Chapter 2

AN INTRODUCTION TO COSTS TERMS AND INVENTORY COSTING

2-1 A *cost object* is anything for which a separate measurement of costs is desired. Examples include a product, a service, a project, a customer, a brand category, an activity and a department.

2-2 Direct costs of a cost object are related to the particular cost object and can be traced to that cost object in an economically feasible (cost-effective) way. Indirect costs of a cost object are related to the particular cost object but cannot be traced to that cost object in an economically feasible (cost-effective) way.

2-3 Managers believe that direct costs that are traced to a particular cost object are more accurately assigned to that cost object than are indirect allocated costs. When costs are allocated, managers are less certain whether the cost allocation base accurately measures the resources demanded by a cost object. Managers prefer to use more accurate costs in their decisions.

2-4 Factors affecting the classification of a cost as direct or indirect include

- the materiality of the cost in question
- available information-gathering technology
- design of operations

2-5 A *variable cost* changes in total in proportion to changes in the related level of total activity or volume. An example is a sales commission that is a percentage of each sales revenue dollar.

A *fixed cost* remains unchanged in total for a given time period, despite wide changes in the related level of total activity or volume. An example is the leasing cost of a machine that is unchanged for a given time period (such as a year) regardless of the number of units of product produced on the machine.

2-6 A *cost driver* is a variable, such as the level of activity or volume, which causally affects total costs over a given time span. A change in the cost driver results in a change in the level of total costs. For example, the number of vehicles assembled is a driver of the costs of steering wheels on a motor-vehicle assembly line.

2-7 The *relevant range* is the band of normal activity level or volume in which there is a specific relationship between the level of activity or volume and the cost in question. Costs are described as variable or fixed with respect to a particular relevant range.

2-8 Unit costs are computed by dividing some amount of total costs (the numerator) by the related number of units (the denominator). In many cases, the numerator will include a fixed cost that will not change despite changes in the denominator. It is erroneous in those cases to multiply the unit cost by activity or volume change to predict changes in total costs at different activity or volume levels.

2-9 *Manufacturing-sector companies* purchase materials and components and convert them into various finished goods, for example, automotive and textile companies.

Retail-sector companies purchase and then sell tangible products without changing their basic form, for example, retailing or distribution.

Service-sector companies provide services or intangible products to their customers, for example legal advice or audits.

2-10 Manufacturing companies typically have one or more of the following three types of inventory:

1. *Direct materials inventory* Direct materials in stock and awaiting use in the manufacturing process.
2. *Work-in-process inventory* Goods partially worked on but not yet completed. Also called *work in progress***.**
3. *Finished goods inventory* Goods completed but not yet sold.

2-11 *Direct material costs* are the acquisition costs of all materials that eventually become part of the cost object (work in process and then finished goods) and can be traced to the cost object in an economically feasible way.

Direct manufacturing labour costs include the compensation of all manufacturing labour that can be traced to the cost object (work in process and then finished goods) in an economically feasible way.

Manufacturing overhead costs are all manufacturing costs that are related to the cost object (work in process and then finished goods), but cannot be traced to that cost object in an economically feasible way.

Prime costs are all direct manufacturing costs (direct material and direct manufacturing labour).

Conversion costs are all manufacturing costs other than direct material costs. It represents the cost of converting raw into finished goods.

2-12 *Inventoriable costs* are all costs of a product that are considered as assets in the balance sheet when they are incurred and that become cost of goods sold when the product is sold. These costs are included in work-in-process and finished goods inventory (they are 'inventoried') to accumulate the costs of creating these assets.

Period costs are all costs in the income statement other than cost of goods sold. These costs are treated as expenses of the accounting period in which they are incurred because they are expected not to benefit revenues in future periods (because there is not sufficient evidence to conclude that such benefit exists). Expensing these costs immediately best matches the expenses to revenues.

No. Service sector companies have no inventories of tangible products for sale and, hence, no inventoriable costs.

2-13 Yes; but not all categories of fixed costs are treated differently under the two methods. Differences in operating profit between variable costing and absorption costing are due to accounting for fixed manufacturing costs. Under variable costing only variable manufacturing costs are included as inventoriable costs. Under absorption costing both variable and fixed manufacturing costs are included as inventoriable costs. Fixed marketing and distribution costs are not accounted for differently under variable costing and absorption costing.

2-14 The main issue between variable costing and absorption costing is the proper timing of the release of fixed manufacturing costs as costs of the period:

a. at the time of incurrence, or
b. at the time the finished units to which the fixed overhead relates are sold

Variable costing use (a) and absorption costing use (b).

2-15 Examples of dysfunctional decisions managers may make to increase reported operating income are:

a. Plant managers may switch production to those orders that absorb the highest amount of fixed manufacturing overhead, irrespective of the demand by customers.
b. Plant managers may accept a particular order to increase production even though another plant in the same company is better suited to handle that order.
c. Plant managers may defer maintenance beyond the current period to free up more time for production.

Approaches used to reduce the negative aspects associated with using absorption costing include:

a. Change the accounting system:
   - Adopt either variable or throughput costing, both of which reduce the incentives of managers to produce extra units for inventory.
   - Adopt an inventory holding charge for managers who tie up funds in inventory.
b. Extend the time period used to evaluate performance. By evaluating performance over a longer time period (say, 3 to 5 years), the incentive to take short-run actions that reduce long-term income is lessened.
c. Include nonfinancial as well as financial variables in the measures used to evaluate performance.

2-16 *Overtime premium* is the wage rate paid to workers (for both direct labour and indirect labour) in excess of their straight-time wage rates.

Idle time is a subclassification of indirect labour that represents wages paid for unproductive time caused by lack of orders, machine breakdowns, material shortages, poor scheduling and the like.

2-17 A product cost is the sum of the costs assigned to a product for a specific purpose. Purposes for computing a product cost include:

- pricing and product mix decisions, and
- preparing financial statements for external reporting under generally accepted accounting principles.

2-18 No; gross margin is not the same as contribution margin. Contribution margin is the difference between total revenues (TR) and total variable costs (VC) when using the variable costing method, whereas gross margin is total revenues less cost of goods sold using the absorption costing method.

2-19 Three common features of cost accounting and cost management are:

- calculating the costs of products, services and other cost objects
- obtaining information for planning and control and performance evaluation
- analysing the relevant information for making decisions

2-20 (15 min.) **Calculating and interpreting manufacturing unit costs**

1.

	(in millions)			
	Supreme	**Deluxe**	**Regular**	**Total**
Direct material cost	A$ 89.00	A$ 57.00	A$60.00	A$206.00
Direct manuf. labour costs	16.00	26.00	8.00	50.00
Manufacturing overhead costs	48.00	78.00	24.00	150.00
Total manuf. costs	153.00	161.00	92.00	406.00
Fixed costs allocated at a rate of A$15M÷A$50M (direct mfg. labour) equal to A$0.30 per dir. manuf. labour dollar (0.30 × A$16; 26; 8)	4.80	7.80	2.40	15.00
Variable costs	A$148.20	A$153.20	A$89.60	A$391.00
Units produced (millions)	125	150	140	
Cost per unit (Total manuf. costs ÷ units produced)	A$1.2240	A$1.0733	A$0.6571	
Variable manuf. cost per unit (Variable manuf. costs ÷Units produced)	A$1.1856	A$1.0213	A$0.6400	

2.

	(in millions)			
	Supreme	**Deluxe**	**Regular**	**Total**
Based on total manuf. cost per unit: (A$1.2240×150; A$1.0733×190; A$0.6571×220)	A$183.60	A$203.90	A$144.56	A$532.09
Correct total manuf. costs based on variable manuf. costs plus fixed costs equal: Variable costs (A$1.1856×150; A$1.0213×190; A$0.64 × 220)	A$177.84	A$194.05	A$140.80	A$152.69
Fixed costs				A$15.00
Total costs				A$527.69

The total manufacturing cost per unit in requirement 1 includes A$15 million of indirect manufacturing costs that are fixed irrespective of changes in the volume of output per month, while the remaining variable indirect manufacturing costs change with the production volume. Given the unit volume changes for August 2014 the use of total manufacturing cost per unit from the past month at a different unit volume level (both in aggregate and at the individual product level) will yield incorrect estimates of total costs of A$532.09 million in August 2014 relative to the correct total manufacturing costs of A$527.69 million calculated using variable manufacturing cost per unit times units produced plus the fixed costs of A$15 million.

2-21 (15 min.) **Direct, indirect, fixed and variable costs**

1.
Yeast direct, variable
Flour direct, variable
Packaging materials direct (or could be indirect if small and not traced to each unit), variable
Depreciation on ovens indirect, fixed (unless 'units of output' depreciation, which then would be variable)
Depreciation on mixing machines indirect, fixed (unless 'units of output' depreciation, which then would be variable)
Rent on factory building indirect, fixed
Fire insurance on factory building indirect, fixed
Factory utilities indirect, probably some variable and some fixed (e.g. electricity may be variable but heating costs may be fixed)
Finishing department hourly labourers direct, variable (or fixed if the labourers are under a union contract)
Mixing department manager indirect, fixed
Materials handlers in each department depends on how they are paid. If paid hourly and not under union contract, then indirect, variable. If salaried or under union contract then indirect, fixed
Custodian in factory indirect, fixed
Night security guard in factory indirect, fixed
Machinist (running the mixing machine) depends on how they are paid. If paid hourly and not under union contract, then indirect, variable. If salaried or under union contract then indirect, fixed
Machine maintenance personnel in each department indirect, probably fixed, if salaried, but may be variable if paid only for time worked and maintenance increases with increased production
Maintenance supplies for factory indirect, variable
Cleaning supplies for factory indirect, most likely fixed since the custodians probably do the same amount of cleaning every night

2. If the cost object is Mixing Department, then anything directly associated with the Mixing Department will be a direct cost. This will include:

- Depreciation on mixing machines
- Mixing department manager
- Materials handlers (of the Mixing Department)
- Machinist (running the mixing machines)
- Machine Maintenance personnel (of the Mixing Department)
- Maintenance supplies (if separately identified for the Mixing Department)

Of course the yeast and flour will also be a direct cost of the Mixing Department, but it is already a direct cost of each kind of bread produced.

2-22 (15–20 min.) **Classification of costs, service sector**

Cost object: Each individual focus group
Cost variability: With respect to the number of focus groups
There may be some debate over classifications of individual items, especially with regard to cost variability.

Cost Item	D or I	V or F
A	D	V
B	I	F
C	I	V[a]
D	D	V
E	I	F
F	D	F
G	I	V[b]
H	I	F

[a]Some students will note that phone call costs are variable when each call has a separate charge. It may be a fixed cost if Consumer Focus has a flat monthly charge for a line, irrespective of the amount of usage.
[b]Fuel costs are likely to vary with the number of focus groups. However, vehicles likely serve multiple purposes, and detailed records may be required to examine how costs vary with changes in one of the many purposes served.

2-23 (15–20 min.) **Classification of costs, retail sector**

Cost object: Videos sold in video section of store
Cost variability: With respect to changes in the number of videos sold
There may be some debate over classifications of individual items, especially with regard to cost variability.

Cost Item	D or I	V or F
A	I	F
B	D	V
C	D	F
D	I	F
E	I	V
F	I	F
G	D	V

2-24 (15–20 min.) **Classification of costs, manufacturing sector**

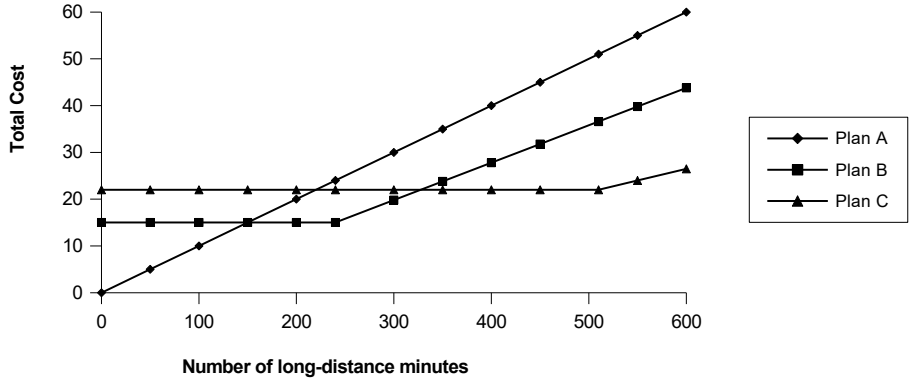
Cost object: Type of vehicle assembled (dirt bikes or motorised buggies)
Cost variability: With respect to changes in the number of vehicles assembled
There may be some debate over classifications of individual items, especially with regard to cost variability.

Cost Item	D or I	V or F
A	D	V
B	I	F
C	D	F
D	D	V
E	I	V
F	D	V
G	I	F

2-25 (20 min.) **Variable costs, fixed costs, total costs**

1.

Minutes per month	**0**	**50**	**100**	**150**	**200**	**240**	**300**	**327.5**	**350**	**400**	**450**	**510**	**540**	**600**	**650**
Plan A (A$/month)	0	5	10	15	20	24	30	32.75	35	40	45	51	54	60	65
Plan B (A$/month)	15	15	15	15	15	15	19.8	22	23.8	27.8	31.8	36.6	39	43.8	47.8
Plan C (A$/month)	22	22	22	22	22	22	22	22	22	22	22	22	23.5	26.5	29



2. In each region, Leigh chooses the plan that has the lowest cost. From the graph (or from calculations)[c], we can see that if Leigh expects to use 0–150 minutes of long-distance each month, she should buy Plan A; for 150–327.5 minutes, Plan B; and for over 327.5 minutes, Plan C. If Leigh plans to make 100 minutes of long-distance calls each month, she should choose Plan A; for 240 minutes, choose Plan B; for 540 minutes, choose Plan C.

[c]Let x be the number of minutes when Plan A and Plan B have equal cost

$A\$0.10x = A\$15$

$x = A\$15 \div A\$0.10$ per minute

$= 150$ minutes.

Let y be the number of minutes when Plan B and Plan C have equal cost

$A\$15 + A\$0.08\,(y - 240) = A\$22$

$A\$0.08\,(y - 240) = A\$22 - A\$15 = A\$7$

$$y - 240 = \frac{A\$7}{A\$0.08} = 87.5$$

$y = 87.5 + 240 = 327.5$ minutes

2-26 (15–20 min.) **Variable costs and fixed costs**

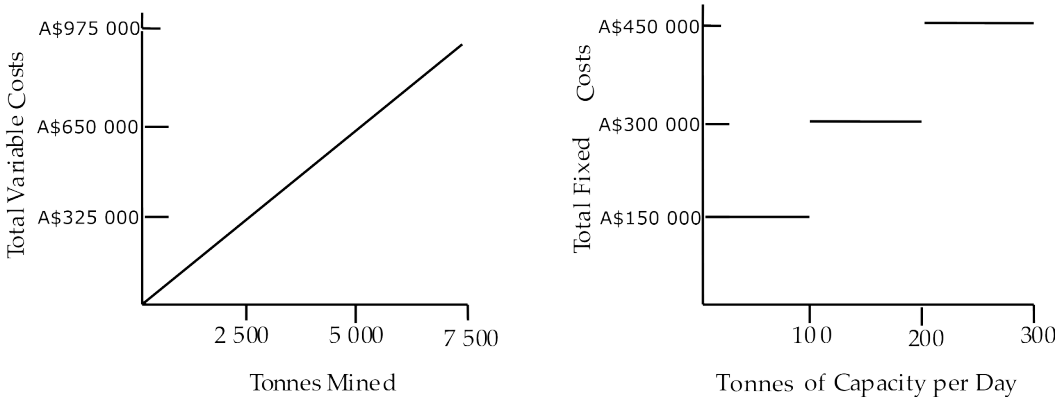
1. Variable cost per tonne of beach sand mined

Subcontractor	A$ 80 per tonne
Government tax	50 per tonne
Total	A$130 per tonne

Fixed costs per month

0 to 100 tonnes of capacity per day	=	A$150 000
101 to 200 tonnes of capacity per day	=	A$300 000
201 to 300 tonnes of capacity per day	=	A$450 000

2. Graph:



The concept of relevant range is potentially relevant for both graphs. However, the question does not place restrictions on the unit variable costs. The relevant range for the total fixed costs is from 0 to 100 tonnes, 101 to 200 tonnes, 201 to 300 tonnes and so on. Within these ranges, the total fixed costs do not change in total.

3. Unit cost per tonne:

	Tonnes Mined per Day (1)	Tonnes Mined per Month (2) = (1) × 25	Fixed Unit Cost per Tonne (3) = FC ÷ (2)	Variable Unit Cost per Tonne (4)	Total Unit Cost per Tonne (5) = (3) + (4)
(a)	180	4 500	A$300 000 ÷ 4 500 = A$66.67	A$130	A$196.67
(b)	220	5 500	A$450 000 ÷ 5 500 = A$81.82	A$130	A$211.82

The unit cost for 220 tonnes mined per day is $211.82, while for 180 tonnes it is only A$196.67. This difference is caused by the fixed cost increment from 101 to 200 tonnes being spread over an increment of 80 tonnes, while the fixed cost increment from 201 to 300 tonnes is spread over an increment of only 20 tonnes.

2-27 (20 min.) **Variable costs, fixed costs, relevant range**

1. Since the production capacity is 4 100 rock lollies per month, the current annual relevant range of output is 0 to 4 100 rock lollies × 12 months = 0 to 49 200 rock lollies.

2. Current annual fixed manufacturing costs within the relevant range are A$1200 × 12 = A$14 400 for rent and other overhead costs, plus A$9000 ÷ 10 = A$900 for depreciation, totalling A$15 300. The variable costs, the materials, are 30 cents per rock lolly, or A$13 680 (A$0.30 per rock lolly × 3800 rock lollies per month × 12 months) for the year.

3. If demand changes from 3800 to 7600 rock lollies per month, or from 3800 × 12 = 45 600 to 7600 × 12 = 91 200 rock lollies per year, Sweet Candy will need a second machine. Assuming Sweet Candy buys a second machine identical to the first machine, it

will increase capacity from 4100 rock lollies per month to 8200. The annual relevant range will be between 4100 × 12 = 49 200 and 8200 × 12 = 98 400 rock lollies.

Assume the second machine costs A$9000 and is depreciated using straight-line depreciation over 10 years and zero residual value, just like the first machine. This will add A$900 of depreciation per year.

Fixed costs for next year will increase to A$16 200, A$15 300 from the current year + A$900 (because rent and other fixed overhead costs will remain the same at A$14 400). That is, total fixed costs for next year equal A$900 (depreciation on first machine) + A$900 (depreciation on second machine) + A$14 400 (rent and other fixed overhead costs).

The variable cost per rock lollies next year will be 90% × A$0.30 = A$0.27. Total variable costs equal A$0.27 per rock lollies × 91 000 rock lollies = A$24 570.

If the company decides to not increase capacity and meet only that amount of demand for which it has available capacity (4100 rock lollies per month or 4100 × 12 = 49 200 rock lollies per year), the variable cost per unit will be the same at A$0.30 per rock lolly. Annual total variable manufacturing costs will increase to A$0.30 × 4 100 rock lollies per month × 12 months = A$14 760. Annual total fixed manufacturing costs will remain the same, A$15 300.

2-28 (20 min.) **Cost drivers and value chain**

1.
Identify customer needs (what do smartphone users want?) Design of products and processes
Perform market research on competing brands Design of products and processes
Design a prototype of the BMP smartphone Design of products and processes
Market the new design to mobile phone companies Marketing
Manufacture the BMP smartphone Production
Process orders from mobile phone companies Distribution
Package the BMP smartphones Production
Deliver the BMP smartphones to the mobile phone companies Distribution
Provide online assistance to mobile phone users for use of the BMP smartphone Customer Service
Make design changes to the smartphone based on customer feedback Design of products and processes

2.

Value Chain Category	**Activity**	**Cost driver**
Design of products and processes	Identify customer needs	Number of surveys returned and processed from competing smartphone users
	Perform market research on competing brands	Hours spent researching competing market brands
		Number of surveys returned and processed from competing smartphone users
	Design a prototype of the BMP smartphone	Engineering hours spent on initial product design
	Make design changes to the smartphone based on customer feedback	Number of design changes

Production	Manufacture the BMP smartphone	Machine hours required to run the production equipment
	Package the BMP smartphones	Number of smartphones shipped by BMP
Marketing	Market the new design to mobile phone companies	Number of mobile phone companies purchasing the BMP smartphone
Distribution	Process orders from mobile phone companies	Number of smartphone orders processed
		Number of deliveries made to mobile phone companies
	Deliver the BMP smartphones to mobile phone companies	Number of deliveries made to mobile phone companies
Customer Service	Provide online assistance to mobile phone users for use of the BMP smartphone	Number of smartphones shipped by BMP Customer Service hours

2-29 (10–15 min.) **Cost drivers and functions**

1.

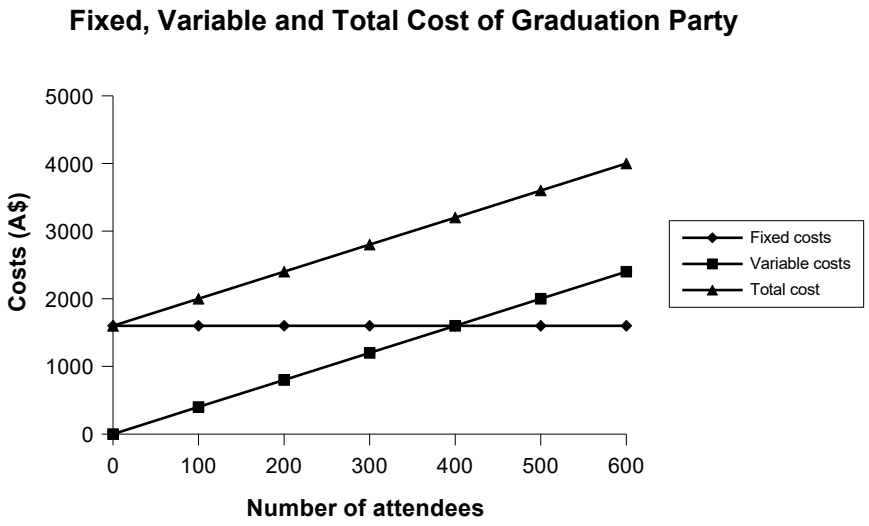
Function	Representative Cost Driver
1. Accounting	Number of transactions processed
2. Human Resources	Number of employees
3. Data processing	Hours of computer processing unit (CPU)
4. Research and development	Number of research scientists
5. Purchasing	Number of purchase orders
6. Distribution	Number of deliveries made
7. Billing	Number of invoices sent

2.

Function	Representative Cost Driver
1. Accounting	Number of journal entries made
2. Human Resources	Salaries and wages of employees
3. Data Processing	Number of computer transactions
4. Research and Development	Number of new products being developed
5. Purchasing	Number of different types of materials purchased
6. Distribution	Distance travelled to make deliveries
7. Billing	Number of credit sales transactions

2-30 (20 min.) **Total costs and unit costs**

1.



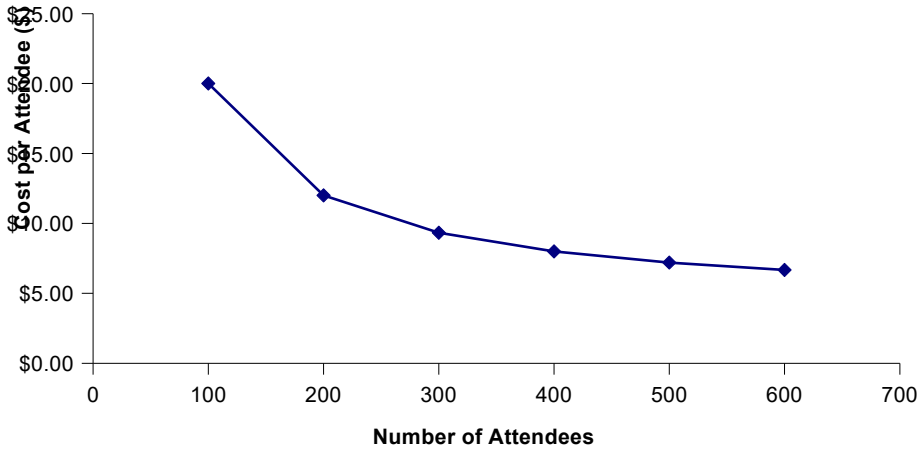
2.

Number of attendees	**0**	**100**	**200**	**300**	**400**	**500**	**600**
Total costs (fixed + variable)	A$1600	A$2000	A$2400	A$2800	A$3200	A$3600	A$4000
Costs per attendee (total costs ÷ number of attendees)		A$20.00	A$12.00	A$9.33	A$ 8.00	A$ 7.20	A$ 6.67

As shown in the table above, for 100 attendees the total cost will be A$2000 and the cost per attendee will be A$20.

3. As shown in the table in requirement 2, for 500 attendees the total cost will be A$3600 and the cost per attendee will be A$7.20.

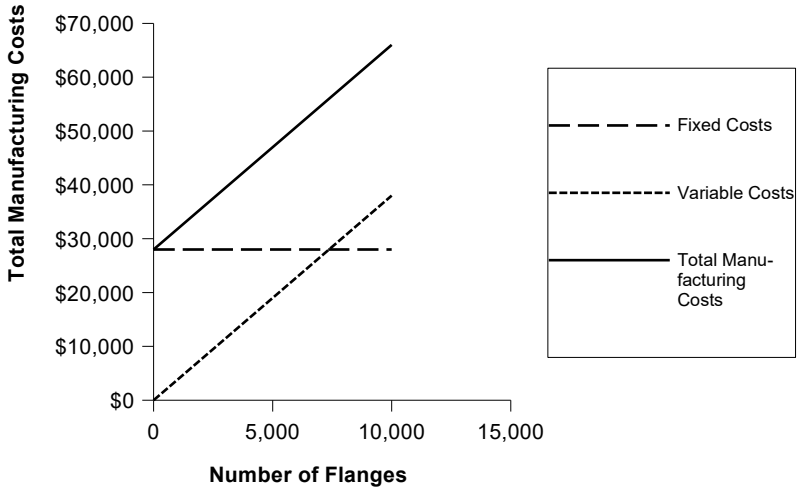
4. Using the calculations shown in the table in requirement 2, we can construct the cost-per-attendee graph shown below:



As president of the student association requesting a grant for the party, you should not use the per unit calculations to make your case. The person making the grant may assume an attendance of 500 students and use a low number like A$7.20 per attendee to calculate the size of your grant. Instead, you should emphasise the fixed cost of A$1600 that you will incur even if no students or very few students attend the party, and try to get a grant to cover as much of the fixed costs as possible as well as a variable portion to cover as much of the A$4 net variable cost to the student association for each person attending the party.

2-31 (25 min.) **Total and unit cost, decision making**

1. Graph:



Note that the production costs include the A$28 000 of fixed manufacturing costs but not the A$10000 of period costs. The variable cost is A$1 per flange for materials, and A$2.80 per flange (A$28 per hour divided by 10 flanges per hour) for direct manufacturing labour for a total of A$3.80 per flange.

2. The inventoriable (manufacturing) cost per unit for 5000 flanges is:
   A$3.80 × 5000 + A$28 000 = A$47 000
   Average (unit) cost = A$47 000 ÷ 5000 units = A$9.40 per unit.

This is below Fred's selling price of A$10 per flange. However, in order to make a profit, Graham's Glassworks also needs to cover the period (non-manufacturing) costs of A$10 000, or A$10 000 ÷ 5000 = A$2 per unit.

Thus total costs, both inventoriable (manufacturing) and period (non-manufacturing), for the flanges is A$9.40 + A$2 = A$11.40. Graham's Glassworks cannot sell below Fred's price of $10 and still make a profit on the flanges.

Alternatively,
At Fred's price of A$10 per flange:

Revenue	A$10	×	5 000	=	A$50 000
Variable costs	A$3.80	×	5 000	=	19 000
Fixed costs					38 000
Operating loss					A$(7 000

Graham's Glassworks cannot sell below A$10 per flange and make a profit. At Fred's price of A$10 per flange, the company has an operating loss of A$7000.

3. If Graham's Glassworks produces 10 000 units, then total inventoriable cost will be:

Variable cost (A$3.80 × 10 000) + fixed manufacturing costs, A$28 000 = total manufacturing costs, A$66 000.

$$\text{Average (unit) inventoriable (manufacturing) cost} = \frac{\text{A\$66 000}}{\text{10 000 units}}$$
$$= \text{A\$6.60 per flange}$$

Unit total cost including both inventoriable and period costs will be (A$66 000 + A$10 000) ÷ 10 000 = A$7.60 per flange, and Graham's Glassworks will be able to sell the flanges for less than Fred and still make a profit.

Alternatively,
At Fred's price of A$10 per flange:

Revenue	A$10	×	10 000	=	A$100 000
Variable costs	A$3.80	×	10 000	=	38 000
Fixed costs					38 000
Operating income					A$ 24 000

Graham's Glassworks can sell at a price below A$10 per flange and still make a profit. The company earns operating income of A$24 000 at a price of A$10 per flange. The company will earn operating income as long as the price exceeds A$7.60 per flange.

The reason the unit cost decreases significantly is that inventoriable (manufacturing) fixed costs and fixed period (nonmanufacturing) costs remain the same regardless of the number of units produced. So, as Graham's Glassworks produces more units, fixed costs are spread over more units, and cost per unit decreases.

This means that if you use unit costs to make decisions about pricing and which product to produce you must be aware that the unit cost only applies to a particular level of output.

2-32 (20–30 min.) **Inventoriable costs versus period costs**

1. *Manufacturing-sector companies* purchase materials and components and convert them into different finished goods.

Retail-sector companies purchase and then sell tangible products without changing their basic form.

Service-sector companies provide services or intangible products to their customers—for example, legal advice or audits.

Only manufacturing and retail companies have inventories of goods for sale.

2. *Inventoriable costs* are all costs of a product that are regarded as an asset when they are incurred and then become cost of goods sold when the product is sold. These costs for a manufacturing company are included in work-in-process and finished goods inventory (they are 'inventoried') to build up the costs of creating these assets.

Period costs are all costs in the income statement other than cost of goods sold. These costs are treated as expenses of the period in which they are incurred because they are presumed not to benefit future periods (or because there is not sufficient evidence to conclude that such benefit exists). Expensing these costs immediately best matches the expenses to revenues.

3.

a. *Mineral water purchased for resale by Kmart* Inventoriable cost of a retail company. It becomes part of cost of goods sold when the mineral water is sold.

b. *Electricity used at Westinghouse assembly plant* Inventoriable cost of a manufacturing company. It is part of the manufacturing overhead that is included in the manufacturing cost of a finished good.

c. *Depreciation on Google's computer equipment* Period cost of a service company. Google has no inventory of goods for sale and, hence, no inventoriable cost.

d. *Electricity for Kmart's store aisles* Period cost of a retail company. It is a cost that benefits the current period and it is not traceable to goods purchased for resale.

e. *Depreciation on Westinghouse's assembly testing equipment* Inventoriable cost of a manufacturing company. It is part of the manufacturing overhead that is included in the manufacturing cost of a finished good.

f. *Salaries of Kmart's marketing personnel* Period cost of a retail company. It is a cost that is not traceable to goods purchased for resale. It is presumed not to benefit future periods (or at least not to have sufficiently reliable evidence to estimate such future benefits).

g. *Mineral water consumed by Google's engineers* Period cost of a service company. Google has no inventory of goods for sale and hence no inventoriable cost.

h. *Salaries of Google's marketing personnel* Period cost of a service company. Google has no inventory of goods for sale and, hence, no inventoriable cost.

2-33 (10 min.) **Absorption and variable costing**

The answers are 1(a) and 2(c). Computations:

1.

Absorption Costing:		
Revenues[a]		A$4 800 000
Cost of goods sold:		
Variable manufacturing costs[b]	A$2 400 000	
Allocated fixed manufacturing costs[c]	360 000	2 760 000
Gross margin		2 040 000
Operating costs:		
Variable operating[d]	1 200 000	
Fixed operating	400 000	1 600 000
Operating income		$ 440 000

[a] A$40 × 120 000
[b] A$20 × 120 000
[c] Fixed manufacturing rate = A$600 000 ÷ 200 000 = A$3 per output unit
Fixed manufacturing costs = A$3 × 120 000
[d] A$10 × 120 000

2.

Variable Costing:

Revenues[a]		A$4 800 000
Variable costs:		
Variable manufacturing cost of goods sold[b]	A$2 400 000	
Variable operating costs[c]	1 200 000	3 600 000
Contribution margin		1 200 000
Fixed costs:		
Fixed manufacturing costs	600 000	
Fixed operating costs	400 000	1 000 000
Operating income		A$200 000

[a] A$40 × 120 000
[b] A$20 × 120 000
[c] A$10 × 120 000

2-34 (30 min.) **Variable and absorption costing, explaining operating profit differences:**

1. Key inputs for income statement computations are:

	April	May
Beginning inventory	0	150
Production	500	400
Goods available for sale	500	550
Units sold	350	520
Ending inventory	150	30

The budgeted fixed cost per unit and budgeted total manufacturing cost per unit under absorption costing are:

		April	May
(a)	Budgeted fixed manufacturing costs	A$2 000 000	A$2 000 000
(b)	Budgeted production	500	500
(c)=(a)/(b)	Budgeted fixed manufacturing cost per unit	A$4 000	A$4 000
(d)	Budgeted variable manufacturing cost per unit	A$10 000	A$10 000
(e)=(c)+(d)	Budgeted total manufacturing cost per unit	A$14 000	A$14 000

a. **Variable costing:**

	April 2015	May 2015
Revenues[a]	A$8 400 000	A$12 480 000
Variable costs:		
Beginning inventory	A$ 0	A$1 500 000

Variable manufacturing costs[b]	5 000 000		4 000 000	
Cost of goods available for sale	5 000 000		5 500 000	
Deduct ending inventory[c]	1 500 000		300 000	
Variable cost of goods sold	3 500 000		5 200 000	
Variable operating costs[d]	1 050 000		1 560 000	
Total variable costs		4 550 000		6 760 000
Contribution margin		3 850 000		5 720 000
Fixed costs:				
Fixed manufacturing costs	2 000 000		2 000 000	
Fixed operating costs	600 000		600 000	
Total fixed costs		2 600 000		2 600 000
Operating income		**A$1 250 000**		**A$3 120 000**

[a] A$24 000 × 350; A$24 000 × 520
[b] A$10 000 × 500; A$10 000 × 400
[c] A$10 000 × 150; A$10 000 ×30
[d] A$3000 × 350; A$3 000 × 520

b.**Absorption costing:**

	April 2015		**May 2015**	
Revenues[a]		A$8 400 000		A$12 480 000
Cost of goods sold:				
Beginning inventory	A$ 0		A$2 100 000	
Variable manufacturing costs[b]	5 000 000		4 000 000	
Allocated fixed manufacturing costs[c]	2 000 000		1 600 000	
Cost of goods available for sale	7 000 000		7 700 000	
Deduct ending inventory[d]	2 100 000		420 000	
Adjustment for production volume variance[e]	0		400 000 U	
Cost of goods sold		4 900 000		7 680 000
Gross margin		3 500 000		4 800 000
Operating costs:				
Variable operating costs[f]	1 050 000		1 560 000	
Fixed operating costs	600 000		600 000	
Total operating costs		1 650 000		2 160 000
Operating income		**A$1 850 000**		**$2 640 000**

[a] A$24 000 × 350; A$24 000 × 520
[b] A$10 000 × 500; A$10 000 × 400– A$1 600 000
[c] A$4 000 × 500; A$4,000 × 400
[d] A$14 000 × 150; A$14,000 × 30
[e] A$2 000 000 – A$2 000 000; A$2 000 000

[f] A$3000 × 350; A$3000 × 520

2.

Absorption-costing operating income − Variable-costing operating income = Fixed manufacturing costs in ending inventory − Fixed manufacturing costs in beginning inventory

April:

A$1 850 000 − A$1 250 000 = (A$4000 × 150) − (A$0)
A$600 000 = A$600 000

May:

A$2 640 000 − A$3 120 000 = (A$4000 × 30) − (A$4000 × 150)
− A$480 000 = A$120 000 − A$600 000
− A$480 000 =− A$480 000

The difference between absorption and variable costing is due solely to moving fixed manufacturing costs into inventories as inventories increase (as in April) and out of inventories as they decrease (as in May).

2-35 (20 min.) **Flow of inventoriable costs**

(All numbers below are in millions).
1.

Direct materials inventory 1/10/2013	A$ 105
Direct materials purchased	365
Direct materials available for production	470
Direct materials used	385
Direct materials inventory 31/10/2013	A$ 85

2.

Total manufacturing overhead costs	A$ 450
Subtract: Variable manufacturing overhead costs	265
Fixed manufacturing overhead costs for October 2013	A$ 185

3.

Total manufacturing costs	A$ 1610
Subtract: Direct materials used (from requirement 1)	385
Total manufacturing overhead costs	450
Direct manufacturing labour costs for October 2013	A$ 775

4.

Work-in-process inventory 1/10/2013	A$ 230
Total manufacturing costs	1610
Work-in-process available for production	1840
Subtract: Cost of goods manufactured (moved into Finished Goods)	1660
Work-in-process inventory 31/10/2013	A$ 180

5.

Finished goods inventory 1/10/2013	A$ 130
Cost of goods manufactured (moved from WIP)	1660
Cost of finished goods available for sale in October 2013	A$ 1790

6.

Finished goods available for sale in October 2013 (from requirement 5)	A$ 1790
Subtract: Cost of goods sold	1770
Finished goods inventory 31/10/2013	A$ 20

2-36 (20 min.) **Calculating cost of goods purchased, cost of goods sold and income statement**

1. **Calculation of cost of goods purchased and sold is as follows:**

a. **Cost of goods purchased:**

Rose Retail Outlet Stores
Schedule of Cost of Goods Purchased
For the Year Ended 31 December 2013
(in thousands)

Purchases		A$260 000
Add freight—in		10 000
		270 000
Deduct:		
Purchase returns and allowances	A$11 000	
Purchase discounts	9 000	20 000
Cost of goods purchased		A$250 000

b.**Cost of goods sold:**

Rose Retail Outlet Stores
Schedule of Cost of Goods Sold
For the Year Ended 31 December 2013
(in thousands)

Beginning retail inventory 1/1/2013	A$ 45 000
Cost of goods purchased (see above)	250 000
Cost of goods available for sale	295 000
Ending retail inventory 31/12/2013	52 000
Cost of goods sold	A$243 000

2.**Income statement:**

Rose Retail Outlet Stores
Income Statement
Year Ended 31 December 2013
(in thousands)

Revenues		A$320 000
Cost of goods sold (see above)		243 000
Gross margin		77 000
Operating costs		
Marketing and advertising costs	A$24 000	
Building depreciation	4 200	
Shipping of inventory to customers	2 000	
General and administrative costs	32 000	
Total operating costs		62 200
Operating income		A$ 14 800

2-37 (30–40 min.) **Cost of goods manufactured**

1.

Canseco Ltd
Schedule of Cost of Goods Manufactured
Year Ended 31 December 2014
(in thousands)

Direct materials:		
Beginning inventory, 1 January 2014	A$ 22 000	
Purchases of direct materials	75 000	
Cost of direct materials available for use	97 000	
Ending inventory, 31 December 2014	26 000	
Direct materials used		A$ 71 000
Direct manufacturing labour		25 000
Indirect manufacturing costs:		
Indirect manufacturing labour	15 000	
Plant insurance	9 000	
Depreciation—plant building & equipment	11 000	
Repairs and maintenance—plant	4 000	
Total indirect manufacturing costs		39 000
Manufacturing costs incurred during 2014		135 000
Add beginning work-in-process inventory, 1 January 2014		21 000
Total manufacturing costs to account for		156 000
Deduct ending work-in-process inventory, 31 December 2014		20 000
Cost of goods manufactured (to Income Statement)		A$136 000

2.

Canseco Ltd
Income Statement
Year Ended 31 December 2014
(in thousands)

Revenues		A$300 000
Cost of goods sold:		
Beginning finished goods, 1 January 2014	A$ 18 000	

Cost of goods manufactured (from above table)	136 000	
Cost of goods available for sale	154 000	
Ending finished goods, 31 December 2014	23 000	
Cost of goods sold		131 000
Gross margin		169 000
Operating costs:		
Marketing, distribution, and customer-service costs	93 000	
General and administrative costs	29 000	
Total operating costs		122 000
Operating income		A$ 47 000

2-38 (25–30 min.)**Income statement and schedule of cost of goods manufactured**

Income statement:

Hancock Ltd
Income Statement for the Year Ended 31 December 2013
(in millions)

Revenues		A$950
Cost of goods sold:		
Beginning finished goods, 1 Jan. 2013	A$ 70	
Cost of goods manufactured (below)	645	
Cost of goods available for sale	715	
Ending finished goods, 31 Dec. 2013	55	660
Gross margin		290
Marketing, distribution, and customer-service costs		240
Operating income		A$ 50

Cost of goods manufactured:

Hancock Ltd
Schedule of Cost of Goods Manufactured
for the Year Ended 31 December 2013
(in millions)

Direct materials costs:		
Beginning inventory, 1 Jan. 2013	A$ 15	
Purchases of direct materials	325	
Cost of direct materials available for use	340	
Ending inventory, 31 Dec. 2013	20	
Direct materials used		A$320
Direct manufacturing labour costs		100
Indirect manufacturing costs:		
Indirect manufacturing labour	60	
Plant supplies used	10	
Plant utilities	30	
Depreciation––plant and equipment	80	
Plant supervisory salaries	5	
Miscellaneous plant overhead	35	220
Manufacturing costs incurred during 2013		640
Add beginning work-in-process inventory, 1 Jan. 2013		10
Total manufacturing costs to account for		650
Deduct ending work-in-process, 31 Dec. 2013		5
Cost of goods manufactured		A$645

2-39 (15–20 min.) **Interpretation of statements (continuation of 2-38)**

1. The schedule in 2-38 can become a Schedule of Cost of Goods Manufactured and Sold simply by including the beginning and ending finished goods inventory figures in the supporting schedule, rather than directly in the body of the income statement. Note that the term *cost of goods manufactured* refers to the cost of goods brought to completion (finished) during the accounting period, whether they were started before or during the current accounting period. Some of the manufacturing costs incurred are held back as costs of the ending work in process; similarly, the costs of the beginning work in process inventory become a part of the cost of goods manufactured for 2013.

2. The sales manager's salary would be charged as a marketing cost as incurred by both manufacturing and retail companies. It is basically an operating cost that appears below the gross margin line on an income statement. In contrast, an assembler's wages would be assigned to the products worked on. Thus, the wages cost would be charged to Work-in-Process and would not be expensed until the product is transferred through Finished Goods Inventory to Cost of Goods Sold as the product is sold.

3. The direct-indirect distinction can be resolved only with respect to a particular cost object. For example, in defence contracting, the cost object may be defined as a contract. Then, a plant supervisor working only on that contract will have his or her salary charged directly and wholly to that single contract.

4. Direct materials used = A$320 000,000 ÷ 1 000 000 units = A$320 per unit
Depreciation on plant equipment = A$80 000 000 ÷ 1 000 000 units = A$80 per unit

5. Direct materials unit cost would be unchanged at A$320 per unit. Depreciation cost per unit would be A$80 000 000 ÷ 1 200 000 = A$66.67 per unit. Total direct materials costs would rise by 20% to A$384 000 000 (A$320 per unit × 1 200 000 units), whereas total depreciation would be unaffected at A$80 000 000.

6. Unit costs are averages, and they must be interpreted with caution. The A$320 direct materials unit cost is valid for predicting total costs because direct materials is a variable cost; total direct materials costs indeed change as output levels change. However, fixed costs like depreciation must be interpreted quite differently from variable costs. A common error in cost analysis is to regard all unit costs as one—as if all the total costs to which they are related are variable costs. Changes in output levels (the denominator) will affect *total variable costs*, but not *total fixed costs*. Graphs of the two costs may clarify this point; it is safer to think in terms of total costs rather than in terms of unit costs.

2-40 (25–30 min.) **Income statement and schedule of cost of goods manufactured**

Chan Ltd
Income Statement
for the Year Ended 31 December 2015
(in millions)

Revenues		A$355
Cost of goods sold:		
Beginning finished goods, 1 Jan. 2015	A$ 47	
Cost of goods manufactured (below)	228	
Cost of goods available for sale	275	
Ending finished goods, 31 Dec. 2015	11	264
Gross margin		91
Marketing, distribution, and customer-service costs		94
Operating income		A$ (3)

Chan Ltd
Schedule of Cost of Goods Manufactured
for the Year Ended 31 December 2015
(in millions)

Direct material costs:		
Beginning inventory, 1 Jan. 2015	A$ 32	
Direct materials purchased	84	
Cost of direct materials available for use	116	
Ending inventory, 31 Dec. 2015	8	
Direct materials used		A$108
Direct manufacturing labour costs		42
Indirect manufacturing costs:		
Plant supplies used	4	
Property taxes on plant	2	
Plant utilities	9	
Indirect manufacturing labour costs	27	
Depreciation––plant and equipment	6	
Miscellaneous manufacturing overhead costs	15	63
Manufacturing costs incurred during 2015		213
Add beginning work-in-process inventory, 1 Jan. 2015		18
Total manufacturing costs to account for		231
Deduct ending work-in-process inventory, 31 Dec. 2015		3
Cost of goods manufactured (to income statement)		A$228

2-41 (15–20 min.) **Terminology, interpretation of statements (continuation of 2-40)**

1. **Prime costs and conversion costs:**

Direct materials used	A$108 million
Direct manufacturing labour costs	42 million
Prime costs	A$150 million
Direct manufacturing labour costs	A$ 42 million
Indirect manufacturing costs	63 million
Conversion costs	A$105 million

2. **Inventoriable costs (in millions) for Year 2015:**

Plant utilities	A$ 9	
Indirect manufacturing labour	27	
Depreciation—plant and equipment	6	
Miscellaneous manufacturing overhead		15
Direct materials used	108	
Direct manufacturing labour	42	
Plant supplies used	4	
Property tax on plant	2	
Total inventoriable costs		A$213
Period costs (in millions) for Year 2015		
Marketing, distribution, and customer-service costs		A$94

3. Design costs and R&D costs may be regarded as product costs in case of contracting with a governmental agency. For example, if the Air Force negotiated to contract with Lockheed to build a new type of supersonic fighter plane, design costs and R&D costs may be included in the contract as product costs.

4. Direct materials used = A$108 000 000 ÷ 2 000 000 units = A$54 per unit
Depreciation on plant and equipment = A$6 000 000 ÷ A$2 000 000 units
= A$3 per unit

5. Direct materials unit cost would be unchanged at A$54 per unit. Depreciation unit cost would be A$6 000 000 ÷ 3 000 000 = A$2 per unit. Total direct materials costs would rise by 50% to A$162 000 000 (A$54 per unit × 3 000 000 units). Total depreciation cost of A$6 000 000 would remain unchanged.

6. In this case, equipment depreciation is a variable cost in relation to the unit output. The amount of equipment depreciation will change in direct proportion to the number of units produced.

(a) Depreciation will be A$2 million (2 million × A$1) when 2 million units are produced.

(b) Depreciation will be A$3 million (3 million × A$1) when 3 million units are produced.

2-42 (30–40 min.) **Missing records, calculating inventory costs**

1. Finished goods inventory, 31/3/2014 = A$210 000

2. Work-in-process inventory, 31/3/2014 = A$190 000

3. Direct materials inventory, 31/3/2014 = A$85 000

This problem is not as easy as it first appears. These answers are obtained by working from the known figures to the unknowns in the schedule below. The basic relationships between categories of costs are:

Manufacturing costs added during the period (given)	A$840 000
Conversion costs (given)	A$660 000
Direct materials used = Manufacturing costs added – Conversion costs	
= A$840 000 – A$660 000 = A$180 000	
Cost of goods manufactured = Direct Materials Used × 4	
= A$180 000 × 4 = A$720 000	

Schedule of Computations

Direct materials, 1/3/2014 (given)		A$ 25 000
Direct materials purchased (given)		240 000
Direct materials available for use		265 000
Direct materials, 31/3/2014	3 =	85 000
Direct materials used		180 000
Conversion costs (given)		660 000
Manufacturing costs added during the period (given)		840 000
Add work in process, 1/3/2014 (given)		70 000
Manufacturing costs to account for		910 000
Deduct work in process, 31/3/2014	2 =	190 000
Cost of goods manufactured (4 × A$180 000)		720 000
Add finished goods, 1/3/2014		320 000
Cost of goods available for sale		1 040 000
Deduct finished goods, 31/3/2014	1 =	210 000
Cost of goods sold (80% × A$1,037,500)		A$830 000

Some instructors may wish to place the key amounts in a Work in Process T-account. This problem can be used to introduce students to the flow of costs through the general ledger (amounts in thousands):

Finished Goods

Beginning inventory	320	Cost of goods sold	830
Cost of goods manufactured	720		
Available for sale	1040		
Ending Inventory	210		

Work-in-Process

Beginning Inventory	70		
Direct materials used (840-660)	180	Cost of goods manufactured	720
Conversion cost	660		
To account for	910		
Ending Inventory	190		

Direct Materials

Beginning inventory	25	Direct materials used	180
Purchases	240		
Ending Inventory	85		

Cost of goods sold

Finished goods	830

2-43 (30 min.) **Comprehensive problem on unit costs, product costs**

1. If 2 kilograms of direct materials are used to make each unit of finished product,123 000 units × 2 kgs., or 246 000 kgs. were used at A$0.60 per kilogram of direct materials (A$147 600 ÷ 246 000 kgs.). (The direct material costs of A$147 600 are direct materials used, not purchased.) Therefore, the ending inventory of direct materials is 2400 kgs. × $0.60 = A$1 440.

2. **Manufacturing Costs for 123 000 units**

	Variable	Fixed	Total
Direct materials costs	A$147 600	A$ –	A$147 600
Direct manufacturing labour costs	38 400	–	38 400
Plant energy costs	2 000	–	2 000
Indirect manufacturing labour costs	14 000	19 000	33 000
Other indirect manufacturing costs	11 000	14 000	25 000
Cost of goods manufactured	A$213 000	A$33 000	A$246 000

Average unit manufacturing cost: A$246 000 ÷ 123 000 units
= A$2.00 per unit

Finished goods inventory in units: $= \frac{\text{A\$26 000 (given)}}{\text{A\$2.00 per unit}}$
= 13 000 units

3. Units sold in 2015 = Beginning inventory + Production – Ending inventory
= 0 + 123 000 – 13 000
= 110 000 units
Selling price in 2015 =A$594 000 ÷ 110 000
= A$5.40 per unit

4.

Eco Office Equipment
Income Statement
Year Ended 31 December 2015
(in thousands)

Revenues (110 000 units sold × A$5.40)		A$594 000
Cost of units sold:		
Beginning finished goods, 1 Jan. 2015	A$ 0	
Cost of goods manufactured	246 000	
Cost of goods available for sale	246 000	
Ending finished goods, 31 Dec. 2015	26 000	220 000
Gross margin		374 000
Operating costs:		
Marketing, distribution, and customer-service costs	176 000	
Administrative costs	56 000	232 000
Operating profit		A$142 000

Note: Although not required, the full set of unit variable costs is:

Direct materials cost	A$1.2	
Direct manufacturing labour cost	0.312	= A$1.731 per unit manufactured
Plant energy cost	0.016	
Indirect manufacturing labour cost	0.114	
Other indirect manufacturing cost	0.089	

Marketing, distribution, and customer-service costs	A$1.0 per unit sold

2-44 (40 min.) **Variable costing versus absorption costing**

1. **Absorption Costing:**

Mavis Ltd Income Statement
For the Year Ended 31 December 2014

Revenues (540 000 × A$5.00)			A$2 700 000
Cost of goods sold:			
Beginning inventory (30 000 × A$3.70[a])	A$ 111 000		
Variable manufacturing costs (550 000 ×A$3.00)	1 650 000		
Allocated fixed manufacturing costs (550 000 × A$0.70)	385 000		
Cost of goods available for sale	2 146 000		
Deduct ending inventory (40 000 × A$3.70)	148 000		
Add adjustment for prod.-vol. variance (50 000[b] × A$0.70)	35 000 U		
Cost of goods sold			2 033 000
Gross margin			667 000
Operating costs:			
Variable operating costs (540 000 × A$1)		540 000	
Fixed operating costs		120 000	
Total operating costs			660 000
Operating income			A$ 7 000

[a] A$3.00 + (A$7.00 ÷ 10) = A$3.00 + A$0.70 = A$3.70

[b] [(10 units per mach. hr. × 60 000 mach. hrs.) – 550 000 units)] = 50 000 units unfavourable

2. **Variable Costing:**

Mavis Ltd Income Statement
For the Year Ended 31 December 2014

Revenues			A$2 700 000
Variable cost of goods sold:			
Beginning inventory (30 000 × $3.00)	A$ 90 000		
Variable manufacturing costs (550 000 × $3.00)	1 650 000		
Cost of goods available for sale	1 740 000		
Deduct ending inventory (40 000 × $3.00)	120 000		
Variable cost of goods sold			1 620 000
Variable operating costs			540 000
Contribution margin			540 000
Fixed costs:			
Fixed manufacturing overhead costs	420 000		
Fixed operating costs	120 000		
Total fixed costs			540 000
Operating income			A$ 0

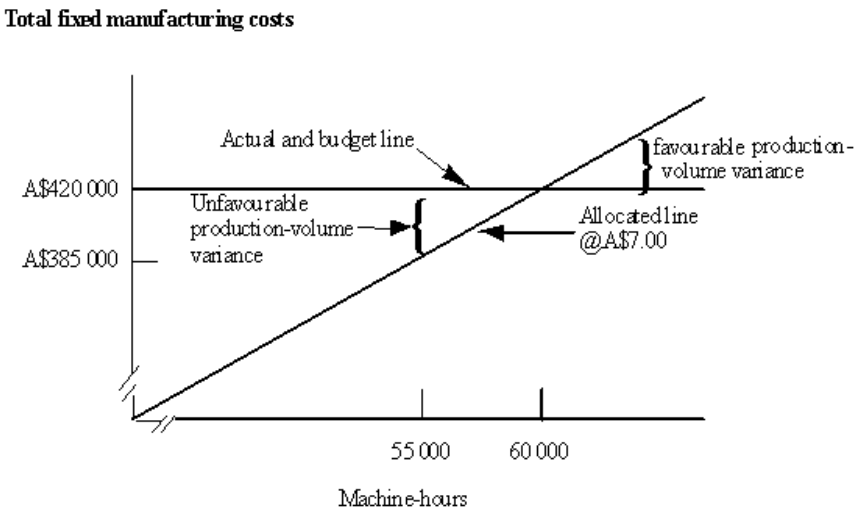
3. The difference in operating income between the two costing methods is:

=

A$7 000 – A$0 = [(40 000 × A$0.70) – (30 000 × A$0.70)]
A$7 000 = A$28 000 – A$21 000
A$7 000 = A$7 000

The absorption-costing operating income exceeds the variable costing figure by A$7000 because of the increase of A$7000 during 2014 of the amount of fixed manufacturing costs in ending inventory vis-à-vis beginning inventory.

4. Graph:



5. Absorption costing is more likely to lead to build-ups of inventory than does variable costing. Absorption costing enables managers to increase reported operating income by building up inventory which reduces the amount of fixed manufacturing overhead included in the current period's cost of goods sold.
Ways to reduce this incentive include:

(a) Careful budgeting and inventory planning.
(b) Change the accounting system to variable costing or throughput costing.
(c) Incorporate a carrying charge for carrying inventory.
(d) Use a longer time period to evaluate performance than a quarter or a year.
(e) Include nonfinancial as well as financial measures when evaluating management performance.

2-45 (30-40 mins) **Variable costing versus absorption costing**

1 Variable-costing income statements:

	2014		2015	
	Sales 1 000 units Production 1 400 units		Sales 1 200 units Production 1 000 units	
Revenues ($3 per unit)		A$3 000		A$3 600
Variable costs:				
Beginning inventory	A$ 0		A$ 200	
Variable cost of goods manufactured	700		500	
Cost of goods available for sale	700		700	
Deduct ending inventory[a]	200		100	
Variable cost of goods sold	500		600	
Variable operating costs	1 000		1 200	
Variable costs		1 500		1 800
Contribution margin		1 500		1 800
Fixed costs				
Fixed manufacturing costs	700		700	
Fixed operating costs	400		400	
Total fixed costs		1 100		1 100
Operating income		A$400		A$700

[a] Unit inventoriable costs:
Year 1: A$700 ÷ 1400 = A$0.50 per unit; A$0.50 × (1400 – 1000)
Year 2: A$500 ÷ 1000 = A$0.50 per unit; A$0.50 × (400 + 1000 – 1200)

2. Absorption-costing income statements:

	2014		2015	
	Sales 1000 units Production 1400 units		Sales 1200 units Production 1000 units	
Revenues ($3 per unit)	A$3000		A$3600	
Cost of goods sold:				
Beginning inventory	A$ 0		A$ 400	
Variable manufacturing costs	700		500	
Fixed manufacturing costs[a]	700		700	
Cost of goods available for sale	1400		1600	
Deduct ending inventory[b]	400		240	
Cost of goods sold		1000		1360
Gross margin		2000		2240
Operating costs:				
Variable operating costs	1000		1200	
Fixed operating costs	400		400	
Total operating costs		1400		1600
Operating income		A$ 600		A$ 640

[a] Fixed manufacturing cost rate:
Year 1: A$700 ÷ 1400 = A$0.50 per unit
Year 2: A$700 ÷ 1000 = A$0.70 per unit
[b] Unit inventoriable costs:
Year 1: A$1400 ÷ 1400 = A$1.00 per unit; A$1.00 × (1400 – 1000)
Year 2: A$1200 ÷ 1000 = A$1.20 per unit; A$1.20 × (400 + 1000 – 1200)

3

	2014	2015
Variable Costing:		
Operating income	A$400	A$700
Ending inventory	200	100
Absorption Costing:		
Operating income	A$600	A$640
Ending inventory	400	240
Fixed manuf. overhead		
• in beginning inventory	0	200
• in ending inventory	200	140

$$\left(\begin{matrix}\text{Absorption costing}\\ \text{operating income}\end{matrix} - \begin{matrix}\text{Variable costing}\\ \text{operating income}\end{matrix}\right) = \left(\begin{matrix}\text{Fixed manuf. costs}\\ \text{in ending inventory}\end{matrix} - \begin{matrix}\text{Fixed manuf. costs in}\\ \text{beginning inventory}\end{matrix}\right)$$

Year 1:	A$600 – A$400	=	A$0.50 × 400 – A$0
	A$200	=	A$200
Year 2:	A$640 – A$700	=	(A$0.70 × 200) – (A$0.50 × 400)
	–A$60	=	–A$60

The difference in reported operating income is due to the amount of fixed manufacturing overhead in the beginning and ending inventories. In Year 1, absorption costing has a higher operating income of A$200 due to ending inventory having A$200 in fixed manufacturing overhead, while beginning inventory does not exist. In Year 2, variable costing has a higher operating income of A$60 due to ending inventory under absorption costing having A$60 less in fixed manufacturing overhead than does beginning inventory.

4.

a. Absorption costing is more likely to lead to inventory build-ups t
costing. Under absorption costing, operating income in a given accounting period is increased by inventory build up, because some fixed manufacturing costs are accounted for as an asset (inventory) instead of as a cost of the period of production.

b. Although variable costing will counteract undesirable inventory build-ups, other measures can be used without abandoning absorption costing. Examples include:
(1) careful budgeting and inventory planning;
(2) incorporating a carrying charge for inventory;
(3) changing the period used to evaluate performance to be long-term;
(4) including nonfinancial variables that measure inventory levels in performance evaluations

2-46 (30 min.) **Effects of differing production levels on absorption costing income: steps to minimise inventory build-ups**

Note to instructors: This question has planned production of 20 000 units and therefore, at 24 000 and 30 000 books there will be a production volume variance.

1.

	20 000 books	24 000 books	30 000 Books
Revenues	A$1 600 000	A$1 600 000	A$1 600 000
Cost of goods sold	1 400 000	1 400 000	1 400 000
Production volume *variance	0[b]	(80 000	(200 000
Net cost of goods sold	1 400 000	1 320 000	1 200 000
Gross Margin	A$ 200 000	A$ 280 000	A$ 400 000

[a] cost per unit = (A$50 + A$400 000/20 000 books sold) = A$70 per book
CGS = A$70 × 20 000 = A$1 400 000

[b] volume variance = Budgeted fixed cost – fixed overhead rate × production
A$400 000 – (A$20 × 20 000 books) = A$0

[c] volume variance = Budgeted fixed cost – fixed overhead rate × production
A$400 000 – (A$20 × 24 000 books) = A$80 000

[d] volume variance = Budgeted fixed cost – fixed overhead rate × production
A$400 000 – (A$20 × 30 000 books) = A$200 000

2.

	20 000 Books	24 000 Books	30 000 Books
Beginning inventory	0	0	0
+ Production	20 000 books	24 000 books	30 000 books
	20 000	24 000	30 000
- Books sold	20 000	20 000	20 000
Ending inventory	0 books	4 000 books	10 000 books
× Cost per book	× A$7	× A$70	× A$70
Cost of Ending Inventory	A$0	A$280 000	A$700 000

3.
a.

	20 000 books	24 000 books	30 000 books
Gross margin	A$200 000	A$280 000	A$400 000
Less 10% × Ending inventory	0	(28 000)	(70 000)
Adjusted gross margin	A$200 000	A$252 000	A$330 000

While adjusting for ending inventory does to some degree mitigate the increase in inventory associated with excess production, it may be difficult to mechanically compensate for all of the increased income. In addition, it does nothing to hold the manager responsible for the poor decisions from the organization's standpoint.

b.

	20 000 books	24 000 Books	30 000 books
1) Inventory change:			
End inventory — begin inventory	0	4 000 books	10 000 books
2) Excess production (%)			
Production ÷ sales	20 000÷20 000	24 000÷20 000	30 000÷20 000
	1.0	1.2	1.5

A ratio of ending inventory to beginning inventory, as suggested in the book, is not possible since beginning inventory was 0, so we substituted change in inventory level.

For these non-financial measures to be useful they must be incorporated into the reward function of the manager.

2-47 (20 min.) **Gross margin and contribution margin**

1.

Ticket sales (A$24 × 525 attendees)		A$12 600
Variable cost of dinner (A$12[a] × 525 attendees)	A$6 300	
Variable invitations and paperwork (A$1[b] × 525)	525	6 825
Contribution margin		5 775
Fixed cost of dinner	9 000	
Fixed cost of invitations and paperwork	1 975	10 975
Operating profit (loss)		A$ (5 200)

[a] A$6300/525 attendees = A$12/attendee
[b] A$525/525 attendees = A$1/attendee

2.

Ticket sales (A$24 × 1 050 attendees)		A$25 200
Variable cost of dinner (A$12 × 1 050 attendees)	A$12 600	
Variable invitations and paperwork (A$1 × 1 050)	1 050	13 650
Contribution margin		11 550
Fixed cost of dinner	9 000	
Fixed cost of invitations and paperwork	1 975	10 975
Operating profit (loss)		A$ 575

2-48 (20 min.) **Labour cost, overtime and idle time**

1.

a.

Total cost of hours worked at regular rates	
42 hours × 18 per hour	A$ 756.00
42 hours × 18 per hour	756.00
43 hours × 18 per hour	774.00
40 hours × 18 per hour	720.00
	3006.00
Minus idle time (5.2 hours × A$18 per hour)	93.60
Direct manufacturing labour costs	A$2912.40

b.

Idle time = 5.2 hours × A$18 per hour = A$93.60

c.

Overtime and holiday premium.	
Week 1: Overtime (42-40) hours × Premium, A$9 per hour	A$ 18.00
Week 2: Overtime (42-40) hours ×Premium, A$9 per hour	18.00
Week 3: Overtime (43-40) hours × Premium, A$9 per hour	27.00
Week 4: Holiday 8 hours × Premium, A$18 per hour	144.00
Total overtime and holiday premium	A$207.00

d.

Total earnings in January:	
Direct manufacturing labour costs	A$2912.40
Idle time	93.60
Overtime and holiday premium	207.00
Total earnings	A$3213.00

In the Human Resources department, Len's time sheet for January would record the following information:

	Reg	O/T	P/Hol	Total
Week 1 – 42 hrs	40	2	-	
Week 2 – 42 hrs	40	2	-	
Week 3 – 43 hrs	40	3	-	
Week 4 – 40 hrs	32	-	8	
Total hours	152	7	8	
Hourly rates	x A$18	x A$27	x A$36	
Gross earnings	A$2736	A$189	A$288	A$3213

2. *Idle time* caused by equipment breakdowns and scheduling mix-ups is an indirect cost of the job because it is not related to a specific job. *Overtime premium* caused by the heavy overall volume of work is also an indirect cost because it is not related to a particular job that happened to be worked on during the overtime hours. If, however, the overtime is the result of a demanding 'rush job,' the overtime premium is a direct cost of that job.

2-49 (20–25 min.) **Finding unknown amounts**

Let G = given, I = inferred

Step 1: Use gross margin formula	**Case 1**	**Case 2**
Revenues	A$ 32 000 G	A$31 800 G
Cost of goods sold	(20 700) I	(20 000) G
Gross margin	A$11 300 G	A$11 800 I

Step 2: Use schedule of cost of goods manufactured formula

Direct materials used	A$ 8 000 G	A$ 12 000 G
Direct manufacturing labour costs	3 000 G	5 000 G
Indirect manufacturing costs	7 000 G	D 6 500 I
Manufacturing costs incurred	18 000 I	23 500 I
Add beginning work in process, 1/Jan	0 G	800 G
Total manufacturing costs to account for	18 000 I	24 300 I
Deduct ending work in process, 31/Jan	0 G	(3 000) G
Cost of goods manufactured	A$18 000 I	A$21 300 I

Step 3: Use cost of goods sold formula

Beginning finished goods inventory, 1/Jan	A$ 4 000	G	A$ 4 000	G
Cost of goods manufactured	18 000	I	21 300	I
Cost of goods available for sale	22 000	I	25 300	I
Ending finished goods inventory, 31/Jan	B (1 300)	I	(5 300)	G
Cost of goods sold	A$20 700	I	A$20 000	G

For case 1, do steps 1, 2 and 3 in order.
For case 2, do steps 1, 3 and then 2.

2-50 (30 min.) **Absorption and variable costing**

1. Variable Costing:

	April		May		June	
Revenues[a]		A$300 000		A$300 000		A$300 000
Variable costs:						
Beginning inventory[b]	A$ 0		A$ 0		A$ 31 000	
Variable manufacturing costs[c]	77 500		108 500		46 500	
Cost of goods available for sale	77 500		108 500		77 500	
Deduct ending inventory[d]	0		31 000		0	
Variable cost of goods sold	77 500		77 500		77 500	
Variable selling costs[e]	7 500		7 500		7 500	
Total variable costs		85 000		85 000		85 000
Contribution margin		215 000		215 000		215 000
Fixed costs:						
Fixed manufacturing costs	105 000		105 000		105 000	
Fixed administrative costs	35 000		35 000		35 000	
Total fixed costs		140 000		140 000		140 000
Operating income		A$ 75 000		A$ 75 000		A$75 000

[a] A$6 × 50 000
[b] ? × 0; A$1.55 × 0; A$1.55 × 20 000
[c] A$1.55 × 50 000; A$1.55 × 70 000; A$1.55 × 30 000
[d] A$1.55 × 0; A$1.55 × 20 000; A$1.55 × 0
[e] A$.15 × 50 000

2. Absorption Costing:

	April		May		June	
Revenues[a]		A$300 000		A$300 000		A$300 000
Cost of goods sold:						
Beginning inventory[b]	A$ 0		A$ 0		A$ 61 000	
Variable manufacturing costs[c]	77 500		108 500		46 500	
Allocated fixed manufacturing costs[d]	105 000		105 000		105 000	
Cost of goods available for sale	182 500		213 500		212 500	
Deduct ending inventory[e]	0		61 000		0	
Adjustment for prod. Vol. var.[f]	0		0		0	
Cost of goods sold		182 500		152 500		212 500
Gross margin		117 500		147 500		87 500
Operating costs:						
Variable selling costs[g]	7 500		7 500		7 500	
Fixed administrative costs	35 000		35 000		35 000	
Total fixed costs		42 500		42 500		42 500
Operating income		A$ 75 000		A$ 105 000		A$45 000

[a] A$6 × 50 000
[b] A$?× 0; A$3.65× 0; A$3.05 × 20 000
[c] A$1.55 × 50 000; A$1.55 × 70 000; A$1.55 × 30 000
[d] (A$105 000/50 000)×50 000; (A$105 000/70 000)×70 000; (A$105 000/30 000)×30 000
[e] A$3.65 × 0; A$3.05 × 20 000; A$5.05 × 0
[f] A$105 000 – A$105 000; A$105 000 – A$105 000; A$105 000 – A$105 000
[g] A$.15 × 50 000