

CIMA FINAL ASSESSMENT

Performance Management

November 2011

Time allowed

Reading and planning: 20 minutes

Writing: 3 hours

All questions are compulsory and **MUST** be attempted.

Do NOT open this paper until instructed by the supervisor.

You are allowed 20 minutes reading time before the examination begins during which you should read the question paper and, if you wish, highlight and/or make notes on the question paper. However, you will not be allowed, under any circumstances, to open the answer book and start writing or use your calculator during this reading time.

This question paper must not be removed from the examination hall.

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Paper P2

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MATHS TABLES AND FORMULAE

PRESENT VALUE TABLE

Present value of \$1, i.e. $(1 - r)^{-n}$ where r = interest rate; n = number of periods until payment or receipt.

Periods	Interest rates (r)									
	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909
2	0.980	0.961	0.943	0.925	0.907	0.890	0.873	0.857	0.842	0.826
3	0.971	0.942	0.915	0.889	0.864	0.840	0.816	0.794	0.772	0.751
4	0.961	0.924	0.888	0.855	0.823	0.792	0.763	0.735	0.708	0.683
5	0.951	0.906	0.863	0.822	0.784	0.747	0.713	0.681	0.650	0.621
6	0.942	0.888	0.837	0.790	0.746	0.705	0.666	0.630	0.596	0.564
7	0.933	0.871	0.813	0.760	0.711	0.665	0.623	0.583	0.547	0.513
8	0.923	0.853	0.789	0.731	0.677	0.627	0.582	0.540	0.502	0.467
9	0.914	0.837	0.766	0.703	0.645	0.592	0.544	0.500	0.460	0.424
10	0.905	0.820	0.744	0.676	0.614	0.558	0.508	0.463	0.422	0.386
11	0.896	0.804	0.722	0.650	0.585	0.527	0.475	0.429	0.388	0.350
12	0.887	0.788	0.701	0.625	0.557	0.497	0.444	0.397	0.356	0.319
13	0.879	0.773	0.681	0.601	0.530	0.469	0.415	0.368	0.326	0.290
14	0.870	0.758	0.661	0.577	0.505	0.442	0.388	0.340	0.299	0.263
15	0.861	0.743	0.642	0.555	0.481	0.417	0.362	0.315	0.275	0.239
16	0.853	0.728	0.623	0.534	0.458	0.394	0.339	0.292	0.252	0.218
17	0.844	0.714	0.605	0.513	0.436	0.371	0.317	0.270	0.231	0.198
18	0.836	0.700	0.587	0.494	0.416	0.350	0.296	0.250	0.212	0.180
19	0.828	0.686	0.570	0.475	0.396	0.331	0.277	0.232	0.194	0.164
20	0.820	0.673	0.554	0.456	0.377	0.312	0.258	0.215	0.178	0.149

Periods	Interest rates (r)									
	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833
2	0.812	0.797	0.783	0.769	0.756	0.743	0.731	0.718	0.706	0.694
3	0.731	0.712	0.693	0.675	0.658	0.641	0.624	0.609	0.593	0.579
4	0.659	0.636	0.613	0.592	0.572	0.552	0.534	0.516	0.499	0.482
5	0.593	0.567	0.543	0.519	0.497	0.476	0.456	0.437	0.419	0.402
6	0.535	0.507	0.480	0.456	0.432	0.410	0.390	0.370	0.352	0.335
7	0.482	0.452	0.425	0.400	0.376	0.354	0.333	0.314	0.296	0.279
8	0.434	0.404	0.376	0.351	0.327	0.305	0.285	0.266	0.249	0.233
9	0.391	0.361	0.333	0.308	0.284	0.263	0.243	0.225	0.209	0.194
10	0.352	0.322	0.295	0.270	0.247	0.227	0.208	0.191	0.176	0.162
11	0.317	0.287	0.261	0.237	0.215	0.195	0.178	0.162	0.148	0.135
12	0.286	0.257	0.231	0.208	0.187	0.168	0.152	0.137	0.124	0.112
13	0.258	0.229	0.204	0.182	0.163	0.145	0.130	0.116	0.104	0.093
14	0.232	0.205	0.181	0.160	0.141	0.125	0.111	0.099	0.088	0.078
15	0.209	0.183	0.160	0.140	0.123	0.108	0.095	0.084	0.079	0.065
16	0.188	0.163	0.141	0.123	0.107	0.093	0.081	0.071	0.062	0.054
17	0.170	0.146	0.125	0.108	0.093	0.080	0.069	0.060	0.052	0.045
18	0.153	0.130	0.111	0.095	0.081	0.069	0.059	0.051	0.044	0.038
19	0.138	0.116	0.098	0.083	0.070	0.060	0.051	0.043	0.037	0.031
20	0.124	0.104	0.087	0.073	0.061	0.051	0.043	0.037	0.031	0.026

CUMULATIVE PRESENT VALUE OF \$1

This table shows the present value of \$1 per annum, receivable or payable at the end of each year for

n years $\frac{1-(1+r)^n}{r}$.

Periods	Interest rates (r)									
	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
1	0.990	0.980	0.971	0.962	0.952	0.943	0.935	0.926	0.917	0.909
2	1.970	1.942	1.913	1.886	1.859	1.833	1.808	1.783	1.759	1.736
3	2.941	2.884	2.829	2.775	2.723	2.673	2.624	2.577	2.531	2.487
4	3.902	3.808	3.717	3.630	3.546	3.465	3.387	3.312	3.240	3.170
5	4.853	4.713	4.580	4.452	4.329	4.212	4.100	3.993	3.890	3.791
6	5.795	5.601	5.417	5.242	5.076	4.917	4.767	4.623	4.486	4.355
7	6.728	6.472	6.230	6.002	5.786	5.582	5.389	5.206	5.033	4.868
8	7.652	7.325	7.020	6.733	6.463	6.210	5.971	5.747	5.535	5.335
9	8.566	8.162	7.786	7.435	7.108	6.802	6.515	6.247	5.995	5.759
10	9.471	8.983	8.530	8.111	7.722	7.360	7.024	6.710	6.418	6.145
11	10.368	9.787	9.253	8.760	8.306	7.887	7.499	7.139	6.805	6.495
12	11.255	10.575	9.954	9.385	8.863	8.384	7.943	7.536	7.161	6.814
13	12.134	11.348	10.635	9.986	9.394	8.853	8.358	7.904	7.487	7.103
14	13.004	12.106	11.296	10.563	9.899	9.295	8.745	8.244	7.786	7.367
15	13.865	12.849	11.938	11.118	10.380	9.712	9.108	8.559	8.061	7.606
16	14.718	13.578	12.561	11.652	10.838	10.106	9.447	8.851	8.313	7.824
17	15.562	14.292	13.166	12.166	11.274	10.477	9.763	9.122	8.544	8.022
18	16.398	14.992	13.754	12.659	11.690	10.828	10.059	9.372	8.756	8.201
19	17.226	15.679	14.324	13.134	12.085	11.158	10.336	9.604	8.950	8.365
20	18.046	16.351	14.878	13.590	12.462	11.470	10.594	9.818	9.129	8.514

Periods	Interest rates (r)									
	11%	12%	13%	14%	15%	16%	17%	18%	19%	20%
1	0.901	0.893	0.885	0.877	0.870	0.862	0.855	0.847	0.840	0.833
2	1.713	1.690	1.668	1.647	1.626	1.605	1.585	1.566	1.547	1.528
3	2.444	2.402	2.361	2.322	2.283	2.246	2.210	2.174	2.140	2.106
4	3.102	3.037	2.974	2.914	2.855	2.798	2.743	2.690	2.639	2.589
5	3.696	3.605	3.517	3.433	3.352	3.274	3.199	3.127	3.058	2.991
6	4.231	4.111	3.998	3.889	3.784	3.685	3.589	3.498	3.410	3.326
7	4.712	4.564	4.423	4.288	4.160	4.039	3.922	3.812	3.706	3.605
8	5.146	4.968	4.799	4.639	4.487	4.344	4.207	4.078	3.954	3.837
9	5.537	5.328	5.132	4.946	4.772	4.607	4.451	4.303	4.163	4.031
10	5.889	5.650	5.426	5.216	5.019	4.833	4.659	4.494	4.339	4.192
11	6.207	5.938	5.687	5.453	5.234	5.029	4.836	4.656	4.486	4.327
12	6.492	6.194	5.918	5.660	5.421	5.197	4.988	4.793	4.611	4.439
13	6.750	6.424	6.122	5.842	5.583	5.342	5.118	4.910	4.715	4.533
14	6.982	6.628	6.302	6.002	5.724	5.468	5.229	5.008	4.802	4.611
15	7.191	6.811	6.462	6.142	5.847	5.575	5.324	5.092	4.876	4.675
16	7.379	6.974	6.604	6.265	5.954	5.668	5.405	5.162	4.938	4.730
17	7.549	7.120	6.729	6.373	6.047	5.749	5.475	5.222	4.990	4.775
18	7.702	7.250	6.840	6.467	6.128	5.818	5.534	5.273	5.033	4.812
19	7.839	7.366	6.938	6.550	6.198	5.877	5.584	5.316	5.070	4.843
20	7.963	7.469	7.025	6.623	6.259	5.929	5.628	5.353	5.101	4.870

FORMULAE

TIME SERIES

Additive model: Series = Trend + Seasonal + Random

Multiplicative model: Series = Trend * Seasonal * Random

LINEAR REGRESSION AND CORRELATION

The linear regression equation of y on x is given by:

$$y = a + bx \text{ or } y - \bar{y} = b(x - \bar{x})$$

where

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

and

$$a = \bar{y} - b\bar{x}$$

or solve

$$\begin{aligned} \sum y &= na + b \sum x \\ \sum xy &= a \sum x + b \sum x^2 \end{aligned}$$

Exponential $Y = ab^x$

Geometric $Y = aX^b$

LEARNING CURVE

$$Y_x = aX^b$$

where:

Y_x = the cumulative average time per unit to produce X units

a = the time required to produce the first unit of output

X = the cumulative number of units

b = the index of learning.

The exponent b is defined as the log of the learning curve improvement rate divided by log 2.

$$\text{Log } a^b = b \text{ log } a$$

$$\text{Log } X = Y, \text{ then } X = 10^Y$$

SECTION A – 50 MARKS

Answer all FIVE questions in this section. Each question is worth 10 marks.

QUESTION 1

Potter plc has extracted the following information from the standard cost card of product Magic. The standard cost card reads as follows on January 1, 2011 :

Direct Labour 6 hours @ \$8.50 per hour \$51.00

The standard time of 6 hours is the average time expected per unit, based on a product life of 64 units. This standard time had been set before the budget was revised to take into account an expected 80% learning rate. The actual time for the first unit was 9 hours, and, after that first unit was produced, the 80% learning curve was still expected to apply throughout the life of product Magic.

Potter completed the production of 32 batches of the product in June, and the total actual direct labour cost was \$2,042. The following direct labour variances have also been calculated :

Direct labour rate \$120 Adverse
Direct Labour efficiency \$1,120 Adverse

Further analysis has shown that the direct labour efficiency variance was caused solely by the actual rate of learning being different from that expected; the first batch did take the 9 hours it should have taken – as planned.

Required:

- (a) Calculate the actual rate of learning that occurred. (6 marks)
- (b) Assuming that the actual rate of learning and the actual labour rate continue throughout the life of Product Magic, calculate the total direct labour cost that the company will incur during the life of product Magic. (4 marks)

(Total: 10 marks)

QUESTION 2

LMR plc is a cable television company which operates from a number of sites in Europe. Its headquarters are in London, and its main management accounting operation (employing 40 staff) is based at the headquarters. The management accounting staff prepare regular budgets and financial control reports which are circulated widely throughout the company. The management accounting staff also undertake on-site cost investigations and participate in project evaluations, which involve travel around Europe to visit sites and participate in meetings.

LMR plc's Chief Executive has recently reviewed the management accounting operation, and has instructed you (in your capacity as LMR plc's Management Services Officer) as follows:

'The management accounting operation has an annual cost of around \$30 million per year, which includes salaries of \$7 million, office costs of \$7 million, and transport/accommodation costs of \$0.5 million. I am unsure whether the company is obtaining adequate value from this. Please investigate the management accounting operation, identify the value added by the various activities it undertakes, and suggest options that are available for cost reduction. I am particularly interested in the elimination of non-value-adding activity, and cost reductions in the use of staff.'

Required:

Explain:

- **how the value added by a particular task or activity might be determined;**
- **how you would conduct a value analysis of activities undertaken by LMR plc's management accounting operation;**
- **how non-value-adding activities in the operation might be eliminated.**

(10 marks)

QUESTION 3

Garden Wizard Ltd manufactures a variety of garden tools for many markets, including one item – the EC Trimmer, a hedge trimmer – that is only sold through Garden Centres and DIY chain shops. Currently, three large DIY chains (X, Y and Z) and seventeen smaller garden centres purchase this item. Garden Wizard sells this hedge trimmer at \$40 per unit, and the standard product cost is \$20 per unit. Assume 40 per cent of the standard product cost represents fixed overheads.

Delivery costs vary according to the distance travelled, and costs \$5 per kilometre. In addition, when a customer's stocks are very low, Garden Wizard makes the occasional emergency delivery outside its normal delivery schedule. These cost \$500 per delivery. Each customer also negotiates discounts on sales prices. Order-taking costs are \$200 per order. Publicity costs are specific to each customer, as all publicity occurs in the shops and garden centres.

Data relating to each of the customers in the previous period are as follows:

	X	Y	Z	Other garden centres
Sales in units	10,000	5,000	3,000	6,000
Kilometres travelled	1,000	500	1,200	7,500
Number of emergency deliveries made	0	0	2	0
Number of orders taken	5	3	7	10
Discounts*	20%	15%	20%	6%
Sales commission*	10%	10%	10%	10%
Publicity costs	\$27,000	\$39,000	\$45,000	\$57,000

*Discounts and sales commission are calculated as a percentage of the sales value.

Required:

Prepare a report for the management of Garden Wizard Ltd, commenting on the profitability of each of Garden Wizard Ltd's existing customers and what action it should take. Your response should be supported with suitable financial calculations, ratios, and a simple Pareto analysis.

(10 marks)

QUESTION 4

IF Ltd makes and sells a single product. The product was expected to require 10 kg of material per unit at \$7 per kg. The supplier of the usual material experienced production difficulties during the period and IF Ltd had to use a slightly different, cheaper grade of the material.

In the light of this, it has been decided that a more appropriate standard would have been 12 kg per unit at \$6 per kg. The actual output was 1,200 units which was as expected, and 14,000 kg were purchased and used at a cost of \$85,000.

Required:

- (a) Calculate the planning material price and usage variances. **(3 marks)**
- (b) Calculate the operational material price and usage variances. **(3 marks)**
- (c) IG Ltd has reported annual operating profits of \$13.4 million. This was after charging \$2.4 million for the full cost of launching a new product that is expected to last four years. JF Division has a risk-adjusted cost of capital of 6% and is paying interest on a substantial bank loan at 5%. The historical cost of the assets in IG Ltd, as shown on its balance sheet, is \$47 million, and the replacement cost has been estimated at \$59 million.

Ignoring the effects of taxation, calculate IG Ltd's EVA. **(4 marks)**

(Total: 10 marks)

QUESTION 5

The Jay and Co company (JCo) operates a retail store selling spares and accessories for the car market. The store has previously only opened for six days per week for the 50 working weeks in the year, but JCo is now considering also opening on Sundays.

The sales of the business on Monday through to Saturday averages at \$10,000 per day with average gross profit of 70% earned.

JCo expects that the gross profit % earned on a Sunday will be 20 percentage points lower than the average earned on the other days in the week. This is because they plan to offer substantial discounts and promotions on a Sunday to attract customers. Given the price reduction, Sunday sales revenues are expected to be 60% more than the average daily sales revenues for the other days. These Sunday sales estimates are for new customers only, with no allowance being made for those customers that may transfer from other days.

JCo buys all its goods from one supplier. This supplier gives a 5% discount on all purchases if annual spend exceeds \$1,000,000.

It has been agreed to pay time and a half to sales assistants that work on Sundays. The normal hourly rate is \$20 per hour. In total five sales assistants will be needed for the six hours that the store will be open on a Sunday. They will also be able to take a half-day off (four hours) during the week. Staffing levels will be allowed to reduce slightly during the week to avoid extra costs being incurred.

The staff will have to be supervised by a manager, currently employed by the company and paid an annual salary of \$80,000. If he works on a Sunday he will take the equivalent time off during the week when the assistant manager is available to cover for him at no extra cost to JCO. He will also be paid a bonus of 1% of the extra sales generated on the Sunday project.

The store will have to be lit at a cost of \$30 per hour and heated at a cost of \$45 per hour. The heating will come on two hours before the store opens in the 25 'winter' weeks to make sure it is warm enough for customers to come in at opening time. The store is not heated in the other weeks.

The rent of the store amounts to \$420,000 per annum.

Required:

Calculate whether the Sunday opening incremental revenue exceeds the incremental costs over a year (ignore inventory movements) and on this basis reach a conclusion as to whether Sunday opening is financially justifiable.

(10 marks)

SECTION B – 50 MARKS

Answer BOTH questions in this section. Each question is worth 25 marks.

QUESTION 6

CTD has two divisions – FD and TM. FD is an iron foundry division which produces mouldings that have a limited external market and are also transferred to TM division. TM division uses the mouldings to produce a piece of agricultural equipment called the "TX" which is sold externally. Each TX requires one moulding. Both divisions produce only one type of product.

The performance of each Divisional Manager is evaluated individually on the basis of the residual income (RI) of his or her division.

The company's average annual 12% cost of capital is used to calculate the finance charges. If their own target residual income is achieved, each Divisional Manager is awarded a bonus equal to 5% of his or her residual income. All bonuses are paid out of Head Office profits.

The following budgeted information is available for the forthcoming year:

	<i>TM division</i> <i>TX per unit</i>	<i>FD division</i> <i>Moulding per unit</i>
	\$	\$
External selling price	500	80
Variable production cost	366*	40
Fixed production overheads	60	20
Gross profit	74	20
Variable selling and distribution cost	25	4**
Fixed administration overhead	25	4
Net profit	24	12
Normal capacity (units)	15,000	20,000
Maximum production capacity (units)	15,000	25,000
Sales to external customers (units)	15,000	5,000
Capital employed	\$1,500,000	\$750,000
Target RI	\$105,000	\$85,000

* The variable production cost of TX includes the cost of an FD moulding.

** External sales only of the mouldings incur a variable selling and distribution cost of \$4 per unit.

FD division currently transfers 15,000 mouldings to TM division at a transfer price equal to the total production cost plus 10%.

Fixed costs are absorbed on the basis of normal capacity.

Required:

- (a) Calculate the bonus each Divisional Manager would receive under the current transfer pricing policy and discuss any implications that the current performance evaluation system may have for each division and for the company as a whole. (10 marks)
- (b) Both Divisional Managers want to achieve their respective residual income targets. Based on the budgeted figures, calculate:
- (i) the maximum transfer price per unit that the Divisional Manager of TM division would pay;
- (ii) the minimum transfer price per unit that the Divisional Manager of FD division would accept. (6 marks)
- (c) Write a brief report to the management of CTD that explains, and recommends, the transfer prices which FD division should set in order to maximise group profits. Your report should also explain how alternative transfer pricing systems could overcome any possible conflict that may arise as a result of your recommended transfer prices. (9 marks)

(Total: 25 marks)

QUESTION 7

LAB Ltd operates in a strict JIT environment in both its factories, Factory A and Factory B. Factory A currently produces four products, details of which are as follows:

	Product Yellow	Product Black	Product Choc	Product Silver
Machine hours per unit	5	8	3	4
Maximum demand per week	1,000	3,500	2,800	4,500

The weekly maximum demand identified above DOES NOT include some existing contractual commitment with LAB's main customer. Indeed, LAB has already signed a contract, which must be fulfilled, to deliver the following units of its products each week for the next 10 weeks:

Product	Contract units
Yellow	100
Black	200
Choc	150
Silver	250

Sales and costing information has also been made available, as follows:

	Product Yellow \$/unit	Product Black \$/unit	Product Choc \$/unit	Product Silver \$/unit
Selling price	48	42	72	78
Direct labour (\$10 per hour)	20	16	24	20
Direct material Alpha (\$3 per litre)	6	3	0	9
Direct material Beta (\$5 per kg)	10	0	15	20
Variable overhead (see note 1)				
Labour related	1.25	1	1.50	1.25
Machine related	1.25	2	0.75	1
Total variable cost	38.50	22	41.25	51.25

Every week, LAB purchases 500 units of a component, component P, from an external supplier for \$27 per component. A single unit of this component is used in producing the 'Collar', the company's only other product. The 'Collar' yields a positive contribution and is produced in LAB's factory B, without using any of the resources identified above. LAB could manufacture Component P in its Factory A, but to do so would require 1 hour of direct labour, 0.5 machine hours, and 2 kgs of direct material Beta. LAB PLC could not produce the component in Factory B.

The purchasing director has recently advised you that the availability of direct materials Alpha and Beta is to be restricted to 21,000 litres and 24,000 kgs per week respectively. This restriction is unlikely to change for at least 10 weeks. No restrictions are expected on any other resources.

Note

An analysis of the variable overhead shows that some of it is caused by the number of labour hours and the remainder is caused by the number of machine hours.

Required:

- (a) Calculate whether LAB should continue to purchase the component P or whether it should manufacture it internally during the next 10 weeks. (13 marks)
- (b) Prepare a statement to show the optimum weekly usage of the available resources in Factory A (you are NOT required to use linear programming.) (5 marks)
- (c) Explain TWO non-financial factors that should be considered before deciding whether or not to manufacture the component internally. (4 marks)
- (d) If you were to solve part (b) above using linear programming state the following:
 - The objective function
 - The inequality for the material Alpha constraint
 - The inequality for the material Beta constraint

(3 marks)

(Total: 25 marks)