4. PROCESS COSTING

- Steps for process costing
- Treatment of proceeds from scrap with a value
- Valuing inventory when units are transferred from prior process
- Valuing output using the short-cut method for allocating normal loss

INTRODUCTION

- Process costing is costing method used where it is **not possible to identify separate units of production**, or jobs, usually because of the continuous nature of the production process involved.

- It is common to identify process costing with continuous production such as the following:
  - ❖ Oil refining
  - ❖ Paper
  - ❖ Food and drinks
  - ❖ Chemicals

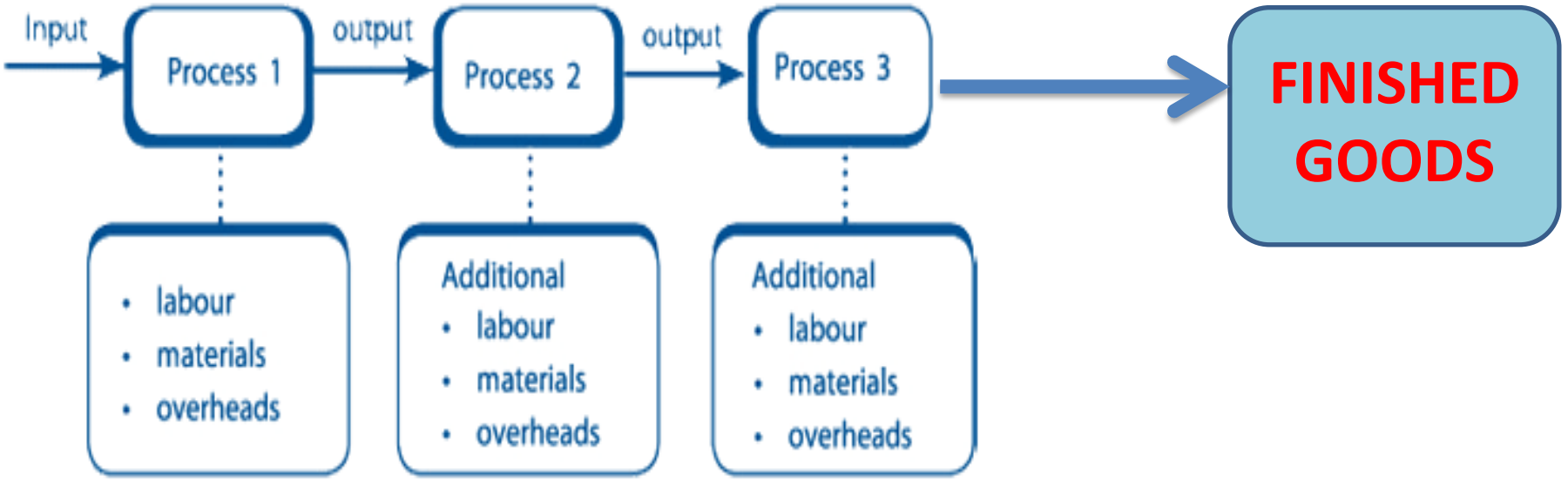
- Process costing may also be associated with the **production of large volumes with low unit costs** such as cans, glass or tins.

PROCESS COSTING DIFFERENCE VS. JOB/BATCH COSTING

- The output of **one process become the inputs of the next process** until the goods are complete in the final process.
- Due to the nature of the production process, there is often **work in progress** that needs to be valued. Because of mass production it is difficult to maintain stock records per unit.
- There is **often a loss** in the process due to **spoilage, evaporation** and wastage.

"...many wine and distilled spirit producers estimate that the angel's share of alcohol lost annually is around two percent per barrel..."
(www.wisegeek.org)

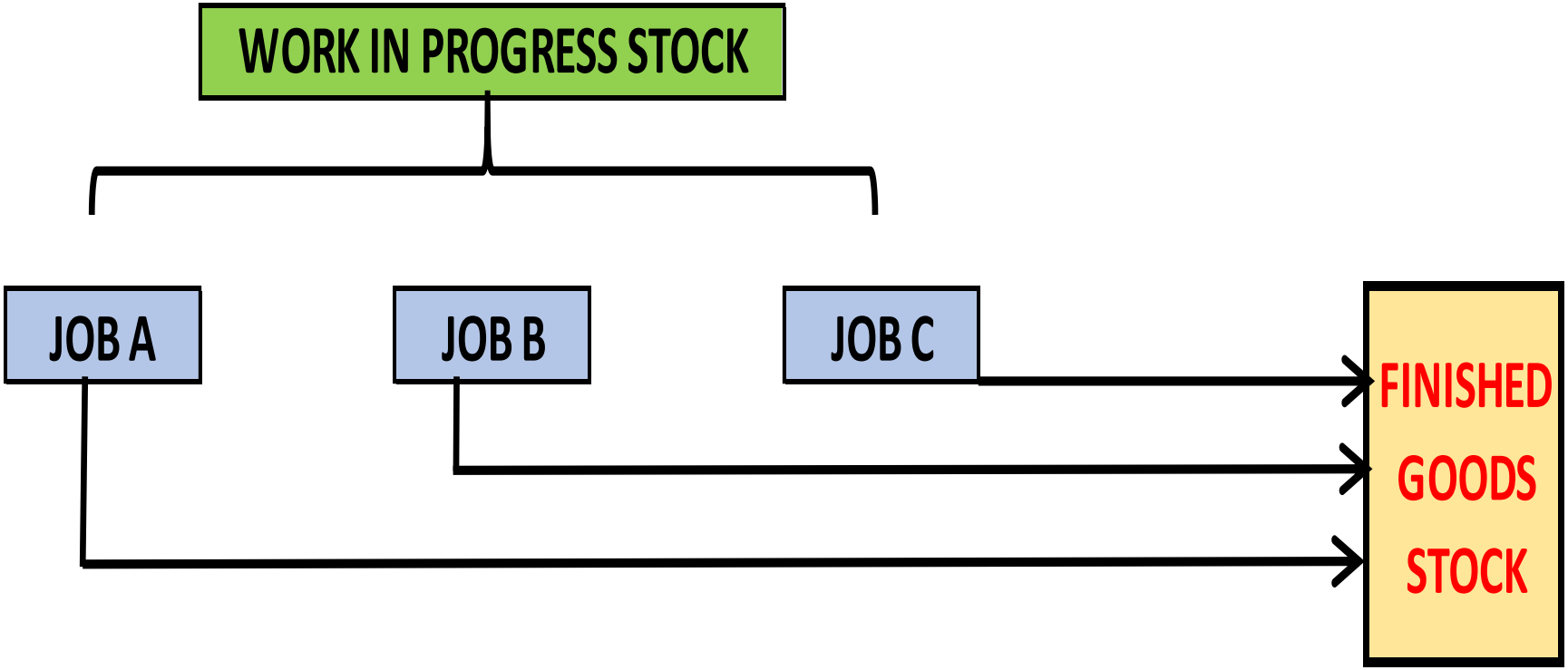
PROCESS COST



Kaplan Financial Knowledge Bank

http://kfknowledgebank.kaplan.co.uk/KFKB/Wiki%20Pages/Process%20Costing.aspx?mode=none

JOB COSTING



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1.	**Calculate the number of units to be accounted for.**	
	1.	Determine total inputs for the period and complete the input column of the quantity statement.
	2.	Determine the units subject to normal wastage by subtracting the units that did not pass the WP from the total of the input column.
	3.	Calculate the normal loss units.
	4.	If FIFO is used, split units completed between opening WIP and new production.
	5.	Fill in the output column of the quantity statement.
	6.	Complete the equivalent units section of the quantity statement for **ALL** line items, including the normal and abnormal losses.
2.	**Determine the cost per equivalent unit.**	
	7.	Complete the production cost statement and calculate the equivalent production cost per unit.
3.	**Reconcile the total cost for the period.**	
	8.	Determine the value of normal loss based on its equivalent units separately for material and conversion cost.
	9.	Determine whether opening WIP, abnormal loss and/or closing WIP will have to be excluded when normal loss is allocated. (Also refer to step 2.)
	10.	Allocate the value of normal loss for material and conversion cost **separately,** based on the ratio of equivalent units in the quantity statement of those units sharing in normal loss (long method).
	11.	Complete the allocation statement by multiplying each category of equivalent output by its equivalent cost per unit. Remember to include that category's share of normal loss (long method).
	12.	Determine rounding and balance.
	13.	Complete T-accounts (if required).

Source: MAC2601, 2012 (adapted)

SUMMARY STEPS FOR PROCESSING COST

PROCESS COSTING: EXAMPLE

We manufacture plastic chairs in 2 processes.
In process 1 the plastic is moulded into shape and in process 2, the final assembly takes place.

Assume that all material is added at the beginning of process 1. No material is added in process 2. Also assume that there is no spoilage and no opening stock.

Material for 10 000 units are placed into production at a total material cost of R100 000 and conversion costs for process 1 amounts to R56 400 and for process 2 R30 400.

WHAT IS OUR OBJECTIVE?

OUR OBJECTIVE IS TO ASSIGN COSTS TO PRODUCTION. PRODUCTION MAYBE COMPLETE OR INCOMLETE, IN OTHER WORDS FINISHED GOODS OR WORK IN PROGRESS.

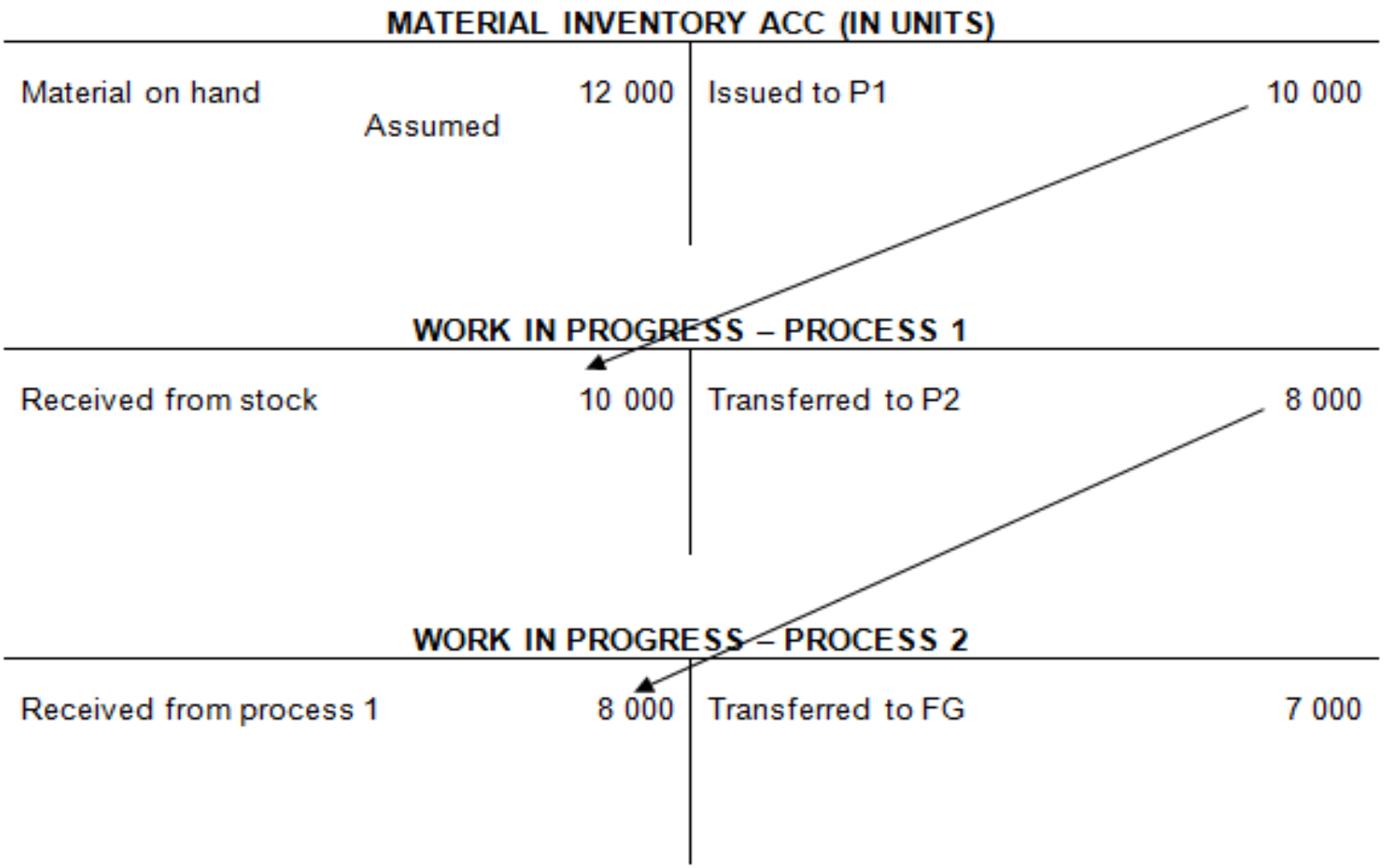
PROCESS COSTING: EXAMPLE

Further assume that at the end of the month, process 1 completes and transfers 8 000 units to process 2 and process 2 in turn completes and transfers 7 000 units to finished goods.

Irrespective of the amount of material in kg, remember that we have entered into production sufficient material for 10 000 units at a total material cost of R100 000.

Remember this is still accounting and its about debits and credits. Let's examine the WIP accounts for the 2 processes.

PROCESS COSTING: EXAMPLE



PROCESS COSTING: EXAMPLE

In process 1 there are 2 000 units which are incomplete. Assume that they are 70% complete. (Obviously they are 100% complete for materials as all materials were added at the beginning of the process). How will the costs of production be allocated to the different products?

Similarly in process 2, 7 000 units are complete and 1 000 units are in progress. Assume that these units are 60 % complete. **Costs must be allocated to all units, finished or unfinished.**

Consider the following production statement for process 1.

PROCESS COSTING: EXAMPLE

INPUT	DETAILS	OUTPUT	MATERIAL	CONVERSION
10 000	Opening stock Current production			
	Completed and transferred	8 000	8 000	8 000
	Closing WIP	2 000	2 000	1 400
10 000		10 000	10 000	9 400

Note:

- Input must equal output.
- All 8 000 units are completed for material and conversion. In other words units started and completed in the same period.
- There are 2 000 unfinished units, but remember material has already been added .Which means I have incurred all my material costs.
- As far as conversion costs are concerned only 70% are complete. In other words 1 400 units.

PROCESS COSTING: EXAMPLE

Now to summarise the costs:

This is called a cost statement

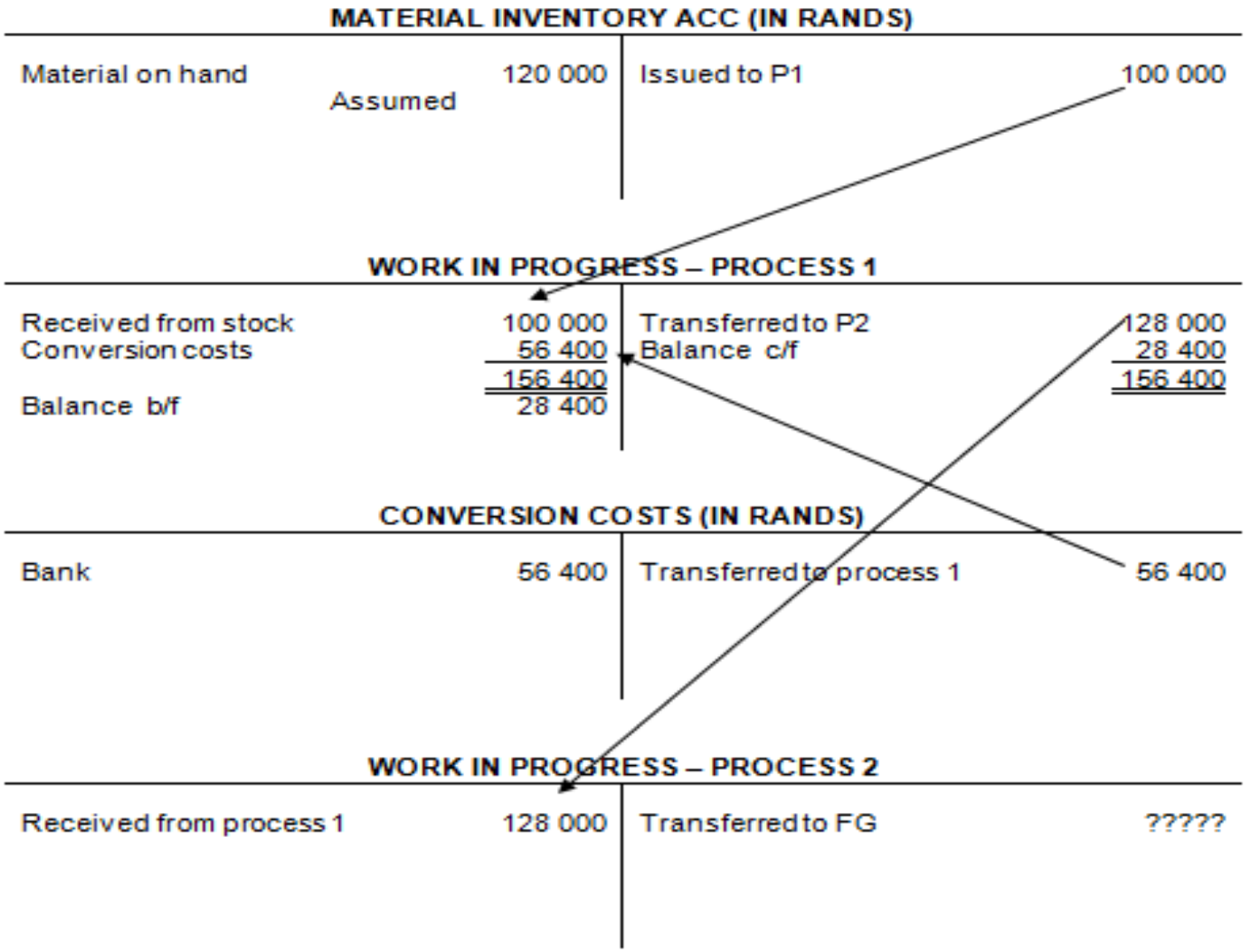
	Total	Material	Conversion
Opening stock	-	-	-
Current production	156 400	100 000	56 400
	156 400	100 000	56 400
		÷	÷
Equivalent production		10 000	9 400
Cost per unit		R10,00	R6,00

The total cost incurred in process 1 is R156 400 and this must be allocated to the complete and incomplete units. We do this in the allocation statement.

Allocation statement

Completed units	8 000 x (10+ 6)	128 000
Closing WIP		28 400
- material	2 000 x 10	20 000
- Conversion	1 400 x 6	8 400
		156 400

PROCESS COSTING: EXAMPLE



PROCESS COSTING: EXAMPLE

NOW LETS TAKE A LOOK AT PROCESS 2

PRODUCTION STATEMENT

INPUT	DETAILS	OUTPUT	PROCESS 1	MATERIAL	CONVER-SION
- 8 000	Opening stock Received from process 1				
	Completed and transferred	7 000	7 000	7 000	7 000
	Closing WIP	1 000	1 000	1 000	600
8 000		8 000	8 000	8 000	7 600

Note:

- Input must equal output.
- All 7 000 units are completed for material and conversion. In other words units started and completed in the same period.
- There are 1 000 unfinished units, but remember material has already been added .Which means I have incurred all my material costs.
- As far as conversion costs are concerned only 60% are complete. In other word 600 units
- A process 1 column is included as the costs of process 1 are brought forward.

PROCESS COSTING: EXAMPLE

COST STATEMENT

	Total	Process 1	Material	Conversion
Opening stock	-	-	-	-
Current production	158 400	128 000	-	30 400
	158 400	128 000	-	30 400
		÷	÷	÷
Equivalent production		8 000	8 000	7 600
Cost per unit		R16,00	R0	R4,00

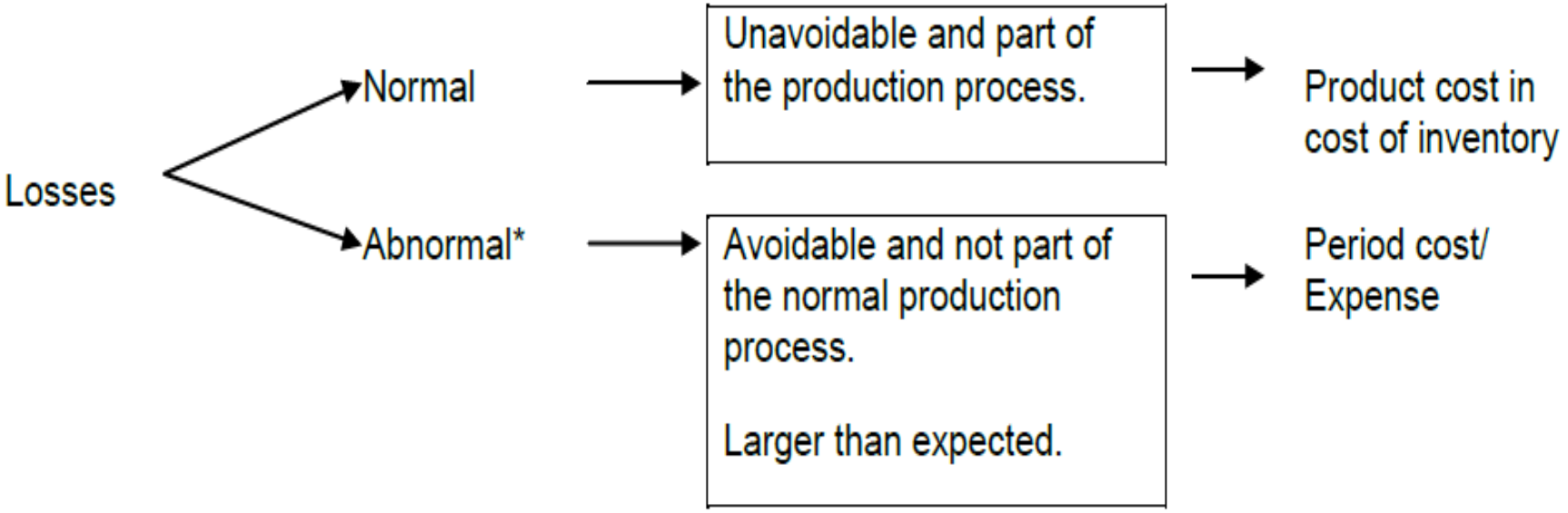
The total cost incurred in process 2 is R158 400 and this must be allocated to the complete and incomplete units. We do this in the allocation statement.

Allocation statement

Completed units	7 000 x (16+ 4)	140 000
Closing WIP		18 400
- Process 1	1 000 x 16	16 000
- Conversion	600 x 4	2 400
		158 400

LOSSES IN PROCESS COSTING SYSTEM

Treatment of Losses in Process Costing



* In real life manufacturing, there is no abnormal gain. If in a particular period more units are produced than anticipated, the difference is treated and explained as a positive variance in respect of the normal loss anticipated.

LOSSES IN PROCESS COSTING SYSTEM

NORMAL SPOILAGE

Normal losses are losses expected during a process. It is a loss we can plan for. For example, say we know from past experience that for every 10 units of input 1 unit is lost. This means that 10% of input is lost. This also means that 90% is good output.

The problem with normal losses is that it does not share in the costs. This simply means that the cost of normal spoilage must be carried by the good output.

Assume that the above 10 units were input at a total cost of R100. 10% of the units are spoilt but the cost still remains R100. This simply means that the cost of output is not R10, 00 per unit (R100÷10), but R11, 11 (R100÷9). Good output is 9 units

LOSSES IN PROCESS COSTING SYSTEM

ABNORMAL LOSSES

Abnormal losses are additional losses which occur during a process. This loss is unplanned for and therefore carries a cost.

Assume the cost of input of 500 units is R7 500. Assume that the normal losses are 10% of input. Out put at the end of the process are 410 units. At the outset the cost per unit seems to be R7 500÷500 = R15 per unit. Remember we have normal spoilage so the cost per unit increases.

	Units	Cost
Total input	500	7 500
Normal spoilage	(50)	-
	450	7 500

The cost per unit is now → $\frac{7\,500}{450}$ = R 16,67

Now to allocate the costs:

Unit completed and transferred	410 x R16,67	6 833
Abnormal spoilage	40 x R16,67	667
	450 x R16,67	7 500

What this means is that the cost of normal spoilage is carried by the good output and the abnormal spoilage.

POINT OF SPOILAGE – LONG METHOD

ILLUSTRATION 1

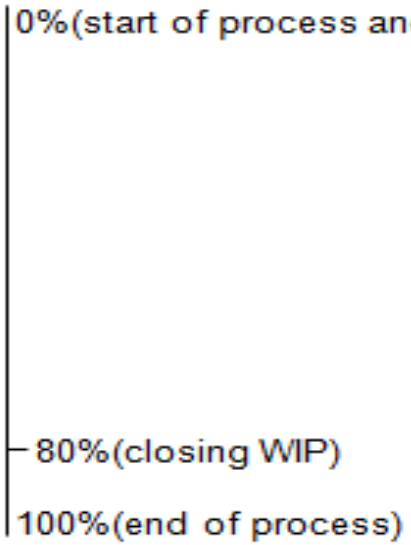
A company manufactures a product in a single process. The following information is for a specific month:

	Units	R
Opening WIP	-	-
Units introduced	10 000	
- Material cost		100 000
- Conversion cost		57 400
Units completed and transferred	7 000	
Closing WIP – 80% complete	1 500	

Normal spoilage is 5% of input that reached the point of spoilage.
Spoilage takes place at the beginning of the process.
Material is added at the beginning of the process and conversion costs are incurred uniformerly throughout the process.

POINT OF SPOILAGE

Lets draw a time line:



THE TIME LINE WILL HELP IN CALCULATING NORMAL SPOILAGE

THE PRODUCTION STATEMENT

INPUT	DETAILS	OUTPUT	MATERIAL	CONVERSION
-	Opening stock			
10 000	Current production			
	Completed and transferred	7 000	7 000	7 000
	Normal spoilage	500	500	-
	Abnormal spoilage	1 000	1 000	-
	Closing WIP	1 500	1 500	1 200
10 000		10 000	10 000	8 200

POINT OF SPOILAGE

Note:

- Input must equal output.
- 7 000 units are completed for material and conversion. In other words units started and completed in the same period.
- There are 1 500 unfinished units, but remember we need to account for 10 000 units, this means that 1 500 have been spoilt.
- Spoilage must be split between normal and abnormal.
- In this case spoilage takes place at the beginning of the process at the 0% point.
- All 10 000 units are placed at the 0% point in this period, which means at that all units pass the spoilage point.
- Normal spoilage is 10 000 x 5% = 500 units.
- Abnormal spoilage is the balancing figure.
- What happened to the material from the spoilt units? They have been wasted, but I still incurred the cost.
- Enter 500 units in the material column for normal spoilage (100%)
- At the 0% point how much work have I done on the spoilt units? None, therefore nothing is entered in the conversion column.
- Abnormal spoilage is allocated in the same way as normal spoilage.

POINT OF SPOILAGE

	Total	Material	Conversion
Opening stock	-	-	-
Current production	157 400	100 000	57 400
	157 400	100 000	57 400
		÷	÷
Equivalent production		10 000	8 200
Cost per unit		R10,00	R7,00

Now remember that normal spoilage must be carried by the other components, completed units incomplete units and abnormal spoilage. We allocate this on a pro-rata basis. The total of the 3 components is 9 500 (7 000+1 000+1 500) units in the material column. And nil in the conversio column.

POINT OF SPOILAGE

ALLOCATION OF NORMAL SPOILAGE

	Material	Conversion
Units completed (7000/9500) x 500	368	-
Abnormal spoilage (1000/9500) x 500	53	-
Closing WIP (1500/9500) x 500	79	-
	500	-

ALLOCATION STATEMENT

Units completed and transferred		122 680
- Material	(7000+368*) x 10	73 680
- Conversion	(7000 + 0) x 7	49 000
Abnormal loss		10 530
- Material	(1000+53*) x 10	10 530
- Conversion	(-)	-
Closing WIP		24 190
- material	(1500+79*) x 10	15 790
- Conversion	(1200+0) x 7	8 400
		157 400

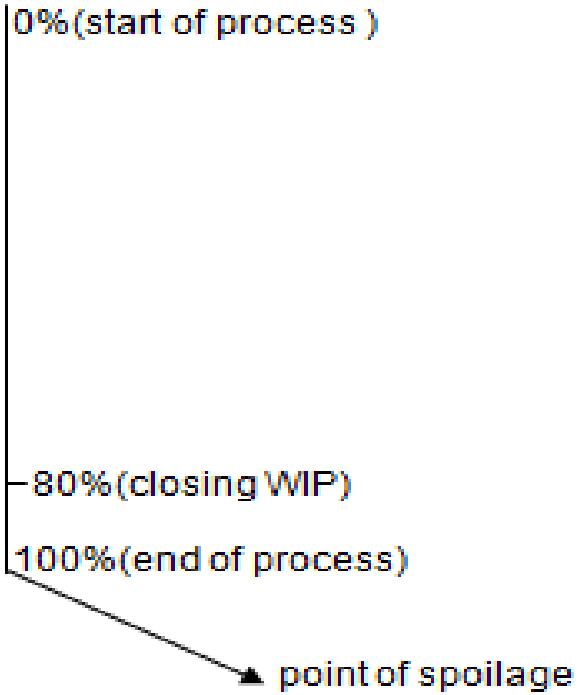
* Normal spoilage

POINT OF SPOILAGE

ILLUSTRATION 2

Assume the same information as in the above illustration 1, but now spoilage takes place at the end of the process.

Lets draw a time line:



THE TIME LINE WILL HELP IN CALCULATING NORMAL SPOILAGE

NOW IT'S TIME TO VISUALISE.I KNOW IT'S HARD FOR YOU. JUST TRY. PLEASE!!

POINT OF SPOILAGE

We introduce 10 000 units at 0% point. Now close your eyes, yes close your eyes and imagine those units moving down your time line. At the 80% point 1 500 units get left behind. Which means that 8 500 units reach the 100% point, which is also the point of spoilage.

At this point we lose 5% of the units that reach this point of spoilage. 8 500 x 5% = 425. This is now normal spoilage. Closing WIP has not passed through this point so spoilage cannot be allocated to closing WIP

THE PRODUCTION STATEMENT

INPUT	DETAILS	OUTPUT	MATERIAL	CONVERSION
-	Opening stock			
10 000	Current production			
	Completed and transferred	7 000	7 000	7 000
	Normal spoilage	425	425	425
	Abnormal spoilage	1 075	1 075	1 075
	Closing WIP	1 500	1 500	1 200
10 000		10 000	10 000	9 700

POINT OF SPOILAGE

Note:

- Input must equal output.
- 7 000 units are completed for material and conversion. In other words units started and completed in the same period.
- There are 1 500 unfinished units, but remember we need to account for 10 000 units, this means that 1 500 have been spoilt.
- Spoilage must be split between normal and abnormal.
- In this case spoilage takes place at the end of the process, at the 100% point.
- Normal spoilage is 8 500 x 5% = 425 units.
- Abnormal spoilage is the balancing figure.
- What happened to the material from the spoilt units? They have been wasted, but I still incurred the cost.
- Enter 425 units in the material column for normal spoilage (100%)
- At the 100% point how much work have I done on the spoilt units? All, therefore all work is lost and 100% is entered in the conversion column.
- Abnormal spoilage is allocated in the same way as normal spoilage.

POINT OF SPOILAGE

COST STATEMENT

	Total	Material	Conversion
Opening stock	-	-	-
Current production	157 400	100 000	57 400
	157 400	100 000	57 400
		÷	÷
Equivalent production		10 000	9 700
Cost per unit		R10,00	R5,92

Now remember that normal spoilage must be carried by the other components, in this case except for closing WIP.

ALLOCATION OF NORMAL SPOILAGE

	Material	Conversion
Units completed		
- Material (7000/8075) x 425	368	
- Conversion (7000/8075) x 425		368
Abnormal spoilage		
- Material (1075/8075) x 425	57	
- Conversion (1075/8075) x 425		57
	425	425

POINT OF SPOILAGE

ALLOCATION STATEMENT

Units completed and transferred		117 299
- Material	(7000+368*) x 10	73 680
- Conversion	(7000 + 368) x 5,92	43 619
Abnormal loss		18 021
- Material	(1075+ 57*) x 10	11 320
- Conversion	(1075+57*) x 5,92	6 701
Closing WIP		22 104
- material	(1500+0) x 10	15 000
- Conversion	(1200+0) x 5,92	7 104
Rounding		(24)
		157 400

* Normal spoilage ; Note:(spoilage is not allocated to closing WIP)

POINT OF SPOILAGE – SHORT METHOD

ILLUSTRATION 3 (SHORT METHOD)

Refer to illustration 1

THE PRODUCTION STATEMENT

INPUT	DETAILS	OUTPUT	MATERIAL	CONVERSION
-	Opening stock			
10 000	Current production			
	Completed and transferred	7 000	7 000	7 000
	Normal spoilage	500	-	-
	Abnormal spoilage	1 000	1 000	-
	Closing WIP	1 500	1 500	1 200
10 000		10 000	9 500	8 200

Note that with the short method, no normal spoilage is allocated to the material and conversion columns. Please compare this to illustration 1 and understand where the differences are.

POINT OF SPOILAGE – SHORT METHOD

COST STATEMENT

	Total	Material	Conversion
Opening stock	-	-	-
Current production	157 400	100 000	57 400
	157 400	100 000	57 400
		÷	÷
Equivalent production		9 500	8 200
Cost per unit		R10,526	R7,00

In illustration 1 The material cost per unit is R10 and in this case it is R10, 526. The additional R0, 526 is the cost of normal spoilage.

With the long method the normal spoilage is part of the units and in the short method it is part of the cost per unit.

POINT OF SPOILAGE – SHORT METHOD

ALLOCATION STATEMENT

Units completed and transferred		122 682
- Material	7000 x 10,526	73 682
- Conversion	7000 x 7	49 000
Abnormal loss		10 526
- Material	1000 x 10,526	10 526
- Conversion		-
Closing WIP		24 189
- material	1500 x 10,526	15 789
- Conversion	1200 x 7	8 400
Rounding		3
		157 400

ALL the units in the OUTPUT column of the quantity statement should have been subjected to spillage or should have passed the Wastage Point (WP or inspection) in the CURRENT PERIOD!!!

OPENING WORK IN PROGRESS (WIP) – WEIGHTED AVERAGE METHOD

The weighted average method works on the premise that all available stock, in other words, opening stock and current production are cost at an average rate per unit.

Assume we have the following available stock

	Units	Cost per unit	Total cost
Opening stock	1 000	3,50	3 500
Current production	4 000	3,30	13 200
	5 000		16 700

We have a total of 5 000 units in stock at a total cost of R16 700. The average cost per unit is therefore:

$$\frac{16\,700}{5\,000} = R3{,}34$$

So if I transferred say 4 000 units to finished goods will it matter where the stock came from, i.e. opening stock or current production? The answer is no as all stock has the same unit cost. Therefore closing stock will be valued as 1 000 units @ R3, 34.

If we used FIFO the basic premise is that what ever was there first will leave first. Hence in the above example what will closing stock be?

	Units	Cost per unit	Total cost
Opening stock	1 000	3,50	3 500
Current production	4 000	3,30	13 200
	5 000		16 700
Transfer 4 000 units	(1 000)	3,50	(3 500)
	(3 000)	3,30	(9 900)
	1 000	3,30	3 300

The cost of opening stock is kept separate from current production.

FIFO VS. WEIGHTED AVERAGE METHOD

FIFO:

- Assumption current period unit costs should be reported rather than unit costs of previous period
- Opening WIP to be completed during current period
- Cost per unit = current period costs
- Closing WIP – from the new units started in the period

WEIGHTED AVERAGE METHOD:

- Assumption current & previous period unit costs should be reported

OPENING WORK IN PROGRESS (WIP) – WEIGHTED AVERAGE METHOD

ILLUSTRATION 4

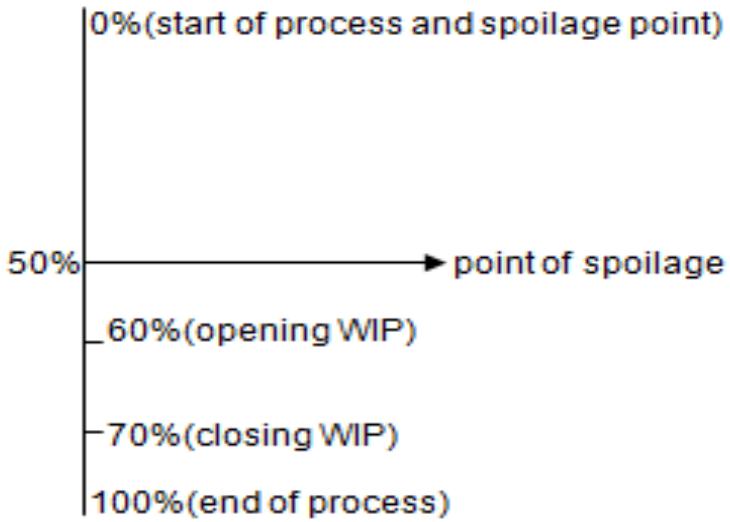
A company manufactures a product in a single process. The following information is for a specific month:

	Units	R
Opening WIP	4 000	
- Material		43 000
- Conversion – 60% complete		12 120
Units introduced	10 000	
- Material cost		100 000
- Conversion cost		57 400
Units completed and transferred	9 000	
Closing WIP – 70% complete	2 600	

Normal spoilage is 10% of input that reached the point of spoilage.
Spoilage takes place when the process is 50% complete.
Material is added at the beginning of the process and conversion costs are incurred uniformly throughout the process.
Stock is valued on the weighted average basis.

OPENING WORK IN PROGRESS (WIP) – WEIGHTED AVERAGE METHOD

Lets draw a time line:



THE TIME LINE WILL HELP IN CALCULATING NORMAL SPOILAGE

THE PRODUCTION STATEMENT

INPUT	DETAILS	OUTPUT	MATERIAL	CONVERSION
4 000	Opening stock			
10 000	Current production			
	Completed and transferred	9 000	9 000	9 000
	Normal spoilage	1 000	-	-
	Abnormal spoilage	1 400	1 400	700
	Closing WIP	2 600	2 600	1 820
14 000		14 000	13 000	11 520

OPENING WORK IN PROGRESS (WIP) – WEIGHTED AVERAGE METHOD

Time to visualise:

I start the new month with opening units of 4 000, which is 60% complete. This means that 4 000 has already passed the point of spoilage in the previous month. It can't be spoilt again. The current units start at 0% point. 10 000 units are introduced and worked on. At the 50% point 10% is lost. This means that 9 000 (10 000 x 90%) units are left to work on. When we get to the 70% point 2 600 units remain at this point as unfinished stock. The remainder go through to output.

Since closing WIP has passed spoilage I can use the short method.

At the 50% point I have lost 50% conversion

COST STATEMENT

	Total	Material	Conversion
Opening stock	55 120	43 000	12 120
Current production	157 000	100 000	57 000
	212 120	143 000	69 120
		÷	÷
Equivalent production		13 000	11 520
Cost per unit	R17,00	R11,00	R6,00

OPENING WORK IN PROGRESS (WIP) – WEIGHTED AVERAGE METHOD

ALLOCATION STATEMENT

Units completed and transferred		153 000
- Material	9000 x 11	99 000
- Conversion	9000 x 6	54 000
Abnormal loss		19 600
- Material	1400 x 11	15 400
- Conversion	700 x 6	4 200
Closing WIP		39 520
- material	2600 x 11	28 600
- Conversion	1820 x 6	10 920
Rounding		
		212 120

OPENING WORK IN PROGRESS (WIP) – FIFO

ILLUSTRATION 5

Use the same information as in illustration 4

THE PRODUCTION STATEMENT

INPUT	DETAILS	OUTPUT	MATERIAL	CONVERSION
4 000	Opening stock			
10 000	Current production			
	Completed and transferred			
	- Opening stock	4 000	-	1 600
	- Current production	5 000	5 000	5 000
	Normal spoilage	1 000	-	-
	Abnormal spoilage	1 400	1 400	700
	Closing WIP	2 600	2 600	1 820
14 000		14 000	9 000	9 120

Note

Opening stock must leave first. Current production is the difference between 9 000 and 4 000 units. Normal and abnormal spoilage is calculated as before. Opening stock does not need any more material this period as all material has already been added. It does however need 40% of conversion to complete the opening stock. Hence the 1 600 units.

OPENING WORK IN PROGRESS (WIP) – WEIGHTED AVERAGE METHOD

COST STATEMENT

	Total	Material	Conversion
Opening stock	55 120	-	-
Current production	157 000	100 000	57 000
	212 120	100 000	57 000
		÷	÷
Equivalent production		9 000	9 120
Cost per unit	R17,36	R11,11	R6,25

ALLOCATION STATEMENT

Units completed and transferred		
Opening stock – opening balance		55 120
Conversion to complete opening stock	1600 x 6,25	10 000
		65 120
Current production	5000 x 17,36	86 800
		151 920
Abnormal loss		19 929
- Material	1400 x 11,11	15 554
- Conversion	700 x 6,25	4 375
Closing WIP		40 261
- material	2600 x 11,11	28 886
- Conversion	1820 x 6,25	11 375
Rounding		10
		212 120

RECAP 1: PROCESS COSTING

UNISA REVISION PACK 2014:

QUESTION 4 (12 marks; 14 minutes)

Professional Processors (Pty) Ltd. uses a process costing system. The following information is available regarding quantities for January 2014:

	Units
Opening WIP – 1 Jan. 2014 (20% complete with regard to conversion costs)	25 000
Put into production during January 2014	75 000
Completed and transferred	80 000
Closing WIP – 31 Jan. 2014 (70% complete with regard to conversion costs)	5 000

The company uses the weighted average method of inventory valuation. Raw materials are added at the beginning of the process.

REQUIRED

a. Prepare a quantity statement for January 2014 assuming that wastage occurs when the process is 60% complete (use the short-cut method if the requirements for its use are met). Normal losses amount to 4% of units that reach the wastage point. (6)

b. Prepare a quantity statement for January 2014 assuming that wastage occurs evenly throughout the process (use the short-cut method) and are detected at the end of the process. Normal losses amount to 4% of units started in January 2014. (6)

RECAP 1: PROCESS COSTING

UNISA REVISION PACK 2014:

a.

Physical units			Equivalent units			
Input		Output	Raw materials		Conversion cost	
(units)	Details	(units)	Units	%	Units	%
	Input					
25 000	Opening WIP					
75 000	Put into production					
	Output					
	Completed and transferred	80 000	80 000^	100	80 000^	100
	Normal loss	① 4 000 ✔	-^		-^	
	Abnormal loss	② 11 000^	11 000^	100	6 600^	60
	Closing WIP	5 000^	5 000^	100	3 500^	70
100 000		100 000	96 000		90 100	

① 100 000 x 4% = 4 000
② Balancing figure

RECAP 1: PROCESS COSTING

UNISA REVISION PACK 2014:

b.

Physical units			Equivalent units			
Input (units)	Details	Output (units)	Raw materials Units	%	Conversion cost Units	%
	Input					
25 000	Opening WIP					
75 000	Put into production					
	Output					
	Completed and transferred	80 000	80 000^	100	80 000^	100
	Normal loss	③ 3 000 ✔	-^		-^	
	Abnormal loss	④ 12 000^	12 000^	100	12 000^	100
	Closing WIP	5 000^	5 000^	100	3 500^	70
100 000		100 000	97 000		95 500	

③ 75 000 x 4% = 3 000
④ Balancing figure

5. JOINT AND BY-PRODUCT COSTING

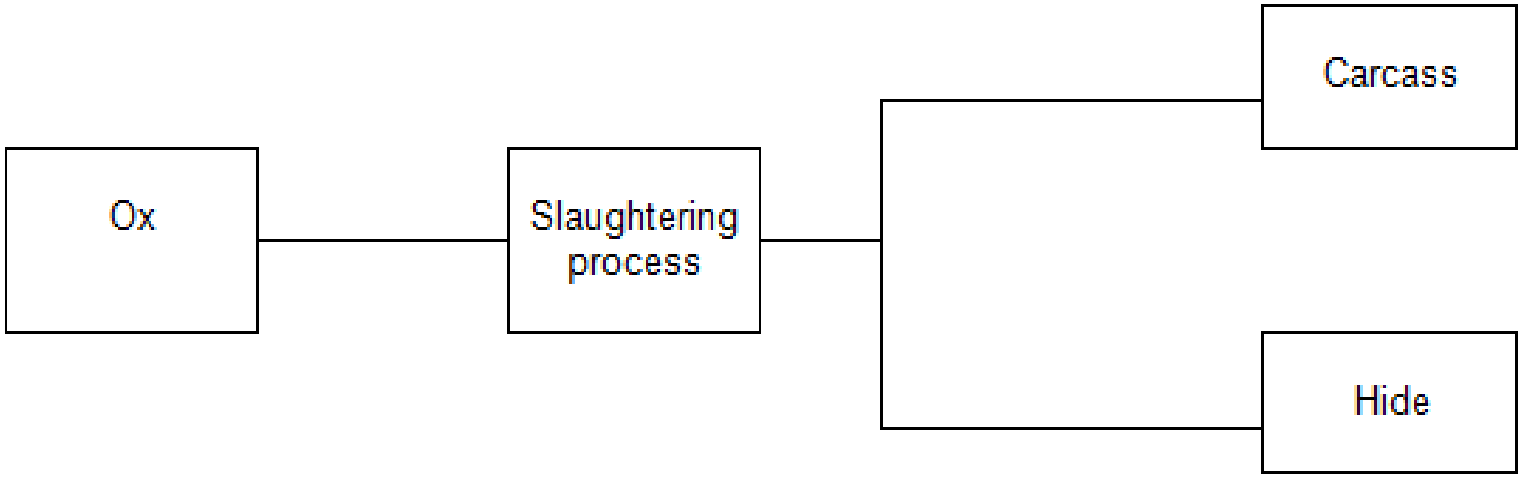
- More features of joint products
- Similarity of treatment: by-product proceeds from regular sales or markets

INTRODUCTION

Where a common raw material or a joint production process is used, the **same production process can produce two or more different products**.

To illustrate the above, take the slaughtering of an ox at an abattoir as an example. The process produces a carcass and a hide. The slaughtering process is the joint production process and the carcass and the hide are the different products which are produced.

The joint process can be diagrammatically represented as follows:



CLASSIFICATION INTO JOINT PRODUCTS AND BY-PRODUCTS

JOINT PRODUCTS:
Products which are more or less equivalent in importance, quantity and value to the other products which also arise from the same manufacturing process

(Example: Hide and Carcass – Good and poor quality meat)

BY-PRODUCTS:
Product is subordinate to the joint products in importance, quantity and value

(Example: Bones)

JOINT COSTS

JOINT COST:
Certain costs are incurred in processing the carcass into the three products (good + poor quality meat + bones). The cost of the carcass, labour and overheads related to processing are common to all three products.

SPLIT-OFF POINT:
In any manufacturing process which produces more than one product, there is a point up to which it is not possible to identify individual products. The **point in the process at which the individual products can be identified**

ADDITIONAL PROCESSING COSTS:
Further processing after split-off point before sold.

COSTING METHODS FOR JOINT PRODUCTS

- The **physical standard** method (units products)
- The market value at the split-off point method (the **selling price/market value at the split-off point** is applied)
- Relative market value (**Net realizable value**) of the **final product** method (the market value of the final product is used and all additional processing costs after the split-off point and selling and distribution costs are deducted there from. In other words, the estimated market value at the split-off point is calculated in this way).
- Reversal costing (**Constant gross profit/contribution**) method.

PHYSICAL UNITS METHOD

ILLUSTRATION 1 – PHYSICAL UNITS METHOD

A company manufactures three products in a single process. Raw material X is used to produce product XX, XY an XZ.

Opening stock, finished goods, 200 units XX, 250 units XY and 300 of XZ with a cost price of R1,50, R2,50 and R4,00 respectively.

One unit X cost R10 and produces 2 units of XX, 3 units of XY and 4 units of XZ.

Separate cost of processing the unit further amount to R0, 50c for XX, R0, 75 for XY and R1 for XZ.

1000 units of material X were processed during the year.

Sales for the year are:

	XX	XY	XZ
Units sold	1 800	3 100	3 750
Proceeds	R5 400	R12 400	R28 125

Fixed cost amount to R2 500 for the year.

Stock is valued on the FIFO basis.

Instead of processing the products further they can be sold at XX R1, 20 per unit, XY at R2 per unit and XZ at R3 per unit.

PHYSICAL UNITS METHOD

Joint costs will be allocated on the basis of **physical units** in the following way:

Units produced:

XX	1 000 x 2	=	2 000
XY	1 000 x 3	=	3 000
XZ	1 000 x 4	=	4 000
			9 000

∴	XX	=	2÷9 x R10 000	R 2 222
	XY	=	3÷9 x R10 000	R 3 333
	XZ	=	4÷9 x R10 000	R 4 445
				R10 000

NB: Allocation of joint cost is based on units produced

(NEVER UNITS SOLD).

RELATIVE SALES VALUE

EXAMPLE 3 – RELATIVE MARKET VALUE OF FINAL PRODUCT

Details as in Example 1.

Joint costs will be allocated on the basis of relative sales value in the following way:

Relative sales value is defined as the selling price of the end product less any costs necessary to process after split off – point sell it and distribute it. Please note that we referring to the sales value of production.

	A	B	C
Sales	5 400	12 400	28 125
Units sold	1 800	3 100	3 750
Selling price per unit	3	4	7.5
Units produced	2 000	3 000	4 000
Sales value of production	**6 000**	**12 000**	**30 000**

Separate costs:
A: R0.5 x 2 000 units = R1 000
B: 0.75 x 3 000 units = R2 250
C: R1 x 4 000 units = R4 000

RELATIVE SALES VALUE

ILLUSTRATION 2 – RELATIVE SALES VALUE BASIS

Details as in Illustration 1.

Joint costs will be allocated on the basis of relative sales value in the following way:

Relative sales value is defined as the selling price of the end product less any costs necessary to process after split off – point sell it and distribute it. Please note that we referring to the sales value of production.

	XX	XY	XZ
Sales value of production	6 000	12 000	30 000
Less: separate cost	1 000	2 250	4 000
Relative sales value	5 000	9 750	26 000

Allocation

XX	5 000 / 40 750 / 4	x	R10 000	=	R 1 227
XY	9 750 / 40 750	x	R10 000	=	R 2 393
XZ	26 000 / 40 750	x	R10 000	=	R 6 380
					R10 000

UNIFORM CONTRIBUTION/REVERSAL COSTING METHOD

ILLUSTRATION 3 – UNIFORM CONTRIBUTION/REVERSAL COSTING METHOD

Details as in illustration 1.

Joint costs will be allocated on the uniform percentage contribution basis as follows:

Profit percentage in example 2 $\frac{30\,750}{48\,000}$ = 64,1%

	(1) Sales value of production	(2) Profit contribution (1)x64,1%	(3) Separatable cost	(4) Share of joint cost (1)-(2)-(3)
XX	6 000	3 844	1 000	1 156
XY	12 000	7 688	2 250	2 062
XZ	30 000	19 218	4 000	6 782
	48 000	30 750	7 250	10 000

RELATIVE SALES VALUE AT SPLIT-OFF

ILLUSTRATION 4 – RELATIVE SALES VALUE AT SPLIT - OFF

Details as in illustration 1.

Joint costs will be allocated on the basis of relative sales value at split off point in the following way:

			%	Allocation
XX	2 000 x R1,20	2 400	11,76	R 1 176
XY	3 000 x R2,00	6 000	29,41	R 2 941
XZ	4 000 x R3,00	12 000	58,83	R 5 883
		20 400	100,00%	R10 000

BY-PRODUCTS

The proceeds earned on the sale of a by-product (contribution) may be brought to account as follows in the income statement:

- a **reduction of the joint production costs**
- **"other income"** (a separate income item) shown directly on the income statement
- a **reduction in the cost of goods sold**.

The proceeds or contribution from a by-product are generally used to reduce the **joint cost of the joint products**.

BY-PRODUCTS

ILLUSTRATION 6 – METHODS OF ACCOUNTING FOR BY-PRODUCTS

During November 2006, Suncake Ltd recorded the following results:

Opening stock	Main product P = Nil By- product z = Nil
Cost of production	R120 000

Sales of the main product amounted to 90% of output during the period, and 10% of production was held as closing stock at 30 November.

Sales revenue from the main product during November was R150 000.

A by-product Z is produced, and output had a net sales value of R1 000. Of this output, R700 was sold during the month, and R300 was still on hand at 30 November.

REQUIRED:

Calculate the profits for November using the four different methods of accounting for by-products.

BY-PRODUCTS

SUGGESTED SOLUTION

Income of by-product is added to sales of the main product

	R	R
Sales of main product (R150 000 + R700)		150 700
Opening stock	-	
Cost of production	120 000	
	120 000	
Less: Closing stock	12 000	
Cost of sales		108 000
Profit – main product		42 700

Income of by-product treated as separate item in income statement

	R	R
Sales of main product		150 000
Opening stock	-	
Cost of production	120 000	
	120 000	
Less: Closing stock	12 000	
Cost of sales		108 000
Profit – main product		42 000
Other income		700
		42 700

BY-PRODUCTS

Income of by-product is deducted from the cost of production

	R	R
Sales of main product		150 000
Opening stock	-	
Cost of production (R120 000 – R700)	119 300	
	119 300	
Less: Closing stock (10%)	11 930	
Cost of sales		107 370
Profit – main product		42 630

Net realisable value of by-product deducted from cost of production (joint cost)

	R	R
Sales of main product		150 000
Opening stock	-	
Cost of production (R120 000 – R1000)	119 000	
	119 000	
Less: Closing stock	11 900	
Cost of sales		107 100
Profit – main product		42 900

6. OPERATING BUDGET

- Multiple functions of budget
- Conflicting roles of budgets
- Advantages of budgets
- Criticism of budgets
- Types of budgets

WHAT IS A BUDGET?

- A budget is basically a financial **plan of action** for the future.

  The key purpose of a budget is to determine the **most profitable strategy** for the company.

MULTIPLE FUNCTIONS OF BUDGETS

- **Planning** annual operations;
- **Coordinating** the activities of the various parts of the organisation and ensuring that the parts are in **harmony** with each other;
- **Communicating** plans to the various responsibility centre managers;
- **Motivating managers** to strive to achieve the organisational goals;
- **Controlling activities**;
- **Evaluating** the **performance** of managers.

CONFLICTING ROLES OF BUDGETS

- Usually single budget serve several purposes:

- **Planning** vs. **motivation** (Demanding budget may motivate performance, but unsuitable for planning purposes)
- What if certain components are out of manager's **control**?
- Will this budget really **motivate** staff?
- What if your department were dependable on other departments. How will this influence my **performance evaluation**?

ADVANTAGES OF BUDGETING

- Guide personnel to **understand expectations** and how they will be evaluated
- Isolate **problem areas** and enable **corrective action** to be taken before problems arise
- Highlight the **importance of cost considerations** in company operations
- Ensures all levels of management co-operate towards a **common goal**
- Causes all sections to **co-ordinate** their **activities** and to **define** specific **areas of responsibility**
- Helps corporate **policies** and **organisational structures** to be **defined**

CRITICISMS OF BUDGETING

- Encourage **rigid planning** and **incremental thinking**
- Being **time-consuming**
- Ignoring key drivers of shareholder value by **focusing too much attention on short-term financial numbers**
- Being a yearly rigid ritual **impedes** firms from being **flexible and adaptive** in the increasingly unpredictable environment facing contemporary organizations
- Tying the to a **12-month commitment** (risky)
- Meeting only the lowest targets, **not beating them**!
- **Spending what is in the budget**, even if it is not necessary (protect against budget reduction next year)
- Achieving the budget even if this results in **undesirable actions**
- Being disconnect from strategy

STAGES IN THE BUDGETING PROCESS (DRURY 8TH EDITION PAGE 364)

1. • Communicating details of budget policy to the people responsible for the preparation of budgets
2. • Determine the factor that restricts output (limited resources/ demand)
3. • Prepare the sales budget
4. • Prepare various other budgets
5. • Negotiations of budgets with supervisors
6. • Coordination and review of budgets
7. • Final acceptance of budgets
8. • Ongoing review of budgets

THE MASTER BUDGET

List of **all the costs and benefits** for the **company as a whole** during the operating period (contains all departmental budgets & ultimately the **budgeted financial statements**).

The master budget consists of the following **sub-budgets:**

- **Capital Budget** - Long-term investment evaluation decisions & their financing.

- **Financial Budget**
  - Cash budget
  - Budgeted balance sheet

TYPES OF BUDGETS…CONTINUED

- **Operating Budget** – enables compilation of the **budgeted income statement.**
  - Sales budget
  - Production budget
  - Cost-of-sales budget
  - Selling expenses budget
  - Administrative expenses budget

CASH BUDGETS

- To ensure **sufficient cash** is available to **meet** the level of **operations** that are outlined in the various other budgets,
- To **identify** any **cash deficiencies** in advance, and
- To ensure any **surplus cash is invested** appropriately.

Motives for holding cash

- **Transactions motive** – to ensure the business holds **enough cash** to make the payments necessary to **keep the business going**.
- **Precautionary motive** – to ensure the business does not find itself in financial difficulties should **unforseen expenses** arise.
- **Speculative motive** – to ensure the business has **cash available to invest** should the opportunity arise.

TYPES OF BUDGETS…CONTINUED

Activity based budgeting

- To manage costs more effectively **organisations** that have **implemented** activity-based costing (**ABC**) have also adopted activity-based budgeting (ABB).

Incremental / conventional budgeting

- The **existing budget** is taken as the **starting point** for preparing the next annual budget.

  This is then **adjusted for changes** which are expected to occur during the new budget period (such as changes in product mix, volumes and prices).

TYPES OF BUDGETS…CONTINUED

Zero-based budgeting

- Developed to overcome the limitations of incremental budgets.

- It is a budget that **starts from scratch** (i.e. from a zero base) and is not based on any previous or existing figures.

  The main implication is that all expenditure must be justified from scratch.

Flexed budget

- The existing **budget** is **"flexed"** to **actual output**.

RECAP 1: EXAM QUESTION

H has a budgeted production for the next budget year of 12,000 units spread evenly over the year. It expects the same production level to continue for the next two years. Each unit uses 4kg of material.

The estimated opening raw material inventory at the start of the next budget year is 3,000kg. H's future policy will be to hold sufficient raw material inventory at the end of each month to cover 110% of the following month's production.

The budgeted material cost is $8 per kg for purchases up to 49,000kg. The excess of purchases over 49,000kg in a year will be at a cost of $7.50 per kg.

Calculate the material purchases budget for the year in $. ***(3 marks)***

Nov 2010_Q1.6

RECAP 1: EXAM QUESTION

Materials Usage

12,000 units x 4kg =	**48,000kg**
Opening inventory =	**3,000kg**
Closing inventory = 12,000/12 x 4kg x 1.1 =	**4,400kg**

Material Purchases Budget (kg)

Material usage	**48,000 kg**
Plus closing inventory	**4,400 kg**
Less opening inventory	**(3,000) kg**
	49,400 kg

Material Purchases Budget ($)

49,000kg x $8 =	$392,000
400kg x $7.50 =	$3,000
Total	**$395,000**

Nov 2010_Q1.6

RECAP 2: EXAM QUESTION

UNISA REVISION PACK 2014:

QUESTION 5 (11 marks; 13 minutes)

ABC (Pty) Ltd is a medium sized manufacturer of plastic squeeze bottles in the Midrand area. The management accountant of the company provided you with the following information for the year ended 30 April 2014:

	Note	R
Sales	1	5 000 000
Dividends received	2	50 000
Cost of sales	3	2 000 000
Office Equipment at cost	4	1 000 000
Machinery at cost	4	1 000 000

Additional information:

1. The company expects sales to increase by 8% for the coming financial year. Sales are spread evenly throughout the year.
2. The company invested R100 000 in the shares of Assus Ltd on 01 May 2013. Assus declared dividends on 31 March to all shareholders registered on 31 March 2014 payable on 30 June 2014.

RECAP 2: EXAM QUESTION

UNISA REVISION PACK 2014:
QUESTION 5 (11 marks; 13 minutes)

3. The cost of sales is expected to increase by 5% per annum for the coming year. The purchases of raw materials are made evenly throughout the year.
4. Depreciation on office equipment is at 20% per annum on the diminishing balance method and machinery is 20% per annum on straight line method. Both the equipment and machinery were purchased on 01 May 2013.
5. To finance the acquisition of office equipment, machinery and operating expenses for the first six months the company borrowed R3million from Abza bank at 8% simple interest per annum on 01 May 2013. The interest is payable annually on 30 April. The capital is repayable in full on 30 April 2018.
6. The company paid R16 000 per month on factory rental and R12 000 per month on vehicles rental. These are expected to increase by 5% and 6% respectively from 1 May 2014.
7. The company monthly salaries bill was R120 000 and a salary negotiation with workers union was settled at 6% for the forthcoming financial year.
8. Administrative expenses were R15 000 per month and will increase by 7% per annum from 1 May 2014.
9. A provision for income tax of R3 000 per month will be made for the forthcoming financial year.

RECAP 2: EXAM QUESTION

UNISA REVISION PACK 2014:
QUESTION 5 (11 marks; 13 minutes)

REQUIRED:

Prepare the budgeted statement of profit or loss of ABC (Pty) Ltd for the six months ended 31 October 2014. (11)

RECAP 2: EXAM QUESTION

UNISA REVISION PACK 2014:
QUESTION 5 (11 marks; 13 minutes)

Budgeted statement of profit or loss for the six months ended 31 October 2014

		R
Revenue	((R5 000 000 X 108%)/ 2))	2 700 000 √
Cost of sales	((R2 000 000 X 105%)/ 2))	(1 050 000) √
Gross profit		**1 650 000**
Other income	– dividends from Assus Ltd (Accrued last year)	- √
		1 650 000
Operating expenses		**1 336 620**
Depreciation (W1)		180 000 √√
Finance costs/ Interest on loan ((R3 000 000 x 8%)/ 2))		120 000 √
Rentals (W2)		177 120 √√
Salaries	(R120 000 x 106% x 6 months)	763 200 √
Administrative expenses	(R15 000 x 107% x 6 months)	96 300 √
Profit before tax		**313 380**
Income tax expense	(R3 000 x 6 months)	18 000 √
Profit after tax		**295 380**

RECAP 2: EXAM QUESTION

UNISA REVISION PACK 2014:
QUESTION 5 (11 marks; 13 minutes)

Calculations:

W1- Depreciation

- Office equipment ((R1 000 000 x 80%) x 20%)/ 2)) = R80 000
- Machinery ((R1 000 000 x 20%)/ 2)) = R100 000

= R180 000

W2 -Rentals

- Factory (R16 000 x 105% x 6 months) = R100 800
- Vehicles (R12 000 x 106% x 6 months) = R76 320

= R177 120