RELEVANT TO FOUNDATIONS IN ACCOUNTANCY PAPER FMA

MANAGEMENT ACCOUNTING

Process costing

Process costing is a method of costing used mainly in manufacturing where units are continuously mass-produced through one or more processes. Examples of this include the manufacture of erasers, chemicals or processed food.

In process costing it is the process that is costed (unlike job costing where each job is costed separately). The method used is to take the total cost of the process and average it over the units of production.

$$\text{Cost per unit} = \frac{\text{Cost of inputs}}{\text{Expected output in units}}$$

Important terms to understand
In a manufacturing process the number of units of output may not necessarily be the same as the number of units of inputs. There may be a loss.

Normal loss
This is the term used to describe normal expected wastage under usual operating conditions. This may be due to reasons such as evaporation, testing or rejects.

Abnormal loss
This is when a loss occurs over and above the normal expected loss. This may be due to reasons such as faulty machinery or errors by labourers.

Abnormal gain
This occurs when the actual loss is lower than the normal loss. This could, for example, be due to greater efficiency from newly-purchased machinery.

Work in progress (WIP)
This is the term used to describe units that are not yet complete at the end of the period. Opening WIP is the number of incomplete units at the start of a process and closing WIP is the number at the end of the process.

Scrap value
Sometimes the outcome of a loss can be sold for a small value. For example, in the production of screws there may be a loss such as metal wastage. This may be sold to a scrap merchant for a fee.

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Equivalent units

This refers to a conversion of part-completed units into an equivalent number of wholly-completed units. For example, if 1,000 cars are 40% complete then the equivalent number of completed cars would be 1,000 x 40% = 400 cars. Note: If 1,000 cars are 60% complete on the painting, but 40% complete on the testing, then equivalent units will need to be established for each type of cost. (See numerical example later.)

How to approach process accounting questions

Step 1 Draw up a T account for the process account. (There may be more than one process, but start with the first one initially.) Fill in the information given in the question.

Process account

	Units	$		Units	$
Opening WIP	X	X	Normal loss	X	X
Materials		X	Transfer to Process 2 or Finished goods	X	X
Labour		X	Abnormal loss	X	X
Overheads		X	Closing WIP	X	X
Abnormal gain	X	X			

Step 2 Calculate the normal loss in units and enter on to the Process account. (The value will be zero unless there is a scrap value – see Step 4).

Step 3 Calculate the abnormal loss or gain (there won't be both). Enter the figure on to the Process account and open a T account for the abnormal loss or gain.

Step 4 Calculate the scrap value (if any) and enter it on to the Process account. Open a T account for the scrap and debit it with the scrap value.

Step 5 Calculate the equivalent units and cost per unit.

Step 6 Repeat the above if there is a second process.

Note: Although this proforma includes both losses and WIP, the Paper F2/FMA syllabus specifically excludes situations where both occur in the same process. Therefore, don't expect to have to complete all of the steps in the questions.

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Normal loss example

Mr Bean's chocolate Wiggly bars pass through two processes. The data for the month just ended are:

		$	kg			$
Process 1	Ingredients	5,000	4,000	Process 2	Packaging	10,000
	Labour and overhead	6,000			Labour and overhead	9,000

Mr Bean allows the staff to eat 5% of the chocolate as they work on Process 1. There was no work in progress at the month end. Prepare the two process accounts and calculate the cost per kg.

Process 1 account

	kg	$		kg	$
Ingredients	4,000	5,000	Normal loss (W1)	200	
Labour and overheads		6,000	Transfer to Process 2 (W2)	3,800	11,000
	4,000	11,000		4,000	
					11,000

Q = figure taken straight from the information given in the question.

Workings

(1) The staff normally eat 5% of the chocolate, so the normal loss is 4,000 x 5% = 200kg

There is no work in progress or scrap value or abnormal losses or gains, so we can now balance the account to obtain the amounts transferred to Process 2.

(2) Number of kg transferred = kg input less normal loss = 4,000 – 200 = 3,800kg

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Process 2 account

	kg	$		kg	$
Transfer from Process 1 (above)	3,800	11,000	Finished goods (balancing figure)	3,800	30,000
Packaging		10,000			
Labour and overheads		9,000			
	3,800	30,000		3,800	30,000

Cost per kg = $\frac{\text{Total costs}}{\text{Number of expected kg}} = \frac{\$30,000}{3,800} = \$7.89$ per kg

Abnormal gain example

There is a heatwave and staff have eaten less chocolate. At the end of Process 1, 3,810 units are transferred to Process 2.

Process 1 account

	kg	$		kg	$
Ingredients	4,000	5,000	Normal loss	200	
Labour and overheads		6,000	Transfer to Process 2 (W2)	3,810	11,029
Abnormal gain (W1+2)	10	29			
	4,010	11,029		4,010	11,029

Workings

(1) As the T account should balance, the abnormal gain = 4,010kg – 4,000kg = 10kg

(2) Cost per kg = $\frac{\text{Costs incurred}}{\text{Expected output in kgs}} = \frac{11,000}{4,000 \times 95\%} = \$2.89$

Cost of units transferred to Process 2 = \$2.89 × 3,810 = \$11,029
(using \$2.894736842 to avoid rounding differences).
Cost of abnormal gain = \$2.89 × 10 = \$29.
[Remember to open an abnormal gain T account and credit it with \$29]

Process 2 account

	kg	$		kg	$
Transfer from Process 1 (above)	3,810	11,029	Finished goods (balancing figure)	3,810	30,029
Packaging		10,000			
Labour and overheads		9,000			
	3,810	30,029		3,810	30,029

Cost per kg = $\frac{\$30{,}029}{3{,}810}$ = $7.88/kg

Scrap value example

Mr Bean can no longer afford to give his staff 5% of the bars. He decides to offer the bars to his staff at a discount. They pay 40c for every kg that they eat. As a result of this, there is another abnormal gain of 10kg, so 3,810 units are transferred to Process 2.

Process 1 account

	kg	$		kg	$
Ingredients	4,000	5,000	Normal loss (W1)	200	80
Labour and overheads		6,000	Transfer to Process 2	3,810	10,947
Abnormal gain (11,000 – 80) / 4,000	10	27			
	4,010	11,027		4,010	11,027

Workings

Here we need to calculate the scrap value. The value of units transferred to Process 2 is a balancing figure.

(1) Number of kg of normal loss × scrap amount per kg = 200 × 0.4 = $80
[Dr Scrap A/C $80, Cr Process A/C $80]

Be careful here! The scrap value also affects the abnormal gain or loss accounts. Since the staff didn't eat the number of bars that they were entitled to, the scrap value (the 40c per bar) is lower than 200 × 40c. In fact, it is 10 × 40c = $4 lower (the abnormal gain). This needs to be reflected in the scrap account and the abnormal gain account.

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Scrap account

Process 1	80	Abnormal gain	4
		Bank	76
	80		80

Abnormal gain A/C

Scrap A/C	4	Process 1	27
Income statement	23		
	27		27

Process 2 account

	kg	$		kg	$
Transfer from Process 1 (above)	3,810	10,947	Finished goods (balancing figure)	3,810	29,947
Packaging		10,000			
Labour and overheads		9,000			
	3,810	29,947		3,810	29,947

Cost per kg = $\frac{\$29,947}{3,810}$ = 7.86/kg

Work in progress example

Assuming at the month end there are now part-completed bars (work-in-progress). Assuming also that he stopped charging staff for the bars that they had eaten. The data for Process 2 was as follows:

Opening WIP	$235 Materials (Ingredients)	100%	100kgs
	$520 Labour and overheads	60%	
Input	$8,405 Materials (Packaging)		3,500kgs
	$6,200 Labour and overheads		
Transferred to finished goods			3,100kgs
Closing WIP	Materials	100%	500kgs
	Labour and overheads	20%	

For questions that include WIP, we need to calculate equivalent units. First, we need to choose the method of valuing WIP. In an exam, use the first in first out (FIFO) method if the **percentage completion** of each element of opening WIP is given. Use the weighted average (WA) method if the **value** of each element of opening WIP is given. [Note that the two methods give different valuations for the closing WIP.]

In the weighted average method, no distinction is made between units of opening inventory and new units introduced to the process during the accounting period.

Step 1 Prepare a statement of equivalent units. Note that opening inventory units count as a full equivalent unit of production when the weighted average cost system is applied.

Kilograms

Weighted average			**FIFO**		
	Material	**Lab and O/hd**		**Material**	**Lab and O/hd**
	kg	kg		kg	kg
Opening WIP	100	100	Opening WIP (100 x 40%)		40
Started and completed (3,100 less op WIP)	3,000	3,000	Started and completed (3,100 less op WIP)	3,000	3,000
Closing WIP 500 × 100% 500 × 20%	500	100	Closing WIP	500	100
Equivalent units	3,600	3,200	Equivalent units	3,500	3,140

Step 2 Prepare a statement of **costs** per equivalent unit

Costs

Weighted average			**FIFO**		
	Material	**Lab and O/hd**		**Material**	**Lab and O/hd**
	$	$		$	$
Op WIP	235	520			
Input	8,405	6,200	Input	8,405	6,200
	8,640	6,720		8,405	6,200
Cost per equivalent unit	8,640/3,600	6,720/3,200	Cost per equivalent unit	8,405/3,500	6,200/3,140
	= $2.40	= $2.10		= $2.40	= $1.975
Total cost per kg = $4.50			Total cost per kg = $4.375		

Step 3 Prepare a statement of evaluation

Weighted average		**FIFO**	
Completed kgs		Op WIP cost + Lab + O/h to finish op WIP:	
3,100 x $4.50	$13,950	755 + ($1.975 x 100 x 40%)	$834
		Current production $4.375 x 3,000	$13,128*
Closing WIP		Closing WIP	
500 x 20% x $2.10		500 x 20% x $1.975	
500 x $2.40	$1,410	500 x $2.40	$1,398
	$15,360		$15,360

* Slight difference due to rounding $4.375 × 3,000 = $13,125

Step 4 Prepare the Process 2 accounts

Weighted average
Process 2 account

	kg	$		kg	$
Opening WIP	100	755	Completed output	3,100	13,950
Materials	3,500	8,405	(3,100 x $4.50)		
Labour and overheads		6,200	Closing WIP	500	
					1,410
	3,600	15,360		3,600	
					15,360

FIFO
Process 2 account

	kg	$		kg	$
Opening WIP	100	755	Completed output	3,100	13,962
Materials	3,500	8,405	(834 + 13,128)		
Labour and overheads		6,200	Closing WIP	500	1,398
	3,600	15,360		3,600	
					15,360

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