## U7D4 Present Value Annuities

## Example 1:

How much money do you need to have saved at age 18 if you want to be able to withdraw $\$ 3000$ every year from age 19 to age 21, inclusive? Assume an interest rate of $2.5 \% /$ a compounded annually. Use a timeline.

## NOTE:



Example 2: (Same as Ex. 1 with formula)
Use the formula: $\mathrm{PV}=\frac{\mathrm{R}\left[1-(1+\mathrm{i})^{-\mathrm{n}}\right]}{\mathrm{i}}$
PV is the Present Value of the annuity (the amount of money needed at age 18 to make the withdrawals in the future)
$\mathrm{R}=$
$i=$
$\mathrm{n}=$
$P V=$ ?

Example 3. Calculate your car payments if you have borrowed $\$ 10,000$ for 4 years, with an interest rate of 4.8\%/a compounded monthly and your payments are monthly at the end of the month.
Use the formula: $P V=\frac{\mathrm{R}\left[1-(1+\mathrm{i})^{-\mathrm{n}}\right]}{\mathrm{i}}$ where you are solving for $\mathrm{R}, \mathrm{PV}$ is the Present Value of the annuity (the amount of money borrowed in this case). Check with technology. (google fncalculator)
$\mathrm{R}=$ ?
$i=$
$\mathrm{n}=$
$P V=$

Example 4. You want to retire with $\$ 650000$. Find the amount you must deposit monthly for 40 years if your retirement investment fund (RIF) earns $6.4 \% /$ a compounded monthly. Assume you are depositing your money at the end of the month.
Use the accumulated value annuity formula and solve for R. Check with technology. (google fncalculator)
Recall: $A=\frac{R\left[(1+i)^{\mathrm{n}}-1\right]}{\mathrm{i}}$

Solve numbers $1 \& 2$ with a timeline and the formula and $3 \& 4$ with the annuity formulas.

1. Find the future value of $\$ 600$ deposited at the beginning of each year for 3 years at an annual interest rate of $6 \%$ compounded monthly. Answer: \$ 1913.30
2. Find the present value of a series of regular $\$ 1000$ withdrawals from an investment account earning 5\%/a compounded monthly. Assume you are withdrawing \$1000 per year for 4 years at the end of the year. Answer: $\$ 3536.40$
3. Find the amount borrowed (present value) if you are making car loan payments of $\$ 350 /$ month for 5 years. The interest rate is $1 \% /$ a compounded monthly. Answer: \$20 475.32
4. If your parents deposit $\$ 50$ every month into an education fund, for 15 years, how much will be in the account at the time of the last deposit. Interest rate is 6\%/a compounded monthly. Answer: \$14540.94
