# Chapter 19 Cost classification, concepts and terminology

## 19.4 Cost classifications

They are **commonly classified into (成本一般分類為)**

- **Direct and indirect costs (直接和間接成本)**
- **Fixed, variable and mixed costs (固定、變動和混合成本)**
- **Manufacturing and non-manufacturing costs (製造和非製造成本)**

## 19.4.1 Direct and indirect costs (直接和間接成本)

### Direct costs (Variable costs)

- **Direct costs** (直接成本) are the costs that can be **easily traced (輕易追溯)** to a **cost object (特定成本對象)**.
- Example: The **costs of materials consumed (材料成本)** in the manufacturing of the product.
- Materials are called direct materials if their costs can be easily traced to the cost object.

### Indirect costs (Fixed cost / Mixed costs)

- **Indirect costs** are the costs that are related to a particular cost object but **cannot be easily traced** to it.
- Also known as **overheads (間接費用)**.
- Example: **Electricity charges for the factory (廠房的水電費)**, **Repairs and maintenance of machinery (機器的維修費用)**, **salaries of factory supervisors (工廠管工的薪金)**.
- Indirect costs are **difficult to trace to (較難追溯)** a particular product because they usually **involve the manufacturing of several products at the same time (同時涉及多種產品的生產過程)**.
- Indirect costs **must be included in the total costs of a cost object (必須包括在成本對象的總成本內)**.
- Managers need to **determine a basis for the allocation of indirect costs to different cost objects (為不同成本對象選取一個間接費用攤派基礎)**.

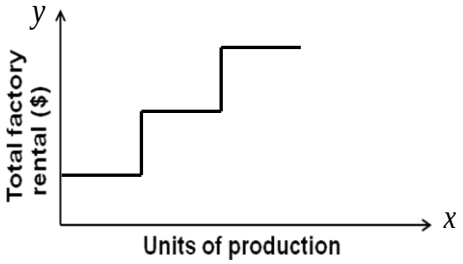
## 20.4.2 Fixed, variable and mixed costs (固定、變動和混合成本)

Costs are classified into **fixed costs (固定成本), variable costs (變動成本) and mixed costs (混合成本) according to (根據)** their **responsiveness (影響)** to **changes in the level of an activity (unit of production) (作業水平的變動)**.

### Fixed costs (固定成本)

- Fixed costs are the costs that **remain constant (維持不變) within a certain level of activity (unit of production) (在某個作業水平範圍內)**
- Example: **Rental of a factory (廠房的租金)**

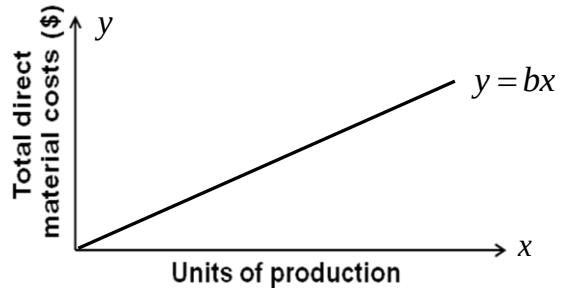

- Fixed costs **may change (會出現改變) beyond a certain level of activity (unit of production) (超出某個作業水平範圍內)**.
- A **higher** level of fixed costs may be required to **cope with (應付)** a higher level of activity (unit of production).




**Step costs (步驟成本)** or ***semi-fixed costs*** **(半固定成本)** which does not change within a range of activity (unit of production)

## Variable costs (變動成本)

- Variable costs are the costs that **vary (轉變) with changes in the level of activity (unit of production).**
- The **total amount of a variable cost (總變動成本)** usually varies in **direct proportion (成正比)** to changes in the level of activity (unit of production).
- Example: **Costs of direct materials (直接材料), direct labour (直接人工).**
- **Contribution (邊際貢獻)** refers to the excess of **sales revenue** over all **variable costs** incurred.

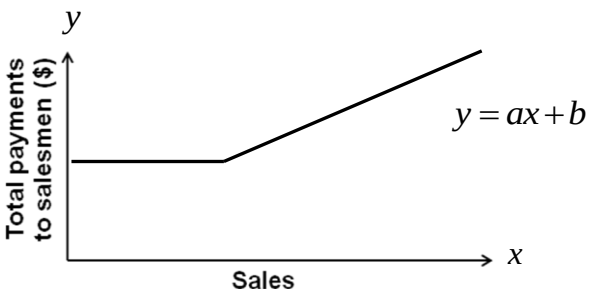



## Fixed costs vs variable costs (固定成本與變動成本的比較)

- **Cost items (成本項目) are not inherently (不是天生)** fixed or variable.
- For example, the **wages are classified** as a **fixed cost (固定成本)** if they are **paid on a monthly basis (按月支付)**. If the wages are **paid on a piece-rate basis (按件數支付)**, they should be classified as a **variable cost (變動成本)**.
- Two costing approaches called **absorption costing (吸收成本法)** and **marginal costing (邊際成本法)** will use to **treat (處理)** of fixed and variable costs.
- **Only variable costs should be considered when making decisions. (作出抉擇時，只考慮變動成本)**
- Fixed costs **will not change (不會改變)** as a result of **taking alternative courses of action (採取不同方案行動) → Not relevant (不相關)** to decision-making.

## Mixed costs (混合成本)

- ***Mixed costs*** are the costs that **partly fixed** (部分固定) and **partly variable (部分可變)**.
- A mixed costs usually changes but **not in direct proportion (不成正比)** to changes in the level of activity
- Also known as ***semi-variable costs* (半變動成本)**
- ***Example:*** Payments to salesmen **(Basic salary + Commission) (底薪 + 佣金)**




## Separating a mixed cost into variable cost and fixed cost

### Using high-low method to calculate the variable costs per unit of a mixed cost.

Step 1 Find the highest level of activity (production units) and its mixed costs

Step 2 Find the lowest level of activity (production units) and its mixed costs

Step 3 Find the variable cost per unit of mixed cost by applying the following formula

$$\textbf{The variable cost per unit of mixed cost} = \frac{\textbf{Highest mixed cost} - \textbf{Lowest mixed cost}}{\textbf{The highest production units} - \textbf{The lowest production units}}$$

### Using the variable costs per unit to calculate the fixed cost of a mixed cost

Step 1 Using the highest or lowest mixed cost

Step 2 Find the fixed cost of a mixed cost by applying the following formula

The fixed cost = highest mixed cost – the highest production units x the variable cost per unit of mixed cost

The fixed cost = lowest mixed cost – the lowest production units x the variable cost per unit of mixed cost

**HKDSE (2020, 4)** **(Cost classification)**

4. Sunny Company launched a new product in 2019. Cost information for the past four quarters is as follows:

| | Quarter 1 | Quarter 2 | Quarter 3 | Quarter 4 |
|---|---|---|---|---|
| Activity level | 3 000 units | 6 000 units | 12 000 units | 11 000 units |
| Cost item | $ | $ | $ | $ |
| Direct materials | 3 600 | 7 200 | 14 400 | 13 200 |
| Direct labour | 6 000 | 12 000 | 24 000 | 22 000 |
| Machinery depreciation | 3 000 | 3 000 | 3 000 | 3 000 |
| Rental expenses | 7 000 | 7 000 | 10 000 | 10 000 |
| Electricity expenses | 2 600 | 4 700 | 9 800 | 10 000 |

(a) Classify the above costs into: (i) Fixed cost (ii) Variable cost (iii) Mixed cost (iv) Step costs

(b) Use the high-low method to calculate the variable component and the fixed component of the electricity expenses respectively.

(a) (i) Machinery depreciation

(ii) Direct materials, Direct labour

(iii) Electricity expenses

(iv) Rental expenses

(b) The highest level of activity = 12 000 units, The electricity expenses in highest level of activity = $9 800

The lowest level of activity = 3 000 units, The electricity expenses in lowest level of activity = $2 600

Variable component electricity expenses = ($9 800 – $2 600)/( 12 000 – 3 000) = $0.8 per unit

The fixed electricity expenses = $9 800 – 12 000 x $0.8 / $2 600 – 3 000 x $0.8 = $200

**Classwork 1**

1 The following are costs budgeted at two levels of activity for a manufacturing company that makes a single product:

| Monthly production and sales (units) | 100,000 | | 150,000 | | 200,000 |
|---|---|---|---|---|---|
| | $ | | $ | | $ |
| Direct materials | 450,000 | | 675,000 | | 900,000 |
| Direct labour | 1,100,000 | 11 | 1,650,000 | 11 | 220,000 |
| Salaries of factory supervisors | 30,000 | | 30,000 | | 30,000 |
| Factory water and electricity | 6,000 | | 8,500 | | 11,000 |
| Factory insurance | 2,000 | | 2,000 | | 2,000 |
| Depreciation on factory and machinery | 8,000 | | 10,000 | | 12,000 |
| Salaries of salesmen | 108,000 | | 158,000 | | 208,000 |
| Salaries of clerical staff | 7,500 | | 7,500 | | 7,500 |

(a) Classify the above costs into: (i) Fixed cost (ii) Variable cost (iii) Mixed cost

(b) Use the high-low method to calculate the variable component and the fixed component of all the mixed cost.

(a) (i) salaries of factory supervisors, factory insurance, salaries of clerical staff

(ii) direct materials, direct labour

(iii) factory water and electricity, depreciation on factory and machinery, salaries of salesmen

(b) Unit variable factory water and electricity = ($11,000 – $6,000)/(200,000 – 100,000) = $0.05 per unit

The fixed component of factory water and electricity = $6,000 – 100,000 x $0.05 = $1,000

Unit variable depreciation on factory and machinery = ($12,000 – $8,000)/(200,000 – 100,000) = $0.04 per unit

The fixed component depreciation on factory and machinery = $8,000 – 100,000 x $0.04 = $4,000

Unit variable salaries of salesmen = ($208,000 – $108,000)/(200,000 – 100,000) = $1 per unit

The fixed component of salaries of salesmen = $108,000 – 100,000 x $1 = $8,000

2 Jimmy operates a factory that makes a single product. The following production costs were budgeted for the next month at different production levels:

| | | | |
|---|---|---|---|
| Units produced | 100,000 | 500,000 | 1,000,000 |
| Total costs | $1,600,000 | $4,000,000 | $7,000,000 |

(a) Calculate the variable costs per unit, total fixed costs and the total costs at different production levels.
(b) Explain how variable costs and fixed costs change with the level of production

(a) Variable costs per unit = ($7,000,000 – $1,600,000) ÷ (1,000,000 – 100,000) = $6 per unit
Total fixed costs = $1,600,000 – (100,000 × $6) = $1,000,000

| Units produced | Variable costs | Total fixed cost | Total cost |
|---|---|---|---|
| 100,000 | $600,000 | $1,000,000 | $1,600,000 |
| 500,000 | $3,000,000 | $1,000,000 | $4,000,000 |
| 1,000,000 | $6,000,000 | $1,000,000 | $7,000,000 |

(b) Variable costs increase with the increase in level of production.
fixed costs remain unchanged with the increase in level of production.

## Classwork 3

1 Starry Ltd had the following information for preparing the 2007 master budget for Product X:
Selling price: $160/unit Direct material: 0.5 kg/unit at $48 per kg Direct labour: 5 hours/unit at $15 per hour

In the production process, only the following three types of factory overheads are incurred, each of which demonstrating a different cost behavior. The maximum production capacity was 30,000 units. Information relating to factory overheads at different levels of production were shown as follows:

| Level of production (units) | 15,000 | 18,000 | 21,000 | 24,000 | 27,000 | 30,000 |
|---|---|---|---|---|---|---|
| | $ | $ | $ | $ | $ | $ |
| Factory overheads – Type 1 | 180,000 | 180,000 | (i) | 180,000 | 180,000 | 180,000 |
| – Type 2 | 240,000 | 240,000 | 240,000 | 300,000 | (ii) | 300,000 |
| – Type 3 | 355,000 | 400,000 | 445,000 | (iii) | 535,000 | 580,000 |
| | 775,000 | 820,000 | ? | ? | ? | 1,060,000 |

(a) Find the missing figures (i) to (iii) in the table above.
(b) Based on (a), identify and describe the cost behaviour for each of the three types of factory overheads.
(c) Calculate the contribution per unit of Product X and the total budgeted gross profit for year 2007 at the level of maximum capital.

(a) (i) $180,000 (ii) $300,000
(iii) Variable cost per unit = ($580,000 – $355,000) ÷ (30,000 – 15,000) = $15 per unit
Fixed cost element (15,000 level): $355,000 – 15,000 x $15 = $130,000
Total cost = $130,000 + 24,000 x $15 = $490,000

(b) Type 1 is fixed cost which does not change regardless of the level of production
Type 2 is stepped (semi-fixed) cost which does not change within a range of activity
Type 3 is semi-variable cost. It consists of fixed and variable elements. The variable cost changes in direct proportion with the level of production.

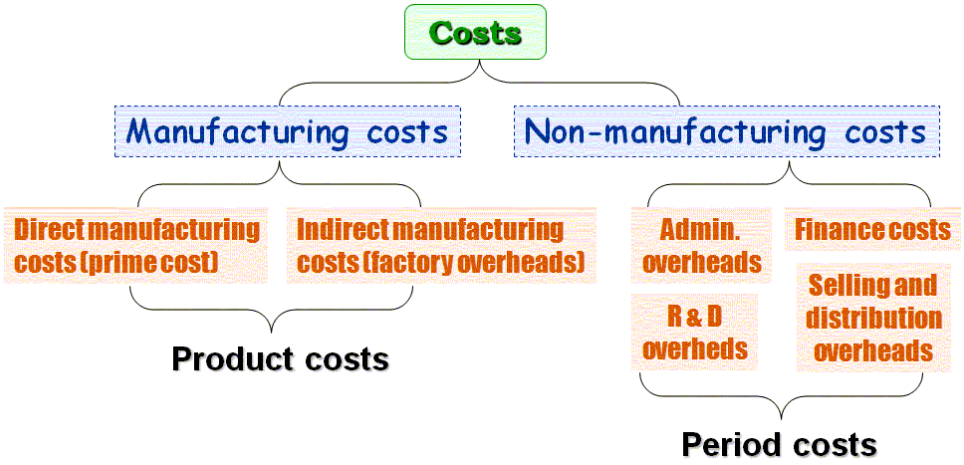
(c) The contribution per unit of Product X

| | $ | | $ |
|---|---|---|---|
| Selling prices | | | 160 |
| Variable costs: Direct material ($48/kg x 0.5 kg) | 24 | | |
| Direct labour ($15/hour x 5 hours) | 75 | | |
| Factor overheads (from (iii)) | 15 | | 114 |
| Contribution per unit | | | 46 |

The total budgeted gross profit for year 2007

| | $ |
|---|---|
| Total contribution ($46 x 30,000) | 1,380,000 |
| Fixed factory overhead ($130,000 + $180,000 + $300,000) | 610,000 |
| Budgeted gross profit | 770,000 |

## 19.4.3 Manufacturing and non-manufacturing costs (製造和非製造成本)




## Manufacturing costs (製造成本)

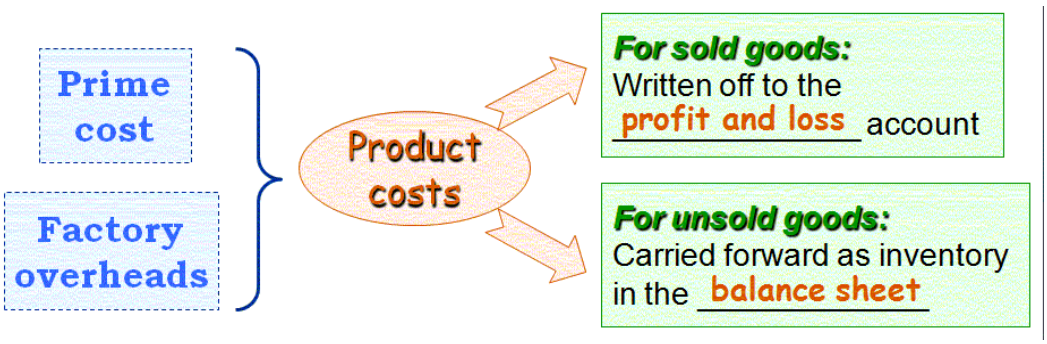
- Manufacturing costs are the costs incurred in the course of **making a product (生產某種產品)**.
- Some are **direct costs** (直接成本) and others are **indirect costs (間接成本)**.
- Also known as **production costs (生產成本)**

### 1. Direct manufacturing costs (直接製造成本)

- **Direct manufacturing costs** are the costs that are **associated with (有關)** the manufacturing of a particular product and can be **easily traced (容易追溯)** to it.
- The total of all direct manufacturing costs is known as the **prime costs (主要成本).**
- All manufacturing costs other than direct materials would be classified as **conversion costs (轉換成本)**. They include direct labour and indirect manufacturing costs.

### 2. Indirect manufacturing costs (間接製造成本)

- Indirect manufacturing costs are the costs that are **associated with the manufacturing of a particular product (與製造某種產品有關)** but **cannot be easily traced (較難追溯)** to it.
- Also known as **factory overheads (間接製造成本), manufacturing overheads or production overheads (製造費用)**
- Factory overheads are **included in the total costs of a product (會包括在產品成本內).**




- **Prime cost** and **factory overheads** are treated as **product costs** (生產成本) and **written off (註銷)** when the goods are sold.
- If the goods remain unsold at the end of the period, their product costs will be **carried forward (轉下)** as **inventories (存貨)**.

**Classwork 1**

3 Consider a manufacturer of a single product. The following production costs were budgeted for the current year at three different activity levels:

| | | Units of output/month | | |
|---|---|---|---|---|
| | | 10,000 | 20,000 | 30,000 |
| **Cost** | **Nature** | **$** | **$** | **$** |
| Direct materials | Variable | 50,000 | 100,000 | 150,000 |
| Direct labour | Semi-variable | 40,000 | 60,000 | 80,000 |
| Factory overheads | Fixed | 20,000 | 20,000 | 20,000 |

**Required:**

Calculate the budgeted production cost at 25,000 units of output per month.

Variable direct materials = $50,000 ÷10,000 = $5 per unit

Variable direct labour cost = ($80,000 − $40,000) ÷ (30,000 − 10,000) = $2 per unit

Fixed direct labour cost = $80,000 − (30,000 × $2) = $20,000

Direct materials at 25,000 units = 25,000 x $5 = $125,000

Direct labour at 25,000 units = $20,000 + (25,000 × $2) = $70,000

The budgeted production cost = $125,000 + $70,000 + $20,000 = $215,000

4 The following details relate to product R:

| Level of activity (units) | 2,500 | 3,500 |
|---|---|---|
| | $/unit | $/unit |
| Direct materials | 9.6 | 9.6 |
| Direct labour | 17.0 | 17.0 |
| Production overhead(mixed) | 4.8 | 3.8 |
| Selling overhead(mixed) | 1.4 | 1.0 |
| Total cost | 32.8 | 31.4 |

**Required:**

(a) Calculate the total variable cost per unit and the total fixed cost.

(b) Distinguish between direct cost and indirect costs; and between prime costs and conversion cost.

(a) Total cost at 2,500 = 2,500 x $32.8 = 82,000

Total cost at 3,500 = 3,500 x $31.4 = 109,900

Total variable cost per unit = (109,900 – 82,000) / (3,500 – 2,500) = $27.9

Using 2,500 units level,

Total fixed cost = 82,000 – 2,500 x $27.9

= 12,250

(b)
- Direct costs are the cost that can be easily traced.
- Indirect costs are the cost that cannot be easily traced.
- Prime costs is the total of all direct manufacturing costs
- Conversion costs are all manufacturing costs other than direct materials. They include direct labour and indirect manufacturing costs

## Non-manufacturing costs (非製造成本)

— ***Non-manufacturing costs*** are the costs that are **not associated with** (無關) manufacturing but which are **necessary (必須)** for the **operation of a manufacturing business (從事製造業)**.

— Also known as ***non-manufacturing overheads*** **(非製造費用)**

— Non-manufacturing overheads are ***period costs*** **(期間成本)**, which must be **written off** (註銷) **in the period in which they are incurred (招致的期間)**.

— They can be classified into

- **Administrative overheads (行政費用)**
  Costs associated with **organising and supervising (組織及監控)** a business of an entity, e.g., **office rent (辦公室租金)**
- **Selling and distribution overheads (銷售及分銷費用)**
  Costs associated with **the provision (提供)** of goods and services for customers, e.g., **salesmen's salaries (售貨員薪金)**
- **Research and development overheads (研究及開發費用)**
  Costs associated with **gaining new knowledge and the application of the new knowledge (獲取新知識，以及把知識應用於開發新產品)**, e.g., **testing materials (測試物料)**
- **Finance costs (融資成本)**
  Costs associated with **the borrowing of funds (與借入資金)**, e.g., **interest on short-term loans (短期貸款的利息)**

### Classwork 2

1 The following costs were incurred by a T-shirt manufacturing firm:

(i) Cotton used
(ii) Wages of factory workers
(iii) Salaries of factory supervisors
(iv) Commissions paid to sales staff
(v) Royalties for logos printed on T-shirts
(vi) Business registrations fees
(vii) Lubrication oil for factory machines
(viii) Depreciation on factory machines
(ix) Depreciation on lorries used to transport finished goods
(x) Factory rent
(xi) Rent for the finished goods warehouse
(xii) Advertising fees

**Required:**

Classify the above costs into:

(a) Direct manufacturing costs
(b) Manufacturing overheads
(c) Non-manufacturing overheads

(a) (i), (ii), (v)

(b) (iii), (vii), (viii), (x)

(c) (iv), (vi), (ix), (xi), (xii)

2 David operates a factory that makes a single product. The following costs were extracted from the books for the first financial year just ended:

| | $ |
|---|---|
| Raw materials used | 7,600,000 |
| Wages and salaries: | |
| Direct factory workers | 800,000 |
| Indirect factory workers | 600,000 |
| Office staff | 140,000 |
| Water and electricity | 80,000 |
| Rent | 120,000 |
| Depreciation: | |
| Plant and machinery | 20,000 |
| Office equipment | 10,000 |
| Selling and administrative | 8,000 |

Additional information:

(i) It was determined that 80% of the water and electricity expenses and 70% of the rent were related to the factory while the rest were related to the office.

(ii) There were no inventories of raw materials or work-in-progress.

**Required:**

(a) Calculate the prime cost, factory overheads and non-manufacturing overheads incurred for the year.

(b) Differentiate the above costs into product costs and period costs and explain their accounting treatments.

(a) Prime cost = $7,600,000 + $800,000 = $8,400,000

Factory overheads = $600,000 + ($80,000 × 80%) + ($120,000 × 70%) + $20,000

= $768,000

Non-manufacturing overheads

= $140,000 + ($80,000 × 20%) + ($120,000 × 30%) + $10,000 + $8,000

= $210,000

(b) Prime cost and factory overheads are treated as product costs and written off in the period in which the goods are sold. If the goods remain unsold at the end of the period, their product costs will be carried forward as inventories.

Non-manufacturing overheads are treated as period costs and written off in the period in which they are incurred.

**Classwork 3**

2. During the year ended 31 December 2013, Ace Ltd produced a total of 204,500 notebook computers, with 205,000 units sold for $3,900 each. The following details relate to the notebook computers:

| | $ | |
|---|---|---|
| Salesmen's commissions | 100 | per unit sold |
| Advertising expenses | 10,000,000 | |
| Administrative expenses | 15,000,000 | |
| Direct labour | 500 | per unit |
| Direct materials | 800 | per unit |
| Factory overheads: Variable | 200 | per unit |
| Factory overheads: Fixed | 184,050,000 | |
| Inventory, 1 January 2013 | 3,600,000 | |

The unit costs in manufacturing of the computers produced in 2012 were $2,400.

(a) Calculate the unit cost in manufacturing of the computers produced in 2013.

(b) Calculate the closing inventory in units and then compute the value of closing inventory.

(c) Prepare an income statement for the year ended 31 December 2013.

(d) Compute the following:

(i) Prime cost

(ii) Conversion costs

(iii) Product costs

(iv) Period costs

(a) Unit costs of a notebook computer:

| | $ |
|---|---|
| Direct labour | 500 |
| Direct materials | 800 |
| Factory overheads: Variable | 200 |
| Fixed ($184,050,000 ÷ 204,500) | 900 |
| | 2,400 |

(b) Closing inventory in units:

| | $ |
|---|---|
| Opening inventory in units ($3,600,000 ÷ $2,400) | 1,500 |
| Units produced | 204,500 |
| | 206,000 |
| Units sold | (205,000) |
| Closing inventory in units | 1,000 |

Value of closing inventory = 1,000 × $2,400 = $2,400,000

(c)

**Ace Ltd**
**Income Statement for the year ended 31 December 2013**

| | $ | | $ |
|---|---|---|---|
| Sales (205,000 × $3,900) | | | 799,500,000 |
| *Less Cost of goods sold:* | | | |
| Opening inventory | 3,600,000 | | |
| *Add* Manufacturing cost of goods completed (204,500 × $2,400) | 490,800,000 | | |
| Cost of goods available for sale | 494,400,000 | | |
| *Less* Closing inventory | (2,400,000) | | (492,000,000) |
| Gross profit | | | 307,500,000 |
| *Less Expenses:* | | | |
| Administrative expenses | 15,000,000 | | |
| Advertising expenses | 10,000,000 | | |
| Salesmen's commissions (205,000 × $100) | 20,500,000 | | (45,500,000) |
| Net profit | | | 262,000,000 |

(d) (i) Prime cost = Direct materials + Direct labour

= (204,500 × $800) + (204,500 × $500)

= $265,850,000

(ii) Conversion costs = Direct labour + Factory overheads

= (204,500 × $500) + [(204,500 × $200) + $184,050,000]

= $327,200,000

(iii) Product costs = Direct materials + Direct labour + Factory overheads

= $163,600,000 + $102,250,000 + $224,950,000

= $490,800,000

(iv) Period costs = Administrative expenses + Advertising expenses + Salesmen's commissions

= $15,000,000 + $10,000,000 + $20,500,000

= $45,500,000