

23 Accounting for Interest

Problems

1. Fotoshop borrows \$100 from a bank at the beginning of Year 1. Fotoshop pays back the principal of \$100 and interest of \$21 (\$10 for the first year and \$11 for the second year) at the end of Year 2. Please write the journal entries for the following:
 - 1.1. Beginning of Year 1 (when it gets \$100 from the bank).
 - 1.2. End of Year 1 to make an adjusting entry for interest of \$10 (which is not paid to the bank yet).
 - 1.3. End of Year 2 to record repayment of \$100 of principal and \$21 of interest.

2. Canbank gives \$1,000 cash as a loan to a borrower for two years. The interest rate is 1% APR compounded annually. Show journal entries for the following.
 - 2.1. Canbank gives \$1,000 cash at the beginning of Year 1 as a loan.
 - 2.2. Canbank gets back \$510 at the end of Year 1. (\$10 is the interest and \$500 is the return of half of principal.)
 - 2.3. Canbank gets back \$505 at the end of Year 2. (\$5 is the interest and \$500 is the return of principal.)

3. CreditCo borrows \$200 for two years. The interest per year is 10% APR compounded annually. Any unpaid interest is added to the balance, and the bank charges interest on the new balance.
 - 3.1. Show the journal entry when the firm borrows \$200 at the beginning of first year.

Suppose the firm pays the interest to the bank at the end of the first year.

- 3.2. What journal entry(ies), if any, will you make at the end of the first year?
- 3.3. What entry or entries will you make at the end of the second year assuming that the firm repays the entire balance?

Suppose the firm does not pay any interest to the bank at the end of the first year.

- 3.4. What journal entry(ies), if any, will you make at the end of the first year?
- 3.5. What entry or entries will you make at the end of the second year assuming that the firm repays the entire balance in full?

4. ABCCo sells an asset to XYZCo.

Acquisition cost = 200
 Salvage value = 20
 Useful life = 18 years
 Years used = 4 years

The asset is depreciated on a straight-line basis. XYZ promises to pay \$50 cash today and \$121 cash after two years. The discount rate for loans to XYZ is 10% APR compounded annually. Show journal entries

 - 4.1. when ABCCO sells the asset.
 - 4.2. after one year from the date of the sale.
 - 4.3. after two years from the date of the sale.

5. HaveCash charges 120% APR compounded monthly as interest. What entry should HaveCash make on the following dates?
 - 5.1. At the beginning of Year 1 when HaveCash gives \$100 cash as a mortgage loan to BuyHouse.
 - 5.2. At the end of the first month when HaveCash receives \$20 cash from BuyHouse.
 - 5.3. At the end of the second month when HaveCash receives \$25 cash from BuyHouse.

6. Borrower Inc. borrows \$100 from Lender Inc. at the beginning of a year. Borrower agrees to pay 10% APR compounded annually. It pays \$50 to Lender at the end of Years 1 and 2. Assume interest costs are fully expensed.
 - 6.1. What journal entry will the Borrower make at the beginning of Year 1 when it gets the \$100 loan?
 - 6.2. What journal entry will the Lender make at the beginning of Year 1 when it gives \$100 as a loan?
 - 6.3. What journal entry will the Borrower make at the end of Year 1 when it pays back \$50?
 - 6.4. What journal entry will the Lender make at the end of Year 1 when it gets \$50?
 - 6.5. What journal entry will the Borrower make at the end of Year 2 when it pays back \$50?
 - 6.6. What journal entry will the Lender make at the end of Year 2 when it gets \$50?
 - 6.7. No journal entries required. How much does Borrower owe Lender at the beginning of Year 3?

7. DelayCo has equipment with an acquisition cost of \$1,000 and a salvage value of \$200. The accumulated depreciation of the equipment at the time of sale is \$400. At the beginning of year 4, the firm sells the equipment to a buyer who does not pay any cash at the time of sale. Instead, the buyer promises to pay \$360 at the end of year 4 and \$720 at the end of year 5. The relevant discount rate is 20% APR compounded annually. Ignore the possibility of bad debts. What journal entry will DelayCo make at the time the asset is sold?

8. LessCash buys equipment for its salespersons worth \$600 by paying \$100 cash now and promising to pay \$605 cash at the end of two years. The salvage value of the asset is \$200, and its useful life is 4 years. LessCash depreciates the asset on a straight-line basis.
 - 8.1. What interest rate is it effectively paying on the loan assuming that the interest is compounded annually?
 - 8.2. What entry should LessCash make when it buys the asset at the beginning of Year 1?
 - 8.3. What entries should LessCash make at the end of Year 1?
 - 8.4. What entries should LessCash make at the end of Year 2? (Assume that it pays off the loan in cash.)
 - 8.5. At the end of Year 3, LessCash sells the asset for \$350 in cash. What entries should it make?

Advanced problems

9. MatchMaker is fanatic about applying the matching concept. It purchases an asset for \$100 with a useful life of 3 years and a salvage value of \$10. MatchMaker decides to use straight-line depreciation for the asset. Assume that the depreciation of the asset is fully expensed in the period in which it is incurred. Fill in the following table

Year	Depreciation for the year	Ending accumulated depreciation	Ending net book value of the asset
1			
2			
3			

MatchMaker does not have the cash to buy the asset and borrows \$100 in cash from its bank at the beginning of Year 1. The interest rate is 20% APR paid at the end of every year. MatchMaker decides to pay back the loan so that the book value of the loan at the beginning of Years 2 and 3 will be equal to the net book value of the asset at the beginning of Years 2 and 3, respectively.

Fill in the following table:

Year	Beginning book value of the loan	Interest expense	Cash paid	Ending book value of the loan
1				
2				
3				

MatchMakers incurs the following routine maintenance costs.

Year	Maintenance costs
1	\$0
2	\$6
3	\$12

Fill in the following table.

Year	Total expense of owning the asset
1	
2	
3	

If the asset is equally useful over the three years, does MatchMaker's depreciation policy make sense? Give reason(s) for your answer.

Answers to problems

1. Fotoshop

Period	Beginning balance	Interest expense	Cash paid	Ending balance
1	100	10	0	110
2	110	11	121	0

1.1. Borrow

A	+dr	-cr	L	-dr	+cr
Cash	100		Loan		100
			E via I/S		

1.2. Accrue interest

A	+dr	-cr	L	-dr	+cr
			Loan		10
			E via I/S		
			Interest expense	10	

1.3. Accrue interest

A	+dr	-cr	L	-dr	+cr
			Loan		11
			E via I/S		
			Interest expense	11	

Repay loan

A	+dr	-cr	L	-dr	+cr
Cash		121	Loan	121	
			E via I/S		

2. Canbank

Period	Beginning balance	Interest expense	Cash paid	Ending balance
1	1000	10	510	500
2	500	5	505	0

2.1. Lend

A	+dr	-cr	L	-dr	+cr
Receivables	1,000				
Cash		1,000	E via I/S		

2.2. Accrue interest

A	+dr	-cr	L	-dr	+cr
Receivables	10		E via I/S		
			Interest revenue		10

Collect

A	+dr	-cr	L	-dr	+cr
Cash	510				
Receivables		510	E via I/S		

2.3. Accrue interest

A	+dr	-cr	L	-dr	+cr
			E via I/S		
Receivables	5		Interest revenue		5

Collect

A	+dr	-cr	L	-dr	+cr
Cash	505				
Receivables		505	E via I/S		

3. CreditCo: If the company does not pay back the interest of \$20 at the end of first year, the bank will charge it interest of 10% on the new balance of \$220 (\$200 principal+\$20 unpaid interest) for the second year. Thus if the company does not pay any interest at the end of the first year, it will have to pay $\$220 + 10\% \text{ of } 220 = \$220 + \$22 = \242 at the end of the second year. If it pays interest of \$20 at the end of the first year, it will have to pay only \$220 at the end of the second year.

3.1. Borrow

A	+dr	-cr	L	-dr	+cr
Cash	200		Loan		200
			E via I/S		

3.2.

Period	Beginning balance	Interest expense	Cash paid	Ending balance
1	200	20	20	200
2	200	20	220	0

A	+dr	-cr	L	-dr	+cr
Cash		20	Loan		20
			Loan	20	
			E via I/S		
			Interest expense	20	

3.3.

A	+dr	-cr	L	-dr	+cr
Cash		220	Loan	200	
			E via I/S		
			Interest expense	20	

3.4.

Period	Beginning balance	Interest expense	Cash paid	Change in balance	Ending balance
1	200	20	0	20	220
2	220	22	242	-220	0

A	+dr	-cr	L	-dr	+cr
			Loan		20
			E via I/S		
			Interest expense	20	

3.5.

A	+dr	-cr	L	-dr	+cr
Cash		242	Loan	220	
			E via I/S		
			Interest expense	22	

4. ABCCo vs. XYZCo: XYZ is promising to pay = $121/(1.1)^2 = 100$
 Depreciation per period of the asset = (cost - salvage value)/ useful life = $(200-20)/18 = 10$
 Accumulated depreciation of the asset = years used x depreciation per period = $4 \times 10 = 40$

Period	Beginning balance	Interest expense	Cash paid	Change in balance	Ending balance
1	100	10	0	10	110
2	110	11	121	-110	0

4.1.

A	+dr	-cr	L	-dr	+cr
Cash	50				
Receivable	100				
Asset		200			
Accumulated depreciation	40				
			E via I/S		
			Loss on sale	10	

4.2.

A	+dr	-cr	L	-dr	+cr
Receivables	10				
			E via I/S		
			Interest revenue		10

4.3.

A	+dr	-cr	L	-dr	+cr
Receivables		110			
Cash	121				
			E via I/S		
			Interest revenue		11

5. HaveCash vs. BuyHouse

Period	Beginning balance	Interest expense	Cash paid	Change in balance	Ending balance
1	100	10	20	-10	90
2	90	9	25	-16	74

5.1.

A	+dr	-cr	L	-dr	+cr
Receivable	100				
Cash		100	E via I/S		

5.2.

A	+dr	-cr	L	-dr	+cr
Cash	20				
Receivable		10	E via I/S		
			Interest revenue		10

5.3.

A	+dr	-cr	L	-dr	+cr
Cash	25				
Receivable		16	E via I/S		
			Interest revenue		9

6. BorrowerInc

Period	Beginning balance	Interest expense	Cash paid	Change in balance	Ending balance
1	100	10	50	-40	60
2	60	6	50	-44	16

6.1. Borrower

A	+dr	-cr	L	-dr	+cr
Cash	100		Payable		100
			E via I/S		

6.2. Lender

A	+dr	-cr	L	-dr	+cr
Cash		100			
Receivable	100		E via I/S		

6.3. Borrower

A	+dr	-cr	L	-dr	+cr
Cash		50	Payable	40	
			E via I/S		
			Interest expense	10	

6.4. Lender

A	+dr	-cr	L	-dr	+cr
Cash	50				
Receivable		40	E via I/S		
			Interest revenue		10

6.5. Borrower

A		+dr	-cr	L		-dr	+cr
Cash			50	Payable		44	
				E via I/S			
				Interest expense		6	

6.6. Lender

A		+dr	-cr	L		-dr	+cr
Cash		50					
Receivable			44	E via I/S			
				Interest revenue			6

6.7. Borrower owes \$16 to Lender at the beginning of Year 3.

7. DelayCo: Present value = $360/1.2 + 720/1.2^2 = 800$

A		+dr	-cr	L		-dr	+cr
Equipment				1,000			
Accumulated depreciation		400		E via I/S			
Receivable			800	Gain on sale			200

8. LessCash

8.1. Effective interest rate = r , Instead of paying \$500 (\$600 - \$100) today, LessCash is paying \$605 at the end of two years. The effective interest rate can be obtained by solving the equation $500(1+r)^2 = 605$, $r = 10\%$ APR compounded annually.

Period	Beginning balance	Interest expense	Cash paid	Change in balance	Ending balance
1		50	0	50	550
2		55	605	-550	0

8.2.

A		+dr	-cr	L		-dr	+cr
Equipment		600		Payable			500
Cash			100	E via I/S			

8.3.

A		+dr	-cr	L		-dr	+cr
Accumulated depreciation			100	E via I/S			
				Depreciation expense		100	

A		+dr	-cr	L		-dr	+cr
				Payable			50
				E via I/S			
				Interest expense		50	

8.4.

A	+dr	-cr	L	-dr	+cr
Accumulated depreciation		100	E via I/S Depreciation expense	100	

A	+dr	-cr	L	-dr	+cr
Cash		605	Payable E via I/S Interest expense	550 55	

8.5.

A	+dr	-cr	L	-dr	+cr
Accumulated depreciation		100	E via I/S Depreciation expense	100	

A	+dr	-cr	L	-dr	+cr
Cash		350	E via I/S Gain on sale		50
Accumulated depreciation	300				
Equipment		600			

Answers to advanced problems

9. Matchmaker

Year	Depreciation for the year	Ending accumulated depreciation	Ending net book value
1	30	30	70
2	30	60	40
3	30	90	10

Year	Beginning book value	Interest expense	Cash paid	Ending book value
1	100	20	50	70
2	70	14	44	40
3	40	8	38 or 48	10 or 0

Year	Total expense of owning the asset
1	30+20+0
2	30+14+6
3	30+12 +8

MatchMaker's depreciation policy makes sense. The asset is equally useful over three years. MatchMaker's depreciation policy results in equal total expenses each period when all costs are considered.