**Maturity Matching**

**Learning Problems**

**Answer Keys**

**Problem: Basic Maturity Matching at Hobson Ltd.**

1.

|  |  |
| --- | --- |
| **2017 (Actual)** | **Net Working Capital** |
| Quarter 1 | 52,500 |
| Quarter 2 | 66,500 |
| Quarter 3 | 45,500 |
| Quarter 4 | 35,000 |
| **2018 (Forecasted)** | **Net Working Capital** |
| Quarter 1 | 55,125 |
| Quarter 2 | 69,825 |
| Quarter 3 | 47,775 |
| Quarter 4 | 36,750 |

36,750 – 35,000 = 1,750

1,750 / 4 = 437.50

|  |  |
| --- | --- |
| 55,125 – 35,000 – 437.5 (1) = | 19,687.50 |
| 69,825 – 35,000 – 437.5 (2) = | 33,950.00 |
| 47,775 – 35,000 – 437.5 (3) = | 11,462.50 |
| 36,750 – 35,000 – 437.5 (4) = | 0.00 |

2. Approximately CAD 35,000 as it is forecasted that temporary financing will reach CAD 33,950.00 in Quarter 2. Additional funds were requested to serve as a safety margin in case temporary financing needs are higher. The amount of the safety margin is at the discretion of management.

3. In the slowest quarter of the year (i.e. Quarter 4), their temporary financing should be paid down to zero.

**Problem: Basic Maturity Matching at Juno Company**

1.

|  |  |
| --- | --- |
| **2017** | **Net Working Capital** |
| Quarter 1 | 49,000 |
| Quarter 2 | 50,000 |
| Quarter 3 | 56,000 |
| Quarter 4 | 47,000 |
| **2018** | **Net Working Capital** |
| Quarter 1 | 53,900 |
| Quarter 2 | 55,000 |
| Quarter 3 | 61,600 |
| Quarter 4 | 51,700 |

51,700 – 47,000 = 4,700

4,700 / 4 = 1,175

|  |  |
| --- | --- |
| 53,900 – 47,000 – 1,175 (1) = | 5,725 |
| 55,000 – 47,000 – 1,175 (2) = | 5,650 |
| 61,600 – 47,000 – 1,175 (3) = | 11,075 |
| 51,700 – 47,000 – 1,175 (4) = | 0 |

2. Approximately CAD 12,000 as it is forecasted that temporary financing will reach CAD 11,075 in Quarter 3. Additional funds were requested to serve as a safety margin in case temporary financing needs are higher. The amount of the safety margin is at the discretion of management.

3. In the slowest quarter of the year (i.e. Quarter 4), their temporary financing should be paid down to zero.

**Problem: Comprehensive Maturity Matching at Elli Ltd.**

1. **Maturity of Long-term Assets**

= $\frac{25,600,000}{2,950,000}$ = 8.68 years

**Maturity of Long-term Debt**

|  |  |  |  |
| --- | --- | --- | --- |
| **When Due** | **Amount** | **Weighted Amount** | **% of Amount** |
| 1 year | 1,500,000 | 1,500,000 | 12% |
| 2 years | 3,950,000 | 7,900,000 | 32% |
| 3 years | 2,340,000 | 7,020,000 | 19% |
| 4 years | 1,100,000 | 4,400,000 | 9% |
| 5 years | 1,890,000 | 9,450,000 | 15% |
| 6 years | 1,440,000 | 8,640,000 | 11% |
| 7 years | 230,000 | 1,610,000 | 2% |
|  | 12,450,000 | 40,520,000 | 100% |

= $\frac{40,520,000}{12,450,000}$ = 3.25 years

63% of debts are due within three years

* Long-term assets on average will last another 8.68 years, while the long-term debt will mature in 3.25 years. Loans will have to be rolled over several times before the assets can generate enough cash flows to pay off the loans.
* 63% of long-term debt is due within the next three years.
* The line of credit has not been paid down to zero at year-end which is the seasonal low.
* 25% of the long-term debt is convertible by investors into common equity, but the current exercise price of CAD 25 is higher than the market price of CAD 12.32, so conversion is not justified.
* Elli is exposing itself to rollover risk by not paying down its line of credit at the seasonal low and by not matching the maturities of its long-term assets and long-term debt. This is likely being done to lower interest expense to raise profitability.

**Problem: Comprehensive Maturity Matching at Big Red One Ltd.**

1. **Maturity of Long-term Assets**

= $\frac{35,350,000}{4,170,000}$ = 8.48 years

**Maturity of Long-term Debt**

|  |  |  |  |
| --- | --- | --- | --- |
| **When Due** | **Amount** | **Weighted Amount** | **Accumulative % Due** |
| 1 year | 3,740,000 | 3,740,000 | 48% |
| 2 years | 2,005,000 | 4,010,000 | 73% |
| 3 years | 945,000 | 2,835,000 | 85% |
| 4 years | 850,000 | 3,400,000 | 96% |
| 5 years | 310,000 | 1,550,000 | 100% |
|  | 7,850,000 | 15,535,000 |  |

= $\frac{15,535,000}{7,850,000}$ = 1.98 years

85% of debts are due within three years

2.

* A large amount is still owed on the line of credit at year-end, which is also the seasonal low. Big Red One may have difficulties paying this large balance down to zero each year, which is required by the lending agreement.
* There is a sizeable mismatch between the maturity of the long-term assets and the maturity of the long-term debt, which exposes Big Red One to considerable rollover risk. This is serious given the poor economic outlook.
* 41% (3,200,000/7,850,000) of the long-term debt may be converted into equity. The exercise price is currently below the market price, but this may change with the coming recession.

**Problem: Cost of Trade Credit**

1.

**Nominal**

= $\frac{2}{98}$ X $\frac{365}{20}$ = .372 or 37.2%

**Effective**

= (1 +$\frac{2}{98}$) 365/20 -1 = .446 or 44.6%

2.

= (1 +$\frac{2}{98}$) 365/35 – 1 = .235 or 23.5%

3.

* Damage to the firm’s credit rating
* Loss of future trade credit or being put on COD or CBD by suppliers
* Interest and penalties on overdue accounts
* Lost early payment discounts

4.

* Give an indirect price cut to attract new customers
* Avoid a price war with competing suppliers
* Avoid having to lower the prices charged to existing customers
* No choice but to match competitors (i.e. other suppliers)
* Reduced credit monitoring and collection costs
* Cannot borrow from another lender at a more reasonable rate

5.

(1 +$\frac{3}{97}$) 365/75 -1 = .1598 or 15.98%

**Problem: Using a Revolving Credit Agreement at ABC Company**

|  |  |  |
| --- | --- | --- |
| **January** |  |  |
| (25,000) (.12) (13 / 365) = | 106.85 |  |
| (43,000) (.12) (12 / 365) = | 169.64 |  |
| (38,000) (.12) (6 / 365) = | 74.96 | 351.45 |
| **February** |  |  |
| (38,000) (.12) (2/365) = | 24.99 |  |
| (38,000) (.13) (7/365) = | 94.74 |  |
| (30,000) (.13) (6/365) = | 64.11 |  |
| (40,000) (.13) (13/365) = | 185.21 | 369.05 |

2.

|  |  |  |
| --- | --- | --- |
| **January** |  |  |
| 106.85 + .0025 (13 / 365) (75,000 – 25,000) = | 111.30 |  |
| 169.64 + .0025 (12 / 365) (75,000 – 43,000) = | 172.27 |  |
| 74.96 + .0025 (6 / 365) (75,000 – 38,000) = | 76.48 | 360.05 |

=$ \frac{360.05}{\left(\frac{13}{31}\right)\left(25,000\right) \left(.9\right)+\left(\frac{12}{31}\right)\left(43,000\right)\left(.9\right)+\left(\frac{6}{31}\right)\left(38,000\right)(.9)}$ = $\frac{360.05}{31,035.48}$ = .0116 or 1.16%

3.

(1.16%) (12) = 13.92%

**Problem: Using a Revolving Credit Agreement at Sampson Ltd.**

1.

|  |  |  |
| --- | --- | --- |
| **January** |  |  |
| (35,000) (.07) (8 / 365) + (250,000 – 35,000) (.0025) (8 / 365) = | 65.48 |  |
| (84,000) (.07) (12 / 365) + (250,000 – 84,000) (.0025) (12 / 365) = | 206.96 |  |
| (84,000) (.08) (5 / 365) + (250,000 – 84,000) (.0025) (5 / 365) = | 97.73 |  |
| (80,000) (.08) (6 / 365) + (250,000 – 80,000) (.0025) (6 / 365) = | 112.19 | 482.36 |

= $\frac{482.36}{\left(35,000\right)\left(\frac{8}{31}\right)\left(.94\right)+\left(84,000\right)\left(\frac{12}{31}\right)\left(.94\right)+\left(84,000\right)\left(\frac{5}{31}\right)(.94)+\left(80,000\right)\left(\frac{6}{31}\right)(.94)}$ = .0073

(.73%) (12) = 8.76%

2.

|  |  |  |
| --- | --- | --- |
| Inventory: 156,000 X .40 = | 62,400 |  |
| Accounts receivable: 250,000 X .65 = | 162,500 | 244,900 |

= (Lessor of the limit on the line of credit or the maximum borrowing allowed based on collateral requirements) – Current borrowing

= (Lessor of 250,000 or 224,900) – 80,000 = 144,900

3.

January is one of the slower months of the year. More funds will be borrowed during the busier periods.

**Problem: Using a Revolving Credit Agreement at Hanson Ltd.**

1.

|  |
| --- |
| **January** |
| (550,000) (.07) (5 / 365) + (1,000,000 – 550,000) (.005) (5 / 365) | 558.22 |  |
| (780,000) (.07) (14 / 365) + (1,000,000 – 780,000) (.005) (14 / 365) | 2,136.44 |  |
| (780,000) (.065) (5 / 365) + (1,000,000 – 780,000) (.005) (5 / 365) | 709.58 |  |
| (645,000) (.065) (7 / 365) + (1,000,000 – 645,000) (.005) (7 / 365) | 838.08 | 4,242.32 |

= $\frac{4,242,32}{\left(550,000\right)\left(\frac{5}{31}\right)\left(.8\right)+\left(780,000\right)\left(\frac{19}{31}\right)\left(.8\right)+\left(645,000\right)\left(\frac{7}{31}\right)(.8)}$ = .0074 or .74%

(.74%) (12) = 8.88%

2.

(Collateral required) (Borrowing %) = Amount of loan

(Collateral required) (.6) = 645,000

Collateral required = 1,075,000

**Problem: Nominal and Effective Rates**

1. 10% for all loans
2. (1 + $\frac{.10}{12}$)12 – 1 = .1047 or 10.47%

(1 +$ \frac{.10}{2}$)2 – 1 = .1025 or 10.25%

(1 +$ \frac{.10}{ 1}$)1 – 1 = .1000 or 10.00%

**Problem: Mortgage Loan with Blended, Equal Monthly Payments at Rose Company**

1.

.09 / 2 = .045

.045 = (1 + i)6 – 1

i = .0073631

1450,000 = P ($\frac{1-(1+.0073631)^{-180}}{.0073631}$)

1(750,000) (1 - .4)

P = 4,520.33

2.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Period** | **Beginning Principal** | **Interest****(.0073631)** | **Principal** | **Ending Principal** |
| 1 | 450,000.00 | 3,313.40 | 1,206.93 | 448,793.07 |
| 2 | 448,793.07 | 3,304.51 | 1,215.82 | 447,577.25 |

**Problem: Mortgage Loan with Blended, Equal Monthly Payments at Wilson Company**

1.

.08 / 2 = .04

.04 = (1 + i)6 – 1

i = .006558196

1900,000 = P ($\frac{1-(1+.006558196)^{-180}}{.006558196}$)

1 (1,500,000) (.6)

P = 8,533.38

2.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Period** | **Beginning Principal** | **Interest****(.006558196)** | **Principal** | **Ending Principal** |
| 1 | 900,000.00 | 5,902.38 | 2,631.00 | 897,369.00 |
| 2 | 897,369.00 | 5,885.12 | 2,648.26 | 894,720.74 |

3.

* The bank is uncertain of the resale value of the land and wants to ensure that the collateral will cover what is owed if it has to call the loan.
* The company may be over-leveraged, and the bank may want to limit their borrowing.

**Problem: Mortgage Loan with Blended, Equal Monthly Payments at Belair Ltd.**

1.

.07 / 2 = .035

.035 = (1 + i)6 – 1

i = .00575

12,700,000 = P ($\frac{1-(1+.00575)^{-120}}{.00575}$)

1 (4,500,000) (.6)

P = 31,210.31

2.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Period** | **Beginning Principal** | **Interest****(.00575)** | **Principal** | **Ending Principal** |
| 1 | 2,700,000.00 | 15,525.00 | 15,685.31 | 2,684,314.69 |
| 2 | 2,684,314.69 | 15,434.81 | 15,775.50 | 2,668,539.19 |

3.

* Make a larger down payment by either saving more before purchasing the property or raising new equity capital
* Increase the amortization period of the loan
* Negotiate a lower interest rate with another lender

**Problem: Term Loan with Blended, Equal Monthly Payments at ABC Company**

1.

11,125,000 = P ($\frac{1-(1+\frac{.08}{12})^{-120}}{\frac{.08}{12}}$)

1 (1,500,000) (1 - .25)

P = 13,649.35

**Note:** The interest rate does not have to be converted because the payment period and compounding period are the same.

2.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Period** | **Beginning Principal** | **Interest****(.08/12)** | **Principal** | **Ending Principal** |
| 1 | 1,125,000.00 | 7,500.00 | 6,149.35 | 1,118,850.65 |
| 2 | 1,118,850.65 | 7,459.00 | 6,190.35 | 1,112,660.30 |

**Problem: Term Loan with Blended, Equal Monthly Payments at Delta Ltd.**

1.

.06 / 2 = .03

.03 = (1 + i)6 – 1

i = .0049386

1109,500 = P ($\frac{1-(1+.0049386)^{-120}}{.0049386}$)

1 (182,500) (1 - .4)

P = 1,211.63

2.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Period** | **Beginning Principal** | **Interest****(.0049386)** | **Principal** | **Ending Principal** |
| 1 | 109,500.00 | 540.78 | 670.85 | 108,829.15 |
| 2 | 108,829.15 | 537.46 | 674.17 | 108,154.98 |

3.

The injection molding machine is specialized equipment that will be difficult to re-sell if the lender has to repossess it.

**Problem: Term Loan with a Customized Repayment Schedule at Jenkins Company**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Interest Paid** | **Principal Paid** | **Total** |
| September 30, 20161 | 12,500 | - | 12,500 |
| December 31, 2016 | 12,500 | - | 12,500 |
| March 31, 2017 | 12,500 | 50,000 | 62,500 |
| June 30, 20172 | 11,250 | 50,000 | 61,250 |
| September 30, 20173 | 10,000 | 50,000 | 60,000 |
| December 31, 20174 | 8,750 | - | 8,750 |
| March 31, 2018 | 8,750 | 50,000 | 58,750 |
| June 30, 20185 | 7,500 | 50,000 | 57,500 |
| September 30, 20186 | 6,250 | 50,000 | 56,250 |
| December 31, 20187,8 | 5,000 | 200,000 | 205,000 |

1 (500,000) (.10/4) = 12,500

2 (500,000 – 50,000) (.10/4) = 11,250

3 (500,000 – 50,000 (2)) (.10/4) = 10,000

4 (500,000 – 50,000 (3)) (.10/4) = 8,750

5 (500,000 – 50,000 (4)) (.10/4) = 7,500

6 (500,000 – 50,000 (5) (.10/4) = 6,250

7 (500,000 – 50,000 (6)) (.10/4) = 5,000

8 (500,000 – 50,000 (6)) = 200,000

2.

**I/O** – Only interest was paid during the first two quarters

**Stepped** – Principal payment increased from CAD 0 in 2016 to CAD 50,000 in 2017

**Seasonal** – No payment is required in the final quarter of the year due to high cash flow needs

**Balloon** – Principal payments are deferred and a large principal payment is required in the final quarter

**Problem: Term Loan with a Customized Repayment Schedule at Eaton Inc.**

1.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Interest Paid** | **Principal Paid** | **Total** |
| September 30, 20161 | 26,250 | - | 26,250 |
| December 31, 2016 | 26,250 | - | 26,250 |
| March 31, 2017 | 26,250 | 150,000 | 176,250 |
| June 30, 20172 | 23,625 | 150,000 | 173,250 |
| September 30, 20173 | 21,000 | - | 21,000 |
| December 31, 2017 | 21,000 | 150,000 | 171,000 |
| March 31, 20184 | 18,375 | 150,000 | 168,375 |
| June 30, 20185 | 15,750 | 150,000 | 165,750 |
| September 30, 20186 | 13,125 | - | 13,125 |
| December 31, 20187 | 13,125 | 750,000 | 763,125 |

1 (1,500,000) (.07/4) = 26,250

2 (1,500,000 – 150,000) (.07/4) = 23,625

3 (1,500,000 – 150,000 (2)) (.07/4) = 21,000

4 (1,500,000 – 150,000 (3)) (.07/4) = 18,375

5 (1,500,000 – 150,000 (4)) (.07/4) = 15,750

6 (1,500,000 – 150,000 (5) (.07/4) = 13,125

7 (1,500,000 – 150,000 (5)) = 750,000

2.

**I/O** – Only interest was paid during the first two quarters

**Stepped** – Principal payment increased from CAD 0 in 2016 to CAD 150,000 in 2017

**Seasonal** – No payment is required in the third quarter of the year due to high cash flow needs

**Balloon** – Principal payments are deferred and a large principal payment is required in the final quarter

3.

* Value of the depreciating collateral should always be more than the amount of the loan
* Uncertain if the company has the ability to either pay or roll over the balloon payment at the end of the loan