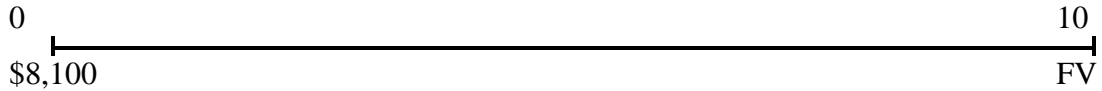


**Chapter 4 - Homework Questions and Problems Answers**

1. **Simple Interest versus Compound Interest.** First City Bank pays 6 percent simple interest on its savings account balances, whereas Second City Bank pays 6 percent interest compounded annually. If you made a deposit of \$8,100 in each bank, how much more money would you earn from your Second City Bank account at the end of 10 years?

**Answer:** The time line for the cash flows is:



The simple interest per year is:  $\$8,100 \times .06 = \$486$

So, after 10 years, you will have:  $486 \times 10 = \$4,860$  in interest.

The total balance will be  $\$8,100 + 4,860 = \$12,960$

With compound interest, we use the future value formula:

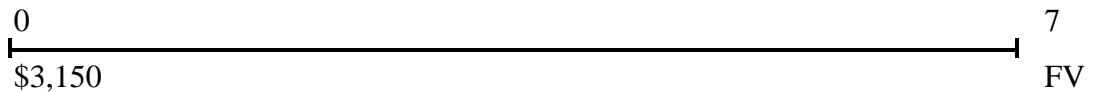
$$FV = PV(1 + r)^t \quad FV = \$8,100(1.06)^{10} \quad FV = \$14,505.87$$

The difference is:  $\$14,505.87 - 12,960 = \$1,545.87$

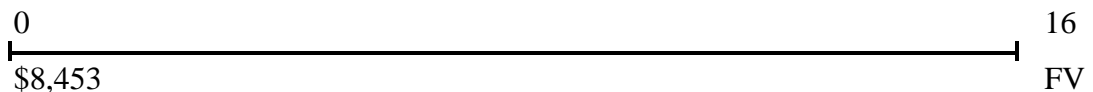
2. **Calculating Future Values.** For each of the following, compute the future value:

Present Value	Years	Interest Rate	Future Value
\$ 3,150	7	13%	
8,453	16	7	
89,305	19	9	
227,382	26	5	

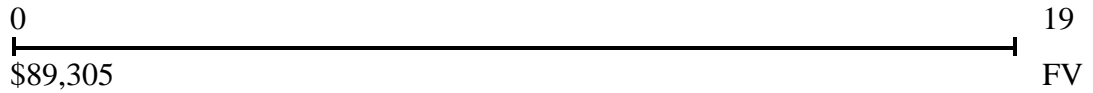
**Answer:** To find the FV of a lump sum, we use:  $FV = PV(1 + r)^t$



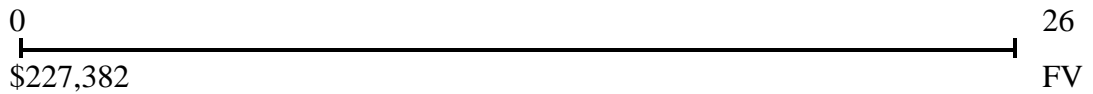
$$FV = \$3,150(1.13)^7 = \$7,410.71$$



$$FV = \$8,453(1.07)^{16} = \$24,954.64$$



$$FV = \$89,305(1.09)^{19} = \$459,176.06$$



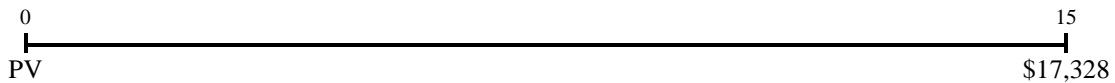
$$FV = \$227,382(1.05)^{26} = \$808,495.97$$

3. **Calculating Present Values.** For each of the following, compute the present value:

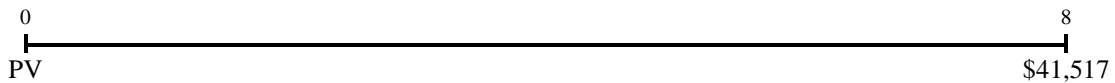
Present Value	Years	Interest Rate	Future Value
	15	7%	\$ 17,328
	8	11	41,517
	13	10	790,382
	25	13	647,816

**Answer:** To find the PV of a lump sum, we use:

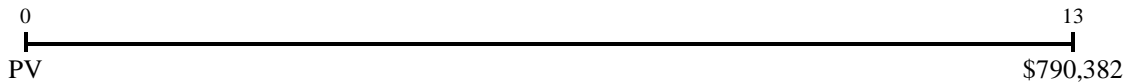
$$PV = FV / (1 + r)^t$$



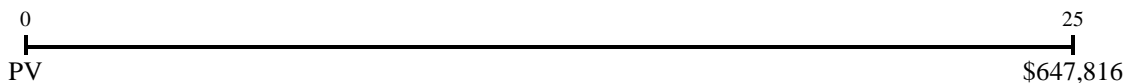
$$PV = \$17,328 / (1.07)^{15} = \$6,280.46$$



$$PV = \$41,517 / (1.11)^8 = \$18,015.33$$



$$PV = \$790,382 / (1.10)^{13} = \$228,945.51$$



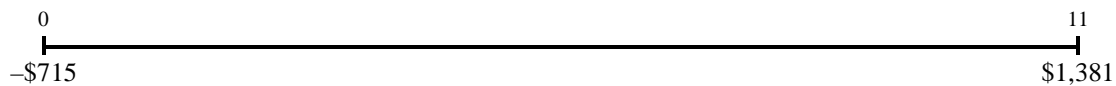
$$PV = \$647,816 / (1.13)^{25} = \$30,153.40$$

4. **Calculating Interest Rates.** Solve for the unknown interest rate in each of the following:

Present Value	Years	Interest Rate	Future Value
\$ 715	11		\$ 1,381
905	8		1,718
15,000	23		141,832
70,300	16		312,815

**Answer:** To answer this question, we can use either the FV or the PV formula. Both will give the same answer since they are the inverse of each other. We will use the FV formula, that is:

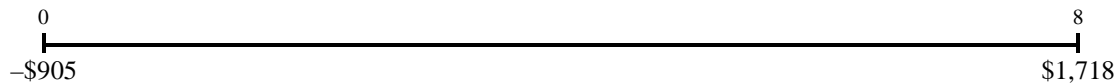
$$FV = PV(1 + r)^t \quad \text{Solving for } r, \text{ we get: } r = (FV / PV)^{1/t} - 1$$



$$FV = \$1,381 = \$715(1 + r)^{11}$$

$$r = (\$1,381 / \$715)^{1/11} - 1$$

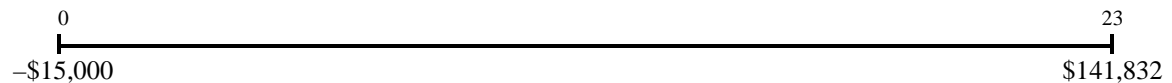
$$r = .0617, \text{ or } 6.17\%$$



$$FV = \$1,718 = \$905(1 + r)^8$$

$$r = (\$1,718 / \$905)^{1/8} - 1$$

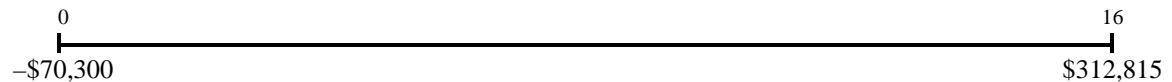
$$r = .0834, \text{ or } 8.34\%$$



$$FV = \$141,832 = \$15,000(1 + r)^{23}$$

$$r = (\$141,832 / \$15,000)^{1/23} - 1$$

$$r = .1026, \text{ or } 10.26\%$$



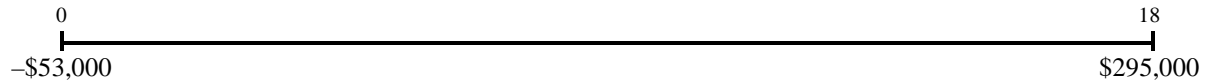
$$FV = \$312,815 = \$70,300(1 + r)^{16}$$

$$r = (\$312,815 / \$70,300)^{1/16} - 1$$

$$r = .0978, \text{ or } 9.78\%$$

5. **Calculating Rates of Return.** Assume the total cost of a college education will be \$295,000 when your child enters college in 18 years. You presently have \$53,000 to invest. What annual rate of interest must you earn on your investment to cover the cost of your child's college education?

**Answer:** The time line is:



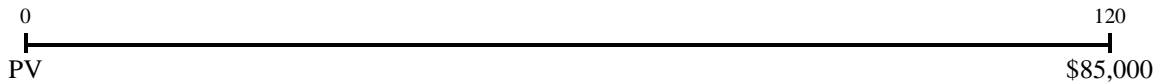
To answer this question, we can use either the FV or the PV formula. Both will give the same answer since they are the inverse of each other. We will use the FV formula, that is:

$$FV = PV(1 + r)^t$$

Solving for  $r$ , we get:  $r = (FV / PV)^{1/t} - 1$        $r = (\$295,000 / \$53,000)^{1/18} - 1$   
 $r = .1001$ , or 10.01%

24. **Calculating Present Values.** You need \$85,000 in 10 years. If you can earn .65 percent per month, how much will you have to deposit today?

**Answer:** The time line is:



To find the PV of a lump sum, we use:

$$PV = FV / (1 + r)^t$$

$$PV = \$85,000 / (1.0065)^{120}$$

$$PV = \$39,062.98$$