 with equal monthly payments over a 10-year period. If you must pay 6.75% compounded monthly, what is your monthly payment?

**Example:** Decide which of the five basic finance formulas to use and write down the formula.

A loan of \$5,400 was repaid at the end of 7 months. What size repayment check was written, if a 6% annual rate of interest was charged?

Pause the video and try these problems.

**Questions:** Decide which of the five basic finance formulas to use and write down the formula.

1. If \$500 is invested at 8% compounded quarterly, what is the amount after 11 years?
2. An automobile costs \$35,000. You pay 0% down and amortize the \$35,000 with equal monthly payments over a 5-year period. If you must pay 5.85% compounded monthly, what is your monthly payment?
3. A loan of \$3,200 was repaid at the end of 8 months. What size repayment check was written, if a 9% annual rate of interest was charged?
4. If \$6500 is invested at 10.5% compounded continuously, what is the amount after 7 years?
5. Lincoln Benefit Life offered an annuity that pays 7.5% compounded monthly. What equal monthly deposit should be made into this annuity in order to have \$56,000 in 10 years?

a)  $A = P(1 + rt)$

b)  $A = P\left(1 + \frac{r}{m}\right)^{mt}$

c)  $A = Pe^{rt}$

d)  $A = (PMT) * \left[ \frac{\left(1 + \frac{r}{m}\right)^{mt} - 1}{\left(\frac{r}{m}\right)} \right]$

e)  $PV = (PMT) * \left[ \frac{1 - \left(1 + \frac{r}{m}\right)^{-mt}}{\left(\frac{r}{m}\right)} \right]$

Restart the video when you have completed the problems.

## Objective 2: Solve Finance Problems

Now that you have a strategy for deciding which finance formula to use, let's solve a few finance problems.

**Example:** Decide which of the five basic finance formulas to use and then solve the problem.

A loan of \$2000 was repaid at the end of 11 months with a check for \$2,110.50. What annual rate of interest was charged?

**Example:** Decide which of the five basic finance formulas to use and then solve the problem. Parents have set up a sinking fund in order to have \$60,000 in 18 years for their children's college education. How much should be paid semiannually into an account paying 7.5% compounded semiannually?

**Example:** Decide which of the five basic finance formulas to use and then solve the problem. You have saved \$12,000 towards the purchase of a car costing \$18,000. How long will the \$12,000 have to be invested at 9% compounded monthly to grow to \$18,000. Leave your answer in terms of years and round to the nearest hundredth.



3. You have saved \$6,000 towards the purchase of a piece of furniture costing \$7,500. How long will the \$6,000 have to be invested at 12% compounded monthly to grow to \$7,500. Leave your answer in terms of years and round to the nearest hundredth.

4. Parents have set up a sinking fund in order to have \$36,000 in 18 years for their children's college education. How much should be paid quarterly into an account paying 8.5% compounded quarterly? Round to the nearest hundredth.

Restart the video when you have completed the problems.