P1 May 2011 Exam Solutions

SECTION A – 20 MARKS

Question One

1.1 The answer is B

Interest is payable on only the part of the overdraft used.

1.2 The answer is B

Risk adverse managers (maximin managers or "pessimist") assume always the worse outcome will arise, therefore aim to maximise the returns from the worst outcomes.

Therefore:

The marketing manager would choose selling price of $60 as the worst case scenario is $30,000 contribution being earned which is the best of all the worst case scenarios.

1.3 The answer is D

The expected value of the decision:

EV of development succeeding + EV of development not succeeding

If development is successful then the company will market the product and therefore we need to work out the EV of marketing success.

Marketing success rate		EV
Very Reasonably Unsuccessful	(250,000 x 0.7 x 0.5) = (150,000 x 0.7 x 0.3) = (-80,000 x 0.7 x 0.2) =	$87,500 $31,500 -$11,200
	Total EV of marketing	$107,800

If development is unsuccessful then we need to work out the EV of development costs only. This is because there will be no expenditure on marketing for an unsuccessful development.

The expected value of the development costs = -$150,000 x 0.3 = -$45,000

The EV of the decision = $107,800 + -$45,000 = $62,800

1.4 The answer is C

	Product D		Product E		Product F
Contribution per unit ($)	12.00		14.00		10.00
Time in Process A (mins per unit)	20		25		15
Contribution per hour ($)	12 / 20 = 0.60		14 / 25 = 0.56		10 / 15 = 0.667
Ranking	**2nd**		**3rd**		**1st**

1.5 The answer is D

	Product D		Product E		Product F
Throughput contribution per unit ($)	22.00		20.00		16.00
Time in Process A (mins per unit)	20		25		15
Throughput contribution per hour ($)	22 / 20 = 1.10		20 / 25 = 0.80		16 / 15 = 1.07
Ranking	**1st**		**3rd**		**2nd**

1.6 The answer is $656,400

Production budget

	Units
Opening inventory	500
Production (balance)	25,500
	26,000
Sales	(24,000)
Closing inventory (W1)	2,000

Raw materials budget

	Kg
Opening raw materials	300
Purchases (balance)	54,700
	26,000
Less: usage (W2)	(51,000)
Closing raw materials (W3)	4,000

Raw materials purchases = 54,700 kg x $12 = $656,400

Workings

W1 – Closing inventory
Closing inventory at the end of each month would be 1 months of sales.
Therefore: 24,000 units / 12 months = 2,000 units

W2 – Raw material usage
25,500 units x 2 Kg = 51,000 Kg

W3 – Closing raw materials
2,000 units x 2 Kg = 4,000 Kg

1.7 The answer is 40.9 days

We can use the trade payable days ratio to work out the amount of trade payables at the year end.

Therefore:
Trade payables at year end = ($474,500 / 365) x 45 days = $58,500

Purchases will increase by 10% next year.

Therefore:
$474,500 x 1.1 = $521,950

Trade payable days at the end of next year = $58,500 / $521,950 x 365 = 40.9 days

1.8 The answer is EV = $3,975 and standard deviation = $804.29

This is a probability distribution and therefore the squared deviations (column 4 below) have to be weighted by the probabilities. We cannot do the usual operation of dividing the squared deviations by the number of data items (being 3 in this case) as the three NPVôs do not have equal chance of occurrence and therefore must be reflected in the calculation.

NPV($)	Probability	EV or $\bar{x}$ ($)	$x - \bar{x}$	$(x - \bar{x})^2$	Weighted Deviations
2,800	0.25	700	-1,175	1,380,625	345,156.25
3,900	0.40	1,560	-75	5,625	2,250
4,900	0.35	1,715	925	855,625	299,468.75
		3,975			**646,875**

The expected value = $3,975

Standard deviation = ã646,875 = $804.29

SECTION B – 30 MARKS

Some of the answers that follow in Section B are more comprehensive than expected for a well-prepared candidate.

Question Two – Part (a)

Explain the above statement and the conflicts that may arise when a single budget is used for both purposes. (5 marks)

The budget allows managers to plan ahead which is crucial as there are always uncertain events in business which may or may not occur in the future. These events must be continually reviewed and action should be taken or revised in advance rather than simply reacting to events as they occur. The budget will allow comparisons to be made against actual results and then any major differences can be investigated and adjustments can be made to the budget for the next period. This makes production more efficient, effective and economical.

The budget will also allow targets to be created for managers that they will want to achieve. This is because they may have been involved in the setting of the targets and also there is a benefit that would be gained such a bonus if a certain level of sales is achieved. Targets have proven to be essential to motivate managers to achieve goals or targets. The problem is trying to determine the optimum target level that would be acceptable by managers. If budgets are too challenging then there is a high probability that they will not be achieved and be demotivating resulting in reduced performance by mangers.

Therefore there must be a separate budget for motivating managers and another for planning purposes as highly challenging budgets are good for motivation but unsuitable for planning as they are unlikely to be achieved. Planning budgets need to be realistic to understand true capabilities of an organisation. In reality companies tend not to have separate budgets for motivating and planning.

Question Two – Part (b)

Calculate, on the basis of expected value, the maximum amount that should be paid for the information from the market research company. (5 marks)

Project		EV
A	(400 x 0.2) + (500 x 0.45) + (700 x 0.35) =	$550,000
B	(300 x 0.2) + (400 x 0.45) + (600 x 0.35) =	$450,000
C	(800 x 0.2) + (600 x 0.45) + (300 x 0.35) =	$535,000

Project A has the highest expected value being $550,000.

To calculate the value of perfect information with respect to the preferences:

Customer demand	Best projects in customer demand	Probability	Net cash inflows	EV
Above average	C	0.2	$800,000	$160,000
Average	C	0.45	$600,000	$270,000
Below average	A	0.35	$700,000	$245,000
EV with perfect information				$675,000
EV without perfect information				($550,000)
Value of perfect information				$125,000

Question Two – Part (c)

Calculate the optimum replacement cycle for the vehicles. You should assume that the initial investment is incurred at the beginning of year 1 and that all other cash flows arise at the end of the year. (5 marks)

Replacement in 1 year

Year	0	1
Initial costs	($25,000)	
Operating costs		($5,000)
Resale value		$18,000
Net cash flows	($25,000)	$13,000
DF at 6%	1	0.943
PV	($25,000)	$12,259

NPV = ($12,741)

EAC = $12,741 / 0.943 = ($13,511)

Replacement in 2 years

Year	0	1	2
Initial costs	($25,000)		
Operating costs		($5,000)	($8,000)
Resale value			$15,000
Net cash flows	($25,000)	($5,000)	$7,000
DF at 8%	1	0.943	0.890
PV	($25,000)	($4,715)	$6,230

NPV = ($23,485)

EAC = $23,485 / 1.833 = ($12,812)

Replacement in 3 years

Year	0	1	2	3
Initial costs	($25,000)			
Operating costs		($5,000)	($8,000)	($11,000)
Resale value				$5,000
Net cash flows	($25,000)	($5,000)	($8,000)	($6,000)
DF at 8%	1	0.943	0.890	0.840
PV	($25,000)	($4,715)	($7,120)	($5,040)

NPV = ($41,875)

EAC = $41,875 / 2.673 = ($15,666)

The optimum replacement cycle would be to replace the vehicles every 2 years giving the lowest cost of $12,812.

Question Two – Part (d)

Discuss the advantages AND disadvantages of factoring as a method of managing trade receivables. (5 marks)

Advantages of factoring

There will be savings in sales ledger administrative costs such as the employment of credit controllers, use of employees elsewhere in the organisation and saving time chasing customers as the factor company will manage trade receivables.

The cash will be received immediately from the factor company which means savings in finance costs and relieving any cash flow problems.

The company can now pay suppliers quicker and take advantage of early settlement discounts.

The optimum stock levels can be maintained as cash is available to purchase stock when needed.

Factors are specialist, therefore are more effective in chasing debts, assessing customer credit worthiness, invoicing and collecting cash.

Advantages of factoring

The fees payable to the factor company for their services can be very expensive as there is usually a service fee and interest on the amount of monies advanced.

The use of a factor company may give a negative image of insolvency to potential investors.

The factor company may not share the same objectives as yourself. Their main objective is to recover the monies and may not take a friendly or courteous approach to this when dealing with your customers. This may result in lost goodwill.

Using a factor company will mean that you have less contact with your customers and the personal relationship will suffer. This may result in not being able to exploit sales leads with important customers.

Once tied into a contract with a factor company it may be difficult to withdraw from this relationship and re-establish sales ledger department.

Question Two – Part (e)

Describe the following methods of export financing:

(i) Bills of exchange
(ii) Forfaiting
(iii) Documentary credits

(5 marks)

(i) Bills of exchange

ñA bill of exchange is a negotiable instrument, drawn by one party on another, for example by a supplier of goods on a customer, who by accepting (signing) the bill, acknowledges the debt, which may be payable immediately (a sight draft) or at some future date (a time draft). The holder of the bill can, thereafter, use an accepted time draft to pay a debt to a third party, or can discount it to raise cash.ò
(CIMA Official Terminology)

A negotiable instrument is a transferable signed document that promises to pay the bearer a sum of money at a future date or on demand, common examples are bills of exchanges and cheques.

Bills of exchange are drawn up for periods of 2 to 6 months and usually for a minimum amount of £75,000.

There are three main parties to a bill of exchange:

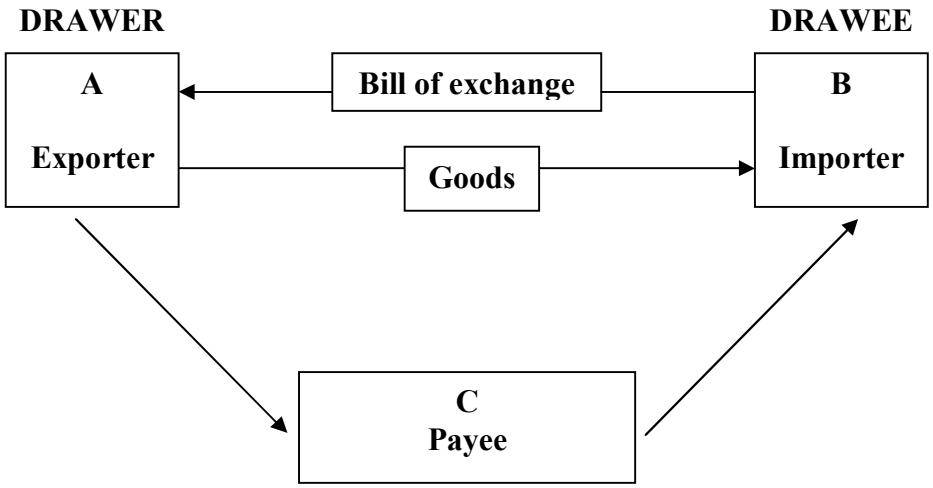
1 The drawer ï who is the exporter.
2 The drawee ï the importer.
3 The payee ï the person the drawee must pay, (Drawer or bank/discount house)

Worked example – Bills of exchange

A sells goods to B for £1.5 million on 4 months credit. A draws up a bill of exchange, which requires B to pay £1.5 million in 4 monthsô time. B signs the bill and, and gives it to A.

A needs the money quite urgently and so decides to sell the bill to a discount house (which specialises in bills of exchange). A sells the bill for £1.4 million. The discount house has therefore discounted the bill by £100,000 compared to its face value.

The discount house pays A £1.4 million and holds onto the bill for 4 months, after which it presents the bill to B who pays £1.5 million. The discount house has made a profit of £100,000.



Under normal trade, the exporter makes out and signs the bill either at sight (cash on demand) or term (usance). If at term, the customer accepts it, by signing across its face as payable at a fixed future date.

As well as the drawerôs and draweeôs name and addresses, a bill of exchange will show the date drawn, the amount in both figures and words, terms (sight or usance) and the payee (or to order, or to bearer). It is more often payable to specified persons rather than bearer.

Types of bill

- **Trade bills** are drawn by one non-bank on another; to be tradable both must have high credit ratings.
- **Bank bills** are drawn and payable by banks.

Discounting bills

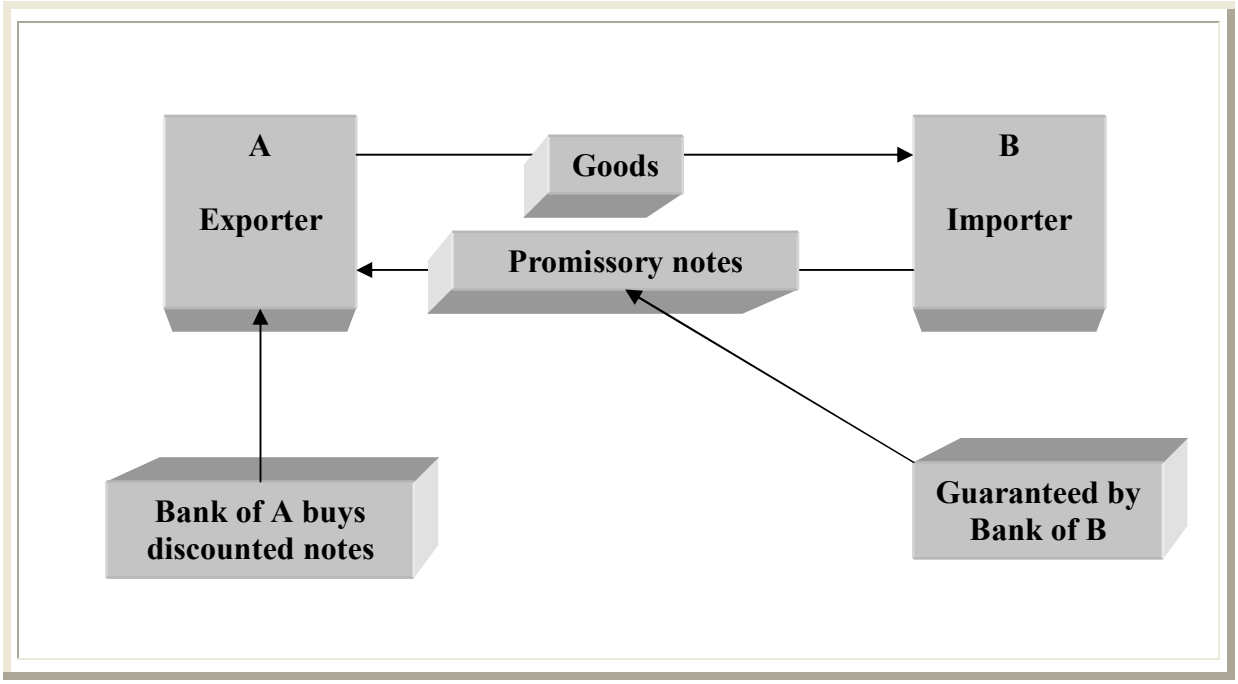
Holder of the bill, presents bill on maturity, or sells bill before maturity at discount depending on credit quality of drawee and market condition for bills.

Bills of exchange are increasingly being used to obtain export finance. They can be discounted, negotiated and forfaited. Advances can be obtained against bills as well as acceptance credits.

(ii) Forfaiting

Forfaiting is when a bank (the forfaiter) purchases a series of promissory notes (these are contracts detailing exactly how much is owed by whom and when it will be paid by), which are signed by an importer in favour of an exporter.

The promissory notes are usually guaranteed by the importerôs bank and then sold by the exporter to the forfaiting bank at a discount. The bank pays the exporter, which gives them payment for the goods, and enabling the importer to settle later.



Forfaiting is a medium term of finance and is secure as there is more than one bank involved in underwriting the notes, however because of this it can be very expensive but it can smooth out needs of cash flows and maybe the only method available to trade. Other contracts are sometimes used instead of promissory notes such as bills of exchange or documentary credits.

(iii) Documentary credits

Documentary credits or letter of credits are risk-free methods of payment, and means of obtaining short-term finance.

Under DC, exporters can receive payment of goods in their own country as soon as the customer has received the goods.

A contract is drawn up by the importer giving details of the goods and its own bank details. Once the goods have been delivered the payment will be made to the exporter upon inspection of all the agreed documents in the contract. Documents may include the commercial invoice, proof of shipment, proof of receipt of goods by importer (bill of lading), and proof of insurance against loss or damage in transit by exporter.

Question Two – Part (f)

Calculate to 0.01%, the yield to maturity for the bond based on today's purchase price. (5 marks)

Year	Cash flow	$	DF 3%	PV	DF 15%	PV
0	Market value	(103)	1.000	(103.00)	1.000	(103.00)
1-4	Interest	6	3.717	22.30	2.855	17.13
4	Capital repayment	100	0.888	88.80	0.572	57.20
				8.10		(28.67)

Apply the interpolation formula to find the IRR or yield to maturity:

$$A + \left[\frac{a}{a - b} \times (B-A) \right]$$

Where:
A = lower discount factor
B = higher discount factor
a = NPV at A
b = NPV at B

3 + (8.10 / (8.10 - -28.67) x (15-3)

= 5.64% yield to maturity.

SECTION C – 50 MARKS

Question Three

(a) Calculate, for the original budget, the budgeted fixed overhead costs, the budgeted variable overhead cost per tray and the budgeted total overheads costs. (5 marks)

We need to use the ñhigh-low methodò to answer the requirement.

Work out variable cost

Units	Overhead cost ($)
840,000	1,096,000
680,000	992,000
160,000	104,000

$104,000 / 160,000 = $0.65 variable cost per tray.

Work out fixed cost

Use either 840,000 or 680,000 units to work out the fixed cost as a balancing figure.

$1,096,000 = Fixed cost + (840,000 x $0.65)

$1,096,000 = Fixed cost + $546,000

Fixed cost = $550,000

(b) Prepare, for the last year, a budget control statement on a marginal cost basis for the Premium product.

The statement should show the original budget, the flexed budget and the total budget variances for sales revenue and each cost element. (5 marks)

We need to flex the original budget to the level of actual quantity sold and then compare the flexed budget against the actual budget to show variances.

	Original budget	Flexed budget	Actual	Variance
Sales (units)	360,000	396,000	396,000	
	$	$	$	$
Sales revenue	1,152,000	(W1) 1,267,200	1,271,160	3,960 (F)
Direct materials	576,000	(W2) 633,600	594,000	39,600 (F)
Direct labour	180,000	(W3) 198,000	213,840	15,840 (A)
Variable overheads	234,000	(W4) 257,400	261,360	3,960 (A)
Contribution	162,000	(W5) 178,200	201,960	23,760 (F)

Workings

W1 ï 396,000 units x $3.20 = $1,267,200
W2 ï 396,000 units x $1.96 = $633,600
W3 ï 396,000 units x $0.50 = $198,000
W4 ï 396,000 units x $0.65 = $257,400
W5 ï 396,000 units x $0.45 = $178,200

(c) Discuss the benefits of flexible budgeting for planning and control purposes. You should use the figures calculated in (b) above to illustrate your answer. (6 marks)

A óflexed budgetô is a budget that has been revised or adjusted using the actual level of sales or output achieved as its activity level. When a budget is flexed it would give an appropriate level of revenue and cost as a yardstick to compare on a like for like basis to actual results, meaningful variances or exceptions to the budget, can then be highlighted for management attention. A fixed budget will not provide this kind of meaningful information For example we cannot tell whether a favourable sales variance is due to increase in price or quantity sold if we compared the fixed budgeted sales revenue with the actual sales revenue.

Flexible budgets will recognise different cost behaviour patterns e.g. costs will rise or fall with the volume of sales or output achieved, this is a better system for control purposes. For example in the flexed budget statement there is a favourable sales revenue variance of $3,960 this may be due to extra sales and therefore would be mean that extra resources would be needed to support this, however materials variance is favourable by $39,600. If the original budget was compared with actuals then you would have an adverse material variance of $18,000 ($576,000 - $594,000 = $18,000).

Flexible budgets are also useful at the planning stage and provide a better indication of performance since comparisons are made with a sensible benchmark.

(d)

(i) Calculate the sales quantity contribution variance. (3 marks)

(ii) Calculate the sales mix contribution variance. (3 marks)

(i) Sales quantity contribution variance

	Economy	**Premium**	**Deluxe**
Selling price	$2.80	$3.20	$4.49
Direct labour	($0.50)	($0.50)	($0.50)
Direct material	($1.00)	($1.60)	($2.20)
Variable overheads	($0.65)	($0.65)	($0.65)
Contribution	$0.65	$0.45	$1.14

	Actual sales at budget mix (W1)	Budget sales quantity	Difference	Contribution	Variance
Economy	193,500	180,000	13,500 (F)	$0.65	$8,775 (F)
Premium	387,000	360,000	27,000 (F)	$0.45	$12,150 (F)
Deluxe	279,500	260,000	19,500 (F)	$1.14	$22,230 (F)
	860,000	800,000	60,000 (F)		$43,155 (F)

(ii) Sales mix contribution variance

	Actual sales quantity	Actual sales at budget mix (W1)	Difference	Contribution	Variance
Economy	186,000	193,500	7,500 (A)	$0.65	$4,875 (A)
Premium	396,000	387,000	9,000 (F)	$0.45	$4,050 (F)
Deluxe	278,000	279,500	1,500 (A)	$1.14	$1,710 (A)
	860,000	860,000			$2,535 (A)

Workings

W1 – Actual sales at budget mix

Economy = 180 / 800 x 860,000 = 193,500
Premium = 360 / 800 x 860,000 = 387,000
Deluxe = 260 / 800 x 860,000 = 279,500

(e) Explain why the analysis of the sales volume variance into the sales quantity and sales mix variances will provide valuable management information. Your answer should refer to the figures calculated in (d) above. (5 marks)

Information about changes in total quantity of sales and the changes in the mix of the products sold can now be clearly understood by reviewing the sales quality and sales mix variances, and their impact on the sales volume variance.

It can be said that if the actual quantity sold had been in the budgeted sales mix then contribution would have been greater by $43,155. However the actual sales mix has reduced contribution by $2,535. The main reason for this fall in contribution is due to the fact that more of the premium product was sold which earned the least contribution and less of the deluxe and standard products which earned the most contribution. This will allow the company to plan for future pricing purposes perhaps increasing the price to increase contribution.

Question Four

(a) Calculate the net present value (NPV) of the project. Workings for Project 1 the relevant cash flows that the accountant should have used for year 1 when appraising the project. All workings should be in $millions. (6 marks)

Year	0 ($m)	1 ($m)	2 ($m)	3 ($m)	4 ($m)	5 ($m)
Investment	(600)					
Contribution from 5G sales (W1)		875	1,150	503	72	
Reduced contribution 4G sales (W2)		(200)				
Fixed costs		(300)	(300)	(300)	(300)	
Marketing new model costs		(150)	(150)	(100)		
Net cash flows	(600)	225	700	103	(228)	
Taxation (W3)		(34)	(139)	(120.5)	18.5	34
Tax depreciation (W4)		22.5	39.5	29.5	35.5	23
Residual value					100	
Net cash flow after taxation	(600)	213.5	600.5	12	(74)	57
DF @ 8%	x 1	x 0.926	x 0.857	x 0.794	x 0.735	x 0.681
PV	(600)	198	515	10	(54)	39

NPV **$108m**

Workings

W1 – Contribution from 5G sales

First we have to work sales volume for each year based on the pattern established in the question.

Year 1 sales = 25,000,000 x 20% = 5,000,000
Year 2 sales = 25,000,000 x 40% = 10,000,000
Year 3 sales = 25,000,000 x 30% = 7,500,000
Year 4 sales = 25,000,000 x 10% = 2,500,000

Selling price per unit will be $300 per unit in the first year but thereafter fall by 20% each year. Variable costs remain constant at $125 per unit.

Total contribution:

Year 1 = $300 - $125 = $175 x 5m = $875m
Year 2 = ($300 x 80%) = $240 - $125 = $115 x 10m = $1,150m
Year 3 = ($240 x 80%) = $192 - $125 = $67 x 7.5m = $502.5m
Year 4 = ($192 x 80%) = $153.60 - $125 = $28.60 x 2.5m = $71.5m

W2 – Reduced contribution 4G sales

There is a fall in 4G sales in year 1 of 5G sales. There are no more 4G sales after this.

Year 1 = 2m 4G units x $100 = $200m

W3 – Taxation ($m)

Years when tax is paid	1	2	3	4	5
Year 1 tax = $225 x 30% = $68	$34	$34			
Year 2 tax = $700 x 30% = $210		$105	$105		
Year 3 tax = $103 x 30% = $31			$15.5	$15.5	
Year 4 tax = ($228) x 30% = ($68)				($34)	($34)
Net cash flow	$34	$139	$120.5	($18.5)	($34)

W4 - Tax savings on tax depreciation ($m)

		Tax savings 30%		Total tax saved
	$	$	$	$
Investment	600			
Y1 tax dep at 25%	(150)	45	Y1 ï 22.5	Y1 ï 22.5
	450		Y2 ï 22.5	
Y2 tax dep at 25%	(113)	34	Y2 ï 17	Y2 ï 39.5
	337		Y3 ï 17	
Y3 tax dep at 25%	(84)	25	Y3 ï 12.5	Y3 ï 29.5
	253		Y4 ï 12.5	
Y4 scrap proceeds	(100)			
	153	46	Y4 ï 23	Y4 ï 35.5
			Y5 ï 23	Y5 ï 23

(b)

(i) Calculate the internal rate of retrun (IRR) of the project.
(ii) Calculate the discounted payback period of the project.

(5 marks)

(i)

We know that at a cost of capital of 8% the investment has an NPV of $108m. The internal rate of return (IRR) is that cost of capital where the NPV of a project is zero. This is achieved through trial and error and then interpolation. If we have a cost of capital which yields a positive NPV then we need to find a cost of capital when applied to the investment will give a negative NPV.

In order to achieve a negative NPV we must select a higher cost of capital than 10% because this effectively increases the discounting effect on the cash flows and therefore giving a negative NPV.

Choose the largest cost of capital given to you in the formulae sheet in the exam. This is 20% and will hopefully give a negative NPV. You do not have to choose a 20% you can choose another cost of capital, for example 17% but it may not be large enough to give you a negative NPV, and therefore you would have do the calculation again for a higher cost of capital.

Year	0	1	2	3	4	5
	$m	$m	$m	$m	$m	$m
Cash flow	(600)	213.5	600.5	12	(74)	57
DF @ 20%	x 1	x 0.833	x 0.694	x 0.579	x 0.482	x 0.402
PV	(600)	178	417	7	(36)	23

NPV = ($11m)

In this case we have a negative NPV.

Apply the interpolation formula to find the IRR:

$$A + \left[\frac{a}{a - b} \times (B-A) \right]$$

Where:
A = lower discount factor
B = higher discount factor
a = NPV at A
b = NPV at B

8 + [(108 / (108 - -11) x (20 - 8)]

= 18.9%

(ii)

To work out discounted payback we add up the PVôs in part (a) to see when the initial $600m is paid back.

Year	PV ($m)	Cumulated PV ($m)
0	(600)	(600)
1	197	(403)
2	515	112

Payback occurs between year 1 and year 2.

Therefore discounted payback
= 1 year + [12 months x (403m / (403m + 112m))]
= 1 year and 9 months.

(c) Discuss the reasons why a company may want to calculate the IRR and discounted payback period of a project even though NPV is the theoretically superior method of investment appraisal. (4 marks)

The IRR is an easily understood measure as it is a percentage and therefore familiar to most users of such information because of other similar percentages used such as interest rates, return on capital employed.

Its decision criteria is very simple; accept the project if the IRR is a sufficient. The IRR also does not require the selection of an approximate discount rate to appraise a project which can be difficult at the best of times to select if using NPV.

The IRR can easily illustrate the excess returns that can be gained in a project when compared to the cost of capital.

Payback is easy to understand as it is simply seeking to choose that investment which will pay back the initial cash outflow the quickest. It is also easy to calculate as you simply accumulate the annual cash flows to work out how long it will take to recover the initial cash outflow.

Payback deals with risk with greater caution than NPV. The longer a project goes on the greater is risk of default on returns and the less reliable are the estimates of cash flow. Payback reduces this risk by choosing shorter life projects over longer life projects to invest in.

Payback is the most commonly used screening technique in most UK companies today, and therefore reducing valuable management time in reviewing every project for investment.

A quick payback means that the company can then invest in other projects or make payments on loans that come to maturity.

(d) Explain the benefits to a company of carrying out a post-completion audit of a project. (4 marks)

A post completion audit provides feedback for control in future decision making, acts as a threat to the project manager that their performance will be appraised, highlights problems experienced to learn from, evaluates the manager and identifies any large discrepancies in costs or revenue.

The post completion audit will allow for the identification and implementation of corrective action and to review current procedures and design better ones to improve future projects e.g. to support continuous improvement. It will also allow us to understand why certain projects have been successful and how we can use these ideals to improve forecasting and accuracy of future projects.

The post completion audit will also examine client expectations e.g. about quality, cost and reliability, as well as any management problems encountered or ǿexceptionsô to project objectives. Mistakes of management can be learned from the PM and other project staff from experiences gained.