EXERCISE 6-4 (15–20 minutes)

(a)	**Future value of an ordinary annuity of $4,000 a period for 20 periods at 8%**	**$183,047.84**	**($4,000 X 45.76196)**
	Factor (1 + .08)	**X 1.08**	
	Future value of an annuity due of $4,000 a period at 8%	**$197,691.67**	
(b)	**Present value of an ordinary annuity of $2,500 for 30 periods at 10%**	**$23,567.28**	**($2,500 X 9.42691)**
	Factor (1 + .10)	**X 1.10**	
	Present value of annuity due of $2,500 for 30 periods at 10%	**$25,924.00**	**(Or see Table 6-5 which gives $25,924.03)**
(c)	**Future value of an ordinary annuity of $2,000 a period for 15 periods at 10%**	**$63,544.96**	**($2,000 X 31.77248)**
	Factor (1 + 10)	**X 1.10**	
	Future value of an annuity due of $2,000 a period for 15 periods at 10%	**$69,899.46**	
(d)	**Present value of an ordinary annuity of $1,000 for 6 periods at 9%**	**$4,485.92**	**($1,000 X 4.48592)**
	Factor (1 + .09)	**X 1.09**	
	Present value of an annuity date of $1,000 for 6 periods at 9%	**$4,889.65**	**(Or see Table 6-5)**

EXERCISE 6-5 (10–15 minutes)

(a) $30,000 X 4.96764 = $149,029.20.

(b) $30,000 X 8.31256 = $249,376.80.

(c) ($30,000 X 3.03735 X .50663 = $46,164.38.
or (5.65022 – 4.11141) X $30,000 = $46,164.30 (difference of $.08 due to rounding).

EXERCISE 6-6 (15–20 minutes)

(a)	Future value of $12,000 @ 10% for 10 years ($12,000 X 2.59374) =	$31,124.88
(b)	Future value of an ordinary annuity of $600,000 at 10% for 15 years ($600,000 X 31.77248)	$19,063,488.00
	Deficiency ($20,000,000 – $19,063,488)	$936,512.00
(c)	$70,000 discounted at 8% for 10 years: $70,000 X .46319 =	$32,423.30

Accept the bonus of $40,000 now.

(Also, consider whether the 8% is an appropriate discount rate since the president can probably earn compound interest at a higher rate without too much additional risk.)

EXERCISE 6-7 (12–17 minutes)

(a)	$50,000 X .31524	=	$15,762.00
	+ $5,000 X 8.55948	=	42,797.40
			$58,559.40
(b)	$50,000 X .23939	=	$11,969.50
	+ $5,000 X 7.60608	=	38,030.40
			$49,999.90

The answer should be $50,000; the above computation is off by 10¢ due to rounding.

(c)	$50,000 X .18270	=	$ 9,135.00
	+ $5,000 X 6.81086	=	34,054,30
			$43,189.30

EXERCISE 6-8 (10–15 minutes)

(a)	Present value of an ordinary annuity of 1 for 4 periods @ 8%	3.31213
	Annual withdrawal	X $20,000
	Required fund balance on June 30, 2013	$66,242.60

(b) Fund balance at June 30, 2013 / Future value of an ordinary annuity at 8% for 4 years

$$\frac{\$66,242.60}{4.50611} = \$14,700.62$$

Amount of each of four contributions is $14,700.62

EXERCISE 6-9 (10 minutes)

The rate of interest is determined by dividing the future value by the present value and then finding the factor in the FVF table with n = 2 that approximates that number:

$\$123,210 = \$100,000\ (FVF_{2,\ i\%})$
$\$123,210 \div \$100,000 = (FVF_{2,\ i\%})$
$1.2321 = (FVF_{2,\ i\%})$—reading across the n = 2 row reveals that i = 11%.

EXERCISE 6-10 (10–15 minutes)

(a) The number of interest periods is calculated by first dividing the future value of $1,000,000 by $92,296, which is 10.83471—the value $1.00 would accumulate to at 10% for the unknown number of interest periods. The factor 10.83471 or its approximate is then located in the Future Value of 1 Table by reading down the 10% column to the 25-period line; thus, 25 is the unknown number of years Mike must wait to become a millionaire.

(b) The unknown interest rate is calculated by first dividing the future value of $1,000,000 by the present investment of $182,696, which is 5.47357—the amount $1.00 would accumulate to in 15 years at an unknown interest rate. The factor or its approximate is then located in the Future Value of 1 Table by reading across the 15-period line to the 12% column; thus, 12% is the interest rate Venus must earn on her investment to become a millionaire.

EXERCISE 6-11 (10–15 minutes)

(a) Total interest = Total payments—Amount owed today
$162,745.30 (10 X $16,274.53) – $100,000 = $62,745.30.

(b) Sosa should borrow from the bank, since the 9% rate is lower than the manufacturer's 10% rate determined below.

$PV–OA_{10,\ i\%}$ = $100,000 ÷ $16,274.53
= 6.14457—Inspection of the 10 period row reveals a rate of 10%.

EXERCISE 6-12 (10–15 minutes)

Building A—PV = $600,000.

Building B—
Rent X (PV of annuity due of 25 periods at 12%) = PV
$69,000 X 8.78432 = PV
$606,118.08 = PV

Building C—
Rent X (PV of ordinary annuity of 25 periods at 12%) = PV
$7,000 X 7.84314 = PV
$54,901.98 = PV

Cash purchase price	$650,000.00
PV of rental income	– 54,901.98
Net present value	$595,098.02

Answer: Lease Building C since the present value of its net cost is the smallest.

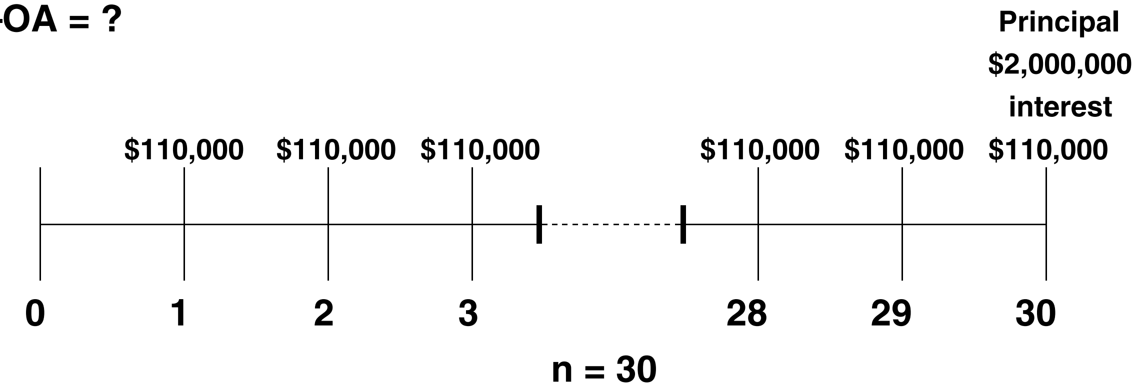
EXERCISE 6-13 (15–20 minutes)

Time diagram:

Lance Armstrong, Inc.

PV = ? **i = 5%**

PV–OA = ?



Formula for the interest payments:

$$PV\text{–}OA = R\,(PVF\text{–}OA_{n,\,i})$$

$$PV\text{–}OA = \$110{,}000\,(PVF\text{–}OA_{30,\,5\%})$$

$$PV\text{–}OA = \$110{,}000\,(15.37245)$$

$$PV\text{–}OA = \underline{\underline{\$1{,}690{,}970}}$$

Formula for the principal:

$$PV = FV\,(PVF_{n,\,i})$$

$$PV = \$2{,}000{,}000\,(PVF_{30,\,5\%})$$

$$PV = \$2{,}000{,}000\,(0.23138)$$

$$PV = \underline{\underline{\$462{,}760}}$$

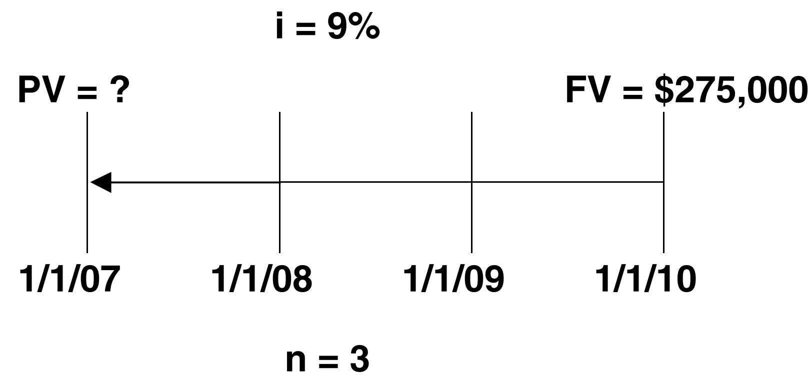
The selling price of the bonds = $1,690,970 + $462,760 = $2,153,730.

SOLUTIONS TO PROBLEMS

PROBLEM 6-1

(a) Given no established value for the building, the fair market value of the note would be estimated to value the building.

Time diagram:



Formula: $PV = FV\ (PVF_{n,\ i})$

$PV = \$275{,}000\ (PVF_{3,\ 9\%})$

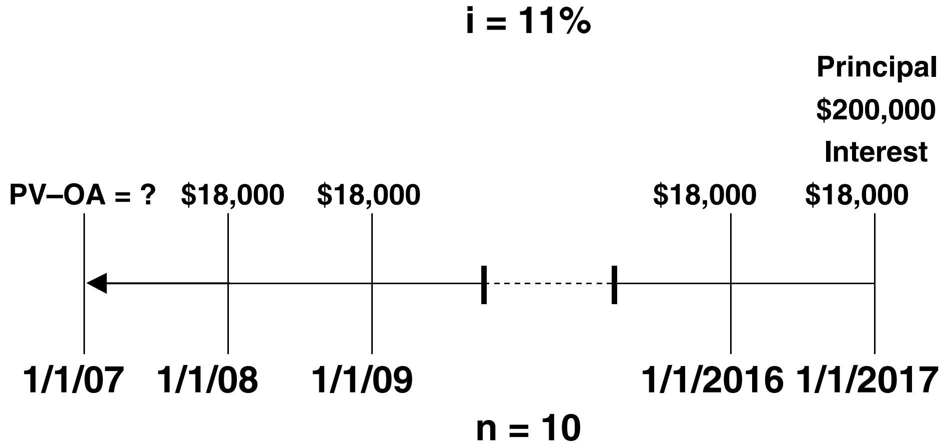
$PV = \$275{,}000\ (.77218)$

$PV = \underline{\underline{\$212{,}349.50}}$

Cash equivalent price of building	$212,349.50
Less: Book value ($250,000 – $100,000)	150,000.00
Gain on disposal of the building	$ 62,349.50

PROBLEM 6-1 (Continued)

(b) Time diagram:



Present value of the principal

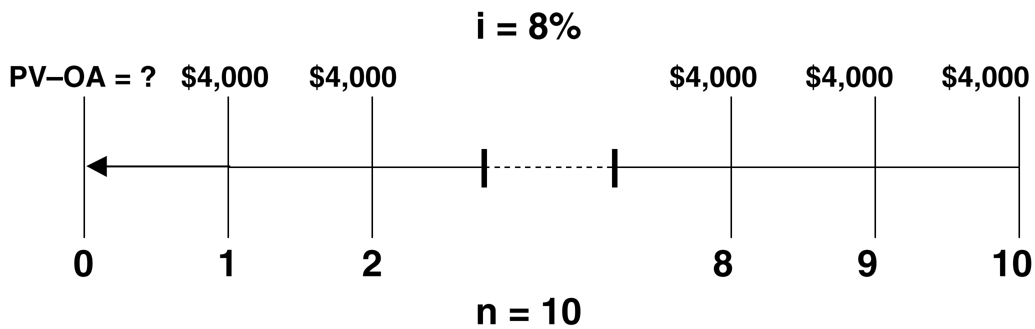
$FV\ (PVF_{10,\ 11\%}) = \$200{,}000\ (.35218)$ = $ 70,436.00

Present value of the interest payments

$R\ (PVF\text{–}OA_{10,\ 11\%}) = \$18{,}000\ (5.88923)$ = 106,006.14

Combined present value (purchase price) $176,442.14

(c) Time diagram:



Formula:

$PV\text{–}OA = R\ (PVF\text{–}OA_{n,i})$

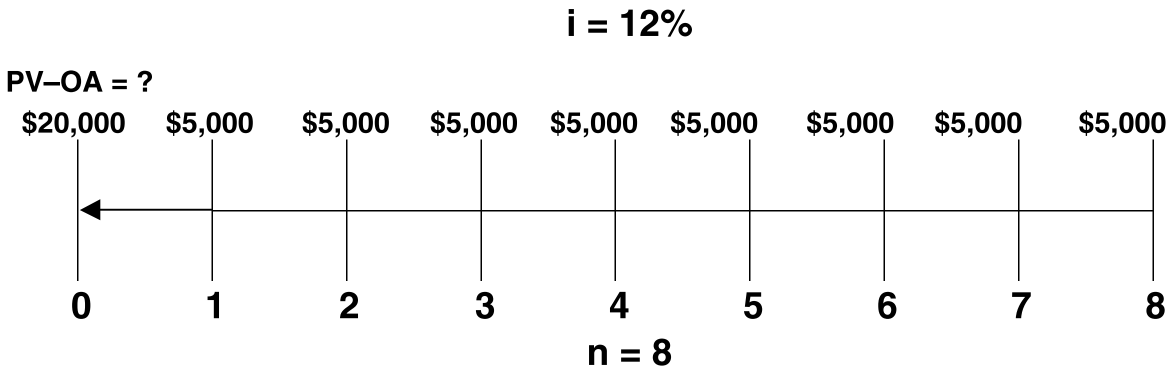
$PV\text{–}OA = \$4{,}000\ (PVF\text{–}OA_{10,\ 8\%})$

$PV\text{–}OA = \$4{,}000\ (6.71008)$

$PV\text{–}OA = \underline{\underline{\$26{,}840.32}}$ (cost of machine)

PROBLEM 6-1 (Continued)

(d) Time diagram:



Formula: $\text{PV–OA} = R\,(\text{PVF–OA}_{n,i})$

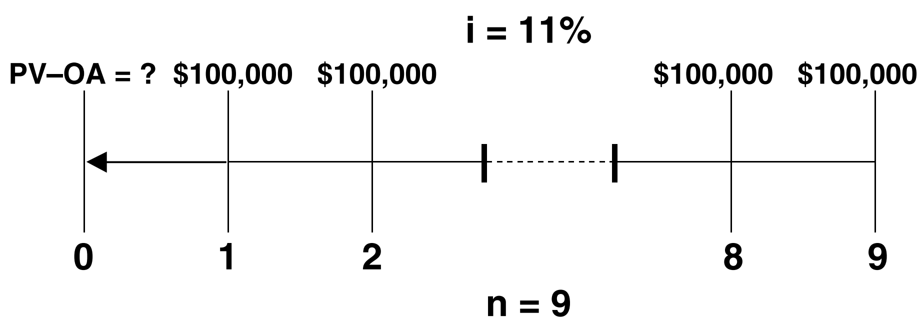
$\text{PV–OA} = \$5{,}000\,(\text{PVF–OA}_{8,\ 12\%})$

$\text{PV–OA} = \$5{,}000\,(4.96764)$

$\text{PV–OA} = \underline{\underline{\$24{,}838.20}}$

Cost of tractor = \$20,000 + \$24,838.20 = $\underline{\underline{\$44{,}838.20}}$

(e) Time diagram:



Formula: $\text{PV–OA} = R\,(\text{PVF–OA}_{n,\ i})$

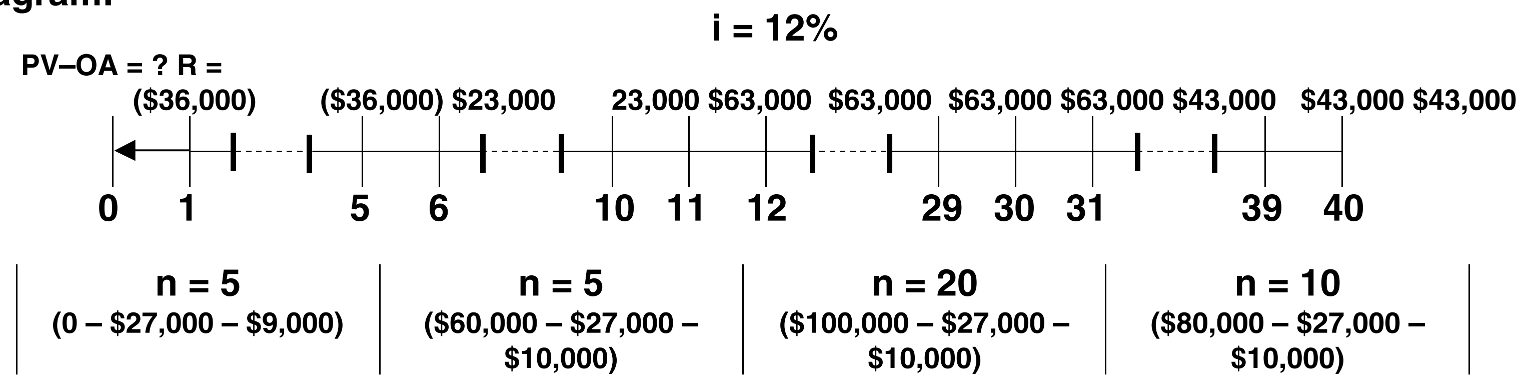
$\text{PV–OA} = \$100{,}000\,(\text{PVF–OA}_{9,\ 11\%})$

$\text{PV–OA} = \$100{,}000\,(5.53705)$

$\text{PV–OA} = \underline{\underline{\$553{,}705}}$

PROBLEM 6-6

Time diagram:



Formulas:

PV–OA = R ($PVF–OA_{n,\ i}$)	PV–OA = R ($PVF–OA_{n,\ i}$)	PV–OA = R ($PVF–OA_{n,\ i}$)	PV–OA =R ($PVF–OA_{n,\ i}$)
PV–OA = ($36,000)($PVF–OA_{5,\ 12\%}$)	PV–OA = $23,000 ($PVF–OA_{10-5,\ 12\%}$)	PV–OA = $63,000 ($PVF–OA_{30–10,\ 12\%}$)	PV–OA = $43,000 ($PVF–OA_{40–30,\ 12\%}$)
PV–OA = ($36,000)(3.60478)	PV–OA = $23,000 (5.65022 – 3.60478)	PV – OA = $63,000 (8.05518 – 5.65022)	PV – OA = $43,000 (8.24378 – 8.05518)
PV–OA =($129,772.08)	PV–OA = $23,000 (2.04544)	PV–OA = $63,000 (2.40496)	PV–OA = $43,000 (.18860)
	PV–OA = $47,045.12	PV–OA = $151,512.48	PV–OA = $8,109.80

Present value of future net cash inflows:

$(129,772.08)
47,045.12
151,512.48
8,109.80
$ 76,895.32

Nicole Bobek should accept no less than $76,895.32 for her vineyard business.