Answers

1 (a) Budgeted Profit Statement

Budgeted Profit Statement for year ending 31/12/2007 assuming Green is manufactured and sold.

	Quarter 1 £000	Quarter 2 £000	Quarter 3 £000	Quarter 4 £000	Total £000
Sales revenue (w1)	1,400	1,260	1,134	1,021	4,815
Variable costs (w2)	(840)	(756)	(680)	(613)	(2,889)
Contribution (w3)	560	504	454	408	1,926
Fixed costs	(200)	(200)	(200)	(200)	(800)
Profit	360	304	254	208	1,126

Workings
W1
Quarter 1 sales = 100,000 × £14 = £1,400,000
Quarter 2 sales = £1,400 × 90% = £1,260,000
Etc

W2
If contribution is 40% of sales revenue, then variable costs will be 60% of sales revenue.
Quarter 1 variable cost = £1,400,000 × 60% = £840,000
Quarter 2 variable cost = £1,260,000 × 60% = £756,000

W3
Quarter 1 contribution £000 = £1,400,000 × 40% = £560,000
Etc

Budgeted Profit Statement for year ending 31/12/2007 assuming Brace is manufactured and sold.

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Total
Sales units (W4)	86,000	92,000	98,000	104,000	380,000
	£000	£000	£000	£000	£000
Sales revenue (W5)	1,376	1,472	1,568	1,664	6,080
Variable costs (W6)	(860)	(920)	(980)	(1,040)	(3,800)
Contribution (W6)	516	552	588	624	2,280
Fixed costs	(240)	(240)	(240)	(240)	(960)
Profit	276	312	348	384	1,320

Workings
W4
Y = 80,000 + 6,000 T
Quarter 1 sales units = 80,000 + (6,000 × 1) = 86,000
Quarter 2 sales units = 80,000 + (6,000 × 2) = 92,000
Quarter 3 sales units = 80,000 + (6,000 × 3) = 98,000
Quarter 4 sales units = 80,000 + (6,000 × 4) = 104,000

W5
Quarter 1 Sales revenue = 86,000 × £16 = £1,376,000
Etc

W6
Variable cost per unit = Selling price – Contribution per unit = £16 – £6 = £10 per unit
Quarter 1 Variable cost = 86,000 × £10 = £860,000
Quarter 1 contribution = 86,000 × £6 = £516,000
Etc

(b) Relevant Costs and revenues

	Replace at 1 January 2007	Replace at 1 July 2007	Incremental revenues and (costs) of eplacing 1/1/2007
	£	£	£
Extra profits in the year (w7)	194,000	270,000	(76,000)
Sale of machinery	140,000	30,000	110,000
Redundancy costs	(40,000)	(50,000)	10,000
Wage savings (w8)	100,000	50,000	50,000
Incremental Profits	394,000	300,000	94,000

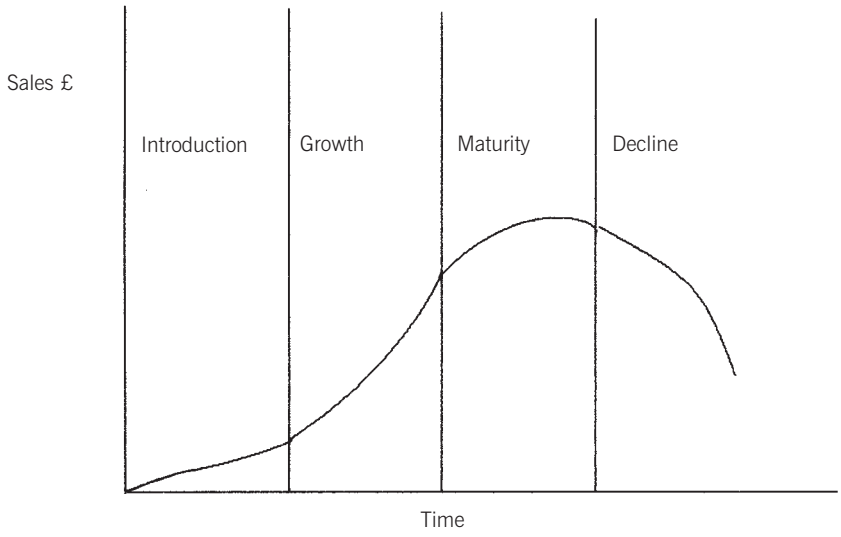
Conclusion
On a relevant cost basis it is best to introduce the new product on 1 January 2007.

Explanation of figures
Profits. Replacing the Green with the Brace will result in extra profits in 2007 as revealed in the budgeted figures (part (a)). Replacing the Green later avoids low sales figures in the first quarter.
Sale of Machinery. The net realiseable value of the machinery is relevant here as this is what the machinery could be sold for. Written down value relates to unexpired historic cost, not future value.
Redundancy and wage savings. Early changeover leads to lower redundancy payments and higher wage savings.

Workings
W7 Using total profit figures for the year from (b): £1,320,000 – £1,126,000 = £194 000
Using second half year profit figures from (b): £348,000 + £384,000 – £254,00 – £208,000
= £270,000
W8 5 workers × £20,000 = £100,000 for the full year, and half of this for the half year.

(c) What is meant by the product life cycle.
The product life cycle refers to the empirically observed pattern in the sales of many products over time. No product will last forever and eventually its sales will fall. The duration of the life cycle varies between products with some lasting for decades whilst others last only for a matter of months.

The general shape of a product life cycle is shown in the following diagram, but it is important to note that the length of each stage varies between products.



Four stages of the product life cycle.
Introduction. This refers to the bringing in and the bringing on of a new product. This is usually the culmination of a period of market research and product research and development; the point at which the product or service first comes to market. Sales are usually low and costs are high due to launch expenses and design changes.

Growth. This is where the product takes off and its true potential begins to become apparent. Sales rise quickly for successful products, unit costs start to decline as the firm gains experience of the product.

Maturity. The product is now a familiar part of the market. Unit costs are low and profits are generally high. Competition is now strong. The market generally reaches saturation during this phase and sales growth stops. The product may be modified or improved as a means of sustaining demand.

Decline. Eventually sales begin to decline and there is over-capacity amongst suppliers. Falling sales volume and reduced prices will eventually lead to losses and withdrawal of the product.

Tutorial Notes:

1. Decline can sometimes be avoided by regeneration of the product. This normally involves adding new features to the product to stimulate its sales, for example adding video cameras to mobile telephones.
2. Some textbooks refer to a development stage of the product life cycle. In this stage there are no sales and high development costs are incurred prior to product launch. Credit will be given for discussion of this stage.

Importance in sales forecasting

When forecasting sales it is important to consider the product life cycle. Rates of sales growth will vary between the different stages of a product's life. It is particularly important to note that growth rates enjoyed at the growth stage will not continue forever. All products should eventually arrive at the maturity stage.

The difficulty of applying the product life cycle in sales forecasting is to know when the end of one stage and the beginning of the next will occur. Some products will never get past the introductory phase (failed products), whilst others, particularly staple food products like bread and rice appear never to reach the decline stage.

2 (a) Variances

Direct material

Actual usage at actual cost 2,700 kg × £4·23	=	£11,421	
		Price	> £621 Adv
Actual usage at standard cost 2,700 kg × £4·00	=	£10,800	
		Usage	> £400 Fav
Standard usage at standard cost 1,400 units × 2kgs × £4·00	=	£11,200	

Direct labour

Actual hours at actual rate 4000 hrs × £7·50	=	£30,000	
		Rate	> £2,000 Adv
Actual hours at standard rate 4,000 hrs × £7·00	=	£28,000	
		Efficiency	> £1,400 Fav
Standard hours at standard rate 1,400 units × 3hrs × £7·00	=	£29,400	

Fixed overhead

Actual overhead	=	£205,000	
		Expenditure	> £5,000 Adv
Budgeted overhead	=	£200,000	

Reconciliation

Standard cost for the period	**£**	**£**	
Variable cost (1,400 units × £29·00 per unit)	40,600		
Fixed cost	200,000		
Total standard cost		240,600	
Direct material price variance		621	Adv
Direct material usage variance		400	Fav
Direct labour rate variance		2,000	Adv
Direct labour efficiency variance		1,400	Fav
Fixed overhead expenditure variance		5,000	Adv
Total actual cost for the period		246,421	

Calculation of total actual cost

Variable cost ((2,700 kg × £4·23) + £30,000)	41,421
Fixed cost	205,000
	246,421

(b) Memorandum
To: Production Manager, Hickman Ltd.
From: A Technician
Subject: Direct material price variance
Date: Today

The direct material price variance measures the effect of paying a different price than standard for actual materials purchased or used. Differences between actual and standard price can be caused by events outside the control of our business (e.g. world shortages of material or exchange rate changes leading to increased prices), or events within our control (e.g. failure to shop around for a good price, or failure to obtain bulk buy discounts). The analysis proposed by the management accountant attempts to split the overall price variance into controllable and non-controllable elements. This is a sensible idea as it supports the concept of responsibility accounting, under which managers are only held accountable for items that they can control.

The controllable price variance is calculated by comparing actual price with a revised standard price. The revised standard price is the original standard price adjusted for inflation in the market price of material Z. After allowing for the effects of inflation we can see that we have paid quite a low price for material Z, leading to a favourable variance, or cost saving, of £2,322. This will be considered to be to the credit of the manager who made the purchase.

(**Tutorial note:** The use of a price index to arrive at a revised standard does, of course, assume that the original budgeted figure was correct.)

The non-controllable price variance is calculated by comparing the revised standard price with the original standard price. It is the part of the total price variance caused by inflation, and is therefore considered non-controllable. In this case inflation in material Z prices resulted in extra costs of £2,943.

I hope this clarifies the analysis. If you have any further queries do not hesitate to contact me.

3 (a) Ratios

Return on capital employed

$$\frac{\text{Operating profit}}{\text{Capital employed}} \times 100 = \frac{20}{2{,}210} \times 100 = 0{\cdot}9\%$$

Return on sales (net margin)

$$\frac{\text{Operating profit}}{\text{Sales}} \times 100 = \frac{20}{1{,}200} \times 100 = 1{\cdot}7\%$$

Asset turnover

$$\frac{\text{Sales}}{\text{Capital employed}} = \frac{1{,}200}{2{,}210} = 0{\cdot}54 \text{ times}$$

Average cost per passenger mile

$$= \frac{\text{operating cost}}{\text{passenger miles}} \quad \frac{1{,}180{,}000}{4{,}320{,}000} = 27{\cdot}3 \text{ p}$$

Tutorial note: the term profit is used throughout this answer; in the public sector it would normally be referred to as surplus.

(b) Meaning of each ratio

Return on capital employed. This ratio measures the profits earned on the long-term finance invested in the business. The Lewisville bus service is only generating an annual profit of 0·9p for every £1 invested. The equivalent figure for private bus companies is 10p.

Return on sales. This ratio measures the profitability of sales. For the Lewisville bus service 1·7p of every £1 of sales is profit. The equivalent figure for private bus companies is 30p.

Asset turnover. This ratio measures a firm's ability to generate sales from its capital employed. The Lewisville bus service generates sales of 54p for every £1 of capital employed. The equivalent figure for private bus companies is only 33p.

Average cost per passenger mile. This measures the cost of transporting passengers per mile travelled. The Lewisville bus service incurs a cost of 27·3p per passenger mile as compared to 37·4 p for private bus companies.

Performance of the bus service

On first sight the Lewisville bus service appears to have performed poorly as compared to private sector bus companies. It has a low return on capital employed, largely due to a poor return on sales. This could be explained by the low fares charged. (See tutorial note) On the positive side its ability to generate sales is good and its buses appear to be more intensively used than private sector equivalents.

However, if we take into account the objectives of the council and the mission statement of the bus service it is possible to draw a different conclusion. Private sector companies usually seek to maximise investor wealth. The council appears to be trying to encourage usage of public transport in an attempt to reduce traffic congestion. To do this it charges low fares, resulting in a poor return on sales and a low return on capital employed. However, the low fares, and willingness to operate uneconomic routes has led to a high asset turnover, implying above industry average usage of the bus service. In turn this greater usage of the service leads to a lower cost per passenger mile as fixed costs are spread more thinly over a larger number of passenger miles.

Before drawing any firm conclusions it would be sensible to compare the performance of the Lewisville bus service with that of bus operators pursuing similar objectives.

(**Tutorial note**: If we compare average fare per passenger mile we can see that the Lewisville bus service charges lower fares than the private sector.

Lewisville fare per passenger mile = passenger fares ÷ passenger miles
= £1,200,000 ÷ 4,320,000 = 27·8p

Private sector = Average cost ÷ (1 – net margin)
= 37·4p ÷ (1 – 0·3) = 53·4p.

Lewisville charges lower fares per passenger mile, which may explain its higher load factor and therefore its lower cost per passenger mile)

(c) Economy, Effectiveness and Efficiency.

When measuring the performance of public sector organisations it is sometimes suggested that they should be assessed on the basis of the 'three Es'; economy, effectiveness and efficiency.

Economy is an input measure and is normally based around the expenditure of the organisation. In the case of the Lewisville bus service it could be measured by total expenditure as compared to budget.

Effectiveness is an output measure and looks at what the organisation achieves in terms of its objectives. In the case of the Lewisville bus service it could be measured by the number of passengers carried, or the number of passenger miles travelled.

Efficiency is a combination of the above two measures. It considers output in relation to input. In the case of the Lewisville bus service it could be measured by cost per passenger mile travelled.

4 (a) Budgets

Production budget 2007

		Units	
	January	February	March
Sales	5,000	5,500	7,000
Desired closing stock (w1)	550	700	700
	5,550	6,200	7,700
Less opening stock (w2)	(500)	(550)	(700)
Production units	5,050	5,650	7,000

Labour budget 2007

	January	February	March
Production units	5,050	5,650	7,000
Hours per unit	4	4	4
		Hours	
Total hours	20,200	22,600	28,000
Basic hours available (w3)	22,080	22,080	22,080
Overtime hours needed	0	520	5,920
	£	£	£
Basic rate payment (w4)	176,640	176,640	176,640
Overtime payment (w5)	0	6,240	71,040
Total labour cost	176,640	182,880	247,680

Workings

Working 1

January closing stock = February sales × 10% = 5,500 units × 10% = 550 units etc

Working 2

January opening stock = January sales × 10% = 5,000 units × 10% = 500 units etc.

Working 3

138 workers × 160 hours per month = 22,080 hours

Working 4

138 workers × £1,280 = £176,640

Working 5

Basic rate = £1,280 ÷ 160 hours = £8·00 per hour

Overtime rate = £8·00 × 150% = £12·00

Overtime payment February = 520 hours × £12·00 = £6,240 etc.

(b) Revised Budgets

Labour budget 2007

	January	February	March
		Hours	
Basic hours available (w3)	22,080	22,080	22,080
		£	
Basic rate payment (£)(w4)	176,640	176,640	176,640

Production budget 2007

		Units		
	January	February	March	
Opening stock	500	1,020	1,040	
Production	5,520	5,520	5,520	
Sales	(5,000)	(5,500)	(6,560)	(w6)
Closing stock	1,020	1,040	0	

Working 6

Rathbone can only sell available finished goods stock, 1,040 units + 5,520 units = 6,560 units

			Marks
1	**(a)**	**Green budget**	
		Sales Revenue	2
		Contribution	2
		Profit	2
			6
		Brace budget	
		Sales units forecast	2
		Sales revenue	2
		Contribution	2
		Profit	2
			8
			14
	(b)	**Relevant cost analysis**	
		Extra profits	2
		Extra profit explained	1
		Sale of machine	2
		Sale of machine explained	2
		Redundancy cost	2
		Wage savings	2
		Wage savings and redundancy explained	2
		Advice	1
			14
	(c)	**Meaning of product life cycle**	
		Pattern in sales over time	1
		Sales eventually fall	1
			2
		Stages	
		Introduction	1
		Low sales/high costs	1
		Growth	1
		Sales rise quickly	1
		Maturity	1
		Saturation/growth stops	1
		Decline	1
		Falling sales/losses	1
			8
		Importance	
		Rates of growth vary over the cycle	1
		Difficulty in predicting stages	1
			2
			12
			40

			Marks
2	**(a)**	**Variances**	
		2 marks per variance , max	10
		Reconciliation	
		Format	1
		Total standard cost	1
		Total actual cost	1
			13
	(b)	**Memo**	
		Memo Format	1
		Controllable explained*	3
		Non-controllable explained*	3
			7
		* for full marks reference must be made to the price index adjustment.	**20**
3	**(a)**	**Ratios**	
		One mark per ratio	4
	(b)	**Performance evaluation**	
		One mark per ratio explained	4
		Simplistic interpretation of performance, max	6
		Performance related to objectives, max	3
		Maximum	**10**
	(c)	**3 Es**	
		One mark per E explained	3
		One mark per measure	3
			6
			20
4	**(a)**	**Production budget**	
		Closing stocks	3
		Production units	3
			6
		Labour budget	
		Basic hours	1
		Overtime hours	2
		Basic payment	1
		Overtime payment	2
			6
		Labour budget	
		Hours	1
		Payment	1
		Production budget	**2**
		Production	2
		Closing stocks	3
		March sales	1
			6
			20