

# Time Value of Money - Six Functions of a Dollar

## Appraisal Training: Self-Paced Online Learning Session

### Lesson 4: Future Worth of \$1 per Period

#### Problem 1

Calculate the future value of each payment (*PMT*) listed below using the future worth of \$1 per period (*FW\$1/P*) factors in AH 505:

	PMT (Periodic Payment)	# periods (years)	Annual Rate (%)	FV (= PMT x FW\$1/P)
1	\$1,000	5	4	
2	\$100	40	1	
3	\$2,000	20	2	
4	\$1,000	10	5	
5	\$1,000	12	1	

#### Solution:

To solve, calculate the future value of each payment amount by multiplying the amount by the future worth of \$1 per period factor found in the AH 505 annual compound interest tables for the given interest rate and term.

1.  $FV = PMT \times FW\$1/P$   
 $FV = \$1,000 \times 5.416323$  (AH 505, page 25, column 2)  
 $FV = \$5,416.32$
2.  $FV = PMT \times FW\$1/P$   
 $FV = \$100 \times 48.886373$  (AH 505, page 13, column 2)  
 $FV = \$4,888.64$
3.  $FV = PMT \times FW\$1/P$   
 $FV = \$2,000 \times 24.297370$  (AH 505, page 17, column 2)  
 $FV = \$48,594.74$
4.  $FV = PMT \times FW\$1/P$   
 $FV = \$1,000 \times 12.577893$  (AH 505, page 29, column 2)  
 $FV = \$12,577.89$
5.  $FV = PMT \times FW\$1/P$   
 $FV = \$1,000 \times 12.682503$  (AH 505, page 13, column 2)  
 $FV = \$12,682.50$

## Problem 2

You invest \$2,000 in an IRA account at the end of each year for 20 years. Assuming an annual interest rate of 8%, with annual compounding, how much will you have at the end of 20 years?

### Solution:

To solve, calculate the future worth of a series of equal future payments using the  $FW\$1/P$  factors in annual compound interest tables in AH 505. Multiply the payment amount by the  $FW\$1/P$  factor for the interest rate of 8% and 20 year term.

- $FV = PMT \times FW\$1/P$  (8%, 20 yrs, annual)  
 $FV = \$2,000 \times 45.761964$  (AH 505, page 41, column 2)  
 $FV = \$91,523.93$

## Problem 3

A property generates \$15,000 annually over a seven-year period. At the end of each year, the income is deposited into an account that pays interest of 6 percent, compounded annually. How much will be in the account after seven years?

### Solution:

To solve, calculate the future worth of a series of equal future payments using the  $FW\$1/P$  factor in the annual compound interest tables in AH 505. Multiply the payment amount by the  $FW\$1/P$  factor for the interest rate of 6% and 7 year term.

- $FV = PMT \times FW\$1/P$  (6%, 7 yrs, annual)  
 $FV = \$15,000 \times 8.393838$  (AH 505, page 33, column 2)  
 $FV = \$125,908$

## Problem 4

A friend plans to invest \$2,000 in an IRA account at the end of each year, starting when she is 25 years old and continuing until her expected retirement at age 65 (40 years later). She expects to earn an annual return of 8% a year on her investment. What is the expected value of the account on her retirement date?

### Solution:

To solve, calculate the future worth of the annual deposits using the  $FW\$1/P$  factor in the annual compound interest tables in AH 505. Multiply the payment amount by the  $FW\$1/P$  factor for the interest rate of 8% and 40 year term (65 less your current age of 25).

- $FV = PMT \times FW\$1/P$  (8%, 40 yrs, annual)  
 $FV = \$2,000 \times 259.056519$  (AH 505, page 41, column 2)  
 $FV = \$518,113.04$

### Problem 5

You deposit \$1,000 at the end of each month, earning an annual rate of 12% with monthly compounding. How much will you have at the end of 15 years?

#### Solution:

To solve, calculate the future worth of the monthly deposits using the **monthly**  $FW\$1/P$  factor in the monthly compound interest tables in AH 505. Multiply the payment amount by the  $FW\$1/P$  factor for the interest rate of 12% and 15 year term.

- $FV = PMT \times FW\$1/P$  (12%, 15 yrs, monthly)  
 $FV = \$1,000 \times \mathbf{499.580198}$  (AH 505, page 56, column 2)  
 $FV = \$499,580.20$

### Problem 6

Johnny will begin college in 18 years. If you deposit \$100 at the end of each month for the next 18 years in Johnny's college fund, how much will Johnny have for college? Assume an earnings rate of 9% compounded monthly.

#### Solution:

To solve, calculate the future worth of the monthly deposits using the **monthly**  $FW\$1/P$  factor in the monthly compound interest tables in AH 505. Multiply the payment amount by the  $FW\$1/P$  factor for the interest rate of 9% and 18 year term.

- $FV = PMT \times FW\$1/P$  (9%, 18 yrs, monthly)  
 $FV = \$100 \times \mathbf{536.351674}$  (AH 505, page 44, column 2)  
 $FV = \$53,635.17$