

VARIABLE COSTING

Key Topics to Know

- Differences between variable and absorption costing
- Fixed manufacturing overhead as a product versus period cost
- Effect of variable costing on
 - Cost applied to units in inventory
 - Units sold
 - Operating income for the year
 - Operating income over a several year period
- How changes in inventory levels affect operating income
- Reconcile operating income determined under variable costing with operating income determined under absorption costing
- Advantages of variable costing and the contribution approach
- Contribution margin analysis
 - Compute the quantity factor
 - Compute the unit price/cost factor
 - Reconcile planned and actual contribution margin

Problems

Problem #1

M Company had variable costing operating income of \$86,300. Ending inventory decreased during the year from 42,000 units to 40,000 units. During both last year and this year, fixed manufacturing overhead was \$800,000 and 100,000 units were produced.

Required: Determine the absorption costing operating income for this year

Problem #2

W Company, a manufacturer of railroad crossing gates, obtained the following information from its accounting and production records. At the end of Year 1, there were 5,000 gates in finished goods inventory. The company used absorption costing.

	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Year 5</u>
Gates produced	10,000	10,000	9,000	10,000
Gates sold	10,000	8,000	12,000	9,000
Fixed overhead	\$50,000	\$50,000	\$45,000	\$50,000
Variable overhead	\$100,000	\$100,000	\$90,000	\$100,000
Operating income	\$60,000	\$48,000	\$66,000	\$60,000

- Required:
- a) Determine the operating income under variable costing by year and in total for Years 2 through 5
 - b) Explain how the changing inventory levels affected annual operating income and total operating income.
 - c) Explain how an increase in the overhead rate in Year 5 would affect operating income.

Problem #3

O Company, which has only one product, has provided the following data concerning its most recent month of operations:

Selling price	\$108
Units:	
Beginning inventory	0
Produced	1,100
Sold	<u>900</u>
Ending inventory	200
Variable costs per unit:	
Direct materials	\$28
Direct labor	30
Overhead	7
Selling expense	11
Fixed costs:	
Overhead	\$14,300
Selling expense	1,800

- Required:
- Prepare a contribution format income statement for the month using variable costing.
 - Prepare an income statement for the month using absorption costing.
 - What is the value of ending inventory using variable costing?
 - What is the value of ending inventory using absorption costing?

Problem #4

P Company, which has only one product, has provided the following data concerning its most recent month of operations:

Selling price	\$112
Units:	
Beginning inventory	500
Produced	2,800
Sold	<u>2,900</u>
Ending inventory	400
Variable costs per unit:	
Direct materials	\$37
Direct labor	19
Overhead	7
Selling expense	5
Fixed costs:	
Overhead	\$109,200
Selling expense	5,800

The company produces the same number of units every month, although the sales in units vary from month to month. The company's variable costs per unit and total fixed costs have been constant from month to month.

- Required:
- Prepare a contribution format income statement for the month using variable costing.
 - Without preparing an income statement, determine the absorption costing net operating income for the month.
 - What is the value of ending inventory using variable costing?
 - What is the value of ending inventory using absorption costing?

Multiple Choice Questions

1. Fixed manufacturing overhead is included in product costs under:
- | | <u>Absorption Costing</u> | <u>Variable Costing</u> |
|-----|---------------------------|-------------------------|
| I | Yes | Yes |
| II | No | No |
| III | No | Yes |
| IV | Yes | No |
- a) I
b) II
c) III
d) IV
2. Which of the following are considered to be product costs under variable costing?
- I Variable manufacturing overhead
II Fixed manufacturing overhead
III Variable selling and administrative expenses
- a) I
b) I and II
c) I and III
d) I, II and III
3. Which of the following are considered to be product costs under absorption costing?
- I Variable manufacturing overhead
II Fixed manufacturing overhead
III Variable selling and administrative expenses
- a) I
b) I and II
c) I and III
d) I, II and III
4. Selling and administrative expenses are considered to be:
- a) A product cost under variable costing.
b) A product cost under absorption costing.
c) Part of fixed manufacturing overhead under variable costing.
d) A period cost under variable costing.

5. Over an extended period of time in which the final ending inventories are zero, the accumulated operating income reported under absorption costing will be:
- Greater than reported under variable costing.
 - Less than reported under variable costing.
 - The same as reported under variable costing.
 - Greater or less than reported under variable costing as no generalization can be made.
6. Last year, C Company had a net operating income of \$80,000 using absorption costing and \$74,500 using variable costing. The fixed manufacturing overhead cost was \$5 per unit. There were no beginning inventories. If 21,500 units were produced last year, then sales last year were:
- 16,000
 - 20,400
 - 22,600
 - 27,000

The next 2 questions refer to the following information.

F Company which produces a single product, has provided the following data for its most recent month of operations:

Number of units produced	8,000
Variable costs per unit:	
Direct materials	\$40
Direct labor	\$77
Variable manufacturing overhead	\$8
Variable selling and administrative expense	\$7
Fixed costs:	
Fixed manufacturing overhead	\$464,000
Fixed selling and administrative expense	\$448,000

There were no beginning or ending inventories.

7. The absorption costing unit product cost was:
- \$125
 - \$246
 - \$117
 - \$183

8. The variable costing unit product cost was:
- \$125
 - \$246
 - \$117
 - \$183
9. U Company, which has only one product, has provided the following data concerning its most recent month of operations:

Units in beginning inventory	0
Units produced	6,300
Units sold	6,000
Units in ending inventory	300
Selling price	\$99
Variable costs per unit:	
Direct materials	\$12
Direct labor	\$42
Variable manufacturing overhead	\$6
Variable selling and administrative	\$6
Fixed costs:	
Fixed manufacturing overhead	\$170,100
Fixed selling and administrative	\$24,000

What is the net operating income for the month under variable costing?

- \$8,100
- \$3,900
- \$12,000
- (\$14,100)

10. W Company produces a single product. Data for June's operations follow:

Units in beginning inventory	0
Units produced	6,000
Units sold	5,000
Variable costs per unit:	
Manufacturing	\$7
Selling and administrative	\$3
Fixed costs in total:	
Manufacturing	\$12,000
Selling and administrative	\$3,000

Under variable costing, ending inventory would be valued at:

- a) \$7,000
- b) \$9,000
- c) \$2,000
- d) \$5,000

11. R Company's absorption costing income statement for March was:

R Company		
Income Statement		
For the Month Ended March 31		
Sales (2,400 units)		\$48,000
Cost of goods sold		<u>24,000</u>
Gross margin		24,000
Selling and administrative expenses:		
Fixed	\$7,200	
Variable	<u>9,600</u>	<u>16,800</u>
Net operating income		<u>\$7,200</u>

During March, variable production costs were \$8 per unit and fixed overhead was \$5,000. The variable costing break-even point in units would be:

- a) 600
- b) 900
- c) 1,107
- d) 1,525

12. S Company manufactures a single product. The following data pertain to the company's operations over the last two years:

Variable costing net operating income, last year	\$58,000
Variable costing net operating income, this year	\$64,000
Fixed manufacturing overhead costs released from inventory under absorption costing, last year	\$11,000
Fixed manufacturing overhead costs deferred in inventory under absorption costing, this year	\$20,000

What was the absorption costing net operating income this year?

- a) \$55,000
- b) \$73,000
- c) \$44,000
- d) \$84,000

Solutions to Problems

Problem #1

Inventory decrease	42,000 – 40,000 =	-2,000
Fixed overhead per unit	\$800,000 / 100,000 units =	<u>X \$8.00</u>
Absorption costing income less than variable costing income by		-\$16,000
Variable costing net income		<u>86,300</u>
Absorption costing net income		\$70,300

Proof:

Under variable costing, fixed overhead was expensed was	\$800,000
Under absorption costing, fixed overhead was expensed was	
100,000 units produced and sold + 2,000 units sold from	
inventory = 102,000 units sold x \$8.00 =	<u>\$816,000</u>
Additional fixed overhead expensed under absorption costing	\$16,000
Variable costing net income	<u>86,300</u>
Absorption costing net income	\$70,300

Problem #2

a)

	<u>2008</u>	<u>2009</u>	<u>2010</u>	<u>2011</u>	<u>Total</u>
Change in inventory	0	2,000	-3,000	1,000	0
Fixed overhead rate	\$5.00	\$5.00	\$5.00	\$5.00	
Fixed overhead deferred in inventory	\$0	\$10,000	-\$15,000	\$5,000	\$0
Absorption Costing Operating income	\$60,000	\$48,000	\$66,000	\$60,000	\$234,000
Variable Costing Operating Income	\$60,000	\$38,000	\$81,000	\$55,000	\$234,000

- b) Increases in inventory levels (2009 and 2011) deferred fixed overhead costs in inventory under absorption costing. Operating income was higher in those years because less fixed overhead was included in cost of goods sold than was incurred for the year.

Decreases in inventory levels (2010) mean that units produced in the prior year(s) were sold in the current year. Since the unit costs under absorption costing include fixed overhead, more fixed overhead was included in cost of goods sold than was incurred for the year.

Inventory was 5,000 gates at the end of 2007 and the end of 2011. Since the overhead rate and the units in inventory did not change over the 4 years, total operating income under absorption costing was exactly the same as operating income under variable costing.

- c) An increase in the fixed overhead rate would increase the fixed overhead cost deferred into inventory in 2011, resulting in a higher operating income under absorption income than shown above. Because of the increased deferral, absorption income would result in a higher total operating income for the 4 years even though the units in ending inventory were the same the beginning and end of the period.

Problem #3

a)		
	Sales (\$108 x 900 units)	\$97,200
	Variable expenses:	
	Cost of goods sold (\$65 x 900 units)	<u>58,500</u>
	Manufacturing Margin	38,700
	Selling expense (\$11 x 900 units)	<u>9,900</u>
	Contribution margin	28,800
	Fixed expenses:	
	Overhead	14,300
	Selling expense	<u>1,800</u>
	Operating income	\$12,700
b)		
	Sales (\$108 x 900 units)	\$97,200
	Cost of goods sold (\$78 x 900 units)	<u>58,500</u>
	Gross margin	28,800
	Selling expense (\$11 x 900 units)+1,800	<u>11,700</u>
	Operating income	\$15,300
c)		
	Ending inventory	200 units
	Variable product cost (\$28+30+7)	<u>\$65.00</u>
	Ending inventory	\$13,000
d)		
	Ending inventory	200 units
	Absorption product cost (\$28+30+7+14,300/1,100)	<u>\$78.00</u>
	Ending inventory	\$15,600

Problem #4

a)		
	Sales	\$324,800
	Variable expenses:	
	Cost of goods sold (\$63 x 2,900 units)	<u>182,700</u>
	Manufacturing Margin	142,100
	Selling expense (\$5 x 2,900 units)	<u>14,500</u>
	Contribution margin	127,600
	Fixed expenses:	
	Overhead	109,200
	Selling expense	<u>5,800</u>
	Operating income	\$12,600
b)		
	Fixed Overhead	<u>\$109,200</u>
	Units produced	2,800
	Units in ending inventory	400
	Units in beginning inventory	500
	Decrease in inventory	100 units
	Fixed overhead released	\$3,900
	Variable costing Operating income	<u>12,600</u>
	Absorption costing Operating income	\$8,700
c)		
	Ending inventory	400 units
	Variable product cost (\$37+19+7)	<u>\$63.00</u>
	Ending inventory	\$25,200
d)		
	Ending inventory	400 units
	Absorption product cost (\$28+30+7+109,200/2,900)	<u>\$102.00</u>
	Ending inventory	\$40,800

Solutions to Multiple Choice Questions

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