## Pension plan Exercise

Suppose that Joe is 20 today and wishes to start saving so that when he's 65 he can have 20 years of $\$ 100,000$ annual withdrawals. How much should be the annual payments if the interest rate is $8 \%$ payments???????!!!!!!!!((()))))@@\$\$

|  | A | B | C |
| :---: | :---: | :---: | :---: |
| 1 | SAVING FOR RETIREMENT |  |  |
| 2 | Joe's age today | 20 |  |
| 3 | Joe's age at last deposit | 64 |  |
| 4 | Number of deposits | 45 | <-- $=$ B3-B2+1 |
| 5 | Number of withdrawals | 20 |  |
| 6 | Annual withdrawal from age 65 | 100,000 |  |
| 7 | Interest rate | 8\% |  |
| 8 |  |  |  |
| 9 | Annual deposit 2,540.23 |  |  |
| 10 |  |  |  |
| 11 | Joe's age today | Annual amount deposited |  |
| 12 | 20 | 2,540.23 | $<-=\left(\$ \mathrm{~B} \$ 6 /(1+\$ B \$ 7)^{M}(\$ B \$ 3-A 12)\right)^{*} P V(\$ B \$ 7, \$ B \$ 5,-1) / P V(\$ B \$ 7, \$ B \$ 3-A 12+1,-1,1)$ |
| 13 | 22 | 2,978.96 | $<-=\left(\$ B \$ 6 /(1+\$ B \$ 7)^{\mu}(\$ B \$ 3-A 13)\right)^{*} P V(\$ B \$ 7, \$ B \$ 5,-1) / P V(\$ B \$ 7, \$ B \$ 3-A 13+1,-1,1)$ |
| 14 | 24 | 3,496.73 | <-- =(\$B\$6/(1+\$B\$7) $\left.{ }^{(\$ 8 B \$ 3-A 14)}\right)^{*} P V(\$ B \$ 7, \$ B \$ 5,-1) / P V(\$ B \$ 7, \$ B \$ 3-A 14+1,-1,1)$ |
| 15 | 26 | 4,109.02 | Annual Deposit Required to Fund 20 years of $\$ 100,000$ when Joe is 65 |
| 16 | 28 | 4,834.85 |  |
| 17 | 30 | 5,697.73 |  |
| 18 | 32 | 6,727.03 | $\left.\begin{array}{l}40,000 \\ 35,000\end{array}\right]$ |
| 19 | 34 | 7,959.85 | $-\begin{aligned} & 35,000 \\ & 30,000 \end{aligned}$ |
| 20 | 35 | 8,666.90 |  |
| 21 | 38 | 11,239.91 | $\begin{aligned} & 30,000 \\ & 25,000 \end{aligned}$ |
| 22 | 40 | 13,430.03 | $\left[\begin{array}{l} 25,000 \\ 20,000- \end{array}\right]$ |
| 23 | 42 | 16,123.53 | $\begin{aligned} & 20,000 \\ & 15,000 \end{aligned}-$ |
| 24 | 44 | 19,471.60 | $10,000 \text { - }$ |
| 25 | 46 | 23,688.86 |  |
| 26 | 48 | 29,090.61 | 07 - |
| 27 | 50 | 36,159.79 | $\begin{array}{lllllll}20 & 25 & 30 & 35 & 40 & 45 & 50\end{array}$ |
| 28 |  |  | Joe's age at start of plan |
| 29 |  |  |  |

