1. **Appendix 13A: the concept of present value (Slide #1 is the title slide for this appendix)**

*Learning Objective 7: Understand present value concepts and the use of present value tables.*

2

#### The mathematics of interest

* + 1. A dollar received today is worth **more** than a dollar received a year from now because you can put it in the bank today and have **more than a dollar** a year from now.

3

* + 1. **An example**
       1. Assume a bank pays **8%** interest on a $100 deposit made today.
       2. **How much will the $100 be worth in one year**?

4

* + - 1. The equation needed to answer this question is as shown, where:
         1. F = the ending balance.
         2. P = the amount invested now.
         3. r= the rate of interestper period.
         4. n *=* the number of periods.
      2. Solving this equation, the answer is **$108**.
      3. The $100 outlay is called the **present value** of the $108 amount to be received in one year. It is also known as the **discounted value** of the future $108 receipt.

5

* + 1. **Compound interest – the example continued**
       1. **What if the $108 was left in the bank for a second year**? How much would the original $100 be worth at the end of the second year?

6

* + - 1. The equation needed to answer this question is as shown, where:
         1. F = the ending balance.
         2. P *=* theamount invested now*.*
         3. r = the rate of interest per period.
         4. n = the number of periods.
      2. Solving this equation, the answer is **$116.64**.
         1. The interest that is paid in the second year on the interest earned in the first year is known as **compound interest**.

7

#### Computation of present value

* + 1. An investment can be viewed in two ways – its **future value** or its **present value**. In the example just completed, the present value was known and the future value was the unknown that we computed. **Let’s look at the opposite situation** – the future value is known and the present value is the unknown that we must compute.

8

* + 1. **Present value – an example**
       1. Assume a bond will pay **$100** in two years. If an investor can earn **12%** on their investments, **what is the present value of the bond**?

9

* + - 1. The equation needed to answer this question is as shown, where:
         1. F = the ending balance.
         2. P *=* theamount invested now*.*
         3. r = the rate of interest per period.

9

* + - * 1. n = the number of periods.
      1. Solving this equation, *P* = **$79.72**.
         1. This process is called **discounting**. We have discounted the $100 to its present value of $79.72. The interest rate used to find the present value is called the **discount rate**.

10

* + - 1. We can verify, as shown on the slide, that if we put **$79.72** in the bank today at **12%** interest, it would grow to **$100** at the end of two years.

11

* + - 1. **We can also use the present value of $1 table from Appendix 13B-1** to verify the accuracy of the $79.72 figure.

12

* + - * 1. An excerpt of the appropriate table is as shown.
        2. The appropriate present value factor is **0.797** and the present value is **$79.72**.

13-14

*Quick Check – present value calculations*

#### Present value of a series of cash flows

* + 1. Although some investments involve a single sum to be received (or paid) at a single point in the future, other investments involve a **series of identical cash flows** known as an **annuity**.

15

* + 1. **Lacey Inc. – an example**
       1. Assume Lacey Inc. purchased a tract of land on which a **$60,000** payment will be due **each of the next five years**.

16

* + - 1. What is the present value of this stream of cash payments when the discount rate is 12%?
      2. **Appendix 13B-2 contains a present value of an annuity of $1 table**. An excerpt from this table is as shown.

17

* + - 1. The appropriate present value factor is **3.605**. The present value is **$216,300**.

18-19

*Quic Concept Check – present value of an annuity calculations*