

VARIABLE COSTING

Key Terms and Concepts to Know

Variable vs. Absorption Costing

- Absorption Costing is required by GAAP for external reporting purposes. This is the costing method used for the traditional income statement.
- Absorption costing classifies costs based on their function: product or period costs.
- Variable Costing is often used for internal decision-making. This is the costing method used for the contribution format income statement.
- Variable costing classifies costs based on their behavior when the activity level changes: variable or fixed costs.
- The difference between the two methods is how they account for fixed manufacturing overhead.

Product Costs:

- Product costs are the manufacturing costs incurred to produce the products to be sold.
- Product costs under absorption costing include both manufacturing costs.
- Product costs under variable costing include only variable manufacturing costs.
- Absorption costing accounts for fixed manufacturing overhead as a product cost.
- Variable costing accounts for fixed manufacturing overhead as a period cost.

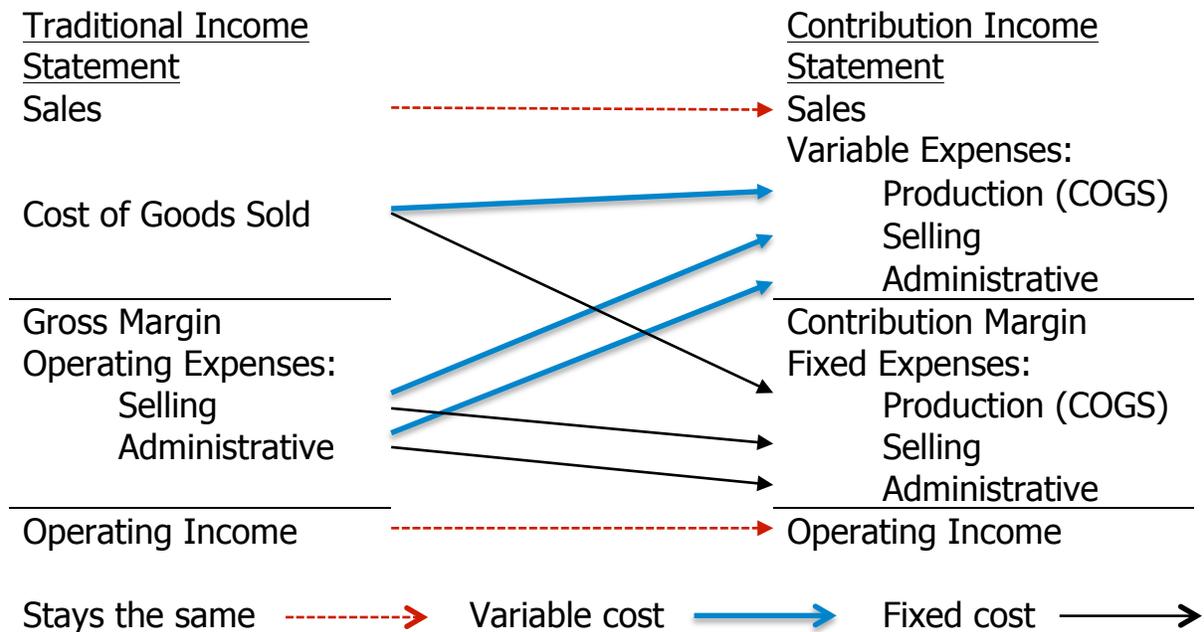
Period Costs:

- Period costs are the non-manufacturing costs incurred to operate the company.
- Period costs are accounted for as expenses in the period incurred.
- Absorption costing accounts for both variable and fixed non-manufacturing costs, i.e., selling and administrative costs as period costs.
- Variable costing accounts for both variable and fixed non-manufacturing costs, i.e., selling and administrative costs, and fixed manufacturing overhead as period costs.

Key Topics to Know

Product vs. Period Costs and Variable vs. Fixed Costs

- Absorption costing accounts for fixed manufacturing overhead as a product cost.
- Variable costing accounts for fixed manufacturing overhead as a period cost.
- The traditional and contribution format income statements are presented below along with the separation of traditional expense categories into their variable and fixed components.



- Under Variable Costing:
 - Only those costs of production that vary with output are product costs. This is consistent with the contribution format income statement and cost-volume-profit analysis because of the emphasis on separating variable and fixed costs.
 - The cost of a unit of product consists of direct materials, direct labor, and variable overhead.
- Under Absorption Costing:
 - All costs of production are product costs, regardless of whether they are variable or fixed. Since no distinction is made between variable and fixed costs, absorption costing is not well suited for CVP computations.

- The cost of a unit of product consists of direct materials, direct labor, and both variable and fixed overhead.
- Variable and fixed selling and administrative expenses are treated as period costs and are deducted from revenue as incurred.
- Summarizing the expense portions of these income statements:

Absorption Costing

Product Costs:

Variable:

Direct materials
Direct labor
Variable overhead

Fixed:

Fixed overhead

Period Costs:

Variable:

Variable selling expenses
Variable administrative expenses

Fixed:

Fixed selling expenses
Fixed administrative expenses

Variable Costing

Variable Costs:

Product Costs:

Direct materials
Direct labor
Variable overhead

Period Costs:

Variable selling expenses
Variable administrative expenses

Fixed Costs:

Period Costs:

Fixed overhead
Fixed selling expenses
Fixed administrative expenses

Example #1

H Company produces a single product. Available information for year 1 is:

- a) Unit product costs under absorption and variable costing will be \$16 and \$10.
- b) 25,000 units were produced and 20,000 units were sold during the year.
- c) The selling price per unit is \$30.
- d) There is no beginning inventory.
- e) The unit product cost is \$10 for variable costing and \$16 for absorption costing.
- f) Fixed manufacturing cost was \$150,000 in the current period.
- g) Selling and administrative expenses were 50% fixed in the current period.
- h) The net operating income is \$90,000 under variable costing.

- Required:
- a) Prepare income statements using both variable and absorption costing.
 - b) Reconcile variable costing and absorption costing net operating incomes and explain why the two amounts differ.
 - c) Determine the amount of fixed overhead deferred in ending inventory and the total value of ending inventory.

Solution #1

a)

<u>Absorption</u>		<u>Variable</u>	
Sales	\$600,000	Sales	\$600,000
		Variable Expenses:	
		Production	<u>200,000</u>
Cost of Goods Sold		Manufacturing Margin	400,000
		Selling &	
	<u>320,000</u>	Administrative	<u>80,000</u>
Gross Margin	<u>280,000</u>	Contribution Margin	320,000
Operating Expenses:		Fixed Expenses:	
		Production	150,000
Selling &		Selling &	
Administrative	<u>160,000</u>	Administrative	<u>80,000</u>
Operating Income	<u>\$120,000</u>	Operating Income	\$90,000

b)

Operating income – absorption costing	\$120,000
Less: fixed overhead deferred in ending inventory	<u>30,000</u>
Operating income – variable costing	\$90,000

c)

Units produced and not sold	$25,000 - 20,000 =$	5,000
Fixed overhead cost per unit	$\$16 - \$10 =$	<u>\$6.00</u>
Fixed overhead deferred in ending inventory		\$30,000
Units in ending inventory (25,000 – 20,000)		5,000
Variable cost per unit		<u>\$10.00</u>
Value of ending inventory		\$50,000

Example #2

H Company produces a single product. Available information for year 2 is:

- a) 25,000 units were produced and 30,000 units were sold during the year.
- b) The selling price per unit, variable costs per unit, total fixed costs and selling and administrative expenses remained unchanged from the prior year.
- c) 5,000 units are in beginning inventory from year 1
- d) The net operating income is \$230,000 under absorption costing.

- Required:
- a) Prepare income statements using variable and absorption costing.
 - b) Reconcile variable costing and absorption costing net operating incomes and explain why the two amounts differ.
 - c) Determine the amount of fixed overhead released from ending inventory.
 - d) Determine the total operating income for the 2 years under both methods.

Solution #2

1.

<u>Absorption Income Statement</u>		<u>Variable Income statement</u>	
Sales	\$900,000	Sales	\$900,000
		Variable Expenses:	
		Production	300,000
Cost of Goods Sold		Manufacturing Margin	600,000
		Selling & Administrative	80,000
Gross Margin	480,000	Contribution Margin	520,000
Operating Expenses:	420,000	Fixed Expenses:	
		Production	150,000
Selling & Administrative	160,000	Selling & Administrative	80,000
Operating Income	\$260,000	Operating Income	\$290,000

2.

Operating income – absorption costing	\$260,000
plus: fixed overhead released from ending inventory	30,000
Operating income – variable costing	\$290,000

3.	Units sold but not produced $30,000 - 25,000 =$	5,000
	Fixed overhead cost per unit $\$16 - \$10 =$	<u>\$6.00</u>
	Fixed overhead released from ending inventory	\$30,000

4.		<u>Absorption</u>	<u>Variable</u>
		<u>Costing</u>	<u>Costing</u>
	First year	\$120,000	\$90,000
	Second year	<u>260,000</u>	<u>290,000</u>
	Total	\$380,000	\$380,000

Summary of Examples #1 and #2

- The difference in net operating income between the two methods can be reconciled by multiplying the number of units of increase or decrease in inventory by the fixed manufacturing overhead per unit.
- For the two-years in total, both methods reported the same total net operating income because the units produced equaled the units sold, i.e., inventory did not change.

Relationship Between Inventory levels and Operating Income

- Absorption costing income is influenced by changes in unit sales and units of production. Simply producing more units even if those units are not sold can increase net operating income.
- Absorption costing assigns per unit fixed manufacturing overhead costs to production. This can potentially produce positive net operating income even when the number of units sold is less than the breakeven point.
- Variable costing income is only affected by changes in unit sales. The number of units produced does not affect it. As a general rule, when sales go up net operating income goes up and vice versa.
- When units produced equals units sold, the two methods report the same net operating income.
- When units produced are greater than units sold, i.e., units in inventory increase, absorption income is greater than variable costing income because absorption costing defers a portion of fixed manufacturing costs in finished goods inventory.
- When units produced are less than units sold, units in inventory decrease, absorption costing income is less than variable costing income because absorption costing the previously deferred fixed manufacturing costs in finished goods inventory are now included in the cost of goods sold for the units sold from inventory.
- In summary:

	<u>Inventory Level</u>	<u>Net Income</u>
Units produced = units sold	No change	Absorption = Variable
Units produced > units sold	Increases	Absorption > Variable
Units produced < units sold	Decreases	Absorption < Variable

Contribution Margin Analysis

- Explains the difference between expected and actual contribution margin.
- Differences are due to two factors: quantity and unit price/cost
- Quantity factor is due to a difference in the number of units sold x the planned unit price/cost
- Unit price/cost factor due to a difference in the unit sales price or variable unit cost x actual units sold
- Both the Quantity factor and the Unit Price/cost factor are further divided into
- The factors are summarized in the following chart.:

	<u>Quantity Factor</u>	<u>Unit Price/Cost factor</u>	
Planned Sales =			Actual Sales =
Planned units sold	(Actual sold-planned sold)	<u>Actual units sold</u>	<u>Actual units sold</u>
x	x	x	x
<u>Planned unit sales price</u>	<u>Planned unit sales price</u>	(Actual unit price – planned unit price)	Actual unit price
 Variable cost =			 Variable cost =
Planned units sold	(Planned sold-actual sold)	<u>Actual units sold</u>	<u>Actual units sold</u>
x	x	x	x
<u>Planned unit cost</u>	<u>Planned unit cost</u>	(Planned unit cost – actual unit cost)	Actual unit cost
 Contribution margin =			 Contribution margin =
Planned units sold	(Actual sold-planned sold)	<u>Actual units sold</u>	<u>Actual units sold</u>
x	x	x	x
<u>Planned unit CM</u>	<u>Planned unit CM</u>	(Planned unit CM – actual CM unit CM)	Actual unit CM

- Note the following consistencies in the chart:
 - The components that repeat across columns have been underlined.
 - The quantity factor calculations are always based on the planned \$ per unit
 - The Unit price/cost factor calculations are always based on the actual units sold

Practice Problems

Practice Problem #1

	<u>Variable Costing</u>		<u>Absorption Costing</u>	
	<u>Product</u>	<u>Period</u>	<u>Product</u>	<u>Period</u>
	<u>Cost</u>	<u>Cost</u>	<u>Cost</u>	<u>Cost</u>
Direct materials				
Direct labor				
Variable overhead				
Fixed overhead				
Variable selling				
Fixed selling				
Variable administrative				
Fixed administrative				

Required: Identify the treatment of each of the following costs under variable costing and absorption costing.

Practice Problem #2

During the first three months of the year, J Company had the following relationships between units produced and units sold:

January - Units produced equal units sold

February - Units produced exceed units sold

March - Units produced are less than units sold

Required:

- a) In each month, how will net income under variable costing compare to net income under absorption costing?
- b) In each month, will fixed overhead be deferred or released from inventory?

Practice Problem #3

C Company reports the following first year production cost information.

Units produced	53,000 units
Units sold	50,000 units
Sales price	\$150.00 per unit
Direct labor	\$8.00 per unit
Direct materials	\$4.00 per unit
Variable overhead	\$2,173,000
Fixed overhead	\$3,339,000
Operating expenses	\$1,000,000

- Required:
- Determine the net income using variable costing.
 - Determine the net income using absorption costing.
 - Reconcile the two net incomes.

Practice Problem #4

S Company began operations on April 1 of the current year. During this time, the company produced 750,000 units and sold 720,000 units at a sales price of \$9 per unit. Cost information for this period is shown below.

Production costs:	
Direct labor	\$.30 per unit
Direct materials	\$1.80 per unit
Variable overhead	\$495,000
Fixed overhead	\$450,000
Non-production costs:	
Variable selling expense	\$18,000
Fixed administrative expenses	\$53,000

- Required:
- Determine the net income using variable costing.
 - Determine the net income using absorption costing.
 - Reconcile the two net incomes.

Practice Problem #5

L Company reports the following first year production cost information.

Units produced	62,000
Units sold	59,000
Direct labor	\$41 per unit
Direct materials	\$15 per unit
Variable overhead	\$9,300,000
Fixed overhead	\$4,340,000

- Required:
- Compute production cost per unit under variable costing.
 - Compute production cost per unit under absorption costing.
 - Determine the cost of ending inventory using variable costing.
 - Determine the cost of ending inventory using absorption costing.

True / False Questions

1. The use of absorption costing can result in misleading product cost data.
True False
2. Variable costing treats fixed overhead cost as a period cost.
True False
3. Under absorption costing a company had the following unit costs when 10,000 units were produced.

Direct labor	\$2 per unit
Direct materials	\$3 per unit
Variable overhead	\$4 per unit
Total variable	\$9 per unit
Fixed overhead (\$50,000, 10,000 units)	\$5 per unit
Total production costs	\$14 per unit

If 25,000 units were produced, the total cost per unit under absorption costing would be \$9.

- True False
4. Given the following data, total product cost per unit under absorption costing will be greater than total product cost per unit under variable costing.

Direct labor	\$9 per unit
Direct materials	\$7 per unit
Variable overhead	\$45,000
Fixed overhead	\$27,000

True False

5. Given the following data, total product cost per unit under absorption costing will be \$700 greater than total product cost per unit under variable costing.

Direct labor	\$1.50 per unit
Direct materials	\$1.50 per unit
Variable overhead	\$900,000
Fixed overhead	\$1,200,000
Expected production	3,000

True False

6. The absorption costing income statement classifies costs based on cost behavior rather than function.
True False
7. When units produced equal units sold, reported income is identical under absorption costing and variable costing.
True False
8. When units produced exceed the units sold, income under absorption costing is higher than income under variable costing.
True False
9. When units produced are less than units sold, income under absorption costing is higher than income under variable costing.
True False
10. To convert variable costing income to absorption costing income, management will need to change the way fixed overhead costs are treated.
True False
11. Variable costing is the only acceptable basis for both external reporting and tax reporting.
True False
12. The quantity factor measures the effect of a difference between actual and planned selling price on contribution margin.
True False
13. Fixed costs are not considered in contribution margin analysis.
True False
14. The unit price factor is computed only for sales.
True False
15. The quantity factor and unit sales factor must always be positive.
True False

Multiple Choice Questions

1. Which of the following statements is true regarding absorption costing?
 - a) It is not the traditional costing approach.
 - b) It is not permitted to be used for financial reporting.
 - c) It assigns all manufacturing costs to products.
 - d) It assigns only variable manufacturing costs to products.

2. Which of the following statements is true regarding variable costing?
 - a) It is a traditional costing approach.
 - b) Only manufacturing costs that change in total with changes in production level are included in product costs.
 - c) It is not used for managerial reporting.
 - d) It treats overhead in the same manner as absorption costing.

3. Which of the following statements is true?
 - a) Variable costing treats fixed overhead as a period cost.
 - b) Absorption costing treats fixed overhead as a period cost.
 - c) Absorption costing treats fixed overhead as an expense in the period it is incurred.
 - d) Variable costing excludes all overhead from product costs.

4. Under absorption costing, a company had the following unit costs when 8,000 units were produced.

Direct labor	\$8.50
Direct materials	9.00
Variable overhead	6.75
Fixed overhead	<u>7.50</u>
Total unit cost	\$31.75

Compute the total production cost per unit under variable costing if 30,000 units had been produced.

- a) \$31.75
- b) \$27.25
- c) \$26.25
- d) \$24.25

5. Which of the following statements is true?
- A per unit cost that is constant at all production levels is a variable cost per unit.
 - Net income under variable costing is affected by production level changes.
 - A per unit cost that is constant at all production levels is a fixed cost per unit.
 - Net income under absorption costing is not affected by production level changes.
6. Under absorption costing, a company had the following unit costs when 8,000 units were produced.

Direct labor	\$8.50
Direct materials	9.00
Variable overhead	6.75
Fixed overhead \$60,000/8,000 units	<u>7.50</u>
Total unit cost	\$31.75

If 20,000 units were produced, production cost per unit under variable costing would be:

- \$31.75
 - \$27.25
 - \$26.25
 - \$24.25
7. Which of the following best describes costs assigned to the product under the variable costing method?
- Direct labor (DL)
 Direct materials (DM)
 Variable selling and administrative
 Variable manufacturing overhead
 Fixed selling and administrative
 Fixed manufacturing overhead
- DL, DM, variable selling and administrative costs and variable manufacturing overhead.
 - DL, DM, and variable manufacturing overhead.
 - DL, DM, variable manufacturing overhead and fixed manufacturing overhead.
 - DL and DM.

The next 5 questions refer to the following information:
Advanced Company reports the following information for the current year.
There was no beginning inventory this year.

Units produced	25,000
Units sold	15,000
Direct materials	\$9.00/unit
Direct labor	\$11.00/unit
Variable overhead	\$75,000
Fixed overhead	\$137,500

8. Compute the cost per unit of finished goods under variable costing.
 - a) \$20.00
 - b) \$25.00
 - c) \$21.88
 - d) \$23.00

9. Compute the cost per unit of finished goods under absorption costing.
 - a) \$20.00
 - b) \$34.17
 - c) \$25.32
 - d) \$28.50

10. Compute the cost of finished goods in inventory under absorption costing.
 - a) \$285,000
 - b) \$712,500
 - c) \$427,500
 - d) \$230,000

11. Compute the cost of finished goods in inventory under variable costing.
 - a) \$285,000
 - b) \$712,500
 - c) \$427,500
 - d) \$230,000

12. If the product is sold for \$50 per unit and fixed operating expenses are \$200,000, compute the net income under absorption costing.
- a) \$55,000
 - b) \$67,500
 - c) \$80,500
 - d) \$122,500
13. If the product is sold for \$50 per unit and fixed operating expenses are \$200,000, compute the net income under variable costing.
- a) \$55,000
 - b) \$67,500
 - c) \$80,500
 - d) \$122,500

Solutions to Practice Problems

Practice Problem #1

	<u>Variable Costing</u>		<u>Absorption Costing</u>	
	<u>Product</u>	<u>Period</u>	<u>Product</u>	<u>Period</u>
	<u>Cost</u>	<u>Cost</u>	<u>Cost</u>	<u>Cost</u>
Direct materials	X		X	
Direct labor	X		X	
Variable overhead	X		X	
Fixed overhead		X	X	
Variable selling		X		X
Fixed selling		X		X
Variable administrative		X		X
Fixed administrative		X		X

Practice Problem #2

	<u>Income</u>	<u>Fixed Overhead Deferred or Released</u>
January	Same	Neither
February	Absorption > Variable	Deferred
March	Variable > Absorption	Released

January Income is identical under variable costing and absorption costing when the units produced equal the units sold.

February When units produced exceed units sold, income under variable costing is less than income under absorption costing. This is because some of fixed overhead was allocated to ending inventory under absorption costing, but all of fixed overhead was expensed under variable costing.

March When units produced are less than units sold, income under variable costing is greater than income under absorption costing. This is because absorption costing is expensing some of a prior period's fixed overhead in addition to the current period's fixed overhead, while variable costing is only expensing the current period's fixed overhead.

Practice Problem #3:

	<u>Absorption</u>		<u>Variable</u>
Sales	\$7,500,000	Sales	\$7,500,000
Cost of goods sold	5,800,000	Variable costs	2,650,000
\$8 + \$4 + \$104 = \$116		\$8 + \$4 + \$41 = \$53	
Gross margin	1,700,000	Contribution margin	4,850,000
Operating expenses	1,000,000	Fixed cost	4,339,000
		3,339,000 + 1,000,000	
Net income	700,000		511,000

Proof: 3,000 units produced and not sold x (\$104 - \$41) = \$189,000
 Net income: absorption \$700,000 – variable 189,000 = \$189,000

	<u>Variable Rate</u>	<u>Total rate</u>
Overhead cost	<u>\$2,173,000</u>	<u>\$5,512,000</u>
Units produced	53,000	53,000
Rate	= \$41.00	= \$104.00

Practice Problem #4

	<u>Absorption</u>		<u>Variable</u>
Sales	\$6,480,000	Sales	\$6,480,000
Cost of goods sold	2,419,200	Variable production	1,987,200
\$1.80 + \$.30 + \$1.26 = \$3.36		\$1.80 + \$.30 + \$.66 = \$2.76	
Gross margin	4,060,800	Variable selling	18,000
Operating expenses	71,000	Contribution margin	4,478,800
53,000 + 18,000		Fixed cost	503,000
Net income	\$3,989,800	450,000 + 53,000	
			\$3,971,800

Proof: 30,000 units produced and not sold x (\$3.36 - \$2.76) = \$18,000
 Net income: absorption \$3,989,800 – variable 3,971,800 = \$18,000

	<u>Variable Rate</u>	<u>Total rate</u>
Overhead cost	<u>\$495,000</u>	<u>\$945,000</u>
Units produced	750,000	750,000
Rate	= \$.66	= \$1.26

Practice Problem #5

Variable overhead	$\frac{\$9,300,000}{62,000}$	= \$150 per unit
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Fixed overhead	$\frac{\$4,340,000}{62,000}$	= \$70 per unit
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	<u>Variable Costing</u>	<u>Absorption Costing</u>
Direct materials	\$15	\$15
Direct Labor	41	41
Variable overhead	150	150
Fixed overhead	<u>0</u>	<u>70</u>
Total Cost per Unit	\$206	\$276

Units produced	62,000	
Units sold	59,000	
Units in inventory	3,000	3,000
Total Cost per Unit	\$206	\$276
Value of ending inventory	\$618,000	\$828,000

Solutions to True / False Problems

1. True
2. True
3. False – Production costs would be $\$9.00 + \$2.00 = \$11.00$
 $\$50,000/25,000 = \2.00
4. True
5. False - $\$1,200,000 / 3,000 = \400 fixed overhead included in absorption cost and not variable cost
6. False – variable costing classifies costs by behavior.
7. True
8. True
9. False – When units produced are less than units sold, fixed overhead is released from inventory under absorption costing, resulting in the income under absorption costing which is less than income under variable costing.
10. True
11. False – Variable costing is not acceptable for external reporting since it is not GAAP.
12. False - The quantity factor measures the effect of a difference between actual and planned units sold on contribution margin.
13. True
14. False – the unit price factor is computed for both sales and variable costs.
15. False – both factors could be negative, depending on whether actual or planned results were larger.

Solutions to Multiple Choice Questions

- | | |
|-----|---|
| 1. | C |
| 2. | B |
| 3. | A |
| 4. | D |
| 5. | A |
| 6. | D |
| 7. | B |
| 8. | D |
| 9. | D |
| 10. | A |
| 11. | D |
| 12. | D |
| 13. | B |