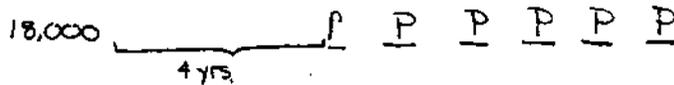


$$X \approx \$95.25$$

This makes sense - the answer is a bit less than $\frac{\$3000}{30} = \100 , but not much less.

3. Borrow \$18,000. The interest grows according to $M(t) = M_0 (1.08)^t$

Let P = annual payments



Take One:	Yr	Balance Owed
	0	18,000
	4	$18,000(1.08)^4 - P$
	5	$18,000(1.08)^5 - P(1.08) - P$
	6	$18,000(1.08)^6 - P(1.08)^2 - P(1.08) - P$
	7	$18,000(1.08)^7 - P(1.08)^3 - P(1.08)^2 - P(1.08) - P$
	8	$18,000(1.08)^8 - P(1.08)^4 - P(1.08)^3 - P(1.08)^2 - P(1.08) - P$
	9	$18,000(1.08)^9 - P(1.08)^5 - P(1.08)^4 - P(1.08)^3 - P(1.08)^2 - P(1.08) - P$

After 6 payments are made the debt is zero. Set the last line equal to zero. Equivalently

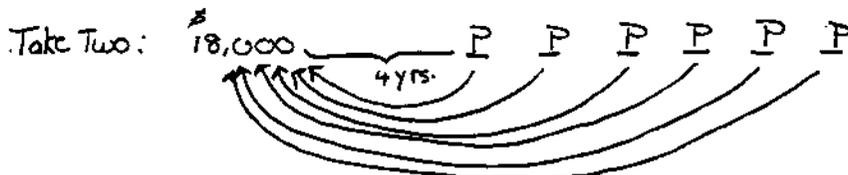
$$18,000(1.08)^9 = [P + P(1.08) + P(1.08)^2 + \dots + P(1.08)^5] = 0$$

$$(*) \quad 18,000(1.08)^9 = P + P(1.08) + \dots + P(1.08)^5$$

$$18,000(1.08)^9 = \frac{P - P(1.08)^6}{-0.08} \quad \xrightarrow{\text{put in closed form}} \quad \frac{P - P(1.08)^6}{1 - 1.08}$$

$$18,000(1.08)^9 = P \left[\frac{1 - (1.08)^6}{-0.08} \right]$$

$$P = \$4904.91$$



The sum of the present values should be \$18,000

$$\frac{P}{(1.08)^1} + \frac{P}{(1.08)^2} + \frac{P}{(1.08)^3} + \frac{P}{(1.08)^4} + \frac{P}{(1.08)^5} + \frac{P}{(1.08)^6} = 18,000$$

$$P \left[\frac{1}{(1.08)^1} + \frac{1}{(1.08)^2} + \dots + \frac{1}{(1.08)^6} \right] = 18,000$$

[Notice - this is eqn (*) divided by (1.08)]

Put in closed form: $S = \frac{1}{(1.08)^1} + \frac{1}{(1.08)^2} + \dots + \frac{1}{(1.08)^6}$

$$- \frac{1}{1.08} S = \frac{1}{(1.08)^2} + \dots + \frac{1}{(1.08)^7}$$

$$S(1 - \frac{1}{1.08}) = \frac{1}{(1.08)^1} - \frac{1}{(1.08)^7}$$