



STRATEGIC LEVEL
FINANCIAL MANAGEMENT PILLAR
PAPER P9 – MANAGEMENT ACCOUNTING –
FINANCIAL STRATEGY

This is a Pilot Paper and is intended to be an indicative guide for tutors and students of the style and type of questions that are likely to appear in future examinations. It does not seek to cover the full range of the syllabus learning outcomes for this subject.

Management Accounting - Financial Strategy will be a three hour paper with one compulsory section (50 marks) and one section with a choice of questions for 50 marks.

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P9 – Financial Strategy

SECTION A – 50 MARKS

Background of company

JHC Group manufactures and distributes a wide range of food products for sale throughout Europe. It also provides advisory services to retailers. Its shares are listed and are widely held, although institutions hold the majority. The company is structured as a group of wholly-owned subsidiaries. Each subsidiary specialises in a particular product or service.

Financial data

Key data for the year to 31 December 2003 is as follows:

Revenue	□ 1,750 million
Earnings	□ 215 million
Shares in issue	350 million
Share price as at today	□ 8.31
Weighted Average Cost of Capital (WACC) for the Group	9% (nominal net of tax rate)

Company objectives

The company has two stated objectives:

- To increase operating cash flow and dividends per share year-on-year by at least 4%, which is 2.5% above the current rate of inflation.
- To increase the wealth of shareholders while respecting the interests of our employees, customers and other stakeholders and operating to the highest ethical standards.

Future plans

The directors are considering establishing a new subsidiary company, SP, to manufacture and distribute health food products. The subsidiary will require a factory. The directors have identified that the factory used by a long-established subsidiary, CC, is currently operating at only 60% capacity. This factory could be converted for use by the new subsidiary at a cost of □2.8 million. CC's annual net (after-tax) earnings are □2.2 million and are expected to remain at this level in nominal terms for the foreseeable future. This subsidiary's operations would cease immediately the decision to proceed with SP is taken as it will take some months to convert the factory.

However, the company is aware that the European parliament is discussing legislation that would introduce more stringent controls on the manufacture of health food products than are currently in operation. Industry spokesmen are attempting to argue that current controls are adequate. Nevertheless, the directors of the JHC Group wish to consider the situation should these tougher controls be introduced and two alternative methods of equipping the new subsidiary have been proposed by the company's technical advisers.

The company has sufficient cash available from a recent disposal to finance the capital costs of the new subsidiary under either alternative.

Alternative 1

This alternative will equip the factory to manufacture to the highest food safety standards that new regulations might impose. It would require the purchase of specialised machinery, which would have to be ordered. Delivery time is approximately 6 months, which would coincide with completion of the factory conversion.

Capital costs

The cost of this machinery is currently £8 million but its price is likely to rise by 5% over the next 6 months. If an order is placed immediately (year 0), together with a 40% deposit, the supplier will hold today's price. The balance of the purchase price is payable 6 months after installation (that is, 12 months after payment of the initial deposit). This machinery is not likely to need replacement for at least 8 years.

Revenues

Forecast revenues for SP for the first three years of operation have been provided by JHC Group's planning department as follows. The probabilities are based on forecasts of the economies of JHC Group's main trading areas.

	Year 1 (6 months of operating)			Year 2			Year 3		
Revenues (£ m)	2.5	4.5	7.4	7.5	12.5	16.5	13.5	18.5	21.5
Probability	0.3	0.5	0.2	0.3	0.5	0.2	0.3	0.5	0.2
Expected revenues (£m)	4.48			11.80			17.60		

The probabilities of sales for year 2 or 3 and beyond are assumed to be independent of the achievement of the previous year's sales revenues.

Operating and other costs/reliefs

- Cash operating costs are expected to have a fixed element of £2.5 million each year, plus a variable element of 35% of sales revenues. A full year's fixed costs will be charged to production in year 1. Variable costs will be much higher under this alternative because the new regulations are likely to require more expensive ingredients in the products.
- Redundancy payments of £2.1 million will be necessary for staff from the CC subsidiary. These would be payable immediately.
- The costs of the factory conversion will be incurred during the 6 months following the decision to proceed but, for simplicity, it can be assumed that these are paid at the end of year 1.
- The availability of capital allowances and other tax reliefs mean that no tax is likely to be payable until year 4. For year 4 onwards, a rough estimate suggests 20% of annual net cash flows (revenues less cash operating costs) will be payable in tax.

Alternative 2

To plan for a continuation of, or modest improvement to, current controls and regulations. This alternative has greater flexibility, as there is a much larger market, worldwide, for cheaper products.

Capital costs

The capital cost to JHC Group would also be much lower at £4.5 million. Equipment for this alternative is readily available and can be bought when the factory conversion is completed.

However, the equipment is likely to need to be replaced in 6 years' time from the date of purchase.

Revenues

The revenues shown below are forecast using similar methods as used in Alternative 1. However, sales will be made to a wider range of customers, many in developing countries.

	Year 1 (6 months of operating)			Year 2			Year 3		
Revenues (£ m)	4.5	7.5	9.5	7.1	9.4	11.1	9.5	12.5	15.6
Probability	0.1	0.6	0.3	0.1	0.6	0.3	0.1	0.6	0.3
Expected revenues (£ m)	7.80			9.68			13.13		

Costs are as follows:

- Fixed cash operating costs will be £ 1.5 million each year; variable costs will be 20% of sales revenue.
- With this alternative, there will be fewer redundancies from CC and the associated costs will be only 20% of those for Alternative 1.
- Costs of factory conversion are as Alternative 1.
- Tax relief will be similar to Alternative 1, that is, no tax will be payable until year 4 when tax will become payable at 20% of annual net cash flow (revenue less cash operating costs).

The revenues and costs for both alternatives are in nominal terms.

Required:

Assume you are JHC Group's financial manager.

- (a) (i) Calculate the net present value for the new subsidiary (SP) under each of the two alternatives. Make, and comment on, appropriate assumptions about cash flows beyond year 3, including terminal values, and the discount rate to use in the evaluation. (15 marks)
- (ii) Explain, without doing any additional calculations, on the appropriateness and possible advantages of providing modified internal rates of return (MIRRs) for the evaluation of the two alternatives. (5 marks)

- (b) Write a report to the directors that discusses how the new subsidiary and the two alternatives might contribute to the attainment of the Group's objectives and recommends which, if either, of the alternatives should be chosen. Refer to the figures you calculated in part (a) where appropriate. You should provide any additional calculations that you consider relevant to support your discussion and analysis.

(22 marks)

- (c) Discuss the option features involved in the JHC Group's decision and explain, briefly, the benefits of including such options in the investment appraisal process.

(8 marks)

(Total = 50 marks)

SECTION B – 50 MARKS

ANSWER TWO QUESTIONS OUT OF FOUR

Question Two

RZ is a privately-owned textile manufacturer based in the UK with sales revenue in the last financial year of £68 million and earnings of £4.5 million. The directors of the company have been evaluating a cost saving project, which will require purchasing new machinery from the USA at a capital cost of \$1.5 million. The directors expect the new machinery to have a life of at least 5 years and to provide cost savings (including capital allowances) of £240,000 after tax each year. Cash flows beyond 5 years are ignored by RZ in all its investment decisions. The discount rate that the company applies to investment decisions of this nature is its post-tax real cost of capital of 9% per annum.

RZ at present has no debt in its capital structure. The directors, who are the major shareholders, would be prepared to finance the purchase of the new machinery via a rights issue but believe an all-equity capital structure fails to take advantage of the tax benefits of debt. They therefore propose to finance with one of the following methods:

- (i) Undated debt, raised in the UK and secured on the company's assets. The current pre-tax rate of interest required by the market on corporate debt of this risk is 7% per annum. Interest payments would be made at the end of each year.
- (ii) A finance lease raised in the USA repayable over 5 years. The terms would be 5 annual payments of US\$325,000 payable at the *beginning* of each year. The machinery could be bought by RZ from the finance company at the end of the five year lease contract for a nominal amount of \$1. Assume the whole amount of each annual payment is tax deductible.
- (iii) An operating lease. No cost details are available at present.

Other information

- The company's marginal tax rate is 30%. Tax is payable in the year in which the liability arises.
- Capital allowances are available at 25% reducing balance
- If bought outright, the machinery is estimated to have a residual value in real cash flow terms, at the end of five years, of 10% of the original purchase price.
- The spot rate US\$ to the £ is 1.58
- Interest rates in the USA and UK are currently 2.5% and 3.5% respectively.

Required:

- (a) Discuss the advisability of the investment and the advantages and disadvantages of financing with either (i) undated debt, (ii) a finance lease or (iii) an operating lease compared with new equity raised via a rights issue and comment on whether the choice of method of finance should affect the investment decision. Provide appropriate and relevant calculations and assumptions to support your discussion.

(18 marks)

- (b) Discuss the benefits and potential problems of financing assets in the same currency as their purchase.

(7 marks)

(Total = 25 marks)

Question Three

PCO plc operates in oil and related industries. Its shares are quoted on the London International Stock Exchange. In its retailing operations the company has concentrated on providing high quality service and facilities at its service stations rather than competing solely on the price of petrol. Approximately 75% of its Revenue and 60% of its profits are from petrol, the remainder coming from other services (car wash and retail sales from its convenience stores which are available at each service station).

The company has been highly profitable in the past as a result of astute buying of petroleum products on the open market. The company does not enter into supplier agreements with the major oil companies except on very short-term deals. However, profit margins are now under increasing pressure as a result of intensifying competition and the cost of complying with environmental legislation.

The managing director of the company is assessing a possible acquisition that would help the company increase the percentage of its non-petroleum revenue and profits. OT plc specialises in oil distribution from the depots owned by the major oil companies to their retail outlets. Its shares have been quoted on the UK Alternative Investment Market for the past 2 years. It operates a fleet of oil tankers, some owned and some leased. PCO plc has used its services in the past and knows it has an up to date and well-managed fleet. However, a bid for OT plc would almost certainly be hostile and, as the directors and their families own 40% of the shares, a successful bid is far from assured.

Extracts from PCO plc's Balance Sheet at 31 December 2003

	<i>£m</i>
Assets Employed	105.00
Cash and marketable securities	95.00
Accounts receivable and inventories	<u>(75.00)</u>
Less current liabilities	
Working capital	125.00
Property, plant and equipment	160.00
Less long term liabilities	<u>(80.00)</u>
Secured loan stock 7% repayable 2009	<u>205.00</u>

Shareholders' equity

Stated capital (Authorised £50 million)	
Issued	40.00
Accumulated profits	<u>165.00</u>
Net Assets Employed	<u>205.00</u>

PCO plc's financial advisors have produced estimates of the expected NPV and the first full year post-acquisition earnings of PCO plc and OT plc:

	<i>Estimated post-acquisition earnings in first full year following acquisition</i>	<i>Estimated NPV of combined organisation</i>
PCO plc plus OT plc	£70 million	£720 million

Summary financial statistics

	<i>PCO plc</i> 31 December 2003	<i>OT plc</i> 31 December 2003
Last year end		
Shares in issue (millions)	40	24
Earnings per share (pence)	106	92
Dividend per share (pence)	32	21
Share price (pence)	967	1020
Book value of fixed assets and current assets less current liabilities (£ million)	285	145
Debt ratio (outstanding debt as % of total market value)	17.0	14.0
Forecast growth rate % (constant, annualised)	5	9
Beta co-efficient	0.9	1.2

Required:

(a) Calculate, for PCO plc and OT plc *before* the acquisition:

- (i) The current market value and P/E ratio.
- (ii) The cost of equity using the CAPM, assuming the return on the market is 8% and the return on the risk free asset is 4%.
- (iii) The prospective share price and market value using the dividend valuation model.

(6 marks)

(b) Discuss and advise on the following issues:

- (i) The price to be offered to the target company's shareholders. You should recommend a range of terms within which PCO plc should be prepared to negotiate.
- (ii) The most appropriate form of funding the bid and the financial effects (assume cash or share exchange are the options).

- (iii) The business implications (effect on existing operation, growth prospects, risk and so on).

(19 marks)

Marks are split roughly equally between sections of part (b) of the question.

(Total = 25 marks)

Question Four

When determining the financial objectives of a company, it is necessary to take three types of policy decision into account: investment policy, financing policy and dividend policy.

Required:

- (a) Discuss the nature of these three types of decision, commenting on how they are inter-related and how they might affect the value of the firm (that is the present value of projected cash flows).

(12 marks)

- (b) Describe the different functions of the treasury and financial control departments of an organisation and comment on the relative contributions of these two departments to policy determination and the setting and achievement of financial objectives.

(13 marks)

(Total = 25 marks)

Question Five

BiOs Limited (BiOs) is an unquoted company that provides consultancy services to the biotechnology industry. It has been trading for 4 years. It has an excellent reputation for providing innovative and technologically advanced solutions to clients' problems. The company employs 18 consultants plus a number of self employed contract staff and is planning to recruit additional consultants to handle a large new contract. The company "outsources" most administrative and accounting functions. A problem is recruiting well-qualified experienced consultants and BiOs has had to turn down work in the past because of lack of appropriate staff.

The company's two owners/directors have been approached by the marketing department of an investment bank and asked if they have considered using venture capital financing to expand the business. No detailed proposal has been made but the bank has implied that a venture capital company would require a substantial percentage of the equity in return for a large injection of capital. The venture capitalist would want to exit from the investment in 4-5 years' time.

The company is all-equity financed and neither of the directors is wholly convinced that such a large injection of capital is appropriate for the company at the present time.

Financial information

Revenue in year to 31 December 2003	£3,600,000
Shares in issue (ordinary £1 shares)	100,000
Earnings per share	756p
Dividend per share	0
Net asset value	£395,000 (Note 1)

Note 1

The net assets of BiOs are the net book values of purchased and/or leased buildings, equipment and vehicles plus net working capital. The book valuations are considered to reflect current realisable values.

Forecast

- Sales revenue for the year to 31 December 2004 - £4,250,000. This is heavily dependent on whether or not the company obtains the new contract.
- Operating costs, inclusive of depreciation, are expected to average 50% of revenue in the year to 31 December 2004.
- Tax is expected to be payable at 30%.
- Assume book depreciation equals capital allowances for tax purposes. Also assume, for simplicity, that profit after tax equals cash flow.

Growth in earnings in the years to 31 December 2005 and 2006 is expected to be 30% per annum, falling to 10% per annum after that. This assumes that no new long-term capital is raised. If the firm is to grow at a faster rate then new financing will be needed.

This is a niche market and there are relatively few listed companies doing precisely what BiOs does. However, if the definition of the industry is broadened the following figures are relevant:

P/E Ratios

Industry Average:	18
Range (individual companies)	12 to 90

Cost of Equity

Industry average	12%
Individual companies	Not available

BiOs does not know what its cost of equity is.

Required:

- (a) Calculate a range of values for the company that could be used in negotiation with a venture capitalist, using whatever information is currently available and relevant. Make and state whatever assumptions you think are necessary. Explain, briefly, the relevance of each method to a company such as BiOs.
- (b) Discuss the advantages and disadvantages of using either venture capital financing to assist with expansion or alternatively a flotation on the stock market in 2-3 years' time. Include in your discussion likely exit routes for the venture capital company.

(15 marks)

(10 marks)

(Total = 25 marks)

End of question paper

Maths Tables and Formulae follow on pages 11-15

INDICATIVE MATHS TABLES AND FORMULAE

Present value table

Present value of 1.00 unit of currency, that is $(1-r)^{-n}$ where r = interest rate; n = number of periods until payment or receipt.

Periods (n)	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 (n)	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 1.00 unit of currency per annum, Receivable or Payable at the end of each year for n years $\frac{1-(1+r)^{-n}}{r}$

Periods (n)	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 (n)	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

Valuation models

- (i) Irredeemable preference share, paying a constant annual dividend, d , in perpetuity, where P_0 is the ex-div value:

$$P_0 = \frac{d}{k_{\text{pref}}}$$

- (ii) Ordinary (equity) share, paying a constant annual dividend, d , in perpetuity, where P_0 is the ex-div value:

$$P_0 = \frac{d}{k_e}$$

- (iii) Ordinary (equity) share, paying an annual dividend, d , growing in perpetuity at a constant rate, g , where P_0 is the ex-div value:

$$P_0 = \frac{d_1}{k_e - g} \quad \text{or} \quad P_0 = \frac{d_0 [1 + g]}{k_e - g}$$

- (iv) Irredeemable (undated) debt, paying annual after-tax interest, $i [1 - t]$, in perpetuity, where P_0 is the ex-interest value:

$$P_0 = \frac{i[1 - t]}{k_{d\text{net}}}$$

or, without tax:

$$P_0 = \frac{i}{k_d}$$

- (v) Total value of the geared firm, V_g (based on MM):

$$V_g = V_u + TB_c$$

- (vi) Future value of S , of a sum X , invested for n periods, compounded at $r\%$ interest:

$$S = X[1 + r]^n$$

- (vii) Present value of £1 payable or receivable in n years, discounted at $r\%$ per annum:

$$PV = \frac{1}{[1 + r]^n}$$

- (viii) Present value of an annuity of £1 per annum, receivable or payable for n years, commencing in one year, discounted at $r\%$ per annum:

$$PV = \frac{1}{r} \left[1 - \frac{1}{[1 + r]^n} \right]$$

- (ix) Present value of £1 per annum, payable or receivable in perpetuity, commencing in one year, discounted at $r\%$ per annum:

$$PV = \frac{1}{r}$$

- (x) Present value of £1 per annum, receivable or payable, commencing in one year, growing in perpetuity at a constant rate of $g\%$ per annum, discounted at $r\%$ per annum:

$$PV = \frac{1}{r - g}$$

FORMULAE CONTINUE OVERLEAF

Cost of capital

- (i) Cost of irredeemable preference capital, paying an annual dividend, d , in perpetuity, and having a current ex-div price P_0 :

$$k_{pref} = \frac{d}{P_0}$$

- (ii) Cost of irredeemable debt capital, paying annual net interest, $i[1 - t]$, and having a current ex-interest price P_0 :

$$k_{d \text{ net}} = \frac{i[1 - t]}{P_0}$$

- (iii) Cost of ordinary (equity) share capital, paying an annual dividend, d , in perpetuity, and having a current ex-div price P_0 :

$$k_e = \frac{d}{P_0}$$

- (iv) Cost of ordinary (equity) share capital, having a current ex-div price, P_0 , having just paid a dividend, d_0 , with the dividend growing in perpetuity by a constant $g\%$ per annum:

$$k_e = \frac{d_1}{P_0} + g \quad \text{or} \quad k_e = \frac{d_0[1 + g]}{P_0} + g$$

- (v) Cost of ordinary (equity) share capital, using the CAPM:

$$k_e = R_f + [R_m - R_f]\beta$$

- (vi) Cost of ordinary (equity) share capital in a geared firm (no tax):

$$k_{eg} = k_0 + [k_0 - k_d] \frac{V_D}{V_E}$$

- (vii) Cost of ordinary (equity) share capital in a geared firm (with tax):

$$k_{eg} = k_{eu} + [k_{eu} - k_d] \frac{V_D [1 - t]}{V_E}$$

- (viii) Weighted average cost of capital, k_0 :

$$k_0 = k_{eg} \left[\frac{V_E}{V_E + V_D} \right] + k_d \left[\frac{V_D}{V_E + V_D} \right]$$

- (ix) Adjusted cost of capital (MM formula):

$$k_{adj} = k_{eu} [1 - tL] \quad \text{or} \quad r^* = r[1 - T^*L]$$

In the following formulae, β_u is used for an ungeared β and β_g is used for a geared β :

- (x) β_u from β_g , taking β_d as zero (no tax):

$$\beta_u = \beta_g \left[\frac{V_E}{V_E + V_D} \right]$$

- (xi) β_u from β_g , taking β_d as zero (with tax):

$$\beta_u = \beta_g \left[\frac{V_E}{V_E + V_D [1 - t]} \right]$$

Other formulae

- (i) Interest rate parity (international Fisher effect):

$$\text{Forward rate US\$/\pounds} = \text{Spot US\$/\pounds} \times \frac{1 + \text{nominal US interest rate}}{1 + \text{nominal UK interest rate}}$$

- (ii) Purchasing power parity (law of one price):

$$\text{Forward rate US\$/\pounds} = \text{Spot US\$/\pounds} \times \frac{1 + \text{US inflation rate}}{1 + \text{UK inflation rate}}$$

- (iii) Link between nominal (money) and real interest rates:

$$[1 + \text{nominal (money) rate}] = [1 + \text{real interest rate}][1 + \text{inflation rate}]$$

- (iv) Equivalent annual cost:

$$\text{Equivalent annual cost} = \frac{\text{PV of costs over } n \text{ years}}{n \text{ year annuity factor}}$$

- (v) Theoretical ex-rights price:

$$\text{TERP} = \frac{1}{N + 1} [(N \times \text{cum rights price}) + \text{issue price}]$$

- (vi) Value of a right:

$$\text{Value of a right} = \frac{\text{Rights on price} - \text{issue price}}{N + 1}$$

or

$$\frac{\text{Theoretical ex rights price} - \text{issue price}}{N}$$

where N = number of rights required to buy one share.

SOLUTIONS TO PILOT PAPER

Note:

In some cases, these solutions are more substantial and wide ranging than would be expected of candidates under exam conditions. They provide background on theorists, frameworks and approaches to guide tutors and students in their preparation, studies and revision.

SECTION A

Answer to Question One

Requirement (a)

(i) Calculations of NPVs

Alternative 1

Item	Year	0	1	2	3
		□m	□m	□m	□m
Revenue		0	4.48	11.80	17.60
Less costs					
Factory conversion			-2.80		
Equipment		-3.20	-4.80		
Redundancy costs		-2.10			
Operating costs			<u>-4.07</u>	<u>-6.63</u>	<u>-8.66</u>
Net cash flows		<u>-5.30</u>	<u>-7.19</u>	<u>5.17</u>	<u>8.94</u>
Discount rate @ 9%		1.000	0.917	0.842	0.772
Discounted cash flows		-5.30	-6.59	4.35	6.90

Net present value of cash flows for first 3 years of operations = □ -0.64 million

One approach to the calculation of terminal value would be to assume, conservatively, that cash flows would only maintain for 8 years, that is until the first date the equipment may need to be replaced. The figures would be:

NPV to end year 3	□m	-0.64
PV of after-tax cash flows from year 4 to year 8		24.03 (note 1)
Less opportunity cost of CC from year 1 to year 8		<u>-12.18</u> (note 2)
Total NPV		<u>11.21</u> million

Notes:

- This is □ 8.94 million multiplied by 80% (year 3's after-tax cash flow) increased by 4% for growth and multiplied by the appropriate year's discount factor for each of the year's 4 to 8.
- This is □ 2.2 million multiplied by the eight-year 9% cumulative present value factor (5.535).

Examiner's Note

An alternative approach would be to use the constant growth version of the dividend valuation model (substituting earnings for dividends) to calculate values beyond year 3. As JHC Group expects constant growth in earnings of 4% per annum, it might be reasonable to assume an annual 4% growth in earnings of a new venture. The NPV would then become:

	□m	
NPV to end year 3:	-0.64	
PV of cash flows from year 4 onwards	114.84	
	[(8.94 x 0.8 x 1.04 x 0.772)/(0.09 - 0.04)]	
Less Opportunity cost of lost revenue from CC (Assuming no growth)	<u>-24.44</u> (2.2/.09)	
Total NPV (value to firm)	□ <u>89.76</u>	

However, there are a lot of assumptions here and we really need estimates of the replacement costs of the equipment to obtain a more realistic figure. A value at the lower end of the range □11.21 million to □ 89.76 million is probably more appropriate given the finite life of the equipment.

Alternative 2

<i>Item</i>	<i>Year</i>	<i>0</i>	<i>1</i>	<i>2</i>	<i>3</i>
		□m	□m	□m	□m
Revenue			7.80	9.68	13.13
<i>Less: Costs</i>					
Factory conversion			-2.80		
Equipment		-4.50			
Redundancy costs		-0.42			
Operating costs		<u> </u>	<u>-3.06</u>	<u>-3.44</u>	<u>-4.13</u>
Net cash flows		-4.92	1.94	6.24	9.00
Discount rate @ 9%		1.000	0.917	0.842	0.772
Discounted cash flows		-4.92	1.78	5.26	6.95

Net present value of cash flows for first 3 years of operations = □ 9.07 million

As with Alternative 1, one approach to the calculation of terminal value would be to assume that cash flows would only maintain for 6 years, that is until the first date the equipment is likely to need to be replaced.

Note: The capital cost is payable when factory conversion is complete, so discounting at the half year rate, or even the 1 year rate, given the instruction on factory conversion costs in the question, would be acceptable.

	□m	
NPV to end year 3	9.07	
PV of after-tax cash flows from year 4 to year 6	15.20	(note 1)
Less opportunity cost of CC - years 1 - 6	<u>-9.87</u>	(note 2)
Total NPV	<u>14.40</u>	

Notes:

1. This is £9.00 million multiplied by 0.8 (year 3's after tax cash flow) increased by 4% growth multiplied by the appropriate year's discount factor for each of the year's 4 to 6.
2. This is £2.2 million multiplied by the six-year 9% cumulative present value factor (4.486).

Examiner's Note

An alternative approach here also is to use the perpetuity formula to calculate values beyond year 3. The NPV would then become:

	£m
NPV for years 1-3	9.07
PV of cash flows from year 4 onwards	115.61 [(9.00 x 0.8 x 1.04 x 0.772)/(0.09 - 0.04)]
Less Opportunity cost of lost revenue from CC	<u>-24.44</u> (2.2/0.09)
Total NPV (value to firm)	<u>100.24</u>

A value somewhere between £14 million and £100 million is suggested. As with Alternative 1, there are a lot of assumptions here and we really need estimates of the replacement costs of the equipment to obtain a more realistic figure. A value at the lower end of the range is probably more appropriate given the finite life of the equipment.

Examiner's Note

Equivalent annual annuities (EAA) could also be calculated, assuming Alternative 1 ceases in year 8 and Alternative 2 in year 6:

	NPV	EAA
	£m	£m
Alternative 1	11.21	2.025 (11.21/5.535)
Alternative 2	14.40	3.210 (14.40/4.486)

The equivalent annual annuity (EAA) approach seeks to determine the constant annual cash flow that offers the same present value as the project's NPV. This is found by dividing the project's NPV by the relevant annuity discount factor. The figures here support the choice of Alternative 2 that was already suggested by the NPV calculations.

Assumptions

- That the WACC is the appropriate discount rate to use in the evaluation. This may not be the case and is discussed further in *requirement (b)*, the report.
- For Alternative 1, we accept the supplier's offer to pay a 50% deposit to hold constant the purchase price. This may not be to our advantage and is discussed further in *requirement (b)*, the report.

- CC would continue to earn \square 2.2 million a year indefinitely. This may not be realistic, but provides an estimate that can be adjusted when we fine-tune the evaluation.
- Cash flows beyond the third year of operations are estimated based on year 3's cash flows and assuming constant growth at 4%. Again, this may not be realistic, but provides a basis for discussion.

(ii)

The process for calculating MIRR is:

- An outflow in year 0 and a single inflow at the end of the project life is assumed.
- Cash flows after the initial investment are converted to a single cash inflow by assuming that the cash flows are reinvested at, usually, the cost of capital.
- MIRR is calculated by dividing the outflow by the single inflow, using PV tables and interpolation to arrive at the discount rate, or MIRR.

MIRR is intended to address some of the deficiencies of IRR, for example:

- It eliminates the possibility of multiple rates of return;
- It addresses the reinvestment issue;
- MIRR rankings are consistent with the NPV rule, which is not always the case with IRR.

However, there are weaknesses:

- If the reinvestment rate is greater than the cost of capital, then MIRR will underestimate the project's true return;
- The determination of the life of the project can have a significant effect on the actual MIRR if the difference between the project's IRR and the company's cost of capital is large;
- The MIRR, like IRR, is biased towards projects with short payback periods;
- It does not appear to be understood or used extensively in practice;
- In the case here, we are evaluating two mutually exclusive projects with different life spans. The argument for using MIRR is therefore weak.

Requirement (b)

Report

To: Directors of JHC Group
From: Financial Manager
Subject: New subsidiary – SP

Introduction

Contents of report

- (i) Estimated net present value of SP under 2 alternatives.
- (ii) Contribution to attainment of group objectives and likely impact of the new subsidiary on the Group's share price and market value.
- (iii) Recommendation of a preferred alternative.

(i) *Estimated net present value for SP*

Two alternatives are proposed:

Alternative 1 assesses the revenues and costs assuming we purchase advanced equipment.

Alternative 2 assumes we use "old" technology with minor improvements.

Workings for the revenues and costs for both alternatives are shown in the answer to requirement (a). In summary the financial performance of the two alternatives is as follows (all figures in □millions):

	Alternative 1	Alternative 2
NPV over 6 or 8 years	11.21	14.40
NPV as a "perpetuity"	89.76	100.24
EAA	2.025	3.210

On the basis solely of the financial performance, alternative 2 is the better choice.

(ii) *Contribution to the Group's objectives.*

OBJECTIVE 1

- The new subsidiary is small and would increase Group revenue by less than 1% in the first full year of operations under both alternatives, assuming current group revenue remains constant or increases. Also, loss of sales revenues by CC would have to be made up before any overall increases in revenues occurred.
- In year 1, *alternative 2* will make a small contribution to cash flow (but still negative on a cumulative basis), but *alternative 1's* cash flows are negative until year 2 and the project only begins to pay back in the second half of year 3.

- The loss of CC's earnings will not be compensated in the first year of operations and so, in the immediate future, the proposal will be detrimental to the Group's objectives.
- The question must be asked whether the Group could not expend its resources, both financial and human, more effectively. There will be little impact on dividends under either alternative.

OBJECTIVE 2

- Both alternatives would contribute to some extent. Using the estimated “bottom of the range” figures in section 1 and shareholder value analysis, and assuming all other things are held constant, the effect on the company's share price and market capitalisation would be as follows:

	<i>Alternative 1</i>	<i>Alternative 2</i>
	□m	□m
Current market value of the JHC Group	2908.50	2908.50
Value of SP	<u>11.21</u>	<u>14.40</u>
Total	<u>2919.71</u>	<u>2922.90</u>
Revised share price	8.34	8.35
Current share price	8.31	8.31
Increase	3 cents	4 cents

- Both alternatives would add to shareholder wealth, but the increase is negligible. However, in theory, any increase would contribute to the first part of our second objective, and there is little to choose between them in respect of contribution to this objective.
- *Alternative 2* would minimise the adverse effects on the workforce, but may not be as beneficial to the other stakeholders if we assume the legislation is intended to benefit the health of the population at large as *Alternative 1*.

Examiner's Note:

The effect on shareholder wealth does of course depend on the assumptions made. Any attempt using sensible assumptions would gain credit.

(iii) *Recommendation*

Factors to consider:

- The two alternatives have to be weighed against the continuation of CC's operations. This is allowed for in the valuation, but some strategic evaluation is needed. If CC is operating at only 60% capacity and has an NPV below both alternatives, then discontinuation of this subsidiary's operation seems a logical decision. No information is given on whether any action could be taken to increase CC's productivity. It has to be assumed that this subsidiary is in decline, but it is worth asking the question.
- The decision must take into account other factors such as relative risks and future strategy of the group.

- On the basis of the increase in shareholder wealth, *Alternative 2* is to be preferred. This also means fewer staff are made redundant. On these criteria, this alternative contributes most to the Group's second objective. On general health and welfare issues, *Alternative 1* would contribute more.
- Neither alternative will contribute much to the Group's objective to increase both operational cash flows and dividends by 4% each year.
- In summary, the question has to be asked whether we should be putting so much effort into pursuing the establishment of such a small subsidiary unless there are other issues to consider, for example the effect on other subsidiaries.

Signed: Financial Manager

Requirement (c)

In the context of investment decisions, there are three options to be considered:

- The abandonment option;
- The timing option;
- The strategic option.

The abandonment option

- Major investment decisions involve heavy capital commitments and are largely irreversible; once the initial capital expenditure is incurred, management cannot turn the clock back and act differently.
- Because management is committing large sums of money in pursuit of higher, but uncertain, payoffs, the option to abandon, or "bail out", should things look grim can be valuable.
- Abandonment possibilities can reduce the riskiness of a project and increase the expected NPV of certain types of project which would otherwise produce large negative NPVs if they could not be abandoned in the event that things do not work out. Also, the investment could be repeated.
- In the case of SP, the company could defer payment of the equipment for *Alternative 1* and risk the 5% increase in cost. This is a high price to pay for an abandonment option on an investment that will have already incurred some capital costs, redundancy payments and loss of earnings from the closure of CC.
- In the case of *Alternative 2*, the equipment can be purchased any time. There will have been some expenditure made as soon as the decision is taken, but as the factory conversion will take six months, the company can choose to abandon the capital expenditure at any time within those six months.

The timing option

- The example here not only introduces an abandonment option, it also raises the option to "wait and see". Management may have viewed the investment as a "now or never" opportunity, arguing that in highly competitive markets there is no scope for delay: money is made by staying ahead of the competition. In effect, this amounts to viewing the decision as a call option which is about to expire on the new plant for the capital investment outlay. If a positive NPV is expected, the

option will be exercised, otherwise the option lapses and no investment is made.

- The option to defer the decision by, say, one year until the outcome of the government's deliberations on health and safety issues becomes known, makes obvious sense. An immediate investment would yield either a negative NPV – in which case it would not be taken up – or a positive NPV.
- Delaying the decision by a year to gain valuable new information is a more valuable option. This helps to understand why management sometimes does not take up apparently wealth-creating opportunities; the option to wait and gather new information is sufficiently valuable to warrant such delay.

The strategic investment option

- Certain investment decisions give rise to follow-on opportunities that are wealth creating. New technology investment is particularly difficult to evaluate. Managers refer to the high level of intangible benefits associated with such decisions - meaning that these investments offer further investment opportunities (for example, greater flexibility).
-

SECTION B

Answer to Question Two

Requirement (a)

NPV of investment

The investment produces a negative NPV as follows:

Capital cost	\$1,500,000 @ 1.58 =	949,367
Cost savings @ 9% for 5 years		
£240,000 x 3.89		<u>933,600</u>
	NPV	-15,767

- This suggests that, as an investment evaluated at the company's post-tax cost of equity capital over 5 years, it is not financially sustainable.
- However, the tax advantages of debt might convert the investment into a positive NPV project.

(i) Financing with undated debt

If undated debt of, say, £950,000 is used to finance the investment there will be tax savings in perpetuity. However, as RZ evaluates investments over 5 years, it is (arguably) reasonable to take into account only 5 years' worth of tax savings for this particular investment decision:

$$\begin{aligned} \text{£950,000} \times 7\% \times 30\% &= \text{£19,950} \\ \text{PV} = \text{£19,950} \times 3.89 &= \text{£77,605} \end{aligned}$$

The adjusted NPV therefore becomes
 $-\text{£15,767} + \text{£77,605} = \text{£61,838}$

- This assumes the discount rate to apply to the tax savings on the interest payments is the company's cost of capital. There is a strong case for using the after tax cost of debt ($7\% \times [1 - 0.30] = 4.9\%$, say 5%). In this case the adjusted NPV would increase by £8,759 to £70,597 (tax savings would be £19,950 @ 4.329 – the cumulative discount factor for 5 years @ 5% = £86,364).
- A problem here is that long-term debt is being used to finance what the company views as a medium term investment. Consideration would have to be given to how the debt would be serviced at the end of the investment's life.

Advantages

- Interest payments are tax deductible.
- Does not dilute share ownership or EPS, although in the case here this is probably not a concern.
- Probably cheaper and easier to administer.

Disadvantages

- Risk of bankruptcy if interest payments not met. RZ has revenue of £68 million and earnings of £4.5 million. Interest payments are therefore comfortably covered.

(ii) *Financing with a finance lease*

- Leasing may be considered a direct alternative to medium term debt rather than long-term debt. The advantages and disadvantages of a finance lease compared to equity are therefore similar to those for debt.
- The most appropriate method of evaluation is to compare the cash flows associated with debt with the cash flows associated with leasing. See attached table.

This shows there is a net advantage of £29,343 of buying with debt. However, much of this advantage is based on the estimated residual value of the machinery.

Other factors to consider are:

- An advantage of leasing might be that it is paid off in 5 years but the company has debt in its capital structure for much longer. Whether this is important or not is related more to the attitudes of management than economic factors. Leasing is not "off balance" sheet - if it ever was - so there should be no effect on ratios.
- An advantage of leasing shown by empirical studies is that leasing is often considered more convenient to arrange and involves lower issue costs than either debt or equity.
- The tax treatment needs more detailed consideration.

(iii) *Financing with an operating lease*

The main difference between a finance lease and an operating lease is who bears the risk. With a finance lease it is the lessee, with an operating lease it is (usually) the lessor. An operating lease is more akin to rental or hire purchase than to new capital. The main advantages are:

- Usually it can be cancelled at break points in the lease.
- Although commitments of the lease should be disclosed in notes to the accounts, the machines would not appear as assets in the balance sheet, which may have a favourable effect on ratios. As this is a private company and the directors are major shareholders, this is probably not a concern.
- Associated costs such as insurance, maintenance and so on may be wrapped up in the lease charge – this may or may not be advantageous to the lessee.

The main disadvantages are:

- Cost – more expensive than other methods of finance, although there may well be tax issues, which would require more information than given in the scenario to evaluate properly.
- May not be available on this type of machinery.

Year		0	1	2	3	4	5	Totals
Lease payments		-325,000						
Lease cash flows								
\$ rental payments		-325,000	-325,000	-325,000	-325,000	-325,000		-1,625,000
In £		-205,696	-207,703	-209,729	-211,776	-213,842		-1,048,746
Tax savings			61,709	62,311	62,919	63,533	64,152	314,624
Net lease cash flows		-205,696	-145,994	-147,418	-148,857	-150,309	64,152	-734,122
Buy/borrow								
Outlay		-949,367						-949,367
Residual value							94,937	94,937
Tax savings			71,203	53,402	40,051	30,039	61,634	256,329
Net cash flows		-949,367	71,203	53,402	40,051	30,039	156,571	-598,101
Net incremental cash flows		-743,671	217,197	200,820	188,908	180,348	92,419	136,021
PV @ 5%		1	0.952	0.907	0.864	0.823	0.784	
		-743,671	206,771	182,144	163,217	148,426	72,456	29,343
Net advantage of purchase with debt		29,343						
Capital allowances								
Purchase cost	949,367							
		CA @ 25%	Tax relief @ 30%					
Year 1 allowances		237,342	71,203					
WDV end Year 1	712,025							
Year 2 allowances		178,006	53,402					
WDV end Year 2	534,019							
Year 3 allowances		133,505	40,051					
WDV end Year 3	400,514							
Year 4 allowances		100,129	30,039					
WDV end Year 4	300,385							
Residual value	94,937		0					
Balancing allowance		205,448	61,634					
Total			256,329					

(b) *Benefits and potential problems of financing assets in the same currency as their purchase*

Benefits

- Exposure to currency fluctuations is minimised as the value of the asset and the value of the liability are matched, assuming the loan is repaid in instalments broadly equal to depreciation.
- Interest payments would (presumably) be made in the foreign currency and paid overseas which would further aid the matching principle.
- There might be cheap finance available in the overseas country to give advantage to US exporters.
- Debt financing is cheaper than equity wherever raised as it has tax effects and is (usually) lower risk than equity. However, the tax situation is difficult to comment on without knowledge of detailed tax regimes and treaties between the two countries.
- The decision is a matter of judgement and depends, to some extent, on how risk averse the company is. However, hedging is an alternative option, which would minimise the risks.

Potential problems

- Changes in exchange rates between decision to buy and finance, unless made simultaneously.
 - Introduction of exchange controls during the life of the finance contract.
 - Better finance deals may be available elsewhere, despite the currency risk.
-
-

Answer to Question Three

Requirement (a)

(i) – P/E Ratios and Market Values

	PCO plc	OT plc
<i>Information in case (shown here for convenience)</i>		
EPS - pence	106	92
Share price - pence	967	1,020
No of shares in issue (millions)	40	24
P/E Ratio (SP/EPS)	9.1	11.1
Market Value (£M) (No of shares * SP)	386.8	244.8

(ii) - Cost of equity using CAPM

	PCO plc	OT plc
$Ke = Rf + B(Rm - Rf)$		
RF rate (given)	0.04	0.04
Market return (given)	0.08	0.08
Beta	0.9	1.2
Cost of Equity	7.6%	8.8%

(iii) - Share price and market value using DVM

$$Po = D1 / (Ke - g)$$

Share price - pence	1,292	n/a
Market value - £ million	$[(32p \times 1.05) / (0.076 - 0.05)]$	$[(21p \times 1.09) / (0.088 - 0.09)]$
	517	n/a

Requirement (b)

Advice on price and form of funding

(i) Price to be offered

- The market value of OT plc can be determined most easily by reference to the current share price.
- The constant growth version of the DVM will not work because estimated growth is greater than the cost of equity. It would be possible to use an adjusted version of the model but information on future cash flows would be necessary.
- Using current market values, PCO plc is worth £387 million and OT plc, £245 million, a total of £632 million before any acquisition gains.
- The financial advisors have estimated that the NPV of the combined companies is £720 million, a post-acquisition gain of £88 million.
- The price to be offered will depend on the negotiating abilities of the two companies. Clearly, PCO plc will not be able to retain all, or possibly even most, of the acquisition gains.

- A key factor may be that it is likely to be a hostile bid. This will inevitably raise the price to be paid and most research has shown that hostile bids result in a fall in wealth for the bidder's shareholders.
- A realistic starting point may be to allocate the gains in the proportion of the relative current market values of the two companies. This would be £88 million in the proportions 61% and 39%.
- This would mean PCO plc would take £54 million of the gain and OT plc £34 million.
- The price to be offered would, therefore, be £279 million (£245 million market value + £34 million share of merger gains) or 1,162 pence per share.
- PCO plc would also, presumably, take on OT plc's outstanding debt of approximately £40 million, but the terms of the debt contract would need to be investigated.

(ii) *Form of funding*

CASH

- PCO plc could not offer cash without raising additional debt funding.
- Assuming it was prepared to use all its cash reserves of £105 million (assuming the balance has not been used recently) this would mean an additional £174 million debt, or £214 million if OT plc's £40 million debt has to be repaid under the terms of the debt contract and PCO plc is required to re-finance it.
- PCO plc's debt ratio (debt as a proportion of market value) would then increase substantially – much would depend on how the share price moved following the acquisition. If the market value of the combined group is worth £632 million, then the gearing in market value terms (assuming debt trading at par) would rise from 17% to 29%. This might be quite acceptable, although the effect on the cost of capital must be considered.

SHARES

- The opening bid would be based on current market prices, i.e. 967 pence and 1,020 pence.
- Suggests an exchange ratio of 1.05 of a PCO plc share for every OT plc share, which would almost certainly be rejected as inadequate, as OT plc's shareholders would have no incentive to accept the offer.
- If all the gains were to be given to OT plc's shareholders the share price would be 1,387 pence for OT plc (£333 million/24 million). This would suggest a ratio of 1.43 PCO plc shares per OT plc share, and 34.32 million new shares would need to be issued to OT plc shareholders.
- If first year earnings are forecast as £70 million, this would be an EPS of 94.3 pence – a decline on current EPS for PCO plc, which might not satisfy shareholders.
- A strong statement from management would be needed.
- PCO plc has only 50 million shares authorised and 40 million are issued. A share offer would require increasing authorised share capital. This might give a signal to the market that PCO plc might be considering a bid for a large company, which would have an effect on the share price. Whether this is up or down would depend on market perceptions and sentiment towards PCO plc at the time. If the share price rose, then this is to PCO plc's advantage in any

share exchange. If it fell, then a share exchange might be considered unwise.

COMBINATION

- A combination offer could be considered; for example, shares plus cash or shares plus debt.

(iii) *Business implications*

- It is likely to be a hostile bid, which will involve extensive advisors' costs and PCO plc will probably eventually pay all acquisition gains (and possibly more) to OT plc's shareholders.
 - Advantages include the diversification aspects of the acquisition, which is after all why PCO plc wants to acquire another company. However, PCO plc has no experience of the industry.
 - OT plc operates in an area in which PCO plc does not have any particular expertise, so it is difficult to see where any additional value can be created. Some synergies as a result of vertical integration might be claimed but these are likely to be small, and accompanied by a reduction in PCO plc's flexibility to change suppliers. It is in the oil business so, again, it does not really look like a diversification move.
 - The required investment is likely to be large by PCO plc's standards. The company would be taking on a substantial amount of debt in the form of OT plc's existing borrowings. A rights issue is possible, perhaps conditional upon the bid being successful.
 - A share offer would need to be a bit above one-for-one, given the current market prices. This would require a prior increase in PCO plc's authorised capital, since only 10 million shares remain unissued, and might give a signal that an acquisition was being considered. A possibility is a choice between shares in PCO plc or cash. Provided no more than half of OT plc's shareholders opted for cash, this would leave a reasonable capital structure but, to be comfortable, the company would still need to increase authorised share capital.
 - An evaluation of the acquisition should look in more detail at effect on business growth, risk of the company, effect on capital structure and cost of capital and so on.
 - An exercise to identify other possible acquisitions targets could (should?) be launched.
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Answer to Question Four

Requirement (a)

Three types of decision

Investment decisions involve:

- The analysis and appraisal of capital expenditure projects, acquisitions, mergers and divestments, together with the related committal of funds.
- Decisions relating to working capital and trade investments, with the aim of maintaining satisfactory returns for the organisation.

Financial controllers will assess the likely cash flows of the various alternatives and identify the one which shows the maximum NPV.

Financing decisions relate to:

- The obtaining of suitable and adequate funds with which to operate the business.
- The desired level of gearing represented by the most appropriate combination of short, medium and long-term debt together with equity, including internally generated funds.

If capital needs to be raised, managers will seek the mix of sources which minimises the weighted average cost of capital.

Dividend decisions are:

- Based in part on making payments to shareholders, which will currently satisfy their desired long-term rate of return on investment and thereby help to maintain the company's share price.
- Based in part on retaining sufficient profits to sustain and advance the level of operations to secure the shareholders' aspirations for the future.

The key decision is whether the shareholders would be better off having money now or allowing it to be reinvested in the business to produce a higher level of cash flow in the future.

All three types of decisions are inter-related, thus the financing decision will affect the cost of capital, and as a consequence, the net benefits obtainable from a particular project, thereby influencing the investment decision, while the financing decision concerning gearing will affect both the other decisions.

The dividend decision, in determining the level of retentions, will affect the cash available for investment, and the extent to which external sources of funds need to be sought in financing to optimise operations.

Requirement (b)

Treasury and Financial Control Departments

In summary, a Treasurer handles the acquisition and custody of funds whereas the Financial Controller has responsibility for accounting, reporting and control.

CIMA Official Terminology describes the treasury function as *the function concerned with the provision and use of finance*. The main functions of such a department include:

- establishment of corporate financial objectives;
- managing the firm's liquid assets; cash, marketable securities and so on;
- management of the company's funding; determination of policies, identifying sources and types of funds;
- corporate finance and related issues such as taxation, pension fund investment and so on (although these functions are sometimes performed by the controller);
- in a multinational, dealing with currency management - dealing in foreign currencies, hedging currency risks and so on.

The financial control function is mainly concerned with the recording and reporting of financial information such as:

- preparation of budgets and budgetary control;
- preparation of periodical financial statements such as monthly accounts, annual accounts;
- management and administration of activities such as payroll, internal audit (which in some cases may be a separate department responsible directly to the Finance Director).

It is therefore apparent that the Treasury Department has main responsibility for setting corporate objectives and policy and Financial Control has the responsibility for implementing policy and ensuring the achievement of corporate objectives. This distinction is probably far too simplistic and, in reality, both departments will make contributions to both determination and achievement of objectives.

There is a circular relationship in that Treasurers quantify the cost of capital, which the Financial Controllers use as the criterion for the deployment of funds; Financial Controllers quantify projected cash flows which in turn trigger Treasurers' decisions to employ capital.

In smaller firms the functions of treasury and financial control may be combined and even in larger firms the two functions often include related activities, for example management of cash. Although the Financial Controller has the main reporting responsibilities, the Treasurer will, typically, report on cash flows and cash management. In some cases who has responsibility for certain activities is not clear cut. For example credit control, taxation, insurance or pensions are sometimes handled by the Treasury department and sometimes by the Financial Controller's department.

Answer to Question Five

Requirement (a)

Range of values

There are three basic methods we could use to value an unquoted company such as BiOs Limited (BiOs): asset value, P/E ratio basis and discounted cash flow basis. Each is discussed in turn.

Asset value

- The book value of BiOs' net assets is a little under £400,000 at the last balance sheet date.
- This value has little relevance except in specific circumstances such as a liquidation or disposal of parts of a business. In BiOs' situation it has even less relevance than in a company with a high level of tangible assets, as much of the value is in employees' expertise, or intellectual capital.
- Assuming the amount in the balance sheet does reflect realisable value then this is a "floor" level valuation, but of little real relevance in the circumstances here.

P/E Ratio

- In a listed company the P/E ratio is used to describe the relationship between the share price (or market capitalisation) and earnings per share (or total earnings). It is calculated by dividing the price per share by the earnings per share.
- Market capitalisation is the share price multiplied by the number of shares in issue. Market capitalisation is not necessarily the true value of a company as it can be affected by a variety of extraneous factors, but for a listed company it provides a benchmark that cannot be ignored.
- In the case of an unlisted company, a P/E ratio that is representative of similar quoted companies might be used as a starting point for arriving at an estimated market value, based upon the present earnings of the unlisted company. The potential market capitalisation would be the company's latest earnings multiplied by the benchmark P/E ratio.
- The P/E ratio can be viewed as indicative of expected growth, which is why some companies in the industry have very high P/E ratios. A relatively high P/E would suggest that investors are prepared to pay a premium for the company's shares, based upon present earnings, because they anticipate growth in future earnings beyond growth rates expected in comparable companies.
- The potential value of BiOs using the average and range of P/Es for the industry is as follows:

BiOs' earnings in 2003: £756,000	(100,000 shares at 756p EPS)		
P/E Ratio	12	18	90
Estimated value (£000)	9,072	13,608	68,040

- This valuation is very rough and ready and takes no real account of BiOs' specific circumstances and potential.
- It would be possible to estimate a more precise P/E ratio based on forecast growth rates, but this is complicated by two years of expected super-growth

followed by a much lower rate after that.

- The average P/E ratio of the industry applied to next year's expected earnings of £1,487,500 [Sales revenue of £4,250,000 x 50% x (1 – 0.3)] might be more appropriate and would give an estimated market capitalisation of £26.775 million.

Note: Any sensible combination of earnings and P/E ratio would be acceptable here.

Discounted Cash Flow

This method values BiOs using the directors' cash flow forecasts based on expected sales growth and associated costs. The approach is as follows:

1. Estimate sales income.
2. Calculate earnings/cash flows for the years 2004-2006 based on your estimates of growth. Assuming earnings equals cash flows is a simplification for examination purposes. In reality this would be affected by, for example: depreciation, movements in working capital, and sale and purchase of non-revenue items.
3. Calculate discounted cash flows using the industry average cost of capital of 12%.
4. Estimate the present value of cash flows from 2006 to infinity using the dividend valuation model. This again is an oversimplification but provides a useful "short cut". BiOs has not in the past paid any dividends but the earnings figure is equally acceptable: the basic form of the model assumes all earnings are paid as dividends.
5. Add the present value of all future estimated cash flows.

Estimation of earnings and cash flows for 2004-2006 (£000s)

Year to:	31 December 2004
Revenue	4,250
Operating costs	-2,125
Tax at 30%	<u>-637</u>
Earnings/cash flow	1,488

Estimation of cash flows for 2005-2006 (£000s)

2005 =	£1,488 * 1.30	=	1,934
2006 =	£1,934 * 1.30	=	2,514

Discounted cash flows for 2004-2006

Year	Cash Flows	Discount factor at 12%	DCF £000
2004	1,488	.893	1,328
2005	1,934	.797	1,541
2006	2,514	.712	<u>1,790</u>
Total			4,659

Estimation of value of cash flows from 2007 to infinity

$$\begin{aligned} \text{Earnings in 2007 assuming 10\% growth on 2006: } & \text{£2,514} * 1.1 = & \text{£2,765} \\ \text{In today's money, } D1 = & \text{£2,765} * 0.712 = & \text{£1,969} \\ P_0 = & D1 / (k_e - g) \\ = & 1,969 / (0.12 - 0.10) = & \text{£98,450} \end{aligned}$$

[Note: Any sensible attempt to calculate the value of cash flows to infinity, and recognition that it is in fact necessary, will gain credit.]

Present value of all future estimated cash flows

2004 - 2006	=	4,659
2007 onwards	=	<u>98,450</u>
Total		103,109

This method suggests a company valuation of just over £100 million.

Summary of methods and values

	£000s	
Asset value	395	
P/E based value(industry average)	13,608	(or £26,775 if 2004 earnings used)
DCF value	103,000	

- As discussed, the asset value is largely irrelevant and the P/E basis is highly unreliable because of difficulties in comparing one company with another. The DCF method is the most likely to be reliable but the figures produced are very rough and ready and assume constant growth to infinity, which is fairly unrealistic.
- A more detailed exercise needs to be undertaken. Points to consider are:
 - How is revenue to grow by rates suggested when the limiting factor is qualified staff?
 - What is the true cost of capital?
 - How will operating costs fall from 70% of revenue to 50% in 2004 and beyond?

70% is calculated as:

$$\begin{aligned} \text{EPS of 756p} * 100,000 \text{ shares} & = & \text{£756,000} \\ \text{Pre-tax this is } 756,000 / 0.7 & = & \text{£1,080,000} \\ \text{As a percentage of sales this is } 1,080 / 3,600 * 100 & = & 30\% \\ \text{Therefore, operating costs} & = & 70\% \end{aligned}$$

Requirement (b)

Venture capital finance versus flotation

- Even if a company valuation of around £100 million is accepted, this is still relatively small for a full listing. A listing on the AIM might be an acceptable alternative and less expensive although the relative length of the "queues" for listing (controlled by the Stock Exchange) needs to be considered.
 - The main advantage of any sort of listing is that it provides a readily available benchmark valuation for the shares. However, the number of shares to be sold needs serious consideration. If a small percentage of the shares is sold, this may deter institutional investors as there may not be a ready market in the shares if they want to sell. If a high percentage is issued, control is lost.
 - If venture capital finance were to be sought, control would be surrendered anyway as these organisations require a large equity stake, high returns and an assured exit route.
 - Typically, an exit route would be to sell the shares on the market either via a placing or offer for sale or to another venture capital company. The original owners of the firm might be able to buy back their shares via an earn-out basis. This method allows the venture capitalist to sell shares back to the owners on the basis of the company achieving certain levels of return.
 - No details of what investment would be required to allow the company to grow at a faster rate is given in the question. In a company such as this, the value is in the intellectual capital and this is clearly in short supply.
 - Before deciding on a course of action the directors must clarify their short and long-term objectives. If the aim is to maximise personal wealth in the shortest possible time, then an early flotation is probably the best alternative. If control is important then other alternatives might be more appropriate. Other issues to consider are:
 - timing and cost of a flotation, and how many other similar companies might be coming to market at the same time;
 - the implications of any likely changes in industry regulation.
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