

FA Module 6: Articulation of financial statements – practice problems

(The attached PDF file has better formatting.)

The practice problems review the preparation of the cash flow statement and the articulation of the financial statements; see also the practice problems for Module 5: the cash flow statement.

Exercise 6.1: Cash flow indirect method

A firm's financial statements show the following amounts:

	<i>Calendar Year 20X1</i>	<i>Calendar Year 20X2</i>
Cost of goods sold	275	300
Net revenue	750	800
Depreciation expense	50	60
Net income	150	200
Shareholder dividends	60	70
	<i>December 31, 20X1</i>	<i>December 31, 20X2</i>
Accounts receivable	180	220
Inventory	40	60
Accounts payable	65	95
Retained earnings	400	?
Property, plant, and equipment	600	?

Sixty percent of the firm's sales are on credit. The only current entries on the balance sheet are cash and marketable securities, accounts receivable, accounts payable, and inventory. For calendar year 20X2:

- What is the receivables turnover?
- What is the cash received from customers?
- What is the gross profit margin?
- What is the inventory turnover?
- What is the inventory bought?
- What is the cash paid to suppliers?
- What is the payables turnover?
- What is the operating cash flow? (Assume shareholder dividends are a financing cash flow.)
- What is the change in retained earnings?

Part A: The receivables turnover = credit sales / average accounts receivable

- Credit sales = $60\% \times 800 = 480$
- Average accounts receivable = $(180 + 220) / 2 = 200$

Receivables turnover = $480 / 200 = 2.40$

Part B: Cash received from customers = net revenue – Δ (accounts receivable) = $800 - (220 - 180) = 760$.

- The 220 accounts receivable at the end of the year means that 220 of sales are not yet paid: the cash has not yet been collected from customers.

- The 180 accounts receivable at the beginning of the year means that 180 of previous years' sales are paid in the current year: the cash has been collected from customers for previous years' sales.

Cash inflows from customers are related to income statement entries as

$$\text{cash flow} = \text{income statement entry} - \text{change in non-cash asset} + \text{change in non-cash liability}$$

The sign of each item is important.

- A cash inflow is a positive cash flow; a cash outflow is a negative cash flow.
- Revenue on the income statement is positive; expenses on the income statement are negative.

To learn the rules, use simple scenarios, with the related asset or liability increasing from zero to a positive amount or decreasing from a positive amount to zero. For each scenario, ask: "Does the change in the asset or liability provide cash to the firm or require cash from the firm?"

The signs of the various components differ by type of cash flow. Other exercises give the general rules.

Question: What if accounts receivable from the beginning of the year are still outstanding at the end of the year?

Answer: Accounts receivable do not change and no adjustment to net revenue is used for the indirect method of computing operating cash flows.

Question: What if accounts receivable are not collected but they are written off during the year?

Answer: In theory, we should restate the financial statements from past years, since the estimates of accounts receivable, net revenue, and retained earnings are revised. But if we restated financial statements for every change in an estimate, we would have to restate entire statements every year, since few estimates are known with certainty. Financial accounting allocates changes in estimates to the year the change occurs. If accounts receivable for 20X1 are revised in 20X2, the change is allocated to 20X2, not 20X1.

Cash flows are initially allocated by transaction date for accrual accounting. The firm estimates the amounts to be allocated to the current year vs to future years. Changes in the estimates in subsequent years are allocated to the year the change is made, not the year of the related transaction.

Part C: The gross profit margin = $1 - \text{cost of goods sold} / \text{net revenue} = 1 - 300 / 800 = 0.625$.

Part D: Inventory turnover = $\text{cost of goods sold} / \text{average inventory} = 300 / ((40 + 60) / 2) = 6$.

Part E: The inventory bought during the year = $\text{cost of goods sold} + (\text{ending inventory} - \text{beginning inventory}) = 300 + (60 - 40) = 320$.

Part F: The cash paid to suppliers is the purchases of inventory + accounts payable at the beginning of the year – accounts payable at the end of the year = $320 + 65 - 95 = 290$.

Part G: The payables turnover is $\text{purchases of inventory} / \text{average accounts payable} =$

$$320 / ((65 + 95) / 2) = 4$$

Part H: Three entries differ for net income vs operating cash flow:

- net income adds net revenue; operating cash flow adds cash received from consumers
- net income subtracts cost of goods sold; operating cash flow subtracts cash paid to suppliers
- net income subtracts depreciation expense; operating cash flow does not

To convert net income into operating cash flow:

- subtract net revenue and add cash received from consumers
- add cost of goods sold and subtract cash paid to suppliers
- add depreciation expense

$$200 - 800 + 760 + 300 - 290 + 60 = 230$$

We verify by examining the non-cash revenue and expenses.

The operating cash flow = net income + non-cash expenses – non-cash revenue =

net income + depreciation expense + Δ (accounts payable) – Δ (accounts receivable) – Δ (change in inventory)

$$= 200 + 60 + 30 - 40 - 20 = 230$$

- Depreciation is an expense that reduces net income but does not reduce operating cash flow, so we add depreciation expense to net income.
- Accounts payable is a liability, so the change in accounts payable is a non-cash expense, so we add the change in accounts payable to net income.
- Accounts receivable is an asset, so the change in accounts receivable is a non-cash revenue, so we subtract the change in accounts payable from net income.
- Inventory is an asset, so the change in inventory is a non-cash revenue, so we subtract the change in inventory from net income.

Other exercises give more complete income statements and balance sheets.

Part I: The change in retained earnings is net income minus shareholder dividends = $200 - 70 = 130$.

This practice problem reverse the input data and the output data (compared to the previous exercise).

Exercise 6.2: Cash flow indirect method

A firm's financial statements show the following amounts:

	<i>Calendar Year 20X1</i>	<i>Calendar Year 20X2</i>
Cash paid to suppliers	400	430
Cash received from customers	700	710
Shareholder dividends	100	110
	<i>December 31, 20X1</i>	<i>December 31, 20X2</i>
Accounts receivable	80	120
Inventory	130	120
Accounts payable	105	115
Retained earnings	400	440
Property, plant, and equipment (net)	600	530

Forty percent of the firm's sales are on credit. The only current entries on the balance sheet are cash and marketable securities, accounts receivable, accounts payable, and inventory. No fixed assets are bought or sold during the year. For calendar year 20X2:

- What is the net revenue?
- What is the receivables turnover?
- What are purchases of inventory from suppliers?
- What is the payables turnover?
- What is the cost of goods sold?
- What is the gross profit margin?
- What is the inventory turnover?
- What is the depreciation expense?
- What is the net income?
- What is the operating cash flow? (Assume shareholder dividends are a financing cash flow.)

Part A: Net revenue = cash received from customers + Δ (accounts receivable) = $710 + (120 - 80) = 750$.

- The 120 accounts receivable at the end of the year means that sales are 120 greater than cash collected from customers.
- The 80 accounts receivable at the beginning of the year means that 80 of previous years' sales are collected in the current year, so the cash collected from customers is 80 greater than current sales.

Part B: The receivables turnover = credit sales / average accounts receivable

- Credit sales = $40\% \times 750 = 300$
- Average accounts receivable = $(80 + 120) / 2 = 100$

Receivables turnover = $300 / 100 = 3.00$

Part C: The purchases of inventory from suppliers = the cash paid to suppliers – accounts payable at the beginning of the year + accounts payable at the end of the year = $430 - 105 + 115 = 440$.

- accounts payable at the beginning of the year = inventory bought in previous years but the cash is paid in the current year, so purchases from supplies are less than cash paid to suppliers

- accounts payable at the end of the year = inventory bought in the current year but the cash is paid in future years, so purchases from suppliers are more than cash paid to suppliers

Part D: The payables turnover is purchases of inventory from suppliers / average accounts payable =

$$440 / ((105 + 115) / 2) = 4$$

Part E: The cost of goods sold = the inventory bought during the year – ending inventory + beginning inventory = $440 - 120 + 130 = 450$.

- The ending inventory was paid for in the current year but not yet sold.
- The beginning inventory was sold in the current year but paid for in previous years.

Part F: Inventory turnover = cost of goods sold / average inventory = $450 / ((130 + 120) / 2) = 3.6$

Part G: The gross profit margin = $1 - \text{cost of goods sold} / \text{net revenue} = 1 - 450 / 750 = 0.400$

Part H: No fixed assets are bought or sold during the year, so the change in property, plant, and equipment (net) = the change in accumulated depreciation = the depreciation expense: $600 - 530 = 70$.

Part I: Net income – shareholder dividends = the change in retained earnings, so

Net income = shareholder dividends + the change in retained earnings = $110 + (440 - 400) = 150$.

Part J: Three entries differ for net income vs operating cash flow:

- net income adds net revenue; operating cash flow adds cash received from consumers
- net income subtracts cost of goods sold; operating cash flow subtracts cash paid to suppliers
- net income subtracts depreciation expense; operating cash flow does not

To convert net income into operating cash flow:

- subtract net revenue and add cash received from consumers
- add cost of goods sold and subtract cash paid to suppliers
- add depreciation expense

$$150 - 750 + 710 + 450 - 430 + 70 = 200$$

We verify by examining the non-cash revenue and expenses.

The operating cash flow = net income + non-cash expenses – non-cash revenue =

$$\begin{aligned} &\text{net income} + \text{depreciation expense} + \Delta(\text{accounts payable}) - \Delta(\text{accounts receivable}) - \Delta(\text{change in inventory}) \\ &= 150 + 70 + 10 - 40 - (-10) = 200 \end{aligned}$$

- Depreciation is an expense that reduces net income but does not reduce operating cash flow, so we add depreciation expense to net income.
- Accounts payable is a liability, so the change in accounts payable is a non-cash expense, so we add the change in accounts payable to net income.
- Accounts receivable is an asset, so the change in accounts receivable is a non-cash revenue, so we subtract the change in accounts payable from net income.
- Inventory is an asset, so the change in inventory is a non-cash revenue, so we subtract the change in inventory from net income.

Question 6.3: Cash flow statement – indirect method

A firm's financial statements show

	<i>Calendar Year 20X1</i>	<i>Calendar Year 20X2</i>
Depreciation expense	25	25
Dividends paid to shareholders	8	10
	<i>December 31, 20X1</i>	<i>December 31, 20X2</i>
Accounts receivable	38	43
Inventory	45	48
Accounts payable	36	29
Retained earnings	120	145

- What is net income in 20X2?
- For the indirect method of preparing the cash flow statement, what are the adjustments for accounts receivable, inventory, accounts payable, and depreciation?
- If the firm considers dividends paid to shareholders as a financing cash flow, what is the firm's operating cash flow in 20X2?

Part A: The change in retained earnings (from the beginning to the end of the year) equals net income minus dividends paid to shareholders:

$$145 - 120 = \text{net income} - 10 \Rightarrow \text{net income} = 145 - 120 + 10 = 35$$

Part B: Each adjustment is the difference between accrued income or expenses and paid income or expense.

- Accounts payable increased by $43 - 38 = 5$ over the year, so cash received from customers was 5 less than net revenue.
- Inventory increased by $48 - 45 = 3$ over the year, so purchases of inventory were 3 more than cost of goods sold.
- Accounts payable decreased by $36 - 29 = 7$ over the year, so cash paid to suppliers was 7 more than purchases.
- Depreciation expense (a non-cash expense) was 10 during the year, so operating cash flow should be increased by 10.

The adjustments to derive operating cash flow from net income are

-5 accounts receivable
-3 inventory
-7 accounts payable
+25 depreciation

The total adjustment is +10.

Part C: Net income is 35, so operating cash flow is $35 + 10 = 45$.

Exercise 6.4: Forming the cash flow statement: income vs cash flows

A firm's income statement and balance sheets show the following entries:

	<i>Calendar Year 20X1</i>	<i>Calendar Year 20X2</i>
Net revenue	2695	2760
Cost of goods sold	1495	1546
Wage expense	397	432
Depreciation expense	115	125
Other operating expenses	294	318
Gain (loss) on sale of equipment	-85	21
Interest expense	25	25
Tax expense	106	114

	<i>December 31, 20X1</i>	<i>December 31, 20X2</i>
Cash and marketable securities	216	?
Accounts receivable	96	101
Inventory	328	398
Prepaid expenses	18	15
Land	126	126
Buildings	293	293
Equipment	856	880
Accumulated depreciation	289	344
Accounts payable	333	350
Wages payable	7	9
Interest payable	8	6
Taxes payable	5	6
Other accrued liabilities	110	117
Long-term debt	358	308
Common stock + additional paid-in capital	435	375
Retained earnings	288	397

The first exercise below derives cash flows from income statement entries and associated balance sheet entries. Other final exam problems derive

- income statement entries from cash flows and balance sheet entries
- the end of the year balance sheet entry from the income statement entry, the cash flow, and the beginning of the year balance sheet entry.

The questions below refer to 20X2 income statement items and the change from 12/31/20X1 to 12/31/20X2 for balance sheet items.

(The next exercises continue this scenario and derive operating, investing, and financing cash flows.)

- A. What is the change in accounts receivable?
- B. What is the cash received from customers?
- C. What is the change in inventory?
- D. What are the purchases from suppliers?
- E. What is the change in accounts payable?
- F. What is the cash paid to suppliers?
- G. What is the change in wages payable?
- H. What are the cash paid to employees?
- I. What is the change in interest payable?
- J. What is the cash interest paid?
- K. What is the change in taxes payable?
- L. What are the taxes paid?
- M. What is the change in the accrued liability for other operating expenses?
- N. What is the change in prepaid expenses?
- O. What is the cash paid for other operating expenses?
- P. What is the gross profit?
- Q. What are total operating expenses?
- R. What is the operating profit (operating income)?
- S. What is pre-tax income?
- T. What is net income?
- U. What is the change in retained earnings?
- V. What are shareholder dividends?

Part A: The change in accounts receivable is $101 - 96 = 5$. The change in a balance sheet item is the end of the year entry minus the beginning of the year entry, or the entry for 12/31/20X2 – the entry for 12/31/20X1.

Part B: The cash received from customers = net revenue – $\Delta(\text{accounts receivable}) = 2760 - 5 = 2755$.

Intuition: For accrual accounting, accounts receivable increase revenue just as cash does. If net revenue is given, an extra unit of accounts receivable means one less unit of cash.

Part C: The change in inventory is $398 - 328 = 70$.

Part D: The purchases from suppliers are $\text{cost of goods sold} + \Delta(\text{inventory}) = 1546 + 70 = 1616$.

Intuition: The purchases from suppliers pay for both the goods sold and additional goods held as inventory.

Question: When do we add the change (“+ Δ ”) and when do we subtract the change (“– Δ ”) in the balance sheet entry?

Answer: The rules may be formulated two ways:

- A cash inflow = a revenue – $\Delta(\text{assets}) + \Delta(\text{liability})$
- A cash outflow = an expense + $\Delta(\text{assets}) - \Delta(\text{liability})$

The inverse versions are more intuitive and easier to remember:

- A revenue = cash inflow + $\Delta(\text{assets}) - \Delta(\text{liability})$
- An expense = cash outflow – $\Delta(\text{assets}) + \Delta(\text{liability})$

In words, these rules say:

- Revenue =
 - + the cash collected
 - + the cash that will be collected (in the future) from the transactions
 - – the cash that will be paid out (in the future) from the transactions.
- Expenses =
 - + the cash paid out
 - – the cash that will be collected (in the future) from the transactions
 - + the cash that will be paid out (in the future) from the transactions.

We can re-state the formula to derive the end of the year balance sheet entry from the corresponding entry at the beginning of the year:

Illustration: For net revenue:

beginning accounts receivable
+ revenue
– cash collected from customers
= ending accounts receivable

Part E: The change in accounts payable is $350 - 333 = 17$.

Part F: The cash paid to suppliers = purchases from suppliers – $\Delta(\text{accounts payable}) = 1616 - 17 = 1599$.

Intuition: Purchases from suppliers may be in cash or on credit. A credit purchase causes accounts payable to increase. The cash paid is the purchases minus the increase in accounts payable (the credit purchases).

Question: Some cash is paid for credit purchases in past years.

Answer: Cash paid for credit purchases in past years causes a decrease in accounts payable and no change in the purchases from suppliers.

Part G: The change in wages payable is $9 - 7 = 2$.

Question: If December 31 is a Wednesday, the firm pays its workers on Friday January 2, and the firm issues its financial statements in February, does the firm show wages payable, even though they were paid two days after the calendar year ended?

Answer: The firm's accounts are for December 31, not January 2. If the firm does not show the wages payable liability, it over-states its net assets. Many working capital assets and liabilities (accounts receivable, accounts payable, wages payable, interest payable, other accrued liabilities, deferred revenue, and prepaid expenses) on December 31 are paid or collected before the financial statements are published, and new working capital assets and liabilities accrue for subsequent months.

Part H: The cash paid to employees is the wage expense – $\Delta(\text{wages payable}) = 432 - 2 = 430$.

Part I: The change in interest payable is $6 - 8 = -2$.

Part J: The cash interest paid is the interest expense – $\Delta(\text{interest payable}) = 25 - (-2) = 27$.

Question: Firms generally pay the interest on their debt when it is due. Is interest payable material?

Answer: Interest payable is interest that is owed, not interest that is overdue. If a firm pays annual coupons on April first of each year, three quarters of the annual interest is owed to bondholders on December 31, even though it is not yet due. Unless the coupon payment is on December 31, all bonds have interest payable. The balance sheet entry is called accrued interest, which is a liability for issuers of debt and an asset for holders of debt.

Part K: The change in taxes payable is $6 - 5 = 1$.

Part L: The cash paid in taxes is $\text{tax expense} - \Delta(\text{taxes payable}) = 114 - 1 = 113$.

Question: Do firms show tax payable on the balance sheet?

Answer: Firms show four balance sheet entries: current tax assets, current tax liabilities, deferred tax assets, and deferred tax liabilities. The tax module of this course explains these entries, which are tested frequently on the final exam. This module combines these entries into a single "taxes payable."

Part M: The change in the accrued liability for other operating expenses is $117 - 110 = 7$.

Part N: The change in prepaid expenses is $15 - 18 = -3$.

Question: How do prepaid expenses differ from other expenses?

Answer: Distinguish four items.

- Accrued expenses are on the income statement.
- Cash paid for expenses is on the cash flow statement.
- Prepaid expenses (cash is paid but expenses are not yet accrued) is an asset on the balance sheet.
- Unpaid expenses are liabilities on the balance sheet.

Prepaid expenses are assets, not liabilities or expenses.

Part O: The cash paid for other operating expenses is $\text{other operating expenses} + \Delta(\text{prepaid expenses}) - \Delta(\text{accrued liability for other operating expenses}) = 318 + (-3) - 7 = 308$.

For the final exam, know

- the conversion of income statement entries to cash flow statement entries
- the conversion of cash flow statement entries to income statement entries

Part P: The gross profit is $\text{net revenue} - \text{cost of goods sold} = 2760 - 1546 = 1214$.

Cost of goods sold includes production costs, such as wages of production workers, and the cost of services, such as wages paid for installation and repair.

Part Q: Total operating expenses = $\text{wage expense} + \text{depreciation expense} + \text{other operating expenses} = 432 + 125 + 318 = 875$.

Part R: The operating profit (operating income) = $\text{gross profit} - \text{total operating expenses} = 1214 - 875 = 339$

Part S: Pre-tax income = $\text{operating income} + \text{other revenue} = 339 + (-4) = 335$.

Part T: Net income = $\text{pre-tax income} - \text{tax expense} = 335 - 114 = 221$.

Part U: The change in retained earnings = $397 - 288 = 109$.

Part V: Net income – shareholder dividends = Δ (retained earnings), so

Shareholder dividends = net income – Δ (retained earnings) = 221 – 109 = 112.

Question: For the indirect method of forming the cash flow statement:

- why is an increase in a current operating asset account subtracted from net income?
- why is an increase in a current operating liability account added to net income?

Answer: Net revenue, such as sales, affect the balance sheet one of two ways:

- increase cash (if the revenue is a cash sale)
- increase a non-cash operating asset account, such as accounts receivable (if the revenue is a credit sale)

Income statement revenue, an addition to net income, is the sum of these two, so the increase in cash is net income minus the increase in non-cash operating asset accounts.

Expenses, such as cost of goods sold, affect the balance sheet one of two ways:

- decrease cash (for a cash expense)
- increase an operating liability account, such as accounts payable (for a credit expense)

Income statement expense, a subtraction from net income, is the sum of these two, so the increase in cash is net income plus the increase in non-cash operating asset accounts.

Accrued interest

Question: A firm issues a 6% semi-annual coupon bond on March 1, with coupons payable each August 31 and February 28. What does it show on December 31?

Answer: By accrual accounting, the interest expense is 0.5% each month. On December 31, it has 4 months of interest payable, even though it has no legal obligation to pay the interest by December 31.

Question: How do the taxes payable in this practice problem relate to deferred taxes and current taxes?

Answer: The cash flow chapter comes before the tax chapter in the textbook. The taxes payable account is actually four accounts: current tax liability + deferred tax liability – current tax asset – deferred tax liability. The accounts are shown separately on the balance sheet; they are not combined. The exercises for the tax module of this course derive the tax expense from the taxes paid and the tax entries on the balance sheet.

Prepaid expenses vs accrued liabilities

Question: Some expenses sometimes appear as prepaid expenses and sometimes as accrued liabilities.

Answer: A gas company might charge customers two ways:

- send a bill at the end of each month for gas used
- have customers pay an estimated three month use and update each month for gas used

A customer has not yet received the bill for December use at the end of the year.

- If the customer pays in arrears (first method), the customer has an accrued liability.
- If the customer pays in advance (second method), the customer has a prepaid expense for two months use.

Exercise 6.5: Forming the cash flow statement: three cash flows

(We continue the previous exercise to derive the operating, investing, and financing cash flows.)

- A. What are the two methods to derive the operating cash flow?
- B. What is the operating cash flow (direct method)?
- C. What is the operating cash flow (indirect method)?
- D. What is the investing cash flow?
- E. What is the financing cash flow?
- F. What is the net cash flow?
- G. What is the cash at the end of the year?

Part A: Operating cash flow can be derived two ways:

Direct method: operating cash flow is the sum of the cash flows from operating activities. These cash flows are the corresponding income statement revenue or expense \pm the change in the associated working capital asset or liability.

Indirect method: Adjust net income three ways:

- Remove revenue and expenses that are classified as investing cash flows or financing cash flows.
 - Example: A gain or loss on sale of property is an investing cash flow.
- Add non-cash operating expenses and revenue to net income.
 - Example: Depreciation and amortization are non-cash expenses.
- Add or subtract the changes in non-cash working capital assets and liabilities.
 - Example: Add the change in accounts payable; subtract the change in accounts receivable.

Illustration: The practice problem shows a gain on sale of equipment of 21.

- The direct method does not include the gain or loss on fixed assets in operating cash flow.
- The indirect method subtracts the gain (adds the loss) to net income to derive operating cash flow.

Illustration: Cash from customers (cash flow statement) can be derived two ways:

- Direct method: Add up the cash received from customers on the firm's sales records and subtract the cash returned to customers.
- Indirect method: Cash from customers = net revenue (income statement) $- \Delta(\text{accounts receivable})$

Question: The textbook says that some firms prefer the indirect method to avoid the costs of the direct method. Don't firms keep track of their cash flows?

Answer: Large firms may have hundreds of thousands of transactions. Firms record cash flows, income flows, and balance sheet entries, but different methods of tallying the figures lead to discrepancies. Firms don't want auditors reviewing financial statements with unexplained discrepancies. They prefer to compute the income statement and the balance sheet, and derive the cash flow statement from the other statements.

Illustration: An insurer with 100,000 policyholders may have a million transactions a year. If it separately computes the income statement, balance sheet, and cash flow statement, the entries may not match.

The textbook gives examples for six income statement entries.

revenue vs expense	income statement	$\Delta(\text{asset})$	$\Delta(\text{liability})$	cash flow statement
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revenue	net revenue (sales)	accounts receivable	deferred revenue (unearned revenue)	cash from customers
expense	cost of goods sold	inventory	accounts payable	cash paid to suppliers
expense	salaries and wages	wages paid in advance	wages payable	cash paid to employees
expense	other operating expenses	prepaid expenses	accrued expenses	other expenses paid
expense	interest expense		accrued interest; amortization	interest paid
expense	tax expense	current tax asset; deferred tax asset	current tax liability; deferred tax liability	taxes paid

Interest expense and interest income are both included in operating income.

- Interest expense is the interest cost on the bonds issued by the firm.
- Interest income is the interest received on the bonds (of other companies) owned by the firm.

Interest expense and interest income both may show accrued interest.

Question: The textbook sometimes adds the change in an asset or liability and sometimes subtracts the change.

Answer: Two presentation formats are common for the income statement.

- Some firms show expenses as negative entries and add them on the income statement.
- Some firms show expenses as positive entries and subtract them on the income statement.

For example, cost of goods sold can be shown as a positive or negative entry.

- If cost of goods sold is a positive entry, the gross profit is net revenue – cost of goods sold.
- If cost of goods sold is a negative entry, the gross profit is net revenue + cost of goods sold.

Assets and liabilities are positive entries on the balance sheet, regardless of the presentation format on the income statement.

- If the expense on the income statement and the corresponding cash flow entry are shown as positive entries, then the cash flow entry = the income statement entry – the change in the associated liability.

Illustration: If the tax expense is 80 and the current tax liability increases from 5 to 15, then the taxes paid are $80 - (15 - 5) = 70$.

- If the expense on the income statement and the corresponding cash flow entry are shown as negative entries, then the cash flow entry = the income statement entry + the change in the associated liability.

Illustration: If the tax expense is –80 and the current tax liability increases from 5 to 15, then the taxes paid are $-80 + (15 - 5) = -70$.

Both income statement presentation formats are common. Some illustrations in the textbook use one format and some use the other format. Understand the intuition for each relation; the signs depend on the format.

Part B: The operating cash flow computed by the direct method =

cash from customers: 2755
– cash paid to suppliers: 1599
– cash paid to employees: 430
– cash paid for other expenses: 308
– interest paid: 27
– taxes paid: 113

= 2,755 – 1,599 – 430 – 308 – 27 – 113 = 278

Part C: The operating cash flow by the indirect method =

net income – non-operating revenue (loss) + non-cash expenses – change in net working capital =

net income: 221
– gain on sale of equipment: 21
+ depreciation expense: 125
– Δ(accounts receivable): 5
– Δ(inventory): 70
– Δ(prepaid expenses): –3
+ Δ(accounts payable): 17
+ Δ(wages payable): 2
+ Δ(interest payable): –2
+ Δ(taxes payable): 1
+ Δ(other accrued liabilities): 7

= 221 – 21 + 125 – 5 – 70 – –3 + 17 + 2 + –2 + 1 + 7 = 278

Question: The gain on sale of equipment is cash; why do we subtract it?

Answer: The gain on sale of equipment is included in net income but it is an investing cash flow. We subtract it from net income to derive the operating cash flow.

Question: Depreciation is not a cash flow; why do we add it to net income?

Answer: Net income subtracts depreciation; we add it back to derive the operating cash flow.

Part D: the investing cash flow is the purchase and sale of (i) fixed assets and (ii) certain financial assets.

(i) The fixed assets on the balance sheet increase for purchases and decrease for sales.

If fixed assets were not depreciated, the investing cash flow = – Δ(carrying value of fixed assets). But the carrying value decreases each year by depreciation, so this formula does not give the cash flow.

The balance sheet shows the accumulated depreciation, and the gross value of fixed assets is the carrying value + accumulated depreciation. Many firms show the gross value explicitly and subtract the accumulated depreciation to show the carrying value.

- When fixed assets are bought, the balance sheet value is the purchase price. If an asset is bought, the investing cash flow = – Δ(gross value of fixed assets).
- When fixed assets are sold, the sales price is not the gross balance sheet value or the net carrying value. If an asset is sold, the investing cash flow is not equal to the Δ(gross value of fixed assets).

If an asset is sold, the gain or loss on sale = the sales price – the carrying value. The gain or loss on sale is shown on the income statement, so the sales price = the carrying value + the gain or loss on sale.

The purchase of fixed assets has no gain or loss, so it does not appear on the income statement. But the notes to the financial statements shows the purchases of fixed assets, which is an investing cash *outflow*.

We derive the investing cash *inflow* from the sale of fixed assets in steps:

Step #1: The gross value of assets purchased during the year is in the notes to the financial statements.

Step #2: The gross value of assets sold during the year = the gross value of assets purchased during the year – the change in the gross value of fixed assets during the year.

Step #3: The accumulated depreciation on assets sold during the year = the depreciation expense on the income statement – the change in the accumulated depreciation on the balance sheet.

Illustration: A firm has two assets, bought on December 31, 20X0, for 100 each, and depreciated at 10 a year. One asset is sold on July 1, 20X3.

- On December 31, 20X2, the accumulated depreciation is $2 \times 20 = 40$.
- On December 31, 20X3, the accumulated depreciation is $1 \times 30 = 30$.
- The depreciation expense in 20X3 is $10 + 5 = 15$.

The accumulated depreciation on the asset which is sold is $15 - (30 - 40) = 25$, or $2\frac{1}{2} \times 10$.

Step #4: The carrying value of the assets sold = the gross value of the assets sold + the accumulated depreciation on the assets sold.

Step #5: The sales price = the carrying value of the assets sold + the gain (loss) on sale.

- If an asset with a carrying value of 25 has a gain on sale of 10, it was sold for 35.
- If an asset with a carrying value of 25 has a loss on sale of 10, it was sold for 15.

In this practice problem:

- the purchase of equipment is 130 (notes to the financial statements).
- The change in the gross value of equipment = the equipment bought – the gross value of equipment sold, so the gross value of equipment sold = $\Delta(\text{gross value of equipment}) - \text{the equipment bought} = 130 - (880 - 856) = 130 - 24 = 106$.
- The change in the accumulated depreciation = $344 - 289 = 55$.
- The accumulated depreciation on the equipment sold = depreciation expense – $\Delta(\text{accumulated depreciation}) = 125 - 55 = 70$.
- The carrying value of the equipment sold = $106 - 70 = 36$.
- The sales price = the carrying value + the gain (loss) on sale = $36 + 21 = 57$.

The investing cash flow = cash received from selling fixed assets – cash paid to buy fixed assets = $57 - 130 = -73$ (an investing cash *outflow*).

Remember four rules for investing cash flows:

- Depreciation reduces net income but is not a cash flow.
- Buying an asset is an investing cash *outflow* but does not affect net income.
- Selling an asset for less than its carrying value is an investing cash *inflow* and reduces net income.
- Selling an asset for more than its carrying value is an investing cash *inflow* and increases net income.

Question: How do financial assets affect the investing cash flow?

Answer: Financial assets, such as bonds and stocks, have the following rules:

- The purchase and sale of financial assets is an investing cash flow for most firms but an operating cash flow for financial institutions such as banks, insurers, and investment firms.
- For all firms, purchases and sales of financial assets held for trading purposes is an operating cash flow.
- Changes in the market value of assets classified as available for sale is a change in the carrying value.
- Assets classified as held to maturity are amortized each year if the purchase price does not equal the maturity value.

The cash flow statement depends on (i) the type of financial asset and (ii) the type of firm.

Part E: The financing cash flow has three parts:

- payment of shareholder dividends
- issue and redemption of bonds
- issue and repurchase of shares

Net income – shareholder dividends = Δ (retained earnings), so

$$\text{shareholder dividends} = \text{net income} - \Delta(\text{retained earnings}).$$

Shareholder dividends are also reported in the notes to the financial statements.

We derive net income, showing the subtotals:

- Gross profit = net revenue – cost of goods sold = $2,760 - 1,546 = 1,214$.
- Operating expense = wage expense + depreciation + other operating expenses = $432 + 125 + 318 = 875$.
- Operating income = gross profit – operating expenses = $1,214 - 875 = 339$.
- Other revenue or expenses = gain (loss) on sale of fixed assets = 21
- Pre-tax income = operating income + other revenue (expenses) – interest expense = $339 + 21 - 25 = 335$
- Net income = pre-tax income – tax expense = $335 - 114 = 221$.

Net income is shown on the income statement; the subtotals may or may not be shown.

For this practice problem, net income = 221 and the change in retained earnings is $397 - 288 = 109$, so shareholder dividends = $221 - 109 = 112$.

Long-term debt is reported at its carrying value, which is usually amortized cost. If the bonds are sold at par value and issue costs are zero, the amortized cost is the par value.

The change in the carrying value of long-term debt is normally the cash received from issue of new bonds minus the cash paid at the redemption or maturity of existing bonds. For this practice problem, the change in the carrying value of long-term debt = $308 - 358 = -50$, or an investing cash outflow. The firm redeemed 50 of long-term debt or 50 of long-term debt matured and was paid or the maturities and redemptions minus new issues = 50.

Common stock is a single balance sheet line in this practice problem, so the change in common stock is $375 - 435 = -60$. In practice, most firms shown the net common stock outstanding in three lines:

- common stock = gross par value outstanding
- + additional paid-in capital (the sale price of common stock issued– its par value)
- Treasury stock (the price paid for common stock repurchased)

Treasury stock is usually shown as a positive entry; readers know that Treasury stock is offset to common stock + additional paid-in capital.

- Dividends paid reduces the market value of common stock, not the book value of common stock.
- On the balance sheet, dividends paid reduce retained earnings, not common stock.

For this practice problem, the financing cash flow = $-50 - 60 - 112 = -222$.

On GAAP statements:

- Interest paid is an operating cash flow.
- Issuance and redemption of bonds are financing cash flows.
- Shareholder dividends are a financing cash flow.
- Issuance and repurchase of shares are financing cash flows.

IFRS allows the firm to choose whether interest paid and shareholder dividends are operating cash flows or financing cash flows.

Part F: The net cash flow = the operating cash flow + the investing cash flow + the financing cash flow = $278 - 73 - 222 = -17$.

Part G: The cash at the end of the year = the cash at the beginning of the year + the net cash flow = $216 - 17 = 199$.

Exercise 6.6: Investment cash flows

A firm buys an office building for 100 on December 31, 20X0, which has an estimated useful life of 10 years and a salvage value of zero. The firm depreciates the building with the double declining balance method. On December 31, 20X2, the firm sells the building and reports a loss of 4 on the sale. The firm uses half the cash from the sale to repurchase its own shares and half the cash to buy common stocks of other companies.

- A. What is the carrying value of the building on December 31, 20X2?
- B. What is the depreciation on the building in 20X2?
- C. What is the sales price of the building on December 31, 20X2?
- D. What is the financing cash flow in 20X2 from these transactions?
- E. What is the investing cash flow in 20X2 from these transactions?
- F. What is the operating cash flow in 20X2 from these transactions?
- G. What is the net income in 20X2 from these transactions?

Part A: A 10 year estimated useful life gives a 10% depreciation rate for straight line depreciation and a $2 \times 10\% = 20\%$ depreciation rate for the double declining balance method.

- The carrying value of the building on December 31, 20X1, is $100 \times (1 - 20\%) = 80$.
- The carrying value of the building on December 31, 20X2, is $80 \times (1 - 20\%) = 64$.

Part B: The depreciation on the building in 20X2 is $80 - 64 = 16$.

Part C: The gain (loss) on sale = the sales price – the carrying value, so

the sales price = the carrying value + the gain (loss) on sale = $64 - 4 = 60$.

Part D: The firm uses half the cash from the sale to repurchase its own shares, so

the financing cash flow = $\frac{1}{2} \times -60 = -30$.

Part E: The firm uses half the cash from the sale to buy common stock of other companies, so

The investing cash flow = $+60 - \frac{1}{2} \times 60 = +30$.

Part F: The total cash flow is zero, as all the cash received is spent. None of the cash flows are operating income, so the operating cash flow is zero: $0 + 30 - 30 = 0$.

Part G: Net income in 20X2 is the gain (loss) on sale – depreciation expense = $-4 - 16 = -20$. (Net income from sale and depreciation of property, plant, and equipment is generally negative.)

Exercise 6.7: Financing cash flows

A firm's GAAP financial statements have the following entries:

	<i>Calendar Year 20X1</i>	<i>Calendar Year 20X2</i>
Cash paid to suppliers	200	250
Cash received from customers	500	450
Gain (loss) from sale of fixed assets	25	(8)
Depreciation expense	58	55
Interest expense	31	30
Net income	100	110
	<i>December 31, 20X1</i>	<i>December 31, 20X2</i>
Long-term debt	380	320
Trade payables to finance purchase of inventory	330	230
Common shares (par value)**	40	35
Additional paid-in capital**	160	140
Retained earnings	400	440
Property, plant, and equipment (carrying value)	600	530
Accumulated depreciation	250	300
<i>** = net of Treasury stock</i>		

- What is the cash flow from issue and redemption of long-term debt in 20X2?
- What is the cash flow from issue and repurchase of common shares in 20X2?
- What are the shareholder dividends in 20X2?
- What is the financing cash flow for 20X2?
- What is the change in the historical cost of property, plant, and equipment in 20X2?
- What is the investing cash flow for 20X2?

Part A: The balance sheet shows the net change in long-term debt: $320 - 380 = -60$ = financing cash outflow. From the balance sheet alone, we cannot decompose this figure into issues, maturities, and redemptions. The firm may have issued 100 of new debt and retired 160 of debt or issued 200 of new debt and retired 560. The notes to the financial statements give the details, which are not needed for this practice problem.

Trade payables to finance purchase of inventory are operating cash flows and do not affect long-term debt.

Interest paid is an operating cash flow under GAAP and for many firms under IFRS as well.

Part B: Common shares (par value) and additional paid-in capital, net of Treasury stock, is the book value of shares held by investors. The balance sheet shows the net change: $(25 + 140) - (40 + 160) = -25$ = financing cash outflow. From the balance sheet alone, we cannot decompose this figure into issues and repurchases. The firm may have issued 100 of new shares and repurchased 125 of existing shares or issued 200 of new share and repurchased 225. The notes to the financial statements give the details. Mature firms often repurchase some shares but do not commonly issue new shares.

Payment of shareholder dividends does not affect the book value of the common shares.

Question: Are common shares outstanding normally shown net of Treasury stock or gross of Treasury stock?

Answer: Firms can report the entries either way. Many firms show shares outstanding gross of Treasury stock, and the net shares outstanding are inferred by subtraction.

Part C: Net income – shareholder dividends = Δ (retained earnings), so

$$\text{shareholder dividends} = \text{net income} - \Delta(\text{retained earnings}) = 110 - (440 - 400) = 70.$$

Part D: The financing cash flow = net issue of debt + net issue of shares – shareholder dividends =

$$-60 - 25 - 70 = -155.$$

Part E: The historical cost of property, plant, and equipment is the carrying value + accumulated depreciation.

- The change in the carrying value of property, plant, and equipment is $530 - 600 = -70$.
- The change in the accumulated depreciation is $300 - 250 = +50$.

The change in the historical cost of property, plant, and equipment is $(530 + 300) - (600 + 250) = -20$.

Part F: If the gain (loss) on sale of property, plant, and equipment were zero, the investing cash flow would be +20, since the firm sold the PPE for its carrying value. In this exercise, the income statement shows a loss on sale of 8, so the sale price was 12 = the investing cash inflow.

Question 6.8: Operating cash flow

A firm's financial statements show

	<i>Calendar Year 20X1</i>	<i>Calendar Year 20X2</i>
Operating income	21	24
Depreciation	8	8
Interest expense	4	4
	<i>December 31, 20X1</i>	<i>December 31, 20X2</i>
Accounts receivable	38	43
Inventory	45	48
Accounts payable	36	29
Wages payable	12	14
Accrued interest	1	1

The only items affecting operating income are net revenue, cost of goods sold, wages, and depreciation.

The 20X2 gross profit margin is 40% and the operating margin is 25%. The tax rate is 20%, and there are no permanent or temporary tax differences.

To provide for increasing demand, the firm bought another plant in 20X2 for a cost of 32.

In 20X2:

- A. What is net revenue?
- B. What is cost of goods sold?
- C. What are wage expenses?
- D. What is the tax expense?
- E. What is net income?
- F. What is cash received from customers?
- G. What is cash paid to suppliers?
- H. What is cash paid as wages?
- I. What is the interest paid?
- J. What are the taxes paid?
- K. What is operating cash flow?
- L. What is free cash flow to the firm?
- M. What is free cash flow to equity?

Part A: Operating income is 24 and the operating margin is 25%, so net revenue = $24 / 0.25 = 96.00$

Part B: The gross profit margin is 40%, so the cost of goods sold is net revenue $\times (1 - \text{gross profit margin})$
 $= 96 * (1 - 0.40) = 57.60$

Part C: Net revenue – cost of goods sold – wage expense – depreciation = operating income:

$$\begin{aligned} 96 - 57.60 - \text{wage expense} - 8 &= 24 \Rightarrow \\ \text{wage expense} &= 96 - 57.6 - 8 - 24 = 6.40 \end{aligned}$$

Parts D and E: Operating income in 20X2 is 24. Interest expense is 4, so pre-tax income is $24 - 4 = 20$. The tax rate is 20% and there are no permanent or temporary tax differences, so tax expense is 4 and net income is $20 \times (1 - 20\%) = 16$.

Part F: Accounts payable increased by $43 - 38 = 5$ over the year, so cash received from customers was 5 less than net revenue: $96 - 5 = 91$.

Part G: Inventory increased by $48 - 45 = 3$ over the year, so purchases of inventory were 3 more than cost of goods sold \Rightarrow purchases of inventory $= 57.6 + 3 = 60.6$

Accounts payable decreased by $36 - 29 = 7$ over the year, so cash paid to suppliers was 7 more than purchases \Rightarrow cash paid to suppliers $= 60.6 + 7 = 67.6$

Part J: Wages payable increased by 2 in 20X2, so wages paid were 2 less than wage expense \Rightarrow wages paid $= 6.4 - 2 = 4.4$

Part I: The interest paid in 20X2 is the interest expense minus the change in accrued interest: $4 - (1-1) = 4$

Part J: Taxes paid here are the tax expense, since there are no permanent or temporary tax differences. The tax expense is worked out above as 4.

Part K: The operating cash flow is cash received from customers (91) – cash paid to suppliers (67.6) – wages paid (4.4) – interest paid – taxes paid $= 91 - 67.6 - 4.4 - 4 - 4 = 11.00$

Part L: The free cash flow to the firm subtracts the capital investment of 32 and adds the pre-tax interest expense of $4 \times (1 - 20\%) = 3.20$: $11 + 3.20 - 32 = -17.80$

Question: Is a negative free cash flow to the firm reasonable when all other items are positive?

Answer: Capital investments for plants may have estimated useful lives of 40 years. The annual depreciation for the new plant costing 32 may be 0.8 on the income statement, but the 32 affects free cash flow to the firm the first year with no effect on subsequent years.

Part M: The free cash flow to equity is the same as the free cash flow to the firm except that the tax-adjusted interest expense is not added to operating cash flow: $11 - 32 = -21$. In addition, net borrowing is added (or net repayments are subtracted). The illustration here does not have net borrowing or repayments.

Question: The free cash flow to the firm may be computed two ways:

- net income + non-cash charges – fixed capital expenditures – working capital expenditures + interest paid $\times (1 - \text{tax rate})$
- operating cash flow – fixed capital investments + interest paid $\times (1 - \text{tax rate})$

Do the two formulas give the result?

Answer: Non-cash charges are depreciation and amortization. Working capital expenditures are the balance sheet entries for accounts receivable, inventory, accounts payable, wages payable (and similar items). These non-cash charges and working capital expenditures are used in the indirect method of completing the cash flow statement: operating cash flow = net income + non-cash charges – working capital expenditures.

Question: Does the formula above use interest expense or interest paid?

Answer: The formula starting with operating cash flow uses interest paid; see the Acme Corporation example on page 282 of the textbook. The formula starting with net income uses interest expense; see the same page of the textbook, before the Acme Corporation example. The change in accrued interest is the difference

between interest expense and interest paid. The change in accrued interest is also one of the adjustments to convert net income to operating cash flow.

Question: The textbook says that the formulas for free cash flow to the firm and free cash flow to equity apply to GAAP statements. For IFRS statements, if interest paid is classified as a financing cash flow or if interest and dividends received are classified as investing cash flows, the formulas must be adjusted. Do GAAP and IFRS have different rules for free cash flow to the firm and free cash flow to equity?

Answer: Free cash flow to the firm and free cash flow to equity are financial items, not accounting entries. They are not shown on the cash flow statement and neither GAAP nor IFRS has rules for them. The formulas were devised for U.S. GAAP, and they assume that interest payments and interest and dividends received are components of operating cash flow. If the reporting company treats them as part of financing cash flow or investing cash flow, the formulas must be adjusted to move them to operating cash flow.

Question: What tax rate do we use in this formula, the statutory tax rate or the effective tax rate?

Answer: We use the tax rate appropriate for interest expense. In many countries, this is the statutory tax rate. A financial analyst may not always know the proper tax rate. If the company is domiciled in another country, or the company operates internationally, the analyst may not know the proper tax rate. Many companies that are publicly traded issue bonds or take loans in various countries and use tax strategies to reduce their tax expenses. Reading foreign tax laws or studying the company's tax strategies is not cost-efficient. The simplest procedure is to use the effective tax rate: the tax expense divided by pre-tax income. The slight accuracy loss from this approximation is small compared to the time needed to estimate the proper tax rate.

The statutory tax rate is used if it is known and the effective tax rate differs materially from the statutory tax rate because of tax exemptions, such as tax exempt investment income for insurers in the United States. This on-line course does not assume knowledge of any country's tax laws, though it does require you to understand how taxes affect financial statements. In most countries, interest expense is a deductible from taxable income, but dividends paid to shareholders are not deductible from taxable income. The textbook assumes readers know this.

Question: The textbook says: "changes in balance sheet accounts are an important factor in determining cash flows (page 258)." Why do balance sheet entries affect cash flow?

Answer: The wording in the textbook is not ideal. Cash flows depend on cash transactions; the accounting system affects income and valuation, not cash flows. The textbook means that the income statement and the balance sheet interact (articulate): many accounting rules affect both the income statement and the balance sheet. If we start with the income statement, we undo the accounting changes from cash flows to income flows by using the working capital changes from the beginning to the end of the year on the balance sheet.

Cash flows come first; they reflect the firm's cash transactions and are not affected by accounting rules. The balance sheet comes next (in most cases): the value of assets is either their fair values or their historical cost. From the cash transactions and the non-cash changes (depreciation, amortization, changes in net working capital), we derive the income statement entries.

This sequence is revised when revenue is matched to expenses or vice versa. The matching principle implies that income statement patterns determine the balance sheet values of some assets or liabilities.

Illustration: Matching affects the depreciation pattern: the depreciation expense should reflect the use of the asset. If an asset is used evenly over ten years, the depreciation is even over ten years. But depreciation that is spread evenly over the life of the asset does not necessarily match the use of the asset. New assets are more valuable (produce more goods) than old assets, so the depreciation should be more rapid when the asset is new than when it is old, which is the rationale for accelerated depreciation methods.

Exercise 6.9: Cash flow classification

On December 31, 20X1, a firm with 200 of cash and 200 of shareholders equity:

- Issues 400 of long-term debt to buy production equipment.
- Issues a six month note for 100 to pay wages on that day to its production workers. The wages are for work that will be performed over the coming month.
- Buys 300 of inventory with trade financing of net 90 days.

- A. What is net income for 20X1?
- B. What is the current ratio at year-end 20X1?
- C. What are the firm's financing cash flows?
- D. What are the firm's investing cash flows?
- E. What are the firm's operating cash flows?

Part A: Nothing is earned or accrued in 20X1, so net income is zero.

Part B: Current assets are 600: cash (200), prepaid expenses (100) for wages, and inventory (300)

Current liabilities are 400: six month note (100) and accounts payable for the inventory (300).

The current ratio is $600 / 400 = 1.5$

Part C: The financing cash flows are +400 of long-term debt and +100 of a six month note.

Part D: The investing cash flows are -400 to buy equipment.

Part E: The operating cash flows are -100 to pay wages. The inventory is bought on credit, not by cash.

Question: The textbook says that investing cash flows exclude investments in cash equivalents (very short term highly liquid securities). Is a six month note a cash equivalent?

Answer: Cash equivalents are securities with maturities of three months or less. Some investors view all short term notes as cash equivalents for internal strategy, but financial statements require maturities of three months or less.

Exercise 6.10: Shareholders' equity

A firm's shareholders' equity has the following components:

	<i>December 31, 20X1</i>	<i>December 31, 20X2</i>
Common shares	848	813
Retained earnings	245	258

The firm has net income of 40 in 20X2 and interest paid of 10. The firm issued no new shares in 20X2.

- A. What are the dividends paid to shareholders in 20X2?
- B. What are the Treasury shares bought in 20X2?
- C. What are financing cash flows in 20X2 under GAAP?
- D. What are financing cash flows in 20X2 under IFRS?

Part A: Net income is 40 in 20X2 but retained earnings increase by $258 - 245 = 13$, so shareholder dividends are $40 - 13 = 27$.

Part B: Common shares decrease by $848 - 813 = 35$. No new shares were issued, so 35 were purchased as Treasury shares in 20X2.

Part C: The GAAP and IFRS rules are

- Shares issued or bought are financing cash flows for both GAAP and IFRS.
- Shareholder dividends are financing cash flows for GAAP and either operating cash flows or financing cash flows for IFRS.
- Interest paid to bondholders is operating cash flow for GAAP and either operating cash flow or financing cash flow for IFRS.

The GAAP financing cash flows are an outflow of $-35 - 13 = -48$

Part D: The IFRS financing cash flows are an outflow of -35 or -48 or -58 .

Exercise 6.11: Sale of equipment

A firm reports the following financial statement entries:

	<i>Calendar Year 20X1</i>	<i>Calendar Year 20X2</i>
Depreciation expense (equipment)	35	35
Gain (loss) on sale of equipment	12	(12)
Shareholder dividends		
	<i>December 31, 20X1</i>	<i>December 31, 20X2</i>
Equipment (historical cost)	400	450
Accumulated depreciation on equipment	200	230

On December 31, 20X2, the firm paid 90 to buy new equipment.

- A. What is the change in the historical cost of equipment in 20X2?
- B. What is the historical cost of the equipment sold in 20X2?
- C. What is the change in the accumulated depreciation for equipment from 12/31/20X1 to 12/31/20X2?
- D. What was the accumulated depreciation for the equipment sold in 20X2?
- E. What was the sales price of the equipment sold in 20X2?

Part A: The historical cost of equipment is 400 on 12/31/20X1 and 450 on 12/31/20X2, so the change during the year is 50.

Part B: The firm paid 90 to buy new equipment in 20X2, so the historical cost of the equipment sold is $90 - 50 = 40$.

Part C: The change in the accumulated depreciation from 12/31/20X1 to 12/31/20X2 is $230 - 200 = 30$.

Part D: Depreciation expense is 35, so $35 - 30 = 5$ is the accumulated depreciation on the equipment sold.

Part E: The carrying value of the equipment sold was $40 - 5 = 35$, and the loss on its sale was 12, so the sales price was $35 - 12 = 23$.

Property, plant, and equipment

The balance sheet shows the gross value and the accumulated depreciation of property, plant, and equipment owned by the firm. The carrying value is the gross value minus the accumulated depreciation.

Illustration: A firm buys a building on July 1, 20X1, for 100, with an estimated useful life of ten years. The firm uses straight line depreciation. On December 31, 20X2, the gross value = 100 (labeled “property, plant, and equipment”), accumulated depreciation ($1\frac{1}{2}$ years at 10 per year) = 15, and the carrying value = $100 - 15 = 85$.

- When the firm buys property, plant, and equipment, the carrying value = the purchase price and the gain or loss on the income statement is zero.
- When the firm sells property, plant, and equipment, the sale price may differ from the carrying value. The gain or loss on the income statement is the sale price minus the carrying value.

Exercise 6.12: Property, plant, and equipment

A firm shows accounting entries for property, plant, and equipment of

	Calendar Year 20X1	Calendar Year 20X2
Gain (loss) on sale of property, plant, equipment	–	(4)
Depreciation expense	12	11
	December 31, 20X1	December 31, 20X2
Property, plant, and equipment	80	70
Accumulated depreciation	25	32

The firm did not buy property, plant, and equipment in 20X2.

- What was the gross value of the property, plant, and equipment sold?
- What was the accumulated depreciation on the property, plant, and equipment sold?
- What was the carrying value of the property, plant, and equipment sold?
- How much cash was received for the property, plant, and equipment sold?

Part A: The gross value of the property, plant, and equipment sold is the decrease in the balance sheet entry for property, plant, and equipment from 20X1 to 20X2: $80 - 70 = 10$.

Part B: The accumulated depreciation at year-end 20X1 was 25. Add the depreciation expense in 20X2 gives accumulated depreciation of $25 + 11 = 36$ if nothing had been sold. Since accumulated depreciation at year-end 20X2 is 32, the accumulated depreciation on the item sold was 4.

Part C: The carrying value of the item sold was $10 - 4 = 6$.

Part D: The gain/(loss) on the sale was -4 , so the cash received was $6 - 4 = 2$.

Question: What if the firm bought more property, plant, and equipment in 20X2? How would the purchase affect the solution to this exercise?

Answer: Assume the firm bought property, plant, and equipment for 5 in 20X2, but the balance sheet and income statement entries remain the same. We revise the solution:

Part A: The gross value of the property, plant, and equipment sold is the decrease in the balance sheet entry for property, plant, and equipment from 20X1 to 20X2 plus the cost of the new item: $80 - 70 + 5 = 15$.

Part B: The accumulated depreciation at year-end 20X1 was 25. Add the depreciation expense in 20X2 gives accumulated depreciation of $25 + 11 = 36$ if nothing had been sold. Since accumulated depreciation at year-end 20X2 is 32, the accumulated depreciation on the item sold was 4 (as with no new purchases).

Part C: The carrying value of the item sold was $15 - 4 = 11$.

Part D: The gain/(loss) on the sale was -4 , so the cash received was $11 - 4 = 7$.

The cost of the new property, plant, and equipment bought is shown in the notes to the financial statements if it is material.

Debt issue and repayments

Debt issues and repayments do not affect the income statement. If the debt is paid at maturity, the repayment is the par value, which is the book value.

Debt issue and repayment are financing cash flows under both GAAP and IFRS. The net debt issue and repayment is the change in the balance sheet liability for debt. This liability is often sub-divided into three parts: long-term debt, short term debt, bank loans (included in other liabilities).

- The interest expense – $\Delta(\text{accrued interest liability})$ = interest paid, an operating cash flow for GAAP and either an operating cash flow or a financing cash flow for IFRS.
- The change in the debt liabilities is a financing cash flow for both GAAP and IFRS.

Shareholders' equity

Two items affect shareholders' equity and financing cash flows.

- Issue of shares (either common or preferred).
- Repurchase of shares; issued shares that have been repurchased are Treasury shares.

Two items affect financing cash flows (at least for GAAP) but not shareholders' equity.

- Dividends paid to common shareholders.
- Dividends paid to preferred shareholders.

For IFRS, dividends paid are either operating cash flows or financing cash flows.

Retained earnings are the accumulated earnings that have been retained by the firm and not paid as dividends to shareholders.

- If no dividends are paid to shareholders, the retained earnings at the end of the year = the retained earnings at the beginning of the year + the net income during the year.
- If dividends are paid to shareholders, the retained earnings at the end of the year = the retained earnings at the beginning of the year + the net income during the year – the dividends paid to shareholders.

Question: The shareholders own the retained earnings. What is the difference between retained earnings and shares?

Answer: The book value of shares is the price the shareholders paid for the shares. Most shares have a price on the share document, called the par value of the share. State laws often require a par value for shares, such as one dollar (or one unit of another currency). The share price when the shares are issued is not related to the par value: shares with a par value of one may be sold for one, for ten, or for a hundred, depending on the number of shares and the fair value of the firm.

- The balance sheet entry "common shares" is the number of shares times the par value per share.
- The balance sheet entry "additional paid-in capital" is the number of shares times (the cash received per share minus the par value per share).

Question: Does "common shares" + "additional paid-in capital" = the market value of the shares?

Answer: When the shares are issued, the entries for common shares + additional paid-in capital = the market value of the shares. Subsequent changes in the firm's value stemming from earnings are retained earnings. The balance sheet entries common shares and additional paid-in capital change only if new shares are issued or shares are repurchased.

Question: Do common shares + additional paid-in capital + retained earnings = the market value of the shares?

Answer: The entries common shares + additional paid-in capital + retained earnings give the book value of the firm. Book value is correlated with market value, but they are not the same. Firms that have created new products in-house often have market value much higher than book value.