Strategic Management Accounting (**BSA 3210**)
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Section 1: Basic Cost Terminology

Before analyzing cost behavior, it is essential to understand the key cost terms used in strategic management accounting.

Term	Definition
Cost	The monetary value of resources used to produce goods or services. It represents a sacrificed resource to achieve a specific objective.
Cost Unit	A unit of a product, service, or activity for which costs are measured (e.g., one tonne of cement, one hour of consultancy).
Actual Cost	A cost that has already occurred — recorded in the books (historical cost).
Budgeted Cost	A predicted or planned cost used for comparison and control purposes.
Cost Object	Any product, service, customer, activity, or organizational unit to which costs are assigned. Examples: a product line, a department, a customer segment.
Cost Behaviour	How a cost changes in relation to changes in the activity level of a business (production or sales volume).

Why Cost Behaviour Matters

Understanding how costs behave enables management to:
- Set competitive prices that cover costs and earn a margin.
- Predict future costs under different activity scenarios.
- Control spending by comparing actual vs. expected costs.
- Make sound decisions about capacity, outsourcing, and product mix.
- Determine the break-even point and required sales volume for profitability.

Section 2: Cost Behaviour Classification

Costs are classified based on how they respond to changes in activity (output or sales volume). The five main categories are:

2.1 Fixed Costs

A fixed cost remains constant in total regardless of changes in activity level, within a relevant range of output. Fixed costs are sometimes called 'period costs' because they are incurred over time, not per unit produced.

Key Characteristics of Fixed Costs

- Total fixed cost does NOT change when output increases or decreases.
- Fixed cost per unit DECREASES as output increases (spread over more units).
- Fixed costs continue even when output is zero (e.g., rent still due).
- They are often contractual or committed in advance.
- Examples: factory rent, annual insurance, depreciation on a straight-line basis, MD's salary, loan interest payments.

Illustration: A factory pays Ugx 600,000 rent per month. Whether 1,000 or 10,000 units are produced, rent remains Ugx 600,000. However, the rent per unit falls from Ugx 600 (at 1,000 units) to Ugx 60 (at 10,000 units). This is the economy of scale effect of fixed costs.

Output (Units)	Total Fixed Cost (Ugx)	Fixed Cost Per Unit (Ugx)
1,000	600,000	600
5,000	600,000	120
10,000	600,000	60
20,000	600,000	30

2.2 Variable Costs

A variable cost changes in direct proportion to changes in activity level. As output doubles, total variable cost doubles; variable cost per unit remains constant.

Key Characteristics of Variable Costs

- Total variable cost INCREASES proportionally with output.
- Variable cost per unit STAYS CONSTANT.
- At zero output, total variable cost is zero.
- Examples: direct raw materials, direct labour (paid per unit), sales commissions, packaging, electricity based on machine hours.

Illustration: Direct material costs Ugx 50 per unit. At 1,000 units the total material cost is Ugx 50,000; at 5,000 units it is Ugx 250,000. The cost per unit remains Ugx 50 throughout.

Output (Units)	Total Variable Cost (Ugx)	Variable Cost Per Unit (Ugx)
1,000	50,000	50
5,000	250,000	50
10,000	500,000	50
20,000	1,000,000	50

2.3 Mixed / Semi-Variable Costs

A mixed cost (also called semi-variable or semi-fixed) contains BOTH a fixed element and a variable element. The total cost increases with output but starts from a positive base (the fixed element).

Total Mixed Cost = Fixed Element + (Variable Rate × Activity Level)

e.g., Electricity Bill = Standing Charge + Cost per kWh consumed

Real-World Examples of Mixed Costs

1. Electricity bill: Fixed standing charge (Ugx 15,000/month) + variable charge per unit consumed.
2. Sales representatives' remuneration: Fixed basic salary + variable commission on sales.
3. Motor vehicle costs: Fixed annual insurance & road tax + variable fuel, oil, tyres.
4. Telephone: Fixed line rental + variable call charges.
5. Machine maintenance: Fixed preventive service fee + variable repairs based on usage hours.

Illustration: A company's electricity bill has a fixed standing charge of Ugx 20,000/month and a variable rate of Ugx 500 per machine hour. At 100 machine hours: Total cost = 20,000 + (500×100) = Ugx 70,000. At 300 hours: 20,000 + (500×300) = Ugx 170,000.

2.4 Stepped Fixed Costs

Stepped costs are fixed over a range of output but jump to a new (higher) fixed level when output exceeds certain thresholds.

Stepped Cost: Worked Example

Scenario: A warehouse costs Ugx 2,000,000/month and holds up to 5,000 units.
If output exceeds 5,000, a second warehouse must be rented (another Ugx 2,000,000).

Output 0 – 5,000 units → Total warehouse cost = Ugx 2,000,000
Output 5,001 – 10,000 units → Total warehouse cost = Ugx 4,000,000

Output 10,001 – 15,000 units → Total warehouse cost = Ugx 6,000,000

Key insight: Within each range, the cost behaves like a fixed cost. At the step, it jumps permanently to the next level.

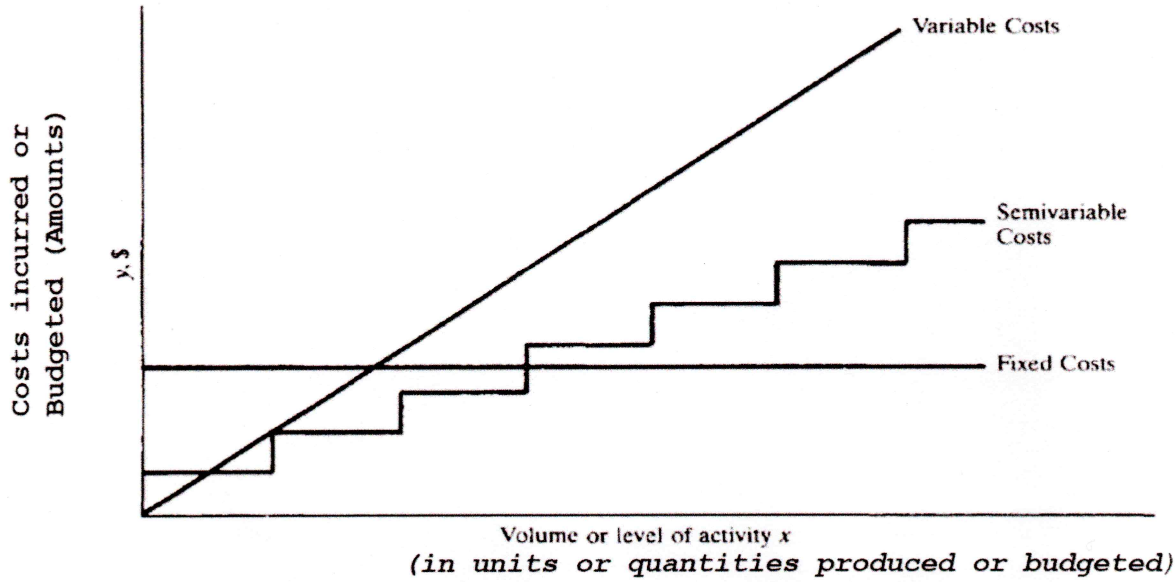

Figure 1: Graphical Presentation of the FC, VC and Mixed costs

2.5 Controllable vs. Uncontrollable Costs

Type	Explanation
Controllable Cost	A cost that management can influence within a given time period (e.g., discretionary advertising spend, overtime hours authorised).
Uncontrollable Cost	A cost that management cannot alter in the short term (e.g., depreciation on existing assets, lease commitments, head-office apportionments).
Management Implication	Managers should only be held accountable for costs over which they have control. Including uncontrollable items in performance reports distorts evaluation.

Section 3: Methods of Estimating Cost Behaviour

To separate a mixed cost into its fixed and variable components, management accountants use four main techniques:

Method	Description
1. Account Analysis	Review each account and classify costs as fixed or variable based on professional judgment.
2. High-Low Method	Use the highest and lowest activity data points to calculate the variable rate and fixed element.
3. Scatter Graph (Graphical)	Plot all data points on a graph; draw a line of best fit by eye; read off the fixed cost intercept.
4. Regression Analysis	Statistical least-squares method that mathematically determines the line of best fit (most accurate).

3.1 The High-Low Method

The high-low method uses only two data points — the period of highest activity and the period of lowest activity — to estimate fixed and variable cost components.

Variable Cost per Unit =
(Cost at High Activity − Cost at Low Activity) ÷ (High Units − Low Units)

$$\frac{\text{Cost at High activity level} - \text{Cost at Low activity level}}{\text{Highest activity level} - \text{Lowest activity level}}$$

Fixed Cost = Total Cost at any Activity − (Variable Cost per Unit × Activity Units)

WORKED EXAMPLE 1 — High-Low Method (KK Ltd)

KK Ltd's monthly production overhead costs were:

- Ugx 81,600 when output was 5,700 units
- Ugx 78,000 when output was 4,800 units

STEP 1: Calculate variable cost per unit

Variable cost = (81,600 − 78,000) ÷ (5,700 − 4,800)

= 3,600 ÷ 900 = Ugx 4 per unit

STEP 2: Calculate fixed costs (using high activity point)

Fixed cost = 81,600 − (4 × 5,700)

= 81,600 − 22,800 = Ugx 58,800 per month

STEP 3: Write the cost formula
Total Cost = Ugx 58,800 + (Ugx 4 × units produced)

VERIFICATION using low point: 78,000 − (4 × 4,800) = 78,000 − 19,200 = Ugx 58,800 ✓

Practice Question 1: Separation of the FC and VC

Sandstorm is an engineering firm. Its indirect costs are thought to be partly variable, with the variable cost element depending on the number of hours worked by maintenance engineers each month.

It has been established that costs were Ugx 57,600 in a month when 22,000 engineer hours were recorded, and Ugx 54,800 in a month when 20,600 engineer hours were recorded.

Required

Using the high-low method, estimate the fixed costs per month and variable cost per engineer hour.

3.2 The Scatter Graph (Graphical) Method

Under this method, all observed cost and activity data points are plotted on a graph (activity on the X-axis, costs on the Y-axis). A 'line of best fit' is drawn by eye through the data points. Where this line intersects the Y-axis gives the estimated fixed cost.

Example Data for Scatter Graph (KK Manufacturing)

Month	Output (Units)	Cost Incurred (Ugx)
April	1,500	6,000
May	1,800	6,600
June	2,100	7,200
July	2,820	8,640
August	2,220	7,440

Steps:
1. Plot each (units, cost) point on graph paper.
2. Draw the line of best fit through or close to all points.
3. Extend the line to the Y-axis → the intercept = Fixed Cost.
4. Pick any two points on the line to calculate the slope = Variable cost per unit.

Advantage: Shows all data; identifies outliers.
Disadvantage: Subjective — different analysts may draw different lines.

3.3 Regression Analysis (Least Squares Method)

Regression analysis is the most mathematically precise method. It uses the linear equation:

$$y = mx + c$$

Where: y = total cost | x = activity level | m = variable cost per unit | c = fixed cost

The least squares method minimises the sum of squared differences between actual data points and the line of best fit. It gives objective, repeatable results unlike the scatter graph method.

Regression — Key Formula Components

n = number of data points
Σx = sum of all activity levels
Σy = sum of all total costs
Σxy = sum of (activity × cost) for each period
Σx^2 = sum of (activity^2) for each period

Variable rate (m) = $[n(\Sigma xy) - (\Sigma x)(\Sigma y)] \div [n(\Sigma x^2) - (\Sigma x)^2]$
Fixed cost (c) = $(\Sigma y - m \cdot \Sigma x) \div n$

The coefficient of determination (R^2) measures how well the line fits the data.
$R^2 = 1.0 \rightarrow$ perfect fit; $R^2 = 0.95 \rightarrow$ 95% of cost variation explained by activity.

Section 4: Cost Structure & Contribution Margin Analysis

4.1 Cost Structure

Cost structure describes the mix of fixed and variable costs a firm has. It has major strategic implications:

Structure Type	Implications
High Fixed Cost Structure	High operating risk if sales fall; high operating leverage; benefits greatly from economies of scale; less flexible short-term.
High Variable Cost Structure	Lower operating risk; costs fall automatically if sales fall; less benefit from volume growth; more flexible short-term.
Strategic Implication	Management must understand cost structure to set prices, plan capacity, and manage risk in line with market expectations.

4.2 Contribution Margin

The contribution margin is the amount remaining after deducting all variable costs from sales revenue. It 'contributes' first to covering fixed costs, and thereafter to profit.

Contribution Margin (CM) = Sales Revenue − Variable Costs

CM per Unit = Selling Price per Unit − Variable Cost per Unit

CM Ratio = Contribution Margin ÷ Sales Revenue × 100%

$$\text{CM Ratio} = \frac{Sales\ Revenue - Variable\ costs}{Sales\ Revenue}$$

Profit = Contribution Margin − Fixed Costs

Example 1: Contribution Margin Analysis

Café Pub sells a 1kg bag of its signature blend for Ugx 20,000.

The variable costs associated with each bag include: Raw coffee beans: Ugx 4000, Packaging: Ugx 1000, Transport costs: Ugx 3,000. The company pays 10,000 for rent per day.

i. Calculate Contribution Margin per Unit
ii. Calculate Total Contribution Margin:
iii. Calculate the Contribution Margin Ratio.

WORKED EXAMPLE — Café Pub (Contribution Margin)

Café Pub sells a 1 kg bag of coffee for Ugx 20,000.
Variable costs per bag:
Raw coffee beans: Ugx 4,000
Packaging: Ugx 1,000
Transport: Ugx 3,000
Total Variable: Ugx 8,000
Fixed costs: Ugx 10,000 rent per day.

CALCULATIONS:
CM per Unit = 20,000 − 8,000 = Ugx 12,000 per bag

If 5 bags are sold in a day:

Total Revenue	= 5 × 20,000 =	100,000
Total Variable Cost	= 5 × 8,000 =	40,000
Total Contribution	=	60,000
Less: Fixed Costs	=	10,000
Profit for the Day	=	Ugx 50,000

CM Ratio = 12,000 ÷ 20,000 = 60%
(Every Ugx 1 of sales contributes 60 cents towards fixed costs and profit.)

4.3 Limitations of Contribution Margin Analysis

Although powerful, contribution margin analysis has limitations:

- It assumes a constant selling price and variable cost per unit — rarely true in practice.
- Fixed costs are assumed constant within the relevant range — but stepped costs complicate this.
- It focuses on short-term decisions; long-term, all costs become variable.
- Product mix decisions require further analysis (linear programming) when constraints exist.

Section 5: Learning Curves

5.1 Definition

The learning curve in management accounting describes the phenomenon where the time (and therefore cost) required to produce a unit decreases at a predictable rate as workers gain cumulative experience.

Historical Origin

The learning curve was first observed in 1925 in aircraft manufacturing, where it was found that the number of man-hours per plane consistently fell as more planes were produced.

T.P. Wright subsequently proved (1930s) that this improvement was not random, it followed a mathematical pattern that allowed future labour times to be predicted.

5.2 Wright's Law (The Core Principle)

Each time cumulative output DOUBLES, the cumulative average time per unit falls to a fixed percentage (the Learning Rate) of the previous cumulative average.

This percentage is called the Learning Rate (LR).

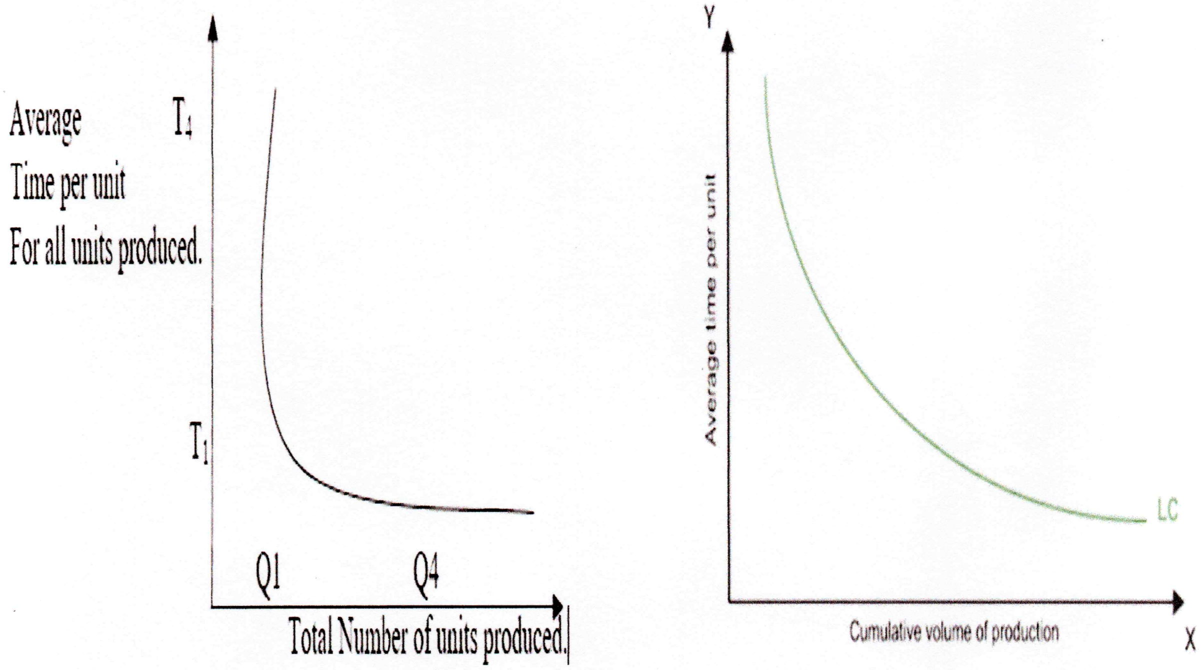

Figure 2: Learning curves: Wright's Law

This relationship demonstrates how experience and repetition in production lead to efficiency gains, particularly in labor-intensive industries.

- ✓ At the early stages of production, the curve is steep, indicating that as workers gain experience from producing the first few units, the average time required to produce each unit decreases rapidly.
- ✓ This improvement occurs due to learning, better coordination, improved skills, and process familiarity.
- ✓ As cumulative production continues to increase, the curve becomes flatter, showing that the rate of improvement gradually slows down.
- ✓ Workers and processes approach their optimal efficiency, so additional learning gains become smaller.
- ✓ Eventually, the curve approaches a near-horizontal line, indicating that the learning effect has largely stabilized and the average production time per unit remains relatively constant.

Example 1: If the first unit takes 10 hours and a learning rate of 80% applies:

Cumulative Units	Cumulative Avg Time/Unit (hrs)	Total Cumulative Time (hrs)	Incremental Time for New Units (hrs)
1	10.00	10.00	10.00 (1st unit)
2	8.00 (10 × 80%)	16.00	6.00 (2nd unit)
4	6.40 (8 × 80%)	25.60	9.60 (3rd & 4th)
8	5.12 (6.4 × 80%)	40.96	15.36 (5th–8th)

5.3 Assumptions of the Learning Curve

Assumption	Explanation
Constant Learning Rate	The cumulative average time per unit falls by a fixed % each time output doubles.
Learning Begins After Unit 1	The effect starts once the first unit is produced.
Stable Conditions	Technology, methods, and workforce remain constant — no disruptions.
Labour-Intensive	The effect is most significant where labour (not machines) dominates production.
Declining Effect	The learning rate's impact diminishes as cumulative production grows; eventually stabilises.

5.4 Conditions Required for the Learning Curve to Operate

Condition	Why It Matters
Motivated and engaged workforce	Workers must want to improve; a go-slow cancels the effect.
Consistent workforce (low turnover)	New workers start at the bottom of the curve, high turnover destroys accumulated learning.

No breaks in production	Gaps cause workers to lose familiarity; learning must be continuous.
Early stage of production	Effect is strongest at the start; it diminishes as production matures.
Complex and repetitive task	Simple tasks hit the efficiency floor quickly; complex ones have more room to improve.
Large manual labour element	Automation reduces human learning opportunities.

5.5 Importance of the Learning Curve

- Pricing Decisions: Prices set on early-unit costs will be uncompetitive once learning reduces costs.
- Work Scheduling: Labour requirements fall over time; this affects workforce planning.
- Budgeting: Labour budgets must incorporate expected efficiency gains.
- Standard Setting: Standards based on early units will show artificially favourable variances if learning is ignored.
- Product Viability: A product that appears loss-making on first-unit costs may become profitable after the learning effect.

5.6 Methods of Estimating the Learning Curve Effect

Method 1: Cumulative Doubling (Tabular) Method

Apply the learning rate each time cumulative output doubles (1 → 2 → 4 → 8 → 16 units, etc.). This is the most straightforward approach.

Example 2:

Spiro takes 30 hours to assemble the first E-Bike. If a 90% learning rate has been determined.

Prepare a table showing the effects of the learning curve up to the 8th unit.

CUMULATIVE			INCREMENTAL		
No. of units	**Average time (Hours)**	**Total time (Hours)**	**No. of units**	**Total Incremental time**	**Average incremental time**
	*(Previous average time *LR)*	*(Average time * No. of units)*	(time for each doubling unit)	Current total time-previous total time	Total incremental time/No. of units
1	30 Hours	30 Hours	1	30 Hours	30/1 = 30 Hours
2	30*0.9= 27 Hours	27*2 = 54 Hours	2-1=1	54-30= 24 Hours	24/1=24 Hours
4	27*0.9= 24.3 Hours	24.3*4 = 97.2 Hours	4-2=2	97.2-54 =43.2 Hours	43.2/2 =21.6 Hours
8	24.3*0.9=21.87 Hours	21.87*8 =174.96	8-4=4	174.96-97.2= 77.76 Hours	77.76/4 =19.44 Hours

Practice Question 1:

Consider the following example of the time taken to make the first four units of a new product.

No. of Units	**Time to taken (hours)**
1	10
2	8
3	7.386

Required; Compute the total time for making the next 4 units to double output up to 8^th^ unit of this product.

Practice Question 2:

The first unit of output of a certain new product requires 100 hours and an 80% learning curve applies.

Required; Compute the cumulative and incremental total time of producing the 4th and 8th unit of this same product.

Method 2: The Mathematical Formula ($Y = ax^b$)

The tabular method only works for doubling points (1, 2, 4, 8...). For any cumulative quantity (e.g., the 5th or 6th unit), the mathematical formula is used:

$$Y = a \cdot x^b$$

Y = cumulative average time per unit for x units | a = time for first unit | x = cumulative units | b = log(LR) ÷ log(2)

Example 1: Mathematical method

Ivys' Ltd has anticipated a 95% learning curve towards production of a new item. The 1st item will cost Ugx 2,000 in materials, and will take 400 labour hours. The cost per labour hour is Ugx 5. Overheads are 50% of labour.

Required; Compute the total cost for the first item and the first 8 items.

WORKED EXAMPLE: Mathematical Method (Ivys' Ltd, 95% Learning Rate)

First item: Materials Ugx 2,000 | Labour 400 hrs @ Ugx 5/hr | Overheads 50% of labour.
Required: Total cost for first item and first 8 items.

STEP 1: Calculate b

b = log(0.95) ÷ log(2) = (−0.02228) ÷ 0.30103 = −0.07400

STEP 2: Cumulative average time for 8 units

$Y = 400 \times 8^{(-0.0740)}$

$Y = 400 \times 0.85738 \approx 342.95$ hours per unit (average)

Options	**First item**	**8 units**
a= 400 Hours		400 Hours
Number of units	1 Unit	8 Units
b	log 0.95/log2	log 0.95/log2
log 0.95	-0.0223	-0.0223
log 2	0.301	0.301
b	-0.074	-0.074
$Y=ax^b$	$400*(1)^{-0.0741}$	$400*(8)^{-0.0741}$
Y, Cumulative average time per unit	400*1	400*0.857
Y, Cumulative average time per unit for the first units	**400 Hours**	**342.8** hours per unit (average)

STEP 3: Total hours for 8 units = 8 × 342.95 = 2,743.7 hours

STEP 4: PREPARE A COST STATEMENT:

Cost elements	**first items**	**Cost elements for the 8 itmes**	**Costs**
Material Cost	2,000	Material Cost (8*2000)	16,000
Labour costs (400 hrs* Ugx 5)	2,000	Labour costs (2742.4* Ugx 5) =342.8 hrs*8 units*5	13,712
Overhead costs (50% of labour)	1,000	Overhead costs (50% of labour)	6,856
Total costs for the first item (MC+LC+OHC)	**5,000**	Total costs for the first item (MC+LC+OHC)	**36,568**

Key observation: Average unit cost falls from Ugx 5,000 to Ugx 4,572 (36,579÷8) due to learning.

Practice Question 1:

Apex Ltd has anticipated a 80% learning curve towards the production of a new product. The 1st unit will require 500 labour hours. Material cost per unit is Ugx1,800. Labour is paid at Ugx6 per hour. Overheads are charged at 40% of labour cost.

Required:
Compute:

a) Compute the total time of producing the 4th and 8th unit of this same product.
b) The total cost of the first unit.
c) The total cost of the first 8 units.

Section 6: Confidence Intervals in Cost Estimation

When cost estimates are based on sample data, confidence intervals (CIs) quantify the uncertainty around those estimates. A CI provides a range of values within which the true population parameter is expected to fall at a stated level of confidence.

Level	Interpretation
99% Confidence Interval	Very wide range. We are 99% sure the true value lies within it. High confidence, low precision.
95% Confidence Interval	The industry standard. Balances confidence and precision. Used in most business reports.
90% Confidence Interval	Narrower range. More precise but only 90% certain. Used when tighter estimates are preferred.

6.1 Key Principles of Confidence Intervals

- The wider the CI, the less precise the estimate, but the greater the certainty.
- Sample size is inversely related to margin of error: larger samples → narrower CI → more precision.
- The conventional maximum margin of error for a 95% CI is approximately ±3%.
- If a distribution is normal, about 95% of data falls within ±2 standard deviations of the mean.

6.2 Application in Cost Analysis

Confidence intervals allow management accountants to:

- Quantify uncertainty around fixed and variable cost estimates derived from regression.
- Communicate risk, a wide CI signals that cost estimates are unreliable; additional data is needed.
- Support break-even analysis, a CI around the break-even point shows the range within which profitability may vary.
- Inform decisions about capacity planning, outsourcing, and pricing under uncertainty.

Relatable Example: Presidential Approval Ratings

An agency selects 1,300 voters (a small fraction of the electorate) and reports:
'Obama approval rating: 52% ± 3% at the 95% confidence level'
This means: We are 95% confident the true approval rating is between 49% and 55%.

Why not sample everyone? Sampling is costly. The industry norm is ±3% at 95% CI, beyond that, the cost of extra precision outweighs the benefit.

Parallel in cost accounting: A firm samples 50 months of cost data. The regression gives:
Variable cost = Ugx 12 per unit ± Ugx 1.50 (95% CI: Ugx 10.50 to Ugx 13.50)
Fixed cost = Ugx 80,000 ± Ugx 5,000 (95% CI: Ugx 75,000 to Ugx 85,000)

Section 7: Test Reliability in Cost Analysis

Test reliability measures the consistency and stability of a cost estimation model or measurement approach. A reliable model produces the same results when applied to the same conditions.

Type	What It Measures
Inter-rater Reliability	Different analysts applying the same model reach the same conclusions.
Test-Retest Reliability	The model produces consistent results when applied to the same data at different times.
Internal Consistency	The components of the cost model are logically consistent with each other.

7.1 Improving Reliability of Cost Estimation Models

- Use historical data to validate models; back-test the model against known past outcomes.
- Perform sensitivity analysis; test how the estimate changes when key assumptions vary.
- Incorporate expert review; have experienced managers challenge the model's assumptions.
- Regularly update models; as production conditions change, update the model with new data.
- Increase sample size; more data points reduce statistical noise and increase reliability.

Section 8: Cost Control vs. Cost Reduction

Both cost control and cost reduction aim to improve profitability, but they differ fundamentally in their nature, objective, and permanence.

Basis for Comparison	Cost Control	Cost Reduction
Meaning	Keeping actual costs within pre-set budgets and standards	Permanently lowering the unit cost of a product without reducing quality
Savings in	Total cost	Cost per unit
Quality Guarantee	Not guaranteed (may cut quality to meet budget)	Quality is maintained — a core requirement
Nature	Temporary (once target achieved, effort may stop)	Permanent and ongoing — no endpoint
Emphasis	Past and present costs (compared to standard)	Present and future costs (structural improvements)
Function Type	Preventive — stops overspending before it happens	Corrective — improves processes to eliminate waste
Ends when	Pre-determined target is achieved	Never — it is a continuous improvement philosophy
Key Techniques	Standard costing, variance analysis, budgetary control	Value engineering, process optimisation, lean manufacturing, benchmarking

8.1 Cost Reduction Techniques

- **Process Optimization**: Streamline workflows through automation, lean manufacturing, and eliminating non-value-adding activities.
- **Value Engineering**: Analyse each component of a product to find cheaper alternatives that maintain functionality.
- **Supplier Negotiation**: Secure bulk purchase discounts, better payment terms, and alternative sourcing.
- **Energy Efficiency**: Invest in energy-saving equipment and practices to lower utility costs permanently.
- **Benchmarking**: Compare costs and processes against best-in-class competitors and adopt their best practices.
- **Waste Minimization**: Reduce scrap, rework, and defective output (Kaizen / TQM approaches).

Section 9: Practice Questions

PRACTICE QUESTION 1 — High-Low Method (Sandstorm Engineering)

Question

Sandstorm is an engineering firm. Its indirect costs are partly variable, depending on the number of hours worked by maintenance engineers each month.

Data collected:

Month A: 22,000 engineer hours → Total cost Ugx 57,600
Month B: 20,600 engineer hours → Total cost Ugx 54,800

Required: Using the high-low method, estimate:

(a) The fixed cost per month
(b) The variable cost per engineer hour
(c) Write the cost formula and estimate costs at 25,000 hours.

PRACTICE QUESTION 2 — All Three Methods (Units Produced)

Question

The following data is available for cost estimation:

Batch	Units Produced	Total Cost
1	680	Ugx 29,800
2	820	Ugx 34,000
3	570	Ugx 27,500
4	660	Ugx 29,000
5	750	Ugx 31,900

Required:

(a) Using the high-low method, estimate the cost formula ($y = mx + b$).
(b) Using graphical, estimate the line of the best fit.
(c) Describe how you would apply the scatter graph method to this data.

PRACTICE QUESTION 3: Buddy's Shipping Company

Question

The following data relates to Buddy's Shipping Company (Jan–Jun 2022):

Months	Number of Packages Shipped	Shipping Cost (Ugx)
January	100	1,200
February	120	1,300
March	125	1,350
April	130	1,500
May	110	1,400
June	90	1,100

Required:

(a) Using the high-low method, estimate the cost formula.

(b) Using the scatter graph method, estimate the cost formula.

(c) Are there factors other than packages shipped that may cause cost variation?

PRACTICE QUESTION 4 — Learning Curve (Apex Ltd, 80% Rate)

Question

Apex Ltd anticipates an 80% learning curve for a new product.

1st unit: 500 labour hours | Material cost per unit: Ugx 1,800

Labour rate: Ugx 6 per hour | Overheads: 40% of labour cost

Required:

(a) Using cumulative doubling, prepare a table up to the 8th unit.

(b) Calculate the total cost of the first unit.

(c) Calculate the total cost of the first 8 units.

PRACTICE QUESTION 5 — Learning Curve (Green Energy Works, 80% Rate)

Question

Green Energy Works expects an 80% learning curve for a new solar device.
1st unit: 600 labour hours | Material cost per unit: Ugx 2,500
Labour rate: Ugx 4 per hour | Overheads: 60% of labour cost

Required:
(a) Use the cumulative doubling method to determine the average time per unit up to the 8th unit.
(b) Calculate the total cost of the first unit.
(c) Calculate the total cost of the first 4 units.

PRACTICE QUESTION 6 — Cost Control & Reduction (Discussion)

Question

A manufacturing firm seeks to reduce its production costs by 10% without affecting quality. Discuss three strategic cost reduction techniques that the firm can apply, and explain how cost reduction differs from cost control.

TOPIC 2 : Key Formulas & Concepts

Concept	Key Formula / Rule
Variable Cost per Unit (High-Low)	= (Highest Cost– Lowest costs) ÷ (Highest Units – Lowest Units)
Fixed Cost (High-Low)	= Total Cost − (VC per Unit × Units)
Cost Formula	Total Cost = Fixed Cost + (Variable Cost × Units)
Contribution Margin per Unit	= Selling Price − Variable Cost per Unit
Contribution Margin Ratio	= Contribution Margin ÷ Sales Revenue × 100%
Profit	= Total Contribution Margin − Fixed Costs
Learning Curve — Wright's Law	Each doubling of cumulative output → Cumul. Avg Time falls to LR% of previous avg
Learning Curve — b index	b = log(Learning Rate) ÷ log(2)
Learning Curve Formula	$Y = a \cdot x^b$ (Y = cumul. avg time; a = 1st unit time; x = cumul. units)
Confidence Interval (95%)	Mean ± (1.96 × Standard Error) — industry norm ≤ ±3% margin of error
R^2 (Coefficient of Determination)	Proportion of cost variation explained by activity; $R^2 = 1$ = perfect fit