

## Formula Sheet for C253

This formula sheet is not a comprehensive list of formulas for the course. It provides many useful formulas to be utilized by the students as they prepare for the assessment.

### Job-Order Costing

1. Pre-determined MOH rate = Estimated MOH/Estimated units of Allocation base

#### **Predetermined Overhead Rate (POR)**

Estimated Overhead Costs / Estimated Activity Base

The following information has been gathered for the Harrell Manufacturing Company for its fiscal year ending December 31:

Actual manufacturing overhead costs	\$ 212,500
Actual direct labor hours	54,900
Actual direct labor costs	\$ 445,000
Estimated manufacturing overhead costs	\$ 210,000
Estimated direct labor	\$ 434,000
Estimated direct labor hours	56,000

What is the predetermined manufacturing overhead rate, assuming direct labor cost is used as the activity base?

$\$210,000 / \$434,000 = \$0.48$  of actual overhead allocated per \$1 of direct labor paid

2. Applied MOH = Pre-determined MOH rate\*Actual units of the Allocation Base

#### **Overhead Applied**

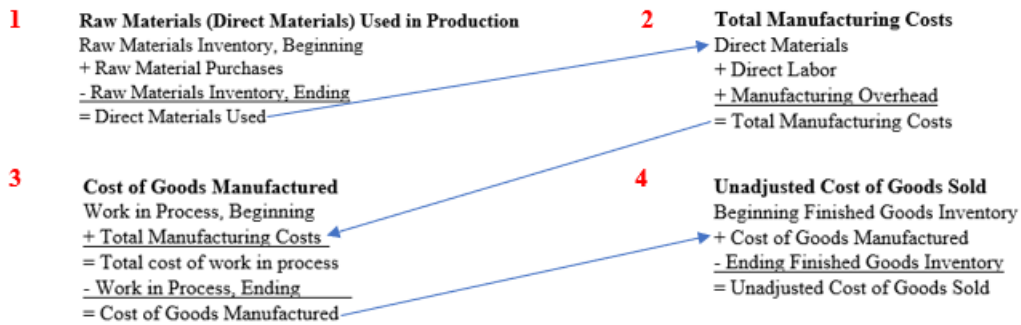
POR x Actual Amount of the Activity Base for the Period

From previous example: \$500,000 direct labor dollars were actually recorded during the year.

$\$0.48 * \$500,000 = \$240,000$  overhead applied (meaning moved from expenses to cost of goods manufactured)

3. Under/Over Applied MOH = Actual MOH – Applied MOH
4. Job cost = Direct Materials used + Direct Labor + Applied MOH
5. Cost of Goods Manufactured = Direct Materials used + Direct Labor + Applied MOH + (Beg WIP – End WIP)

At any one point in time, inventory in a manufacturing business will be presented on the balance sheet in one of three sub-accounts: Inventory Raw Materials, Inventory Work in Process (started but not finished), Finished Goods Inventory. As inventory is used, it “moves” according to the following process:



6. Cost of Goods Sold = Cost of Goods Manufactured + (Beg Finished Goods – Ending Finished Goods)

7. Adjusted Cost of Goods Sold = Cost of Goods Manufactured + (Beg Finished Goods – Ending Finished Goods) +/- Under/Over applied MOH

**Unadjusted Cost of Goods Sold**  
Beginning Finished Goods Inventory  
+ Cost of Goods Manufactured  
- Ending Finished Goods Inventory  
= Unadjusted Cost of Goods Sold

**Adjusting Cost of Goods Sold**  
COGS – Overapplied Overhead (Decreases or credits COGS)  
COGS + Underapplied Overhead (Increases or debits COGS)

Morton Inc. has provided the following data for the month of November. The balance in the Finished Goods inventory account at the beginning of the month was \$49,000 and at the end of the month was \$45,000. The cost of goods manufactured for the month was \$226,000. The actual manufacturing overhead cost incurred was \$74,000 and the manufacturing overhead cost applied to Work in Process was \$70,000. The adjusted cost of goods sold that would appear on the income statement for November is:

	Unadjusted	Overhead (Underapplied) Overapplied	Adjusted (What's on the Income Stmt.)
Beginning Finished Goods Inventory	49,000	-	49,000
+ Cost of Goods Manufactured	226,000	-	226,000
- <b>Cost of Goods Sold</b>	<b>(230,000)</b>	(4,000)	(234,000)
= Ending Finished Goods Inventory	45,000	(4,000)	41,000

Actual overhead costs included in operating expenses as debits:	74,000
Overhead costs credited out of operating expenses during the year and debited to Cost of Goods Manufactured as an estimate:	70,000
Adjustment to "true-up" overhead applied to inventory costs (Estimated overhead was underapplied during the year)	<u>(4,000)</u>

## Process Costing

### Weighted-Average method

1. Units transferred = Beg WIP + Units started – End WIP
2. Equivalent units for materials = (Units transferred\*100%) + (End WIP\*completion%)
3. Equivalent units for conversion = (Units transferred\*100%) + (End WIP\*completion%)

#### **Weighted Average Equivalent Units of Production (EUP)**

Units Completed and Transferred Out + EUP in Ending WIP Inventory

In cost accounting, **equivalent units** are the **units** in production multiplied by the percentage of those **units** that are complete (100 percent) or those that are in process. That covers everything. If a **unit** is completed and transferred out, it's 100 percent complete.

A company has the following work in process inventory information:

- 8,000 units were in beginning inventory.
- 15,000 units were started.
- 4,000 units were in ending inventory.
- Beginning inventory is 40% complete for materials and 60% complete for conversion.
- Ending inventory is 20% complete for materials and 60% complete for conversion.

What is the number of equivalent units for materials using weighted average process costing?

#### **1. Unit Quantity Schedule**

	<b>Total Units</b>	<b>Materials</b>	<b>Direct Labor</b>
Beginning Work in Process Inventory	8,000		
Units Started	15,000		
Units Accounted For	<u>23,000</u>		
Units Completed and Transferred to Finished Inventory	19,000		
Ending Work in Process Inventory	<u>4,000</u>		
Units Accounted For	<u>23,000</u>		

#### **2. Equivalent Unit Schedule**

	<b>Total Units</b>	<b>Materials</b>	<b>Direct Labor</b>
Ending Work in Process Percentage of Completion	100%	20%	60%
Units Completed and Transferred to Finished Inventory	19,000	19,000	19,000
Ending Work in Process Inventory	<u>4,000</u>	<u>800</u>	<u>2,400</u>
Total Equivalent Units	<u>23,000</u>	<b>19,800</b>	<b>21,400</b>

**A:** => (Materials = 4000 \* 20%; Direct Labor = 4000\* 60%)

4. Cost/equivalent unit for materials = (Beg WIP\$ + Current Costs\$)/Equivalent units for materials
5. Cost/equivalent unit for conversion = (Beg WIP\$ + Current Costs\$)/Equivalent units for conversion
6. Costs assigned to units transferred = (Units transferred\*cost/eq unit for materials) + (Units transferred\*cost/eq unit for conversion)

6. Costs assigned to End WIP = (End WIP eq. units for materials\*cost/eq unit for materials) + (End WIP eq. units for conversion\*cost/eq unit for conversion)

### Weighted Average Cost per EUP

(Costs in Beginning WIP Inventory + Costs Added During the Period) / EUP

The Lakeside Company uses a weighted-average process costing system. The following data are available:

Beginning inventory	-0-
Units started in production	20,000
Units finished during the period	16,000
Units in process at the end of the period (complete as to materials, ¼ complete as to labor and overhead)	4,000
Cost of materials used	\$ 35,200
Labor and overhead costs	\$ 37,400

Cost per equivalent unit of materials is:

#### 1. Unit Quantity Schedule

	Total Units	Materials	Direct Labor
Beginning Work in Process Inventory	-		
Units Started	20,000		
Units Accounted For	20,000		
Units Completed and Transferred to Finished Inventory	16,000		
Ending Work in Process Inventory	4,000		
Units Accounted For	20,000		

#### 2. Equivalent Unit Schedule

	Total Units	Materials	Direct Labor
Ending Work in Process Percentage of Completion	100%	100%	25%
Units Completed and Transferred to Finished Inventory	16,000	16,000	16,000
Ending Work in Process Inventory	4,000	4,000	1,000 <sup>A</sup>
Total Equivalent Units	20,000	20,000	17,000

<sup>A</sup>: => (Materials = 4000 \* 100%; Direct Labor = 4000 \* 25%)

#### 3. Cost per Equivalent Unit Schedule

	Total Cost	Materials	Direct Labor
Beginning Work in Process Inventory Costs	\$ -	\$ -	\$ -
Units Started	\$ 35,200	\$ 37,400	
Cost Accounted For	\$ 35,200	\$ 37,400	
Total Equivalent Units		20,000	17,000
Cost per Equivalent Unit	\$ 3.96	\$ 1.76	\$ 2.20

## FIFO Method

13. A company had 1,000 units in beginning work in process, 80% complete for materials and 30% complete for conversion. During the period, 10,000 units were started. At the end of the month, 800 units were in ending work in process: 70% complete for materials, and 40% complete for conversion.

What is the equivalent units for materials using the first-in, first-out (FIFO)?

	Direct Materials	Labor Conversion		
Percentage Remaining of Beginning WIP	20%	70%		
Beginning WIP	* 1,000	1,000		
Beginning Equivalent WIP	= 200	700	A	
Percentage Complete of Ending WIP	70%	40%		
Ending WIP	* 800	800		
Ending Equivalent WIP	= 560	320	B	
Units Started and Completed	9,200	9,200	C	
Total Equivalent Units	9,960	10,220	(A+B+C)	

Beginning Units	1000
+ Units Added	10000
- Ending Units	-800
= Units Completed	10200
- Beginning Units	-1000
= Units Started and Completed	9200

	Units	Percent Completed	Direct Materials Costs	Conversion Costs
Beginning work in process	10,000	90%	\$10,000	\$30,000
Units started and completed during the period	50,000			
Costs added this period			\$110,000	\$200,000
Ending work in process	20,000	30%		
Units completed and transferred during the period	60,000			

Materials are added at the beginning of the production process. Conversion costs are added uniformly throughout the production process.

Assuming a FIFO flow of costs, what is Balartistry Company's computed total production cost per equivalent unit for work done during the period?

### A. Prepare an Equivalent Units Schedule for Ending Inventory

	Direct Materials	Labor Conversion	
Percentage Remaining of Beginning WIP	0%	10%	
Beginning WIP	* 10,000	10,000	
Beginning Equivalent WIP	= -	1,000	A
Percentage Complete of Ending WIP	100%	30%	
Ending WIP	* 20,000	20,000	
Ending Equivalent WIP	= 20,000	6,000	B
Units Started and Completed	50,000	50,000	C
Total Equivalent Units	70,000	57,000	(A+B+C)

### B. Compute the cost per Equivalent Unit

	Total	Direct Materials	Labor Conversion
Total equivalent units accounted for		70,000	57,000
Total cost accounted for		\$ 110,000	\$ 200,000
Cost per Equivalent Unit	\$ 5.08	\$ 1.57	\$ 3.51

## Variable and Absorption Costing

1. Variable costing product cost = Direct Material + Direct Labor + Variable MOH
2. Absorption costing product cost = Direct Material + Direct Labor + Variable MOH + Fixed Manufacturing overhead
3. Difference in Net Income between Variable and Absorption costing = Ending inventory\*Fixed MOH/unit

Selling price

\$

150

Units in beginning inventory

0

Units produced

2,500

Units sold

1,800

Units in ending inventory

700

Variable cost per unit:

Direct materials

\$

30

Direct labor

\$

36

Variable manufacturing overhead

\$

8

Variable selling and administration

\$

6

Fixed costs:

Fixed manufacturing overhead

\$

36,000

Fixed selling and administration

\$

10,000

Calculate amounts under absorption and variable costing.

Classify each income statement calculation with the method used to determine it.

Select your answer from the pull-down list.

Under Variable Costing, only variable manufacturing costs are included in the inventory product cost.

Absorption Costing includes both variable and fixed manufacturing costs in the inventory product cost.

1

Variable Costing

Absorption Costing

Direct Materials

\$

30.00

\$

30.00

Direct Labor

36.00

36.00

Variable Overhead

8.00

8.00

Fixed Overhead

-

14.40

Total Inventory Product Cost

\$

74.00

\$

88.40

Fixed Overhead

Divided by

Units Produced

= Per Unit Cost

\$36,000

2500

\$14.40

2

Units

\$ Per Unit

Total Variable

Total Absorption

Sales Revenue

1800

\$ 150.00

\$ 270,000

\$ 270,000

Cost of Good Sold

1800

\$74 or \$88.40

\$ 133,200

\$ 159,120

Gross Profit

\$ 136,800

\$ 110,880

Less:

Fixed Overhead

\$ 36,000

\$ -

Fixed Selling and Admin

\$ 10,000

\$ 10,000

Variable Selling and Admin

1800

6.00

\$ 10,800

\$ 10,800

Net Income

\$ 80,000

\$ 90,080

3

Total Variable

Total Absorption

Ending Finished Inventory

700 Units

\$ 51,800

\$ 61,880

## 2. Material Quantity Variance = (AQ-SQ)\*SP

### Materials Quantity Variance

$SP(AQ - SQ)$

Degregorio Corporation makes a product that uses a material with the following direct material standards:

Standard quantity.....	3.8	kilos per unit
Standard price.....	\$7.00	per kilo

The company produced 5,600 units in November using 21,750 kilos of the material. During the month, the company purchased 24,800 kilos of the direct material at a total cost of \$168,640. The direct materials purchases variance is computed when the materials are purchased.

The materials quantity variance for November is:

First, calculate Standard Quantity (SQ): 5,600 units produced \* 3.8 kilos/unit = 21,280 kilos used.

Then: Standard Price (SP) \$7.00 \* (Actual Quantity (AQ) 21,750 – SQ 21,280) = 3,290 variance.

The variance is Unfavorable because they actually used more materials than expected.

## 3. Labor rate variance = (AR-SR)\*AH

### Labor Rate Variance

$AH(AR - SR)$

The following labor standards have been established for a particular product:

Standard labor-hours per unit of output .....	1.7	hours
Standard labor rate .....	\$14.05	per hour

The following data pertain to operations concerning the product for the last month:

Actual hours worked .....	3,700	hours
Actual total labor cost.....	\$50,690	
Actual output.....	2,300	units

What is the labor rate variance for the month?

First, calculate actual rate (AR): \$50,690 actual labor cost / 3,700 actual hours = \$13.70 per hour

AH 3,700 \* (\$13.70 - \$14.05) = \$1,295 variance.

The variance is Favorable because the actual labor rate was less than expected.

#### 4. Labor Efficiency variance = (AH-SH)\*SR

##### **Labor Efficiency Variance**

SR(AH – SH)

The following labor standards have been established for a particular product:

Standard labor-hours per unit of output .....	8.3	hours
Standard labor rate .....	\$12.10	per hour

The following data pertain to operations concerning the product for the last month:

Actual hours worked .....	6,100	hours
Actual total labor cost .....	\$71,370	
Actual output .....	900	units

What is the labor efficiency variance for the month?

First, calculate standard hours (SH): 900 actual units products \* 8.3 standard hours per unit = 7,470 SH.

SR \$12.10 \* (6,100 AH – 7,470 SH) = \$16,577 labor efficiency variance.

The variance is Favorable because the production requires less hours than expected.

#### 5. Variable overhead spending variance = (AR-SR)\*AH

##### **Variable Overhead Rate Variance**

AH(AR – SR)

The following standards for variable manufacturing overhead have been established for a company that makes only one product:

Standard hours per unit of output .....	5.6	hours
Standard variable overhead rate .....	\$12.00	per hour

The following data pertain to operations for the last month:

Actual hours .....	2,600	hours
Actual total variable manufacturing overhead cost .....	\$31,330	
Actual output .....	400	units

What is the variable overhead rate variance for the month?

First, calculate the actual rate (AR) per hour: \$31,330 variable costs / 2,600 hours = \$12.05 AR.

AH 2,600 \* (AR \$12.05 – SR \$12.00) = \$130 variable overhead rate variance.

The variance is Unfavorable because the actual overhead cost was more than expected.



## 6. Variable overhead efficiency variance = (AH-SH)\*SR

### Variable Overhead Efficiency Variance SR(AH – SH)

The following data have been provided by Gerlach Corporation, a company that produces forklift trucks:

Budgeted production.....	1,900	trucks
Standard machine-hours per truck.....	8.6	machine-hours
Standard supplies cost.....	\$4.20	per machine-hour
Actual production.....	2,000	trucks
Actual machine-hours .....	16,970	machine-hours
Actual supplies cost (total).....	\$78,137	

Supplies cost is an element of variable manufacturing overhead. The variable overhead efficiency variance for supplies cost is:

First calculate SH: 8.6 hours per truck \* 2,000 actual trucks produced = 17,200 standard hours.

Variable OH Efficiency Variance: Standard cost (SR) \$4.20 \* (16,970 AH – 17,200 SH) = \$966.

The \$966 variance is Favorable because actual hours in production were less than expected.

## Differential Analysis

### 1. Segment Elimination decision:

Segment Margin = Sales revenue – variable costs – Avoidable Fixed costs.

If Segment Margin is positive retain the segment

47. A company is considering whether it should drop business segment A. After analyzing their cost structure, the company determines that it has \$400,000 in total company-wide fixed costs and that \$40,000 of these fixed costs are associated with segment A. Avoidable costs equal \$30,000, and unavoidable costs equal \$10,000.

Should the company continue or discontinue Segment A if the segment's contribution margin is \$25,000?

	Segment A	Discontinued	
Sales revenue	\$ 25,000	\$ -	
Variable costs	-	-	
Avoidable fixed costs	(30,000)	-	
Allocated fixed costs	(10,000)	(10,000)	
Net income (loss)	\$ (15,000)	\$ (10,000)	\$ 5,000 Discontinue

## 2. Make-or-Buy Decision:

Cost to Make = Variable Costs + Avoidable Fixed costs

Cost to BUY: Purchase costs

Select the lower of the two costs

18. A company presently manufactures and assembles all parts for its toy truck product. Another toy company has offered to sell the parts for \$3.00 per truck. If the company buys the truck parts instead of making them, the space used in producing the parts could be used for a new toy monster, which is scheduled to begin production next year. If the company continues to produce the parts, it will have to lease space in an adjacent building for \$20,000 per year to produce the parts for the new toy monster.

Cost information related to the production of the toy truck parts:

Cost per unit:	
Direct materials	\$ 1.20
Direct labor	\$ 0.40
Variable manufacturing overhead	\$ 0.30
Fixed manufacturing overhead	\$ 0.20
Total manufacturing costs	\$ 2.10

The marketing department estimated that sales for the toy truck will be approximately 15,000 units per year for the next three years. The fixed manufacturing overhead is indirect and will still be incurred regardless of what decision is made.

How much will overall annual net income change if this company decides to buy the parts?

**Note: I made up a sales price of \$10 per truck just for illustration. It won't change the answer.**

	Make Parts	Buy Parts	
Sales	\$ 150,000	\$ 150,000	
Cost of Manufacturing:			
Direct materials	18,000	-	
Direct labor	6,000	-	
Variable OH	4,500	-	
Fixed OH	3,000	3,000	
Total Cost of Manufacturing	31,500	3,000	
Cost of Goods Purchased	-	45,000	
Cost of Lease	20,000	-	
Profit	\$ 98,500	\$ 102,000	\$ 3,500

## 3. Sell as-is or Process Further decision

Incremental Profit = Incremental Revenue – Incremental costs to process further.

If incremental profit is positive, then process further

53. A company that currently produces final product A is considering stopping processing earlier in the production process and selling the intermediary product on the market. The final product sells for \$110 per unit, whereas the firm believes it can sell the partially processed intermediary product for \$90 per unit. The firm sells 1,000 units per quarter and faces a total finish processing cost of \$50,000 per year after split-off.

Should the firm sell the intermediary good or the final good?

	Final Product 1000 Units	Intermediary Product 1000 Units	Variance
Sales Revenue	\$ 110,000	\$ 90,000	
Final Processing Cost per quarter	\$ 12,500	-	
Total Quarterly Profit	\$ 97,500	\$ 90,000	\$ 7,500

(\$50,000 / 4 quarters)

## 4. Constrained Resource Decision

Contribution Margin/unit = (S.P-V.C)

Contribution Margin/constrained resource = (S.P – V.C)/units of constrained resource

## **Budgeting**

### 1. Budgeted Production = Budgeted Sales + Desired Ending Inventory – Beginning Inventory

On September 30 of Year 1, a company had finished goods inventory of 1,500 units. Starting in October, the company intends to have an inventory policy of maintaining ending inventory at the end of every month equal to the next month's sales.

Forecasted sales for the months October, Year 1, through January, Year 2 are as follows:

October 4,000 units  
November 5,500 units  
December 3,500 units  
January 2,000 units

What is the amount of budgeted production units for November?

	October	November	December
Beginning Inventory	1,500	5,500	3,500
+ Production Added	8,000	3,500	2,000
- Inventory Sales	(4,000)	(5,500)	(3,500)
= Ending Inventory	5,500	3,500	2,000
Next Month's Sales	5,500	3,500	2,000

Plug this amount until ending inventory equals required balance

## **Flexible Budgeting**

### 1. Activity variance = Planning Budget – Flexible Budget

### 2. Revenue and spending variance = Flexible Budget – Actual Results

## Performance Evaluation

1.  $\text{ROI} = \text{Net Income} / \text{Average Investment}$
2.  $\text{Residual Income} = \text{Net income} - (\text{Average Investment} * \text{Minimum Required Rate of Return})$

### **Return on Investment (ROI)**

$\text{ROI} = \text{Net Operating Income} / \text{Average Operating Assets}$

The following information is available for Sweet Dreams Company:

Sales	\$ 100,000
Operating expenses	\$ 94,000
Operating assets	\$ 40,000
Stockholder's equity	\$ 25,000
Cost of capital	10%

What is Sweet Dreams Company's return on investment (ROI)?

*(Note: if there is no prior period information use operating assets instead of average operating assets)*

$\text{Net Operating Income} = \text{Sales} - \text{COGS (if any)} - \text{Operating Expense:}$

$$\$100,000 - \$94,000 = \$6,000$$

$\text{ROI: } \$6,000 / \$40,000 \text{ or } 15\%$

### **Additional ROI Formulas**

$\text{ROI} = \text{Margin} * \text{Turnover}$

$\text{Margin} = \text{Net Operating Income} / \text{Sales}$

$\text{Turnover} = \text{Sales} / \text{Average Operating Assets}$

The Nacho Division of the Tex-Mex Company has a return on investment (ROI) of 12%, sales of \$200,000, and an asset turnover of 2.0. What was Nacho's operating income?

*(Note: sometimes you have to use combinations of formulas and a bit of algebra to "solve for x")*

$$2.0 \text{ Turnover} = \$200,000 \text{ Sales} / X \text{ Average Operating Assets}$$

$$2.0 \text{ Turnover} * X = \$200,000 \text{ Sales}$$

$$X = \$100,000 \text{ Average Operating Assets}$$

$$\text{ROI } 12\% = X \text{ Operating Income} / \$100,000 \text{ Average Operating Assets}$$

$$12\% * \$100,000 = X$$

$$X = \$12,000 \text{ Operating Income}$$

3.  $\text{Simple rate of return} = \text{Net Income} / \text{Initial Investment}$

## **Cost-Volume-Profit Analysis**

1.  $BEP \text{ (units)} = \text{Fixed costs} / (S.P - V.C)$
2.  $BEP (\$) = (\text{Fixed costs} / (S.P - V.C)) * S.P$

### **Contribution Margin per Unit (CMU)**

CMU = Sales Price per Unit - Variable Cost per Unit

Sales (4,500 units)	\$ 427,500
Variable costs	<u>265,500</u>
Contribution margin	162,000

Sales price per unit = \$427,500 / 4,500 units or \$95

VC per unit = \$265,500 / 4,500 units or \$59

CMU: \$95 - \$59 = \$36

### **Contribution Margin Ratio (CMR)**

CMR = CMU / Sales Price Per Unit

### **Break-Even Point in Dollars (BEP \$) (Formula method)**

**BEP \$ = Fixed Costs / CMR**

The following information pertains to Tiller Co.:

Sales	\$ 800,000
Variable Costs	160,000
Fixed Costs	40,000

What is Tiller's break-even point in sales dollars? (CPA adapted)

First, calculate the contribution margin: Sales \$800,000 - VC \$160,000 = \$640,000

Next, divide contribution margin by sales to get the contribution margin ratio:

$\$640,000 / \$800,000 = 80\%$

Finally, divide fixed costs by the contribution margin ratio to get BEP \$:

$\$40,000 / 80\% = \$50,000$

3.  $\text{Margin of Safety} = \text{Actual or Budgeted Sales} - \text{BEP}$

### **Break-Even Point in Units (BEP Units) (Formula method)**

BEP Units = Fixed Costs / CMU

### **Margin of Safety in Dollars (MS \$)**

MS \$ = Total Budgeted (or Actual) Sales - Break Even Sales

### **Margin of Safety (MS)**

MS = MS \$ / Total Budgeted (or Actual) Sales in Dollars

Xi-Tech, Inc. is considering the introduction of a new music player with the following price and cost characteristics:

Sales price	\$ 125each
Variable costs	75each
Fixed costs	180,000per year

(a) How many units must Xi-Tech sell to break even?

(b) How many units must Xi-Tech sell to make an operating profit of \$120,000 for the year?

(c) If projected sales are 7,500 units, what is the margin of safety in units?

(a) Contribution margin per unit = Sales per unit \$125 - VC per unit \$75 or \$50.

Break-Even Point in Units (BEP Units) = \$180,000 / \$50 or 3,600 units sold.

(b)  $(\$120,000 \text{ operating profit} + \$180,000 \text{ fixed costs}) / (\$50 \text{ CMU}) = 6,000 \text{ units sold}$

(c) Projected Sales 7,500 units - Breakeven unit sales 3,600 = 3,900 Margin of Safety

Margin of safety in \$ would be 3,900 units \* \$125 sales price or \$487,500

#### 4. Degree of Operating Leverage = Net Operating Income / Contribution margin

##### Degree of Operating Leverage (DOL)\*

DOL = Contribution Margin / Net Operating Income

\*DOL measures how much the operating income of a company will change in response to a change in sales.

A manufacturer of tiling grout has supplied the following data:

Kilograms produced and sold.....	300,000
Sales revenue .....	\$1,950,000
Variable manufacturing expense.....	\$960,000
Fixed manufacturing expense.....	\$266,000
Variable selling and administrative expense.....	\$360,000
Fixed selling and administrative expense.....	\$232,000
Net operating income.....	\$132,000

The company's degree of operating leverage is closest to:

First, calculate contribution margin: Sales revenue – Variable costs = Contribution Margin

Sales revenue \$1,950,000 – Variable costs (\$960,000 + \$360,000) = \$630,000

DOL: Contribution Margin (\$630,000) / Operating Income (\$132,000) = \$4.77

This means every kilogram sold changes operating income by \$4.77.

## Capital Budgeting

### 1. Profitability Index = NPV/Investment

### 2. NPV = PV of Net cash inflows – PV of Net Cash outflows

Annual Cash Revenues and Costs:	
Sales	\$300,000
Cost of Goods Sold	120,000
Cost of Equipment Needed	\$220,000
Overhaul of Equipment in Two Years	20,000
Salvage Value of Equipment in Five Years	55,000

What is the net present value of the project if the company uses a 12% discount rate?

	Now	Year 1	Year 2	Year 3	Year 4	Year 5	
Initial Investment	\$ (220,000)	\$ -	\$ -	\$ -	\$ -	\$ -	
Annual Profit	-	180,000	180,000	180,000	180,000	180,000	
Salvage Value of the New Equipment	-	-	-	-	-	55,000	
Equipment Overhaul	-	-	(20,000)	-	-	-	
Total Cash Flows	(220,000)	180,000	160,000	180,000	180,000	235,000	
Discount Factor of 12%	1.0000	0.8929	0.7972	0.7118	0.6355	0.5674	From Present value of \$1 table -OR- you can use the calculator function
Present Value of the Cash Flows	\$ (220,000)	\$ 160,722	\$ 127,552	\$ 128,124	\$ 114,390	\$ 133,339	Calculator: I = 12; N = [number of the year you are in]; FV = Cash Flow; Compute PV
Net Present Value (sum of cash flows)	\$ 444,127						