

2

Materials costs

this chapter covers . . .

Businesses and other organisations hold stocks of materials in the form of raw materials and components, products bought for resale, and service items. Often the value of such materials is high, representing a considerable investment of money. In this chapter we look at:

- *the purchasing and control of stocks of materials*
- *re-ordering procedures*
- *the records that are kept for stocks of materials*
- *the purposes of stock taking and stock reconciliation*
- *the valuation of stock*
- *the use of stores ledger records*
- *the book-keeping entries for materials costs*

PERFORMANCE CRITERIA COVERED

unit 6: RECORDING AND ANALYSING COSTS AND REVENUES

element 6.1

record and analyse information relating to direct costs and revenues

- A identify direct costs in accordance with the organisation's costing procedures*
- B record and analyse information relating to direct costs*
- C calculate direct costs in accordance with the organisation's policies and procedures*
- D check cost information for stocks against usage and stock control practices*
- E resolve or refer queries to the appropriate person*

MATERIALS STOCKS

Materials is the cost of:

- raw materials and components bought for use by a manufacturing business
- products bought for resale by a shop or a wholesaler
- service items, such as stationery, bought for use within a business or organisation

In costing we need to distinguish between direct materials and indirect materials. Thus a manufacturer classifies the cost of materials from which the finished product is made as direct materials; other materials used – grease for machines, cleaning materials, etc – are classified as indirect materials, and form part of the overheads of the business.

The buying of materials is normally undertaken by a firm's Purchasing Department, although in smaller businesses the responsibility will be carried out by an individual or the owner. The job of the buyer(s) is to ensure that the purchases made by the business are bought at the lowest possible cost, consistent with quality and quantity.

At any time, most businesses will hold materials in stock ready for use or resale. The diagram shown on the next page examines the holding of stocks by three types of business: a manufacturing business which makes stock, a trading business such as a shop, which buys and sells stock, and a service business or organisation.

PLANNING OF PURCHASES AND CONTROL OF STOCKS

Planning for the purchase of materials and the control of stocks of materials is critical to the efficiency of a business. However, holding stocks is expensive:

- they have to be financed, possibly by using borrowed money (on which interest is payable)
- there are storage costs, including rent and rates, security, insurance

Within an organisation there are conflicting demands on its policy for stocks of materials. On the one hand, the finance department will want to minimise stock levels to keep costs as low as possible; on the other hand, production and marketing departments will be anxious to keep stocks high so that output can be maintained and new orders satisfied speedily before customers decide to buy elsewhere.

STOCKS HELD BY BUSINESSES		
Manufacturing Business	Trading Business	Service Business
<p>raw materials and components</p> <p>These stocks are held by a manufacturer to reduce the risk of production delays if a supplier fails to deliver on time. A vehicle manufacturer may hold a stock of plastic bumpers, for example.</p>	<p>goods for sale</p> <p>These are items the retailer or wholesaler has bought in (eg from the manufacturer) and has available for sale to the customer.</p> <p>For example:</p> <ul style="list-style-type: none"> ■ <i>retailers</i> a supermarket will have a stock of cans of orange drink for sale ■ <i>wholesalers</i> a timber merchant will have quantities of wood for sale to customers 	<p>consumable materials</p> <p>These are materials that are either for use in the organisation or for sale to the customer as part of the service provided.</p> <p>For example:</p> <ul style="list-style-type: none"> ■ <i>for use in the organisation</i> in a college there will be a stock of paper for the photocopiers ■ <i>items for sale</i> an optician will sell reading glasses as part of the service provided
<p>work-in-progress</p> <p>These are stocks of part-finished goods on the production line. In a car factory these would be cars partly assembled, for example.</p>		
<p>finished goods</p> <p>These are goods that have been completed and are ready for sale to customers. A vehicle manufacturer would have completed cars ready for sale, for example.</p>		

There are a number of methods of planning purchases and of stock control. Which is adopted will depend on the size and sophistication of the organisation. It is important that an organisation knows how much stock it has at any time – either by making a physical stock count, or by keeping computer records (which need physical verification at regular intervals) – and it must know when it will have to re-order more stocks. The organisation then needs to know the quantity that needs to be re-ordered. The methods used include:

estimation

Some small businesses do not keep much stock, and the owner may estimate the quantity and timing of materials purchases. This is not a recommended method for a well-managed business or organisation.

'two bin' system	The principle here is to keep two 'bins' of a stock unit. When the first bin has run out, new stocks of materials are ordered and will be supplied before the second 'bin' runs out. The term 'bin' is used loosely, and can apply to any measure of stock. This is a very basic principle, but it works well in many situations.
perpetual inventory	'Inventory' is another word for stock. This system records receipt and issue of stock as the items pass in and out of the organisation, and re-orders are made accordingly. Records of stock are kept manually, or more commonly now on computer file activated by reading of bar codes. Many supermarkets and manufacturing businesses work on this basis, and order stock on a 'Just-In-Time' basis (see page 43).
formulas	Organisations need to calculate when to order materials, and how much to order; formulas can be used to help with this. These are explained in the sections which follow.

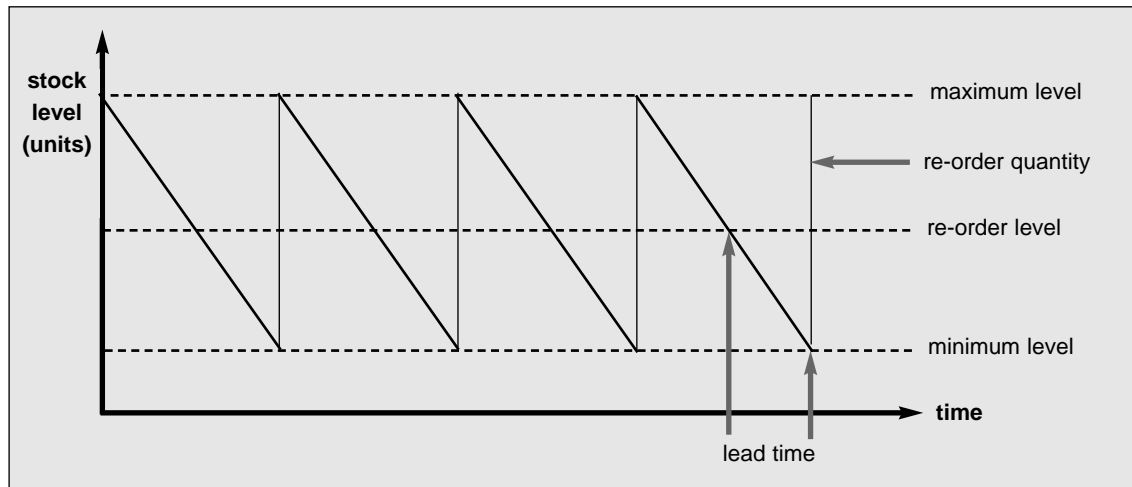
MATERIALS PURCHASES: LEVEL METHOD OF RE-ORDERING

This method orders materials in fixed quantities, eg 750 reams of photocopying paper (a ream is 500 sheets). For such a system to operate, the organisation should know:

- the *lead time*, ie how long it takes for new stock to be delivered after being ordered
- the appropriate *re-order quantity*
- the *minimum stock level*, ie the lowest level that stock should fall to before the new order from the supplier is delivered (the minimum stock level is also known as a *buffer stock* to meet unexpected emergencies)
- the *maximum stock level* that can be held – this can be calculated (see below) but may well be determined by the amount of storage space available in the warehouse, shop or office stationery 'cupboard'
- the *re-order level*, ie the point at which a new order is to be placed – this is often the most critical factor to determine

Many organisations use manual or computer stock control systems to keep a running record of the amount of each material held in stock, the lead time for

re-ordering, and the minimum stock level. The level method of re-ordering is illustrated as follows:



re-order level

The re-order level is calculated so that replacement materials will be delivered just as the stock level reaches the minimum level. The calculation of re-order level is:

$$(maximum\ usage \times maximum\ lead\ time) + minimum\ stock\ level$$

re-order quantity

At the re-order level, a purchase order for new stock is forwarded to the supplier. The quantity to be purchased is the re-order quantity; which is calculated as:

$$maximum\ stock\ level - minimum\ stock\ level$$

maximum and minimum stock levels

By the time new stock is delivered, the remaining stock should have fallen to the minimum level, so that the new stock restores the level to the maximum.

The maximum and minimum stock levels can be set as follows:

- $maximum\ stock\ level = minimum\ stock\ level + re-order\ quantity$
- $minimum\ stock\ level = re-order\ level - (average\ usage \times average\ lead\ time)$

However, maximum stock may be determined by other factors, eg the amount of storage space available, a policy decision not to hold more than a certain number of days' (or weeks' or months') usage.

example

A4, white photocopying paper

daily usage	30 reams (a ream is 500 sheets)
lead time	5 days
re-order quantity	750 reams*
minimum stock level	150 reams**
maximum stock level	900 reams***

*Re-order level = (30 daily usage x 5 days' lead time)
+ 150 minimum stock*

$$= (30 \times 5) + 150$$

$$= 150 + 150$$

$$= 300 \text{ reams (re-order level)}$$

When the balance of stock falls to 300 reams, a purchase order for 750 reams is forwarded to the supplier of the paper.

$$\begin{aligned} * \text{ re-order quantity} &= \text{maximum stock level} - \text{minimum stock level} \\ &= 900 - 150 \\ &= 750 \text{ reams} \end{aligned}$$

$$\begin{aligned} ** \text{ minimum stock level} &= \text{re-order level} - (\text{average usage} \times \\ &\quad \text{average lead time}) \\ &= 300 - (30 \times 5 \text{ days}) \\ &= 150 \text{ reams} \end{aligned}$$

$$\begin{aligned} *** \text{ maximum stock level} &= \text{minimum stock level} + \text{re-order quantity} \\ &= 150 + 750 = 900 \text{ reams} \end{aligned}$$

It is important not to treat stock calculations in isolation – there does need to be consideration of wider issues which may affect the business or organisation. Such issues include:

- needs of the business – for example, if a stock item is being used less frequently than before, the stock calculations will need to be revised to suit current and future needs
- obsolescence of stock – for example, if spare parts are kept for a particular make and model of vehicle, stock levels will need to be run down if the vehicles are being replaced by those of a different make and model
- seasonal variations affecting usage and stock levels – for example, a business using oil for heating may be offered a cheaper price when usage

is low in the summer which may make it worthwhile to stock up; by contrast, when usage is high in the winter, the supplier's price and lead times may increase

MATERIALS PURCHASES: ECONOMIC ORDER QUANTITY (EOQ)

It is clear that the re-order quantity is critical to the efficiency of stock-holding:

- if re-order amounts are *too large*, too much stock will be held, which will be an expense to the business
- if re-order amounts are *too small*, the expense of constantly re-ordering will outweigh any cost savings of lower stock levels, and there will be the danger that the item might 'run out'

The most economic re-order quantity – *the economic order quantity (EOQ)* – can be calculated by a mathematical formula which involves a number of different costs and other figures:

- *ordering cost* – the administration cost of placing each order, eg stationery, postage, wages, telephone
- *stock holding cost* – the cost of keeping the stock on the shelves expressed as the cost of holding one item of stock per year; examples of stock holding costs include rent and rates, insurance, wages, deterioration, obsolescence, security
- *annual usage* – the number of stock units used per year

The formula is:

$$\text{Economic Order Quantity (EOQ)} = \sqrt{\frac{2 \times \text{annual usage} \times \text{ordering cost}}{\text{stock holding cost}}}$$

On a calculator with a square root function, this formula can be worked out easily. Calculate the figures in the formula first, and then press the square root button ($\sqrt{\quad}$).

For example, for a particular stock item, the ordering cost of each order is £30, the stock holding cost is £2 per stock item per year, and annual usage is 2,000 units. The EOQ formula is applied as follows:

$$\begin{aligned} \text{Economic Order Quantity (EOQ)} &= \sqrt{\frac{2 \times 2,000 \times \text{£}30}{\text{£}2}} \\ &= \sqrt{\frac{120,000}{2}} \end{aligned}$$

continued on next page

$$= \sqrt{60,000}$$
$$= 245 \text{ units}$$

As a result of using EOQ, a balance is struck between the cost of placing an order and the cost of holding stock; EOQ represents the most efficient level of order to place – in the example here it is 245 units.

As well as the formula method, EOQ can be found using other methods – by tabulation and by graph.

MATERIALS PURCHASES: JUST-IN-TIME (JIT)

Just-In-Time is a system of materials purchasing favoured by manufacturing businesses and large supermarket chains. Using JIT, materials needed by a manufacturer are delivered to the production line, or – for retailers – delivered to the store, just as they are needed. The essentials of the successful operation of JIT are:

- the right quantities
- in the right place
- just-in-time

For JIT to operate effectively, the manufacturer or supermarket needs quality suppliers who can be contracted to deliver materials in accordance with demand schedules. In this way stock levels are kept to a minimum, with consequent savings in stock holding costs. The disadvantage is that the JIT system is susceptible to supply chain problems – eg bad weather or a labour dispute – there are no buffer stocks to absorb such difficulties.

Manufacturers who use JIT often try to attract component suppliers to the same area. The car manufacturer Fiat has gone a step further than this by building a car factory in southern Italy with the component firms on the same site.

Retailers who use JIT – such as major supermarket chains – have arrangements with their suppliers to supply goods more or less on demand. Information technology systems used by these businesses help them to anticipate the quantities they have to order: electronic tills provide up-to-the-minute stock usage for each product 'line' and so stock levels are constantly monitored. Orders are sent to suppliers, often through EDI (Electronic Data Interchange) systems, and delivered within a short space of time. If there is a run on a particular item – eg soft drinks in a heat wave – the system will ensure that new stock is delivered very rapidly.

Factors to consider in relation to JIT include:

- reliability of the supplier
- quality of goods supplied
- effect on the business of disruption of supplies caused by factors such as bad weather or strikes
- flexibility of suppliers to react positively to changes in orders caused by increases or decreases in demand
- minimal stock taking requirements
- alternative uses for resources released, eg storage areas no longer needed
- overall efficiency of the JIT system in the context of maintaining the firm's output

STOCK RECORDS

Most organisations will have records of their stocks of materials. Such records may be kept either by using a computer stock control system, or manually on individual stock records. Under both methods – computer and manual – a separate record is maintained for each of the different materials kept in stock. The system is used whether the materials are held for resale by a retailer, or for use in production by a manufacturer. When supplies of the material are received they are entered in the stock record, and when items are sold (or issued to production) they are deducted from the stock record.

A typical stock record is shown on the next page. The stock item is A4 white photocopying paper which is used within the organisation.

Note the following on the stock record:

stock description	refers to the description of the stock, for example photocopying paper
stock units	refers to how the stock is stored or packed, eg photocopying paper is packed in reams (packets of 500 sheets)
stock reference no	refers to the identification number allocated to the stock by the business – often marked on the stock, and sometimes by means of a barcode
location	refers to where the stock can be found in the stores, eg row A, bin 6 refers to the location in the storeroom or warehouse

STOCK RECORD					
Stock description ..A4 white photocopying paper.....					
Stock units reams.....		Minimum 150 reams.....			
Stock ref. No. P1026.....		Maximum 900 reams.....			
Location row A, bin 6.....		Re-order level 300 reams.....			
		Re-order quantity 750 reams.....			
DATE	GOODS RECEIVED		GOODS ISSUED		BALANCE
	Reference	Quantity	Reference	Quantity	
2007					
1 Apr					300
2 Apr			MR 101	40	260
5 Apr			MR 104	30	230
6 Apr			MR 116	50	180
7 Apr			MR 121	40	140
8 Apr	GRN 17901	750			890
9 Apr	MRN 58	5			895

goods received

the two columns record the Goods Received Note (GRN) reference and the quantity of items received – or where goods are returned into stock, the reference of the Materials Returns Note (MRN)

goods issued

the two columns record the Materials Requisition (MR) reference and the number of items issued; an example of a Materials Requisition is shown below

balance

is the number of items which remain in stock

MATERIALS REQUISITION			
Department: Printing		Document no: MR 101	
Date: 2 April 2007			
Code no	Description	Quantity	For cost office use only Value of issue (£)
P 1026	A4 white photocopying paper	40 reams	
Authorised by: <i>R Omar</i>		Received by: <i>Pete Bashir</i>	

STOCK TAKING AND STOCK RECONCILIATION

stock taking

A business or organisation will check regularly that the quantity of stock held is the same as the number recorded on the stock records. This is done by means of a stock take – counting the physical stock on hand to check against the balance shown by the records, and to identify any theft or deterioration.

Stock taking is carried out on either a periodic basis or continuously.

A *periodic basis* involves carrying out a stock take of all items held at regular intervals (often twice a year).

Continuous stock taking is a constant process where selected items are counted on a rotating basis, with all items being checked at least once a year (expensive, desirable or high-turnover items will need to be checked more frequently).

The number of items actually held is recorded on a stock list by the person doing the stock take. An extract from a stock list is shown on the next page; it shows the A4 paper seen in the stock record. The stock list will, of course, contain many items when the stock take has been completed.

stock list as at 9 April 2007					checker <i>H Ramsay</i>		
product code	item description	location	unit size	units counted	stock record balance	discrepancy	checker's initials
<i>P1026</i>	<i>A4 white photocopying paper</i>	<i>row A, bin 6</i>	<i>ream</i>	<i>895</i>	<i>895</i>	<i>nil</i>	<i>HR</i>
checker's signature <i>H Ramsay</i>				Authorised for write-off			

stock reconciliation

The object of the stock take is to see if the stock records represent accurately the level of stock held. The two columns on the stock list – 'units counted' and 'stock record balance' enable this comparison to be carried out; the process is known as a *stock reconciliation*. It is an important process because

- an accurate stock figure can then be used to value the stock
- it will highlight any discrepancies which can then be investigated

Discrepancies and queries should be noted on the stock list and referred to the supervisor and any other people who may need to know, eg the storekeeper, or the firm's auditors who are organising the stock take. If the discrepancy is small it will be authorised for write-off. Larger discrepancies will need to be investigated, as they could have been caused by:

- an error on the stock record, such as a failure to record a stock movement or an error in calculating the balance of stock
- theft of stock
- damaged stock being disposed of without any record having been made

stock holding queries

Inevitably, even in the best-run system, queries will arise about stock. These queries may come from within the organisation, eg the production department, or externally, eg suppliers.

It is important that such queries are resolved swiftly and efficiently by referring directly to the correct department, as indicated in the following diagram:

QUERY	DEPARTMENT/SECTION
stock levels	stores
materials usage	production, purchase ordering, goods inwards, auditors
materials prices	purchasing, accounts
quality and rejects	goods returns, stores (scrap)
stock returns	returns outwards, accounts

VALUATION OF STOCK

The stock of materials held by a business or organisation invariably has considerable value and ties up a lot of money. At the end of the financial year, it is essential to value the stock for use in the calculation of profit in the final accounts. As we have just seen, a process of stock taking is used to make a physical check of the stock held, which is then compared with the stock records. The stock held is then valued as follows:

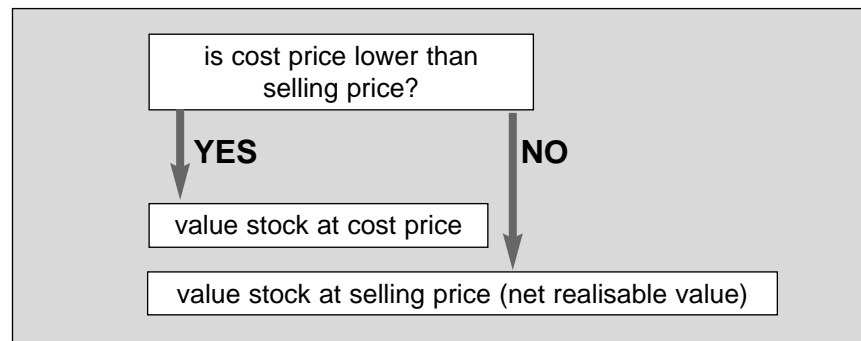
$$\text{number of items held} \times \text{cost per item} = \text{stock value at cost}$$

The auditors may make random checks to ensure that the stock value is correct.

The general rule is that stock can be valued at *either*:

- what it cost the business to buy the stock (including additional costs to bring the product or service to its present location or condition, such as delivery charges), *or*
- the net realisable value – which is the actual or estimated selling price (less any extra costs, such as selling and distribution) – ie what you would get for it

Stock valuation is normally made at the *lower of cost and net realisable value*. This valuation is taken from Statement of Standard Accounting Practice (SSAP) No 9, entitled 'Stocks and long-term contracts'. This method of valuation applies the 'prudence' concept of accounting. It is illustrated as follows:



The difficulty in stock valuation is in finding out the cost price of stock – this is not easy when quantities of a particular stock item are continually being bought in – often at different prices – and then sold. Some organisations have stock in a number of different forms, eg manufacturing businesses have stocks of raw materials, work-in-progress and finished goods.

METHODS OF STOCK VALUATION

issuing of materials and goods

The costing process requires that a value is given to raw materials (for a manufacturer) and goods (for a shop) when they are 'issued'. This means the point at which they are handed over to the production line or placed on the shop shelves. Traditionally the materials and goods were issued from 'stores' – a storage area or stockroom – where they had been kept by the business since delivery from the supplier. The phrase 'issued from stores' is still used, although nowadays materials and stocks are often delivered at the very last minute (Just-In-Time) to save storage and finance costs.

The cost of the materials or goods at the time of issue is normally the purchase cost – ie the price the business paid the supplier. But costs do vary – so which cost do you take and what valuation do you give the materials or goods?

The three most commonly used methods for deciding which 'cost' to use for raw materials used in the production process or sold from shop shelves are:

FIFO (First In, First Out)

In this method, the first (oldest) cost prices are used first when goods are issued from stores. This means that the remaining stock is valued at the most recent cost prices.

LIFO (Last In, First Out)

In this method, the most recent (last) cost prices are used first when goods are issued from stores. This means that the remaining stock is valued at older cost prices.

AVCO (Weighted Average Cost)

In this method, a weighted average cost is calculated for the goods in stock at a given time, using the formula:

$$\text{weighted average cost} = \frac{\text{total cost of goods in stock}}{\text{number of items in stock}}$$

The weighted average cost is then used to attach a value to issues from stores. A new weighted average must be calculated each time that further purchases are made.

The use of a particular method of stock valuation does not necessarily correspond with the method of physical distribution adopted in a firm's stores. For example, in a car factory one car battery of type X is the same as another, and no-one will be concerned if the storekeeper issues one from the last batch received, even if the FIFO system has been adopted. However, perishable goods are always physically handled on the basis of first in, first out, even if the accounting stock records use another method.

Having chosen a suitable stock valuation method, a business will continue to use that method unless there are good reasons for making the change. This is in line with the 'consistency' concept of accounting.

recording stock values – stores ledger record

In order to be able to calculate accurately the price at which stocks of materials are issued and to ascertain a valuation of stock, a stores ledger record – or stock card – is used, as shown below. This method of recording stock data is also used in the Case Study which follows.

STORES LEDGER RECORD									
Date	Receipts			Issues			Balance		
	Quantity	Cost*	Total Cost	Quantity	Cost*	Total Cost	Quantity	Cost*	Total Cost
		£	£		£	£		£	£

*cost = cost price

Note that the layout of the stores ledger record – or stock card – may vary slightly from one business to another. Also, many businesses use a computer system for their stock records.

Case Study



H RASHID COMPUTER SUPPLIES: STORES LEDGER RECORDS

situation

H Rashid runs a computer supplies company. One of the items he sells is the 'Zap' data disk.

To show how the stores ledger records would appear under FIFO, LIFO and AVCO, and the closing stock valuation at 31 May 2007, the following data is used for each method:

January	Opening stock of 40 units at a cost of £3.00 each
February	Bought 20 units at a cost of £3.60 each
March	Sold 36 units for £6 each
April	Bought 20 units at a cost of £3.75 each
May	Sold 25 units for £6 each

What will be the profit for the period using each stock valuation method?

solution

Note: In the first two methods – FIFO and LIFO – units issued at the same time may be valued at different costs. This is because the quantities received, with their costs, are listed separately and used in a specific order. There may be insufficient units at one cost, eg see the May issue using both FIFO and LIFO methods.

FIFO

STORES LEDGER RECORD

Date	Receipts			Issues			Balance		
	Quantity	Cost	Total Cost	Quantity	Cost	Total Cost	Quantity	Cost	Total Cost
2007									
Jan	Balance	£	£		£	£	40	3.00	<u>120.00</u>
Feb	20	3.60	72.00				40	3.00	120.00
							20	3.60	<u>72.00</u>
							<u>60</u>		<u>192.00</u>
March				36	3.00	108.00	4	3.00	12.00
							20	3.60	<u>72.00</u>
							<u>24</u>		<u>84.00</u>
April	20	3.75	75.00				4	3.00	12.00
							20	3.60	72.00
							20	3.75	75.00
							<u>44</u>		<u>159.00</u>
May				4	3.00	12.00			
				20	3.60	72.00			
				1	3.75	3.75	19	3.75	<u>71.25</u>

Note: In the 'Balance' columns, a new list of stock quantities and costs is started after each receipt or issue. When stock is issued, costs are used from the **top** of the list downwards.

LIFO**STORES LEDGER RECORD**

Date	Receipts			Issues			Balance		
	Quantity	Cost	Total Cost	Quantity	Cost	Total Cost	Quantity	Cost	Total Cost
2007									
Jan	Balance	£	£		£	£	40	3.00	<u>120.00</u>
Feb	20	3.60	72.00				40	3.00	120.00
							20	3.60	72.00
							<u>60</u>		<u>192.00</u>
March				20	3.60	72.00			
				16	3.00	48.00	24	3.00	<u>72.00</u>
April	20	3.75	75.00				24	3.00	72.00
							20	3.75	75.00
							<u>44</u>		<u>147.00</u>
May				20	3.75	75.00			
				5	3.00	15.00	19	3.00	<u>57.00</u>

Note: In the 'Balance' columns, a new list of stock quantities and costs is started after each receipt or issue. When stock is issued, costs are used from the **bottom** of the list upwards. However, the new balance list each time must be kept in date order.

AVCO

In this method, each quantity issued is valued at the weighted average cost per unit, and so is the balance in stock. The complete list of different costs does not have to be re-written each time.

STORES LEDGER RECORD

Date	Receipts			Issues			Balance		
	Quantity	Cost	Total Cost	Quantity	Cost	Total Cost	Quantity	Cost	Total Cost
2007									
Jan	Balance	£	£		£	£	40	3.00	<u>120.00</u>
Feb	20	3.60	72.00				40	3.00	120.00
							20	3.60	72.00
							<u>60</u>	3.20	<u>192.00</u>
March				36	3.20	115.20	24	3.20	<u>76.80</u>
April	20	3.75	75.00				24	3.20	76.80
							20	3.75	75.00
							<u>44</u>	3.45	<u>151.80</u>
May				25	3.45	86.25	19	3.45	<u>65.55</u>

Note: Weighted average cost is calculated by dividing the quantity held in stock into the value of the stock. For example, at the end of February, the weighted average cost is $\text{£}192 \div 60 \text{ units} = \text{£}3.20$, and at the end of April it is $\text{£}151.80 \div 44 = \text{£}3.45$.

The closing stock valuations at the end of May 2007 under each method show total cost prices of:

FIFO	£71.25
LIFO	£57.00
AVCO	£65.55

There is quite a difference, and this has come about because different stock methods have been used.

effect on profit

In the example above, the selling price was £6 per unit. The effect on gross profit of using different stock valuations is shown below.

	<i>FIFO</i>	<i>LIFO</i>	<i>AVCO</i>
	£	£	£
Sales: 61 units at £6	<u>366.00</u>	<u>366.00</u>	<u>366.00</u>
Opening stock: 40 units at £3	120.00	120.00	120.00
Purchases: 20 units at £3.60 and 20 units at £3.75	<u>147.00</u>	<u>147.00</u>	<u>147.00</u>
	267.00	267.00	267.00
Less Closing stock: 19 units	<u>71.25</u>	<u>57.00</u>	<u>65.55</u>
Cost of sales	<u>195.75</u>	<u>210.00</u>	<u>201.45</u>
Gross profit = Sales – Cost of sales	<u>170.25</u>	<u>156.00</u>	<u>164.55</u>

Notice that the cost of sales figure in each case is also obtainable by adding up the values in the 'Issues' column. You can also check in each case that, both in Units and in Values:

opening stock + receipts – issues = closing stock

The Case Study shows that in times of rising prices, FIFO produces the highest reported profit, LIFO the lowest, and AVCO between the other two. However, over the life of a business, total profit is the same in total, whichever method is chosen: the profit is allocated to different years depending on which method is used.

The choice of method depends on which method is considered to give the most useful information for management purposes.

ADVANTAGES AND DISADVANTAGES OF FIFO, LIFO AND AVCO

FIFO (first in, first out)

advantages

- it is realistic, ie it assumes that goods are issued in order of receipt
- it is easy to calculate
- stock valuation comprises actual costs at which items have been bought
- the closing stock valuation is close to the most recent costs

disadvantages

- costs at which goods are issued are not necessarily the latest prices
- in times of rising prices, profits will be higher than with other methods (resulting in more tax to pay)
- the method is cumbersome as the list of different costs must be maintained

LIFO (last in, first out)

advantages

- goods are issued at the latest costs
- it is easy to calculate
- in manufacturing, materials are issued at more up-to-date costs, giving a more realistic production cost

disadvantages

- illogical, ie it assumes goods are issued in reverse order from that in which they are received
- the closing stock valuation is not usually at most recent costs
- when stocks are being run down, issues will 'dip into' old stock at out-of-date costs
- may not be acceptable to HM Revenue & Customs for taxation purposes as the method overstates cost of sales and understates profit
- the method is cumbersome as the list of different costs must be maintained

AVCO (weighted average cost)

advantages

- over a number of accounting periods reported profits are smoothed, ie both high and low profits are avoided
- fluctuations in purchase costs are evened out so that issues do not vary greatly
- logical, ie it assumes that identical units, even when purchased at different times, have the same value
- closing stock valuation is close to current market values (in times of rising prices, it will be below current market values)
- the calculations can be computerised more easily than the other methods

disadvantages

- a new weighted average has to be calculated after each receipt, and calculations may be to several decimal places
- issues and stock valuation are usually at costs which never existed
- issues may not be at current costs and, in times of rising prices, will be below current costs

The important point to remember is that a business must adopt a consistent stock valuation policy, ie it should choose one method of finding the cost price, and not change it without good reason. FIFO and AVCO are more commonly used than LIFO; in particular, LIFO usually results in a stock valuation for the final accounts which bears little relationship to recent costs – for this reason it is not favoured by SSAP 9. However, LIFO has the advantage that it gives a more realistic production cost – this is because materials are issued at more up-to-date prices. It is also appropriate to apply LIFO principles when costing materials in a quotation to be given to a potential customer: in times of rising prices you wouldn't want to quote old prices – for example, under FIFO – and then, when the quotation is accepted, find that there is no more of the older-priced materials left.

Now study the table on the next page to consolidate what you have learnt so far.

a comparison of the methods of stock valuation

	FIFO	LIFO	AVCO
method	The costs used for goods sold or issued follow the order in which the goods were received.	The costs used for goods sold or issued are opposite to the order in which the goods were received.	Does not relate issues to any particular batch of goods received, but uses a weighted average cost.
calculation	It is easy to calculate costs because they relate to specific receipts of materials or goods.	It is easy to calculate costs because they relate to specific receipts of materials or goods.	More complex because of the need to calculate weighted average costs.
stock valuation	Stock valuations are based on the most recent costs of materials or goods received.	Stock valuations are based on older costs of materials or goods received.	Weighted average costs are used to value closing stock.
profits and taxation	In times of rising prices this method will result in higher reported profits than the other methods, resulting in more tax being payable. This method is acceptable for tax purposes.	In times of rising prices this method will result in lower reported profits than the other methods. This may not be acceptable for tax purposes.	The weighted average method will smooth out some of the peaks and troughs of profit and loss. This method is acceptable for tax purposes.
administration	Use of this method will mean keeping track of each receipt until the goods are issued or sold.	Use of this method will mean keeping track of each receipt until the goods are issued or sold.	There is no need to track each receipt as a weighted average cost is used. This also means it is easier to computerise the stock records.
cost of sales	In a time of rising prices this method will use older, out of date prices for cost of sales or goods issued.	In a time of rising prices this method will use more up-to-date prices for cost of sales or goods issued.	This method will give an average price for the cost of sales.

CATEGORIES OF STOCK

Statement of Standard Accounting Practice No 9 requires that, in calculating the lower of cost and net realisable value, note should be taken of:

- separate items of stock, or
- groups of similar items

This means that the stock valuation 'rule' must be applied to each separate item of stock, or each group or category of similar stocks. The total cost cannot be compared with the total net realisable value, as is shown by the Case Study which follows.

Case Study

PAINT AND WALLPAPER SUPPLIES: VALUING YEAR-END STOCKS

situation

The year-end stocks for the two main groups of stock held by the business Paint and Wallpaper Supplies are found to be:

	Cost £	Net realisable value £
Paints	2,500	2,300
Wallpapers	5,000	7,500
	7,500	9,800

How will the stock be valued for the year-end accounts?

solution

The correct stock valuation is £7,300, which takes the 'lower of cost and net realisable value' for each group of stock, ie

	£
Paints (at net realisable value)	2,300
Wallpapers (at cost)	5,000
	7,300

You will also note that this valuation is the lowest possible choice, indicating that stock valuation follows the *prudence concept* of accounting.

STOCK VALUATION FOR MANUFACTURING BUSINESSES

We saw earlier that, under SSAP 9, stock is normally valued at the lower of cost and net realisable value. This principle applies to a manufacturer for the three types of stock that may be held at the year-end:

- raw materials
- part-finished goods or work-in-progress
- finished goods

For raw materials, the comparison is made between cost (which can be found using techniques such as FIFO, LIFO, or AVCO) and net realisable value.

For stocks of both part-finished and finished goods, SSAP 9 requires that the cost valuation includes expenditure not only on direct materials but also on direct labour, direct expenses and production overheads. Thus for part-finished and finished goods, 'cost' means 'production cost', ie the total of:

- direct materials
- direct labour
- direct expenses
- production overheads (to bring the product to its present location or condition)

Such 'cost' is then compared with net realisable value – less any further costs necessary to complete the item or get it in a condition to be sold – and the lower figure is taken as the stock valuation. (Remember that different items or groups of stock are compared separately).



Case Study

ABC MANUFACTURING: STOCK VALUATION FOR A MANUFACTURER

situation

ABC Manufacturing started in business on 1 July 2006 producing security devices for doors and windows. During the first year 2,000 units were sold and, at the end of the year, on 30 June 2007, there were 200 units in stock which were finished and 20 units which were exactly half-finished as regards direct materials, direct labour and production overheads.

Costs for the first year were:

	£
Direct materials used	18,785
Direct labour	13,260
Production overheads	8,840
Non-production overheads	<u>4,420</u>
Total cost for year	<u>45,305</u>

At 30 June 2007 it was estimated that the net realisable value of each completed security device was £35. There were no stocks of direct materials.

Calculate the stock valuation at 30 June 2007 for:

- part-finished goods
- finished goods

solution

PART-FINISHED GOODS/WORK-IN-PROGRESS

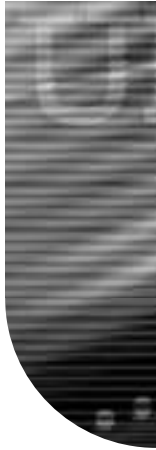
To calculate the value of both part-finished and finished goods we need to know the production cost, ie direct materials, direct labour and production overheads. This is:

	£
Direct materials used	18,785
Direct labour	13,260
Production overheads	<u>8,840</u>
Production cost for year	<u>40,885</u>

All these costs are included because they have been incurred in bringing the product to its present location or condition. Non-production overheads are not included because they are not directly related to production.

Thus, a production cost of £40,885 has produced:

Units sold	2,000
Closing stock of completed units	200
Closing stock of part-finished goods –	
20 units exactly half-finished equals	
10 completed units	10
Production for year	<u>2,210</u>



The **cost per unit** is:

$$\frac{\pounds 40,885}{2,210} = \pounds 18.50 \text{ per unit}$$

The 20 half-finished units have a cost of $(20 \div 2) \times \pounds 18.50 = \pounds 185$.

They have a net realisable value of $(20 \div 2) \times \pounds 35 = \pounds 350$.

The value of part-finished goods will, therefore, be shown in the accounts as $\pounds 185$, which is the lower of cost and net realisable value.

FINISHED GOODS

The completed units in stock at the end of the year have a production cost of $200 \times \pounds 18.50 = \pounds 3,700$, compared with a net realisable value of $200 \times \pounds 35 = \pounds 7,000$. Applying the rule of lower of cost and net realisable value, finished goods stock will be valued at the cost price, **$\pounds 3,700$** .

OTHER STOCK VALUATION METHODS

As well as the FIFO, LIFO and AVCO methods used to determine the valuation of closing stock, other methods which could be used include:

standard cost

This uses a pre-determined cost based on estimates of expected cost levels – referred to as standard cost. This level of cost is determined in advance so as to aid planning, cost control and pricing.

An example would be in a factory making cars. The costs of materials are assessed – based on past production and future predictions to establish a standard cost. The same process is carried out on anticipated wage levels. Finally a standard cost for materials and labour can be prepared which then would form the basis for any decision on car prices, and also be used to assess control of cost levels during actual production.

SSAP 9 stresses that standard costs should be reviewed frequently, to ensure that they bear a reasonable relationship to actual costs during the period.

Note: standard costs are studied in detail in your later studies.

replacement cost

This method considers the price at which the items of stock can be replaced, either by purchase or by manufacture. SSAP 9 considers this method unacceptable because replacement cost is not necessarily the same as actual cost. For example, in times of rising prices, replacement cost will be higher than actual cost, which means that a profit is taken before the stock is sold.

This method, similarly to LIFO, gives a more up-to-date production cost for the work done.

BOOK-KEEPING FOR MATERIALS COSTS

In this section we look at the cost book-keeping entries to record stock transactions – the purchase of materials on credit from suppliers, and the issue of materials to work-in-progress. These entries form part of the book-keeping system for costing. Chapter 7 looks in detail at an integrated book-keeping system.

When making cost book-keeping entries, remember to use the principles of double-entry book-keeping:

- a debit entry records a gain in value, an asset or an expense
- a credit entry records the giving of value, a liability or an income item

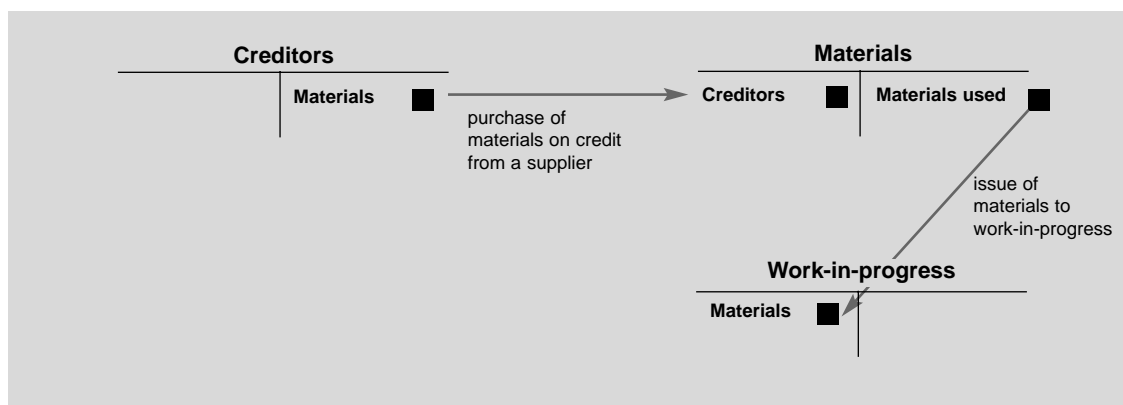
With stocks of materials, there are two main entries to record:

- **purchase of materials on credit from a supplier**
 - debit materials account (ie an asset is gained)
 - credit creditor's account (ie a liability is incurred)
- **issue of materials to work-in-progress**
 - debit work-in-progress account (ie an asset of materials is gained)
 - credit materials account (ie value of materials is given to work-in-progress account)

Three accounts are involved in these transactions

- materials account
- work-in-progress (or part-finished goods) account
- creditor's account/purchases ledger control account

The cost book-keeping entries are shown diagrammatically as follows:



**Case
Study**
**BLUE JEANS LIMITED:
BOOK-KEEPING FOR MATERIALS COSTS**
situation

Blue Jeans Limited manufactures and sells denim jeans and jackets. The company uses the first in, first out (FIFO) method for valuing issues of materials to production and stocks of materials.

The company has been very busy in recent weeks and, as a consequence, some of the accounting records are not up-to-date. The following stores ledger record has not been completed:

STORES LEDGER RECORD
Product: Blue denim

Date	Receipts			Issues			Balance	
	Quantity metres	Cost per metre	Total Cost	Quantity metres	Cost per metre	Total Cost	Quantity metres	Total Cost
2007		£	£		£	£		£
Balance at 1 Oct							20,000	10,000
11 Oct	10,000	0.60	6,000				30,000	16,000
14 Oct				25,000				
19 Oct	20,000	0.70	14,000					
25 Oct				20,000				

All issues of blue denim are for the manufacture of blue jeans. The following cost accounting codes are used to record material costs:

<i>code number</i>	<i>description</i>
2000	stock of blue denim
2200	work-in-progress – blue jeans
4000	creditors/purchases ledger control

As an accounts assistant at Blue Jeans Limited, you are asked to complete the stores ledger record and to fill in the table (below) to record separately the two purchases and two issues of blue denim in the cost accounting records.

2007	Code	Debit	Credit
11 October	2000		
11 October	4000		
14 October	2000		
14 October	2200		
19 October	2000		
19 October	4000		
25 October	2000		
25 October	2200		

solution

The stores ledger record is completed as shown on the next page.

Note that there may be a need to calculate the balance from more than one receipt cost. For example, on 11 October, the balance is made up of:

20,000 metres at £0.50 per metre	=	£ 10,000
<u>10,000 metres at £0.60 per metre</u>	=	<u>6,000</u>
<u>30,000 metres</u>	=	<u>16,000</u>

Similarly, on 19 October, the balance is made up of:

5,000 metres at £0.60 per metre	=	£ 3,000
<u>20,000 metres at £0.70 per metre</u>	=	<u>14,000</u>
<u>25,000</u>	=	<u>17,000</u>

The cost book-keeping entries are recorded on the table as follows:

2007	Code	Debit	Credit
11 October	2000	£6,000	
11 October	4000		£6,000
14 October	2000		£13,000
14 October	2200	£13,000	
19 October	2000	£14,000	
19 October	4000		£14,000
25 October	2000		£13,500
25 October	2200	£13,500	

Chapter Summary

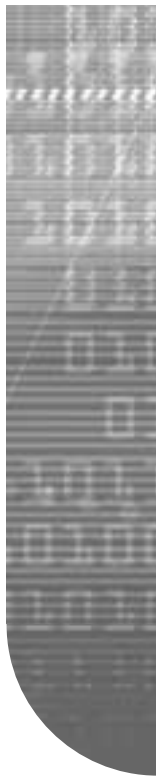
- Businesses and other organisations hold stocks of raw materials and components bought for production, products bought for resale, and service items bought for use within the business.
- Two important stock costs are the ordering cost and the stock holding cost.
- Materials purchases can be made using techniques such as:
 - the level method of re-ordering
 - Economic Order Quantity (EOQ)
 - Just-In-Time (JIT)
- The level of stock is recorded on a stock record, which also indicates
 - the level at which new stock should be ordered
 - the quantity of stock that should be re-ordered
- Stock levels of materials are monitored regularly by means of stock taking; stock reconciliation notes any discrepancies and reports them for further investigation.
- Stock valuation is normally made *at the lower of cost and net realisable value* (SSAP 9).



- Stock valuation methods include:
 - FIFO (first in, first out)
 - LIFO (last in, first out)
 - AVCO (weighted average cost)
 - standard cost
 - replacement cost
- For a manufacturer, cost comprises the direct manufacturing costs of materials, labour and expenses, together with the production overheads which bring the product to its present location or condition.
- Cost book-keeping entries are made to record stock transactions such as:
 - the purchase of materials on credit from suppliers
 - the issue of materials to work-in-progress/part-finished goods

Key Terms

materials	the cost of: <ul style="list-style-type: none"> – raw materials and components used in production – products bought for resale – service items bought for use within the business
level method of re-ordering	the re-ordering of materials in fixed quantities
Economic Order Quantity (EOQ)	a balance between ordering costs and stock holding costs; calculated by the formula: $\sqrt{\frac{2 \times \text{annual usage} \times \text{ordering cost}}{\text{stock holding cost}}}$
Just-In-Time (JIT)	the process of delivering goods in the right quantities, in the right place, just-in-time
stock record	record held for each stock item which shows receipts of supplies and sales (or issues to production)
stock taking	the process of counting physical stock on hand
stock reconciliation	comparison of the physical stock on hand with the stock record balance and identification of the reason(s) for discrepancies
stock value	number of items held x stock valuation per item



cost	the amount it cost to buy the stock (including additional costs to bring the product to its present location or condition)
net realisable value	selling price (less any extra costs, such as selling and distribution)
FIFO	'First in, first out' method of attaching a value to each issue of materials or goods from stores, using the oldest cost prices first
LIFO	'Last in, first out' method of attaching a value to each issue of materials or goods from stores, using most recent cost prices first
AVCO	'Average cost' method of attaching a value to each issue of materials or goods from stores, using a weighted average of the cost prices of all items in stock at the date of issue
stores ledger record (stock card)	method of recording stock data in order to ascertain the cost at which stocks of materials are issued, and to ascertain a valuation of stock
cost book-keeping	double-entry system to record costing transactions; uses the principles of double-entry book-keeping

Student Activities

2.1 Calculate, for stock items D and E, the re-order stock level and the re-order quantity to replenish stock levels to the maximum level, from the following information:

- daily usage of D = 3 units, of E = 4 units
- total stock should never exceed 95 days' usage
- 10 days' stock should always be held
- there is space available in the store for 350 units of each item of stock
- lead time is 7 days

- 2.2 (a) Prepare a stock record from the following information:
- *product*: A4 Yellow Card, code A4/Y3, location row 7, bin 5
 - *units*: reams
 - *maximum stock level*: 35 days' usage
 - *daily usage*: 3 units
 - *lead time*: 10 days
 - *minimum stock level*: 12 days' stock
 - *opening balance on 1 May 2007*: 84 reams

Note: a blank stock record, which may be photocopied, is provided in the Appendix.

- (b) Calculate maximum, minimum and re-order levels of stock, together with re-order quantity (to replenish stock to the maximum level)
- (c) Enter the following materials requisitions for May 2007 on the stock record remembering to re-order when necessary and to show the order arriving ten days later (Goods Received Note 4507):

4 May	Materials Requisition 184	18 reams
6 May	Materials Requisition 187	20 reams
10 May	Materials Requisition 188	10 reams
17 May	Materials Requisition 394	20 reams
20 May	Materials Requisition 401	11 reams
26 May	Materials Requisition 422	6 reams

- 2.3 Complete the following sentences:

- (a) Stock levels and movements are recorded on a
- (b) A person carrying out a stock check will record the stock on a
- (c) The process of comparing stock on the shelves with stock in the records is known as
.....
- (d) The usual basis for stock valuation is at the lower of and
.....

2.4 From the following information prepare stores ledger records for product X using:

- (a) FIFO
- (b) LIFO
- (c) AVCO

- 20 units of the product are bought in January 2007 at a cost of £3 each
- 10 units are bought in February at a cost of £3.50 each
- 8 units are sold in March
- 10 units are bought in April at a cost of £4.00 each
- 16 units are sold in May

Notes:

- a blank stores ledger record, which may be photocopied, is provided in the Appendix
- where appropriate, work to two decimal places

2.5 XY Limited is formed on 1 January 2007 and, at the end of its first half-year of trading, the stores ledger records show the following:

2007	TYPE X		TYPE Y	
	Receipts (units)	Issues (units)	Receipts (units)	Issues (units)
January	100 at £4.00		200 at £10.00	
February		80	100 at £9.50	
March	140 at £4.20			240
April	100 at £3.80		100 at £10.50	
May		140	140 at £10.00	
June	80 at £4.50			100

At 30 June 2007, the net realisable value of each type of stock is:

type X	£1,750
type Y	£1,950
	<u>£3,700</u>

You are to:

- Complete stores ledger records for products X and Y using (a) FIFO, (b) LIFO, (c) AVCO.
- The business has decided to use the FIFO method. Show the amount at which its stocks should be valued on 30 June 2007 in order to comply with standard accounting practice.

Notes:

- a blank stores ledger record, which may be photocopied, is provided in the Appendix
- where appropriate, work to two decimal places

2.6 Breeden Bakery Limited makes 'homestyle' cakes which are sold to supermarket chains.

The company uses the first in, first out (FIFO) method for valuing issues of materials to production and stocks of materials.

As an accounts assistant at Breeden Bakery you have been given the following tasks.

Task 1

Complete the following stores ledger record for wholewheat flour for May 2007:

STORES LEDGER RECORD								
Product: Wholewheat flour								
Date	Receipts			Issues			Balance	
	Quantity kgs	Cost per kg £	Total Cost £	Quantity kgs	Cost per kg £	Total Cost £	Quantity kgs	Total Cost £
2007								
Balance at 1 May							10,000	2,500
6 May	20,000	0.30	6,000				30,000	8,500
10 May				20,000				
17 May	10,000	0.35	3,500					
20 May				15,000				

Task 2

All issues of wholewheat flour are for the manufacture of fruit cakes. The following cost accounting codes are used to record materials costs:

<i>code number</i>	<i>description</i>
3000	stock of wholewheat flour
3300	work-in-progress – fruit cakes
5000	creditors/purchases ledger control

Complete the table below to record separately the two purchases and two issues of wholewheat flour in the cost accounting records.

2007	Code	Debit	Credit
6 May	3000		
6 May	5000		
10 May	3000		
10 May	3300		
17 May	3000		
17 May	5000		
20 May	3000		
20 May	3300		