Chapter 18

MyFinanceLab Solutions

Problem 18-1

(Related to Checkpoint 18.1) (Measuring firm liquidity) The following table contains current asset and current liability balances for Deere and Company (DE):

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Current Assets</th>
<th>Total Current Liabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Measure the liquidity of Deere & Co. for each year using the company's net working capital and current ratio.
b. Is the trend in Deere's liquidity improving over this period?

a. Measure the liquidity of Deere & Co. for each year using the company's net working capital and current ratio.

STEP 1: Picture the problem

Firm liquidity refers to the ability of the firm to pay its bills in a timely fashion. Thus, a rudimentary measure of firm liquidity can be obtained by comparing the assets that the firm has on hand that can be converted to cash within the coming year (current assets) with the bills the firm must pay within the coming year (current liabilities).
Problem 18-1 (cont.)

Note that these figures are in thousands of dollars.

**STEP 2: Decide on a solution strategy**

Firm liquidity can be measured by a comparison of current assets and current liabilities using the following measures:

\[
\text{Net Working Capital} = \text{Current Assets} - \text{Current Liabilities}
\]

and

\[
\text{Current Ratio} = \frac{\text{Current Assets}}{\text{Current Liabilities}}
\]

**STEP 3: Solve**

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2009</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net working capital ($000)</td>
<td>$(5,634,600)</td>
<td>$(6,001,400)</td>
<td>$(5,885,900.00)</td>
</tr>
<tr>
<td>Current ratio</td>
<td>0.56</td>
<td>0.62</td>
<td>0.61</td>
</tr>
</tbody>
</table>

**STEP 4: Analyze**

The effects of the recession are clearly visible in the liquidity measures for Deere and Company. This is perhaps most obvious when we compare the current ratios for the three periods. The 2010 ratio is closer to that of 2009 but less than that of 2008.

b. Overall, Deere's liquidity position is fairly consistent: net working capital is negative throughout the period, with the current ratio consistently less than one.

Data Table
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Problem 18-1 (cont.)

<table>
<thead>
<tr>
<th>(S thousands)</th>
<th>2010</th>
<th>2009</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current assets</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash and cash equivalents</td>
<td>2,211,400</td>
<td>2,278,600</td>
<td>1,687,500</td>
</tr>
<tr>
<td>Short-term investments</td>
<td>0</td>
<td>1,623,300</td>
<td>0</td>
</tr>
<tr>
<td>Net receivables</td>
<td>3,944,200</td>
<td>3,680,900</td>
<td>3,508,100</td>
</tr>
<tr>
<td>Inventory</td>
<td>3,041,800</td>
<td>2,337,300</td>
<td>1,957,300</td>
</tr>
<tr>
<td><strong>Total current assets</strong></td>
<td>9,197,400</td>
<td>9,920,100</td>
<td>7,152,900</td>
</tr>
<tr>
<td><strong>Current liabilities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts payable</td>
<td>6,562,800</td>
<td>3,186,100</td>
<td>4,666,300</td>
</tr>
<tr>
<td>Short/current long-term debt</td>
<td>8,520,500</td>
<td>9,969,400</td>
<td>8,121,200</td>
</tr>
<tr>
<td>Other current liabilities</td>
<td>0</td>
<td>2,766,000</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total current liabilities</strong></td>
<td>15,083,300</td>
<td>15,921,500</td>
<td>12,787,500</td>
</tr>
</tbody>
</table>
Problem 18-3

(Identifying permanent and temporary asset investments) Classify each of the investments in assets as either permanent or temporary:

a. A seasonal increase in a card shop's inventory of Valentine cards.
b. The acquisition of a new forklift truck that is expected to have a useful life of 5 years.
c. An increase in accounts receivable resulting from an expansion in the firm's customer base.

a. A seasonal increase in a card shop's inventory of Valentine cards is classified as a temporary asset. (Select from the drop-down menu.)
b. The acquisition of a new forklift truck that is expected to have a useful life of 5 years is classified as a permanent asset. (Select from the drop-down menu.)
c. An increase in accounts receivable resulting from an expansion in the firm's customer base is classified as a permanent asset. (Select from the drop-down menu.)
Problem 18-4

(Identifying spontaneous, temporary, and permanent sources of financing) Classify each of the following sources of new financing as spontaneous, temporary, or permanent:

a. A manufacturing firm enters into a loan agreement with its bank that calls for annual principal and interest payments spread over the next four years.

This source of financing can be classified as a **permanent asset**. (Select from the drop-down menu.)

b. A retail firm orders new items of inventory that are charged to the firm's trade credit.

This source of financing can be classified as a **spontaneous asset**. (Select from the drop-down menu.)

c. A trucking firm issues common stock to the public and uses the proceeds to upgrade its tractor fleet.

This source of financing can be classified as a **permanent asset**. (Select from the drop-down menu.)
Problem 18-5

(Related to Checkpoint 18.2) (Calculating the cash conversion cycle) Network Solutions just introduced a new, fully automated manufacturing plant that produces 2,000 wireless routers per day with materials costs of $50 per router and no other costs. The average number of days a router is held in inventory before being sold is 45 days. In addition, they generally pay their suppliers in 30 days, while collecting from their customers after 25 days.

a. What is the cash conversion cycle?
b. What would happen to the cash conversion cycle if they could stretch their payments to suppliers from 30 days to 50 days?
c. How much would working capital be reduced if they stretched their payments to suppliers from 30 days to 50 days?

a. The average number of days a router is held in inventory before being sold is 45 days. In addition, Network Solutions generally pay their suppliers in 30 days, while collecting from their customers after 25 days. What is the cash conversion cycle?

STEP 1: Picture the problem

We can visualize the operating and cash conversion cycles using the following diagram:
STEP 2: Decide on a solution strategy

The firm's cash conversion cycle and operating cycle are defined as follows:

Operating Cycle = Inventory Conversion Period + Average Collection Period

Cash Conversion Cycle = Operating Cycle – Accounts Payable Deferral Period

STEP 3: Solve
Problem 18-5 (cont.)

The firm's operating cycle is computed as:

\[
\text{Operating Cycle} = \text{Inventory Conversion Period} + \text{Average Collection Period}
\]

\[
\text{Operating Cycle} = 45 \text{ days} + 25 \text{ days} = 70 \text{ days}
\]

and its cash conversion cycle is found to be:

\[
\text{Cash Conversion Cycle} = \text{Operating Cycle} - \text{Accounts Payable Deferral Period}
\]

\[
\text{Cash Conversion Cycle} = 70 \text{ days} - 30 \text{ days} = 40 \text{ days}
\]

**STEP 4: Analyze**

Network Solution's cash conversion cycle is 40 days: the difference between its operating cycle of 70 days and its accounts payable deferral period of 30 days.

The firm is financing its sales during this period: it has already paid its suppliers, but has not yet been paid by its customers. It must have sufficient other resources to operate during this period.

b. If they could stretch their payments to suppliers from 30 days to 50 days, the cash conversion cycle becomes:

\[
\text{Cash Conversion Cycle} = 70 \text{ days} - 50 \text{ days} = 20 \text{ days}
\]

If the firm were able to delay payment to its suppliers, then it would be able to hold onto its cash longer, decreasing the period that it must finance its sales—that is, decreasing its cash conversion cycle. Thus, Network Solutions could reduce the cash conversion cycle by 20 days from 40 days to 20 days if they could stretch their payments to suppliers from 30 days to 50 days.

c. If they stretched their payments to suppliers from 30 days to 50 days, the amount of working capital that can be reduced is equal to the cost per unit times the number of units produced per day and then multiplied by the number of days the payment to the supplier is deferred, or $50 \times 2,000 \text{ units} \times (50 \text{ days} - 30 \text{ days}) = 2,000,000.$
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Problem 18-6

(Related to Checkpoint 18.2)  (Calculating the operating and cash conversion cycle)  Carraway Seed Company Inc. has for many years cultivated and sold what are known as heritage plants and seeds. For example, the company has sought out older varieties of tomato plants that are no longer grown by commercial vegetable farmers since they either take too long to mature, do not ship well, or do not hold up for long on the store shelf. The company has recently been considering ways to reduce its investment in working capital in order to make itself more profitable. At present the firm has an inventory conversion period of 90 days and the majority of its customers take advantage of its credit terms of 30 days. The company purchases its inventory items on credit terms that allow them 45 days to pay but has always followed a policy of making cash payments for invoices as soon as they are received, so the accounts payable deferral period is typically only 5 days.

a. What are Carraway's operating and cash conversion cycles?
b. If Carraway were to decide to take full advantage of its credit terms and delay payment until the last possible date, how would this impact their cash conversion cycle?
c. What would be your recommendation to the company with regard to its working capital management practices and why?

a. At present the firm has an inventory conversion period of 90 days and the majority of its customers take advantage of its credit terms of 30 days. The company purchases its inventory items on credit terms that allow them 45 days to pay but has always followed a policy of making cash payments for invoices as soon as they are received, so the accounts payable deferral period is typically only 5 days. What are Carraway's operating and cash conversion cycles?

STEP 1: Picture the problem

We can visualize the operating and cash conversion cycles using the following diagram:
Problem 18-6 (cont.)

**STEP 2: Decide on a solution strategy**

The firm's cash conversion cycle and operating cycle are defined as follows:

Operating Cycle = Inventory Conversion Period + Average Collection Period

Cash Conversion Cycle = Operating Cycle − Accounts Payable Deferral Period

**STEP 3: Solve**
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Problem 18-6 (cont.)

The firm's operating cycle is computed as:

\[
\text{Operating Cycle} = \text{Inventory Conversion Period} + \text{Average Collection Period}
\]

\[
\text{Operating Cycle} = 90 \text{ days} + 30 \text{ days} = 120 \text{ days}
\]

and its cash conversion cycle is found to be:

\[
\text{Cash Conversion Cycle} = \text{Operating Cycle} - \text{Accounts Payable Deferral Period}
\]

\[
\text{Cash Conversion Cycle} = 120 \text{ days} - 5 \text{ days} = 115 \text{ days}
\]

**STEP 4: Analyze**

Carraway's cash conversion cycle is 115 days: the difference between its operating cycle of 120 days and its accounts payable deferral period of 5 days. The firm is financing its sales during this period: it has already paid its suppliers, but has not yet been paid by its customers. It must have sufficient other resources to operate during this period.

b. If Carraway were to decide to take full advantage of its credit terms and delay payment until the last possible date, the cash conversion cycle becomes:

\[
\text{Cash Conversion Cycle} = 120 \text{ days} - 45 \text{ days} = 75 \text{ days}
\]

If the firm were able to delay payment to its suppliers, then it would be able to hold onto its cash longer, decreasing the period that it must finance its sales—that is, decreasing its cash conversion cycle. Thus, Carraway could reduce the cash conversion cycle by 40 days from 115 days to 75 days if they could stretch their payments to suppliers from 5 days to 45 days.

c. By not taking advantage of its suppliers' offer to finance its inventory—by allowing Carraway to delay their payment—for an extra 40 days essentially means that Carraway is walking away from an interest-free, 40-day loan. (It pays the same dollar amount to its suppliers regardless of when it pays.) Carraway should definitely take full advantage of its suppliers' terms, increasing its accounts payable deferral period to the full 45 days, thereby decreasing its cash conversion cycle to 75 days.
Problem 18-7

(Related to Checkpoint 18.3) (Estimating the cost of bank credit) Paymaster Enterprises has arranged to finance its seasonal working-capital needs with a short-term bank loan. The loan will carry a rate of 12 percent per annum with interest paid in advance (discounted). In addition, Paymaster must maintain a minimum demand deposit with the bank of 10 percent of the loan balance throughout the term of the loan. If Paymaster plans to borrow $100,000 for a period of 3 months, what is the annualized cost of the bank loan?

If Paymaster plans to borrow $100,000 for a period of 3 months, what is the annualized cost of the bank loan?

**STEP 1: Picture the problem**

In this case, the principal must be adjusted because a compensating balance of 10 percent of the loan balance is used to maintain a minimum demand deposit and the loan interest is deducted (discounted) from the loan amount before the funds are transferred to Paymaster Enterprises.

**STEP 2: Decide on a solution strategy**

To solve for the annual percentage rate (APR) or the effective annual cost of the loan, use the following equation:

\[
APR = \frac{\text{Interest}}{\text{Principal}} \times \frac{1}{\text{Time}}
\]

where the interest is computed as follows:

\[
\text{Interest} = \text{principal} \times \text{rate} \times \text{time}
\]

**STEP 3: Solve**

The dollar amount of interest on $100,000 that is borrowed at an annual rate of 12% for a period of 3 months is:

\[
\text{Interest} = 100,000 \times 0.12 \times \frac{3}{12} = 3,000.00
\]

The principal must be adjusted because a compensating balance of $10,000 ($100,000 \times 10\%) is used to maintain a minimum demand deposit and the loan interest of $3,000.00 is deducted (discounted) from the loan amount before the funds are transferred to Paymaster Enterprises. Therefore, the APR of the bank loan is...
Problem 18-7 (cont.)

The annualized cost of the bank loan or APR for Paymaster Enterprises is 13.79%. Note that the presence of a compensating balance requirement increases the cost of credit to Paymaster Enterprises. Adding a requirement that interest be deducted from the loan proceeds (discounted interest) also increases the cost of credit.
Problem 18-8

(Related to Checkpoint 18.3) (Calculating the cost of trade credit) Calculate the annualized cost of the trade credit terms of 2/10, net 30 when payment is made on the net due date (assume a 360-day year).

What is the annualized cost of the trade credit terms of 2/10, net 30 when payment is made on the net due date (assume a 360-day year)?

**STEP 1: Picture the problem**

Trade credit provides one of the most flexible sources of short-term financing available to a firm. Very often the credit terms offered with trade credit involve a cash discount for early payment. For example, a supplier might offer terms of 2/10, net 30, which means that a discount of 2 percent is offered if payment is made within 10 days or the full amount is due in 30 days. Thus, a 2 percent penalty is involved for not paying within 10 days, or for delaying payment from the 10th to the 30th day (that is, 20 days).

**STEP 2: Decide on a solution strategy**

To solve for the annual percentage rate (APR) or the effective annual cost of the trade credit term, use the following equation:

\[
APR = \frac{\text{Interest}}{\text{Principal}} \times \frac{1}{\text{Time}}
\]

**STEP 3: Solve**

Using a $1 invoice amount, the effective cost of passing up the discount period of the credit term of 2/10, net 30 can be calculated as follows:

\[
APR = \frac{\$0.02}{\$0.98} \times \frac{1}{20/360} = 0.3673 = 36.73\%
\]

**STEP 4: Analyze**

Note that the 2 percent cash discount is the interest cost of extending the payment period an additional 20 (30 – 10) days. Note also that the principal amount of the credit is $0.98. This amount constitutes the full principal amount as of the 10th day of the credit period since this is the amount that is due if paid by day 10. After the 10th day the cash discount is lost. The annualized cost of passing up the 2 percent discount for 20 days in this instance is 36.73%. Furthermore, once the discount period has passed, there is no reason to pay before the final due date (the 30th day).
Problem 18-9

(Related to Checkpoint 18.3) (Calculating the cost of short-term financing) The R. Morin Construction Company needs to borrow $100,000 to help finance the cost of a new $150,000 hydraulic crane used in the firm’s commercial construction business. The crane will pay for itself in one year, and the firm is considering the following alternatives for financing its purchase:

**Alternative A**—The firm’s bank has agreed to lend the $100,000 at a rate of 14 percent. Interest would be discounted, and a 15 percent compensating balance would be required. However, the compensating-balance requirement would not be binding on R. Morin because the firm normally maintains a minimum demand deposit (checking account) balance of $25,000 in the bank.

**Alternative B**—The equipment dealer has agreed to finance the equipment with a 1-year loan. The $100,000 loan would require payment of principal and interest totaling $116,300.

a. Which alternative should R. Morin select?

b. If the bank’s compensating-balance requirement were to necessitate idle demand deposits equal to 15 percent of the loan, what effect would this have on the cost of the bank loan alternative?

---

**a. Which alternative should R. Morin select?**

**STEP 1: Picture the problem**

Occasionally, bank loans will be made on a "discounted interest" basis. That is, the loan interest will be deducted from the loan amount before the funds are transferred to the borrower. In the case where interest is discounted, the amount actually borrowed ($B$) will be larger than the $100,000 needed.

**STEP 2: Decide on a solution strategy**

**Alternative A:** Since the interest on the bank loan is discounted, you must first determine how much R. Morin will have to borrow in order that the firm receives the needed $100,000. Let’s call $B$ the amount to be borrowed. So, you need to solve for $B$ such that

$$B - 0.14B = 100,000$$

Note that interest must be paid on the amount actually borrowed ($B$). Then, solve for the annual percentage rate ($APR$) of alternative A as follows:

$$APR = \frac{\text{Interest}}{\text{Principal}} \times \frac{1}{\text{Time}}$$
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Problem 18-9 (cont.)

**Alternative B:** Since the required payment of principal and interest is $116,300, subtract the value of the loan, $100,000, to obtain the value of the interest for this alternative. Then solve for the annual percentage rate \((APR)\) of alternative B as follows:

\[
APR = \frac{\text{Interest}}{\text{Principal}} \times \frac{1}{\text{Time}}
\]

**STEP 3: Solve**

**Alternative A:** Since the interest on the bank loan, 14\%, is discounted, you must first determine how much R. Morin will have to borrow in order that the firm receives the needed $100,000. Let's call \(B\) the actual amount to be borrowed. Then, you need to solve for \(B\) such that,

\[
B - 0.14B = 100,000
\]

\[
B = \frac{100,000}{1 - 0.14} = 116,279.07
\]

Therefore, with alternative A, R. Morin will have to borrow $116,279.07 and the amount of interest paid for alternative A must be calculated as follows:

\[
\text{Interest} = 116,279.07 \times 0.14 = 16,279.07
\]

Solve for the annual percentage rate \((APR)\) of alternative A as follows:

\[
APR = \frac{16,279.07}{100,000} \times \frac{1}{360 / 360} = 0.1628 = 16.28\%
\]

**Alternative B:** Since the required payment of principal and interest is $116,300, subtract the value of the loan, $100,000, to obtain the value of interest for this alternative. Then solve for the annual percentage rate \((APR)\) of alternative B as follows:

\[
APR = \frac{116,300 - 100,000}{100,000} \times \frac{1}{360 / 360} = 0.1630 = 16.30\%
\]

**STEP 4: Analyze**
The APR of Alternative A would be 16.28% and the APR of Alternative B would be 16.30%. For financing this purchase, R. Morin should select the alternative with the lower cost of short-term financing—in other words, the lower annual percentage rate (APR). Therefore, R. Morin Construction Company should select Alternative A for financing its purchase.

b. If the bank’s compensating-balance requirement were to necessitate idle demand deposits equal to 15 percent of the loan, what effect would this have on the cost of the bank loan alternative?

**STEP 1: Picture the problem**

In this case, the principal must be adjusted because a compensating balance of 15 percent of the loan balance is used to maintain a minimum demand deposit and the loan interest is deducted (discounted) from the loan amount before the funds are transferred to R. Morin.

**STEP 2: Decide on a solution strategy**

**Alternative A:** Now the compensating balance becomes binding and the interest on the bank loan is discounted. You must first determine how much R. Morin will have to borrow in order that the firm receives the needed $100,000. Let’s call $B^*$ the amount to be borrowed. So, you need to solve for $B^*$ such that

$$B^* - 0.14B^* - 0.15B^* = 100,000$$

Note that interest must be paid on the new amount actually borrowed ($B^*$). Then, solve for the new annual percentage rate (APR) of alternative A as follows:

$$\text{APR} = \frac{\text{Interest}}{\text{Principal}} \times \frac{1}{\text{Time}}$$

**STEP 3: Solve**

**Alternative A:** The new amount actually borrowed by the firm would be:

$$B^* - 0.14B^* - 0.15B^* = 100,000$$
Problem 18-9 (cont.)

\[ B^* = \frac{\$100,000}{(1 - 0.14 - 0.15)} = \$140,845.07 \]

The new amount actually borrowed by the firm would be \$140,845.07. Thus, interest will be paid on \$140,845.07 and calculated as follow:

\[ \text{Interest} = \$140,845.07 \times 0.14 = \$19,718.31 \]

Finally, solve for the new annual percentage rate (APR) as follows:

\[ APR = \frac{\$19,718.31}{\$100,000 \times \frac{360}{360}} = 0.1972 = 19.72\% \]

**STEP 4: Analyze**

The new APR of Alternative A (bank loan alternative) would be 19.72% and the APR of Alternative B would be 16.30%. For financing this purchase, R. Morin should select the alternative with the lower cost of short-term financing—in other words, the lower annual percentage rate (APR). Therefore, R. Morin Construction Company should select Alternative B for financing its purchase.
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Problem 18-10

(Related to Checkpoint 18.3) (Calculating the cost of a short-term bank loan) On July 1, 2009, the Southwest Forging Corporation arranged for a line of credit with the First National Bank of Dallas. The terms of the agreement call for a $100,000 maximum loan with interest set at 1 percent over prime. In addition, the firm has to maintain a 20 percent compensating balance in its demand deposit account throughout the year. The prime rate is currently 12 percent (assume a 360-day year).

a. If Southwest normally maintains a $20,000 to $30,000 balance in its checking account with FNB of Dallas, what is the annualized cost of credit through the line-of-credit agreement when the maximum loan amount is used for a full year?

b. Recompute the annualized cost of financing to Southwest if the firm borrows the compensating balance and it borrows the maximum possible under the loan agreement. Again, assume the full amount of the loan is outstanding for a whole year.

a. If Southwest normally maintains a $20,000 to $30,000 balance in its checking account with FNB of Dallas, what is the effective cost of credit under the line-of-credit agreement when the maximum loan amount is used for a full year?

STEP 1: Picture the problem

Southwest Forging Corporation is required to maintain a minimum balance in the bank throughout the loan period. This compensating balance is 20 percent of the loan amount. However, the company maintains sufficient funds (between $20,000 and $30,000) in the bank to satisfy the compensating-balance requirement. In addition, this bank loan will not be made on a discount basis. That is, the loan interest will not be deducted from the loan amount.

STEP 2: Decide on a solution strategy

Use the following equation to calculate the cost of this short-term bank loan:

\[
APR = \frac{\text{Interest}}{\text{Principal}} \times \frac{1}{\text{Time}}
\]

In order to calculate the amount of the interest, notice that the prevailing rate is 1 percent over the prime rate of 12 percent. Therefore, you must consider a loan interest rate of 13 percent on the loan amount.

STEP 3: Solve

First, calculate the dollar amount of interest on the loan. Notice that the prevailing rate is 1 percent over the prime rate of 12 percent. Therefore, you must consider a loan interest rate of 13 percent. The amount of the interest is found to be:
Problem 18-10 (cont.)

Interest = $100,000 \times 0.13 \times 1 \text{ year} = $13,000

The dollar amount of interest on the loan is $13,000. Next, the cost of this short-term bank loan is computed as follows:

$$APR = \frac{13,000}{100,000} \times \frac{1}{1} = 0.13 = 13\%$$

**STEP 4: Analyze**

When $100,000 is borrowed for a full year, the effective cost of credit, $APR$, would be 13%.

b. Recompute the annualized cost of financing to Southwest if the firm borrows the compensating balance and it borrows the maximum possible under the loan agreement. Again, assume the full amount of the loan is outstanding for a whole year.

**STEP 1: Picture the problem**

Unlike part a, Southwest Forging Corporation is now required to maintain a minimum balance in the bank throughout the loan period. This compensating balance is 20 percent of the loan amount and increases the firm's effective cost of the loan.

**STEP 2: Decide on a solution strategy**

Use the following equation to calculate the cost of this short-term bank loan:

$$APR = \frac{\text{Interest}}{(\text{Principal} - \text{Compensating balance})} \times \frac{1}{\text{Time}}$$

**STEP 3: Solve**

The compensating balance is 20 percent of the loan amount:

Compensating balance = 0.20 \times $100,000 = $20,000
Problem 18-10 (cont.)

Thus, the cost of this short-term bank loan becomes:

\[
APR = \frac{\$13,000}{\$100,000 - \$20,000} \times \frac{1}{1} = 0.1625 = 16.25\%
\]

STEP 4: Analyze

If the firm borrows the compensating balance and the maximum possible amount, the effective cost of credit would be 16.25 percent. The compensating balance increases the firm's effective cost of the loan.
Problem 18-11

(Related to Checkpoint 18.3) (Calculating the cost of short-term financing) You plan to borrow $20,000 from the bank to pay for inventories for a gift shop you have just opened. The bank offers to lend you the money at 10 percent annual interest for the 6 months the funds will be needed (assume a 360-day year).

a. Calculate the annualized rate of interest on the loan.

b. In addition, the bank requires you to maintain a 15 percent compensating balance in the bank. Because you are just opening your business, you do not have a demand deposit account at the bank that can be used to meet the compensating-balance requirement. This means that you will have to put 15 percent of the loan amount (which you had planned to use to help finance the business) in a checking account. What is the cost of the loan now?

c. In addition to the compensating-balance requirement in part b, you are told that interest will be discounted. What is the annualized rate of interest on the loan now?

STEP 1: Picture the problem

The procedure for estimating the cost of short-term credit is a very simple one and relies on the basic interest equation:

\[
\text{Interest} = \text{principal} \times \text{rate} \times \text{time}
\]

where interest is the dollar amount of interest on the principal that is borrowed at some annual rate for a fraction of a year (represented by time). We use this basic relationship to solve for the cost of a source of short-term financing or the annual percentage rate (APR) when the interest amount, the principal sum, and the time period for financing are known.

STEP 2: Decide on a solution strategy

To solve for the annual percentage rate (APR) or the effective annual cost of the loan, use the following equation:

\[
\text{APR} = \frac{\text{Interest}}{\text{Principal}} \times \frac{1}{\text{Time}}
\]

STEP 3: Solve

First, calculate the dollar amount of the interest on the loan. The amount of interest is found to be:
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Problem 18-11 (cont.)

Interest = $20,000 \times 0.10 \times \frac{6}{12} = $1,000

The dollar amount of interest on the loan is $1,000. Next, the cost of this short-term bank loan is computed as follows:

$$APR = \frac{$1,000}{$20,000} \times \frac{1}{\frac{6}{12}} = 0.1000 = 10.00\%$$

**STEP 4: Analyze**

When $20,000 is borrowed for 6 months, the effective cost of credit, $APR$, would be 10.00%.

b. In addition, the bank requires you to maintain a 15 percent compensating balance in the bank. Because you are just opening your business, you do not have a demand deposit account at the bank that can be used to meet the compensating-balance requirement. This means that you will have to put 15 percent of the loan amount (which you had planned to use to help finance the business) in a checking account. What is the cost of the loan now?

**STEP 1: Picture the problem**

You are now required to maintain a minimum balance in the bank throughout the loan period. This compensating balance is 15 percent of the loan amount and increases your effective cost of the loan.

**STEP 2: Decide on a solution strategy**

The annual percentage rate ($APR$) becomes:

$$APR = \frac{\text{Interest}}{\text{Principal} - \text{Compensating balance}} \times \frac{1}{\text{Time}}$$

**STEP 3: Solve**

The compensating balance is 15 percent of the loan amount:
Problem 18-11 (cont.)

Compensating balance \(= 0.15 \times \$20,000 = \$3,000\)

Thus, the cost of this short-term bank loan becomes:

\[
APR = \frac{\$1,000}{\$20,000 - \$3,000} \times \frac{1}{6 / 12} = 0.1176 = 11.76\%
\]

STEP 4: Analyze

If the firm borrows the compensating balance and the maximum possible amount, the effective cost of credit would be 11.76 percent. The compensating balance increases the firm's effective cost of the loan.

c. In addition to the compensating-balance requirement in part b, you are told that interest will be discounted. What is the annualized rate of interest on the loan now?

STEP 1: Picture the problem

In this case, the principal must be adjusted because a compensating balance of 15 percent of the loan balance is used to maintain a minimum demand deposit and the loan interest is deducted (discounted) from the loan amount before the funds are transferred to you.

STEP 2: Decide on a solution strategy

If the bank requires a compensating balance and the interest is discounted, then the annual percentage rate \((APR)\) on the loan is:

\[
APR = \frac{\text{Interest}}{\text{Principal} - \text{Compensating balance} - \text{Interest}} \times \frac{1}{\text{Time}}
\]

STEP 3: Solve

If the loan interest is deducted (discounted) from the loan amount, the cost of this short-term bank loan becomes:
Problem 18-11 (cont.)

\[ APR = \frac{\$1,000}{\$20,000 - \$3,000 - \$1,000} \times \frac{1}{6 / 12} = 0.1250 = 12.50\% \]

**STEP 4: Analyze**

Thus, the effect of discounting interest was to raise the cost of the loan from 11.76% to 12.50%.
Problem 18-12

(Related to Checkpoint 18.3) (Calculating the cost of a short-term bank loan) Jimmy Hale is the owner and operator of the grain elevator in Brownfield, Texas, where he has lived for most of his 62 years. The rains during the spring have been the best in a decade and Mr. Hale is expecting a bumper wheat crop. This prompted Mr. Hale to rethink his current financing sources. He now believes he will need an additional $240,000 for the 3-month period ending with the close of the harvest season. After meeting with his banker, Mr. Hale is puzzling over what the additional financing will actually cost. The banker quoted him a rate of 1 percent over prime (which is currently 7 percent) and also requested that the firm increase its current bank balance of $4,000 up to 20 percent of the loan.

a. If interest and principal are all repaid at the end of the 3-month loan term, what is the annual percentage rate on the loan offer made by Mr. Hale's bank?
b. If the bank were to offer to lower the rate to prime if interest is discounted, should Mr. Hale accept this alternative?

Note: Mr. Hale wants to ensure that he receives $240,000 in proceeds after meeting all the requirements.

a. If interest and principal are all repaid at the end of the 3-month loan term, what is the annual percentage rate on the loan offer made by Mr. Hale's bank?

**STEP 1: Picture the problem**

Jimmy Hale’s firm is required to increase its current bank balance up to 20 percent of the loan. So, the dollar amount of the requested compensating balance can be found with the following equation:

\[
\text{Compensating balance} = 0.20 \times \text{principal} - \text{current balance}
\]

**STEP 2: Decide on a solution strategy**

Use the following equation to calculate the cost of this short-term bank loan:

\[
APR = \frac{\text{Interest}}{\text{Principal} - \text{Compensating balance}} \times \frac{1}{\text{Time}}
\]

where the interest payment on the loan is computed as:

\[
\text{Interest} = \text{principal} \times \text{rate} \times \text{time}
\]

In order to calculate the amount of the interest, notice that the prevailing rate is 1 percent over the prime rate of 7 percent. Therefore, you must consider a loan
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Problem 18-12 (cont.)

interest rate of 8 percent on the loan amount.

STEP 3: Solve

First, calculate the dollar amount of the interest on the loan. Mr. Hale wants to ensure that he received $240,000 in proceeds after meeting all the requirements.

Let's call $B^{**}$ the amount to be borrowed. So, you need to solve for $B^{**}$ such that,

$$B^{**} - 0.20 \times B^{**} + 4,000 = 240,000$$

Thus,

$$B^{**} = \frac{240,000 - 4,000}{1 - 0.20} = 295,000$$

The amount of interest is found to be:

$$\text{Interest} = 295,000 \times (0.01 + 0.07) \times (3/12) = 5,900.00$$

Remember that the bank requested that the firm increase its current bank balance of $4,000 up to 20 percent of the loan. So, the dollar amount of the requested compensating balance will be $295,000 \times 20\% - 4,000 = 55,000.

Next, the cost of this short-term bank loan is computed as follows:

$$\text{APR} = \frac{5,900.00}{240,000} \times \frac{1}{3/12} = 0.09833 = 9.83\%$$

STEP 4: Analyze

When $295,000 is borrowed for 3 months, the annual percentage rate on the loan offer made by Mr. Hale's bank is 9.83%.

b. If the bank were to offer to lower the rate to prime if interest is discounted, should Mr. Hale accept this alternative?
Problem 18-12 (cont.)

STEP 1: Picture the problem

Now, the bank lowers the rate to 7% and discounts the interest on the bank loan. Also notice that, even though the compensating balance (20% of the loan) becomes binding, Mr. Hale’s firm still keeps its current bank balance of $4,000. Therefore, under this new agreement, you must determine first how much Mr. Hale will have to borrow in order that his firm receives the needed $240,000.

STEP 2: Decide on a solution strategy

Let’s call $B^*$ the amount to be borrowed. So, you need to solve for $B^*$ such that,

$$B^* - 0.07 \times (3 / 12) \times B^* - 0.20 \times B^* + $4,000 = $240,000$$

Then, calculate the interest that will be paid on the new amount borrowed, $B^*$.

Interest = $0.07 \times (3 / 12) \times B^*$

Finally, solve for the new annual percentage rate (APR):

$$APR = \frac{\text{Interest}}{\text{Principal}} \times \frac{1}{\text{Time}}$$

STEP 3: Solve

Solving the following equation for $B^*$ we find,

$$B^* - 0.07 \times (3 / 12) \times B^* - 0.20 \times B^* + $4,000 = $240,000$$

thus,
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Problem 18-12 (cont.)

\[
B^* = \frac{\$240,000 - \$4,000}{[1 - 0.07 \times (3 / 12) - 0.20]} = \$301,597.44
\]

Next, calculate the interest that will be paid on the new borrowed amount of $301,597.44.

Interest = \$301,597.44 \times 0.07 \times (3 / 12) = \$5,277.96

Finally, solve for the new annual percentage rate (APR) as follows:

\[
APR = \frac{\$5,277.96}{\$240,000} \times \frac{1}{\frac{3}{12}} = 0.08797 = 8.80\%
\]

STEP 4: Analyze

The annual percentage rate of this alternative is 8.80%.

Since the second alternative offers a lower effective interest rate, Mr. Hale should accept it.
Problem 18-13

(Related to Checkpoint 18.3) (Evaluating trade credit discounts) If a firm buys on trade credit terms of 2/10, net 50 and decides to forgo the trade credit discount and pay on the net day, what is the annualized cost of forgoing the discount (assume a 360-day year)?

If a firm buys on trade credit terms of 2/10, net 50 and decides to forgo the trade credit discount and pay on the net day, what is the annualized cost of forgoing the discount (assume a 360-day year)?

**STEP 1: Picture the problem**

Trade credit provides one of the most flexible sources of short-term financing available to a firm. Very often the credit terms offered with trade credit involve a cash discount for early payment. For example, a supplier might offer terms of 2/10, net 30, which means that a 2 percent discount is offered if payment is made within 10 days or the full amount is due in 30 days. Thus, a 2 percent penalty is involved for not paying within 10 days, or for delaying payment from the tenth to the thirtieth day (that is, 20 days).

**STEP 2: Decide on a solution strategy**

To solve for the annual percentage rate ($APR$) or the effective annual cost of the trade credit term, use the following equation:

$$APR = \frac{\text{Interest}}{\text{Principal}} \times \frac{1}{\text{Time}}$$

**STEP 3: Solve**

Using a $1$ invoice amount, the effective cost of passing up the discount period of the credit term of 2/10, net 50 can be calculated as follows:

$$APR = \frac{\$0.02}{\$0.98} \times \frac{1}{40 / 360} = 0.1837 = 18.37\%$$

**STEP 4: Analyze**

Note that the 2 percent cash discount is the interest cost of extending the payment period an additional 40 (50 - 10) days. Note also that the principal amount of the credit is $0.98. This amount constitutes the full principal amount as of the 10th day of the credit period since this is the amount that is due if paid by day 10. After the 10th day the cash discount is lost. The annualized cost of passing up the 2 percent discount for 40 days in this instance is 18.37%. Furthermore, once
the discount period has passed, there is no reason to pay before the final due date (the 50th day).