Financial Calculator

Guide and Workbook

Second Edition

by

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for

Contemporary Mathematics for Business
and Consumers, 6th Edition

by Robert A. Brechner

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Foreword

Instructors

  The Business Calculator Workbook is designed to be used in conjunction with *Contemporary Mathematics for Business and Consumers, 6th Edition,* by Robert A. Brechner. It is also an additional resource for training your students in using a business analyst or financial calculator. The calculator selected for this workbook is the Texas Instruments *BA II Plus™* Advanced Business Analyst, which may be purchased at most office supply stores and department stores for about $30.

  Each section in this workbook shows how to use the calculator to work out solutions to problems similar to those found in selected chapters of Brechner's textbook. Most types of problems are covered. Emphasis is on the use of the financial functions of the calculator. The only assumption is that students have the identical calculator. If another model of calculator is used, it is possible, or even likely, that other keystroke sequences will be needed to achieve correct results. Some calculators will not be able to do all the types of problems demonstrated in this workbook. In particular, higher financial and business functions, such as break even analysis, may not be available on all business calculators.

  The style of this workbook is similar to that which Brechner uses in his textbook. Students who use the textbook are accustomed to this style. Therefore students using this workbook will find each sequence of problem presentation familiar to them as they embark on gaining proficiency in the use of the calculator.

Students

  A business person my often have need to solve a financial analysis or business problem while away from the office. A variety of calculators have been manufactured since 1972 that specialize in employing pre-programmed financial formulas to make the solution of such problems relatively simple. This financial calculator workbook shows how to solve a variety of problems using the Texas Instruments *BA II Plus™* which may be purchased at most office supply stores and department stores for about $30. This is one of the most popular financial calculators available, and is capable of solving a wide variety of business and financial analysis problems. This calculator has a mode that prompts the user for entries to solve a variety of problem types. This mode is entered by pressing the 2nd function key followed by a key, above which is printed the code for the function. The calculator remains in prompted entry mode until deliberately exited. This is called the *Spreadsheet* mode.

  This workbook is organized into sections that contain solution methods of selected financial problem types from *Contemporary Mathematics for Business and Consumers, 6th Edition* by Robert A. Brechner. Each section is named for the type of problem it explains. Each has a problem statement, calculator solution keystroke sequence, a Try It problem and a group of practice problems to solve. Key stroke sequences are shown with display results that appear immediately upon completion of the sequence. Entry of numbers is shown in bold, without key symbols. For example:

1 ⧉+⧉ **1001** ⧉=⧉ | 1,002.00 |

Emphasis is on the use of the built-in financial formulas and prompted spreadsheets provided by the calculator. Use the table of contents to guide you directly to the section that applies to the type of problem you desire to solve.

Preface to the Second Edition

A big thank you to Robert Brechner for the many suggestions he provided for this edition of the workbook.

The manual has been extensively modified for easier use. It was rearranged to introduce all calculator modes first. The sample topics and problem sets are now arranged generally in the same sequence they are presented in the text. Text in this workbook has been edited and modified for improved meaning and clarity.

MG
May, 2011

Calculator Modes

The Texas Instruments *BA II Plus*™ calculator has two modes: *standard* and *spreadsheet*.

Standard Mode

The *standard mode* operates as most calculators do, with the sequence of keys pressed being dependent upon the desired calculation, without any assistance to the user. Operations in the standard mode include both primary key operations and shifted key functions, using the 2nd key to access the shifted functions. Some of the example problems below will be solved using standard mode key sequences and reference the chapter in which these problems are explained.

Spreadsheet Mode

The *spreadsheet mode* includes several types of business problems involving entry of multiple values which are prompted in the display by codes of up to three letters, such as OLD. The calculator has a variety of built-in financial and business formulas that operate on the entered data to produce the desired solution. Using prompted spreadsheets usually requires the user to first enter that mode then clear all previous results. Spreadsheet mode key sequences will be shown for problems whose solutions require them. Examples that use spreadsheet mode include the clearing step.

Mode and Memory Contents at Turn-on

Turn the calculator on or off by pressing the ON/OFF button located in the upper right corner of the keyboard. The calculator will turn itself off automatically after a few minutes of non-use.

Regardless of the mode of the calculator when the user turns it off, it will not be in spreadsheet mode when it is turned on, but previously entered values will still be in memory.

Basic operations

Example: Changing the Number of Decimal Places Displayed

The *BA II Plus*™ calculator's display normally defaults to two decimal places. However, the number of decimal places the calculator displays may be changed. To change the number of decimal places displayed, proceed as follows:

1. Put the calculator into format mode:

   FORMAT

   [2nd] [.] | DEC=   2.00 |

2. Enter the number of decimal places (in this case, 3) to be displayed:

   3 [ENTER] | DEC=   3.000 |

3. Exit format mode:

QUIT

[2nd] [CPT] | 0.000 |

Storing and Recalling Constants – All Chapters

The calculator has 10 memories that retain their contents even when the calculator is turned off. The memories may be cleared individually by storing a zero, or they may all be cleared simultaneously (all 10 memories will contain zero) by using 2nd function keys. Storing a value in a memory location replaces the previous value stored there.

Example: Storing a Value

Store a six digit value for pi (π) in memory 6 of the calculator. This value is 3.14159.

Solution Strategy

1. Enter the value to be stored then select the memory in which to store it.

3.14159 [STO] **6** | 3.14 |

Note that although only two decimal places are displayed (unless a different number of display decimal places has been set), the calculator stores all digits entered. Note also that the stored value is rounded to the number of displayed decimal places.

Example: Recalling a Stored Value

Recall the value for pi stored in memory 6 of the calculator as part of a calculation:

What is the circumference of a circle, to four decimal places, whose diameter is 5.7 inches (the formula for the circumference is $C = \pi D$, where D is the diameter)?

Solution Strategy

1. Set four decimal places to be displayed.

FORMAT   QUIT

[2nd] [·] **4** [ENTER] [2nd] [CPT] | 0.0000 |
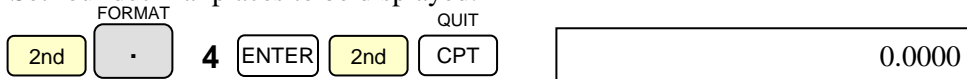
2. Calculate the circumference using the formula and the value for pi stored in memory 6.

5.7 [×] [RCL] **6** [=] | 17.9071 |

Note that the five decimal value would be 17.90706, but because the calculator has been set to display four places, the final digit is rounded up in this case.

Example: Clearing All Ten Calculator Memories at Once

How may all memories be cleared (set to zero) simultaneously?

Solution Strategy

2nd	0	2nd	CE/C

M0 =	0.00

2nd	CPT

	0.00

Arithmetic – Chapters 1, 2 and 3

Problems involving addition, subtraction, multiplication and division use algebraic entry order; that is, the keys are pressed in the same sequence as you would write the arithmetic problem – left to right, with the equal sign key being pressed last.

Example: Addition

What is the sum of 3.4, 18.29 and 11.6?

Solution Strategy

3.4 [+] 8.29 [+] 11.6 [=]

	33.29

Try It – a

Evaluate the following expression to two decimal places.

a. 20.44 + 6.8

Example: Subtraction

What is the difference between 134.98 and 56.12?

Solution Strategy

134.98 [−] 56.12 [=]

	78.86

Try It – b

Evaluate the following expression to two decimal places.

b. 113.95 – 86.04

Example: Multiplication

What is the product of 4.22 and 34?

Solution Strategy

4.22 $\boxed{\times}$ **34** $\boxed{=}$ | 143.48 |

Try It – c

Evaluate the following expression to two decimal places.

c. 19.99×6

Example: Division

What is the quotient of 12,855.42 divided by 1,112.67?

Solution Strategy

12855.42 $\boxed{\div}$ **1112.67** $\boxed{=}$ | 11.55 |

Try It – d

Evaluate the following expression to two decimal places.

d. $1,744.84 \div 15$

Example: Mixed Operators

What is the value of $25.1 + 856 - 11.83 \times 3.45?$

Solution Strategy

25.1 $\boxed{+}$ **856** $\boxed{-}$ **11.83** $\boxed{\times}$ **3.45** $\boxed{=}$

| 2,998.98 |

Note: expressions are evaluated from left to right as they are entered. This means that the sum and difference are calculated, then the result is multiplied by 3.45.

Try It – e

Evaluate the following expression to two decimal places.

e. $16 + 38.2 \div 9.42 - 0.87$

Example: Parentheses

When the operator uses parentheses, the *calculator* changes the order of evaluation: it evaluates the expression within the parentheses first, then it evaluates the whole expression, using the result it got for the parenthetical expression as if it were a single value.

Re-evaluate the previous example written using parentheses as follows:

$$25.1 + 856 - (11.83 \times 3.45)$$

Solution Strategy

25.1 $\boxed{+}$ 856 $\boxed{-}$ $\boxed{(}$ 11.83 $\boxed{\times}$ 3.45 $\boxed{)}$ $\boxed{=}$

840.29

Try It – f

Evaluate the following expression to two decimal places.

f. $(16 + 38.2) \div (9.42 - 0.87)$

Review Exercises

Evaluate expressions 1 through 7.

1. $1466.54 + 234.02 + 691.11$
2. $664.29 - 318.49$
3. 841×70.04
4. $115,000 \div 582.15$
5. $(59.44 - 33.76) \div (32.1 + 56.22)$
6. $1,408 - (15.6 \times 36.87)$
7. $688.43 + (1,882.64 \div 89.41)$
8. Paulo's Passionate Pizza sold two large combination pizzas and 3 medium pepperoni pizzas to a customer during half-time of a local sports broadcast. If a large combination sells for $21.35, and a medium pepperoni is priced at $9.25, and the tax rate is 7.5%, what was the total cost to the customer?
9. Fifteen employees contributed an average of $1.83 per week to the United Way campaign by method of payroll deduction. What is the total annual contribution of the employees?

10. A corporate jet has a fuel tank in each wing and a centerline tank. At 15 degrees Celcius each wing holds 4,640 pounds of fuel and the centerline tank has a capacity of 1,978 pounds. How much of the jet's weight would be fuel if all tanks were full?

Try It Solutions

a. **20.44** $+$ **6.8** $=$ 　　　　　　27.24

b. **113.95** $-$ **86.04** $=$ 　　　　　　27.91

c. **19.99** $\times$ **6** $=$ 　　　　　　119.94

d. **1,744.84** $\div$ **15** $=$ 　　　　　　116.32

e. **16** $+$ **38.2** $\div$ **9.42** $-$ **0.87** $=$

　　　　　　4.48

f. **(** **16** $+$ **38.2** **)** $\div$ **(** **9.42** $-$ **0.87** **)** $=$

　　　　　　6.34

Review Exercise Solutions

1. 2,391.67
2. 345.80
3. 58,903.64
4. 197.54
5. 0.29
6. 832.83
7. 709.49
8. $((2 \times \$21.35) + (3 \times \$9.25)) \times 1.075 = \$75.73$
9. $15 \times \$1.83 \times 52 = \$1,427.40$
10. $2 \times 4,640 + 1,978 = 11,258.00$ pounds

Converting Fractions to Decimals – Chapter 3

   Although the calculator has no fraction mode arithmetic, a fraction can still be converted to a decimal by entering the fraction as a division problem.

Example: Convert a Fraction to a Decimal

   Convert $\frac{3}{8}$ to a decimal.

Solution Strategy

   Divide 3 by 8 as follows:

3 ÷ **8** =   0.38

   The actual value is 0.375, which the calculator maintains internally. To see this, set the calculator to display three decimal places and do the problem again.

Try It – a-c

   Convert the following fractions to decimal expressions to *four* decimal places.

   a. $\frac{5}{11}$

   b. $\frac{7}{4}$

   c. $\frac{1}{6}$

Example: Convert a Mixed Number to a Decimal

   Calculate the decimal value of 1¼.

Solution Strategy

   First calculate the fraction part, then add the whole number part as follows:

1 ÷ **4** + **1** =   1.25

Try It – d-e

Convert the following mixed numbers to decimal expressions to *four* decimal places.

d. $3\frac{1}{2}$

e. $7\frac{3}{8}$

Review Exercises

Set the calculator to display five decimal places and convert the following fractions and mixed numbers to decimals.

1. $\frac{15}{4}$

2. $\frac{3}{9}$

3. $5\frac{23}{100}$

4. $\frac{5}{6}$

5. $17\frac{4}{10}$

6. $10\frac{19}{30}$

7. $25\frac{2}{9}$

8. $\frac{73}{18}$

9. $9\frac{20}{32}$

10. $7\frac{3}{4}$

11. $\frac{355}{113}$ (When it's converted, does this number look familiar?)

Try It Solutions

First set the calculator to display four decimal places.

FORMAT | QUIT
2nd | . | 4 | ENTER | 2nd | CPT

| 0.0000 |

Next, convert the fractions.

a. **5** ÷ **11** =

| 0.4545 |

b. **7** ÷ **4** =

| 1.7500 |

c. **1** ÷ **6** =

| 0.2917 |

d. **1** ÷ **2** + **3** =

| 3.5000 |

e. **3** ÷ **8** + **7** =

| 7.3750 |

Review Exercise Solutions

1. 3.75000
2. 0.33333
3. 5.23000
4. 0.83333
5. 17.40000
6. 10.63333
7. 25.22222
8. 4.05556
9. 9.62500
10. 7.75000
11. 3.14159 (It's π to five decimal places)

Delta Percent (Δ%) – Chapter 6

In business the rate of increase or decrease over time, expressed as a percent, is often useful. A change expressed in this way is often referred to as delta percent (Δ%) after the Greek letter delta, which is used in mathematics to represent change. Delta percent could, for example, represent the change in inventory over two consecutive quarters, or the change in customer complaints across a time span of several months. By knowing the percent change, the business manager can infer a possible trend. Should the trend be undesirable (increasing customer complaints, for example) then corrective measures may be applied in attempt to change the trend.

Example: Delta Percent

If a business measure increases from 48 to 56, what is the percent change?

Solution Strategy

By observation, you can see that the number is increasing, and so you would expect a positive delta percent. Using the calculator in one of its spreadsheet modes:

1. Put the calculator into Percent Change/Compound Interest mode:

Δ%
[2nd] [5]
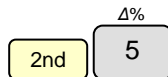
2. Clear any previous values that may have been entered:
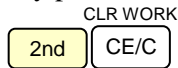
CLR WORK
[2nd] [CE/C] | OLD=   0.00 |

3. Enter the old value:

48 [ENTER] | OLD=   48.00 |

4. Advance to the new value by pressing the down arrow key and enter the new value:

[↓] **56** [ENTER] | NEW=   56.00 |

5. Advance to the Percent Change display by pressing the down arrow key and calculate the delta percent value by pressing the compute key:

[↓] [CPT] | %CH=   16.67 |

Try It

Customer complaints are down this quarter to 34 from last quarter's count of 47. What is the percent of decrease in customer complaints?

Review Exercises

1. To improve fuel efficiency, Blue Sky Air has decided to remove the paint from their planes to make them lighter. What is the percent change in weight of a 57,300 pound plane if the weight of the paint removed is 186 pounds?

2. Thirty-seven winter coats were sold last month. Management has set a sales goal of 52 coats this month. What percent change does this represent?

3. The National Institute of Science and Technology has created a new type of atomic clock that can be packaged in a 6 inch case. If the previous clock model had a 30 inch case, what is the percent of size reduction?

4. A new model clock has a maximum error of four seconds in 300 years, but an older model is accurate to within one second in 300 years. How does the error of the new model compared to that of the old, expressed as a percent?

5. Last year in March the snow pack in the mountains measured 40 feet. This year the same measurement shows only 36 feet of snow at the same spot. What percent of reduction is this?

6. Ready Crunch Cereal Company has decided to stop marketing 10 ounce boxes and start marketing 13 ounce boxes. What percent change in box capacity does this represent?

7. In a class of 180 students, 16 received a grade of *A* last quarter. This quarter 21 students out of 180 are getting an *A*. What percent of students this quarter are receiving *A*'s compared to last quarter in the class?

8. Nine out of 40 grocery customers made spot purchases on Saturday. On Monday, only six customers in 40 made spot purchases. What is the trend in spot purchase sales from Saturday to Monday?

9. Lily White Paper Company sold 742 cases of 20 pound white laser printer paper during its first quarter of the fiscal year. It sold 836 cases of the same paper during its second quarter. What is the measure of the more recent sales, expressed as a percent increase over last quarter's sales?

Try It Solution

| 2nd | Δ%
5 | 2nd | CLR WORK
CE/C | **34** ENTER | ↓ | **47** ENTER | ↓ | CPT |

| %CH= | 38.24 |

Review Exercise Solutions

11. Weight after paint removal is 57,300 – 186 = 57,114. Delta is -0.32%

12. 40.54% increased sales of coats

13. 80.00% reduction in size (-80.00%)

14. 300.00% greater error

15. 10.00% reduction in snow pack (-10.00%)

16. 30.00% increase

17. 31.25%

18. 33.33% reduction in spot purchases (-33.33%)

19. 12.67% increase

Percent and Trade Discount– Chapters 6 and 7

Calculations that include use of the percent key can find a percent of a given value, single and multiple trade discounts and add-on value.

Example: Percent of a Value

How much is 86.3% of 34,877?

Solution Strategy

34877 × **86.3** % =

| 30,098.85 |

Try It – a

a. What is 18% of 74?

Example: Percent Discount

Mercheson's High Fashion, a locally owned dress shop, is having a sale. All merchandise purchased during the sale will be discounted 20 percent. Nora Schwartz has selected a dress marked $59.95. What will be the sale price of the dress?

Solution Strategy

59.95 [–] **20** [%] [=] | 47.96 |

Try It – b

b. How much is 25% off of $28.53?

Example: Percent Ratio

What percent of 208 is 142?

Solution Strategy

142 [÷] **208** [%] [=] | 68.27 |

Note: read this result at 68.27%.

Try It – c

c. 43 is what percent of 86?

Example: Percent Add-on

The sales tax rate on the dress that Nora Schwartz purchased in the above example is 7.5%. What is the final amount she must pay, including the tax?

Solution Strategy

47.96 [+] **7.5** [%] [=] | 51.56 |

Try It – d

d. A certain hat costs $5.82. The store has a 120% markup on all its hats. What should the retail price be?

Example: Multiple Trade Discounts

To promote aging stock, HD Supply Co., an commercial sprinkler and pipe fixture business, is offering trade discounts of 22/14/6 on selected items. If a 6" five-way hydro-indexing valve retails for $386.35, what would the net price be after all discounts are taken?

Solution Strategy

[–]   [%] [–]   [%] [–]   [%] [=]

386.35 22 14 6

Try It – e

    e. After taking trade discounts of 30/12/2, what should the net price be for an item that retails for $684.98?

Review Exercises

1. How much is 81% of $\frac{11}{4}$, expressed as a decimal number to four decimal places?

2. A recent movie runs 19% longer than the "average" movie time of 94 minutes. How many minutes does it take to show the movie?

3. A calculator that retails for $29.85 is on sale for 15% off. A sign at the display says the discount will be taken at the checkout register. What is the effective sale price of the calculator?

4. With full fuel tanks, a small airplane can fly 450 miles. The pilot must plan to land with a 20% fuel reserve. What is the maximum range she can plan to fly before landing to refuel?

5. Gil Aguirre had his automotive technician add an aftermarket chip to the engine computer in his BMW. The manufacturer of this chip advertises it will improve fuel economy 14%. This car's EPA fuel economy rating for highway driving is 25.6 miles per gallon. What highway driving fuel economy figure should Gil expect with the aftermarket chip installed?

6. Brecke Millwork Supply, a forest products wholesaler, is offering their retail customers a promotional discount on ¾ inch CDX Douglass Fir plywood. If the normal discount is 38% and the promotion allows a 12% discount on top of that, what would be the price to the retailer of a 4 x 8 foot sheet that retails for $21.39?

7. Three weeks ago an open barrel (without a top) full of water weighed 586 pounds. Since then 12% of the water has evaporated. What is the weight of the barrel and water now if the empty barrel weighs 56 pounds?

8. Paula Erickson receives an employee discount of 20% on the price of all merchandise she buys at company stores, on top of any promotional discounts that may be offered. If a Cuisinart countertop mixer that retails for $124.99 is on sale for 25% off, what out-the-door price will Paula pay if state sales tax is 8.5%?

Try It Solutions

a. **18** | % | | × | **74** | = | ⟶ | 13.32 |

b. **28.53** | − | **25** | % | | = | ⟶ | 21.40 |

c. **43** | ÷ | **86** | % | | = | ⟶ | 50.00 |

d. **5.82** | + | **120** | % | | = | ⟶ | 12.80 |

e. **684.98** | − | **30** | % | **12** | − | | % | **2** | − | | % | | = |

| 413.51 |

Review Exercise Solutions

1. 2.2275
2. 111.86 minutes
3. $25.37
4. 360 miles
5. 29.2 miles per gallon
6. $11.67
7. 586 – 56 – 12% + 56 = 522.4 pounds (The weight of the barrel doesn't change. Only the water weight is reduced)
8. $81.37

Profit Margin – Chapter 8

A business that sells goods or services must make a profit to stay in business. This means that the cost of producing services or purchasing goods must be less than the price for which they are sold to the consumer. Cost of goods sold is a major factor in determining the retail price. So are overhead expenses such as wages, insurance, facilities lease, power and heat. Combined, all cost factors should total less than the selling price for there to be a profit, however overhead is usually apportioned. So a percentage of overhead is applied to all products and services based upon an assumed sales volume, and the retail price is determined by a *percentage markup*, or *gross profit margin*, applied to the purchase cost. **Gross profit margin** is defined as the difference between the selling price and the cost, expressed as a percentage of the selling price. **Markup** is the difference between selling price and cost, expressed as a percentage of the cost. This section deals *only* with gross profit margin.

The calculator has a profit margin worksheet, entered by pressing the two

keys: [2nd] [3 PROFIT]

In this problem set, three variables are employed: CST (**cost**), SEL (**sel**ling price) and MAR (gross profit **mar**gin). Values for any two of these may be entered, and then the value for the third one computed.

Example: Cost

The selling price of a calculator is $32.48 and its gross profit margin is 45%. What is its cost?

Solution Strategy

1. Enter the profit margin worksheet:

    [2nd] [3 PROFIT] | CST=   0.00 |

    Note: if the display does not say zero, then clear the worksheet:

    [2nd] [CE/C CLR WORK]

2. Enter the selling price:

    [↓] **32.48** [ENTER] | SEL=   32.48 |

3. Enter the gross profit margin:

    [↓] **45** [ENTER] | MAR=   45.00 |

4. Compute the cost:

    [↓] [CPT] | CST=   17.86 |

Try It – a

a. What would the cost for an in-dash AM/FM stereo/CD player be if it sells for $286.98 and the gross profit margin is 35%?

Example: Selling Price

What should the selling price be for a hydrotherapy tub that costs $633.58 and has a gross profit margin of 60%?

Solution Strategy

1. Enter the profit margin worksheet:

    PROFIT

    [2nd] [3] $\boxed{\text{CST= }\qquad\qquad 0.00}$

    Note: if the display does not say zero, then clear the worksheet:

    CLR WORK

    [2nd] [CE/C]

2. Enter the cost:

    633.58 [ENTER] $\boxed{\text{CST= }\qquad\qquad 633.58}$

3. Enter the gross profit margin:

    [↑] **60** [ENTER] $\boxed{\text{MAR= }\qquad\qquad 60.00}$

4. Compute the selling price:

    [↑] [CPT] $\boxed{\text{SEL= }\qquad\qquad 1,583.95}$

Try It – b

b. What should the selling price of a three pound hammer that cost $18.72 if the gross profit margin is 40%?

Example: Markup Percentage

What is the gross profit margin of a suit that costs $95.31 and sells for $175.00?

Solution Strategy

1. Enter the profit margin worksheet:

    PROFIT

    [2nd] [3] $\boxed{\text{CST= }\qquad\qquad 0.00}$

    Note: if the display does not say zero, then clear the worksheet:

    CLR WORK

    [2nd] [CE/C]

2. Enter the cost:

    95.31 [ENTER] $\boxed{\text{CST= }\qquad\qquad 95.31}$

3. Enter the selling price:

    [↓] **175** [ENTER] $\boxed{\text{SEL= }\qquad\qquad 175.00}$

4. Compute the gross profit margin:

| ↓ | CPT |

| MAR= | 45.54 |

Try It – c

c. What is the gross profit margin of a saddle costing $846 and selling for $1449.99?

Review Exercises

1. An MP3 player sells for $49.95 and its gross profit margin is 32%. What is its cost?

2. Contractor's wheelbarrows sell for $79.95 and have a gross profit margin of 47.5%. How much do they cost the dealer?

3. A gross profit margin of 44% is applied to an item costing $18.44. What should the selling price be?

4. How much should a coat sell for if it cost $58.27 and the gross profit margin is 55%?

5. What is the gross profit margin of a table saw that costs $214.58 and sells for $324.99?

6. A storage shed that retails for $449.95 costs $275. What is the gross profit margin?

Try It Solutions

a. [2nd] [3 (PROFIT)] [2nd] [CE/C (CLR WORK)] | CST= | 0.00 |

[↓] **286.98** [ENTER] | SEL= | 286.98 |

[↓] **35** [ENTER] | MAR= | 35.00 |

[↓] [CPT] | CST= | 186.54 |

b. [2nd] [3 (PROFIT)] [2nd] [CE/C (CLR WORK)] | CST= | 0.00 |

18.72 [ENTER] | CST= | 18.72 |

[↑] **40** [ENTER] | MAR= | 40.00 |

[↑] [CPT] | SEL= | 31.20 |

18

c. [2nd] [3] [2nd] [CE/C] (PROFIT, CLR WORK)

846 [ENTER]

[↓] 1449.99 [ENTER]

[↓] [CPT]

CST=	0.00
CST=	846.00
SEL=	1449.99
MAR=	41.65

Review Exercise Solutions

1. $33.97
2. $41.97
3. $32.93
4. $129.49
5. 33.97%
6. 38.88%

Simple Interest – Chapter 10

Interest

Simple interest may be calculated by using the formula,

$$I = PRT,$$

where I is the amount of interest obtained from the principal, P, multiplied by the annual interest rate, R, multiplied by the time, T. Time is expressed in terms of years or fraction of years. Typically, simple interest is used for short term (less than one year) financial paper, such as notes and bonds, but may also be used for long term debt or time deposits. As mentioned in Chapter 10, the number of days used for a year may be either 360 for **ordinary** interest, or 365 for **exact** interest.

Example: Interest

How much interest will a deposit of $3,635 earn in four years if it earns 6.5% simple interest?

Solution Strategy

Multiply the principal times the rate times the time:

3635 [×] **6.5** [%] [×] **4** [=] | 945.10 |

Example: Simple Note – Interest

What is the interest on a 102 day note for $512 at 8% ordinary interest?

Solution Strategy

Use the simple interest formula, with the time represented by a fraction of a year, $\frac{102}{360}$.

512 [×] **8** [%] [×] **102** [÷] **360** [=]

| 11.61 |

Try It – a-c

a. How much interest does a time $58,000 deposit earn in 3 ½ years at 5.5% simple interest?

b. A deposit of $648 earns 10.8% ordinary interest. How much interest is paid at 284 days if the deposit account is closed?

c. The Wayne State Federal Credit Union provides short term notes at 4.675% exact interest. How much interest would be owed on a 170 day $862 note?

Maturity Value

The **maturity value** of a simple interest note is the interest it earns plus the principal. Maturity value may be obtained by either of two formulas:

$$MV = P + I \quad \text{or} \quad MV = P(1+RT)$$

The decision of which formula to use will depend upon the information available.

Example: Maturity Value

A deposit of $832.88 will earn $54.11 interest at maturity. What is the deposit's maturity value?

Solution Strategy

Use the formula for maturity value that adds principal and interest:

[+]   [=] | 886.99 |

20

832.88 **54.11**

Example: Simple Note – Maturity Value

A simple note for $5,000 matures in 6 years and earns 3.875% annually. What is the note's maturity value?

Solution Strategy

Use the formula for maturity value that adds 1 to the product of the interest and the time, then multiplies the result times the principal:

6 [×] 3.875 [%] [+] 1 [×] 5000 [=]

> 6,162.50

Try It – d-e

d. What is the maturity value of a 4% simple interest note for $8,600 for 3 months?

e. A principal of $328.89 has earned $34.22. What is the maturity value?

Review Exercises

1. Calculate the interest on an 8% simple interest loan for $17,580 for five years.

2. What is the maturity value of a $1,940, 6 year loan at 7.75% simple interest?

3. A principal of $694 earned $61.56 simple interest. What was the maturity value?

4. A 270 day, 5% ordinary interest note for $3,250 has what value at maturity?

5. How much interest will be owed on an $86,450 loan at 6.125% exact interest at the end of 86 days?

6. If Jim borrows $500 at 5.5% simple interest for 180 days, how much will he owe when the loan matures?

7. How much interest will $392 earn in an 8.5% savings account in 3 years?

8. What is the maturity value of a 300 day 6.75% exact interest note for $810?

Try It Solutions

a. **58000** [×] **3.5** [×] **5.5** [%] [=]

> 11,165.00

b. **648** [×] **10.8** [%] [×] **284** [÷] **360** [=]

c. **862** ⌷ × ⌷ **4.675** ⌷ % ⌷ ⌷ × ⌷ **170** ⌷ ÷ ⌷ **365** ⌷ = ⌷

$$\boxed{55.21}$$

d. **3** ⌷ ÷ ⌷ **12** ⌷ × ⌷ **4** ⌷ % ⌷ ⌷ + ⌷ **1** ⌷ × ⌷ **8600** ⌷ = ⌷

$$\boxed{18.77}$$

$$\boxed{8,686.00}$$

e. **328.89** ⌷ + ⌷ **34.22** ⌷ = ⌷

$$\boxed{363.11}$$

Review Exercise Solutions

1. $7,032.00
2. $2,842.10
3. $755.56
4. $3,371.88
5. $1,246.88
6. $513.75
7. $99.96
8. $854.94

Y^x key: Universal Power and Time Value of Money – Chapters 11 and 12

Formulas in Chapters 11 and 12 provide direct ways of computing the future value of money, present value of money, and various numerical aspects of sinking funds, annuities and debt amortization. The calculator has special functions in the prompted spreadsheet mode for solving these problems, but if the user wants to use a formula, then the universal power key, y^x, may be used.

Example: Raising a Number to a Power

What is the value of 1.05125 raised to the 16th power, expressed to 5 decimal places?

Solution Strategy

First, set the calculator to display five decimal places:

FORMAT   SET   QUIT

[2nd] [.] [5][ENTER] [2nd] [CPT] | 0.00000

Next, enter the base and raise it to the 16th power.

1.05125 [y^x] **16** [=] | 2.22483

Example: Future Value

What is the future value of $10,000 in four years compounded quarterly at 5%, expressed to two decimal places?

Solution Strategy

Use the future value of money formula, $A = P(1 + i)^n$, where P is the principle ($10,000), n is the number of compounding periods – in this case, 16 (four quarters per year multiplied by four years), and i is the single period rate. The single period rate is the annual rate, 5%, divided by 4, which is 1.5%. Calculate the value inside the parentheses. Raise that value to the 16th power, then multiply by P.

1 [+] **1.5** [%] [y^x] **16** [×] **10000** [=]

| 12,689.86

Try It – a

a. What is the value in 18 years of $150.00 deposited now into an account that pays 7.375% compounded monthly?

Example: Present Value

How much money must be deposited now in an account that pays 6% compounded semiannually for the account value to be $8,450 at the end of seven years?

Solution Strategy

Use the present value of money formula, $P = \dfrac{A}{(1+i)^n}$, where A is the accumulated amount ($8,450), n is the number of compounding periods – in this case, 14 (two periods per year multiplied by seven years), and i is the single period rate. Calculate the single period rate first, 6% divided by 2, which is 3%. Then add one and raise the sum to the 14th power. Finally invert the intermediate result and multiply by A.

6 [%] [÷] 2 [+] 1 [y^x] 14 [=] [$1/x$] [×] 8450 [=]

5,586.45

Try It – b

    b. How much must be deposited now into a credit union that pays 5.125% compounded quarterly if the goal is to have $22,500 in five years?

Review Exercises

Set the calculator display for two decimal places.

1. What is the value of 3.744 multiplied by itself 13 times?

2. A Gigabyte is 2^{30} bytes. How many bytes is that?

3. How many bytes are in a Megabyte (2^{20} bytes)?

4. How many Megabytes are in one Gigabyte? Hint: divide 10^{30} by (10^{20}).

5. What is the future value of $450 compounded annually for 11 years at 4.5%?

6. What is the present value of an account to be valued at $2,300 in nine years if the account pays 3.75% compounded monthly?

7. Fred Dolman has deposited an insurance check for $6,000 into an interest bearing account for future use. If the account pays 4.125% compounded quarterly, how much will Fred's account be worth in four years?

8. Mary Anne Johnson will need $58,000 in 17 years when her baby starts college to pay for the first year of tuition and books. What amount should she deposit now into a 9.2% savings certificate that compounds annually so she will have the money she needs when her child starts college?

9. Barbara Shoblad overpaid her state college tuition by $3,459 because she did not carry a full load of classes. The college has had her money for five years. The state requires public debt be repaid with interest compounded monthly at 4.5% annual interest. How much is Barbara owed?

Try It Solutions

    a. The periodic rate is 7.375% divided by 12, which is approximately .61458%. This rate should be calculated as part of the computation because the calculator will retain all digits of accuracy internally, even though the display is set for two decimal places. The number of periods, n, is 18 times 12. This can also be incorporated into the computation. Using the future value formula and the information given, calculate as follows:

7.375 $\boxed{\%}$ $\boxed{\div}$ **12** $\boxed{+}$ **1** $\boxed{y^x}$ $\boxed{(}$ **12** $\boxed{\times}$ **18** $\boxed{)}$ $\boxed{=}$

$\boxed{\times}$ **150** $\boxed{=}$

563.45

b. Five years compounded quarterly gives 20 periods (5 times 4). Use the calculator to compute the quarterly interest rate by dividing the annual rate by 4. To find the present value, we invert the exponentiated quantity before multiplying by the future value to calculate the present value.

5.125 $\boxed{\%}$ $\boxed{\div}$ **4** $\boxed{+}$ **1** $\boxed{y^x}$ **20** $\boxed{=}$ $\boxed{1/x}$ $\boxed{\times}$ **22500** $\boxed{=}$

17,442.21

Review Exercise Solutions

1. 28,403,111.64

2. 1,073,741,824 bytes

3. 1,048,576.00 bytes

4. 1,024.00 – Several methods may produce this answer:

    -   Divide the answer to problem 2 by the answer to problem 3.

    -   First store the answers to problems 2 and 3 in different memories, then recall $\boxed{\text{RCL}}$ the value stored for the answer to problem 2 and divide it by the recalled value stored for the answer to problem 3.

    -   Calculate the result directly using the $\boxed{y^x}$ key twice. Use of parentheses is required to produce the correct result if you use this method: $2^{30} \div (2^{20}) =$.

5. $730.28

6. $1,642.03

7. $7,070.38

8. $12,991.02

9. $4,329.96

Time Value of Money – Chapter 11

Future Value

In business the value of money invested today at compound interest increases over time. Given an amount of money invested today, the annual interest rate, the length of a compounding period, and the duration of the investment, a manager can calculate the value of that investment at maturity several months or years in the future.

Example: Future Value

$4,650 is invested at 3.25% compounded annually. What is the value of the investment in 15 years?

Solution Strategy

1. Reset all variables to their default values:

   RESET
   [2nd] [+/−] [ENTER] | RST   0.00 |

2. Enter the number of compounding period in one year. For this case it is one (1).

   P/Y
   [2nd] [I/Y] **1** [ENTER] | P/Y=   1.00 |

3. Return to calculator mode:

   QUIT
   [2nd] [CPT] | 0.00 |

4. Enter the total number of compounding periods, N (number of compounding periods in one year multiplied by the total number of years):

   15 [N] | N=   15.00 |

5. Enter the percent rate of interest per year:

   3.25 [I/Y] | I/Y=   3.25 |

6. Enter the deposit amount as a negative value:

   4650 [+/−] [PV] | PV=   -4650.00 |

7. Compute the future value of the investment:

   [CPT] [FV] | FV=   7512.84 |

Try It

Sue Sanders can get 3.65% annual interest rate, compounded quarterly, on 18 month certificates of deposit at her credit union. If Sue buys a $3,000 certificate, what will be its value at the end of the 18 months?

Review Exercises

1. What is the future value of $18,000 invested for six years at 4.75% compounded annually?

2. How much will be in a savings account in seven years if the original deposit was $9,800? The account has an interest rate of 1.83% and the balance is compounded semiannually.

3. Monthly compounding of $1,000 invested at 6.125% will be worth how much in four years?

4. Hilbert Building Co., will need $185,000 in three years to finance a project. The company now has $168,000 it can invest at 4.18%, compounded bi-monthly (six times a year). Will this account grow to the amount needed in three years? By how much will the account fall short of or exceed the goal?

5. Van Nguyen plans to invest money in an interest bearing account. He can choose 3.00% compounded quarterly, or 3.25% compounded annually. Which option provides faster growth of his investment?

6. Linda Briggs has inherited $5600 she has decided to save for future need. Her bank offers an account compounded monthly at 4.25% annual rate. What would her nest egg be worth in three and a half years if she accepts the offer?

7. Eddie Mott plans to go into the apple juice business. Eddie needs $8,460 to buy a fruit press. He plans to offer a four year note at 4.5% compounded quarterly to finance the purchase of the press. What amount will Eddie owe on the due date four years in the future?

8. Planning to buy a water ski boat and trailer three years from now, Eric Smith deposits $16,500 into a three year Certificate of Deposit at 3.825% compounded annually. How much will his CD be worth when he is ready to buy?

Try It Solution

FV =	3168.04

Review Exercise Solutions

1. $23,779.17
2. $11,132.85
3. $1,276.83
4. Yes, it will grow to $190,362.32, exceeding the goal by $5,362.32
5. In the first year Juan would earn $30.34 on $1000 invested at 3.00% compounded quarterly. He would earn $32.50 on $1000 invested at 3.25% compounded annually. His investment grows faster at 3.25% compound annually.
6. $6,496.44
7. $10,118.29
8. $18,466.72

Present Value

Often a business will need money in the future to fund a planned purchase. If the future value of the purchase is known, along with the annual interest rate, the number of compounding periods a year, the total number of periods, and the duration of the investment, a manager can calculate the present value of an amount to be invested now so it will grow to the needed value by the time of the purchase.

Example: Present Value

$7450 will be needed in three years to purchase a replacement copy machine. How much should be invested now at 2.85% compounded semiannually to meet that goal?

Solution Strategy

1. Reset all variables to their default values:

RST	0.00

2. Enter the number of compounding period in one year. For this case it is two.

P/Y			
2nd	I/Y	2 ENTER

P/Y=	2.00

3. Return to calculator mode:

QUIT	
2nd	CPT

	0.00

4. Enter the total number of compounding periods, N (number of compounding periods in one year multiplied by the total number of years):

6	N

N=	6.00

5. Enter the percent rate of interest per year:

2.85	I/Y

I/Y=	2.85

6. Enter the future value:

7450	+/–	FV

FV=	7450.00

7. Compute the present value of the investment:

CPT	PV

PV=	-6843.62

$6,843.62 needs to be invested now to grow to $7,450.00 in three years.

Try It

John and Marsha plan to sell an antique farm tractor to help finance the first year of their baby's college education 17 years from now. Predictions say that by that time an average year of college will cost $24,800 at a public university. If they can invest the proceeds at 4.6% compounded quarterly, for what price should they sell their tractor to meet this goal?

Review Exercises

1. Reagor Metal Salvage Co. will need to replace a flatbed truck in four years. If a new truck will cost $68,400, and Raider can get 7.24% compounded monthly, how much must be invested now so Reagor can pay cash for the truck when the time comes?

2. What is the present value of $35,000 eight years in the future if investments are compounded quarterly at 4.75%?

3. Sharon wants to have $28,400 to buy a new car five years from now. If she can get 3.15% compounded monthly from her credit union on a Certificate of Deposit, how much should she put into the CD so she has enough money to pay cash for the car?

4. Suremix Flour Mills will need to buy a new packaging machine in six years when the current one reaches the end of its useful life. A new machine is projected to cost $261,000 at that time. How much does Suremix need to invest now at 3.5% compounded semiannually to have the money needed to buy the machine?

5. Drucker Consulting plans office technology upgrades on a three year cycle. Drucker's purchasing specialist projects that each of 21 computers and its software will cost $1,148, the two laser printers will cost $1,985 each, and the server with its software will cost $11,368. How much does the company need to invest today at 5.5% compounded annually to be able to pay cash for the equipment three years from now? (hint: the sum of the cost of all items should be used for this calculation.)

6. Now much would you deposit today at 4.45% compounded monthly to have $6,750 in 54 months?

7. Lassiter Construction Company has to buy a bulldozer in 18 months to clear and grade the site of a new shopping mall that is in the planning and permit stage now. If the bulldozer will cost $62,900, how much should the company invest at 8.25% compounded semiannually to be able to buy the bulldozer with cash?

8. With a goal of having $10,000 in five years, Douglas Franklin has a choice of putting money in a Certificate of Deposit (CD) that compounds quarterly at 2.35% or into another CD that offers 2.5% compounded annually. Which CD should he buy if he wants to minimize his investment outlay?

Try It Solution

They need to get $11,396.50 for the tractor to be able to meet their investment goal.

Review Exercise Solutions

1. $51,246.28
2. $19,859.96
3. $24,266.47
4. $211,947.11
5. $33,592.75
6. $5,527.10
7. $55,716.73
8. $8,894.46 is the outlay needed for the 2.35% CD compounded quarterly. He only needs $8,838.54 if he buys the 2.5% CD compounded annually. He should buy the 2.5% CD.

Amortization – Chapter 12

A business owner or manager may need to borrow money to finance a purchase or an operation. Knowing how much the monthly payment will be can help the loan seeker in negotiating the best deal with the lending institution. The loan payment amount may be easily calculated.

Example: Loan Payment

You are considering buying a small building from which to operate your business. You believe you can buy it for $345,000 on a 30 year mortgage at 6.375%. What would the monthly payment be (principle and interest)?

Solution Strategy

1. Reset all variables to their default values:

   RESET
   [2nd] [+/−] [ENTER] | RST   0.00 |

   This will reset several internal variables, including the number of payments per year, P/Y, to 12.

2. Enter the number of years of the mortgage and use the payment multiplier keys to calculate the total number of payments:

   xP/Y
   30 [2nd] [N] [N] | N =   360.00 |

3. Enter the annual interest rate:

   6.375 [I/Y] | I/Y =   6.375 |

4. Enter the amount of the loan:

345000 [PV] | PV =   345,000.00 |

5. Compute the payment amount (shown as a negative amount because it is owed):

[CPT] [PMT] | PMT =   -2,152.35 |

Try It

Susan is planning to accept a 3.9%, five year loan offered by the dealer from whom she is buying a car costing $17,003.48. What will her monthly payment be if she makes no down payment?

Review Exercises

1. To borrow $22,300 for a wedding, Kristi's parents get a 4.8% loan from their credit union. The monthly payments will be made for four years. What will their payment be?

2. Dick Schleister decides to borrow money to buy a new chainsaw. He can get a 5.5% loan for two years. If the saw retails for $489.99, what will his monthly payment be?

3. Michael McCusker is buying a small airplane that costs $184,000. If he pays $35,000 down and finances the balance with a 6%, 15-year loan, how much must he pay monthly?

4. To purchase a boat, motor and trailer, Bob King agrees to a 10-year loan at 4.75%. If the purchase price totals $28,384, and he pays $2,000 down, how much are his payments?

5. Sally and Paul are buying a new $310,000 home. They can get a 15% down, 30-year fixed mortgage at 5.375%. How much will their monthly house payment (PI) be if they can make the down payment?

Try It Solution

Keys	Display
RESET: 2nd [+/−] ENTER	RST 0.00
5 2nd [N] (xP/Y) [N]	N = 60.00
3.9 [I/Y]	I/Y = 3.90
17003.48 [PV]	PV = 17,003.48
[CPT] [PMT]	PMT = -312.38

Review Exercise Solutions

1. $511.54
2. $21.61
3. $1,257.35 (The amount financed is $184,000 - $35,000 = $149,000)
4. $276.25 (The amount of the loan is $28,384 - $2,000 = $26,384)
5. $1,475.52 (The amount borrowed is $310,000 - 15% = $263,500)

Break Even Analysis

When undertaking certain enterprises, a business will have certain fixed costs in setting up production, and it will have per-item costs, called variable cost, usually materials and labor, in producing each unit. A selling price is set that is expected to be competitive, and then a break even analysis is done to determine how many units must be sold to recoup the expenses of setting up and running production.

The calculator has a breakeven spreadsheet that allows entry of five items: fixed cost (FC), variable cost per unit (VC), expected profit (PFT), the selling price (P) and the quantity (Q) that needs to be sold. For break even analysis, the expected profit is left at zero, and then the user enters FC, VC and P. The final step is to compute Q. For these five variables, the user may enter any four of them and compute the fifth.

Example: Break Even Quantity

The cost to set up a manufacturing line to produce a new model of sports shoe is expected to be $4,850. The cost of producing each pair of shoes will be $23.03. If a pair will be retailed for $49.99, how many pairs need be made and sold in order to break even?

Solution Strategy

1. Enter the Break Even mode and clear the quantities.

   BRKEVN CLR WORK
   | 2nd | 6 | 2nd | CE/C | | FC = | 0.00 |

2. Enter the fixed cost to set up the production line.

   4850 ENTER | FC = | 4,850.00 |

3. Arrow down to the variable cost prompt and enter the value.

   | ↓ | **23.03** ENTER | VC = | 23.03 |

4. Arrow down to the selling price prompt and enter the value.

   | ↓ | **49.99** ENTER | P = | 49.99 |

5. Arrow down twice, leaving the profit zero, and compute the break even quantity.

   | ↓ | ↓ | CPT | | Q = | 179.90 |

   The company would have to produce and sell 180 pairs of shoes to break even.

Try It – a-b

a. How many bearing journal boxes would a foundry need to produce before it begins to make a profit? It will cost $176 to make the molds for casting the boxes. Steel will cost $1.85 per journal box, and labor will be $1.23. The journal boxes will sell for $3.66 each?

b. To make a profit of $8,480 on a new line of shoes, how many pairs must be sold if fixed cost to set up production is $2,344, and the variable cost is $31.38. A pair of shoes will sell for $49.95.

Review Exercises

1. A piecework factory produces dresses at a variable cost of $17.34. If set-up expenses are $326, and a dress will sell for $24.75, how many dresses must be sold before starting to make a profit?

2. To set up the production line for a certain model truck, production managers at NUMI project expenses of $684,932 will be incurred. Labor and materials to produce each truck will be $12,408. How many trucks must be sold for $16,488.34 before the model becomes profitable?

3. To set up a production line to manufacture dining tables, Able Wood Products, Inc. projects it will incur $838 in expenses. Each table will require $84.50 in materials, and the labor will cost $39.20. If a table is to be sold for $160, how many do they have to make and sell before the line becomes profitable?

4. A line to produce a new model of high security padlock will take $4,882 to set up. Each lock will cost $14.28 to make. If a lock will sell for $22.85, how many will have to be sold to break even?

5. Setup cost to establish a production line for a 17-inch flat screen monitor is going to be $45,867. Production variable cost will total $208.17 for each monitor. If the company wants to break even after selling 800 monitors, for what price should each monitor be sold?

6. The production line for the 17-inch monitors above can be modified to produce and 18-inch monitor for $18,644. The manufacturer wants to sell them for $339.99 and expects to sell a minimum of 265 units. What is the limit on the variable cost to produce the 18-inch monitors if the line is to break even?

Try It Solutions

a.

Keys				Display	
2nd	6 (BRKEVN)	2nd	CE/C (CLR WORK)	FC =	0.00

176 ENTER — FC = 176.00

↓ **1.85** + **1.23** = ENTER

VC = 3.08

↓ **3.66** ENTER — P = 3.66

↓ ↓ CPT — Q = 303.45

They must sell at least 304 journal boxes to break even.

b.

2nd 6 (BRKEVN) 2nd CE/C (CLR WORK) — FC = 0.00

2344 ENTER — FC = 2344.00

↓ **31.38** ENTER — VC = 23.03

↓ **49.95** ENTER — P = 23.03

↓ **8480** ENTER — PFT= 8,480.00

↓ CPT — Q = 582.88

The number of pairs sold must exceed 582 to realize an $8,480 profit.

Review Exercise Solutions

1. 44 dresses

2. 168 trucks

3. 24 tables

4. 570 locks

5. 266 monitors

6. $269.64

Depreciation – Chapter 17

Capital assets, purchased new at cost (CST), lose value as they age for a number of years until their useful life (LIF) has ended and they are sold for salvage (SAL). Various methods have been devised to depreciate them for accounting and tax purposes. Depreciation methods discussed in Chapter 17 include straight line (SL), sum-of-the-years-digits (SYD), and declining balance (DB). For DB the rate defaults to 200%, but the user may enter any value as an option. The depreciation worksheet mode of the calculator can perform calculations to provide the depreciation (DEP) for the year, the remaining book value (RBV) at the end of the year, and the remaining depreciable value (RDV). It can do this for successive years with a few simple keystrokes so the user can obtain figures for a depreciation table. It can do this for any of the three depreciation methods mentioned. To use the calculator for depreciation problems, there are three sets of steps.

- Select the depreciation mode (SL, SYD or DB). If you select DB, key in the percentage if you are not going to use double declining balance (200% – the default value). Note: the calculator will remain in the selected depreciation mode until another mode is selected, or else the calculator is reset.

- Enter the depreciation data: the life, cost, and salvage value of the asset, and the year of service for which you want the depreciation calculated.

- Display the values for depreciation, remaining book value, and remaining depreciable value for the year you entered. These may be repeated for successive years until the RDV is zero.

Example: Choose Straight Line Depreciation

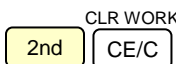*Set the calculator to do straight line depreciation, and then clear the worksheet of any previously stored values.*

Solution Strategy

1. Select the depreciation worksheet.
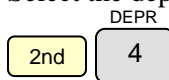
   [2nd] [4] (DEPR) | SL |

2. Clear the worksheet.

   [2nd] [CE/C] (CLR WORK) | SL |

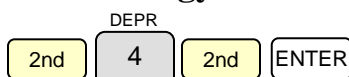## Example: Choose Sum-of-the-Years-Digits Depreciation

Set the calculator to do sum-of-the-years-digits depreciation.

Solution Strategy

   [2nd] [4] (DEPR) [2nd] [ENTER] | SYD |

Example: Choose Declining Balance Depreciation

Set the calculator to do declining balance depreciation, and set the rate to 150%.

Solution Strategy

DEPR

| 2nd | 4 | 2nd | ENTER | 2nd | ENTER | **150** | ENTER |

| DB = | 150.00 |

Example: Entering and Calculating Depreciation Data

Set the calculator to do straight line depreciation for a well drilling machine that cost $280,000. The machine is expected to be in service for five years and have a $22,500 salvage value. What is the first year depreciation, the remaining book value and the remaining depreciable value of the machine?

Solution Strategy

1. Reset the calculator, select the depreciation worksheet and clear the data.

RESET   DEPR   CLR WORK

| 2nd | +/− | ENTER | 2nd | 4 | 2nd | CE/C |

| SL |

2. Enter the data asked for.

| ↓ | **5** | ENTER | | LIF= | 5.00 |

| ↓ | ↓ | **280000** | ENTER | | CST= | 280,000.00 |

| ↓ | **22500** | ENTER | | SAL= | 22,500.00 |

| ↓ | | YR = | 1.00 |

3. Display the first year depreciation data. At this point, the calculator has already calculated this data for the first year. The remaining steps cause the values to be displayed.

| ↓ | | DEP= | 51,500.00 |

| ↓ | | RBV= | 228,500.00 |

| ↓ | | RDV = | 206,000.00 |

Example: Remaining Book Value for Any Year

In the previous example, what is the remaining book value of the well drilling machine at the end of the third year?

Solution Strategy

1. Continue from the previous solution keystroke sequence, and perform the third year computations.

   | ↓ | **3** | ENTER |

   | YR = | 3.00 |

2. Arrow down to the RBV display and read the third year remaining book value.

   | ↓ | ↓ |

   | RBV= | 125,500.00 |

   NOTE: if a year is entered that is greater than the year when salvage value is reached, the RBV will be the same as the salvage value.

Try It

Use the double declining balance method to calculate the annual depreciation and remaining book value at the end of the *second* year for a 5-axis automated milling machine that cost $178,489 new. The machine has a salvage value of $28,400, and a useful life of five years.

Review Exercises

1. How much is the first year depreciation on a boat and motor whose combined cost when they were new was $19,229? They have an $8,450 combined salvage value at the end of 3 years and will be depreciated using sum-of-the-years digits.

2. A tower crane has a useful life of eight years and costs $471,000 new. If it is to be depreciated using straight line, and its salvage value is $65,350. What is the book value remaining at the end of year five?

3. A commercial washing machine has a salvage value of $99. It costs $486 new and will be depreciated using 150% declining balance over a four year period. What is the amount of the first year depreciation?

4. The brick liner of a boiler firebox is worn out and must be replaced at a cost of $3,200. The new liner is expected to last 10 years and will be depreciated on the books using straight line depreciation. There is no salvage value. What is the liner's remaining depreciable value after the sixth year of service?

5. A certain company has a policy of annually replacing one third of its information technology assets with current technology hardware and software. A machine being replaced has a salvage value that averages one-sixth of its cost

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new. Using straight line depreciation, calculate the book value of a laser prin-ter at the end of its second year of service. The printer cost $1,248 when it was new.

6. A new car costing $18,539 remains in the fleet of a delivery service for at least 125,000 miles and is then sold. The fleet average annual miles per ve-hicle is 26,400. The car when sold is expected to be worth $1,250. If the company accountant uses sum-of-the-years digits method for depreciating rolling assets, what is the remaining depreciable value of the car after the second year of service? (*Hint: calculate the number of years of service based upon the mileage.*)

Try It Solution

1. Set up the calculator for double declining balance depreciation.

RESET			DEPR		SET		SET	
2nd	+/–	ENTER	2nd	4	2nd	ENTER	2nd	ENTER

DB =	200.00

2. Enter the expected life of the machine.

↓ 5 ENTER

LIF=	5.00

3. Enter the cost of the machine.

↓ ↓ 178489 ENTER

CST=	178,489.00

4. Enter the salvage value.

↓ 28400 ENTER

SAL=	28,400.00

5. Calculate second year values.

↓ 2 ENTER

YR =	2.00

6. Read out the annual depreciation and the remaining book value.

↓

DEP=	42,837.36

↓

RBV=	64,256.04

Review Exercise Solutions

1. $5,389.50

2. $217,468.75

3. $182.25

4. $1,280.00

5. $554.66

6. $6,915.60

Bonds – Chapter 20

The bond worksheet of the calculator will either calculate the price (PRI) of a bond or its percent yield (YLD). It will also calculate the bond's accrued interest (AI). Once in the bond worksheet mode, the calculator will default to the actual day-count method for calculating. An optional day count method may be selected that assumes all months have 30 days, and a year has 360 days.

The user will enter bond information, and then obtain computed results from the calculator. Information to be entered includes the date the bond is purchased, called the *settlement date* in the calculator guide, to be thought of as the *start date* (SDT) for computing purposes. The U.S. order of date notation, using the MM.DDYY format, is the calculator's default date entry mode, where MM is the number of the month, DD is the number of the day, and YY are the year's final two digits. A leading zero is not required for the month, but it is required for entry of the day. The user must enter a decimal point to separate the month from the day. The calculator assumes year 50 is 1950 and year 49 is 2049. The default coupon payment method is twice per year (2/Y). The coupon rate (CPN) is entered as a percent. Another date to be entered is the redemption date (RDT). The calculator assumes the redemption date coincides with a coupon date. If the bond is redeemed at maturity, then the redemption value (RV) is entered as 100 percent, but if the bond is called, enter the call value percent. Enter either the bond's yield as a percent to compute the price, or else enter the price to compute the yield. Accrued interest is automatically computed, compounded semiannually at the stated rate. This means the bond holder is not clipping coupons, but is allowing all payments to accrue.

Clearing the calculator, using 2ⁿᵈ [RESET], sets the following values.
- Redemption Value to $100 (per $100 of par value)
- Coupon Rate to 0%
- Yield to 0%
- Price to zero dollars
- Start Date and Redemption Date to 12-31-1990
- Day-count method to actual
- Coupon frequency to twice per year

Clearing the bond worksheet using 2ⁿᵈ [CLR Work], sets the same values for the first four bullets, but does not reset the dates, day-count method or coupon frequency.

An error will be displayed when pressing the up and down arrow keys to move through the worksheet if needed information has not been entered.

Example: Bond Data Entry

Reset all values, enter the bond worksheet, and enter the following values: Start Date – March 31, 2005; Coupon Rate – 7.5%; Redemption Date – March 31, 2015; Redemption Value -- $100.

Solution Strategy

1. Clear the values and key for the bond worksheet.

RESET			BOND		
2nd	+/–	ENTER	2nd	9	STD= 12 – 31 – 1990

2. Enter the start date.

3.3105 ENTER   STD=   3 – 31 – 2005

3. Enter the coupon rate.

↓ **7.5** ENTER   CPN=   7.50

4. Enter the redemption date.

↓ **3.3115** ENTER   RDT=   3 – 31 – 2015

The redemption value is already at $100 as a result of the reset in step 1.

Try it – a

a. Reset all values, enter the bond worksheet, and enter the following values: Start Date – July 15, 2006; Coupon Rate – 5.25%; Redemption Date – July 15, 2026; Redemption Value -- $98.35.

Example: Bond Price

A bond is purchased on April 17, 2003 that will mature on April 17, 2013. The coupon payments are twice per year, and the coupon rate is 5.25%. For a 6% yield to maturity, find the price of the bond if it will be redeemed at 100% of its par value.

Solution Strategy

1. Reset the calculator and enter the bond worksheet.

RESET			BOND		
2nd	+/–	ENTER	2nd	9	STD= 12 – 31 – 1990

2. Enter the start date, coupon rate, redemption date, and redemption value.

4.1703 ENTER | ↓ | **5.25** ENTER | ↓ | **4.1713** ENTER | ↓

| RV = | 100.00 |

3. Down arrow three times, leaving the defaults of actual day count and twice per year coupon payment. Enter the yield value.

↓ | ↓ | ↓ | **6** ENTER

| YLD= | 6.00 |

4. Calculate the price.

↓ | CPT

| PRI= | 94.42 |

The price of the bond should be $94.42 per $100 of maturity value.

Try It – b

b. A 17 year bond is purchased on October 21, 2006. The coupon payments are twice per year, and the coupon rate is 6.75%. For a 7.2% yield to maturity, what is the bond price if it will be redeemed at 100% of its par value?

Example: Bond Yield to Redemption

Susan Kollmar bought a 14 year bond on January 31, 2006. The coupon rate is twice a year, and the day-count method used is actual. If she paid $94.38 per $100 for the bond, and the coupon rate is 5.75%, what will be the bond's yield to maturity?

Solution Strategy

1. Reset the calculator and enter the bond worksheet.

RESET   BOND
2nd | +/– | ENTER | 2nd | 9

| STD= | 12 – 31 – 1990 |

2. Enter the start date, coupon rate, redemption date, and redemption value.

1.3106 ENTER | ↓ | **5.75** ENTER | ↓ | **1.3120** ENTER | ↓

| RV = | 100.00 |

3. Down arrow four times, leaving the defaults of actual day count and twice per year coupon payment. Bypass the yield value and enter the price.

↓ | ↓ | ↓ | ↓ | **94.38** ENTER

| PRI= | 94.38 |

4. Up arrow and enter to compute the yield.

| ↑ | CPT |

| YLD= | 6.36 |

The bond yield will be 6.36 percent.

Try It – c

c. On July 29, 2005, Julie Roediger plans to redeem an eight-year bond she has kept in a safe deposit box since it was issued. The coupon rate has been twice per year, and actual day-count applies to the bond. If the coupon rate is 7.25% and price was $97.06 per $100, what is the bond's yield at maturity?

Review Exercises

1. A bond is purchased on August 18, 2004 that will mature on August, 18, 2015. The coupon payments are twice per year, and the coupon rate is 6.25%. For a 7% yield to maturity, find the price of the bond if it will be redeemed at 100% of its par value.

2. A 27 year bond was purchased on October 21, 1992. The coupon payments are twice per year, and the coupon rate is 5.75%. For a 6.4% yield to maturity, what is the bond price if it will be redeemed at 100% of its par value?

3. Bob Snellman bought a 6 year bond on January 31, 2003. The coupons are paid twice a year, and the day-count method used is actual. If he paid $95.88 per $100 for the bond, and the coupon rate is 4.75%, what will be the bond's yield to maturity?

4. On December 11, 2006, Jim McCusker plans to redeem an eighteen-year bond he has kept in a safe deposit box since it was issued. The coupon rate has been twice per year, and actual day-count applies to the bond. If the coupon rate is 8.25% and yield to maturity is 8.875%, for what price was the bond bought?

Try It Solutions

a.

RESET

| 2nd | +/– | ENTER | 2nd | BOND 9 |

| STD= | 12 – 31 – 1990 |

7.1506 ENTER

| STD= | 7 – 15 – 2006 |

↓ **5.25** ENTER

| CPN= | 5.25 |

↓ **7.1526** ENTER

| RDT= | 7 – 15 – 2026 |

↓ **98.35** ENTER

| RV = | 98.35 |

b.. [2nd] [+/−] RESET [ENTER] [2nd] [9] BOND | STD=   12 – 31 – 1990 |

10.2106 [ENTER] [↓] **6.75** [ENTER] [↓] **10.2123** [ENTER] [↓]

| RV =   100.00 |

[↓] [↓] [↓] **7.2** [ENTER] | YLD=   7.20 |

[↓] [CPT] | PRI=   95.63 |

The price of the bond should be $95.63 per $100 of maturity value.

c. [2nd] [+/−] RESET [ENTER] [2nd] [9] BOND | STD=   12 – 31 – 1990 |

7.2905 [ENTER] [↓] **7.25** [ENTER] [↓] **7.2913** [ENTER] [↓]

| RV =   100.00 |

[↓] [↓] [↓] [↓] **97.06** [ENTER]

| PRI=   97.06 |

[↑] [CPT] | YLD=   7.75 |

The bond yield will be 7.75 percent.

Review Exercise Solutions

1. $94.36
2. $91.70
3. $5.57
4. $94.43

Statistics – Chapter 21

The calculator supports the entry of data, including histogram data. It can then calculate the data's average value and other statistics on the data. Data may be entered for up to 50 histogram pairs (the *X* value and its frequency count, entered as the *Y* value). Data may be entered in any order.

Data entry mode is different than the statistics calculation mode. Pressing the [2nd] [7] DATA keys puts the calculator into data entry mode. Pressing the [2nd] [8] STAT

keys puts the calculator into statistics method selection and computation mode. There are two types of statistics: *single variable* and *two-variable*. Only single variable problems will be explained in this section. To reset all X and Y values to zero when the calculator is in data entry mode, press the [2nd] [CE/C] (CLR WORK) keys. To reset all statistics data and calculated values to zero, press the [2nd] [+/−] (RESET) [ENTER] keys.

Example: Statistical Data Entry

Enter the following distinct data values: 16, 23, 19, 20, 18 and 21 in preparation for finding the number of data entries and the average of the entered data.

Solution Strategy

1. Clear the calculator, and then set it for data entry.

   [2nd] [+/−] (RESET) [ENTER] [2nd] [7] (DATA) | X01   0.00 |

2. Enter the value for X_{01}.

   16 [ENTER] | X01=   16.00 |

3. Note the value for Y_{01} has been automatically assigned.

   [↓] | Y01=   1.00 |

4. Enter the values for the remaining five numbers as X_{02} through X_{06}. Use the down arrow key to bypass the Y values. They are automatically assigned a value of one as soon as an X value is entered.

   [↓] **23** [ENTER] | X02=   23.00 |

   [↓] [↓] **19** [ENTER] | X03=   19.00 |

   [↓] [↓] **20** [ENTER] | X04=   20.00 |

   [↓] [↓] **18** [ENTER] | X05=   18.00 |

   [↓] [↓] **21** [ENTER] | X06=   21.00 |

   The data is now available for statistical calculation.

   NOTE: if there are multiple occurrences of a value, X_{nn}, in a data set, the frequency count, Y_{nn}, should be entered also, rather than leaving the value as one. For example, if the value 38 occurs four times in a set of data and is the third value entered. Enter 38 for X_{03} and enter 4 for Y_{03}.

Example: Statistics Calculation

How many data items were entered in the previous example and what is their average value?

Solution Strategy

1. Select Statistics mode.

    [2nd] [8] (STAT) | LIN |

2. Select one-variable statistics.

    [2nd] [ENTER] (SET) [2nd] [ENTER] (SET) [2nd] [ENTER] (SET) [2nd] [ENTER] (SET)

    | 1−V |

3. Display the number, n, of X values that were entered.

    [↓] | n   =   6.00 |

4. Display the average value, $\bar{x}$, of the six data entries, X_{01} through X_{06}.

    | $\bar{x}$ =   19.50 |

Try It

Enter the following numbers as single-variable data. Display the number of data items entered and their average value.

36 29 33 37 27 30 32 34 35

Review Exercises

1. What is the average of 346.2, 356.8, 351.0 and 349.3?

2. A class of 15 students received the following scores on a recent exam:

    86 91 82 77 45 88 93 69 62 75 89 80 97 96 84

    What was the average test score?

3. A sampling of a certain model of production oven tested the bake tempera-ture of five ovens after 15 minutes of operation. The measured internal tem-peratures were 346°, 356°, 351°, 358° and 345°. What was the average tem-perature measured?

4. How many numbers are there in the sequence 17, 18, 19, … , 42, 43? What is their average value?

Try It Solution

Keys	Display
2nd [RESET] +/− ENTER 2nd [DATA] 7	
36 ENTER	X01= 36.00
↓ ↓ **29** ENTER	X02= 23.00
↓ ↓ **33** ENTER	X03= 19.00
↓ ↓ **37** ENTER	X04= 20.00
↓ ↓ **27** ENTER	X05= 18.00
↓ ↓ **30** ENTER	X06= 21.00
↓ ↓ **32** ENTER	X07= 32.00
↓ ↓ **34** ENTER	X08= 34.00
↓ ↓ **35** ENTER	X09= 35.00
2nd [STAT] 8 2nd [SET] ENTER 2nd [SET] ENTER 2nd [SET] ENTER 2nd [SET] ENTER	1−V
↓	n = 9.00
↓	$\bar{x}$ = 32.56

Review Exercise Solutions

1. 350.83
2. 80.93 was the average score.
3. 351.20° was the average temperature.
4. There are 27 entries. Their average value is 30.00.