1. For each problem listed below, write down the formula that you will use to solve the problem, circle the variable that you are looking for and then solve the problem.

a. Rachel deposits $200 every month on an account that pays 6% annual interest compounded monthly, and she wants to know how much she'll have in 24 months to spend on a car.

**Answer:** Since Rachel is making periodic deposits we need to use the **annuity formula**.

\[ A = P \left( \frac{(1+i)^n-1}{i} \right) \]

\( A \) is the variable we are looking for (accumulated amount)

\( P \) are the periodic deposits = $200, \( i = .06/12 \) and \( n = 24 \).

Substituting these values in the formula we get \( A = \$5,086.40 \).

b. Madison deposited her $1000 tax refund on an account at 5.75% annual interest compounded daily and she wants to know how much money she will have in two years.

**Answer:** Since we have a single deposit we use the **compound interest formula**

\[ A = P (1+i)^n \]

\( A \) is the variable we are looking for (accumulated amount)

\( P \) is the principal = $1000, \( i = .0575/365 \) and \( n = 365(2) = 730 \).

Substituting these values in the formula we get \( A = \$1,121.86 \).

c. Monica wants to know how much she should have in the bank when she retires so that she will be able to withdraw $800 per month for 20 years after she retires. Assume 12.5% annual interest compounded monthly.

**Answer:** Since Monica wants to make periodic withdrawals we need to use the **Present Value Formula**.

\[ V = P \left( \frac{1-(1+i)^{-n}}{i} \right) \]

\( V \) is the variable we are looking for (amount she needs in the bank)

\( P \) are the periodic withdrawals = $800, \( n = 20(12) = 240 \) and \( i = .125/12 \).

Substituting these values in the formula we get \( V = \$70,413.82 \).

d. Anthony has to pay back a loan by making payments of $350/month for the next 5 years at 4.5% annual interest compounded monthly. How much money did he borrow?

**Answer:** Since we are amortizing a loan we need to use the **Present Value Formula**:

\[ V = P \left( \frac{1-(1+i)^{-n}}{i} \right) \]

\( V \) is the variable we are looking for (the amount he borrowed)

\( P \) are the monthly payments = $350, \( n = 12(5) = 60 \) and \( i = .045/12 \).

Substituting these values in the formula we get \( V = \$18,773.78 \).

e. Filipescu signed a note for a discounted loan and he agrees to pay $3000 in 1 year at 5.6% annual interest. How much money did he borrow?

**Answer:** Since we are told it is a discounted loan we use the **discounted loan formula**

\[ R = L (1-rt) \]

\( R \) is the variable we are looking for (the amount he borrowed)

\( L \) is the amount he needs to repay = $3000, \( t = 1 \) and \( r = .056 \).

Substituting these values in the formula we get \( R = \$2,832 \).