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CONTEMPORARY BUSINESS MATHEMATICS

for Colleges



Deitz / Southam



Discounts

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Learning Objectives

By studying this chapter and completing all assignments, you will be able to:

Learning Objective

1

Compute trade discounts.

Learning Objective

2

Compute a series of trade discounts.

Learning Objective

3

Compute the equivalent single discount rate for a series of trade discounts.

Learning Objective

4

Compute cash discounts and remittance amounts for fully paid invoices.

Learning Objective

5

Compute cash discounts and remittance amounts for partially paid invoices.

STEPS

to Compute Net Price with the Discount Method

- 1. Multiply the discount rate by the list price to get the discount amount:**
Discount = Trade discount rate × List price
- 2. Subtract the discount from the list price to get the net price:**
Net price = List price – Discount

EXAMPLE A

Northeast Restaurant Supply sells a set of stainless steel trays to Gideon's Bagels. The list price is \$120, and Gideon qualifies for a 25% trade discount. Compute the net price using the discount method.

STEP 1 Discount = $0.25 \times \$120 = \30

STEP 2 Net price = $\$120 - \$30 = \$90$

STEPS

to Compute Net Price with the Complement Method

- 1. Subtract the discount rate from 100% to get the complement rate:**
Complement rate = 100% – Trade discount rate
- 2. Multiply the complement rate by the list price to get the net price:**
Net price = Complement rate × List price

EXAMPLE B

Using the data in example A, compute the net price, using the complement method.

STEP 1 Complement rate = $100\% - 25\% = 75\%$

STEP 2 Net price = $0.75 \times \$120 = \90

STEPS

in Computing a Series of Trade Discounts

- 1. Apply the first discount rate to the list price.**
- 2. For subsequent discounts, compute intermediate prices and then apply the discount rates to them.**
- 3. If the buyer does not need to know all of the intermediate prices, an efficient shortcut is to multiply the list price by all of the complement rates successively.**

EXAMPLE C

Northeast Restaurant Supply sells a set of mixing bowls with a list price of \$200. Gideon's Bagels qualifies for the series of discounts: 25%, 20%, 10%. Compute the net price using the discount method.

| | <u>First Discount</u> | <u>Second Discount</u> | <u>Third Discount</u> |
|--------|----------------------------|----------------------------|----------------------------|
| STEP 1 | $0.25 \times \$200 = \50 | $0.20 \times \$150 = \30 | $0.10 \times \$120 = \12 |
| STEP 2 | $\$200 - \$50 = \$150$ | $\$150 - \$30 = \$120$ | $\$120 - \$12 = \$108$ |

EXAMPLE D

Using the data in example C, calculate the net price using the complement method.

| | <u>First Discount</u> | <u>Second Discount</u> | <u>Third Discount</u> |
|--------|-----------------------------|-----------------------------|-----------------------------|
| STEP 1 | $100\% - 25\% = 75\%$ | $100\% - 20\% = 80\%$ | $100\% - 10\% = 90\%$ |
| STEP 2 | $0.75 \times \$200 = \150 | $0.80 \times \$150 = \120 | $0.90 \times \$120 = \108 |

EXAMPLE E

Repeat example D, using the shortcut. The list price is \$200, and the discounts are 25%, 20%, and 10%. The complement rates are 75%, 80%, and 90%.

$$\text{Net price} = \$200 \times 0.75 \times 0.80 \times 0.90 = \$108$$

Note: Remember that there should be *no rounding* until you reach the final net price. Then round it to the nearest cent.

STEPS

to Compute the Equivalent Single Discount Rate

1. **Compute the complement of each rate.**
2. **Multiply all the complement rates (as decimals), and then write the product as a percent.**
3. **Subtract the product (Step 2) from 100% to get the equivalent single discount rate.**

EXAMPLE F

Find the equivalent single discount rate for Northeast's series of discounts: 25%, 20%, and 10%.

STEP 1

$$\text{First complement rate} = 100\% - 25\% = 75\%$$

$$\text{Second complement rate} = 100\% - 20\% = 80\%$$

$$\text{Third complement rate} = 100\% - 10\% = 90\%$$

STEP 2

$$\text{Product of complements} = 0.75 \times 0.80 \times 0.90 = 54\%$$

STEP 3

$$\text{Equivalent single discount} = 100\% - 54\% = 46\%$$

STEPS

to Compute the Remittance

- 1. Multiply the discount rate by the net purchase amount to get the cash discount:**
Cash discount = Discount rate × Net purchase amount
- 2. Subtract the cash discount from the net purchase amount to get the remittance:**
Remittance = Net purchase amount – Cash discount

Figure 7.1

Sales Invoice


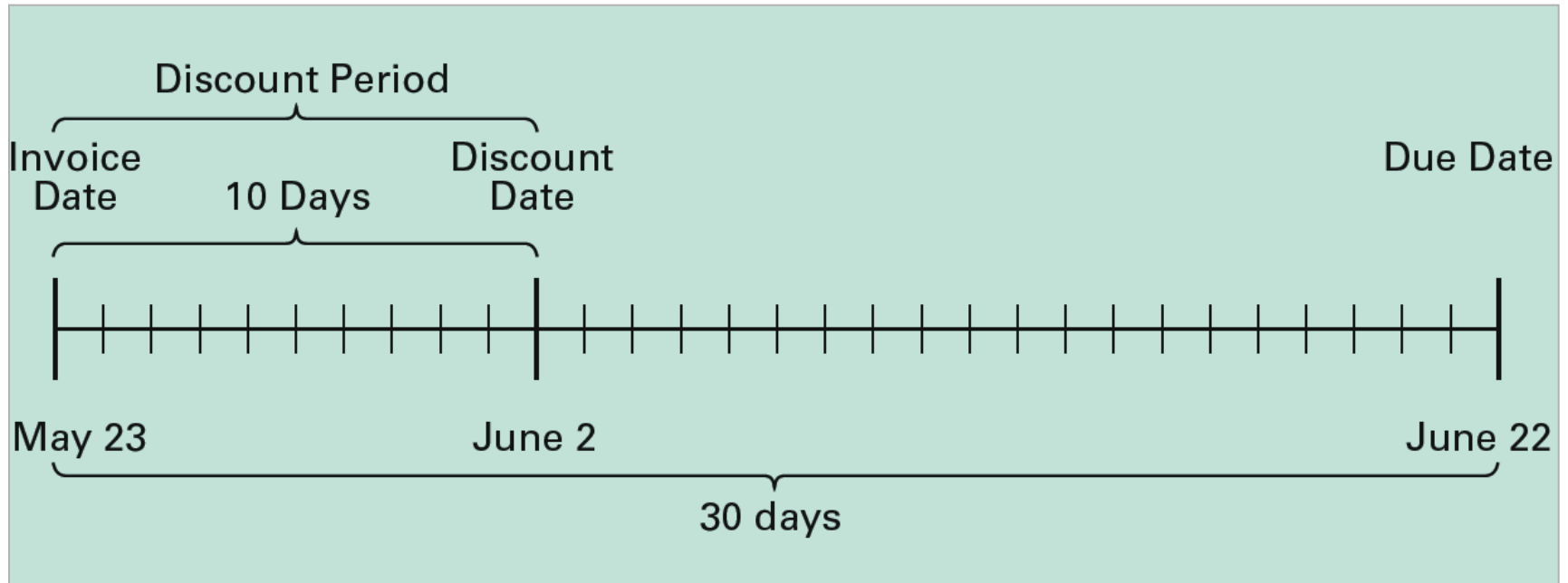
|  NATIONAL AUTOMOTIVE SUPPLY | | INVOICE NO. 782535 | | |
|---|-------------|--|--------------|------------|
| SOLD TO Broadway Motors 730 W. Columbia Dr. Peoria, IL 62170-1184 | | DATE May 23, 20-- TERMS 2/10, n/30 SHIP VIA UPS | | |
| QUANTITY | DESCRIPTION | UNIT PRICE | GROSS AMOUNT | NET AMOUNT |
| 24 gals. | Car wax | \$22.00 | \$528.00 | \$528.00 |

Figure 7.2

Cash Discount Time Line



EXAMPLE G

Compute the remittance due if Broadway Motors pays National for the \$528 invoice amount within the 10-day discount period under the terms 2/10, n/30.

STEP 1

$$\text{Cash discount} = 2\% \text{ of } \$528 = 0.02 \times \$528 = \$10.56$$

STEP 2

$$\text{Remittance} = \$528 - \$10.56 = \$517.44$$

STEPS

to Compute the Remittance When There Are Merchandise Returns and/or Freight Charges

- 1. Net purchase =**
Invoice amount – Merchandise returns – Freight
- 2. Cash discount =**
Discount rate × Net purchase
- 3. Cost of merchandise =**
Net purchase – Cash discount
- 4. Remittance =**
Cost of merchandise + Freight, if any

EXAMPLE H

National Automotive Supply, a major distributor, sells merchandise to Broadway Motors. The invoice amount is \$510, which includes \$30 in freight charges. The invoice date is August 13, and the terms are 2/10, n/30. Broadway Motors returns \$200 worth of merchandise and pays the balance of the invoice prior to the discount date. Compute the cash discount and the remittance. Also, determine the discount date and due date.

STEP 1 Net purchase = $\$510 - \$200 - \$30 = \280

STEP 2 Cash discount = $0.02 \times \$280 = \5.60

STEP 3 Cost of merchandise = $\$280 - \$5.60 = \$274.40$

STEP 4 Remittance = $\$274.40 + \$30 = \$304.40$

Discount date = August 13 + 10 days = August 23

Due date = August 13 + 30 days = September 12

STEPS

to Compute the Remittance with the Complement Method

- 1. Net purchase =**
Invoice amount – Merchandise returns – Freight
- 2. Complement rate =**
100% – Cash discount rate
- 3. Cost of merchandise =**
Net purchase × Complement rate
- 4. Remittance =**
Cost of merchandise + Freight, if any

EXAMPLE I

Solve example H by using the complement method for cash discounts. The invoice amount is \$510, merchandise returns are \$200, and freight is \$30.

STEP 1

$$\text{Net purchase} = \$510 - \$200 - \$30 = \$280$$

STEP 2

$$\text{Complement rate} = 100\% - 2\% = 98\%$$

STEP 3

$$\text{Cost of merchandise} = 0.98 \times \$280 = \$274.40$$

STEP 4

$$\text{Remittance} = \$274.40 + \$30 = \$304.40$$

STEPS

to Compute the Unpaid Balance

- 1. Compute the complement of the discount rate (100% – Discount rate).**
- 2. Compute the amount credited by dividing the dollar amount paid (remittance) by the complement rate.**
- 3. Compute the unpaid balance by subtracting the amount credited (Step 2) from the invoice amount.**

EXAMPLE J

Ike's Storage Center is a do-it-yourself center for closet and storage materials. The owner, Larry Eickworth, buys shelving supplies with an invoice price of \$484 and terms of 2/10, net 60. Within the 10-day discount period, he sends in a check for \$300. With a discount for the partial payment, how much credit should Larry receive, and what will be his new unpaid balance?

STEP 1

$$\text{Complement rate} = 100\% - 2\% = 98\%$$

STEP 2

$$\text{Amount credited} = \$300 \div 0.98 = \$306.1224, \text{ or } \$306.12$$

STEP 3

$$\text{Unpaid balance} = \$484.00 - \$306.12 = \$177.88$$

EXAMPLE K

Suppose that Ike's Storage Center buys \$484 worth of shelving materials. The terms are 2/10, net 60. Ike wants to pay enough within the 10-day discount period to reduce the unpaid balance by exactly \$300. What amount should Ike remit to the seller? What will be the new unpaid balance?

STEP 1 Cash discount = $2\% \times \$300 = \6

STEP 2 Remittance = $\$300 - \$6 = \$294$

STEP 3 Unpaid balance = $\$484 - \$300 = \$184$

Chapter Terms for Review

amount credited

cash discount

complement method

complement rate

discount date

discount method

discount period

discount rate

due date

equivalent single discount rate

invoice

invoice date

list price

net price

net purchase amount

remittance

series of discounts

terms of payment

trade discounts

vendor

Assignment 7.1: Trade Discounts

- A** Problems 1–3: Find the dollar amount of the trade discount and the net price, using the discount method. Problems 4–6: Find the complement rate and the net price, using the complement method.

| Trade Discount | List Price | Discount Amount | Net Price | |
|----------------|------------|-------------------|-------------------|---|
| 1. 35% | \$1,260 | <u>\$441</u> | <u>\$819</u> | $0.35 \times \$1,260 = \441 $\$1,260 - \$441 = \$819$ |
| 2. 30% | \$4,052 | <u>\$1,215.60</u> | <u>\$2,836.40</u> | $0.30 \times \$4,052 = \$1,215.60$ $\$4,052 - \$1,215.60 = \$2,836.40$ |
| 3. 25% | \$8,480 | <u>\$2,120</u> | <u>\$6,360</u> | $0.25 \times \$8,480 = \$2,120$ $\$8,480 - \$2,120 = \$6,360$ |
| Trade Discount | List Price | Complement Rate | Net Price | |
| 4. 30% | \$1,670 | <u>70%</u> | <u>\$1,169</u> | $100\% - 30\% = 70\%$ $0.70 \times \$1,670 = \$1,169$ |
| 5. 20% | \$6,990 | <u>80%</u> | <u>\$5,592</u> | $100\% - 20\% = 80\%$ $0.80 \times \$6,990 = \$5,592$ |
| 6. 32% | \$5,400 | <u>68%</u> | <u>\$3,672</u> | $100\% - 32\% = 68\%$ $0.68 \times \$5,400 = \$3,672$ |

Assignment 7.1: Trade Discounts

- B** Find the amount of each discount in the given series of trade discounts. Then find the net price. Where a discount doesn't exist, write a dash.

| List Price | Trade Discounts | Trade Discount Amounts | | | Net Price |
|------------|-----------------|-------------------------------|-------------------------------|-----------------------------|----------------|
| | | First | Second | Third | |
| 7. \$2,400 | 30%, 25% | <u>\$720</u> | <u>\$420</u> | <u>—</u> | <u>\$1,260</u> |
| | | $0.30 \times \$2,400 = \720 | $0.25 \times \$1,680 = \420 | | |
| | | $\$2,400 - \$720 = \$1,680$ | $\$1,680 - \$420 = \$1,260$ | | |
| 8. \$1,800 | 40%, 30%, 25% | <u>\$720</u> | <u>\$324</u> | <u>\$189</u> | <u>\$567</u> |
| | | $0.40 \times \$1,800 = \720 | $0.30 \times \$1,080 = \324 | $0.25 \times \$756 = \189 | |
| | | $\$1,800 - \$720 = \$1,080$ | $\$1,080 - \$324 = \$756$ | $\$756 - \$189 = \$567$ | |

Assignment 7.1: Trade Discounts

- C** Find the complement rate for each discount in the given series of trade discounts. Then find the net price, using the complement method. Where a complement rate doesn't exist, write a dash.

| List Price | Trade Discounts | Complement Rates | | | Net Price |
|--|-----------------|------------------|------------|------------|----------------|
| | | First | Second | Third | |
| 9. \$1,800 $100\% - 40\% = 60\%$ $100\% - 20\% = 80\%$ $0.60 \times 0.80 \times \$1,800 = \$864$ | 40%, 20% | <u>60%</u> | <u>80%</u> | <u>—</u> | <u>\$864</u> |
| 10. \$4,000 $100\% - 30\% = 70\%$ $100\% - 25\% = 75\%$ $100\% - 15\% = 85\%$ $0.70 \times 0.75 \times 0.85 \times \$4,000 = \$1,785$ | 30%, 25%, 15% | <u>70%</u> | <u>75%</u> | <u>85%</u> | <u>\$1,785</u> |

Assignment 7.1: Trade Discounts

- D** Find the complement rate for each discount in the given series of trade discounts. Then find the equivalent single discount rate, to the nearest 1/10 of a percent.

| Trade Discounts | Complement Rates | | | Equivalent Single Discount Rates |
|--|-----------------------|---|----------------------|----------------------------------|
| | First | Second | Third | |
| 11. 30%, 20%, 5% $100\% - 30\% = 70\%$ $0.70 \times 0.80 \times 0.95 = 0.532$ | <u>70%</u> | <u>80%</u> | <u>95%</u> | <u>46.8%</u> |
| | $100\% - 20\% = 80\%$ | $100\% - 5\% = 95\%$ | | |
| | | $1.000 - 0.532 = 0.468, \text{ or } 46.8\%$ | | |
| 12. 20%, 10%, 5% $100\% - 20\% = 80\%$ $0.80 \times 0.90 \times 0.95 = 0.684$ | <u>80%</u> | <u>90%</u> | <u>95%</u> | <u>31.6%</u> |
| | | $100\% - 10\% = 90\%$ | $100\% - 5\% = 95\%$ | |
| | | $1.000 - 0.684 = 0.316, \text{ or } 31.6\%$ | | |

Assignment 7.1: Trade Discounts

E Solve each of the following business applications about trade discounts. Use either the discount method or the complement method.

- 13.** Gifford Landscaping, Inc., purchased \$425 worth of plants and \$180 worth of soil and fertilizer from a garden supply wholesaler. The wholesaler gives Gifford a 20% trade discount on the plants and a 30% trade discount on the other items. Compute the net price that Gifford Landscaping will be required to pay. \$466
- | | | | |
|----------------------------|------------------|--------------|------------|
| $0.20 \times \$425 = \85 | $\$425 - \$85 =$ | <u>\$340</u> | plants |
| $0.30 \times \$180 = \54 | $\$180 - \$54 =$ | <u>+ 126</u> | soil, etc. |
| | | <u>\$466</u> | total |
- 14.** Hackett Roofing Company is purchasing cedar shingles to reroof a house. The shingles have a list price of \$11,820. The Kalman Roofing Supply gives Hackett the normal trade discount of 40%. In addition, Kalman gives Hackett two further trade discounts of 25% and 15% because of the large volume of business that the company has done with Kalman so far this year. What is Hackett's net price on the order of cedar shingles? \$4,521.15
- | |
|---|
| $100\% - 40\% = 60\%$ |
| $100\% - 25\% = 75\%$ |
| $100\% - 15\% = 85\%$ |
| $0.60 \times 0.75 \times 0.85 \times \$11,820 = \$4,521.15$ |

Assignment 7.2: Cash Discounts

A For the following problems, find the discount date, the due date, the amount of the cash discount, and the amount of the remittance.

| | | | |
|------------------|------------|------------------|-------------------|
| 1. Terms: | 3/5, n/25 | Discount date: | <u>June 1</u> |
| Invoice date: | May 27 | Due date: | <u>June 21</u> |
| Invoice amount: | \$2,875.12 | Discount amount: | <u>\$86.25</u> |
| | | Remittance: | <u>\$2,788.87</u> |

Disc. date: $\text{May } 27 + 5 = \text{June } 1$
 Due date: $\text{May } 27 + 25 = \text{June } 21$
 $0.03 \times \$2,875.12 = \86.2536 , or $\$86.25$
 $\$2,875.12 - \$86.25 = \$2,788.87$

| | | | |
|------------------|------------|------------------|-------------------|
| 2. Terms: | 2-10, n-30 | Discount date: | <u>Apr. 7</u> |
| Invoice date: | Mar. 28 | Due date: | <u>Apr. 27</u> |
| Invoice amount: | \$3,241.94 | Discount amount: | <u>\$44.59</u> |
| Returned goods: | \$1,012.59 | Remittance: | <u>\$2,184.76</u> |

Disc. date: $\text{Mar. } 28 + 10 = \text{Apr. } 7$
 Due date: $\text{Mar. } 28 + 30 = \text{Apr. } 27$
 $\$3,241.94 - \$1,012.59 = \$2,229.35$
 $0.02 \times \$2,229.35 = \44.587 , or $\$44.59$
 $\$2,229.35 - \$44.59 = \$2,184.76$

Assignment 7.2: Cash Discounts

A For the following problems, find the discount date, the due date, the amount of the cash discount, and the amount of the remittance. (cont'd)

| | | | | |
|-----------|------------------------------------|----------------|------------------|-----------------|
| 3. | Terms: | 1.5/15, net 45 | Discount date: | Sept. 4 |
| | Invoice date: | Aug. 20 | Due date: | <u>Oct. 4</u> |
| | Invoice amount: | \$692.00 | Discount amount: | <u>\$9.12</u> |
| | Freight: | \$84.00 | Remittance: | <u>\$682.88</u> |
| | Disc. date: Aug. 20 + 15 = Sept. 4 | | | |
| | Due date: Aug. 20 + 45 = Oct. 4 | | | |
| | $\$692 - \$84 = \$608$ | | | |
| | $0.015 \times \$608 = \9.12 | | | |
| | $\$608 - \$9.12 + \$84 = \682.88 | | | |

| | | | | |
|-----------|---|--------------|------------------|-------------------|
| 4. | Terms: | 2.5/20, n/60 | Discount date: | Aug. 18 |
| | Invoice date: | July 29 | Due date: | <u>Sept. 27</u> |
| | Invoice amount: | \$1,645.55 | Discount amount: | <u>\$26.42</u> |
| | Returned goods: | \$498.75 | Remittance: | <u>\$1,120.38</u> |
| | Freight: | \$90.00 | | |
| | Disc. date: July 29 + 20 = Aug. 18 | | | |
| | Due date: July 29 + 60 = Sept. 27 | | | |
| | $\$1,645.55 - \$498.75 - \$90 = \$1,056.80$ | | | |
| | $0.025 \times \$1,056.80 = \26.42 | | | |
| | $\$1,056.80 - \$26.42 + \$90 = \$1,120.38$ | | | |

Assignment 7.2: Cash Discounts

B For the following problems, find the discount date, the complement rate, and the amount of the remittance.

| | | | |
|-----------------|------------|------------------|-----------------|
| 5. Terms: | 2/10, n/35 | Discount date: | <u>Apr. 8</u> |
| Invoice date: | March 29 | Complement rate: | <u>98%</u> |
| Invoice amount: | \$582.50 | Remittance: | <u>\$570.85</u> |

Disc. date: $\text{Mar. } 29 + 10 = \text{Apr. } 8$

Comp rate: $100\% - 2\% = 98\%$

$0.98 \times \$582.50 = \570.85

| | | | |
|-----------------|----------------|------------------|-------------------|
| 6. Terms: | 2.5-20, net 30 | Discount date: | <u>Sept. 18</u> |
| Invoice date: | Aug. 19 | Complement rate: | <u>97.5%</u> |
| Invoice amount: | \$3,424.50 | Remittance: | <u>\$2,563.38</u> |

Returned goods: \$797.38

Freight: \$77.50

Disc. date: $\text{Aug. } 19 + 30 = \text{Sept. } 18$

Comp. rate: $100\% - 2.5\% = 97.5\%$

$\$3,424.50 - \$797.38 - \$77.50 = \$2,549.62$

$0.975 \times \$2,549.62 = \$2,485.8795$, or $\$2,485.88$

$\$2,485.88 + \$77.50 = \$2,563.38$

Assignment 7.2: Cash Discounts

C The following problems involve partial payments made within the discount period. Solve for the items indicated.

| | | | |
|-----------------|-----------|------------------|-----------------|
| 7. Terms: | 4/5, n/20 | Amount credited: | <u>\$625.00</u> |
| Invoice date: | Feb. 28 | Remittance: | \$600 |
| Invoice amount: | \$981.94 | Unpaid balance: | <u>\$356.94</u> |

$$\text{Comp. rate: } 100\% - 4\% = 96\%$$

$$\$600 \div 0.96 = \$625.00$$

$$\$981.94 - \$625.00 = \$356.94$$

| | | | |
|-----------------|--------------|------------------|-----------------|
| 8. Terms: | 3/10, net 25 | Amount credited: | <u>\$670.10</u> |
| Invoice date: | Feb. 12 | Remittance: | \$650 |
| Invoice amount: | \$967.27 | Unpaid balance: | <u>\$214.42</u> |
| Returned goods: | \$82.75 | | |

$$\text{Comp. rate: } 100\% - 3\% = 97\%$$

$$\$650 \div 0.97 = \$670.1031, \text{ or } \$670.10$$

$$\$967.27 - \$82.75 - \$670.10 = \$214.42$$