

Name:

Quiz #4

Solve the following problems. Show all of your work and make it clear what your answer is.

1. A research facility has approached you and has offered to pay you to be cryogenically frozen for 85 years. They want to pay you by making a monthly deposit into your savings account that compounds monthly at an APR of 3.6%.

- (a) If you want to have \$181,000,000 (\$181 million) dollars when you wake up 85 years from now, how much should you have them deposit each month?

We'll use the savings formula with $A = 181,000,000$, $Y = 85$, $\text{APR} = .036$ and $n = 12$.

$$\$181,000,000 = PMT \left(\frac{12}{.036} \right) \left[\left(1 + \frac{.036}{12} \right)^{(12)(85)} - 1 \right]$$

$$\$181,000,000 = PMT(6742.360817)$$

$$\$26,841.22 = PMT$$

- (b) How much (in dollars) of the \$181 million was deposited by the research facility and how much (in dollars) came from interest?

$$\text{total deposited} = \$26,841.22(12)(85) = \$27,378,044.40$$

$$\text{interest} = 181,000,000 - 27,378,044.40 = 153,621,955.60$$

- (c) What percentage of the total balance of \$181,000,000 came from interest?

$$\frac{153,621,955.60}{181,000,000} = 84.874\%$$

2. Juniper (age 9) wants to have the best lemonade stand on the entire block. In order to do this, she takes out a loan for \$350 from her bank. The interest on her loan is compounded weekly at an APR of 13%.

- (a) If she agrees to pay the loan off in 2 years, how much will her weekly payment be? How much will she pay back to the bank over the 2-year loan?

We'll use the loan formula with $P = 350$, $\text{APR} = .13$, $n = 52$ and $Y = 2$.

$$PMT = \frac{350 \left(\frac{.13}{52} \right)}{1 - \left(1 + \frac{.13}{52} \right)^{-(52)(2)}} = 3.826$$

so her weekly payment will be \$3.83. That means that

$$\text{total paid} = 3.83(104) = 398.32$$

so she pays a total \$398.32 to the bank.

- (b) If she agrees to pay the loan off in 1 year, how much will her weekly payment be? How much will she pay back to the bank over the 1-year loan?

We'll use the loan formula with $P = 350$, $\text{APR} = .13$, $n = 52$ and $Y = 1$.

$$PMT = \frac{350 \left(\frac{.13}{52} \right)}{1 - \left(1 + \frac{.13}{52} \right)^{-(52)(1)}} = 7.186$$

so her weekly payment will be \$7.19. That means that

$$\text{total paid} = 7.19(52) = 373.88$$

so she pays a total \$373.88 to the bank.

- (c) How much (in dollars) will Juniper save in interest by paying the loan off in 1 year instead of 2 years?

$$398.32 - 373.88 = 24.44$$

she saves \$24.44 if she pays the loan off earlier.