



1

Basic Aspects of Cost Accounting

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LEARNING OUTCOMES

After completing this chapter, you should be able to:

- ▶ explain why organisations need to know how much products, processes and services cost and why they need costing systems;
- ▶ explain the idea of a 'cost object';
- ▶ explain the concept of a direct cost and an indirect cost;
- ▶ explain why the concept of cost needs to be qualified as direct, full, marginal, etc. in order to be meaningful;
- ▶ explain how costs behave as product, service or activity levels increase or decrease;
- ▶ distinguish between fixed, variable and semi-variable costs;
- ▶ explain step costs and the importance of time-scales in their treatment as either variable or fixed;
- ▶ compute the fixed and variable elements of a semi-variable cost using the high–low method and 'line of best fit' method.

1.1 Introduction

In this chapter, we will look at some of the fundamental concepts of the framework of cost accounting. You will learn some basic principles which underpin all of the material in your *Fundamentals of Management Accounting* syllabus.

1.2 Why organisations need costing systems

An organisation's costing system is the foundation of the internal financial information system for managers. It provides the information that management needs to plan and control the organisation's activities and to make decisions about the future. Examples of the type of

information provided by a costing system and the uses to which it might be put include the following.

- Actual unit costs for the latest period; could be used for cost control by comparing with a predetermined unit standard cost, which would also be provided by the costing system. Could also be used as the basis for planning future unit costs and for decisions about pricing and production levels. For example, a manager cannot make a decision about the price to be charged to a customer without information which tells the manager how much it costs to produce and distribute the product to the customer.
- Actual costs of operating a department for the latest period; could be used for cost control by comparing with a predetermined budget for the department. Could also be used as the basis for planning future budgeted costs and for decisions such as outsourcing. For example, a manager might be considering the closure of the packing department and instead outsourcing the packing operations to another organisation. In order to make this decision the manager needs to know, among other things, the actual cost of operating the packing department.
- The forecast costs to be incurred at different levels of activity. Could be used for planning, for decision making and as a part of cost control by comparing the actual costs with the forecasts. For example, a manager cannot make a well-informed decision about the appropriate production level for the forthcoming period unless information is available about the costs that will be incurred at various possible output levels.

This is by no means an exhaustive list of the information that is provided by a costing system. However, it should serve to demonstrate that organisations need costing systems that will provide the basic information that management requires for planning, control and decision-making.

1.3 What is meant by 'cost'?

The word 'cost' can be used in two contexts. It can be used as a noun, for example, when we are referring to the cost of an item. Alternatively, it can be used as a verb, for example, we can say that we are attempting to cost an activity, when we are undertaking the tasks necessary to determine the costs of carrying out the activity.

The word 'cost' can rarely stand alone and should always be qualified as to its nature and limitations. You will be seeing throughout this text that there are many different types of cost and that each has its usefulness and limitations in different circumstances.

1.4 Cost units



The CIMA *Terminology* defines a cost unit as 'a unit of product or service in relation to which costs are ascertained'.

This means that a cost unit can be anything for which it is possible to ascertain the cost. The cost unit selected in each situation will depend on a number of factors, including the purpose of the cost ascertainment exercise and the amount of information available.

Cost units can be developed for all kinds of organisations, whether manufacturing, commercial or public-service based. Some examples from the CIMA *Terminology* are as follows:

<i>Industry sector</i>	<i>Cost unit</i>
Brick-making	1,000 bricks
Electricity	Kilowatt-hour (KwH)
Professional services	Chargeable hour
Education	Enrolled student
<i>Activity</i>	<i>Cost unit</i>
Credit control	Account maintained
Selling	Customer call



Exercise 1.1

Can you think of at least one other cost unit which could be used for each of these industries and activities? For example, in controlling the costs of the selling activity we might monitor the cost per order taken.

The above list is not exhaustive. A cost unit can be anything which is measurable and useful for cost control purposes. For example, with brick-making, 1,000 bricks is suggested as a cost unit. It would be possible to determine the cost per brick but perhaps in this case a larger measure is considered more suitable and useful for control purposes.

Notice that this list of cost units contains both tangible and intangible items. Tangible items are those which can be seen and touched, for example the 1,000 bricks. Intangible items cannot be seen and touched and do not have physical substance but they can be measured, for example a chargeable hour of accounting service.

1.4.1 Composite cost units

The cost units for services are usually intangible and they are often composite cost units, that is, they are often made up of two parts. For example, if we were attempting to monitor and control the costs of a delivery service we might measure the cost per tonne delivered. However, ‘tonne delivered’ would not be a particularly useful cost unit because it would not be valid to compare the cost per tonne delivered from London to Edinburgh with the cost per tonne delivered from London to Brighton. The former journey is much longer and it will almost certainly cost more to deliver a tonne over the longer distance.

Composite cost units assist in overcoming this problem. We could perhaps use a ‘tonne-mile’ instead. This means that we would record and monitor the cost of carrying one tonne for one mile. The cost per tonne-mile would be a comparable measure whatever the length of journey and this is therefore a valid and useful cost unit for control purposes.

Other examples of composite cost units might be as follows:

<i>Business</i>	<i>Cost unit</i>
Hotel	Bed night
Bus company	Passenger mile
Hospital	In-patient day



Exercise 1.2

Can you think of some other examples of composite cost units that could be used in these organisations and in other types of organisation?

1.5 Cost centres

A cost centre is a production or service location, a function, an activity or an item of equipment for which costs are accumulated.

A cost centre is used as a 'collecting place' for costs. The cost of operating the cost centre is determined for the period, and then this total cost is related to the cost units which have passed through the cost centre.

For instance, an example of a production cost centre could be the machine shop in a factory. The production overhead cost for the machine shop might be £100,000 for the period. If 1,000 cost units have passed through this cost centre we might say that the production overhead cost relating to the machine shop was £100 for each unit.

A cost centre could also be a service location, a function, an activity or an item of equipment. Examples of these might be as follows but you should try to think of some others:

<i>Type of cost centre</i>	<i>Examples</i>
Service location	Stores, canteen
Function	Sales representative
Activity	Quality control
Item of equipment	Packing machine

If you are finding it difficult to see how a sales representative could be used as a cost centre, then work carefully through the following points.

1. What are the costs which might be incurred in 'operating' a sales representative for one period?

Examples might be the representative's salary cost, the cost of running a company car, the cost of any samples given away by the representative and so on. Say these amount to £40,000.

2. Once we have determined this cost, the next thing we need to know is the number of cost units that can be related to the sales representative.

The cost unit selected might be £100 of sales achieved. If the representative has achieved £400,000 of sales, then we could say that the representative's costs amounted to £10 per £100 of sales. The representative has thus been used as a cost centre or collecting place for the costs, which have then been related to the cost units.

1.6 Cost objects

A cost object is anything for which costs can be ascertained. The CIMA *Terminology* contains the following description: 'For example a product, service, centre, activity, customer or distribution channel in relation to which costs are ascertained'.

All of the cost units and cost centres we have described earlier in this chapter are therefore types of cost object. We have seen the quality control activity being treated as a cost centre, and thus as a cost object.



Exercise 1.3

Notice that CIMA's examples of cost objects include a customer. Can you think of costs that might be attributed to a supermarket which is a customer and is treated as a cost object by a supplier of processed foods?



Solution

Costs that you might have thought of include the following:

- the cost of the food products supplied to the customer,
- the cost of delivering the food products to the customer,
- the cost of funding the credit taken by the customer,
- the cost of holding any inventories for the supermarket,
- the salary cost of the account manager responsible for the supermarket's account,
- the cost of dealing with the customer's queries.

1.7 Classification of costs

Costs can be classified in many different ways. It is necessary to be able to classify all costs, that is, to be able to arrange them into logical groups, in order to devise an efficient system to collect and analyse the costs. The classifications selected and the level of detail used in the classification groupings will depend on the purpose of the classification exercise.



The CIMA *Terminology* defines classification as the 'arrangement of items in logical groups by nature, purpose or responsibility'.

1.7.1 Classification of costs according to their nature

This means grouping costs according to whether they are materials, labour or expense cost.

Material costs include the cost of obtaining the materials and receiving them within the organisation. The cost of having the materials brought to the organisation is known as *carriage inwards*.

Labour costs are those costs incurred in the form of wages and salaries, together with related employment costs. In the United Kingdom, there is an additional cost borne by the employer in respect of employees which is paid to the government: this is called National Insurance. These costs are documented internally, the amount of the wages and salary costs being determined by reference to agreed rates of pay and attendance time and output measures, depending on the method of remuneration being used.

Expense costs are external costs such as rent, business rates, electricity, gas, postages, telephones and similar items which will be documented by invoices from suppliers.

Within each of these classifications there is a number of subdivisions; for example, within the materials classification the subdivisions might include the following:

- (a) Raw materials, that is, the basic raw material used in manufacture.
- (b) Components, that is, complete parts that are used in the manufacturing process.
- (c) Consumables, that is, cleaning materials, etc.
- (d) Maintenance materials, that is, spare parts for machines, lubricating oils, etc.

This list of subdivisions is not exhaustive, and there may even be further subdivisions of each of these groups. For example, the raw materials may be further divided according to the type of raw material, for example, steel, plastic, glass, etc.



Exercise 1.4

Can you think of some possible subdivisions for the costs that are classified as labour costs and as expense costs?

1.7.2 Classification of costs according to their purpose: direct costs and indirect costs

When costs are classified having regard to their purpose, they are grouped according to the reason for which they have been incurred. The broadest classification of this type is to divide costs into *direct* costs and *indirect* costs.

A direct cost is one that can be clearly identified with the cost object we are trying to cost. For example, suppose that a furniture maker is determining the cost of a wooden table. The manufacture of the table has involved the use of timber, screws and metal drawer handles. These items are classified as *direct materials*. The wages paid to the machine operator, assembler and finisher in actually making the table would be classified as *direct labour costs*. The designer of the table may be entitled to a royalty payment for each table made, and this would be classified as a *direct expense*.

Other costs incurred would be classified as *indirect costs*. They cannot be directly attributed to a particular cost unit, although it is clear that they have been incurred in the production of the table. Examples of indirect production costs are as follows:

<i>Cost incurred</i>	<i>Cost classification</i>
Lubricating oils and cleaning materials	Indirect material
Salaries of supervisory labour	Indirect labour
Factory rent and power	Indirect expense

It is important for you to realise that a particular cost may sometimes be a direct cost and sometimes an indirect cost. It depends on the cost object we are trying to cost.

For example, the salary of the machining department supervisor is a direct cost of that department because it can be specifically identified with the department. However, it is an indirect cost of each of the cost units processed in the machining department because it cannot be specifically identified with any particular cost unit.



Exercise 1.5

State whether each of the following costs would be a direct cost or an indirect cost of the quality control activity which is undertaken in a company's factory.

- The salary of the quality control supervisor.
- The rent of the factory.
- The depreciation of the quality testing machine.
- The cost of the samples destroyed during testing.
- The insurance of the factory.



Solution

- The salary of the quality control supervisor is a direct cost of the quality control activity because it can be specifically attributed to this cost object.
- The rent of the factory is an indirect cost of the quality control activity because it cannot be specifically attributed to this cost object but must also be attributed to other activities undertaken in the factory.
- The depreciation of the quality testing machine is a direct cost of the quality control activity because it can be specifically attributed to this cost object.
- The cost of the samples destroyed during testing is a direct cost of the quality control activity because it can be specifically attributed to this cost object.
- The insurance of the factory is an indirect cost of the quality control activity because it cannot be specifically attributed to this cost object but must also be attributed to other activities undertaken in the factory.



In a later chapter we will return to consider the classification of costs by responsibility.

1.8 Elements of cost

The elements of cost are the constituent parts of cost which make up the total cost of a cost object.

In Figure 1.1, the outline cost statement for a single cost unit shows you how the total or full cost for a unit might be built up. Notice in particular that a number of subtotals can be highlighted before the total cost figure is determined.

The usefulness of each of these subtotals depends on the management action that is to be taken based on each of the totals.

Suppose that the cost analysis in Figure 1.1 has been provided by the management accountant to help us to decide on the selling price to be charged for a luxury wall-mounted hairdryer: the type that is fixed to the wall for customers' use in hotel bedrooms.

You have been negotiating with the procurement manager of a chain of hotels in an attempt to secure a contract to supply a batch of hairdryers. It is very important that you should win this contract because it is likely that, once this first order has been fulfilled successfully, the hotel chain will place future orders for hairdryers and for your company's other products, when refurbishing its other hotels. Furthermore, other hotel chains may become interested in your company's products once they discover that this major chain is one of your customers.

	£	£
Direct material		15
Direct labour		5
Direct expenses		<u>2</u>
Prime cost or total direct cost		22
Production overhead:		
indirect material	4	
indirect labour	6	
indirect expenses	<u>6</u>	
		<u>16</u>
Total production/factory cost		38
Selling, distribution and administration overhead		<u>2</u>
Total (full) cost		40
Profit		<u>10</u>
Selling price		<u>50</u>

Figure 1.1 The build-up of cost

Unfortunately, the hotel's procurement manager is working within the constraints of a very strict budget and has made it clear that the highest price that the hotel is prepared to pay is £25 per hairdryer. The analysis in Figure 1.1 shows that your company's normal selling price is considerably higher than this.

The company cannot afford to sell its hairdryers for £25 each if they cost £40 to produce and sell. Or can it?

Let us look at the sort of costs that might be incurred in manufacturing and selling a hairdryer, and how each cost would be classified in terms of the above analysis of the elements of cost.

- *Direct materials.* This is the material that actually becomes part of the finished hairdryer. It would include the plastic for the case and the packaging materials. If we make another batch of hairdryers then we will need to purchase another batch of these and other direct materials.
- *Direct labour.* This is the labour cost incurred directly as a result of making one hairdryer. If we make another batch of hairdryers then we will need to pay more direct labour cost.
- *Direct expenses.* These are expenses caused directly as a result of making one more batch of hairdryers. For example, the company might be required to pay the designer of the hairdryer a royalty of £2 for each hairdryer produced.

The three direct costs are summed to derive the prime cost or total direct cost of a hairdryer. This is one measure of cost but there are still other costs to be added: production overheads and other overheads.

Production overheads are basically the same three costs as for direct cost, but they are identified as *indirect* costs because they cannot be specifically identified with any particular hairdryer or batch of hairdryers. Indirect costs must be shared out over all the cost objects using a fair and equitable basis.



In a later chapter you will see how indirect costs can be shared over all the production for the period.

Indirect materials are those production materials that do not actually become part of the finished product. This might include the cleaning materials and lubricating oils for the machinery. The machines must be clean and lubricated in order to carry out production, but it will probably not be necessary to spend more on these materials in order to manufacture a further batch. This cost is therefore only indirectly related to the production of this batch.

Indirect labour is the production labour cost which cannot be directly associated with the production of any particular batch. It would include the salaries of supervisors who are overseeing the production of hairdryers as well as all the other products manufactured in the factory.

Indirect expenses are all the other production overheads associated with running the factory, including factory rent and rates, heating and lighting, etc. These indirect costs must be shared out over all of the batches produced in a period.

The share of indirect production costs is added to the prime cost to derive the total production cost of a hairdryer. This is another measure of cost but there are still more costs to be added: a share of the other overheads.

Selling and distribution overhead includes the sales force salaries and commission, the cost of operating delivery vehicles and renting a storage warehouse, etc. These are indirect costs which are not specifically attributable to a particular cost unit.

Administration overhead includes the rent on the administrative office building, the depreciation of office equipment, postage and stationery costs, etc. These are also indirect costs which are not specifically attributable to a particular cost unit.

Now that you understand the nature of each of the cost elements which make up the full cost we can think a bit more about the price to be charged to the hotel chain.



Exercise 1.6

Which of the above costs would be incurred as a result of making another hairdryer?



Solution

The direct cost of £22 would definitely be incurred if another hairdryer was produced. This is the extra material that would have to be bought, the extra labour costs that would have to be paid and the extra expenses for royalties that would be incurred.

The £16 production overhead cost would not be incurred additionally if another hairdryer was produced. This is the share of costs that would be incurred anyway, such as the cleaning materials, the factory rent and the supervisors' salaries.

The £2 share of selling, distribution and administration overhead would probably not be incurred if another hairdryer was produced. This includes the office costs, the depreciation on the delivery vehicles and the rent of warehousing facilities. This sort of cost would not increase as a result of producing another hairdryer or batch of hairdryers. However, there may be some incremental or extra selling and distribution costs, for example we would probably be entitled to a sales commission for all our hard work in winning the sale, and there would be some costs involved in delivering the goods to the hotel chain. For the sake of our analysis let us suppose that this incremental cost amounts to £1 per hairdryer, rather than the full amount of £2 shown in the cost analysis.

You can see from the discussion in this exercise that in fact the only extra or incremental cost to be incurred in producing another hairdryer is £23 (£22 direct cost plus assumed £1 incremental selling and distribution costs).

Therefore it may be possible to sell to the hotel chain for £25 per hairdryer, and still be better off than if the sale was not made at all! At least the extra £2 per hairdryer (£25 – £23 extra cost) would contribute towards the costs which are being incurred anyway – the production overheads, administration overheads, etc.

This discussion has illustrated that the concept of cost needs to be qualified if it is to be meaningful. We need to know to which cost we are referring when we state something like, 'The cost is £40'.

The £40 cost quoted is the full cost, which includes a fair share of all costs incurred on behalf of the cost object. In our discussion we derived the *marginal* or *incremental* cost of £23 which would be incurred as a direct result of making and selling another hairdryer.

Therefore, we have seen that different costs are useful in different circumstances and we must always qualify what we mean by 'cost'. Do we mean the direct cost, the marginal cost, the full cost or some other measure of cost?

When we consider the full cost in this example there is a profit of £10 on this particular cost unit if it is sold for £50. This is referred to as a profit *margin* on sales of 20 per cent (10/50) and a profit *mark-up* on full cost of 25 per cent (10/40). These are the 'strictly correct' definitions of margin and mark-up. However, in practice, the two terms tend to be used interchangeably.



The important thing in an assessment question is that you should establish whether profit is to be calculated as a percentage of cost, or as a percentage of selling price.

1.9 Cost behaviour

Many factors affect the level of costs incurred; for instance inflation will cause costs to increase over a period of time. In management accounting, when we talk about cost behaviour we are referring to the way in which costs are affected by fluctuations in the level of activity.

The level of activity can be measured in many different ways. For example, we can record the number of units produced, miles travelled, hours worked, meals served, percentage of capacity utilised and so on.

An understanding of cost behaviour patterns is essential for many management tasks, particularly in the areas of planning, decision-making and control. It would be impossible for managers to forecast and control costs without at least a basic knowledge of the way in which costs behave in relation to the level of activity.

In this section we will look at the most common cost behaviour patterns and we will consider some examples of each.

1.9.1 Fixed cost



The CIMA *Terminology* defines a fixed cost as a 'cost incurred for an accounting period, that, within certain output or turnover limits, tends to be unaffected by fluctuations in the levels of activity (output or turnover)'.

Another term that can be used to refer to a fixed cost is a period cost. This highlights the fact that a fixed cost is incurred according to the time elapsed, rather than according to the level of activity.

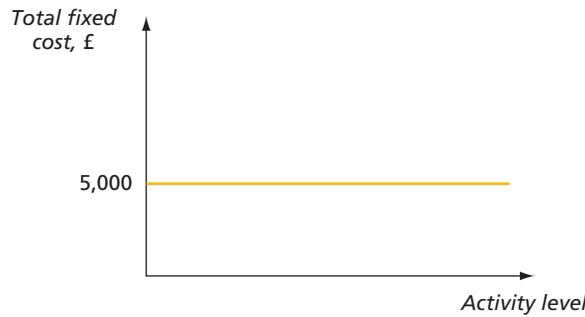


Figure 1.2 Fixed cost

A fixed cost can be depicted graphically as shown in Figure 1.2.

Examples of fixed costs are rent, rates, insurance and executive salaries.

The graph shows that the cost is constant (in this case at £5,000) for all levels of activity. However, it is important to note that this is only true for the relevant range of activity. Consider, for example, the behaviour of the rent cost. Within the relevant range it is possible to expand activity without needing extra premises and therefore the rent cost remains constant. However, if activity is expanded to the critical point where further premises are needed, then the rent cost will increase to a new, higher level.

This cost behaviour pattern can be described as a stepped fixed cost or step cost (Figure 1.3).

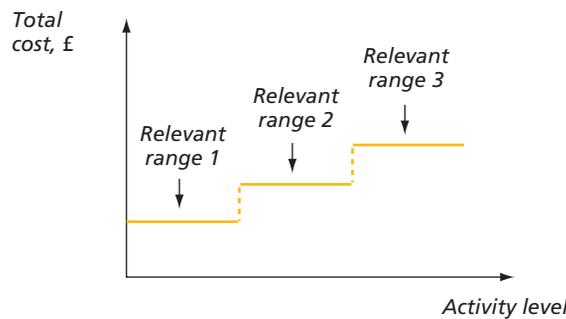


Figure 1.3 Stepped fixed cost

The cost is constant within the relevant range for each activity level but when a critical level of activity is reached, the total cost incurred increases to the next step.

The possibility of changes occurring in cost behaviour patterns means that it is unreliable to predict costs for activity levels which are outside the relevant range. For example our records might show the cost incurred at various activity levels between 100 units and 5,000 units. We should therefore try to avoid using this information as the basis for forecasting the level of cost which would be incurred at an activity of, say, 6,000 units, which is outside the relevant range.

 This warning does not only apply to fixed costs: it is never wise to attempt to predict costs for activity levels outside the range for which cost behaviour patterns have been established.

When you are drawing or interpreting graphs of cost behaviour patterns, it is important that you pay great attention to the label on the vertical axis. In Figures 1.2 and 1.3 the graphs depicted the total cost incurred. If the vertical axis had been used to represent the fixed cost per unit, then it would look as shown in Figure 1.4.

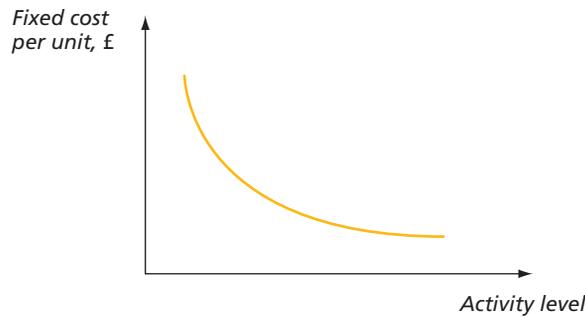


Figure 1.4 Fixed cost per unit

The fixed cost per unit reduces as the activity level is increased. This is because the same amount of fixed cost is being spread over an increasing number of units.

1.9.2 Variable cost



The CIMA *Terminology* defines a variable cost as a 'cost that varies with a measure of activity'.

Examples of variable costs are direct material, direct labour and variable overheads.

Figure 1.5 depicts a linear variable cost. It is a straight line through the origin, which means that the cost is nil at zero activity level. When activity increases, the total variable cost increases in direct proportion, that is, if activity goes up by 10 per cent, then the total variable cost also increases by 10 per cent, as long as the activity level is still within the relevant range.

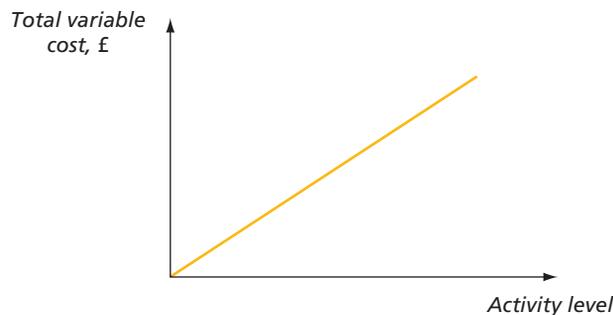


Figure 1.5 Linear variable cost

The gradient of the line will depend on the amount of variable cost per unit.



Exercise 1.7

Figure 1.5 depicts the total variable cost at each activity level. Can you draw a sketch graph of the variable cost per unit?

Your graph of variable cost per unit should look like Figure 1.6. The straight line parallel to the horizontal axis depicts a constant variable cost per unit, within the relevant range.

In most assessment situations, and very often in practice, variable costs are assumed to be linear. Although many variable costs do approximate to a linear function, this assumption

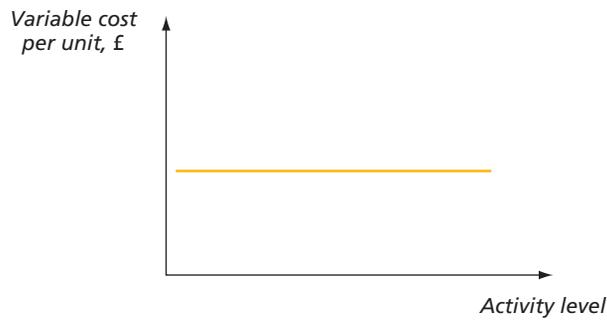


Figure 1.6 Variable cost per unit

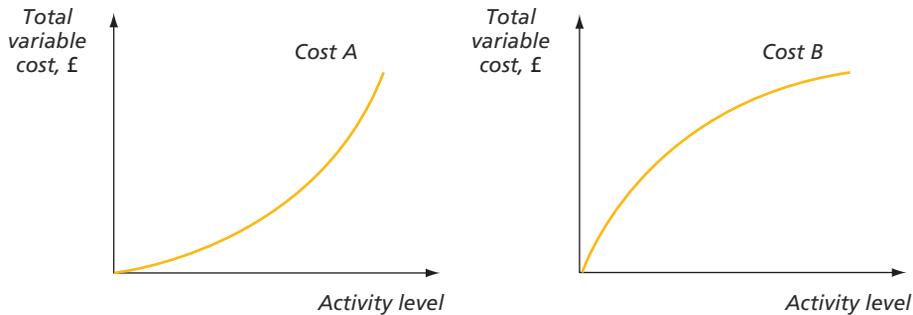


Figure 1.7 Non-linear variable costs

may not always be realistic. A variable cost may be non-linear as depicted in either of the diagrams in Figure 1.7.

These costs are sometimes called curvilinear variable costs.

The graph of cost A becomes steeper as the activity level increases. This indicates that each successive unit of activity is adding more to the total variable cost than the previous unit. An example of a variable cost which follows this pattern could be the cost of direct labour where employees are paid an accelerating bonus for achieving higher levels of output. The graph of cost B becomes less steep as the activity level increases. Each successive unit of activity adds less to total variable cost than the previous unit. An example of a variable cost which follows this pattern could be the cost of direct material where quantity discounts are available.



Exercise 1.8

Can you think of other variable costs which might follow the behaviour patterns depicted in Figure 1.7?

The important point is that managers should be aware of any assumptions that have been made in estimating cost behaviour patterns. They can then use the information which is based on these assumptions with a full awareness of its possible limitations.

1.9.3 Semi-variable cost



A semi-variable cost is also referred to as a semi-fixed or mixed cost. The CIMA *Terminology* defines it as a ‘cost containing both fixed and variable components and thus partly affected by a change in the level of activity’.

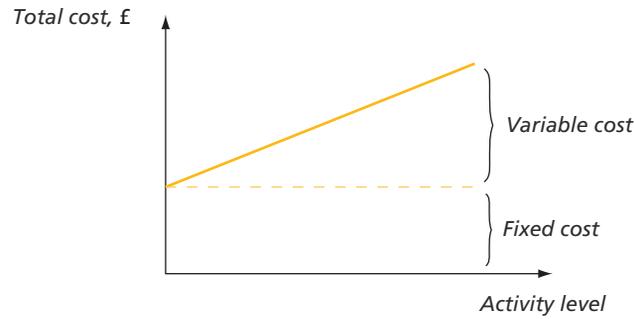


Figure 1.8 Semi-variable cost

A graph of a semi-variable cost might look like Figure 1.8.

Examples of semi-variable costs are gas and electricity. Both of these expenditures consist of a fixed amount payable for the period, with a further variable amount which is related to the consumption of gas or electricity.

Alternatively a semi-variable cost behaviour pattern might look like Figure 1.9.

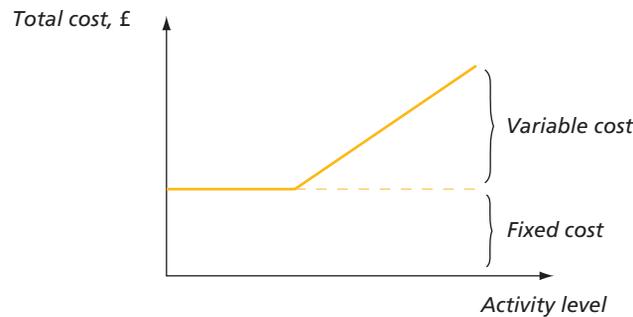


Figure 1.9 Semi-variable cost

This cost remains constant up to a certain level of activity and then increases as the variable cost element is incurred. An example of such a cost might be the rental cost of a photocopier where a fixed rental is paid and no extra charge is made for copies up to a certain number. Once this number of copies is exceeded, a constant charge is levied for each copy taken.



Exercise 1.9

Can you think of other examples of semi-variable costs with behaviour patterns like those indicated in Figures. 1.8 and 1.9?

1.9.4 Analysing semi-variable costs

The semi-variable cost behaviour pattern depicted in Figure 1.8 is most common in practice and in assessment situations.

When managers have identified a semi-variable cost they will need to know how much of it is fixed and how much is variable. Only when they have determined this will they be able to estimate the cost to be incurred at relevant activity levels. Past records of costs and their associated activity levels are usually used to carry out the analysis. Your *Fundamentals*

of *Management Accounting* syllabus requires you to know how to use two common methods of separating the fixed and variable elements:

- (1) The high–low method.
- (2) The ‘line of best fit’ method.

The high–low method

This method picks out the highest and lowest activity levels from the available data and investigates the change in cost which has occurred between them. The highest and lowest points are selected to try to use the greatest possible range of data. This improves the accuracy of the result.

Example: The high–low method

A company has recorded the following data for a semi-variable cost:

Month	Activity level (units)	Cost incurred (£)
January	1,800	36,600
February	2,450	41,150
March	2,100	38,700
April	2,000	38,000
May	1,750	36,250
June	1,950	37,650

The highest activity level occurred in February and the lowest in May. Since the amount of fixed cost incurred in each month is constant, the extra cost resulting from the activity increase must be the variable cost.

	Activity level (units)	£
February	2,450	41,150
May	<u>1,750</u>	<u>36,250</u>
Increase	<u>700</u>	<u>4,900</u>

The extra variable cost for 700 units is £4,900. We can now calculate the variable cost per unit:

$$\text{Variable cost} = \frac{\pounds 4,900}{700} = \pounds 7 \text{ per unit}$$

Substituting back in the data for February, we can determine the amount of fixed cost:

February	£
Total cost	41,150
Variable cost (2,450 units × £7)	<u>17,150</u>
Therefore, fixed cost per month	<u>24,000</u>

Now that the fixed and variable cost elements have been identified, it is possible to estimate the total cost for any activity level within the range 1,750 units to 2,450 units.

The scattergraph method

This method takes account of all available historical data and it is simple to use. However, it is very prone to inaccuracies that arise due to subjectivity and the likelihood of human error.

1. First a scattergraph is drawn which plots all available pairs of data on a graph.
2. Then a line of best fit is drawn by eye. This is the line which, in the judgement of the user, appears to be the best representation of the gradient of the sets of points on the graph. This is demonstrated in Figure 1.10.

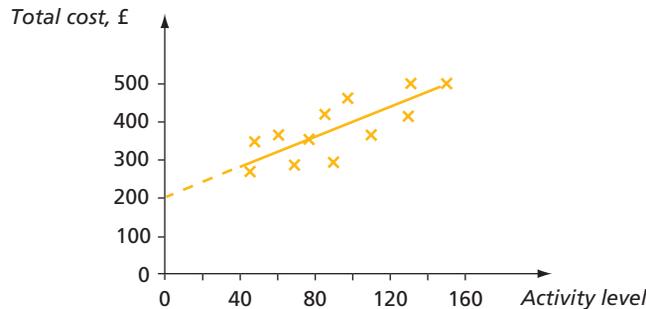


Figure 1.10 Scattergraph



The inaccuracies involved in drawing the line of best fit should be obvious to you. If you had been presented with this set of data, your own line of best fit might have been slightly different from ours.

3. The point where the extrapolation of this line cuts the vertical axis (the intercept) is then read off as the total fixed cost element. The variable cost per unit is given by the gradient of the line.

From Figure 1.10, the fixed cost contained within this set of data is adjudged to be £200. The variable cost is calculated as follows:

Cost for zero units = £200

Cost for 150 units = £500

$$\text{Gradient (i.e. variable cost)} = \frac{500 - 200}{150 - 0} = \text{£2 per unit}$$

1.9.5 Using historical data

The main problem which arises in the determination of cost behaviour is that the estimates are usually based on data collected in the past. Events in the past may not be representative of the future and managers should be aware of this if they are using the information for planning and decision-making purposes.

1.9.6 The importance of time scale in analysing cost behaviour

It is important to think about the time period under consideration when we are analysing cost behaviour patterns. For example, over a long period of time all costs might be considered to be variable.

Over a number of years, if activity reduces an organisation can move to smaller premises to reduce rent costs and they can reduce the number of supervisors to reduce supervisor salary cost. Thus costs which we might normally classify as fixed costs are, in the longer term, becoming more variable in relation to the level of activity.

However in the shorter term costs such as rent and supervisors' salaries are fixed. If demand for a product reduces, the expenditure on rent and on supervisors' salaries cannot be reduced immediately in response to the reduction in output. Such decisions require planning and consideration of factors such as whether the reduction in output is temporary or actions that might be taken to increase output again.

Similarly, over a number of years if activity increases then rent costs and supervisor salary costs will increase in response to the change in activity, again demonstrating more variable behaviour patterns in the longer term.

However the rent and salary cost is not likely to increase in the longer term in a linear fashion in the way that we have depicted linear variable costs earlier in this chapter. In fact the behaviour of such costs over a longer period of time is likely to follow the pattern of the stepped fixed cost depicted in Figure 1.3.

Think also about a cost that we would normally classify as variable, such as direct labour cost. In the very short term, for example one day, this cost could be regarded as a fixed cost. If for some reason, perhaps a machine breakdown, we do not produce any output on a particular day it is unlikely that at short notice we can send home all the work force and not pay them. Thus the direct labour cost is a fixed cost in the very short term.



In an assessment you should assume that the time period under consideration is neither very long nor very short, unless you are given clear instructions to the contrary.

1.10 Summary

Having read this chapter the main points that you should understand are as follows.

1. Organisations need costing systems that will provide the basic information that management requires for planning, control and decision-making.
2. A cost unit is the basic unit of measurement selected for cost control purposes.
3. A cost centre is used as a 'collecting place' for costs, which may then be further analysed and related to individual cost units.
4. A cost object is anything for which costs can be ascertained. Examples are a product, a service, a centre, an activity, a customer and a distribution channel.
5. Costs may be classified in a number of different ways depending on the reason for the classification exercise. The main classifications are according to their nature (material, labour, expenses), according to their purpose (direct or indirect) or according to responsibility.
6. The concept of cost needs to be qualified as direct, full, marginal, etc. in order to be meaningful.
7. Costs which are not affected by changes in the level of activity are fixed costs or period costs.

8. A stepped fixed cost is constant within the relevant range for each activity level.
9. A variable cost increases or decreases in line with changes in the level of activity.
10. A cost which is partly fixed and partly variable is a semi-variable, semi-fixed or mixed cost.
11. Observed cost behaviour patterns apply only over the relevant range of activity levels.
12. The fixed and variable elements of a semi-variable cost can be determined using the high–low method or a scattergraph.
13. It is important to consider the time scale when analysing cost behaviour. In the longer term, fixed costs tend to become step fixed costs and in the very short term all costs are fixed.

Revision Questions

1

? Question 1 Multiple choice

In the multiple choice questions in the actual assessment each option would usually have an empty box or circle beside it. You would be required to simply place the cursor on the relevant box and click the mouse to select the correct answer. In this Learning System we have labelled the four options as A, B, C and D. These letters are for reference purposes only and to assist us in our discussion of the solutions.

You are advised to try the online demo of cba questions on CIMA's website at www.cimaglobal.com/cba so that you will be aware of the way in which the questions will be presented.

1.1 Cost centres are:

- (A) units of output or service for which costs are ascertained.
- (B) functions or locations for which costs are ascertained.
- (C) a segment of the organisation for which budgets are prepared.
- (D) amounts of expenditure attributable to various activities.

1.2 Prime cost is:

- (A) all costs incurred in manufacturing a product.
- (B) the total of direct costs.
- (C) the material cost of a product.
- (D) the cost of operating a department.

1.3 Fixed costs are conventionally deemed to be:

- (A) constant per unit of output.
- (B) constant in total when production volume changes.
- (C) outside the control of management.
- (D) those unaffected by inflation.

1.4 The following data relate to two activity levels of an out-patient department in a hospital:

Number of consultations by patients	4,500	5,750
Overheads	£269,750	£289,125

Fixed overheads are not affected by the number of consultations per period. The variable cost per consultation:

- (A) is approximately £15.50
- (B) is approximately £44.44
- (C) is approximately £59.94
- (D) cannot be calculated without more information.

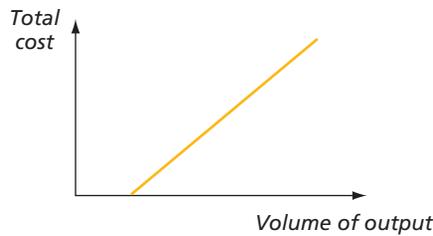
1.5 P Ltd is preparing the production budget for the next period. Based on previous experience, it has found that there is a linear relationship between production volume and production costs. The following cost information has been collected in connection with production:

Volume (units)	Cost (£)
1,600	23,200
2,500	25,000

What would be the production cost for a production volume of 2,700 units?

- (A) £5,400
- (B) £25,400
- (C) £27,000
- (D) £39,150

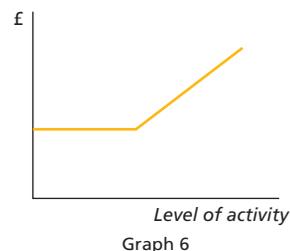
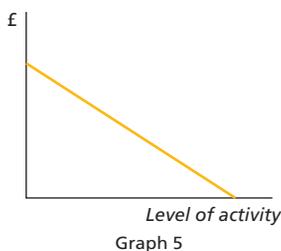
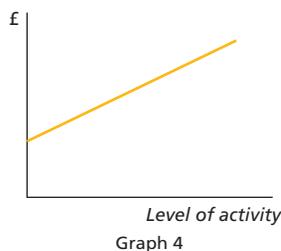
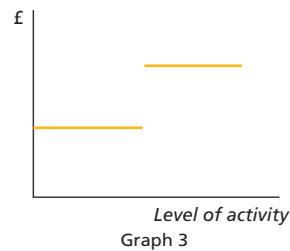
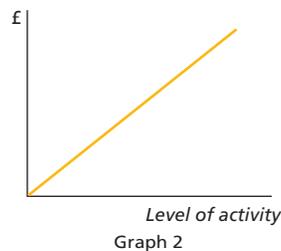
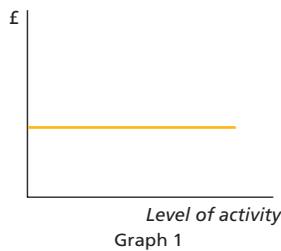
1.6 The following is a graph of cost against volume of output:



To which of the following costs does the graph correspond?

- (A) Electricity bills made up of a standing charge and a variable charge.
- (B) Bonus payments to employees when production reaches a certain level.
- (C) Sales commission payable per unit up to a maximum amount of commission.
- (D) Bulk discounts on purchases, the discount being given on all units purchased.

The following information relates to questions 1.7–1.11



Which one of the above graphs illustrates the costs described in questions 1.7–1.11?

- 1.7 A linear variable cost – when the vertical axis represents cost incurred.
- (A) Graph 1
 - (B) Graph 2
 - (C) Graph 4
 - (D) Graph 5
- 1.8 A fixed cost – when the vertical axis represents cost incurred.
- (A) Graph 1
 - (B) Graph 2
 - (C) Graph 3
 - (D) Graph 6
- 1.9 A linear variable cost – when the vertical axis represents cost per unit.
- (A) Graph 1
 - (B) Graph 2
 - (C) Graph 3
 - (D) Graph 6
- 1.10 A semi-variable cost – when the vertical axis represents cost incurred.
- (A) Graph 1
 - (B) Graph 2
 - (C) Graph 4
 - (D) Graph 5
- 1.11 A step fixed cost – when the vertical axis represents cost incurred.
- (A) Graph 3
 - (B) Graph 4
 - (C) Graph 5
 - (D) Graph 6
- 1.12 Over long-time periods of several years, factory rent costs will tend to behave as:
- (A) linear variable costs
 - (B) fixed costs
 - (C) step fixed costs
 - (D) curvilinear variable costs



Question 2 Short objective-test questions

2.1 Which of the following are stepped fixed costs?

- Machine rental costs
- Direct material costs
- Royalties payable on units produced
- Depreciation on delivery vehicles

2.2 A company increases its activity within the relevant range. Tick the correct boxes below to indicate the effect on costs.

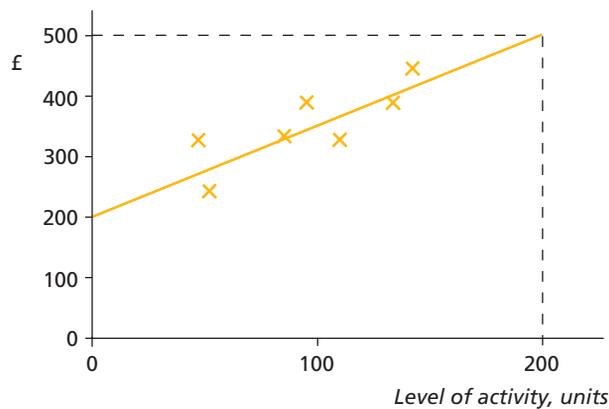
- | | | |
|----------------------------------|-----------------|--------------------------|
| Total variable costs will: | increase | <input type="checkbox"/> |
| | decrease | <input type="checkbox"/> |
| | remain the same | <input type="checkbox"/> |
| Total fixed cost will: | increase | <input type="checkbox"/> |
| | decrease | <input type="checkbox"/> |
| | remain the same | <input type="checkbox"/> |
| The variable cost per unit will: | increase | <input type="checkbox"/> |
| | decrease | <input type="checkbox"/> |
| | remain the same | <input type="checkbox"/> |
| The fixed cost per unit will: | increase | <input type="checkbox"/> |
| | decrease | <input type="checkbox"/> |
| | remain the same | <input type="checkbox"/> |

2.3 The variable production cost per unit of product B is £2 and the fixed production overhead for a period is £4,000. The total production cost of producing 3,000 units of B in a period is £ .

2.4 In a hotel, which of the following would be suitable cost units and cost centres?

	<i>Suitable as cost centre</i>	<i>Suitable as cost unit</i>
Restaurant	<input type="checkbox"/>	<input type="checkbox"/>
Guest night	<input type="checkbox"/>	<input type="checkbox"/>
Meal served	<input type="checkbox"/>	<input type="checkbox"/>
Fitness suite	<input type="checkbox"/>	<input type="checkbox"/>
Bar	<input type="checkbox"/>	<input type="checkbox"/>

2.5



Based on the above scattergraph:

- the period fixed cost is £ .
- the variable cost per unit is £ .

2.6 The following data relates to the overhead costs of a commercial laundry for the latest two periods.

<i>Overhead costs</i>	<i>Number of items laundered</i>
£	
5,140	2,950
5,034	2,420

A formula that could be used to estimate the overhead costs for a forthcoming period is:

$$\text{Overhead cost} = \text{£ } + (\text{£ } \times \text{number of items laundered})$$

2.7 Spotless Limited is an office cleaning business which employs a team of part-time cleaners who are paid an hourly wage. The business provides cleaning services for a number of clients, ranging from small offices attached to high-street shops to large open-plan offices in high-rise buildings.

In determining the cost of providing a cleaning service to a particular client, which of the following costs would be a direct cost of cleaning that client's office and which would be an indirect cost?

	<i>Direct cost</i>	<i>Indirect cost</i>
(a) The wages paid to the cleaner who is sent to the client's premises	<input type="checkbox"/>	<input type="checkbox"/>
(b) The cost of carpet shampoo used by the cleaner	<input type="checkbox"/>	<input type="checkbox"/>
(c) The salaries of Spotless Ltd's accounts clerks	<input type="checkbox"/>	<input type="checkbox"/>
(d) Rent of the premises where Spotless Ltd stores its cleaning materials and equipment	<input type="checkbox"/>	<input type="checkbox"/>
(e) Travelling expenses paid to the cleaner to reach the client's premises	<input type="checkbox"/>	<input type="checkbox"/>
(f) Advertising expenses incurred in attracting more clients to Spotless Ltd's business	<input type="checkbox"/>	<input type="checkbox"/>



Question 3 Cost classification

A company manufactures and retails clothing.

When determining the cost of units produced, *you are required* to write the correct classification for each of the costs below into the box provided, using the following classifications (each cost is intended to belong to only one classification):

- (i) direct materials
- (ii) direct labour
- (iii) direct expenses
- (iv) indirect production overhead
- (v) research and development costs
- (vi) selling and distribution costs
- (vii) administration costs
- (viii) finance costs

- | | |
|--|----------------------|
| 1. lubricant for sewing machines | <input type="text"/> |
| 2. floppy disks for general office computer | <input type="text"/> |
| 3. maintenance contract for general office photocopying machine | <input type="text"/> |
| 4. telephone rental plus metered calls | <input type="text"/> |
| 5. interest on bank overdraft | <input type="text"/> |
| 6. Performing Rights Society charge for music broadcast throughout the factory | <input type="text"/> |
| 7. market research undertaken prior to a new product launch | <input type="text"/> |
| 8. wages of security guards for factory | <input type="text"/> |
| 9. cost of denim fabric purchased | <input type="text"/> |
| 10. royalty payable on number of units of product XY produced | <input type="text"/> |
| 11. road fund licences for delivery vehicles | <input type="text"/> |
| 12. postage cost of parcels sent to customers | <input type="text"/> |
| 13. cost of advertising products on television | <input type="text"/> |
| 14. audit fees | <input type="text"/> |
| 15. chief accountant's salary | <input type="text"/> |
| 16. wages of operatives in the cutting department | <input type="text"/> |
| 17. cost of painting advertising slogans on delivery vans | <input type="text"/> |
| 18. wages of storekeepers in materials store | <input type="text"/> |
| 19. wages of fork lift truck drivers who handle raw materials | <input type="text"/> |
| 20. cost of developing a new product in the laboratory | <input type="text"/> |

Solutions to Revision Questions

1

✓ Solution 1

- The best way to approach multiple-choice questions is to work out your own answer first, before you look at the options. If your answer is not included in the options then you may be forced to guess. Improve your chances by eliminating the unlikely answers, or those that you know to be incorrect. Then take a guess from the remaining choices.
- Make sure that you answer every question. You will not be penalised for an incorrect answer – and you might guess correctly!

1.1 Answer: (B)

Cost centres act as 'collecting places' for costs before they are analysed further.

1.2 Answer: (B)

Answer (A) describes total production cost. Answer (C) is only a part of prime cost. Answer (D) is an overhead cost.

1.3 Answer: (B)

The total amount of fixed costs remains unchanged when production volume changes, therefore the unit rate fluctuates.

1.4 Answer: (A)

With the same amount of fixed overheads at both activity levels, the change in overheads must be due to extra variable cost.

	<i>Overheads</i>	<i>Consultations</i>
	£	
High	289,125	5,750
Low	<u>269,750</u>	<u>4,500</u>
Change	<u>19,375</u>	<u>1,250</u>

$$\text{Variable overhead cost per consultation} = \frac{\pounds 19,375}{1,250} = \pounds 15.50$$

1.5 Answer: (B)

<i>Units</i>	<i>£</i>
2,500	25,000
<u>1,600</u>	<u>23,200</u>
<u>900</u>	<u>1,800</u>

$$\text{Variable cost per unit} = \frac{\pounds 1,800}{900} = \pounds 2$$

Substitute in high activity:

	<i>£</i>
Total cost	25,000
Variable cost = 2,500 units \times $\pounds 2$	<u>5,000</u>
Therefore fixed cost	<u>20,000</u>

Forecast for 2,700 units:

	<i>£</i>
Fixed cost	20,000
Variable cost 2,700 \times $\pounds 2$	<u>5,400</u>
Total cost	<u>25,400</u>

1.6 Answer: (B)

The graph shows a variable cost which starts to be incurred only beyond a certain volume of output. Only B fits this description of cost behaviour.

1.7 Answer: (B)

Graph 2 depicts a cost which increases in total by equal amounts for each increment in the level of activity.

1.8 Answer: (A)

Graph 1 depicts a cost which remains the same regardless of the level of activity.

1.9 Answer: (A)

The variable cost per unit remains constant regardless of the level of activity.

1.10 Answer: (C)

Graph 4 depicts a cost which contains a fixed element which is incurred even at zero activity. Thereafter the cost increases in total by equal amounts for each increment in the level of activity: this is the extra variable cost incurred.

1.11 Answer: (A)

Graph 3 depicts a cost which remains constant up to a critical level of activity. At that point the total cost increases by a step to a new, higher level.

1.12 Answer: (C)

As activity increases or decreases over a period of several years the rent cost will remain constant for a range of activity but will then increase or decrease in steps as critical activity levels are reached when larger or smaller premises are needed.



Solution 2

- Always read the question carefully. For example, question 2.1 does *not* state ‘which *one* of the following are stepped fixed costs?’. In fact, there is more than one correct answer.

2.1 Machine rental cost is a stepped fixed cost. For one machine the total rental cost stays constant until the machine is working at full capacity. Then two machines will be needed and the rental cost goes up a step to a new, higher level. When the two machines are at full capacity there will be a need to rent three machines and so on.

Depreciation on delivery vehicles is a stepped fixed cost. Depreciation is calculated on an annual basis and is unlikely to be affected by the level of activity in the short term. For one vehicle the annual depreciation is a constant amount. If two vehicles are required the depreciation cost goes up a step and so on.

Royalty costs and direct material costs are variable costs.

2.2 As activity increases within the relevant range, the total variable costs will *increase* and the total fixed cost will *remain the same*. The variable cost per unit will *remain the same* and the fixed cost per unit will *decrease*.

2.3 Total production cost = $(3,000 \times £2) + £4,000 = £10,000$.

2.4		<i>Suitable as cost centre</i>	<i>Suitable as cost unit</i>
	Restaurant	✓	
	Guest night		✓
	Meal served		✓
	Fitness suite	✓	
	Bar	✓	

2.5 The period fixed cost is £200. The variable cost per unit is:

$$\frac{£500 - £200}{200 \text{ units}} = £1.50 \text{ per unit}$$

2.6	<i>Overhead costs</i>	<i>Number of items</i>
	£	<i>laundered</i>
	5,140	2,950
	<u>5,034</u>	<u>2,420</u>
	<u>106</u>	<u>530</u>

Variable cost per item laundered $£106/530 = £0.20$

Substitute in high activity:

	£
Total cost	5,140
Variable cost = 2,950 items × £0.20	<u>590</u>
Therefore fixed cost	<u>4,550</u>

A formula that could be used to estimate the overhead costs for a forthcoming period is:

$$\text{Overhead cost} = \text{£}4,550 + (\text{£}0.20 \times \text{number of items laundered})$$

2.7

	<i>Direct cost</i>	<i>Indirect cost</i>
(a) The wages paid to the cleaner who is sent to the client's premises	✓	
(b) The cost of carpet shampoo used by the cleaner	✓	
(c) The salaries of Spotless Ltd's accounts clerks		✓
(d) Rent of the premises where Spotless Ltd stores its cleaning materials and equipment		✓
(e) Travelling expenses paid to the cleaner to reach the client's premises	✓	
(f) Advertising expenses incurred in attracting more clients to Spotless Ltd's business		✓

The direct costs are (a), (b) and (e) because they can be directly identified with the cost object under consideration (this particular client). The other costs are indirect because they would have to be shared among all of the clients serviced by Spotless Limited.



Solution 3

- When you are trying to determine whether a cost is direct or indirect in relation to a cost object, think about whether the cost would need to be shared over several cost objects or whether it can be attributed directly to a particular cost object. A cost that needs to be shared must be an indirect cost.

<i>Item</i>	<i>Classification</i>	<i>Item</i>	<i>Classification</i>
1	(iv)	11	(vi)
2	(vii)	12	(vi)
3	(vii)	13	(vi)
4	(vii)	14	(vii)
5	(viii)	15	(vii)
6	(iv)	16	(ii)
7	(vi)	17	(vi)
8	(iv)	18	(iv)
9	(i)	19	(iv)
10	(iii)	20	(v)