

Paper F2

MANAGEMENT ACCOUNTING

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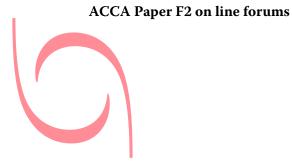
- F1 Accountant in Business
- F2 Management Accounting
- F3 Finanticial Accounting
- F4 Corporate & Business Law
- F5 Performance Management
- F6 Taxation (UK)
- F7 Financial Reporting
- F8 Audit and Assurance
- F9 Financial Management
- P1 Governance, Risk & Ethics
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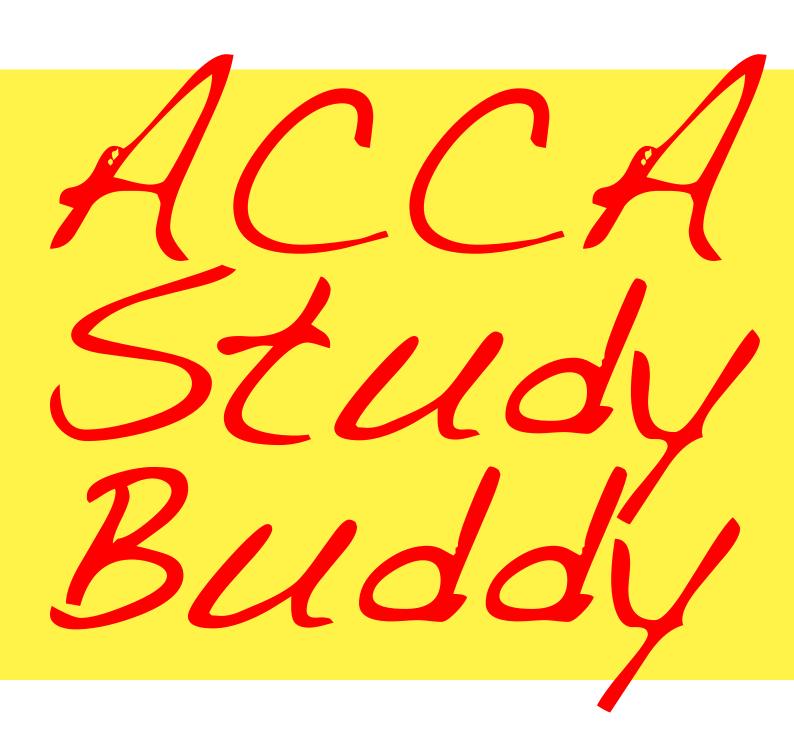
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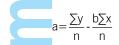




Paper F2

FORMULAE

Regression analysis



$$b = \frac{n\sum xy - \sum x\sum y}{n\sum x^2 - (\sum x)^2}$$

$$\mathbf{r} = \frac{\mathbf{n} \sum \mathbf{xy} - \sum \mathbf{x} \sum \mathbf{y}}{\sqrt{(\mathbf{n} \sum \mathbf{x}^2 - (\sum \mathbf{x})^2)(\mathbf{n} \sum \mathbf{y}^2 - (\sum \mathbf{y})^2)}}$$

Economic order quantity

$$= \sqrt{\frac{2C_0D}{C_h}}$$

Economic batch quantity

$$=\sqrt{\frac{2C_0D}{C_h(1-\frac{D}{P})}}$$



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Chapter 1



THE NATURE AND PURPOSE OF COST AND MANAGEMENT ACCOUNTING

Introduction

The purpose of management accounting is to assist management in running the business in ways that will improve the performance of the business.

Data and information

One way of assisting management is to provide them with good information to help them with their decisions.

The information can be provided to them in different ways, but is usually in the form of reports. For example, a report analysing costs of producing each of several products may assist management in deciding which products to produce.

It is the management accountant who will be expected to provide the information, and in order to do so he/she needs to collect data. Data consists of the facts that are gathered and stored. Data has no clear meaning until it is processed – analysed and sorted – into information.

What makes good information?

Good quality information should:

- have a purpose and be relevant for the purpose
- be timely
- be understandable (to the manager using it)
 - be accurate
- be complete (but not excessive)
 - be communicated to the right person
 - be communicated by an appropriate channel (for example, be printed or be sent electronically)

The main managerial processes 4

The main areas of management accounting are:

Costing

Cost accounting is identifying the cost of producing an item (or providing a service) in order to, for example, assist in deciding on a selling price.

Planning

e.g. plan how many staff will be required in the factory next year

Decision making

e.g. decide on what selling price to charge for a new product

Control

e.g. check month-by-month whether the company is over or under spending on wages

The different levels of planning 5

strategic planning

long-term plans (e.g. 5 to 10 years) for the business

e.g. what new offices to open? / what new products to launch?

tactical planning

medium-term, more detailed, plans – usually involving producing budgets for the next year

e.g. how many staff to employ next year?

operational planning

short-term planning and decisions

e.g. which supplier to choose for a purchase next week



Chapter 1

Comparison of management accounting with financial accounting

	Financial Accounting	Management Accounting
•		
3		
1		
- 		

Chapter 1

TEST 1

Question 1

The following assertions relate to financial accounting and to cost accounting:

- The main users of financial accounting information are external to an organisation.
- (ii) Cost accounting is that part of financial accounting which records the cash received and payments made by an organisation.

Which of the following statements are true?

- Assertions (i) and (ii) are both correct. A
- В Only assertion (i) is correct.
- \mathbf{C} Only assertion (ii) is correct.

(1 mark)

Question 2

For which of the following is a profit centre manager responsible?

- Costs only A
- Revenues only В
- Costs and revenues.

(1 mark)

Question 3

Data is information that has been processed in such a way as to be meaningful to its recipients.

Is this statement true or false?

- A True
- В False

(1 mark)

Question 4

The following statement refers to a quality of good information:

The cost of producing information should be greater than the value of the benefits of that information to management.

Is this statement true or false?

True

False

(1 mark)

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Chapter 2



COST CLASSIFICATION AND BEHAVIOUR

Cost classification Cost classification is the arrangement of cost items into logical groups. For example: by their nature (materials, wages etc.); or function (administration, production etc.). The eventual aim of costing is to determine the cost of producing a product/service; for profitability analysis, selling price determination and stock valuation purposes. Cost unit A cost unit is a unit of product or service in relation to which costs may be ascertained. The cost unit should be appropriate to the type of business, for example: Example 1 Suggest appropriate cost units for the following businesses Solution Business Appropriate cost unit Car manufacturer Cigarette manufacturer Builder Audit company

COST CLASSIFICATION AND BEHAVIOUR	Chapter 2
Types of expenses	
-	\$
Production/manufacturing costs	X
Administration costs	X
Selling and distribution costs	<u>X</u>
TOTAL EXPENSES	X
Only the production costs will be relevant in o	costing.
Direct costs	
Direct costs are those costs which can be iden	ntified with and allocated to a particular cost unit.
TOTAL DIRECT COSTS = PRIME COST	_ [
Example 2	
Direct costs	
	
<u></u>	
Indirect production costs (overheads)	
	ion overheads) are those costs which are incurred in hich cannot be identified with a particular cost unit.
Example 3	
Indirect production costs	
1	

TOTAL PRODUCTION COST = PRIME COST + PRODUCTION OVERHEADS

COST CLASSIFICATION AND BEHAVIOUR

Non-production costs

Other costs required to run the business.

Example 4
Non-manufacturing/production costs
TOTAL COSTS = PRODUCTION COSTS + NON-PRODUCTION COSTS
2 Cost behaviour
It is expected that costs will increase as production increases (i.e. as output increases) but the exact way in which costs behave with output may differ.
Example 5
Types of behaviour
(a) Variable cost
(b) Fixed cost
(c) Stepped fixed cost
(d) Semi variable/fixed cost

Linear assumption

For this examination we will assume that total variable costs vary linearly with the level of production (or that the variable cost per unit remains constant). In practice this may not be the case, but we will not consider the effect of this until later examinations.

Behaviour of manufacturing costs

With the linear assumption all costs can be categorised as either fixed or variable. This fits together with previous definitions:

Direct costs

By their nature direct costs will be variable costs.

Indirect costs/overheads

Overheads can be fixed or variable

	Fixed	Variable
Direct costs	X	$\sqrt{}$
Production overheads	$\sqrt{}$	$\sqrt{}$
Non-manufacturing costs	\checkmark	$\sqrt{}$

Semi-variable costs

It is necessary to determine the fixed and variable elements of semi-variable costs. A method known as 'High-Low' can be used to establish the fixed and variable elements. This technique is best illustrated by the use of an example.

Example 6

The total costs of a business for differing levels of output are as follows:

Output	Total Costs
(units)	<i>(\$'000)</i>
200	30
1,000	110

What are the fixed and variable elements of the total cost using the High-Low method?



A better approximation of the fixed and variable elements can be obtained using Regression Analysis. This will be considered in a later chapter of these notes.

Typical cost card for a cost unit

		\$/unit
Direct costs:		
- Direct materials	(2kg @ \$1.50/kg)	3.00
Direct labour	(3 hrs @ \$4/hr)	12.00
Prime cost		15.00
Indirect costs		
Variable overheads		2.00
Fixed overheads		3.00
Full product cost		20.00



Test 2

Question 1

An organisation has the following total costs at two activity levels:

Activity level (units) 16,000 22,000 Total costs (\$) 135,000 170,000

Variable cost per unit is constant within this range of activity but there is a step up of \$5,000 in the total fixed costs when the activity exceeds 17,500 units.

What is the total cost at an activity of 20,000 units?

- A \$155,000
- B \$158,000
- **C** \$160,000
- **D** \$163,000

(2 marks)

Question 2

Which one of the following should be classified as indirect labour?

- A Assembly workers on a car production line
- **B** Bricklayers in a house building company
- C Machinists in a factory producing clothes
- **D** Forklift truck drivers in the stores of an engineering company.

(1 mark)

Question 3

A manufacturing organisation incurs costs relating to the following:

- (1) Commission payable to salespersons.
- (2) Inspecting all products.
- (3) Packing the products at the end of the manufacturing process prior to moving them to the warehouse.

Which of these costs are classified as production costs?

- **A** (1) and (2) only
- **B** (1) and (3) only
- C (2) and (3) only
- **D** (1), (2) and (3)

(2 marks)

Question 4

What would be the most appropriate cost unit for a cake manufacturer? Cost per:

- A Cake
- B Batch
- C Kg
- D Production run

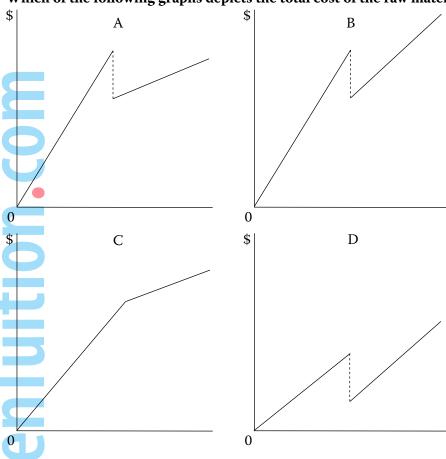
(1 marks)

COST CLASSIFICATION AND BEHAVIOUR

Question 5

Up to a given level of activity in each period the purchase price per unit of a raw material is constant. After that point a lower price per unit applies both to further units purchased and also retrospectively to all units already purchased.

Which of the following graphs depicts the total cost of the raw materials for a period?



(2 marks)

Question 6

In an organisation manufacturing a number of different products in one large factory, the rent of that factory is an example of a direct expense when costing a product.

Is this statement true or false?

True A

False

(1 mark)

Question 7

An organisation operates a piecework system of remuneration, but also guarantees its employees 80% of a time-based rate of pay which is based on \$20 per hour for an eight hour working day. Three minutes is the standard time allowed per unit of output. Piecework is paid at the rate of \$18 per standard hour.

If an employee produces 200 units in eight hours on a particular day, what is the employee's gross pay for that day?

\$128 A

В \$144

 \mathbf{C} \$160

D \$180

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COST CLASSIFICATION AND BEHAVIOUR

Chapter 2

Question 8

A semi-variable cost is one that, in the short term, remains the same over a given range of activity but beyond that increases and then remains constant at the higher level of activity.

Is this statement true or false?

- True
- В **False**

(1 mark)

Question 9

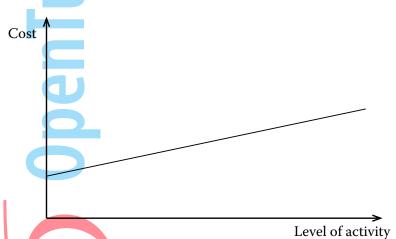
Which of the following are indirect costs?

- (i) The depreciation of maintenance equipment
- (ii) The overtime premium incurred at the specific request of a customer
- The hire of a tool for a specific job (iii)
- Item (i) only A
- В Items (i) and (ii) only
- \mathbf{C} Items (ii) and (iii) only
- D All of them

(2 marks)

Question 10

The following is a graph of cost against level of activity



To which one of the following costs does the graph correspond?

- Electricity bills made up of a standing charge and a variable charge A
- В Bonus payment to employees when production reaches a certain level
- \mathbf{C} Salesman's commission payable per unit up to a maximum amount of commission
- D Bulk discounts on purchases, the discount being given on all units purchased

(2 marks)

Question 11

Which of the following costs are part of the prime cost for a manufacturing company?

- Α Cost of transporting raw materials from the supplier's premises
- В Wages of factory workers engaged in machine maintenance
- C Depreciation of lorries used for deliveries to customers
- D Cost of indirect production materials

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Chapter 3



OVERHEAD ALLOCATION, APPORTIONMENT AND ABSORPTION

Introduction

A business needs to know the cost per unit of goods or services that they produce for many reasons.

E.g. to value stock

to fix a selling price

to analyse profitability

In principle, the unit cost of materials and of labour should not be a problem, because they can be measured. It is the overheads that present the real difficulty – in particular the fixed overheads.

E.g. if the factory costs \$100,000 p.a. to rent, then how much should be included in the cost of each unit?

2 Absorption of overheads

To show our approach to solving the problem referred to above, consider the following example:

Example 1

X plc produces desks.

Each desk uses 3 kg of wood at a cost of \$4 per kg, and takes 4 hours to produce.

Labour is paid at the rate of \$2 per hour.

Fixed costs of production are estimated to be \$700,000 p.a..

The company expects to produce 50,000 desks p.a..

Calculate	the cost per desk.		
-			
-			

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OVERHEAD ALLOCATION, APPORTIONMENT AND ABSORPTION

Chapter 3

This method of arriving at an overhead cost p.u. (dividing total overheads by total production) is known as the absorbing of overheads.

(Note that because we need the cost p.u. for things like fixing a selling price, we will usually absorb the overheads based on estimated total cost and estimated production. This can lead to problems later because obviously our estimates may not be correct. We will deal with this problem in the next chapter.)

Although the basic approach to absorbing overheads is not difficult, there are two extra problems that can occur and that you can be asked to deal with.

We will consider each of these problems in turn, and then look at a full example.

3 First problem – more than one product produced in the same factory

In this situation we have to decide on a basis for absorption first.

There are many bases for absorption that could be used (e.g. per unit, per labour hour, per machine hour etc.)

Example 2

X plc produces desks and chairs in the same factory.

Each desk uses 3 kg of wood at a cost of \$4 per kg, and takes 4 hours to produce.

Each chair uses 2 kg of wood at a cost of \$4 per kg., and takes 1 hour to produce.

Labour is paid at the rate of \$2 per hour.

Fixed costs of production are estimated to be \$700,000 p.a..

The company expect to produce 30,000 desks and 20,000 chairs p.a.

(Overheads are to be absorbed on a labour hour basis)

Calculate the cost per unit for desks and chairs	
· ·	

Chapter 3

In practice it would be up to the Management Accountant to decide on the most appropriate basis. In examinations it will be made obvious to you which basis to use, but read the question carefully.

4 Second problem – more than one department in the factory.

In this situation we need first to **allocate** and **apportion** the overheads between each department. We can then **absorb** the overheads in each department separately in the same way as before.

Exampl	е	3
--------	---	---

X plc produces desks and chairs in the same factory. The factory has two departments, assembly and finishing.

Each desk uses 3 kg of wood at a cost of \$4 per kg., and takes 4 hours to produce - 3 hours in assembly and 1 hour in finishing.

Each chair uses 2 kg of wood at a cost of \$4 per kg, and takes 1 hour to produce $-\frac{1}{2}$ hour in assembly and $\frac{1}{2}$ hour in finishing.

All labour is paid at the rate of \$2 per hour.

Fixed costs of production are estimated to be \$700,000 p.a.. Of this total, \$100,000 is the salary of the supervisors – \$60,000 to Assembly supervisor, and \$40,000 to Finishing supervisor.

The remaining overheads are to be split 40% to Assembly and 60% to Finishing.

The company expects to produce 30,000 desks and 20,000 chairs.

(Overheads to be absorbed on a labour hour basis)

Calculate the cost per unit for desks and for chairs

\ '				

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OVERHEAD ALLOCATION, APPORTIONMENT AND ABSORPTION

Chapter 3

The charging of supervisors salaries to the relevant department is known as allocation of overheads.

The splitting or sharing of overheads between departments (as in the remaining \$600,000 in our example) is known as the **apportionment** of overheads.

A fuller example of allocating and apportioning overheads:

Example 4

Production overhead o	costs for the period				
		\$			
Factory rent		20,000			
Factory heat		5,000			
Processing Dept – su	pervisor	15,000			
Packing Dept – super	visor	10,000			
Depreciation of equip	oment	7,000			
Factory canteen expe	nses	18,000			
Welfare costs of factory employees		5,000			
		80,000			
	Processing Dept	Packing Dept	Canteen		
Cubic space	50,000 m ³	25,000 m ³	5,000 m ³		
NBV equipment	\$300,000	\$300,000	\$100,000		
No. of employees	50	40	10		
	on production overh	ead costs amongst the	three departments using	ng a suitable	
basis.					

Allocate and apportion production overhead costs amongst the three departments using a suitable
basis.

Reapportionment of service cost centre overheads

Factory cost centres can be broken down into two types:

PRODUCTION COST CENTRES

- these make the cost units.

SERVICE COST CENTRES

- these do work for the production cost centres and one

We therefore need to transfer all service cost centre overheads to the production centres so that all production overheads for the period are shared between the production cost centres alone - as it is through these cost centres that cost units flow.

No Inter Service Work Done

If there is just one service department, or if there is more than one service department but there is no work done by one service department for another, then reapportionment is done using a suitable basis (e.g. canteen costs by the number of employees).

Example 5 Reapportion the canteen costs in Example 4 to the production cost centres.

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OVERHEAD ALLOCATION, APPORTIONMENT AND ABSORPTION

Chapter 3

Inter-Service Work Done

The problem is a little more complicated if there is more than one service cost centre and where they do work for one another. The way to deal with this is the reciprocal method.

The reciprocal method can be carried out in one of two ways:

- either the continuous or repeated distribution (tabular) method; or
- the algebraic method.

Example 6				
	Producti	ion Depts	Servi	ice Centres
	X	Y	Stores	Maintenance
	<i>\$</i>	<i>\$</i>	<i>\$</i>	<i>\$</i>
Allocated and apportioned overheads	70,000	30,000	20,000	15,000
Estimated work done by the service centres for				
other departments:				
Stores	50%	30%	-	20%
Maintenance	45%	40%	15%	-
Reapportion service department costs to department	ments usi	ng:		
(a) repeated distribution method; and		& ·		
(b) algebraic method.				
·				

Test 3

Question 1

A factory consists of two production cost centres (A and B) and two service cost centres (X and Y). The total allocated and apportioned overhead for each is as follows:

A B X Y \$95,000 \$82,000 \$46,000 \$30,000

It has been estimated that each service cost centre does work for other cost centres in the following proportions:

The reapportionment of service cost centre costs to other cost centres fully reflects the above proportions.

After the reapportionment of service cost centre costs has been carried out, what is the total overhead for production cost centre A?

A \$124,500

B \$126,100

\$127,000 \$128,500

(2 marks)

Question 2

D

The process of cost apportionment is carried out so that

- A costs may be controlled
- B cost units gather overheads as they pass through cost centres
- whole items of cost can be charged to cost centres
- D common costs are shared among cost centres

(1 marks)

Question 3

A cost centre is

- A A unit of product or service in relation to which costs are ascertained
- B An amount of expenditure attributable to an activity
- C A production or service location, function, activity or item of equipment for which costs are accumulated
- D A centre for which an individual budget is drawn up

(1 marks)

Question 4

A company manufactures two products L and M in a factory divided into two cost centres, X and Y. The following budgeted data are available:

Cost centre		
X	Y	

Allocated and apportioned fixed

overhead costs \$88,000 \$96,000

Direct labour hours per unit:

Product L	3.0	1.0
Product M	2.5	2.0

Budgeted output is 8,000 units of each product. Fixed overhead costs are absorbed on a direct labour hour basis.

What is the budgeted fixed overhead cost per unit for Product M?

- A \$10
- B \$11
- C \$12
- D \$13

(2 marks)

Ouestion 5

A company operates a job costing system. Job number 1203 requires \$300 of direct materials and \$400 of direct labour. Direct labour is paid at the rate of \$8 per hour. Production overheads are absorbed at a rate of \$26 per direct labour hour and non-production overheads are absorbed at a rate of 120% of prime cost.

What is the total cost of job number 1203?

- A \$2,000
- B \$2,400
- C \$2,840
- D \$4,400

(2 marks)

Question 6

The management accountant of Warsaw Limited has already allocated and apportioned the fixed overheads for the period although she has yet to reapportion the service centre costs. Information for the period is as follows:

	Production depart- ments		Service departments		Total
	1	2	Stores	Maintenance	
Allocated and apportioned	\$17,500	\$32,750	\$6,300	\$8,450	\$65,000
Work done by:					
Stores	60%	30%	-	10%	
Maintenance	75%	20%	5%	-	

What are the total overheads included in production department 1 if the reciprocal method is used to reapportion service centre costs?

- A \$27,618
- B \$28,171
- C \$28,398
- D \$28,453

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Chapter 4



THE MANAGEMENT ACCOUNTANTS PROFIT STATEMENT – ABSORPTION COSTING

Introduction

In the previous chapter we stated that the cost per unit is normally calculated in advance using estimated or budgeted figures. This is for several reasons. For instance, we need an estimate of the cost before we can fix a selling price. In addition, the estimated cost per unit provides a benchmark for control purposes. The Management Accountant can check regularly whether or not units are costing more or less than estimated and attempt to take corrective action if necessary.

As a result, the Management Accountants Profit Statement (or Operating Statement) takes a different form than that of the Financial Accountant's Income Statement

The statement is usually prepared monthly, and its objective is to show whether the profit is higher or lower than that expected, and to list the reasons for any differences.

The statement starts with the profit that should have been made if all the costs had been the same as on the standard cost card.

It then lists all the reasons for any differences in profit (or variances) to end with the actual profit.

However, in calculating the budgeted profit for individual months, absorption costing causes a problem when the expected production in a month differs from that used to absorb fixed overheads for the cost card.

This problem is illustrated in the following example



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THE MANAGEMENT ACCOUNTANTS PROFIT STATEMENT – ABSORPTION COSTING

Chapter 4

2 Illustration

Example 1

X plc produces one product – desks.

Each desk is budgeted to require 4 kg of wood at \$3 per kg, 4 hours of labour at \$2 per hour, and variable production overheads of \$5 per unit.

Fixed production overheads are budgeted at \$20,000 per month and average production is estimated to be 10,000 units per month.

The selling price is fixed at \$35 per unit.

There is also a variable selling cost of \$1 per unit and fixed selling cost of \$2,000 per month.

During the first two months X plc expects the following levels of activity:

	January	February
Production	11,000 units	9,500 units
Sales	9,000 units	11,500 units

Sales	9,000 units 11,500 units
(a) (b)	Prepare a cost card using absorption costing Set out budget Profit Statements for the months of January and February.
	U
+	
	<u> </u>

3 **Hourly absorption rates**

The previous example assumed that fixed overheads were absorbed on a unit basis. A popular question in the exam is to be asked to calculate the amount of any over or under - absorption when fixed overheads are absorbed on an hourly basis

Example 2

Y plc budgets on working 80,000 hours per month and having fixed overheads of \$320,000.	During April, the
actual hours worked are 78,000 and the actual fixed overheads are \$315,500.	

Calculate:	
(a) the overhead absorption rate per hour.	
(b) the amount of any over or under absorption of fixed overheads in April	
of the mass and of the first of	
9	



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Chapter 5



THE MANAGEMENT ACCOUNTANTS PROFIT STATEMENT - MARGINAL COSTING

Overview

Some businesses only want to know the variable cost of the units they make, regarding fixed costs as period costs. The variable cost is the extra cost each time a unit is made, fixed costs being effectively incurred before any production is started.

The variable production cost of a unit is made up of:

Direct materials X Direct labour X X Variable production overheads Marginal cost of a unit

Marginal costing

Variable production costs are included in cost per unit (i.e. treated as a *product cost*).

Fixed costs are deducted as a period cost in the profit statement.

Contribution

Contribution is an important concept in marginal costing. Contribution is an abbreviation of "contribution towards fixed costs and profit".

It is the difference between selling price and all variable costs (including non-production variable costs), usually expressed on a per unit basis.

\$ Selling price: X Less: Variable production costs X Variable non-production costs X (X) Contribution

Note: Contribution takes account of all variable costs. Marginal cost takes account of variable production costs only and inventory is valued at marginal cost.

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Example 1

X plc produces one product – desks.

Each desk is budgeted to require 4 kg of wood at \$3 per kg, 4 hours of labour at \$2 per hour, and variable production overheads of \$5 per unit.

Fixed production overheads are budgeted at \$20,000 per month and average production is estimated to be 10,000 units per month.

The selling price is fixed at \$35 per unit.

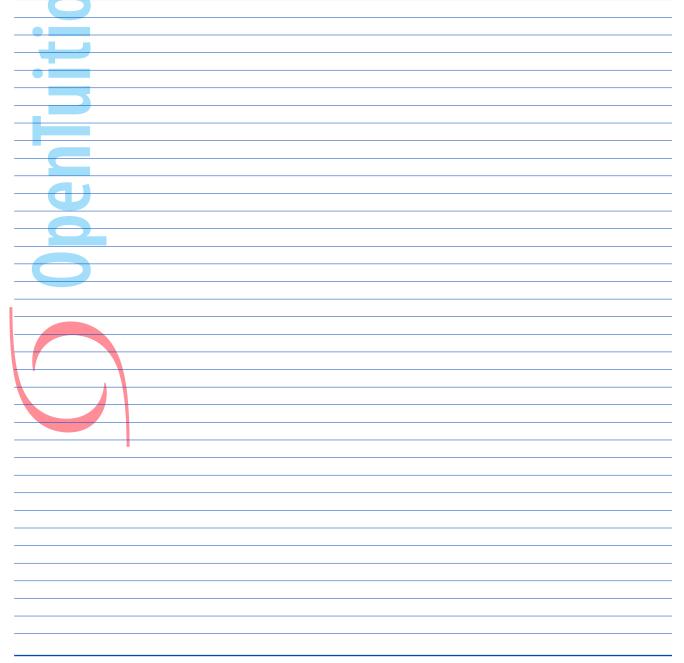
There is also a variable selling cost of \$1 per unit and fixed selling cost of \$2,000 per month.

During the first two months, X plc expects the following levels of activity:

	January	February
Production	11,000 units	9,500 units
Sales	9,000 units	11,500 units

All other results were as budgeted.

- Prepare a cost card using marginal costing (a)
- Set out Profit Statements for the months of January and February.



Example 2

D				C . 1	. 4	1		C
Prei	oare a	reconcili	arion o	r absori	วบเดท ลทส	marginal	costing	pronts
	- u - u	1 C C C II C II I	MULTUIN OF		JUIOII WIIW			PIOILEO

		January	February	
		<i>\$</i>	<i>\$</i>	
Abs	orption costing			
Mar	ginal costing			
Diff	erence			
-				
	The difference in profit arises from	the different inv	entory valuations w	hich are the result of the
	difference in treatment of the fixed p			
	To .			
	Effects			
	The delay in charging some producti	on overheads ui	nder absorption cost	ing leads to the following
	situations.			
Exa	mple 3			
Requ	iired			
Com	pare profits under marginal and ab	sorption costii	ng for the following	g situations
	Production > Sales			
(b)	Production < Sales			
(c)	Production = Sales			
	1			

Test 5

Question 1

A company manufactures and sells a single product. In two consecutive months the following levels of production and sales (in units) occurred:

	Month 1	Month 2
Sales	3,800	4,400
Production	3,900	4,200

The opening inventory for Month 1 was 400 units. Profits or losses have been calculated for each month using both absorption and marginal costing principles.

Which of the following combination of profits and losses for the two months is consistent with the above data?

	Absorption costing profit/(loss)		Marginal cos	ting profit/(loss)	
	Month 1	Month 2	Month 1	Month 2	
	\$	<i>\$</i>	<i>\$</i>	<i>\$</i>	
A	200	4,400	(400)	3,200	
В	(400)	4,400	200	3,200	
C	200	3,200	(400)	4,400	
D	(400)	3,200	200	4,400	
					(2 marks)

Question 2

The following budgeted information relates to a manufacturing company for next period:

	Units		<i>\$</i>
Production	14,000	Fixed production costs	63,000
Sales	12,000	Fixed selling costs	12,000

The normal level of activity is 14,000 units per period.

Using absorption costing the profit for next period has been calculated as \$36,000.

What would the profit for next period be using marginal costing?

A \$25,000 B \$27,000 C \$45,000 D \$47,000

(2 marks)

Question 3

A company uses an overhead absorption rate of \$3.50 per machine hour, based on 32,000 budgeted machine hours for the period. During the same period the actual total overhead expenditure amounted to \$108,875 and 30,000 machine hours were recorded on actual production.

By how much was the total overhead under or over absorbed for the period?

- A Under absorbed by \$3,875
- **B** Under absorbed by \$7,000
- C Over absorbed by \$3,875
- **D** Over absorbed by \$7,000

Question 4

Glossop Limited reported an annual profit of \$47,500 for the year ended 31 March 2000. The company uses absorption costing. One product is manufactured, the Rover, which has the following standard cost per unit.

	\$
Direct material (2 kg at \$5/kg)	10
Direct labour (4 hours at \$6.50/hour)	26
Variable overheads (4 hours at \$1 /hour)	4
Fixed overheads (4 hours at \$3/hour)	12
	<u>52</u>

The normal level of activity is 10,000 units although actual production was 11,500 units. Fixed costs were as budgeted.

Inventory levels at 1 April 1999 were 400 units and at the end of the year were 600 units.

What would be the profit under marginal costing?

\$44,300

\$45,100

\$49,900

\$50,700

(2 marks)

Question 5

A company absorbs overheads on machine hours which were budgeted at 11,250 with overheads of \$258,750. Actual results were 10,980 hours with overheads of \$254,692.

Overheads were

under absorbed by \$2,152

over absorbed by \$4,058 B

under absorbed by \$4,058

over absorbed by \$2,152

(1 marks)

Question 6

The production overhead of department P is absorbed using a machine hour rate. Budgeted production overheads for the department were \$280,000 and the actual machine hours were 70,000. Production overheads were under absorbed by \$9,400.

If actual production overheads were \$295,000 what was the overhead absorption rate per machine hour?

\$4.00 A

\$4.08 B

C \$4.21

\$4.35 D

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Question 7

Tesla has the following data relating to overheads.

	Budget	Actual
Fixed overheads	\$15,000	\$14,000
Units of production	10,000	10,100
Direct labour hours	20,000	19,500

Overheads are absorbed on the basis of labour hours.

Which of the following statements is true?

- Overheads will be under absorbed by \$1,000 due to the lower than expected expenditure. A
- В Overheads will be over absorbed by \$1,150 due to the unexpected increase in production.
- \mathbf{C} Overheads will be under absorbed by \$625 due to lower than expected expenditure and lower than expected labour hours.
- D Overheads will be over absorbed by \$625 due to lower than expected expenditure and lower than expected labour hours.

(2 marks)

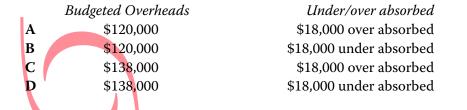
Question 8

Grove Limited reported an annual profit of \$47,500 for the year ended 31 March 2000. The company uses absorption costing. One product is manufactured, the Rover, which has the following standard cost per unit.

Direct material (2 kg at \$5/kg)	10
Direct labour (4 hours at \$6.50/hour)	26
Variable overheads (4 hours at \$1/hour)	4
Fixed overheads (4 hours at \$3/hour)	12
	52

The normal level of activity is 10,000 units although actual production was 11,500 units. Fixed costs were as budgeted. Inventory levels at 1 April 1999 were 400 units and at the end of the year were 600 units.

What were the budgeted fixed overheads for the year ended 31 March 2000 and the actual under or over absorption?



Question 9

A company produces a single product for which cost and selling price details are as follows.

	\$ per unit	\$ per unit
Selling price		28
Direct material	10	
Direct labour	4	
Variable overhead	2	
Fixed overhead	5	
		21
Profit per unit		

Last period, 8,000 units were produced and 8,500 units were sold. The opening inventory was 3,000 units and profits reported using marginal costing were \$60,000. The profits reported using an absorption costing system would be

A \$47,500 B \$57,500 C \$59,500 D \$62,500

(2 marks)

Question 10

A company made 17,500 units at a total cost of \$16 each. Three quarters of the costs were variable and one quarter fixed. 15,000 units were sold at \$25 each. There were no opening inventories.

By how much will the profit calculated using absorption costing principles differ from the profit if marginal costing principles had been used?

A The absorption costing profit would be \$10,000 less

The absorption costing profit would be \$10,000 greater

C The absorption costing profit would be \$30,000 greater

The absorption costing profit would be \$40,000 greater







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Chapter 6



PROCESS COSTING – INTRODUCTION

1 Introduction

Process costing is a method of applying costing systems to goods or services that are produced in a series of processes. Every unit is assumed to have involved the same amount of work and therefore the costs for a period are charged to processes or operations, and unit costs are calculated by dividing process costs by the quantity of units produced.

2 Calculation of cost per unit

- Calculate the total of all costs incurred in the process during a period.
 - » If using absorption costing then include all overheads.
 - » If using marginal costing then only include variable overheads.

Divide the total cost by the number of units produced to arrive at a cost per unit.

Example 1

During February the following costs were incurred in a process:

Materials \$20,000 Labour \$10,000 Overheads \$8,000

2,000 units were produced.

Calculate the cost per unit.

Process T-Accounts 3

If a T-account is shown in the examination, then the entries are as follows:

Debit the Process Account with each cost incurred

Credit the Process Account with the unit cost previously calculated.

It is normal and useful to have 2 columns in the Process Account – one for units and one for \$'s

Example 2

Prepare a Process Account for the information in example 1.

		D 4 (
-	• •	Process Account	•	d
	units	\$	units	\$
pen				
, 1				

4 **Problem areas**

There are three problem areas that can occur in the examinations

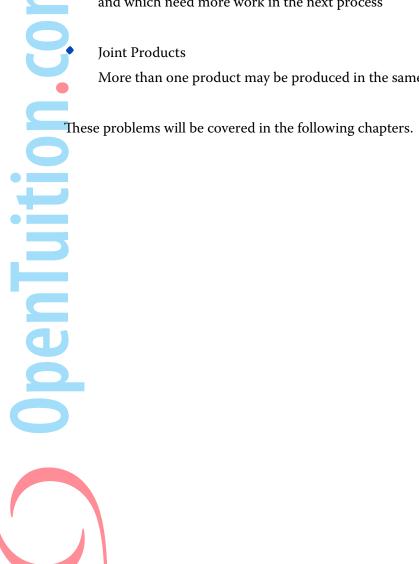
Losses

Some of the units started in a process may not end up as finished output due to loss or damage

Work-in-progress

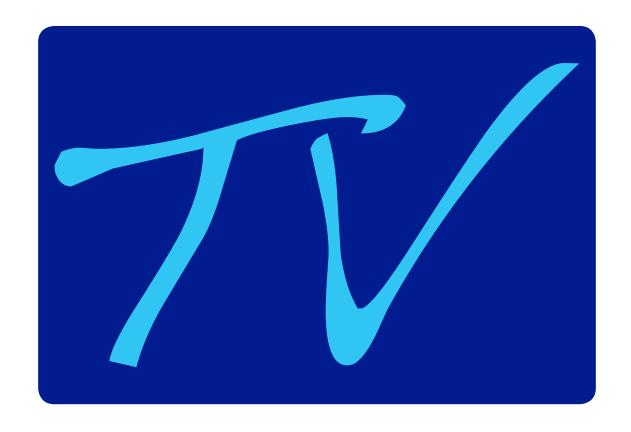
At the start and end of a period there may be some units in the process that are only partly finished and which need more work in the next process

More than one product may be produced in the same process.



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Chapter 7



PROCESS COSTING - LOSSES

Introduction

In many processes it is unlikely that the output units will equal the input units. For example, in the manufacture of beer it is very unlikely that the litres produced will equal the number of litres that were input, due to evaporation.

We need to deal with any losses in our costings.

2 Normal loss

Normal loss is the amount of loss that is expected from the process, based on past experience. It is also known as the **expected loss**.

In our costings, we spread the process costs over the number of units that we expect to produce.

Example 1

During March the following costs were incurred in a process:

Materials (1,000 kg) \$12,000 Labour \$7,000 Overheads \$8,000

A normal loss of 10% was expected. The actual output was 900 kg.

Calculate the cost per kg, and prepare a Process Account.

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Paper F2

PROCESS COSTING - LOSSES

Chapter 7

Normal loss with a scrap value 3

The word 'loss', when used in process costing, does not just mean units that are lost but also units that were damaged. Any damaged units may be saleable as scrap.

If there are any expected scrap proceeds from damaged units, then these scrap proceeds are subtracted from the total costs of the process before spreading over the units we expect to produce.

Example 2

During Apri	l, the following	coata ruzono	incurred in a	2000000
During Apri	ւ, ւուе ւսпожите	costs were	incurred in a	process:

Materials (3,000 kg)	\$30,000
Labour	\$12,000
Overheads	\$10,800

A normal loss of 10% was expected. The actual output was 2,700 kg. Losses have a scrap value of \$5 per unit.

Calculate the cost per kg and prepare a Process Account and a Loss Account.



4 Abnormal losses

Even though we may expect a normal loss of (for example) 10% to occur each month, it is unlikely that we will actually lose exactly 10% each month. Some months we will probably lose more than 10%, and some months less than 10%.

Any excess loss in any month is known as an **abnormal** (or **unexpected**) **loss**.

We prepare costings as normal, taking into account any normal loss, and spreading the total cost over the units that we expect to produce.

Any abnormal losses are charged separately at the full cost per unit.

(Note: we always assume that any abnormal losses are sold for scrap at the same price as normal losses).

Example 3

During May, the following costs were incurred in a process:

Materials (1,000 kg) \$9,000 Labour \$18,000 Overheads \$13,500

A normal loss of 10% of input was expected.

Actual output was 850 kg.

Losses are sold as scrap for \$9 per kg.

		and a Loss Acco	
41	 		

Chapter 7

Abnormal Gains 5

In the same way that the actual output may be less than that expected, in some months it may be more than expected.

If this happens, then we say that we have an **abnormal gain**.

The treatment of abnormal gains is exactly the same as for abnormal losses.

Example 4

During June the following costs were incurred in a process:

Materials (2,000 kg) \$18,000 Labour \$36,000 Overheads \$27,000

A normal loss of 10% of input was expected.

Actual output was 1,840 kg.

Losses are sold as scrap for \$9 per kg.

alculate the cos	t per kg, and prepare a Proces	ss Account and a Los	s Account.	

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Chapter 8



PROCESS COSTING – WORK-IN-PROGRESS

1 Introduction

At the end of a process there may be some units that have been started but not completed. These are known as **closing work-in-progress**. They are still there at the start of the next period, waiting to be finished. They are therefore **opening work-in-progress** of the next period.

2 Equivalent units

In our costings we still wish to calculate the cost of a finished unit. For costing purposes we assume the work done on 100 units that are only half finished is equivalent to 50 fully finished units. Therefore, 100 units each 50% finished is regarded as 50 equivalent complete units.

3 Closing Work-in-Progress (no opening Work-In-Progress)

When we have closing work-in-progress, we calculate a cost per unit for each category of cost, using equivalent units. The total cost per unit is the sum of these separate costs.

Example 1

During January the following costs were incurred in a process:

Materials (1,000 units) \$5,000 Labour \$2,760 Overheads \$3,440

During the month, 800 units were finished and transferred to the next process.

The remaining 200 units were WIP and were complete as follows:

Materials 100% Labour 60% Overheads 30%

- (a) calculate the cost per unit;
- (b) value the finished output and the WIP;
- (c) prepare Process Account.

lune 2011 Examinations PROCESS COSTING – WORK-IN-PROGRESS	Pa_l Chap
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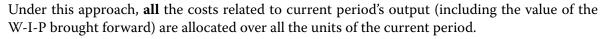
4 Opening and Closing W-I-P.

When there is opening W-I-P, there are two alternative approaches to the costings.

• First-in-first-out (FIFO)

Under this approach it is assumed that the opening W-I-P is the first to be finished. All the costs brought forward for the W-I-P are treated as costs of these specific units, and the current period's expenditure is allocated over the work done in the current period.

Weighted Average



5 FIFO

Example 2

During July, the following costs were incurred

Materials (30,000 units) \$24,900 Labour and overheads \$20,075

At the beginning of July, there were 15,000 units of work in progress valued as follows:

Materials (100% complete) \$9,000 Labour and overheads (40% complete) \$1,250

At the end of July, there were 5,000 units of work-in-progress. They were 100% complete for materials and 50% complete for labour and overheads.

- (a) calculate how many units were completed during July
- (b) calculate the cost per unit
- (c) value the finished items and the closing work-in-progress
- (d) prepare a Process Account.

(Note: use the FIFO approach and assume no losses)



Weighted average 6

One problem with the FIFO approach is that completed units are valued at two different costs depending on whether or not they were opening work-in-progress.

The **weighted average** approach values all finished units at an average cost.

Example 3

During July, the following costs were incurred

Materials (30,000 units) \$24,900 Labour and overheads \$20,075

At the beginning of July, there were 15,000 units of work in progress valued as follows:

Materials (100% complete) \$9,000 Labour and overheads (40% complete) \$1,250

At the end of July, there were 5,000 units of work-in-progress. They were 100% complete for materials and 50% complete for labour and overheads.

calculate how many units were completed during July (a)

(b) calculate the cost per unit value the finished items and the closing work-in-progress prepare a Process Account. (Note: use the weighted average approach and assume no losses)

PROCESS COSTING - WORK-IN-PROGRESS

Tests

Question 1

Information relating to two processes (X and Y) was as follows:

Process	Normal loss as % of input	Input litres	Output litres
X	8	65,000	58,900
Y	5	37,500	35,700

For each process, was there an abnormal loss or an abnormal gain?

Process X	Process Y
Abnormal gain	Abnormal gain
Abnormal gain	Abnormal loss
Abnormal loss	Abnormal gain
Abnormal loss	Abnormal loss
	Abnormal gain Abnormal gain Abnormal loss

(2 marks)

Question 2

A company manufactures and sells one product which requires 8 kg of raw material in its manufacture. The budgeted data relating to the next period are as follows:

	Units
Sales	19,000
Opening inventory of finished goods	4,000
Closing inventory of finished goods	3,000
	Kg
Opening inventory of raw materials	50,000
Closing inventory of raw materials	53,000

What is the budgeted raw material purchases for next period (in kg)?

- **A** 141,000
- **B** 147,000
- **C** 157,000
- **D** 163,000

(2 marks)

Question 3

A company operates a process in which no losses are incurred. The process account for last month, when there was no opening work-in-progress, was as follows:

Process Account

	\$		<i>\$</i>
Costs arising	624,000	Finished output (10,000 units)	480,000
		Closing work-in progress (4,000 units)	144,000
	624,000		624,000

The closing work-in-progress was complete to the same degree for all elements of cost.

What was the percentage degree of completion of the closing work-in-progress?

- **A** 12%
- **B** 30%
- **C** 40%
- **D** 75%

Ouestion 4

A company which operates a process costing system had work-in-progress at the start of last month of 300 units (valued at \$1,710) which were 60% complete in respect of all costs. Last month a total of 2,000 units were completed and transferred to the finished goods warehouse. The cost per equivalent unit for costs arising last month was \$10.

The company uses the FIFO method of cost allocation.

PROCESS COSTING - WORK-IN-PROGRESS

What was the total value of the 2,000 units transferred to the finished goods warehouse last month?

- \$19,910 A
- \$20,000 В
- \mathbf{C} \$20,510
- D \$21,710

(2 marks)

Question 5

In process costing, if an abnormal loss arises, the process account is generally

- debited with the scrap value of the abnormal loss units A
- В debited with the full production cost of the abnormal loss units
- C credited with the scrap value of the abnormal loss units
- credited with the full production cost of the abnormal loss units

(1 mark)

Question 6

Burgess operates a continuous process into which 3,000 units of material costing \$9,000 was input in a period. Conversion costs for this period were \$11,970 and losses, which have a scrap value of \$1.50, are expected at a rate of 10% of input. There were no opening or closing stocks and output for the period was 2,900 units.

What was the output valuation?

- A \$20,271
- В \$20,520
- \mathbf{C} \$20,970
- D \$22,040

(2 marks)

Question 7

Process B had no opening stock. 13,500 units of raw material were transferred in at \$4.50 per unit. Additional material at \$1.25 per unit was added in process. Labour and overheads were \$6.25 per completed unit and \$2.50 per unit incomplete.

If 11,750 completed units were transferred out, what was the closing stock in Process B?

- A \$6,562.50
- В \$12,250.00
- \mathbf{C} \$14,437.50
- D \$25,375.00

The following information relates to questions 8 and 9:

A company operates a process costing system using the first-in-first-out (FIFO) method of valuation. No losses occur in the process. All materials are input at the commencement of the process. Conversion costs are incurred evenly through the process.

The following data relate to last period:

	Units	Degree of completion
Opening work in progress	2,000	60%
Total number of units completed	14,000	
Closing work in progress	3,000	30%
		\$
Costs arising:		
Materials	Į	51,000
Conversion	19	93,170

Question 8

What was the total number of units input during last period?

12,000

13,000

15,000

17,000

(2 marks)

Question 9

What was the value of the closing work in progress for last period?

\$21,330

В \$21,690

C \$22,530

D \$22,890



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PROCESS COSTING – JOINT PRODUCTS

Introduction

Sometimes, one process may produce several products. In this case we need to decide on a cost per unit for each of the products. These products, produced in the same process, are known as joint products.

Joint products refer to our main products with full sales value. However, there may be an additional product (or products) which is produced incidentally and has a relatively low sales value (effectively a waste product). This is known as a by-product.

Accounting treatment

Any sale proceeds of a by-product are subtracted from the joint costs of the process.

The net total cost of the process is then split between the joint products.

For the examination, there are two ways of splitting the joint costs:

- The physical units basis
- The market value at the point of separation basis.



Physical units basis 3

Under this method, the same cost per unit is applied to all the joint products

Example 1

Litalliple 1		
During August, the follow	ving costs w	vere incurred in a process:
Materials (3,500 kg)		5,000
Labour and overheads		2,300
	7-	
The production from the	process wa	s as follows:
	kg	
Product A	1,000	selling price \$5 per kg
Product B	2,000	selling price \$2 per kg
by-product X	500	scrap value \$0.20 per kg
Calculate a cost per kg a	ınd profit p	per kg for A and B using the physical units basis.
•		
41		
'		
-		

Market value basis 4

Under this method the costs per unit are calculated so as to be in the same proportions as the market values of each product

Example 2		
During August,	the following costs	were incurred in a process:
Materials (3,500	kg) \$5	5,000
Labour and over		2,300
	·	
The production	from the process w	as as follows:
	kg	
Product A	1,000	selling price \$5 per kg
Product B	2,000	selling price \$2 per kg
by-product X	500	scrap value \$0.20 per kg
		g of A and 1,500 kg of B. per kg for A and B using the market value basis;
Calculate a cos	t per kg and pront	per kg for A and D using the market value basis,
-		

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Paper F2

PROCESS COSTING - JOINT PRODUCTS

Chapter 9

5 Net-realisable value approach

The market value approach is not always possible. This is because the products will often require further work (and therefore costs) after leaving the process. We have to use the net realisable value at a point of separation as an approximation to the market value.

The net realisable value is the final market value less costs incurred after leaving the joint process.

Example 3

During September the following costs were incurred in a process:

Materials (3,500 kg) \$5,000 Labour and overheads \$2,300

The production from the process was as follows:

		k

Product A	1,000	selling price \$8.40 per kg
Product B	2,000	selling price \$4.50 per kg
by-product X	500	scrap value \$0.20 per kg

All the output of A and B incurred further processing at a cost of \$4.80 per kg for A and \$2.20 per kg for B.

ate a cost per kg fo	or A and B <i>using th</i>	e net realisable v	alue approach.	
•				

TESTS

Question 1

Two products P and Q are created from a joint process. P can be sold immediately after split-off. Q requires further processing into product X before it is in a saleable condition. There are no opening inventories and no work in progress of products P, Q or X. The following data are available for last period:

	\$
Total joint production costs	350,000
Further processing costs of product Q	66,000
Product Production	• • • • • • • • • • • • • • • • • • • •
units	inventory units
P 420,000	20,000
X 330,000	30,000

Using the physical unit method for apportioning joint production costs, what was the cost value of the closing inventory of product X for last period?

- **A** \$16,640
- **B** \$18,625
- C \$20,000
- **D** \$21,600

(2 marks)

Question 2

What is a by-product?

- A A product produced at the same time as other products which has no value
- A product produced at the same time as other products which requires further processing to put it in a saleable state
- C A product produced at the same time as other products which has a relatively low volume compared with the other products
- D A product produced at the same time as other products which has a relatively low value compared with the other products

(1 marks)

Question 3

In process costing, a joint product is

- A a product which is later divided into many parts
- **B** a product which is produced simultaneously with other products and is of similar value to at least one of the other products
- **C** a product which is produced simultaneously with other products but which is of a greater value than any of the other products
- **D** a product produced jointly with another organisation

(1 marks)

Question 4

Heath Ltd manufactures three joint products, W, X and Y in a common process. The cost and production data for March is as follows.

	<i>\$</i>
Opening stock	40,000
Direct materials input	80,000
Conversion costs	100,000
Closing stock	20,000

Output and sales were as follows.

•	Production	Sales units	Sales price
	Units	sales units	\$ per unit
W	20,000	15,000	4
X	20,000	15,000	6
Z	40,000	50,000	3

If costs are apportioned between joint products on a market value basis, what was the cost per unit of product X in March?

\$3.38

\$3.75

D \$4.62

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Chapter 10



SEMI-VARIABLE COSTS

Introduction

The chapter relates to semi-variable costs i.e. part fixed and part variable. It may be necessary for you in the examination to identify the fixed and variable elements and in this chapter we will revise the 'high-low' method and also explain Regression Analysis.

High-Low Method

This is a quick and easy approach that estimates fixed and variable costs by comparing the highest and lowest activity levels.

Example 1

Electricity costs for the first 6 months of the year are as follows:

	Units produced	<i>Cost (\$)</i>
January	340	2,260
February	300	2,160
March	380	2,320
April	420	2,400
May	400	2,300
June	360	2,266

Calculate the fixed and variable costs using the high-low method.

Problems with the high-low approach 3



SEMI-VARIABLE COSTS

Regression 4

If there is a reasonable degree of linear correlation between two variables, we can use regression analysis to calculate the equation of the best fit for the data.

This is known as least squares linear regression.

If the equation relating two variables, \times and y, is

$$y = a + bx$$

then the values of a and b may be calculated using the following formulae (which are given in the examination)

$$b = \frac{n \sum xy - \sum x \sum y}{n \sum x^{2} - (\sum x)^{2}}$$
$$a = \frac{\sum y}{n} - \frac{b \sum x}{n}$$

Example 2

The following table shows the number of units produced each month and the total cost incurred:

	Units	Cost (\$ '000)
January	100	40
February	400	65
March	200	45
April	700	80
May	600	70
June	500	70
July	300	50

Calculate the regression line, y = a + bx

5 Problems with regression analysis



The correlation coefficient 6

Pearson's correlation coefficient is a measure of how linear the relationship between variables is.

A correlation coefficient of +1 indicates perfect positive linear correlation, whereas -1 indicates perfect negative linear correlation.

The further away from + or - 1, the less linear correlation exists.

The correlation coefficient may be calculated using the following formula (which is given to you in the examination)

$$r = \frac{n\sum xy - \sum x\sum y}{\sqrt{\left(n\sum x^2 - \left(\sum x\right)^2\right)\left(n\sum y^2 - \left(\sum y\right)^2\right)}}$$

Example 3

Using the data in example 2, calculate the correlation coefficient

Coefficient of determination

The **coefficient of determination** is the square of the coefficient of correlation (r^2) . It is a measure of how much of the variation in the dependent variable is 'explained' by the variation of the independent variable.



SEMI-VARIABLE COSTS

TESTS

Question 1

Regression analysis is being used to find the line of best fit (y = a + bx) from eleven pairs of data. The calculations have produced the following information:

 $\Sigma x = 440$, $\Sigma y = 330$, $\Sigma x^2 = 17,986$, $\Sigma y^2 = 10,366$, $\Sigma xy = 13,467$ and b = 0.69171

What is the value of 'a' in the equation for the line of best fit (to 2 decimal places)?

- **A** 0.63
- **B** 0.69
- **C** 2.33
- **D** 5.33

(2 marks)

Question 2

Which of the following is NOT a feasible value for the correlation coefficient?

- A +1.4
- \mathbf{B} +0.7
- $\mathbf{C} = 0$
- **D** -0.7

(2 marks)

Question 3

Which of the following is correct with regard to expected values?

- **A** Expected values provide a weighted average of anticipated outcomes.
- **B** The expected value will always equal one of the possible outcomes.
- **C** Expected values will show the decision maker's attitude to risk.
- The expected value will never equal one of the possible outcomes.

(1 mark)

Question 4

There is a 60% chance that a company will make a profit of \$300,000 next year and a 40% chance of making a loss of \$400,000.

What is the expected profit or loss for next year?

- **A** \$120,000 Loss
- **B** \$20,000 Loss
- **C** \$20,000 Profit
- **D** \$120,000 Profit

(2 marks)

Question 5

The correlation coefficient between advertising expenditure and sales revenue is calculated to be 0.85. **Which of the following statements is true?**

- A There is a weak relationship between advertising expenditure and sales revenue
- **B** 85% of the variation in sales revenue can be explained by the corresponding variation in advertising expenditure
- C 72% of the variation in sales revenue can be explained by the corresponding variation in advertising expenditure
- D Sales revenue will increase by 85% more than advertising expenditure will increase (1 mark)



SEMI-VARIABLE COSTS

Question 6

X Ltd has recorded the following data for two recent periods.

Transport costs	Deliveries made
\$	
9,680	840
9.860	930

The transport costs for a particular period could be represented by:

- \$10.60 × number of deliveries
- В \$11.52 × number of deliveries
- \mathbf{C} $\$8,000 - (\$2 \times \text{number of deliveries})$
- D $$8,000 + ($2 \times number of deliveries)$



Question 7

Berry has recorded the following costs over the last six months:

Month	Total cost	Units produce
	6000	'000
1	74	3
2	72.75	1.75
3	73.25	2
4	75	2.5
5	69.5	1.5
6	72.75	2

Using the high - low method what would be the total cost equation?

- Total cost = $61,250 + 5.5 \times Quantity$ A
- Total cost = $65,000 + 3 \times Quantity$ В
- \mathbf{C} Total cost = $70,250 + 1.25 \times Quantity$
- D Total cost = $71,000 + 1 \times Quantity$



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Chapter 11



EXPECTED VALUES

1 Introduction

This chapter relates to decision making under uncertainty. There are many situations in real life where the outcome of a decision is unsure. A simple approach to dealing with this is to look at the expected value of the outcome and this will be explained.

2 Expected values - Dealing with Uncertainty

One way of dealing with the situation where there are several possible outcomes from a decision is to base the decision on the average outcome. We call this average the expected value.

Example 1

Daiga plc has to decide whether the selling price for a product should be \$10 p.u. or \$15 p.u..

They have estimated that if the selling price is \$10 p.u. they will either sell 6,000 units or 2,000 unit per year, with probabilities of 0.6 and 0.4 respectively.

Alternatively, a selling price of \$15 p.u. is estimated to result in sales of either 4,000 or 3,000 units per year, with probabilities 0.3 and 0.7 respectively.

Assuming t	hat Daiga's objective is to maximize revenue, which selling price should be chosen?

Limitations of expected values 3

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Chapter 12

COST VOLUME PROFIT ANALYSIS

Introduction

Cost-volume-profit analysis considers how costs and profits change with changes in the volume or level of activity.

You should remember from earlier chapters that the variable cost per unit and the selling price per unit are assumed to be unaffected by a change in activity level. Hence the total contribution will vary linearly with the level of activity.

Total fixed costs are not affected by the level of activity although the costs per unit will fall as more units are produced.

Breakeven

Breakeven is the level of activity which gives rise to zero profit. Since profit is the difference between total contribution and fixed costs, breakeven is where the total contribution equals total fixed costs.

Fixed costs Breakeven volume =

Contribution per unit



Example 1

Product X has variable costs of \$2 per unit, and selling price of \$6 per unit. The fixed costs are \$1,000 per year

(a)	If budgeted sales and production are 300 units, what is the budgeted profit (or loss) for the year?
(b)	What is the breakeven point (in units)?
(c)	What is the breakeven revenue?
(d)	How many units need to be sold to achieve a target profit of \$300 per year?
	di-
	<u> </u>
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1	

COST VOLUME PROFIT ANALYSIS

3	Margin	of safety
•		01 04100,

The Margin of Safety measures the %age fall in budgeted sales that can be allowed before breakeven is reached.

Margin of safety =
$$\frac{\text{Budgeted sales - breakeven}}{\text{Budgeted sales}} \times 100\%$$

It is useful in identifying how big a problem any inaccuracy in the budgeted sales is likely to be.

Example 2
Calculate the margin of safety for example 1

Contribution to sales ratio

The contribution to sales ratio (or C/S ratio) is calculated as follows:

$$C/S$$
 ratio =
$$\frac{Contribution in \$}{Sales in \$}$$

Since the contribution and the sales revenue both vary linearly with the volume, the C/S ratio will remain constant.

[Note: the C/S ratio is sometimes called the profit to volume (or P/V ratio)].

Calculate the C/S ratio for example 1

What sales revenue is needed to generate a target profit of \$320?

Breakeven chart

The breakeven chart plots total costs and total revenues at different levels of volume, and shows the activity level at which breakeven is achieved.

Example 4

Draw a breakeven chart for example 1



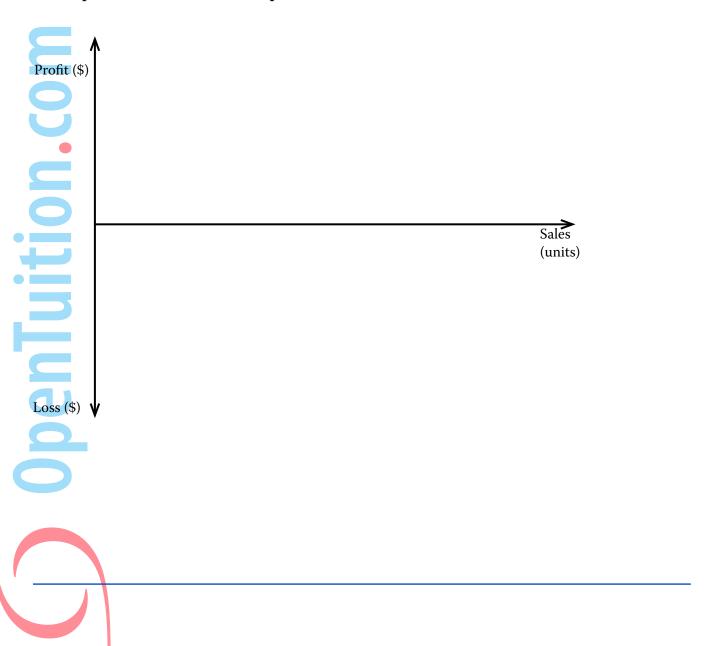
Output (units)

Profit-volume chart 6

The profit volume chart shows the net profit or loss at any level of activity

Example 5

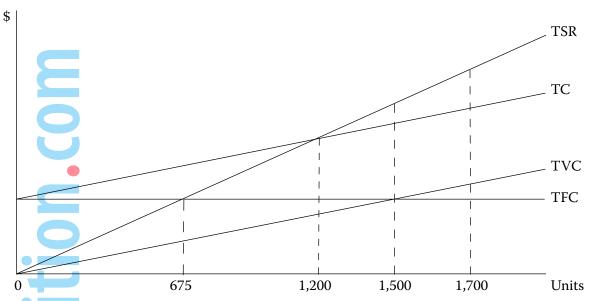
Draw a profit-volume chart for example 1



Tests

Question 1

The following break-even chart has been drawn showing lines for total cost (TC), total variable cost (TVC), total fixed cost (TFC) and total sales revenue (TSR):



What is the margin of safety at the 1,700 units level of activity?

- A 200 units
- В 300 units
- \mathbf{C} 500 units
- D 1,025 units

(2 marks)

Question 2

An organisation manufactures a single product which is sold for \$80 per unit. The organisation's total monthly fixed costs are \$99,000 and it has a contribution to sales ratio of 45%. This month it plans to manufacture and sell 4,000 units.

What is the organisation's margin of safety this month (in units)?

1,250 В 1,750 C 2,250 2,750

(2 marks)

Question 3

A company manufactures a single product which it sells for \$20 per unit. The product has a contribution to sales ratio of 40%. The company's weekly break- even point is sales revenue of \$18,000.

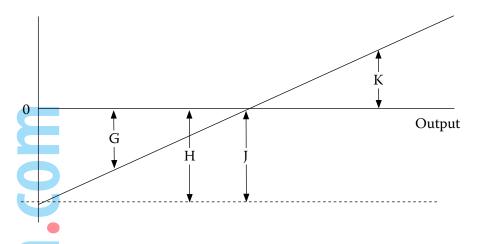
What would be the profit in a week when 1,200 units are sold?

- \$1,200 A
- В \$2,400
- \mathbf{C} \$3,600
- \$6,000 D

COST VOLUME PROFIT ANALYSIS

Question 4

Four vertical lines have been labelled G, H, J and K at different levels of activity on the following profit-volume chart:



Which line represents the total contribution at that level of activity?

- A Line G
- **B** Line H
- **C** Line J
- **D** Line K

(2 marks)

Question 5

Information concerning Razor Ltd's single product is as follows.

	\$ per unit
Selling price	6.00
Variable production cost	1.20
Variable selling cost	0.40
Fixed production cost	4.00
Fixed selling cost	0.80

Budgeted production and sales for the year are 10,000 units.

How many units must be sold if Razor Limited wants to achieve a profit of \$11,000 for the year?

- A 2,500 units
- **B** 9,833 units
- C 10,625 units
- **D** 13,409 units

(2 marks)

Question 6

Sky Ltd sells a single product. In the coming month, it is budgeted that this product will generate a total revenue of \$300,000 with a contribution of \$125,000. Fixed costs are budgeted at \$100,000 for the month.

What is the margin of safety?

- **A** 0%
- **B** 10%
- **C** 20%
- **D** 25%

Question 7

Vovchuk makes and sells a single product which has a selling price of \$26, prime costs are \$10 and overheads (all fixed) are absorbed at 50% of prime cost. Fixed overheads are \$50,000.

What is the break-even point (to the nearest whole unit)?

- 1,923 A
- В 3,125
- \mathbf{C} 4,545
- D 5,000

(2 marks)

Question 8

A company manufactures a single product which it sells for \$15 per unit. The product has a contribution to sales ratio of 40%. The company's weekly break-even point is sales of \$18,000.

What would be the profit in a week when 1,500 units are sold?

- \$900 A
- В \$1,800
- \mathbf{C} \$2,700
- D \$4,500



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Chapter 13



INVENTORY CONTROL

Introduction

There are many approaches in practice to ordering goods from suppliers. In this chapter we will consider one particular approach – that of ordering fixed quantities each time.

For example, if a company needs a total of 12,000 units each year, then they could decide to order 1,000 units to be delivered 12 times a year. Alternatively, they could order 6,000 units to be delivered 2 times a year. There are obviously many possible order quantities.

We will consider the costs involved and thus decide on the order quantity that minimises these costs (the *economic order quantity*).

2 Costs involved

The costs involved in inventory ordering systems are as follows:

- the purchase cost
- the reorder cost
- the inventory-holding cost

Purchase cost

This is the cost of actually purchasing the goods. Over a year the total cost will remain constant regardless of how we decide to have the items delivered and is therefore irrelevant to our decision.

(Unless we are able to receive discounts for placing large orders – this will be discussed later in this chapter)

Re-order cost

This is the cost of actually placing orders. It includes such costs as the administrative time in placing an order, and the delivery cost charged for each order.

If there is a fixed amount payable on each order then higher order quantities will result in fewer orders needed over a year and therefore a lower total reorder cost over a year.

Inventory holding cost

This is the cost of holding items in inventory. It includes costs such as warehousing space and insurance and also the interest cost of money tied up in inventory.

Higher order quantities will result in higher average inventory levels in the warehouse and therefore higher inventory holding costs over a year.

3 Minimising costs

INVENTORY CONTROL

One obvious approach to finding the economic order quantity is to calculate the costs p.a. for various order quantities and identify the order quantity that gives the minimum total cost.

Example 1

Janis has demand for 40,000 desks p.a. and the purchase price of each desk is \$25. There are ordering costs of \$20 for each order placed. Inventory holding costs amount to 10% p.a. of inventory value.

		is p.a. for the following order quantities, and plot them on a graph:
(a)	500 units	
(b)	750 units	
(c)	1,000 units	
(d)	1,250 units	
	-	
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INVENTORY CONTROL

The EOQ formula 4

A more accurate and time-saving way to find the EOQ is to use the formula that is provided for you in the exam.

The formula is:

$$EOQ = \sqrt{\frac{2C_{o}D}{C_{H}}}$$

Where C_0 = fixed costs per order

D = annual demand

 C_H = the inventory holding cost per unit per annum

you are not required to be able to prove this formula)

Example 2

For the information given in Example 1,

- use the EOQ formula to calculate the Economic Order Quantity.
- calculate the total inventory costs for this order quantity.

Quantity discounts 5

Often, discounts will be offered for ordering in large quantities. The problem may be solved using the following steps:

- Calculate EOQ ignoring discounts (1)
- (2)If it is below the quantity which must be ordered to obtain discounts, calculate total annual inventory costs.
- Recalculate total annual inventory costs using the order size required to just obtain the discount (3)
- Compare the cost of step 2 and 3 with the saving from the discount and select the minimum cost
- Repeat for all discount levels

Example 3

For the information given in Example 1 the supplier now offers us discounts on purchase price as follows:

Order quantity	discount
0 to < 5,000	0 %
5,000 to < 10,000	1 %
10,000 or over	1.5 %

Calculate the Economic Order Quantity.

INVENTORY CONTROL

6 The Economic Batch Quantity

In the earlier examples, we assumed that we purchased goods from a supplier who delivered the entire order immediately.

Suppose instead that we have our own factory. The factory can produce many different products (using the same machines). Whenever we order a batch of one particular product then the factory will set-up the machines for the product and start producing and delivering to the warehouse immediately.

However it will take them a few days to produce the batch and during that time the warehouse is delivering to customers.

As a result the maximum inventory level in the warehouse never quite reaches the order quantity, and the formula needs changing slightly.

$$EBQ = \sqrt{\frac{2C_{o}D}{C_{H}(1 - \frac{D}{R})}}$$

where:

C_o = fixed costs per batch (or set-up costs)

D = annual demand

C_H = inventory holding cost per unit per annum

R = rate of production per annum

It is also worth learning that the average inventory level in this situation will be:

Average inventory =
$$\frac{EBQ}{2}(1 - \frac{D}{R})$$

(Note that this formula will not be given to you in the exam)

Example 4

A company has demand for 50,000 units p.a.

They produce their own units at a cost of \$30 per unit, and are capable of producing at rate of 500,000 units p.a.

Machine set-up costs are \$200 for each batch.

Inventory holding costs are 10% p.a. of inventory value.

Calculate the Economic Batch Quantity, and the costs involved p.a. for that quantity.

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INVENTORY CONTROL

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Chapter 13

Re-order level and 'safety' inventories

In the previous paragraphs we have considered the re-order quantities for inventory - that is the quantity that we should order each time.

However, in real life, it is unlikely that the supplier will deliver our order instantly - for example, it might take a week for the delivery to arrive - and therefore we need to place an order when we still have some units left. If we do not have sufficient units in inventory to last us until the delivery arrives, then we will run out of inventory and have to turn customers away.

The time between the placing of an order and the delivery arriving is known as the lead time.

The level of inventory at which time we should place a new order is known as the re-order level.

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A company has a demand from customers of 100 units per week.

The time between placing an order and receiving the goods (the lead time) is 5 weeks.
Will distribute a second of the second of th
What should the re-order level be? (i.e. how many units should we still have in inventory when we place an order).
place all order).
In practice, the demand per day and the lead time are unlikely to be certain.
What therefore we might do is re-order when we have more than 500 units in inventory, just to be 'safe' in case the demand over the lead time is more than 500 units. Any extra held in inventory for
this reason is known as safety inventory, or buffer inventory.
· · · · · · · · · · · · · · · · · · ·
Example 6
A company has a demand from customers of 100 units per week.
The time between placing an order and receiving the goods (the lead time) is 5 weeks. The company has a policy of holding safety inventory of 100 units.
the company has a policy of holding safety inventory of 100 units.
What should the re-order level be?
w hat should the re-order level be:

Chapter 13

INVENTORY CONTROL

Alternatively, if we do know the maximum demand over the lead time and want to be certain of not running out of inventory then the re-order level needs to be equal to the maximum possible demand over the lead time.

Example 7
Demand from customers is uncertain and is between 70 and 120 units per week. The lead time is also uncertain and is between 3 and 4 weeks.
What should the re-order level be if we are to never run out of inventory?
Although our answer to example 7 (a re-order level of 480 units) will mean that if the very worst should happen then we will still have enough units to fulfil demand, much of the time the demand will be lower than the maximum and/or the lead time will be shorter than the maximum.
If the demand over the lead time is less than the re-order level then it will mean we still have some units in inventory when the new delivery arrives.
It therefore means that the maximum inventory level will be the maximum number left in inventory, plus the number of units delivered.
The maximum number left in inventory is the re-order level less the minimum demand over the lead time.
Example 8
Demand from customers is uncertain and is between 70 and 120 units per week. The lead time is also uncertain and is between 3 and 4 weeks.
We have a re-order quantity of 1,000 units each time.
What is the maximum inventory level?

Tests

Question 1

The purchase price of an inventory item is \$25 per unit. In each three month period the usage of the item is 20,000 units.

The annual holding costs associated with one unit equate to 6% of its purchase price. The cost of placing an order for the item is \$20.

What is the Economic Order Quantity (EOQ) for the inventory item to the nearest whole unit?

- A 730
- **B** 894
- C 1,461
- **D** 1,633

(2 marks)

Question 2

A company always determines its order quantity for a raw material by using the Economic Order Quantity (EOQ) model.

What would be the effects on the EOQ and the total annual holding cost of a decrease in the cost of ordering a batch of raw material?

EOQ Annual holding cost

A Higher Lower
B Higher Higher
C Lower Higher
D Lower Lower

(2 marks)

Question 3

Sky Limited wishes to minimise its inventory costs. At the moment its reorder quantity is 1,000 units. Order costs are \$10 per order and holding costs are \$0.10 per unit per month. Sky Limited estimates annual demand to be 15,000 units.

What is the optimal reorder quantity (to the nearest 100 units)?

A 500 units
 B 1,000 units
 C 1,200 units
 D 1,700 units

(2 marks)

Question 4

A company uses 9,000 units of a component per annum. The component has a purchase price of \$40 per unit and the cost of placing an order is \$160. The annual holding cost of one component is equal to 8% of its purchase price.

What is the Economic Order Quantity (to the nearest unit) of the component?

- **A** 530
- **B** 671
- **C** 949
- **D** 1,342

INVENTORY CONTROL

Question 5

A company determines its order quantity for a component using the Economic Order Quantity (EOQ) model.

What would be the effects on the EOQ and the total annual ordering cost of an increase in the annual cost of holding one unit of the component in inventory?

EOQ Total annual ordering cost

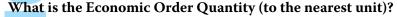
A	Lower	Higher
В	Higher	Lower
C	Lower	No effect
D	Higher	No effect

(2 marks)

Question 6

The demand for a product is 12,500 units for a three month period. Each unit of product has a purchase price of \$15 and ordering costs are \$20 per order placed.

The annual holding cost of one unit of product is 10% of its purchase price.



- 577
- 1,816
- 1,866
- **D** 1,155









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Chapter 14



LIMITING FACTORS

Introduction

Limiting factor analysis involves the situation when a resource is in short supply (a scarce resource). If a company makes several products using the same scarce resource (or resources) then the production will be limited as a result.

Our problem is to decide on the best production schedule for the company.

One scarce resource - 'Key-Factor' analysis

If there is only one scarce resource, then the approach to the problem is as follows:

- Determine the resource that is in short supply
- (2)For each product calculate the contribution per unit of the limited resource.
- Produce as many as possible of the product giving the highest contribution per unit of the limited resource
- Continue with production of the product giving the next highest contribution per unit of the limited resource, until supply of the limited resource is exhausted.



Example 1

X Ltd manufacture 3 products for which details are as follows:

	\boldsymbol{A}	\boldsymbol{B}	\boldsymbol{C}
Selling price	\$25	\$20	\$15
Materials	7	6	5
Labour (@ 75c per hr)	9	6	3
Variable overheads	_ 3	3	3
	\$19	\$15	\$11
Contribution	\$6	\$5	\$4

Sales demand for the period is limited as follows:

Product A 4,000 units Product B 6,000 units Product C 6,000 units

The supply of labour is limited to 90,000 hours per period.

Determine the production schedule that will yield the maximum contribution per period.

Two or more scarce resources – Linear Programming

If there are two or more scarce resources then we are unable to use the Key Factor approach. Instead, we must use Linear Programming.

In your examination, you are required to have knowledge of the graphical approach to Linear Programming.

The steps are as follows:

- (1) Define the unknowns in terms of symbols
- (2) Formulate equations for the constraints
- (3)Formulate an equation for the objective
- (4)Graph the constraints and the objective
- (5)Find the optimum solution

Example 2

Peter makes two types of chair – the 'Executive' and the 'Standard'.

The data relating to each is as follows:

	Standard	Executive
Materials	2 kg	4 kg
Labour	5 hours	6 hours
Contribution	\$6	\$9

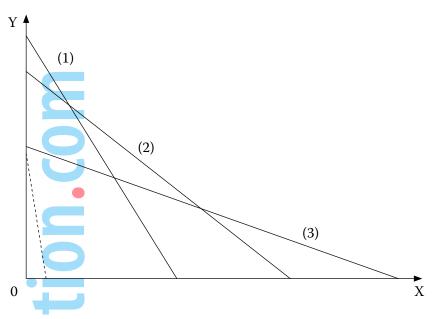
There is a maximum of 80 kg of material available each week and 180 labour hours per week. Demand for 'Standard' chairs is unlimited, but maximum weekly demand for 'Executive' chairs is 10.

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Tests

Question 1

The following graph relates to a linear programming problem:



The objective is to maximise contribution and the dotted line on the graph depicts this function. There are three constraints which are all of the "less than or equal to" type which are depicted on the graph by the three solid lines labelled (1), (2) and (3).

At which of the following intersections is contribution maximised?

- Constraints (1) and (2) A
- В Constraints (2) and (3)
- C Constraints (1) and (3)
- D Constraint (1) and the ×-axis

(2 marks)

Question 2

A company manufactures and sells two products (X and Y) both of which utilise the same skilled labour. For the coming period, the supply of skilled labour is limited to 2,000 hours. Data relating to each product are as follows:

Product	\boldsymbol{X}	\boldsymbol{Y}
Selling price per unit	\$20	\$40
Variable cost per unit	\$12	\$30
Skilled labour hours per unit	2	4
Maximum demand (units) per period	800	400

In order to maximise profit in the coming period, how many units of each product should the company manufacture and sell?

A 200 units of X and 400 units of Y

400 units of X and 300 units of Y В

 \mathbf{C} 600 units of X and 200 units of Y

D 800 units of X and 100 units of Y

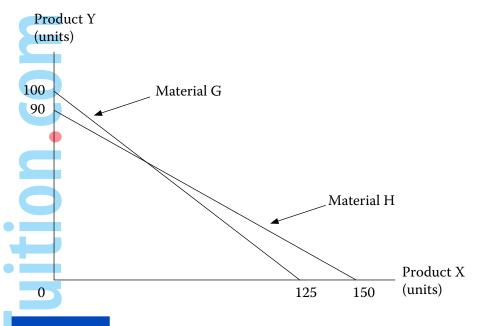
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The following information relates to questions 3 and 4:

A company manufactures and sells two products (X and Y) which have contributions per unit of \$8 and \$20 respectively.

The company aims to maximise profit. Two materials (G and H) are used in the manufacture of each product. Each material is in short supply – 1,000 kg of G and 1,800 kg of H are available next period. The company holds no inventories and it can sell all the units produced.

The management accountant has drawn the following graph accurately showing the constraints for materials G and H.



Question 3

What is the amount (in kg) of material G and material H used in each unit of product Y?

Material G Material H

A	10	20
В	10	10
C	20	20
D	20	10

(2 marks)

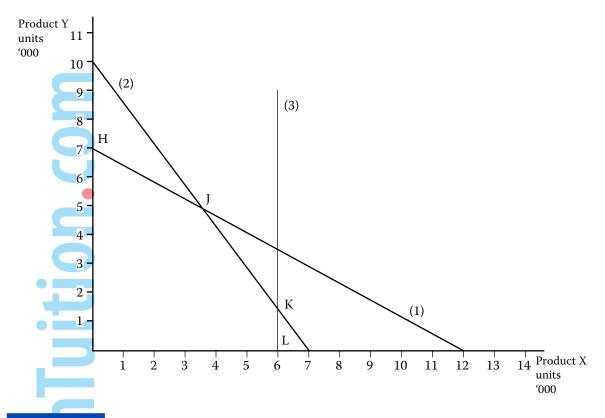
Question 4

What is the optimal mix of production (in units) for the next period?

	Product X	Product Y
A	o	90
B	50	60
C	60	50
D	125	0

The following information relates to questions 5 and 6:

A company which manufactures and sells two products (X and Y) aims to maximise its profits. It holds no stocks. Product X makes a contribution per unit of \$4 and product Y makes a contribution per unit of \$1. Next period the company faces three 'less than' production constraints and these are shown as the lines labelled (1), (2) and (3) on the following graph:



Question 5

Which of the following points shown on the graph is optimal for next period?

- A Point H
- B Point J
- C Point K
- **D** Point L

(2 marks)

Question 6

Which of the following constraint formulations is represented by the line labelled (2) on the graph?

- A $10X + 7Y \le 70,000$
- **B** $7X + 10Y \le 70,000$
- C $7X + 13Y \le 91,000$
- **D** $13X + 7Y \le 91,000$

Question 7

A company uses limiting factor analysis to calculate an optimal production plan given a scarce resource. The following applies to the three products of the company:

Product	I	II	III
	\$	\$	\$
Direct materials (at \$6/kg)	36	24	15
Direct labour (at \$10/hour)	40	25	10
Variable overheads (\$2/hour)	8	5	2
	84	54	27
Maximum demand (units)	2,000	4,000	4,000
Optimal production plan	2,000	1,500	4,000

How many kg of material were available for use in production?

15,750 kg

28,000 kg

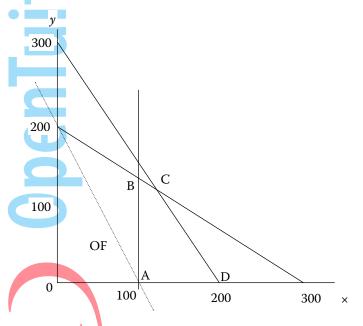
30,000 kg

38,000 kg

(2 marks)

Question 8

The following graph has been established for a given set of constraints:



The objective function (OF) for the company has also been plotted on the graph and the feasible region is bounded by the area ABCD.

At which point on the graph will profits be maximised?

A

В

 \mathbf{C}

D

Which of the following is correct?

- A When considering limiting factors the products should always be ranked according to contribution per unit sold
- В If there is only one scarce resource linear programming should be used
- \mathbf{C} In linear programming the point furthest from the origin will always be the point of profit maximisation
- D The slope of the objective function depends on the contributions of the products

(1 mark)



Chapter 15



RELEVANT COSTING

Introduction

Strictly, relevant costs are simply the costs that need to be taken into account in any particular decision making process.

However, the situation to be prepared for in the exam is that where a company is approached to produce goods for a one-off contract.

The basic principle is to identify all future incremental (or extra) costs that will be incurred if the contract is undertaken.

Terminology

Sunk costs

These are costs that have already been incurred and will therefore be unaffected whether or not the contract is undertaken.

They are therefore **not relevant** to the decision.

Opportunity costs

These are benefits lost as a result of undertaking the contract.

If, for example, undertaking a contract were to mean that we lost sales of another product which would have earned us \$10,000 then this lost income would effectively be a cost of undertaking the

Opportunity costs **are relevant** to the decision.



RELEVANT COSTING

Example 1

The managing director of Parser Ltd, a small business, is considering undertaking a one-off contract and has asked her inexperienced accountant to advise on what costs are likely to be incurred so that she can price at a profit. The following schedule has been prepared:

Costs for special order:

	Notes	\$
Direct wages	1	28,500
Supervisor costs	2	11,500
General overheads	3	4,000
Machine depreciation	4	2,300
Machine overheads	5	18,000
Materials	6	34,000
		98,300

Notes:

- (1) Direct wages comprise the wages of two employees, particularly skilled in the labour process for this job, who could be transferred from another department to undertake work on the special order. They are fully occupied in their usual department and sub-contracting staff would have to be bought-in to undertake the work left behind.
 - Subcontracting costs would be \$32,000 for the period of the work. Different subcontractors who are skilled in the special order techniques are available to work on the special order and their costs would amount to \$31,300.
- (2) A supervisor would have to work on the special order. The cost of \$11,500 is comprised of \$8,000 normal payments plus \$3,500 additional bonus for working on the special order. Normal payments refer to the fixed salary of the supervisor. In addition, the supervisor would lose incentive payments in his normal work amounting to \$2,500. It is not anticipated that any replacement costs relating to the supervisor's work on other jobs would arise.
- (3) General overheads comprise an apportionment of \$3,000 plus an estimate of \$1,000 incremental overheads.
- (4) Machine depreciation represents the normal period cost based on the duration of the contract. It is anticipated that \$500 will be incurred in additional machine maintenance costs.
- Machine overheads (for running costs such as electricity) are charged at \$3 per hour. It is estimated that 6,000 hours will be needed for the special order. The machine has 4,000 hours available capacity. The further 2,000 hours required will mean an existing job is taken off the machine resulting in a lost contribution of \$2 per hour.
- (6) Materials represent the purchase costs of 7,500 kg bought some time ago. The materials are no longer used and are unlikely to be wanted in the future except on the special order. The complete inventory of materials (amounting to 10,000 kg), or part thereof, could be sold for \$4.20 per kg. The replacement cost of material used would be \$33,375.

Because the business does not have adequate funds to finance the special order, a bank overdraft amounting to \$20,000 would be required for the project duration of three months. The overdraft would be repaid at the end of the period. The bank's overdraft rate is 18%.

The managing director has heard that, for special orders such as this, relevant costing should be used that also incorporates opportunity costs. She has approached you to create a revised costing schedule based on relevant costing principles.

Adjust the schedule prepared by the accountant to a relevant cost l costs.	basis, incorporating appropriate opportunity

RELEVANT COSTING

Tests

Question 1

A company is evaluating a project that requires 400 kg of raw material X. The company has 150 kg of X in inventory that were purchased six months ago for \$55 per kg. The company no longer has any use for X. The inventory of X could be sold for \$40 per kg. The current purchase price for X is \$53 per kg.

What is the total relevant cost of raw material X for the project?

- **A** \$17,950
- **B** \$19,250
- **C** \$21,200
- **D** \$21,500

(2 marks)

Question 2

A company purchased a machine several years ago for \$50,000. Its written down value is now \$10,000. The machine is no longer used on normal production work and it could be sold now for \$8,000.

A project is being considered which would make use of this machine for six months. After this time the machine would be sold for \$5,000.

What is the relevant cost of the machine to the project?

- A \$2,000
- **B** \$3,000
- **C** \$5,000
- **D** \$10,000

(2 marks)

Question 3

The following statements relate to relevant cost concepts in decision-making:

- (i) Materials can never have an opportunity cost whereas labour can.
- (ii) The annual depreciation charge is not a relevant cost.
- (iii) Fixed costs would have a relevant cost element if a decision causes a change in their total expenditure

Which statements are correct?

- A (i) and (ii) only
- **B** (i) and (iii) only
- C (ii) and (iii) only
- **D** (i), (ii) and (iii)

(2 marks)

Question 4

A contract is under consideration which requires 600 labour hours to complete. There are 350 hours of spare labour capacity for which the workers are still being paid the normal rate of pay. The remaining hours for the contract can be found either by weekend overtime working paid at double the normal rate of pay or by diverting labour from other production. This other production makes a contribution, net of labour cost, of \$5 per hour.

What is the total relevant cost of labour for the contract?

- A \$1,250
- **B** \$3,500
- C \$4,500
- **D** \$4,900

Question 5

All of a company's skilled labour, which is paid \$8 per hour, is fully employed manufacturing a product to which the following data refer:

		\$ per unit	\$ per unit
Sellin	g price		60
Less	Variable costs:		
	Skilled labour	20	
	Others	15	
			(35)
Conti	ribution		25

The company is evaluating a contract which requires 90 skilled labour hours to complete. No other supplies of skilled labour are available.

What is the total relevant skilled labour cost of the contract?

- \$720
- \$900 В
- C \$1,620
- \$2,160 D

(2 marks)

Question 6

A company requires 600 kg of raw material Z for a contract it is evaluating. It has 400 kg of material Z in inventory which were purchased last month. Since then the purchase price of material Z has risen by 8% to \$27 per kg. Raw material Z is used regularly by the company in normal production.

What is the total relevant cost of raw material Z to the contract?

- \$15,336
- \$15,400
- C \$16,200
- D \$17,496

(2 marks)

Question 7

A company is evaluating a project that requires 4,000 kg of a material that is used regularly in normal production. 2,500 kg of the material, purchased last month at a total cost of \$20,000, are in inventory. Since last month the price of the material has increased by $2\frac{1}{2}$ %.

What is the total relevant cost of the material for the project?

- \$12,300
- В \$20,500
- C \$32,300
- D \$32,800

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Chapter 16 BUDGETING



1 Introduction

Budgeting is an essential tool for management accounting for both planning and controlling future activity. In this chapter we will discuss the benefits of budgeting, the types of budget, and the preparation of budgets.

What is budgeting

Most companies prepare budgets – generally once a year they budget for the coming year.

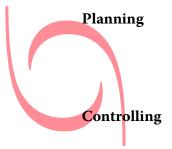
Although this usually includes a forecast Income Statement for the year, the budget is actually a set of plans.

For example, a manufacturing company needs to plan their material and labour requirements for the coming year. In order to do this they will generally have to forecast their expected sales units for the year i.e. a sales budget. Then they will be in position to budget their production units for the year i.e. a production budget. Once they have budgeted how many units to produce they are in a position to estimate how much material and how much labour they will require i.e. a materials usage budget and a labour budget.

None of the budgets so far mentioned will be in money terms – they will be expressed in units of production, or kg of material, or hours of labour – but they each represent a plan for the year.

When all the individual budgets (or **functional budgets**) have been prepared, then it will be possible to cost them out in money terms and prepare a forecast Income Statement.

3 Benefits of budgeting



Co-ordination

Authorising and delegating

Evaluation of performance

Communicating and motivating

Principal budget factor

As previously discussed, the budget needs to be prepared in stages – for example we normally will need to know the budget production (in units) before we can budget how much material will be needed (in kg).

The first thing that the person in charge of the budget process must do is decide where to start! For most companies the starting point will be a sales budget. Once it has been decided how many units the company expects to sell it is then possible to produce a production budget and so on.

However, this will not always be the starting point. Suppose, for example, that the company is a manufacturer of desks for which wood is the main material. Suppose also that during the coming year there is expected to be only a limited supply of wood available. In this situation the starting point will be to budget the amount of wood available, then budget how many units the company is capable of producing (a production budget) and then how many they expect to sell (a sales budget).

In general terms, the first budget to be prepared should be whatever factor it is that limits the growth of the company – it may be the level of demand (so a sales budget will be prepared first) or, as for the example in the previous paragraph, it may be the availability of raw material (so a material budget will be prepared first).

The factor that limits the company is known as the **principal budget factor**. The management accountant needs to identify the principal budget factor and it is this factor that will be budgeted first.

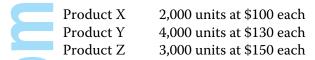


The preparation of budgets

Example 1

The XYZ company produces three products, X, Y, and Z. For the coming accounting period budgets are to be prepared using the following information:

Budgeted sales



Standard usage of raw material

	Wood	Varnish
	(kg per unit)	(litres per unit)
Product X	5	2
Product Y	3	2
Product Z	2	1
Standard cost of raw material	\$8	\$4

Inventories of finished goods

	Λ	1	L
Opening	500u	800u	700u
Closing	600u	1,000u	800u

Inventories of raw materials

	Wood	Varnish	
	(kg)	(litres)	
Opening	21,000	10,000	
Closing	18,000	9,000	

Labour

Labour is paid at the rate of \$3 per hour

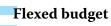
Prepare the following budgets:

- Sales budget (quantity and value) (a)
- **Production budget (units) (b)**
- (c) Material usage budget (quantities)
- Material purchases budget (quantities and value)
- Labour budget (hours and value) (e)

UDGETING	Chapt
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Type of budgets 6

Fixed budget



Flexible budget

Example 2

A company has prepared the following fixed budget for the coming year.

Sales	10,000 units
Production	10,000 units
	\$
Direct materials	50,000
Direct labour	25,000
Variable overheads	12,500
Fixed overheads	10,000
	\$97,500

Budgeted selling price \$10 per unit.

At the end of the year, the following costs had been incurred for the actual production of 12,000 units.

<i>1</i> 1	\$
Direct materials	60,000
Direct labour	28,500
Variable overheads	15,000
Fixed overheads	11,000
	\$114,500

The actual sales were 12,000 units for \$122,000

- Prepare a flexed budget for the actual activity for the year (a)
- Calculate the variances between actual and flexed budget, and summarise in a form suitable for (b) management.

(Use a marginal costing approach)

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TEST

Question 1

Which of the following best describes a flexible budget?

- **A** A budget which shows variable production costs only.
- **B** A monthly budget which is changed to reflect the number of days in the month.
- **C** A budget which shows sales revenue and costs at different levels of activity.
- A budget that is updated halfway through the year to incorporate the actual results for the first half of the year.

(2 marks)

Question 2

The following statements relate to aspects of budget administration:

Statement (1): An important task of a budget committee is to ensure that budgets are properly coordinated.

Statement (2): A budget manual is the document produced at the end of the budget setting process.

Which of the following is true?

- A Only statement (1) is correct.
- **B** Only statement (2) is correct.
- C Both statements are correct.

(1 mark)

Question 3

The following statements refer to spreadsheets:

- (i) A spreadsheet is the most suitable software for the storage of large volumes of data.
- (ii) A spreadsheet could be used to produce a flexible budget.
- (iii) Most spreadsheets contain a facility to display the data in them within them in a graphical form.

Which of these statements are correct?

- A (i) and (ii) only
- **B** (i) and (iii) only
- C (ii) and (iii) only
- **D** (i), (ii) and (iii)

(2 marks)

Question 4

Which of the following best describes a principal budget factor?

- A A factor that affects all budget centres.
- **B** A factor that is controllable by a budget centre manager.
- **C** A factor which limits the activities of an organisation.
- **D** A factor that the management accountant builds into all budgets.

(2 marks)

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Chapter 17



VARIANCE ANALYSIS

Introduction

In earlier chapters we looked at the layout of the management accountants' Profit Statements.

Unlike the financial accountant, the purpose for the management accountant is to explain (usually monthly) why the actual profit is different from the budgeted profit.

If the reasons for the difference can be identified, the information can be used for control purposes e.g. an overspend in one month can be investigated and attempts made to correct any problem for future months.

Total variances

Example 1

A company has prepared the following standard cost card:

	\$ per unit
Materials (4 kg at \$4.50 per kg)	18
Labour (5 hrs at \$5 per hr)	25
Variable overheads (5 hrs at \$2 per hr)	10
Fixed overheads (5 hrs at \$3 per hr)	15
	\$68

Budgeted selling price \$75 per unit.

Budgeted production 8,700 units **Budgeted** sales 8,000 units

There is no opening inventory

The actual results are as follows:

Sales: 8,400 units for \$613,200

Production: 8,900 units with the following costs:

Materials (35,464 kg)	163,455
Labour (45,400 hrs paid, 44,100 hrs worked)	224,515
Variable overheads	87,348
Fixed overheads	134,074

Prepare a flexed budget and calculate the total variances

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3 Analysis of cost variances

The total revenue that we have calculated for materials indicates that the actual expenditure on materials was not \$18 per unit. However, this could be either because we used the wrong amount of materials (which should have been 4 kg per unit) or that we paid the wrong price (which should have been \$4.50 per kg). More likely of course, it would be a combination of the two.

We will therefore analyse this and the other variances in as much detail as possible.

Example 2
Using the data from example 1, analyse each of the cost variances.
Materials
Labour
Laboui

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Variable Overheads	
Ti. 10 1 1	
Fixed Overheads	
•	

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4 Sales Variances

Although we have already calculated the sales variances in example 1, you may be asked to calculate them independently.

Example 3
Using data from example 1, calculate the Sales price variance and the Sales volume variance

Marginal costing 5

In the previous examples, the company had been using absorption costing. They could alternatively have been using marginal costing. The variances are all calculated exactly as before, with the exception of the sales volume variance, and the fixed overhead variance.

Example 4
Using data from example 1, calculate the sales volume variance and the fixed overhead variance, on the assumption that the company is using marginal costing.

VARIANCE ANALYSIS **Interpretation of variances**

Example 5
In the previous example there was a materials price variance.
Suggest possible reasons for its occurrence.
Suggest possible reasons for its occurrence.

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VARIANCE ANALYSIS

Tests

Question 1

A company's budgeted sales for last month were 10,000 units with a standard selling price of \$20 per unit and a standard contribution of \$8 per unit. Last month actual sales of 10,500 units at an average selling price of \$19.50 per unit were achieved.

What were the sales price and sales volume contribution variances for last month?

Sales price variance (\$) Sales volume contribution variance (\$)

 A
 5,250 Adverse
 4,000 Favourable

 B
 5,250 Adverse
 4,000 Adverse

 C
 5,000 Adverse
 4,000 Favourable

 D
 5,000 Adverse
 4,000 Adverse

(2 marks)

THE FOLLOWING INFORMATION RELATES TO QUESTIONS 2 AND 3:

A company uses standard costing and the standard variable overhead cost for a product is: 6 direct labour hours @ \$10 per hour.

Last month when 3,900 units of the product were manufactured, the actual expenditure on variable overheads was \$235,000 and 24,000 hours were actually worked.

Question 2

What was the variable overhead expenditure variance for last month?

A \$5,000 Adverse

B \$5,000 Favourable

C \$6,000 Adverse

D \$6,000 Favourable

(2 marks)

Question 3

What was the variable overhead efficiency variance for last month?

A \$5,000 Adverse

B \$5,000 Favourable

C \$6,000 Adverse

D \$6,000 Favourable

(2 marks)

Question 4

When a manufacturing company operates a standard marginal costing system there are no fixed production overhead variances.

Is this statement true or false?

A True

B False

(1 mark)

VARIANCE ANALYSIS

Ouestion 5

A company operates a standard costing system. The variance analysis for last month shows a favourable materials price variance and an adverse labour efficiency variance.

The following four statements, which make comparisons with the standards, have been made:

- Inferior quality materials were purchased and used.
- Superior quality materials were purchased and used. (2)
- Lower graded workers were used on production. (3)
- Higher graded workers were used on production. (4)

Which statements are consistent with the variance analysis?

- (1) and (3)
- B (1) and (4)
- (2) and (3)
- (2) and (4)

(2 marks)

Question 6

A company operates a standard absorption costing system. The standard fixed production overhead rate is \$15 per hour.

The following data relate to last month:

Actual hours worked 5,500 **Budgeted** hours 5,000 Standard hours for actual production 4,800

What was the fixed production overhead capacity variance?

\$7,500 Adverse

В \$7,500 Favourable

\$10,500 Adverse

\$10,500 Favourable

(2 marks)

Ouestion 7

A company uses standard absorption costing. The following data relate to last month:

	Budget	Actual
Sales and production (units)	1,000	900
	Standard	Actual
	\$	\$
Selling price per unit	50	52
Total production cost per unit	39	40

What was the adverse sales volume profit variance last month?

\$1,000 A

В \$1,100

C \$1,200

D \$1,300

(2 marks)

Question 8

A company operates a standard marginal costing system. Last month actual fixed overhead expenditure was 2% below budget and the fixed overhead expenditure variance was \$1,250.

What was the actual fixed overhead expenditure for last month?

- A \$61,250
- В \$62,475
- \mathbf{C} \$62,500
- D \$63,750

(2 marks)

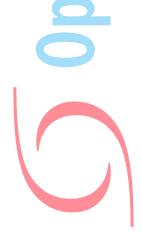
Question 9

Last month 27,000 direct labour hours were worked at an actual cost of \$236,385 and the standard direct labour hours of production were 29,880. The standard direct labour cost per hour was \$8.50.

What was the labour efficiency variance?

- \$17,595 Adverse A
- В \$17,595 Favourable
- \mathbf{C} \$24,480 Adverse
- \$24,480 Favourable

(2 marks)



Paper F2

ANSWERS TO EXAMPLES

Chapter 2

Example 6

1	units	cost
High	1,000	110,000
Low	200	30,000
Difference	800	80,000

Therefore, variable cost =
$$\frac{80,000}{800}$$
 = \$100 per unit

Using in 'high', total cost \$110,000 variable cost

 $(1,000 \times $100)$ \$100,000 Therefore, \$10,000 fixed cost

Therefore, y = 100x + 10,000

Chapter 3

Example 1

	\$ p.u.
Material (3kg × \$4)	12
Labour (4hrs × \$2)	8
Overheads (\$700,000 ÷ 50,000)	14
	\$34

Example 2

Total overheads \$700,000 Total labour hours Desks $(30,000 \times 4hr)$ 120,000 Chairs $(20,000 \times 1 \text{ hr})$ 20,000 140,000hrs

\$700,000 Overhead absorption rate: = \$5 per hour 140,000 hr

Costs cards:

	Desks		Chairs
Materials ($3kg \times 4)	12	$(2kg \times $4)$	8
Labour (4hrs \times \$2)	8	(1hr × \$2)	2
Overheads ($4kg \times 5)	20	$(1hr \times $5)$	5
	\$40		\$15

ANSWERS TO EXAMPLES

Example 3

Total overheads:	Total	Assembly	Finishing
Supervisors	100,000	60,000	40,000
Other (40:60)	600,000	240,000	360,000
	\$700,000	\$300,000	\$400,000

Total hours:

Desks (30,000 × 3 hr; 30,000 × 1 hr)	90,000	30,000	
Chairs (20,000 × ½ hr; 20,000 × ½ hr)	10,000	10,000	
	100,000 hrs	40,000	hrs
O.A.R	\$3 per hr	\$10 per hr	

desk

chair

Cost cards:

Materials		12		8
Labour		8		2
Overheads:				
Ass	sembly 9		1.50	
Fin	ishing 10		5.00	
	_	19		6.50
		\$39		\$16.50

Example 4

	Total	Processing	Packing	Canteen
Factory rent	20,000	12,500	6,250	1,250
(cubic space)				
Factory Heat	5,000	3,125	1,563	312
(cubic space)				
Supervisors	25,000	15,000	10,000	_
Depreciation	7,000	3,000	3,000	1,000
(NBV equipment)				
Canteen	18,000	_	_	18,000
Welfare	5,000	2,500	2,000	500
(No of employees)				
	\$80,000	\$36,125	\$22,813	\$21,062

Example 5

Already apportioned Recharge canteen (no. of employees)

Processing	Packing	Canteen
36,125	22,813	21,062
11,701	9,361	(21,062)
\$47,826	\$32,174	_

Example 6

Repeated distribution method

	\boldsymbol{X}	\boldsymbol{Y}	Stores	Maintenance
Already allocated	70,000	30,000	20,000	15,000
Recharge stores	10,000	6,000	(20,000)	4,000
			_	19,000
Recharge maintenance	8,550	7,600	2,850	(19,000)
Recharge stores	1,425	855	(2,850)	570
Recharge maintenance	257	228	85	(570)
				_
Recharge stores	43	25	(85)	17
Recharge maintenance	8	7	2	(17)
Recharge stores	1	1	(2)	
	\$90,284	\$44,716		

Algebraic method

Stores:

$$S = 20,000 + 0.15M$$

Maintenance

$$M = 15,000 + 0.20S$$

Replace M in (1):S = 20,000 + 2,250 + 0.03S

$$0.97S = 22,250$$

$$S = 22,250/0.97 = $22,938$$

Replace S in (2):M = 15,000 + 0.20 × 22,938

$$M = $19,588$$

	\boldsymbol{X}	\boldsymbol{Y}	Stores	Maintenance
Already allocated	70,000	30,000	20,000	15,000
Recharge stores:				
(\$22,938)	11,469	6,881	(22,938)	4,588
Recharge maintenance:				
(\$19,588)	8,815	7,835	2,938	(19,588)
	\$90,284	\$44,716		

Chapter 4

Example 1

(a) Cost cards:

	\$ p.u
Materials (4kg \times \$3)	12
Labour (4hrs × \$2)	8
Var. overheads	5
Fixed overheads	
(\$20,000/10,000)	2
Selling price	——— \$35p.u
Standard profit	——————————————————————————————————————

ANSWERS TO EXAMPLES

(b) Income Statements

Sales $(9,000 \times \$35)$ 315,000 $(11,500 \times \$35)$ 402,500 Cost of sales:			January		February
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Sales	$(9,000 \times \$35)$	315,000	$(11,500 \times $35)$	402,500
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Cost of sales:				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Opening inventory		_	$(2,000 \times \$27)$	54,000
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Materials	$(11,000 \times $12)$	13,200	$(9,500 \times $12)$	114,000
Fixed o/h	Labour	$(11,000 \times \$8)$	88,000	$(9,500 \times \$8)$	76,000
Less: Closing inventory $(2,000 \times \$27)$ $(54,000)$ $ 243,000$ $310,500$ Standard Gross Profit $(9,000 \times \$8)$ $72,000$ $(11,500 \times \$8)$ $92,000$ Adjustment for over/(under) absorption of fixed overheads $(1,000)$ Actual fixed o/h's: 20,000 $(1,000)$ Actual Gross Profit $(9,000 \times \$8)$ $(1,000)$ Actual: 20,000 $(1,000)$	Variable o/h	$(11,000 \times \$5)$	55,000	$(9,500 \times \$5)$	47,500
Less: Closing inventory $(2,000 \times \$27)$ $(54,000)$ $310,500$ Standard Gross Profit $(9,000 \times \$8)$ $72,000$ $(11,500 \times \$8)$ $92,000$ Adjustment for over/(under) absorption of fixed overheads $(1,000)$ Actual fixed o/h's: 20,000 Absorbed: 22,000 Actual Gross Profit $(2,000 \times \$8)$ $(2,000$	Fixed o/h	$(11,000 \times \$2)$	22,000	$(9,500 \times \$2)$	19,000
Standard Gross Profit (9,000 \times \$8) 72,000 (11,500 \times \$8) 92,000 Adjustment for over/(under) absorption of fixed overheads 2,000 Actual fixed o/h's: 20,000 Actual Gross Profit 74,000 Less: selling costs			297,000		310,500
Standard Gross Profit (9,000 × \$8) 72,000 (11,500 × \$8) 92,000 Adjustment for over/(under) absorption of fixed overheads 2,000 (1,000) Actual fixed o/h's: 20,000 Absorbed: 22,000 Actual: 20,000 Absorbed: 19,000 2,000 Actual Gross Profit 74,000 191,000	Less: Closing inventory	$(2,000 \times \$27)$	(54,000)		
Adjustment for over/(under) absorption of fixed overheads Actual fixed o/h's: 20,000 Absorbed: 22,000 Actual Gross Profit Actual Gross Profit Actual: 20,000 Absorbed: 19,000 74,000 Actual: 20,000 Absorbed: 19,000 91,000			243,000		310,500
absorption of fixed overheads Actual fixed o/h's: 20,000 Absorbed: 22,000 Actual Gross Profit Actual Gross Profit Actual Gross Profit Actual: 20,000 Absorbed: 19,000 91,000		$(9,000 \times \$8)$	72,000	$(11,500 \times \$8)$	92,000
Actual fixed o/h's: 20,000 Absorbed: 22,000 Actual Gross Profit Actual Gross Profit Actual: 20,000 Absorbed: 19,000 74,000 Actual: 20,000 Absorbed: 19,000 91,000			2.000		(1,000)
Absorbed: 22,000 Actual Gross Profit T4,000 Absorbed: 19,000 91,000 Less: selling costs			2,000	Actual: 20,000	•
Actual Gross Profit 74,000 91,000 Less: selling costs					
Less: selling costs			74.000	710301000. 17,000	91,000
	Actual Gross Front		7 1,000		71,000
	Less: selling costs				
Variable $(9,000 \times \$1)$ $(9,000)$ $(11,500 \times \$1)$ $(11,500)$	Variable	$(9,000 \times \$1)$	(9,000)	$(11,500 \times $1)$	(11,500)
Fixed (2,000) (2,000)	Fixed	, ,	, , ,	, , ,	
Actual Net Profit \$63,000 \$77,500	Actual Net Profit				

Example 2

- Overhead absorption rate $=\frac{320,000}{80,000} = 4 per hour
- (b) Amount absorbed = $78,000 \times $4 = $312,000$ Actual overheads = \$315,500 Amount under absorbed = 315,500 - 312,000 = \$3,500

Chapter 5

Example 1

(a) Cost card

	\$ p.u
Materials (4kg \times \$3)	12
Labour (4hrs \times \$2)	8
Var. overheads	5
Marginal cost	\$25_ p.u
Selling price	\$35 p.u
Marginal cost	(25)
Variable selling cost	(1)_
Standard profit	\$9 p.u

(b) Income Statements

		January		February
Sales	$(9,000 \times \$35)$	315,000	$(11,500 \times $35)$	402,500
Less: Cost of sales:				
Opening inventory		_	$(2,000 \times $25)$	50,000
Materials	$(11,000 \times $12)$	132,000	$(9,500 \times $12)$	114,000
Labour	$(11,000 \times \$8)$	88,000	$(9,500 \times \$8)$	76,000
Variable o/h	$(11,000 \times $5)$	55,000	$(9,500 \times \$5)_{-}$	47,500
		275,000		287,500
Less: Closing inventory	$(2,000 \times $25)$	(50,000)	_	
		225,000	_	287,500
		90,000		115,000
Less: Variable selling costs	$(9,000 \times \$1)$	(9,000)	$(11,500 \times $1)_{-}$	(11,500)
Contribution		81,000		103,500
Less: Fixed costs				
Production		(20,000)		(20,000)
Selling		(2,000)		(2,000)
Actual Net Profit		\$59,000	-	\$81,500

Example 2

	January	February
Absorption costing	63,000	77,500
Marginal costing	59,000	81,500
Difference	4,000	(4,000)
Fixed overheads in inventory value:		
Opening inventory $(2,000 \times \$2)$	_	(4,000)
Closing inventory $(2,000 \times \$2)$	4,000	
	4,000	(4,000)

Chapter 6

Example 1

Materials	20,000
Labour	10,000
Overheads	8,000
	\$38,000

Cost per unit

Example 2

Process Account					
	Units	\$		Units	\$
Materials	2,000	20,000	Transfer out	2,000	38,000
Labour		10,000	(2,000 u × \$19)		
Overheads		8,000			
	2,000	38,000		2,000	38,000

Chapter 7

Example 1

	kg	\$
Materials	1,000	12,000
Labour		7,000
Overheads		8,000
	1,000	27,000
Normal loss (10%)	(100)	
	900	\$27,000

Cost per kg
$$\frac{\$27,000}{900 \text{ kg}} = \$30$$

		Process	s Account		
	kg	\$		kg	\$
Materials	1,000	12,000	Normal loss	100	_
Labo <mark>ur</mark>		7,000	Transfer out	900	27,000
Overheads		8,000	(at \$30)		
	1,000	27,000		1,000	27,000

	kg		\$
Materials	3,000		30,000
Labour			12,000
Overheads		_	10,800
	3,000		52,800
Normal loss (10%)	(300)	×\$5	(1,500)
	2,700		\$51,300

Cost per kg
$$\frac{\$51,300}{2,700 \text{ kg}} = \$19$$

i e		Process	Account		
	kg	\$		kg	\$
Materials	3,000	30,000	Normal loss	300	1,500
Labour		12,000	(at \$5)		
Overheads		10,800			
			Transfer out	2,700	51,300
			(at \$19)		
	3,000	52,800		3,000	52,800
		Loss A	Account		
	kg	\$		kg	\$
Normal loss	300	1,500	Cash	300	1,500
	3,000	1,500		3,000	1,500

Example 3

	kg	\$
Materials	1,000	9,000
Labour		18,000
Overheads		13,500
	1,000	40,500
Normal loss (10%)	(100)	(900)
	900	\$39,600

Cost per kg
$$\frac{$39,600}{900 \text{ kg}} = $44$$

		Process	Account		
	kg	\$		kg	\$
Materials	1,000	9,000	Normal loss	100	900
Labour		18,000	Transfer out	850	37,400
Overheads		13,500			
			Abnormal loss	50	2,200
			(at \$44)		
	1,000	40,500		1,000	40,500

		LOSS A	ccount		
	kg	\$		kg	\$
Normal loss	100	900	Cash	150	1,350
Abnormal loss	50	2,200	I/S a/c		1,750
	150	3,100		150	3,100

Example 4

	kg	\$
Materials	2,000	18,000
Labour		36,000
Overheads		27,000
	2,000	81,000
Normal loss (10%)	(200)	(1,800)
	1,800	\$79,200

\$79,200 1,800 kg Cost per kg

		Process	Account		
	kg	\$		kg	\$
Materials	2,000	18,000	Normal loss	200	1,800
Labour		36,000	Transfer out	1,840	80,960
Overheads		27,000			
Abnormal Gain	40	1,760			
	2,040	82,760		2,040	82,760

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ANSWERS TO EXAMPLES

		Loss	Account		
	kg	\$		kg	\$
Normal loss	200	1,800	Abnormal Gain	40	1,760
P&L a/c		1,400	Cash	160	1,440
	200	3,200		200	3,200

Chapter 8

Example 1

(a)	Cost		<i>Materials</i> \$5,000		Labour \$2,760		<i>Overheads</i> \$3,440
	Equivalent costs: Finished W.I.P.	(100%)	800 200 1,000	(60%)	800 120 920	(30%)	800 60 860
	Cost per unit	5,000	= \$5	2,760 920	= \$3	3,440	- = \$4

Total cost per unit = 5 + 3 + 4 = \$12

(b) Finished output: $800 \times $12 = $9,600$

W.I.P.:

Materials: $200~u\times100\%\times\$5$ = 1,000Labour: $200 \text{ u} \times 60\% \times \3 = 360

Overheads: $200 \text{ u} \times 30\% \times \4 = 240

\$1,600

(c)	Process Account					
		и	\$		и	\$
	Materials	1,000	5,000	Finished	800	9,600
	Labour		2,760	WIP c/f	200	1,600
	Overheads		3,440			
		1,000	11,200		1,000	11,200

Example 2			
(a)	Uni	its	
	и		и
W.I.P. b/f	15,000	Finished	40,000
Started	30,000	(balancing figure)	
		WIP c/f	5,000
	45,000		45,000

- **(b)** Units started **and** finished in July
 - = units finished W.I.P b/f
 - = 40,000 15,000 = 25,000 units

7 (1 4)	SWERS TO EXAMPLE Cost in July	.5		<i>Materials</i> \$24,900		Lab & o/h's \$20,075	
	Equivalent units:						
	Finished W.I.P b/f (15)	00011)	(0%)		(60%)	9,000	
	Started and finished (2		(070)	25,000	(00%)		
			(1000/)		(500/)	25,000	
	Start W.I.P. c/f (5,000	1)	(100%)	5,000	(50%)	2,500	
			24.000	30,000	20.055	36,500	
	Cost per unit		24,900 30,000	= \$0.83	20,075 36,500	- = \$0.55	
	Total cost p.u. = \$0.83	+ \$0.55 = \$1.	38				
(c)	Finished units (40,00	0)					
	W.I.P b/f (15,000 units						
	Cost b/f (9,000 + 1			10,250			
	Cost of finishing:	,		,			
	Labour & o/h (15,0	000 × 60% × \$0	0.55)	4,950			
	200001 00 0/11 (10)		0.00)	15,200			
	Started and finished in	July (25,000	v \$ 1 38)	34,500			
	Started and infisited in	1 July (25,000	Α Ψ 1.50)	\$49,700			
	W.I.P c/f (5,000 units)			<u></u>			
	Materials (5,000 ×	100% × \$0.83)	4,150			
	Labour o/h (5,000			1,375			
				\$5,525			
(d)			Proc	ess Account			
		и	\$			и	\$
	W.I.P. b/f	15,000	10,250	Transferre	d out	40,000	49,700
	Materials	30,000	24,900	WIP c/f		5,000	5,525
	Labour & o/h		20,075				
		45,000	55,225	_		45,000	55,225
		<u> </u>		_ '			
Exa	imple 3						
(a)			nits 				
	AVII D L IS	<i>u</i>	T::.l J		<i>u</i>		
	W.I.P. b/f	15,000	Finished		40,000		
	Started	30,000	WIP c/f		5,000		
		45,000		_	45,000		
				_			
(b)	C_{-}			Materials		Lab & o/h's	

1	N	<i>Iaterials</i>	i	Lab & o/h's
Costs				
W.I.P b/f		9,000		1,250
In July		24,900		20,075
		\$33,900	_	\$21,325
Equivalent units:	_		_	
W.I.P b/f (15,000u)		15,000		15,000
Started & finished (25,000u)		25,000		25,000
Finished in July		40,000		40,000
Start W.I.P. c/f (5,000u)	(100%)	5,000	(50%)	2,500
		45,000	_	42,500
	W.I.P b/f In July Equivalent units: W.I.P b/f (15,000u) Started & finished (25,000u) Finished in July	Costs W.I.P b/f In July Equivalent units: W.I.P b/f (15,000u) Started & finished (25,000u) Finished in July	W.I.P b/f 9,000 In July 24,900 \$33,900 Equivalent units: W.I.P b/f (15,000u) 15,000 Started & finished (25,000u) 25,000 Finished in July 40,000 Start W.I.P. c/f (5,000u) (100%) 5,000	Costs W.I.P b/f In July 24,900 \$33,900 Equivalent units: W.I.P b/f (15,000u) Started & finished (25,000u) Finished in July Start W.I.P. c/f (5,000u) (100%) 5,000 (50%)

ANSWERS TO EXAMPLES

Cost per unit	33,900	= \$0.75	21,325	= \$0.50
	45,000	= \$0.75	42,500	= \$0.50

Total cost p.u. = \$0.75 + \$0.50 = \$1.25

(c) Finished units (40,000 × \$1.25) \$50,000

W.I.P c/f (5,000 units)

Materials $(5,000 \times 100\% \times \$0.75)$ 3,750 Labour o/h $(5,000 \times 50\% \times \$0.50)$ 1,250 \$5,000

(d)	Process Account					
		и	\$		и	\$
	W.I.P. b/f	15,000	10,250	Transferred out	40,000	50,000
	Materials	30,000	24,900	WIP c/f	5,000	5,000
	Labour & o/h		20,075			
		45,000	55,225		45,000	55,000

• (Note: The difference of \$225 is due to rounding the costs p.u. to 2 decimal places)

Chapter 9

Example 1

 Total joint costs:
 \$

 Materials
 5,000

 Labour & o/h
 2,300

 7,300

Less: proceeds of by-product

(500 kg × \$0.20) Started & finished (25,000 u)

Production of joint products: kg

A 1,000 B 2,000 3,000 kg

Cost per kg $\frac{7,200}{3,000}$ = \$2.40 (for A and B)

Example 2

 Total joint costs:
 \$

 Materials
 5,000

 Labour o/h
 2,300

 7,300

Less: Proceeds of by-product

 $(500 \text{ kg} \times \$0.20) \qquad \qquad (100) \\ \hline \$7,200$

(100)

\$7,200

ANSWERS TO EXAMPLES

Sales value of production of joint products:

	<i>\$</i>
A $(1,000 \text{kg} \times \$5)$	5,000
B $(2,000 \text{kg} \times \$2)$	4,000
	\$9,000

Allocation of joint costs to production:

A
$$\frac{5,000}{9,000} \times 7,200$$
 4,000 for 1,000 kg

B
$$\frac{4,000}{9,000} \times 7,200$$
 3,200 for 2,000 kg

Cost per kg:

A
$$\frac{4,000}{1,000}$$
 = \$4.00 per kg

$$\frac{3,200}{2,000} = $1.60 \text{ per kg}$$

Example 3

Less: Proceeds of by-product

$$(500 \text{ kg} \times \$0.20)$$
 (100)
$$\$7,200$$

Net realisable value of production

B 2,000 kg × (\$4.50 – \$2.20) =
$$\frac{4,600}{$8,200}$$

Allocation of joint costs to production:

A
$$\frac{3,600}{8,200} \times 7,200$$
 3,161
B $\frac{4,600}{8,200} \times 7,200$ 4,039

Cost per kg:

A
$$\frac{3,161}{1,000}$$
 = \$3.16 per kg

B
$$\frac{4,039}{2.000}$$
 = \$2.02 per kg

Chapter 10

Example 1

	units	<i>\$</i>
High	420	2,400
Low	300	2,160
Difference	120	\$240

Variable cost =
$$\frac{$240}{120}$$
 = \$2 per unit

In 'high'

$$y = 1,560 + 2x$$

Examples 2 & 3

$$b = \frac{n\Sigma xy - \Sigma x\Sigma y}{n\Sigma x^2 - (\Sigma x)^2} = \frac{(7 \times 1,870) - (28 \times 420)}{(7 \times 140) - (28 \times 28)} = \frac{1,330}{196} = 6.7857$$

$$a = \frac{\sum y}{n} - \frac{b\sum x}{n} = \frac{420}{7} - \frac{6.7857 \times 28}{7} = 60 - 27.1428 = 32.8572$$

$$y = 32.86 + 6.79x$$

or:
$$y = 32,857 + 67.9x$$

(if \times and y are actual units and \$'s)

Coefficient of correlation:

$$r = \frac{n\Sigma xy - \Sigma x\Sigma y}{\sqrt{(n\Sigma x^2 - (\Sigma x)^2)(n\Sigma y^2 - (\Sigma y)^2)}} = \frac{7 \times 1,870 - 28 \times 420}{\sqrt{(7 \times 140 - 28^2)(7 \times 26,550 - 420^2)}}$$
$$= \frac{+1330}{\sqrt{196 \times 9,450}} = +0.98$$

Chapter 11

No Answers

Chapter 12

Example 1

\$
6
_2
4

(a) \$ 1,200
Fixed costs
$$(1,000)$$
Profit $(300u \times $4)$ $(1,000)$

(b) Breakeven =
$$\frac{\text{Fixed costs}}{\text{Contribution p.u}} = \frac{1,000}{4} = 250 \text{ units}$$

Number of units
$$= \frac{\text{Target contribution}}{\text{Contribution p.u}} = \frac{1,300}{4} = 325 \text{ units}$$

Example 2

Margin of safety =
$$\frac{300 - 250}{300} \times 100 = 16.67\%$$

Example 3

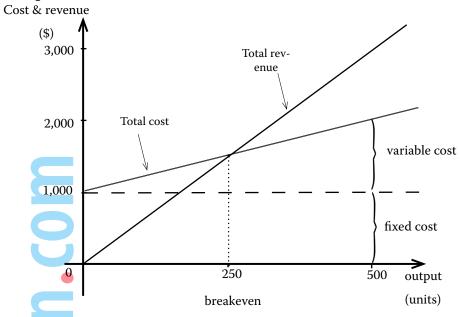
C/S ratio =
$$\frac{\text{Contribution}}{\text{Sales}} = \frac{4}{6} = \mathbf{0.67}$$

Sales revenue required = Target contribution \div C/S ratio = 1320 \div $^4/6$ = \$1,980

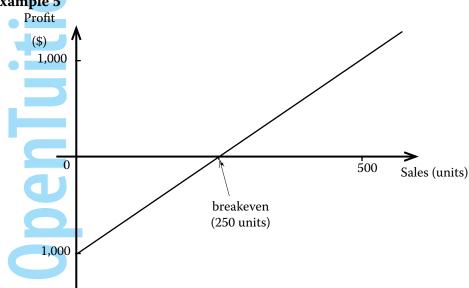
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ANSWERS TO EXAMPLES

Example 4



Example 5



Chapter 13

Example 1

Order	Number of	(\$20 per order) Reorder	Average	(10%×\$25=\$2.50 p.u.) Stockholding	Total in-	
quantity	order	cost p.a. (a)	inventory	cost p.a. (b)	<i>ventory</i> (a + b)	
500	80	1,600	250	625	2225	
750	53.33	1,067	375	938	2005	*
1000	40	800	500	1250	2050	
1250	32	640	625	1563	2203	

Example 2

$$EOQ = \sqrt{\frac{2C_{o}D}{C_{H}}} = \sqrt{\frac{2 \times £20 \times 40,000}{£2.50}} = 800 \text{ units}$$

Reorder cost:
$$= \frac{40,000}{800} = 50 \times \$20 = 1,000$$

Inventory holding cost
$$= \frac{800}{2} = 400 \times \$2.50 = 1,000$$

Total inventory costs \$2,000p.a.

Example 3

Order quantity = EOQ = 800 units:

Order quantity = 5,000 units

Inventory costs:

Reorder:
$$\frac{40,000}{5,000} = 8 \times $20 =$$
 160

Inventory holding:
$$\frac{3,000}{2} = 2,500 \times 99\% \times \$2.50 = 6,188$$

$$\frac{}{}$$
\$996,348p.a.

Order quantity = 10,000 units

Purchase cost: **Inventory** costs:

Reorder:
$$\frac{40,000}{10,000} = 4 \times $20 = 80$$

Inventory holding:
$$\frac{10,000}{2} = 5,000 \times 98.5\% \times \$2.50 = 12,313$$
 $\frac{}{\$997,393}$ p.a.

Order quantity of 5,000 units is the best option.

Example 4

EBQ =
$$\sqrt{\frac{2C_{o}D}{C_{H}(1-\frac{D}{R})}}$$
 = $\sqrt{\frac{2 \times 200 \times 50,000}{3(1-\frac{50,000}{500,000})}}$ = 2,722 units

Reorder costs:
$$= \frac{50,000}{2,722} \times £200 = 3,674$$

Reorder costs:
$$= \frac{50,000}{2,722} \times £200 = 3,674$$
Inventory holding cost
$$= \frac{2,722}{2} 1 - \frac{50,000}{500,000} \times $3 = 3,675$$
Total inventory costs $\boxed{\$7,349}$ p.a.

Example 5

Re-order level = demand over the lead time = $5 \times 100 = 500$ units

Example 6

Demand of the lead time = 500 units (see answer 5)

Safety inventory 100 units Re-order level 600 units **130** June 2011 Examinations Paper F2

ANSWERS TO EXAMPLES

Example 7

Re-order level = maximum lead time x maximum demand = $4 \times 120 = 480$ units

Example 8

Re-order level = 480 units (see answer 7)

Minimum demand over lead time = minimum lead time x minimum demand per week = 3 x 70 = 210 units

Therefore, maximum inventory left when the new order arrives = 480 - 210 = 270 units

The new delivery will be of 1,000 units, therefore the maximum inventory = 270 + 1,000 = 1,270 units

Chapter 14

Example 1

	Α	В	C
Materials (kg p.u.)	14	12	10
Labour (hrs p.u.)	12	8	4

The supply of materials is above the maximum that is required and is therefore irrelevant to the problem. The only limited resource is labour.

	A	В	С
Contribution p.u.	\$6	\$5	\$4
Labour (hrs p.u.)	12	8	4

	Λ	Ъ	C
Contribution per labour hr:	\$0.50	\$0.625	\$1.00
Ranking	3	2	①

Production Schedule:

	Units	Labour hours	
С	6,000	24,000	
В	6,000	48,000	
A	1,500	18,000	(balance)
		90,000hrs	

Example 2

Let S = number of standard chairs produced per week

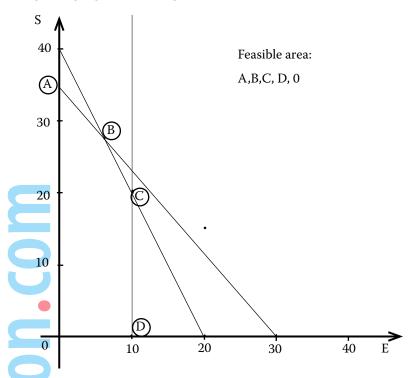
E = number of executive chairs produced per week

Constraints:

Materials: $2S + 4E \le 80$ Labour: $5S + 6E \le 180$ Demand: E ≤ 10 Non-negativity: $S \ge 0$; $E \ge 0$

Objective:

Maximise C = 6S + 9E



Maximum contribution occurs at point \mathbf{B} (using the objective function).

At B,
$$2S + 4E = 80$$

$$5S + 6E = 180$$
 (2)

$$(1) \times 2.5$$
: $5S + 10E = 200$ (3)

$$(3) - (2)$$
: $4E = 20$

$$E = 5$$

In (1):
$$2S + 20 = 80$$

$$2S = 60$$

$$S = 30$$

$$C = 6S + 9E$$

Produce 5 Executive chairs and 30 standard chairs per week.

Maximum contribution is \$225 per week.

Chapter 15

Example 1

Adjusted Schedule

\$ Direct wages 31,300

(Subcontract)

Supervisor

Special bonus 3,500

Saved incentive payments (2,500)

1,000

General overheads

(Incremental) 1,000

Depreciation

500 Additional maintenance

18,000 Machine overheads (6,000 hrs \times \$3)

Lost contribution (2,000 hrs \times \$2) 4,000

22,000

Materials

Lost scrap (7,500kg \times \$4.20) 31,500 Overdraft interest ($$20,000 \times 18\% \times \frac{1}{4}$)

900 \$88,200

Chapter 16

No Answers

Chapter 17

Example

	Original Fixed Budget	Flexed Budget \$	Actual \$	Variances	
	•	,			
Sales (units)	8,000	8,400	8,400		
Production (units)	8,700	8,900	8,900		
Sales	600,000	630,000	613,200	16,800	(A)
Materials	156,000	160,200	163,455	3,255	(A)
Labour	217,500	222,500	224,515	2,015	(A)
Variable o/h	87,000	89,000	87,348	1,652	(F)
Fixed o/h	130,500	133,500	134,074	574	(A)
	591,600	605,200	609,392		
Closing inventory	(47,600)	(34,000)	(34,000)		
	544,000	571,200	575,392		_
Profit	\$56,000	\$58,800	\$37,808	20,992	(A)

Example 2

Materials

Expense variance

Actual purchases at actual cost 163,455

35,464kg

at standard cost

(\$4.50) <u>159,588</u> **\$3,867** (A)

Usage variance

kgActual usage 35,464

Standard usage for actual production

at a standard cost (\$4.50) = \$612 (F)

at a standard cost (φ4.50) – φ**012** (

Labour Rate of Pay variance

Actual hours paid at actual cost 224,515
45,400 hours at standard cost (\$5) 227,000

\$2,485 (F)

Idle Time Variance

 Actual hours paid
 45,400

 Actual hours worked
 44,100

 1,300
 hrs

at a standard cost (\$5) = \$6,500 (A)

Efficiency variance

Actual hours worked 44,100

Standard hours for actual production

at a standard cost (\$5) = \$2,000 (F)

Variable overheads Expenditure variance

Actual hours worked at actual cost 87,348
44,100 at standard cost 88,200
\$852 (F)

Efficiency variance

Actual hours worked 44,100

Standard hours for actual production

 $(8,900u \times 5hrs)$ 44,500 400 hrs

at a standard cost (\$2) = \$800 (F)

Fixed overheads Expenditure variance

Actual total 134,074

Original budget total 130,500

\$3,574 (A)

Capacity variance

Actual hours worked 44,100Budget hours $(8,700u \times 5hrs)$ 43,500 600 hrs

at a standard cost (\$3) = **\$1,800** (F)

Efficiency variance

Actual hours worked 44,100

Standard hours for actual production

 $(8,900u \times 5hrs)$ $\frac{44,500}{400 \text{ hrs}}$

at a standard cost (\$3) = **\$1,200** (F)

Example 3

Sales price variance

Actual sales at actual selling price \$613,200Actual sales at standard selling price $(8,400u \times $75)$ \$630,000 \$16,800 (A)

Sales volume variance

units 8,400 budgeted sales 8,000

 $400 \text{ u} \times \$7 = \$2,800 \text{ (F)}$

Profit (Standard profit per unit)

Example 4

Sales volume variance

units actual sales 8,400 budgeted sales 8,000

 $400 \text{ u} \times \$22 = \$8,800(\text{F})$

Profit (Standard contribution per unit)

ANSWERS TO EXAMPLES

Fixed overhead expenditure variance

\$ Actual total fixed overheads 134,074 Budgeted total fixed overheads (8,700 $u \times 15) 130,500 \$3,574 (A)

(This is the **only** fixed overhead variance if marginal costing is being used)



Paper F2

ANSWERS TO MULTIPLE CHOICE TESTS

Answers to tests in chapter 1

- 1 F
- 2 C
- **3** B
- **4** B

Answers to tests in chapter 2

1 (

Variable cost per unit: $[(170,000 - 5,000) - 135,000] \div (22,000 - 16,000) = 5

Total fixed cost (below 17,500 units): $[135,000 - (16,000 \times 5)] = $55,000$

Total cost for 20,000 units: $55,000 + 5,000 + (20,000 \times 5) = $160,000$

- **2** D
- **3** C
- 4 B

Cost per cake would be very small and therefore not an appropriate cost unit. The most appropriate cost unit would be cost per batch.

- **5** B
- **6** B
- 7 D

 $200 \text{ units} \times (3 \div 60) \times 18 = 180

8 1

False, this is a stepped fixed cost

9 A

Depreciation is an indirect cost because it does not relate directly to the number of units produced. Items (ii) and (iii) can be traced directly to specific cost units therefore they are direct expenses.

10 A

The depicted cost has a basic fixed element which is payable even at zero activity. A variable element is then added at a constant rate as activity increases. Therefore the correct answer is A.

11

Option A is a part of the cost of direct materials.

Options B and D are production overheads. Option C is a selling and distribution expense.

Answers to tests in chapter 3

1 D

Total overhead to cost centre A:	<i>\$</i>
Direct	95,000
Proportion of cost centre X $[46,000 + (0.10 \times 30,000)] \times 0.50$	24,500
Proportion of cost centre Y [30,000 \times 0.3]	9,000
	128,500

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ANSWERS TO MULTIPLE CHOICE TESTS

2 D

Costs are controlled using budgets and other management information, therefore option A is not correct. Option B describes overhead cost absorption and option C describes cost allocation.

3 C

Option A is the definition of a cost unit.

Option B describes the cost of an activity or cost centre.

Option D describes a budget centre. Although a budget centre may also be a cost centre at times, this is not always the case.

- 4 D
- 5 C
- 6 C

Answers to tests in chapter 4

No Tests

Answers to tests in chapter 5

- 1 C
 - Month 1: Production > Sales; Absorption costing profit > Marginal costing profit
 Month 2: Sales > Production; Marginal costing profit > absorption costing profit
 - A and C satisfy Month 1, C and D satisfy Month 2. Therefore C satisfies both.
- 2 B

Production > Sales; Absorption costing profit > Marginal costing profit Marginal costing profit: $\{36,000 - [2,000 \times (63,000 \div 14,000)]\} = \$27,000$

3 A

Actual cost \$108,875 Absorbed cost (30,000 × 3.50) \$105,000 Under absorption \$3,875

4 B

Absorption costing profit 47,500Add: fixed overhead included in opening inventory (\$12 × 400) 4,800Less: fixed overhead included in closing inventory (\$12 × 600) (7,200)Marginal costing profit 45,100

Remember that if closing inventory is greater than opening inventory then absorption costing will give the higher profit figure and the value of the additional fixed overhead included in inventory should be deducted from the absorption costing profit in order to obtain the marginal costing profit.

If you selected option C, you deducted the fixed overhead included in opening inventory and added the fixed overhead included in closing inventory instead of the other way round.

5 A

Budgeted overhead absorption rate = $\frac{$258,750}{11.250}$ = \$23 per machine hour

\$

Overhead absorbed = $$23 \times 10,980$ hours	252,540
Overhead incurred	254,692
Under-absorbed overhead	2,152

If you selected option B or C you calculated the difference between the budgeted and actual overheads and interpreted the result as an under or over absorption.

If you selected option D your calculations were correct but you misinterpreted the result as over absorbed.

В

	>
Actual overheads	295,000
Under-absorbed overheads	9,400
Overheads absorbed for 70,000 hours	
at budgeted absorption rate (×)	285,600

Option A is incorrect because it is based on the budgeted overhead and the actual machine hours. Option C is incorrect because it is the actual overhead rate per machine hour.

If you selected option D you added the under-absorbed overhead by mistake, at the beginning of the calculation.

D

Overhead absorbed $\frac{\$15,000}{20,000} \times 19,500$ $\frac{\$14,625}{14,000}$ Overhead incurred $\frac{14,000}{625}$

Statement A is untrue because lower expenditure is more likely to lead to over absorption, unless there is a corresponding reduction in the actual labour hours.

Statement B is incorrect because the absorption is based on labour hours, which were lower than budgeted despite the increase in production units.

If you selected statement C you performed the calculations correctly but misinterpreted the result as an under absorption.

8 A

Budgeted production = 10,000 units

Budgeted fixed overheads per unit = \$12

Budgeted fixed overheads = $10,000 \times $12 = $120,000$

It is therefore possible to eliminate options C and D at this stage.

Actual fixed overheads = budgeted fixed overheads 120,000
Absorbed overheads $(11,500 \times $12)$ (138,000)Over-absorbed overheads 18,000

The correct answer is therefore A since absorbed overheads are greater than actual overheads which leads to an over absorption of fixed overheads.

9 B

Sales volume exceeded production volume by 500 units, therefore inventories reduced. The absorption costing profit will be lower than the marginal costing profit because fixed overheads

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ANSWERS TO MULTIPLE CHOICE TESTS

were 'released' from inventory.

Profit difference = inventory reduction in units × fixed overhead per unit

 $= 500 \times \$5 = \$2,500$

Absorption costing profit = \$60,000 - \$2,500 = \$57,500

If you selected option A you based your calculation of the profit difference on the closing inventory of 2,500 units. Option C is calculated as \$7 profit per unit \times 8,500 units sold, however, this takes no account of the actual level of fixed overhead cost.

If you selected option D you calculated the correct profit difference but you added it to the marginal costing profit instead of subtracting it.

10

Fixed costs per unit = \$16 / 4 = \$4

Units in closing inventory = 17,500 - 15,000 = 2,500 units

Profit difference = inventory increase in units × fixed overhead per unit

 $= 2,500 \times \$4 = \$10,000$

Inventories increased, therefore fixed overhead would have been carried forward in inventory using absorption costing and the profit would be higher than with marginal costing.

If you selected option A you calculated the correct profit difference, but misinterpreted the 'direction' of the difference.

If you selected option C or D you evaluated the inventory difference at variable cost and full cost respectively.

Answers to tests in chapter 6

No Tests

Answers to tests in chapter 7

No Tests

Answers to tests in chapter 8

	Normal loss litres	Actual loss litres	Abnormal loss litres	Abnormal gain litres
Process X	5,200	6,100	900	_
Process Y	1,875	1,800	_	75

Budgeted production: (19,000 + 3,000 - 4,000) = 18,000 units Raw materials required for budgeted production: $(18,000 \times 8)$ = 144,000 kgBudgeted raw material purchases: (144,000 + 53,000 - 50,000) = 147,000 kg

3

Cost per equivalent unit: $(480,000 \div 10,000)$ = \$48Closing work in progress valuation: $(4,000 \times \text{Degree of completion} \times 48)$ = 144,000**Degree** of completion = $(144,000 \div 4,000 \div 48) = 0.75$ = 75%

4

	<i>\$</i>
Value of 2,000 units transferred:	
1,700 units × 10	17,000
$300 \text{ units} \times 0.40 \times 10$	1,200
Opening work in progress value	1,710
	19,910

5 D

> The abnormal loss units are valued at their full production cost and credited to the process account, so that their occurrence does not affect the cost of good production. Therefore the correct answer is D.

ANSWERS TO MULTIPLE CHOICE TESTS

Options A and C are incorrect because the scrap value of the abnormal loss is debited to the scrap account and credited to the abnormal loss account, it has no impact on the process account.

6 D

	<i>\$</i>
Material	9,000
Conversion costs	11,970
Less: scrap value of normal loss $(300 \times $1.50)$	(450)
Cost of process	20,520

Expected output =
$$3,000 - (10\% \times 3,000)$$

$$=$$
 3,000 $-$ 300 $=$ 2,700 units

Costs per unit =
$$\frac{\text{Input costs - scrap value of normal loss}}{\text{Expected output}} = \frac{\$20,520}{2,700} = \$7.60$$

Costs of output =
$$2,900 \times $7.60 = $22,040$$

If you selected option B, you calculated the input costs less the scrap value of normal loss. You forgot to calculate a cost per unit and then to multiply this by the actual output. If you selected option C, you simply calculated the input costs. You need to take account of scrap proceeds and to calculate a cost per unit also.

Cost per unit in closing inventory
$$= \$(4.50 + 1.25 + 2.50) = \$8.25$$

Number of units in closing inventory $= 13,500 - 11,750 = 1,750$ units $= 1,750$ units

Option A applies a unit rate of \$3.75, ie omitting the cost of the raw material transferred into the process. Option B applies a unit rate of \$7, omitting the additional material added. Option D applies a unit rate of \$14.50, ie all of the unit rates supplied in the question. The work in progress should be valued at the **rate per incomplete unit** in respect of labour and overheads.

D

Answers to tests in chapter 9

Joint costs apportioned to Q:
$$[330,000 \div (420,000 + 330,000)] \times 350,000 = \$154,000$$

Closing inventory valuation (X): $(30,000 \div 330,000) \times (154,000 + 66,000) = \$20,000$

A by-product is output of some value produced when manufacturing something else (the main product).

Option A is incorrect because a by-product has some value.

Option B is incorrect because this description could also apply to a joint product.

Option C is incorrect because the value of the product described could be relatively high, even though the output volume is relatively low.

3 В

> Joint products are two or more products produced by the same process and separated in processing; each product has a sufficiently high saleable value to merit recognition as a main product.

> A joint product may be subject to further processing, as implied in option A, but this is not the case for all joint products.

ANSWERS TO MULTIPLE CHOICE TESTS

C 4

Determine total production cost

	\$'000
Opening inventory	40
Direct materials	80
Conversion costs	_100
	220
Less closing inventory	20
Total production cost	_200

Production costs are apportioned based on the sales value of units produced.

Production units		Sales value		Apportioned cost
		\$'000		\$'000
W	20,000 (× \$4)	80	(\$200,000 × (80/320))	50
X	20,000 (× \$6)	120	(\$200,000 × (120/320))	75
Y	40,000 (× \$3)	120	(\$200,000 × (120/320))	75
		320		200

Product X cost per unit = \$75,000/20,000 = \$3.75

If you selected option A you apportioned costs on the basis of units sold. Option B makes no adjustment for inventories and option D apportions costs on the basis of unit selling price, rather than sales value of output.

Answers to tests in chapter 10

C 1

a =
$$(\Sigma y \div n) - [(b\Sigma x) \div n] = (330 \div 11) - [(0.69171 \times 440) \div 11]$$

= $(30 - 27.6684)$

= 2.3316 (2.33 to 2 decimal places)

2 Α

3

$$(300,000 \times 0.60) - (400,000 \times 0.40) = +$20,000 (profit)$$

Correlation coefficient, r = 0.85

Coefficient of determination, $r^2 = 0.85^2 = 0.72$

The coefficient of determination tells us that 72% of the variation in sales revenue can be explained by the corresponding variation in advertising expenditure.

	Deliveries	\$
High activity	930	9,860
Low activity	840	9,680
Variable cost of	90	180

Variable cost per delivery \$180/90 = \$2 per delivery

Fixed costs = $$9,860 - ($2 \times 930) = $8,000$

Total costs = fixed costs + (variable cost per delivery × number of deliveries)

= \$8,000 + (\$2 × number of deliveries)

Therefore the correct answer is D.

If you selected options A or B you simply calculated the average cost at either of the two activity levels - but the fixed cost remains constant for each activity level.

If you selected option C you did the calculations correctly but forgot that variable costs must be added to fixed costs to derive the total cost.

7 В

	Units	\$
Highest production – month 1	3,000	74,000
Lowest production – month 5	1,500	69,500
	1,500	4,500

Variable cost per unit =
$$\frac{4,500}{1,500}$$
 =\$3 per unit

It is possible at this stage to eliminate options A, C and D since option B is the only one with a variable cost per unit of \$3. The fixed costs of \$65,000 can be proven as follows.

\$ In month 1, total costs = 74,000 Variable costs ($\$3 \times 3,000$) = 9,000 Fixed costs = 65,000

Answers to tests in chapter 11

No Tests

Answers to tests in chapter 12

Contribution per unit (CPU): $(80 \times 0.45) = 36 Break even point (units): $(99,000 \div 36) = 2,750$ Margin of safety: (4,000 - 2,750) = 1,250 units

3

CPU: $(20 \times 0.4) = 8

Break even point: $(18,000 \div 20) = 900$ units

Profit when 1,200 units produced and sold: $(300 \times 8) = \$2,400$

- C

Contribution required for target profit = fixed costs + profit = \$48,000 + \$11,000 = \$59,000

- + Contribution per unit (from qu 81) = \$4.40
- ∴ Sales units required =13,409 units

If you selected option A you divided the required profit by the contribution per unit, but the fixed costs must be covered before any profit can be earned. If you selected option B you identified correctly the contribution required for the target profit, but you then divided by the selling price per unit instead of the contribution per unit. Option C ignores the selling costs, which must be covered before a profit can be earned.

P/V ratio =
$$\frac{\text{Contribution}}{\text{Selling price}} = \frac{\$125,000}{\$300,000} = 0.4167$$

Fixed costs \$100,000 Sales revenue at breakeven point= P/V ratio

 $\frac{$300,000 - $240,000}{$\times$ 100\%} = 20\%$ <u>Budgeted sales – breakeven sales</u> **Budgeted** sales \$300,000

7 В

> \$50,000 Fixed costs Breakeven point = 3,125 unitsContribution per unit \$26-\$10

8 В

ANSWERS TO MULTIPLE CHOICE TESTS

Answers to tests in chapter 13

1 C

{[$2 \times 20 \times (4 \times 20,000)$] \div [0.06×25]} $^{0.5}$ = 1,461 units

2 D

3 A

The formula for the economic order quantity (EOQ) is

$$EOQ = \sqrt{\frac{2C_{o}D}{CH}}$$

with

$$C_o = £10$$

D = 15,000 ÷ 12 = 1,250

CH = £0.10

$$EOQ = \sqrt{\frac{2 \times £10 \times 1,250}{£0.10}} = \sqrt{250,000} = 500 \text{ units}$$

4

4 C

5

6 D

Answers to tests in chapter 14

1 D

2 D

	\boldsymbol{X}	\boldsymbol{Y}
CPU	\$8	\$10
Contribution per hour	\$4	\$2.50
Ranking	1st	2nd

Therefore produce and sell the maximum 800 units of X using 1,600 hours and with the remaining 400 hours produce and sell 100 units of Y.

3 A

100 units of Y with all of material G (1,000 kg) = 10 kg per unit90 units of Y with all of material H (1,800 kg) = 20 kg per unit

4 A

Total contributions:

 $A[(0 \times 8) + (90 \times 20)] = $1,800$

 $B[(50 \times 8) + (60 \times 20)] = \$1,600$

 $C [(60 \times 8) + (50 \times 20)] = \$1,480$ $D [(125 \times 8) + (0 \times 20)] = \$1,000$

5

6 A

7 B

8 D

9 D

Answers to tests in chapter 15

1 В

$$(150 \times 40) + (250 \times 53) = $19,250$$

- 2
 - Relevant cost: (8,000 5,000) = \$3,000
- C 3
- 4 В

Overtime cost for 250 hours: $(250 \times 9 \times 2) = \$4,500$ Cost of diverting labour: $250 \times (9 + 5) = \$3,500$ Relevant cost (lowest alternative) = \$3,500

- C
- C
- D

Answers to tests in chapter 16

- C

Answers to tests in chapter 17

Price variance: $(0.50 \times 10,500) = \$5,250$ Adverse

Volume variance: $(500 \times 8) = $4,000$ Favourable

	\$
Actual expenditure	235,000

Actual hours \times standard rate (24,000 \times 10) 240,000

Expenditure variance Favourable 5,000

C

\$ Actual hours × standard rate 240,000 Standard cost of actual production $(3,900 \times 6 \times 10)$ 234,000

Efficiency variance 6,000 Adverse

- 4 В
- 5
- В 6

Budgeted hours 5,000 5,500 Actual hours worked

Capacity variance 500hours × 15 = \$7,500 Favourable

- 7 В
- 8 A
- 9 D







