COST ACCOUNTING AND QUANTITATIVE ANALYSIS

Foundation
December 2003

MARKING SCHEME

Question 1

(a) Initial workings:

	Budget/standard (£)	Actual (£)
Selling price	100	105
Variable cost	80	80 (nb Standard cost)
Contribution margin	20	25

Sales Margin Variance — (Actual cost less Budget/Standard cost)
NB: Based on Standard cost

(AC – BC) — 900 x £25 less 1,000 x £20

£22,500 less £20,000 = £2,500 (F)

Sales Margin Price Variance

AV (AM – SM) — 900 units x (£25 – £20)

Or numerically 900 x (£105 – £100)

= £4,500 (F)

Sales Margin Volume Variance

(AV – BV) x SP — (900 units – 1,000 units) x £20

= £2,000 (A)

Materials Cost Variance

(SC – AC) — (900 units x 5kg x £10 per kg) less
4,600kg x £9 per unit

= £3,600(F)

Materials Price Variance

AQ x (SP – AP) — 4,600 kg x (£10 – £9)

= £4,600 (F)

Materials Usage Variance

(SQ – AQ) x SP — (900 x 5kg – 4600kg) x £10

= £1,000 (A)

Labour Cost Variance

(SC – AC)	(900 x £16) – £16,500
	= £2,100 (A)

Labour Rate Variance

AH x (SR –AR)	2,200 hours x (£8 – £7.50)
	= £1,100 (F)

Labour Efficiency Variance

(SH – AH) x SR	(1,800 hours – 2,200 hours) x £8 per hour
	= £3,200 (A)

(One mark for each of the materials and labour variances. 4 marks in total available for sales variances – 1 mark for establishing the actual contribution margin NB based on standard cost. Then 1 mark each for the sales variance totals) *(10)*

(b) Different types of standard cost.

Basic standard	–	Original benchmark/specification, used for long run comparisons.
Ideal standard	–	Assumes 100% efficiency all the time. May also not include all costs/delays which are inevitable/part of production process. Should not be used for cost comparison/control purposes.
Attainable standard	–	Attainable under normal (efficient) operating conditions.
Current standard	–	Attainable standard kept updated for price changes.

1 mark each for identification and explanation, up to a maximum of 4 marks

(c) Public sector use?

Unlikely to be used in purest/strictest form because most public sector is "service" based output with different customers/needs/quality issues etc. Would need to be a repetitive "product" based area – not impossible (eg school meals ? output from a council run workshop? Etc.) Much more usual to use in a repetitive manufacturing situation with identical products.

1 mark for each valid point, up to a maximum of 4 marks

(d) Mean, median, mode and Standard deviation calculation.

Units	Mean	Difference	(Difference)^2
1,050	1,050	0	0
950	1,050	150	22,500
1,200	1,050	(150)	22,500
1,050	1,050	0	0
1,150	1,050	(100)	10,000
900	1,050	100	10,000
6,300			65,000

In ascending order: 900 950 1,050 1,050 1,150 1,200

Mean is 6,300/6 = 1,050 *1*

Median is middle value. As even number of values median is
(1,050 + 1,050) / 2 = 1,050 *2*

Mode (commonest value) is 1,050 *1*

Standard Deviation is √65,000/6 ie √10,833.33 = 104.08 *3*

or √65,000/5 ie √13,000 = 114.02

(7)

(25)

Question 2

(a) Process A account

	£			£	
Direct materials (100kg x £5)	500	½	Normal loss (10 kg x £3)	30	*1*
Direct labour (20 hours x £10)	200	½	Abnormal loss (5kg x £8)	40	*1*
Overheads (25% x labour cost)	50	*1*	Transfer to Process B	680	*1*
			(85 kg x £8 per kg)		
Total	750		Total	750	

5

Process B account

	£			£	
Transfer from Process A	680	½	Normal loss (10 kg x £10.50)	105	*1*
Direct materials (115kg x £10)	1,150	½			
Direct labour (30 hours x £12)	360	½			
Overheads (50%x new materials cost)	575	½	Transfer to finished goods	2,730	*1*
Abnormal gain (5kg x £14)	70	*1*	(195 kg x £14 per kg)		
Total	2,835		Total	2,835	

5

(10)

(b) Normal Loss Account

	£		£
Process A	30.00	Scrap sales	30.00
Process B	105.00	Abnormal gain	52.50
		Scrap sales	52.50
	135.00		135.00

2

Abnormal Gain Account

	£		£
Normal loss	52.50	Process B	70.00
Profit & loss A/C	17.50		
	70.00		70.00

2

Abnormal Loss Account

	£		£
Process A	40.00	Scrap sales	15.00
		Profit & loss A/C	25.00
	40.00		40.00

2

Scrap sales Account

	£		£
Process A	30.00	Bank/cash	97.50
Process A	15.00		
Process B	52.50		
	97.50		97.50

2
(8)

(c) Alternative treatment of scrap value:

NB: the question is asking about alternative treatment of scrap value ie the accounting treatment. Answers which suggest alternative uses/treatment of the material itself (eg melting down and reusing) should not receive any credit.

The normal treatment is to credit to the appropriate process account. This is the strictly technical correct treatment – however, it might be that scrap amounts are infrequent , of small quantities, and in particular of small value. The cost/time/trouble effort etc of identification might outweigh the value of technically correct treatment. It is possible to credit the value of all scrap amounts to an overhead account and reduce overheads for the period. Thus the doctrine of materiality might be important here.

1 mark for reason for using alternative
1½ marks for explaining alternative
½ mark for referring to materiality doctrine
(3)

(d) Investment of £10,000 at an interest rate of 0.2% per month over a period of 3 years (36 months.)

Simple interest: £10,000 x 0.2% = £20 x 36 months = £720 *2*

Compound interest: Formula for this is $S = P(1 + r)^n$

So here $£10,000\ (1 + 0.002)^{36}$
ie £10,000 x 1.074578 = £10,745.78 *2*
So interest earned (compound) is = £745.78 *(4)*

(25)

Question 3

(a) (b)

	Sales	Moving average	Moving average	Period	Trend Y=a+bx	Seasonal adjust	Calculated sales	Residual
Day 1 (M)	62							
Day 1 (A)	56	198/3	66	0	66	(10)	53	(3)
Day 1 (E)	80	213/3	71	1	75	5	78	(2)
Day 2 (M)	77	240/3	80	2	84	(7)	80	3
Day 2 (A)	83	264/3	88	3	93	(10)	80	(3)
Day 2 (E)	104	294/3	98	4	102	2	105	1
Day 3 (M)	107	306/3	102	5	111	(4)	107	0
Day 3 (A)	95	333/3	111	6	120	(25)	107	12
Day 3 (E)	131	363/3	121	7	129	2	132	1
Day 4 (M)	137	408/3	136	8	138	(1)	134	(3)
Day 4 (A)	140	441/3	147	9	147	(7)	134	(6)
Day 4 (E)	164							
	1		*2*		*2*	*2*	*1½*	*1*

(b)

Using the moving averages values from the above table and the high/low method, the increase in the number of sales is from 66 to 147 over 9 periods. So average increase per period is (147 – 66) / 9 = 81/9 = 9 *1*

So the equation of the line using the formula: – y = a + bx is thus y = 66 + 9 x 2

(10)

(b) Average seasonal adjustments:

	Morning	Afternoon	Evening
Day 1		(10)	5
Day 2	(7)	(10)	2
Day 3	(4)	(25)	2
Day 4	(1)	(7)	
Average	- 4.0	- 13.0	+ 3.0
	½	*½*	*½*

Thus calculated values will be given by y = 66 + 9 x plus seasonal adjustments of – 4.0 (for morning) – 13.0 (afternoon) and + 3.0 (evening.)
(NB residual/random variations given in final column above.) *(4)*

(a) Establishing the trend line (using least squares regression method)

	Period	Sales			Trend = Y = a + bx	Seasonal adjust	Calculated Sales	Residual
	X	**Y**	**XY**	**X^2**				
Day 1 (M)	1	62	62	1	53	9	55.25	6.75
Day 1 (A)	2	56	112	4	62	(6)	53	3
Day 1 (E)	3	80	240	9	71	9	79.25	0.75
Day 2 (M)	4	77	308	16	80	(3)	82.25	(5.25)
Day 2 (A)	5	83	415	25	89	(6)	80	3
Day 2 (E)	6	104	624	36	98	6	106.25	(2.25)
Day 3 (M)	7	107	749	49	107	0	109.25	(2.25)
Day 3 (A)	8	95	760	64	116	(21)	107	(12)
Day 3 (E)	9	131	1179	81	125	6	133.25	(2.25)
Day 4 (M)	10	137	1370	100	134	3	136.25	0.75
Day 4 (A)	11	140	1540	121	143	(3)	134	6
Day 4 (E)	12	164	1968	144	152	12	160.25	3.75
Totals	78	1236	9327	650				
			1	*1*	*2*	*2*	*1½*	*1*

(b) (b)

Trend line is given by $y = a + bx$

From formula sheets:

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

$$a = \frac{\Sigma y}{n} - \frac{b \Sigma x}{n}$$

So b is $\frac{(12 \times 9327) - (78 \times 1,236)}{12 \times 650 - 78 \times 78}$ ie $\frac{15,516}{1,716}$ ie 9.041958

2

and a is $\frac{1,236}{12} - \frac{9.041958 \times 78}{12}$ ie 44.22728

So $y = 44 + 9x$ is used to calculate the estimated figures above. 2

(10)

(b) Average seasonal adjustments:

	Morning	Afternoon	Evening
Day 1	9	(6)	9
Day 2	(3)	(6)	6
Day 3	0	(21)	6
Day 4	3	(3)	12
Average	2.25	(9)	8.25
	½	½	½

Thus calculated values will be given by y = 44 + 9x plus seasonal adjustments of +2.25 (for morning) , - 9.0 (afternoon) and + 8.25 (evening).

(4)

(c) If only 0.2% of buns may be underweight then ø (x) = 99.8 % Z = -2.88. The Z score for the current machine is

To calculate the setting for the current machine $\frac{(75 - x)}{0.5}$ = -2.88 so the setting for the old machine is 76.44 grams

.

1 mark for 2.88 from tables
2 marks for correct calculation
(3)

(d)

To calculate the setting for the new machine $\frac{(75 - x)}{0.2}$ = -2.88 so the setting for the new machine is 75.576 grams

1

Now can calculate the proportion of buns that will need the extra packaging.

Using the old machine

$Z = \frac{77 - 76.44}{0.5}$ = 1.12 so ø (x) = 86.86 % So 13.14% of buns will need the extra packaging

1

Using the new machine

$Z = \frac{77 - 75.576}{0.2} = 7.12$ But Z values in the normal distribution only

Go up to a value of 4 (for Z = 4 then ø (x) = 100 %) so with the new machine we will not expect any buns to need the extra packaging. Can now calculate the weekly cost of using the two machines. *1*

Old
Weekly bun content requirement is 2,000 x 76.44 gm = 152,880 gm
Weekly cost of content is therefore 152,880 gm x 0.05p = **£76.44** *1*

Each week 13.14 % of 2,000 buns need extra packaging = 262.8 extra buns
Weekly cost of extra packaging is therefore 262.8 x 0.5p = **£1.314** *1*

New
Weekly bun content requirement is 2,000 x 75.576 gm = 151,152 gm
Weekly cost of content is therefore 151,152 gm x 0.05p = **£75.576** *1*
(NB There is no extra packaging costs with this machine)
Extra weekly cost of hiring the new machine is **£25**

Conclusion
Old costs are £77.75 but new costs £75.57 so save £2.18
But extra hire cost is £25 per week, so financially not worth it. *2*
(8)

(***25)***

Question 4

(a) Cost Accounts for the month

Raw Materials

Balance b/f (CLC)	20,000	Work in progress (WIP)	40,000
CLC	80,000	Factory o/h	5,000
		Bal c/d	55,000
	100,000		100,000

1

Work in Progress

Balance b/f (CLC)	40,000	Finished goods	140,000
Raw materials	40,000	Bal c/d	18,000
Wages	50,000		
Factory overhead	28,000		
	158,000		158,000

1½

Finished Goods

Balance b/f (CLC)	5,000	Cost of sales (COS)	120,000
WIP	140,000	Bal c/d	25,000
	145,000		145,000

1

Wages

CLC	60,000	WIP	50,000
		Factory overhead	10,000
	60,000		60,000

1½

Cost Ledger Control

Sales	140,000	Balance b/f (CLC)	65,000
Bal c/d	98,000	Raw materials	80,000
		Wages	60,000
		Factory overheads	15,000
		Administration	6,000
		Profit	12,000
	238,000		238,000

2

Factory Overheads

Materials	5,000	WIP	28,000
Wages	10,000	Profit and loss (P&L)	2,000
CLC	15,000	(Underabsorbed o/h)	
	30,000		30,000

2

Administration

CLC	6,000	P&L	6,000
	6,000		6,000

½

Cost of Sales

Finished goods	120,000	P&L	120,000

½

Sales

P&L	140,000	CLC	140,000

½

Profit & Loss

COS	120,000	Sales	140,000
Factory overheads (Under absorbed)	2,000		
Administration	6,000		
Profit [CLC]	12,000		
	140,000		140,000

1½

(12)

(b) The main differences between integrated and interlocking systems of cost accounts:

An integrated system essentially uses just a single set of books with all cost and financial accounting transactions recorded together. An interlocking system keeps a separate cost and financial accounts ledger with corresponding double entries in the interlocking system being provided by a Cost Ledger Control Account. *2*

Advantages of each approach:

Integrated – Fewer entries, less complex, less time consuming etc. *1½*

Interlocking– More flexible (eg stores pricing, depreciation methods), more suited to purpose etc *1½*

(5)

(c) The differences between systematic, stratified, quota and cluster sampling.

Systematic
After a randomly selected start point or points, a sample item would be selected every nth sample. Gap is the sampling interval and is itself often randomly selected. Need to ensure no regular pattern/bias coinciding (or not) with sample interval.

Stratified
Population is divided into groups or strata. Random samples are then taken from each group, in the proportions that each group bears to the population as a whole.

Quota sampling
This type of sample is not pre selected but is chosen by interviewer on the spot up to the level of a quota. To avoid undue bias the quota is sub-divided into various categories eg male/female, young/old, etc. The interviewer is given quotas for each category and uses discretion to choose interviewees.

Cluster sampling
A few geographical areas are selected at random but then every household in the selected area is interviewed.

(2 marks for each well explained definition)
(8)

(25)

Question 5

(a) Overhead analysis sheet showing apportionments

Overhead	Basis	Totals		Machining	Assembly	Stores	Maint
		£		£	£	£	£
Rent	Area	16,000		8,000	2,000	4,000	2,000
Machine depreciation	Values	100,000		75,000	20,000	2,500	2,500
Building ins.	Area	8,000		4,000	1,000	2,000	1,000
Personnel	Employees	64,000		32,000	16,000	8,000	8,000
Machine ins.	Values	4,000		3,000	800	100	100
	Totals	192,000		122,000	39,800	16,600	13,600
		1		*1*	*1*	*1*	*1*

(5)

(b) Reciprocal service department costs:

Reapportion stores costs on the basis of number of stores issues.
Reapportion maintenance costs on the basis of number of jobs carried out.

(NB using continuous allotment method/repeated distribution method)

Totals b/f			122,000	39,800	16,600	13,600
	1					
Reapportion stores	(5/8, 2/8, 1/8)		10,375	4,150	(16,600)	2,075
Reapportion mtce	(1/5, 3/5, 1/5)		3,135	9,405	3,135	(15,675)
Reapportion stores	(5/8, 2/8, 1/8)		1,959	784	(3,135)	392
Reapportion mtce	(1/5, 3/5, 1/5)		79	235	78	(392)
Reapportion stores	(5/8, 2/8, 1/8)		49	19	(78)	10
Reapportion mtce	(1/5, 3/5, 1/5)		3	7	0	(10)
	Totals		137,600	54,400		
			2	*2*		

(**Alternative** method using algebra/simultaneous equations method)

S = 16,600 + 1/5 x M *½*
M = 13,600 + 1/8 x S *½*
Multiply first equation by 5 gives 5S = 83,600 + M
and so rearranging and substituting in second equation gives

4.875 S = 96,600 so S = <u>19,815.384</u> *½*

M = 13,600 + (19,815.384) / 8
So M = <u>16,076.923</u> *½*

Totals b/f			122,000	39,800	16,600	13,600
	1					
Reapportion stores	(5/8, 2/8, 1/8)		12,384	4,954	(19,815)	2,477
Reapportion mtce	(1/5, 3/5, 1/5)		3,216	9,646	3,215	(16,077)
	TOTALS		137,600	54,400	0	0
			1	*1*		

Overhead absorption rates:

NB: for machining department both "name" and comparative number of hours budgeted suggests that a machine hour rate basis of absorption should be used.

For the Assembly department the "name" gives no indication but comparative hours in this case suggests a labour hour basis of absorption is probably best.

Machining department: £137,600/40,000 machine hours
= £3.44 per machine hour. *1*

Assembly department: £54,400/20,000 labour hours
= £2.72 per labour hour. *1*

(7)

(c) Under/over absorption

Machining department:

Overhead absorbed £3.44 x 41,600 hours =	£143,104
Actual overhead cost incurred =	£142,690
	£414 over absorbed

1

Reasons:

Budget overhead	(£137,600)		
Actual overhead	(£142,690)		
Expenditure	£5,090	over spent	*½*
Activity	1,600	extra hours x £3.44 per hour	
	£5,504	over absorbed	*½*

Assembly department:

Overhead absorbed £2.72 x 19,600 hours =	£53,312
Actual overhead cost incurred =	£53,910
	£598 under absorbed

1

Reasons:

Budget overhead	(£54,400)		
Actual overhead	(£53,910)		
Expenditure	£490	underspent	*½*
Activity	400	less hours x £2.72 per hour	
	£1,088	under absorbed	*½*

(4)

(d) Reasons to use predetermined overhead absorption rates are as follows:

- need to charge overheads to customers throughout costing period.
- not practical to wait till end of costing period.
- helps smooth out seasonal fluctuations.
- helps planning.
- charge consistent prices to customers.

1 mark for each valid reason up to a maximum of 3 marks

(e) Reconciling Costing and Financial Profit *½ mark for heading*

	£	
Costing profit	5,500	*½*
Add back notional rent	4,000	*1*
	9,500	
Less debentures paid	3,000	*1*
	6,500	
Add received dividends	2,000	*1*
	8,500	
Stock adjustment	500	*1*
Financial accounting profit	8,000	*1*

NB: Cost accounts show o/s £22,000 and c/s £20,000 ie £2,000 used

But financial accounts show o/s £23,500 and c/s £21,000 ie £2,500 used

So adjustment is £500 (cost of stock is less in cost accounts compared with financial accounts.) *(6)*

(25)