

INTEREST [PIRNOT 8.2]

EX 8.2.2: Jim plans to take a vacation in 3 years. He expects the trip to cost \$1800.

He purchases a CD (Certificate of Deposit) with an annual interest rate of 12%. The CD uses **simple interest**.

How much money must Jim put into the CD to ensure he will have the necessary money for the trip?

Identify all known & unknown quantities:

$$FV = \$1800, \quad P = ???, \quad r = 12\% = 0.12, \quad t = 3 \text{ years}$$

Plug in what you know (FV, r, t) & solve for what you don't know (P):

$$\begin{aligned} FV &= P(1 + rt) \\ \Rightarrow 1800 &= P[1 + (0.12)(3)] \end{aligned}$$

$$\text{(CALCULATOR)} \quad : \quad 1 + (0.12 \cdot 3)$$

$$\Rightarrow 1800 = P(1.36)$$

$$\Rightarrow \frac{1800}{1.36} = P$$

$$\Rightarrow 1323.529412 = P$$

$$\therefore P = 1323.529412 \approx \boxed{\$1323.53} \quad (\text{Rounded to two decimal places since } P \text{ is a dollar value.})$$

EX 8.2.5: Mark is 32 years old and plans to retire at age 65 with \$1,500,000 in his retirement account.

He intends to achieve this by putting some money in an investment paying 6% annual interest compounded daily.

How much money must Mark set aside in this investment to achieve his goal? (Assume 365 days in a year.)

Identify all known & unknown quantities:

$$FV = \$1,500,000, \quad P = ???, \quad r = 6\% = 0.06, \quad m = 365, \quad t = 65 - 32 = 33 \text{ years}, \quad n = mt = 365(33) = 12045$$

NOTE: $m = 365$ since the interest is compounded **daily** & there are 365 days in a year.

Plug in what you know (FV, r, m, n) & solve for what you don't know (P):

$$\begin{aligned} FV &= P \left(1 + \frac{r}{m} \right)^n \\ \Rightarrow 1,500,000 &= P \left(1 + \frac{0.06}{365} \right)^{12045} \end{aligned}$$

$$\text{(CALCULATOR)} \quad : \quad (1 + (0.06/365))^{12045}$$

$$\Rightarrow 1,500,000 = P(7.241564472)$$

$$\Rightarrow \frac{1,500,000}{7.241564472} = P$$

$$\therefore P = 207,137.5606 \approx \boxed{\$207,137.56} \quad (\text{Rounded to two decimal places since } P \text{ is a dollar value.})$$

**IMPORTANT: NEVER, EVER, EVER, ROUND AN INTERMEDIATE CALCULATION.....EVER!
IF YOU NEED TO ROUND A CALCULATION, ONLY ROUND IT AT THE VERY END!**

NOTE: The symbol \Rightarrow means "which implies that".

NOTE: The symbol \therefore means "therefore".