

Chapter 11 Investment Appraisal

The availability of cash resources is generally limited

Capital budgeting, or **investment appraisal**, is the planning process used to determine whether an organization's long term investments such as new machinery, replacement machinery, new plants, new products, and research development projects are worth the funding of cash through the firm's capitalization structure (debt, equity or retained earnings).

Methods of Investment evaluation

1. Payback period
2. Net present value
3. Discounted payback period
4. Accounting rate of return
5. Internal rate of return

1. Payback period (Cash payback period)

Payback period is the time in which the initial cash outflow of an investment is expected to be recovered from the cash inflows generated by the investment. It is one of the simplest investment appraisal techniques.

Remember, payback uses cash flows not profit

For even cash flow, the formula to calculate payback period is:

Cash Payback Period =	Cost of investment
	Annual net cash flow

Worked example

For example, suppose you need to decide whether to buy a new computer costing \$500; you expect the computer to increase your net cash flow by \$300 per year. Calculate payback period?

When cash inflows are uneven, we need to calculate the cumulative net cash flow for each period and then use the following formula for payback period:

$\text{Payback Period} = A + \frac{B}{C}$

In the above formula,

A is the total period with a cumulative cash flow;

B is the absolute value of cash flow needed to complete investment;

C is the total cash flow during the in the excess cash flow period above investment

Advantages

- ✓ It is relatively easy to calculate
- ✓ Calculation of net cash flows is less subjective than calculation of profitability
- ✓ Payback is useful in technological industries, where a short pay back is preferred
- ✓ Short payback periods benefit business's liquidity and facilitate faster growth

Disadvantages

- ✗ Life expectancy of project is ignored
- ✗ Payback considers the payback period only and does not take future cash flows into account
- ✗ Time value of money may be ignored

2. Net Present Value

Net present value is the present value of net cash inflows generated by a project including salvage value, if any, less the initial investment on the project. It is one of the most reliable measures used in capital budgeting because it accounts for **time value of money** by using discounted cash inflows.

Advantage

- ✓ Net present value considers **time value of money**.
- ✓ It is relatively easy to understand
- ✓ Greater importance is given to earlier cash flows

Disadvantage

- ✗ It is based on estimated future cash flows of the project and estimates may be far from actual results
- ✗ The current cost of capital may change over the life of the project
- ✗ The life of the project is difficult to predict

Cost of capital

Cost of capital is based on the weighted average cost of capital available to business

3. Discounted payback period

This method is widely used in business as a method of selecting a machine or project

4. Accounting rate of return

Accounting rate of return is the ratio of estimated accounting profit of a project to the average investment made in the project. ARR is used in investment appraisal.

Remember, some projects will require an injection of additional working capital in the form of extra inventory and as a result more trade payables. The increase in working capital can be assumed to be

constant during the life time of the project. This means there is no need to calculate the average increase in working capital over this time

Accounting Rate of Return is calculated using the following formula:

$$ARR = \frac{\text{Average Profit}}{\text{Average Investment}}$$

$$\text{Average investment} = \frac{\text{Cost of project} + \text{scrap value}}{2} + \text{working capital}$$

Or

$$\frac{\text{Cost of project} - \text{scrap value}}{2} + \text{working capital}$$

Note:

Increase in working capital is cash outflow and decrease in working capital is cash inflow

$$\begin{aligned} \text{Profit} &= \text{cash inflow} - \text{cash outflow} - \text{depreciation} \\ &= \text{net cash flow} - \text{depreciation} \end{aligned}$$

$$\text{Net cash flow} = \text{profit} + \text{depreciation}$$

$$\text{Average profit} = \frac{\text{Total profit}}{\text{No of years}}$$

Advantages

- ✓ Profitability of a project may be compared with present profitability of business
- ✓ It is relatively easy to calculate
- ✓ It takes into account the aggregate earnings of the project

Disadvantages

- ✗ Timing of cash inflows and outflows is ignored
- ✗ It ignores the payback risk factor
- ✗ It ignores the time value of money
- ✗ 'Profit' is subjective (provisions for depreciation, bad debts etc.)
- ✗ No commonly accepted method of calculating capital employed
- ✗ Ignores duration of project

5. Internal rate of return

Internal rate of return (IRR) is the discount rate at which the net present value of an investment becomes zero. In other words, IRR is the discount rate which equates the present value of the future cash flows of an investment with the initial investment. It is one of the several measures used for investment appraisal.

The return on a project must cover the cost of capital, so if a business has cost of capital 12%, any project undertaken must yield a return that is greater than 12%

When evaluating a capital project, internal rate of return (IRR) measures the estimated percentage return from the project. It uses the initial cost of the project and estimates of the future cash flows to figure out the interest rate.

In general, companies should accept projects with IRR that exceed the cost of capital and reject projects that don't meet that guideline

$$\text{IRR} = \text{low DR} + \left[\text{Difference in Discount factor} \times \frac{\text{NPV at low DF}}{\text{NPV at low DF} - \text{NPV at high DF}} \right]$$

Advantages

- ✓ Indicates return actually to be expected from expenditure
- ✓ May assist in ranking different proposals
- ✓ Often used in businesses
- ✓ Recognizes time value of money

Disadvantages

- ✗ More difficult to calculate than NPV
- ✗ NPV is usually more useful in ranking different projects

Non quantitative method

- ❖ Better customer loyalty
- ❖ Enhanced safety
- ❖ Stronger employee morale
- ❖ Improved quality
- ❖ Protection of the environment

Sensitivity Analysis

The time horizon involved in making sound capital investment decisions is generally long. Looking into the future makes the reliability of forecast data uncertain.

Sensitivity analysis measures how responsive the outcome of such decisions is to variability of revenues and costs

Sensitivity of the project to changes in the cost of the machinery

= Net present value/cost of machine * 100

Sensitivity of the project to changes in the selling price

Net present value per year = net present value / sum of discount factor

Sp per unit = NPV per year / No of units sold

Changes in % = Sp per unit / original selling price * 100

Sensitivity Applied to Investment Appraisal

(a) Sensitivity of Selling Price: NPV/Present Value of Sales * 100

(b) Sensitivity of Initial Cost: NPV/Initial Cost *100

Past Paper Questions

Q # 1 The directors of Joloss plc intend to purchase an additional machine to manufacture one of the new products. Two machines are being considered: Milligan and Bentine. The company depreciates its machinery using the straight line method.

Joloss plc will borrow the money required to purchase the machine and pay interest of 10% per annum on the loan.

Estimates for the machines are as follows:

		Milligan \$	Bentine \$
Cost of machine		100 000	130 000
Additional Receipts:	Year 1	70 000	72 000
	2	80 000	84 000
	3	90 000	90 000
	4	90 000	100 000
Additional costs (see note)	Year 1	50 000	60 000
	2	60 000	70 000
	3	65 000	75 000
	4	70 000	80 000

Note: These costs include the charges for depreciation and interest on the loans.

Useful life of machine		4 years	4 years
Value at end of useful life		nil	nil
Present value of \$1		10%	20%
	Year 1	0.909	0.833
	2	0.826	0.694
	3	0.751	0.579
	4	0.683	0.482

Resource Pack/Accounting/A Level (Paper 3)

REQUIRED

(i) Calculate the net present value of each machine. (Base your calculations on the cost of capital.)

[18]

(ii) State, with your reason, which machine Joloss plc should purchase. [2]

The directors require the machine to produce a return on outlay of not less than 25%.

REQUIRED

(iii) Calculate the internal rate of return on the machine you have selected in (ii) to see if it meets the required return on outlay. [5]

June 2002

Q # 2 Clegg is replacing one of his machines. He can choose between machine A or machine B.

Details of the machines are as follows:

	Machine A	Machine B
Cost	\$80 000	\$100 000
Estimated useful life	4 years	4 years
Scrap value	\$4000	\$8000

Annual depreciation (each machine): straight line.

Estimated receipts and payments are as follows:

	Machine A	Machine B
	\$000	\$000
Year 1	66 000	70 000
2	80 000	90 000
3	100 000	100 000
4	70 000	60 000
	\$000	\$000
Year 1	31 000	42 000
2	47 000	49 000
3	68 000	67 000
4	38 000	29 000

Clegg Ltd's cost of capital is 10%.

Discounting rates:	10%	20%
Year 1	0.909	0.833
2	0.826	0.694
3	0.751	0.579
4	0.683	0.482

Resource Pack/Accounting/A Level (Paper 3)

REQUIRED

- (a) Calculate the accounting rate of return (ARR) for each machine. [12]
- (b) Calculate the payback period for each machine. [4]
- (c) Calculate the net present value (NPV) of each machine. [11]

The new machine must produce an internal rate of return (IRR) of at least 22%.

REQUIRED

- (d) Prepare calculations to show the internal rate of return (IRR) produced by each machine. [4]
- (e) State which machine Clegg should purchase. Give your reasons. [5]
- (f) Suggest why Clegg requires the new machine to produce an IRR of at least 22% if it already produces a positive NPV. [4]

November 2003

Q # 3 The directors of Makeit Ltd propose to buy a machine costing \$300 000. At the end of five years the machine will be sold for \$50 000. In each of the five years the machine will increase revenue by \$160000. Increased annual expenditure of \$80 000 will be incurred.

Makeit Ltd will require an increase in working capital of \$40 000. Machinery is depreciated on the straight line method.

REQUIRED

- (a) Calculate the accounting rate of return (ARR) which will result if the machine is purchased. [10]

The directors have decided to calculate the payback period of the machine and have decided to discount future net receipts by the cost of capital which is 10%.

The discounting factors at 10% are:

Year 1	0.909
2	0.826
3	0.751
4	0.683
5	0.621

REQUIRED

- (b) Calculate the discounted payback period for the machine. (It will be necessary to discount the net receipts.) [5]

Resource Pack/Accounting/A Level (Paper 3)

Makeit Ltd currently earns a return of 15% on its capital. The discounting factors at 20% are:

Year 1	0.833
2	0.694
3	0.579
4	0.482
5	0.402

REQUIRED

(c) (i) Calculate the internal rate of return (IRR). [10]

(ii) State with reasons whether the directors should purchase the machine. [3]

The directors believe that the various methods of appraising capital expenditure have advantages and disadvantages.

REQUIRED

(d) State the advantages and disadvantages of using the following methods:

(i) Accounting rate of return (ARR)

(ii) Payback period

(iii) Internal rate of return (IRR). [12]

June 2004

Q # 4 The directors of Relham Ltd plan to introduce a new product
A new machine costing \$125 000 will be required. It will be sold at the end of five years for \$30 000.
Machinery is depreciated using the straight line method.

The new product will earn \$90 000 revenue annually and incur additional expenditure of \$60 000 each year

The purchase of the new machine will be financed by a loan at 8% per annum.

The following discounting factors are given.

	8%	14%
Year 1	0.926	0.877
2	0.857	0.769
3	0.794	0.675
4	0.735	0.592
5	0.681	0.519

REQUIRED

(a) Calculate for the new product

(i) Net present value (NPV) [10]

(ii) Internal rate of return (IRR) [7]

(iii) Accounting rate of return (ARR) [5]**November 2004**

Resource Pack/Accounting/A Level (Paper 3)

Q # 5 Tesda plc is a supermarket chain. They have been offered the choice of two five-year leases on supermarkets abroad. Lack of finance means that they can choose only one of them

The directors have projected the following forecasts:

The lease on supermarket A will cost \$5m.

The lease on supermarket B will cost \$8m.

They expect cash receipts and payments to be as follows:

Year	Without leasing either new supermarket \$	With supermarket A \$	With supermarket B \$
Total receipts			
1	61m	63.6m	63.9m
2	64m	67.7m	69.4m
3	67m	71.2m	73.3m
4	71m	75.5m	77.9m
5	75m	80.1m	83.4m
Total payments			
1	20m	21.8m	21.8m
2	23m	25.0m	25.7m
3	27m	29.2m	30.3m
4	32m	34.4m	35.9m
5	38m	40.6m	42.7m

Assume all receipts and payments occur at the end of the respective year.

Additional information:

Estimated additional costs	Supermarket A	Supermarket B
Additional working capital required at start of lease	\$0.6m	\$1m
Improvements end of year 2	-	\$1.8m
Improvements end of year 3	\$2.9m	-
Improvements end of year 4	-	\$1m
Depreciation	\$0.5 m per annum	\$0.7 m per annum

REQUIRED

- (a) Calculate the estimated annual net cash flows for
 - (i) Supermarket A [3]

Resource Pack/Accounting/A Level (Paper 3)

- (ii) Supermarket B [3]
- (b) Calculate the accounting rate of return (ARR) for
- (i) Supermarket A [7]
 (ii) Supermarket B [7]

The following are extracts from present value tables for \$1:

Year	8%	14%
1	0.926	0.877
2	0.857	0.769
3	0.794	0.675
4	0.735	0.592
5	0.681	0.519

The current cost of capital for Tesda plc is 8 %.

REQUIRED

- (c) Calculate the net present value for
- (i) Supermarket A [6]
 (ii) Supermarket B [6]
- (d) Identify the supermarket that Tesda plc should lease. Explain your choice. [3]

The net present value for each supermarket using a cost of capital of 14 % is estimated to be:

Supermarket A \$1 057 900 negative
 Supermarket B \$2 127 600 negative

REQUIRED

- (e) Calculate the internal rate of return (IRR) for the supermarket chosen in (d). [5]

June 2007

Q # 6 Ghosh Ltd is considering expanding its business and has to decide between taking on Project A or Project B. Both projects have a life of four years. Equipment is expected to have no scrap value. Other information about the projects is as follows:

	Project A	Project B
Initial outlay	\$150 000	\$140 000
Annual sales	\$100 000	\$120 000
Annual purchases	\$40 000	\$65 000
Other costs as a percentage of sales	8%	5%
Increase in working capital	\$10 000	\$18 000

Resource Pack/Accounting/A Level (Paper 3)

Ghosh Ltd uses a cost of capital of 10%. Discounting factors at 10% are as follows:

Year 1	0.909
Year 2	0.826
Year 3	0.751
Year 4	0.683

Using a cost of capital of 10% Project B has a net present value of \$15 281.

REQUIRED

(a) For each of the two projects calculate the following:

- (i) The annual net cash flow [2]
- (ii) The accounting rate of return [6]
- (iii) The payback period. [10]

(b) Calculate the net present value of Project A only. [11]

(c) State two limitations of each of the following:

- (i) Accounting rate of return [2]
- (ii) The payback period [2]
- (iii) The net present value. [2]

(d) State which of the two projects Ghosh Ltd should select. Give reasons for your answer. [5]

June 2010

Q # 7 The committee of the Qadir Cricket club want your financial advice about employing Brad Driscoll at the start of next season.

Brad is a young player who has impressed cricket lovers all over the world. He would sign a 5 year contract. He would receive an initial payment and be paid a salary as follows:

	\$
Initial payment	200 000
Salary year 1	30 000
2	36 000
3	43 200
4	51 840
5	62 208

Resource Pack/Accounting/A Level (Paper 3)

The club would rent an apartment for Brad. The rent of the apartment would be as follows:

Rent	year	\$
	1	3 600
	2	3 600
	3	4 500
	4	4 500
	5	4 500

The total rent for each year would be paid at the start of the year.

The club would pay Brad \$1000 at the end of each year towards the air fare to visit home. Without Brad attendance receipts would remain constant at \$1 000 000 per year. If Brad were employed receipts would rise by 10% each year.

REQUIRED

- (a) Calculate the net cash flow generated by the new player, Brad Driscoll. [22]
The current cost of capital for the club is 12%.

The present value of \$1 at an interest rate of 12% per annum is:

Year 1	\$0.893
Year 2	\$0.797
Year 3	\$0.712
Year 4	\$0.636
Year 5	\$0.507

REQUIRED

- (b) Calculate the net present value for Brad. [8]
(c) Calculate the discounted payback period for Brad. [4]

The Qadir Cricket Club has also considered employing a different player, Tanzeel. The club accountant has calculated the net present value of Tanzeel to be \$181 606 and that his payback period would be 2.27 years. Tanzeel would retire from cricket at the end of year 3.

REQUIRED

- (d) Advise the club committee which player they should employ, Brad or Tanzeel. Give reasons for your answer, using both financial and non-financial factors. [6]

November 2010

Resource Pack/Accounting/A Level (Paper 3)

Q # 8 Bradley Ltd is considering investing in a project which requires an initial outlay of \$800000. A net cash inflow of \$235 000 is expected at the end of the first year and this is expected to rise by 10% annually until the end of year 4. The project is fully complete and has no residual value at the end of year 5 and the anticipated net cash inflow at this time is just 20% of the initial investment. The company's cost of capital is 8%. Extracts from present value tables for \$1

Year	8%	15%
1	0.926	0.870
2	0.857	0.756
3	0.794	0.658
4	0.735	0.572
5	0.681	0.497

REQUIRED

- (a) Calculate the net present value (NPV) of the project at the company's cost of capital and advise the directors whether the project is acceptable. [13]
- (b) Determine the discounted payback period. [7]
- (c) Explain briefly what you understand by the internal rate of return (IRR) of a project. [2]
- (d) Calculate the IRR of the project. [14]
- (e) Identify **four** other factors other than NPV which may be used to determine the acceptability of the project. [4]

November 2011

Q # 9 The directors of a clothing company are proposing to manufacture coats. They anticipate that the coats would stay in fashion for the next 4 years. This would require the purchase of additional equipment at a cost of \$250000 which would be scrapped after 4 years. Sales are expected to be 4000 coats in year 1. In years 2 and 3 the expected number of coats sold will increase by 10% on the previous year but will fall to 3500 in year 4. The selling price of the coats will be \$80 in year 1, \$90 in years 2 and 3 and \$75 in the final year. Variable costs will be \$65 per coat for years 1 and 2, rising to \$70 for years 3 and 4. The company's cost of capital is 10%.

The discount factors are:

Year 1	0.909
Year 2	0.826
Year 3	0.751
Year 4	0.683

REQUIRED

- (a) Calculate the net cash flows for each year. [13]
- (b) Calculate the accounting rate of return. [7]

- (c) Calculate the net present value of the proposal. [11]
- (d) Advise the directors whether they should proceed with the proposal. [4]
- (e) (i) Explain what you understand by the internal rate of return (IRR). [2]
- (ii) Identify how IRR could be used to appraise this proposal. [3]

June 2012

Q # 10 The directors of Drake plc wish to invest in a new production plant, and must choose between Project Utopia and Project Sylvania

In each case the investment will be financed with a bank loan for the full amount. This will be repaid in full on the day the plant is purchased. The loan will be repaid in full in a single payment at the end of year five, however interest is payable throughout the useful life of the plant at 10% per annum.

The useful life of the plant will be 5 years, and it will then be scrapped with no sale proceeds.

The following information is available for Project Utopia:

Cost of production plant	\$200 000
Cost of capital	10%
Depreciation rate	30% reducing balance
Revenue in year 1	\$110 000
Direct costs in year 1	\$40 000

Revenue each year will be 5% higher than the year before.

Costs each year will be 3% higher than the year before.

Discount factors showing net present value of \$1

Year	10%	40%
1	0.909	0.714
2	0.826	0.510
3	0.751	0.364
4	0.683	0.260
5	0.621	0.186

Copy the following table into your answer booklet

Year	Revenue	Costs	Interest	Net cash flow
	\$	\$	\$	\$
0				
1				
2				
3				
4				
5				
Total				

REQUIRED

- (a) Complete the table from the information given to calculate the net cash flow for each year and in total for Project Utopia. [7]
- (b) Calculate the net present value for Project Utopia. [7]
- (c) Calculate the accounting rate of return (ARR). [5]
- (d) Calculate the internal rate of return (IRR). [7]

Additional information

The following information has also been calculated for Project Sylvania.

Net present value	\$41 680
Accounting rate of return (ARR)	19.48%
Internal rate of return (IRR)	17.29%

REQUIRED

- (e) State, with reasons, in which project the directors of Drake plc should invest. [4]

Additional information

The directors of Drake plc could finance the new project by issuing new ordinary shares and not using a bank loan.

REQUIRED

- (f) Explain how financing the new project from the proceeds of issuing new ordinary shares would affect the accounting rate of return (ARR). [6]
- (g) State and explain two other sources of finance for the project. [4]

June 2014

Q # 11 The directors of Ragley Limited are considering a new business opportunity. This involves the purchase of machinery costing \$600000.

Units produced by the machine are expected to have a selling price of \$50 each and the variable costs of production are expected to be \$31.10 per unit. Fixed costs are expected to be \$120000 per annum excluding depreciation.

The machinery is expected to lose its value evenly over four years and then be scrapped. The directors expect to produce and sell 20000 units a year.

REQUIRED

(a) Calculate the following expected annual values. Label each answer.

- (i) Total contribution
- (ii) Net cash flow
- (iii) Profit [6]

(b) Calculate the expected annual breakeven level of production, both in units and sales revenue. [5]

Additional information

Ragley Limited has a cost of capital of 10%. Discount factors are as follows.

Year 1	0.909
Year 2	0.826
Year 3	0.751
Year 4	<u>0.683</u>
	<u>3.169</u>

The directors provide the following incorrect net present value calculation as an aid to decision making.

Annual surplus	\$108000
x Discount factor for four years	<u>3.169</u>
Net present value	<u>\$342252</u>

REQUIRED

- (c) Explain why the directors' net present value calculation is incorrect. [4]
- (d) Calculate the correct net present value of the machinery. [6]
- (e) Calculate the sensitivity of the project to changes in the cost of the machinery. [4]
- (f) Calculate the sensitivity of the project to changes in the selling price. [9]

Nov 2014

Q # 12 The summarised financial statements of Firgo plc for the year ended 31 December 2013 showed the following.

Income statement for the year ended 31 December 2013

	\$000
Revenue	6000
Revenue expenditure excluding depreciation	5600
Depreciation	300

Resource Pack/Accounting/A Level (Paper 3)

The directors consider that, without expansion plans, these costs and revenues will remain constant in future years.

Statement of financial position at 31 December 2013

	\$000
Non-current assets	1700
Current assets	<u>450</u>
	<u>2150</u>
Ordinary shares of \$1 each	2000
Retained earnings	(400)
Current liabilities	<u>550</u>
	<u>2150</u>

REQUIRED

- (a) State the year in which Firgo plc will next be able to pay a cash dividend. [3]
- (b) Explain the scheme which would enable the directors to pay a cash dividend straight away. [5]

Additional information

The directors believe they can improve profitability if they start manufacture of a new product. This would involve the purchase of new machinery costing \$400 000 on 31 December 2014. The total annual revenue of the company would then be expected to increase to:

	\$000
2015	6500
2016	6700
2017	7100
2018	6300

The annual running costs of the new machinery are expected to be:

	\$000
2015	300
2016	490
2017	740
2018	610

On 31 December 2018 the machinery would be scrapped. There would be no residual value.

Firgo plc has a cost of capital of 10%. Discount factors are as follows.

Year 1	0.909
Year 2	0.826
Year 3	0.751
Year 4	0.683

REQUIRED

(c) Calculate the net present value of the machinery. Assume all cash flows arise on the last day of the year. [15]

Additional information

Using a cost of capital of 15% the net present value of the machinery is \$ (7830).

REQUIRED

(d) Calculate the internal rate of return. [5]

(e) Calculate the accounting rate of return of the machinery correct to one decimal place. [6]

(f) Advise the directors on the proposed purchase of machinery. [6]

Nov 2014

Q # 13 Abdul has a taxi business and is considering investing in an additional taxi, the London or the Paris.

The useful life of the taxi is expected to be 5 years, and it will then be scrapped with no sale proceeds. Depreciation will be provided on the straight-line basis.

The following information is available about the London taxi.

Cost of vehicle	\$20000
Additional revenue in year 1	\$10000
Annual rate of increase in revenue	5%
Additional direct costs in year 1	\$2000
Annual rate of increase of direct costs	3%
Annual fixed costs	\$1600
Cost of capital	8%

Discounting factors showing net present value of \$1		
Year	8%	25%
1	0.926	0.800
2	0.857	0.640
3	0.794	0.512
4	0.735	0.410
5	0.681	0.328

REQUIRED

(a) Copy the table below into your answer booklet.

Complete the table and calculate the net present value of the investment in the London taxi using a discount factor of 8%.

Year	Revenue	Direct costs	Fixed costs	Net cash flows	8% Discount factor	Present value
	\$	\$	\$	\$		\$
Net present value						

[12]

(b) (i) Copy the table below into your answer booklet.

Complete the table and calculate the net present value of the investment in the London taxi using a discount factor of 25%. (6)

Year	Net cash flows	25% Discount factor	Present value
	\$		\$
Net present value			

(ii) Calculate the internal rate of return (IRR) on the investment in the London taxi. Show your workings in detail and give your answer to two decimal places. [4]

Additional information

The following information is available for the Paris taxi.

Net present value	\$7489
Internal rate of return	24.56%
Average accounting rate of return	30.10%

REQUIRED

(c) Calculate the accounting rate of return for the London taxi. [6]

(d) State, with reasons, which of the two makes of taxi Abdul should buy. [4]

Additional information

Abdul is considering forming a company by issuing ordinary and preference shares.

REQUIRED

(e) State one advantage and one disadvantage of ordinary shares to:

(i) the company [2]

(ii) a shareholder. [2]

(f) State one advantage and one disadvantage of preference shares to:

(i) the company [2]

(ii) a shareholder. [2]

June 2015

Q # 14 Harko runs a successful retail business. His typical annual results have been as follows:

	\$
Revenue	210 000
Cost of sales	<u>115 500</u>
Gross profit	94 500
Variable selling and administrative expenses	48 000
Fixed expenses	<u>19 500</u>
Profit for the year	<u>27 000</u>

Harko is now considering building an extension to his premises.

The following information is available:

- 1 The building cost would be \$265 000.
- 2 Because of the increase in floor space he anticipates that sales volume would increase by 40%.
- 3 The gross profit margin would be maintained.
- 4 The inventory level would need to be increased by \$10 000 in year 1 only.
- 5 The existing variable expenses would increase by 30%.

Resource Pack/Accounting/A Level (Paper 3)

6 The business would in future have to rent garage space for the delivery vehicle at a cost of \$2000 a year.

7 Harko intends to retire at the end of year 4 and sell the business as a going concern. He expects the purchase consideration for the business (including inventory) to be \$600 000 without the extension or \$910 000 if he proceeds with the extension.

REQUIRED

(a) Calculate the annual cash flows arising from the building of the extension. (8)

Use the column headings:

Year 0	Year 1	Year 2	Year 3	Year 4
\$	\$	\$	\$	\$

Additional information

Harko's cost of capital is 10%. Discount factors are as follows.

Year	Discount factor
0	1.000
1	0.909
2	0.826
3	0.751
4	0.683

REQUIRED

(b) Calculate the net present value (NPV) of building the extension. Round calculations to the nearest dollar (\$) [8]

(c) Advise Harko whether he should proceed with the extension, based on your figures from (b). [2]

(d) Outline why Harko might have doubts about proceeding with the extension, based on the NPV. [3]

(e) Explain why Harko chose to use net present value as a basis for his decision rather than the payback method. [4]

SP 2016

Q # 15 One of the assembly machines at Artem Limited needs to be replaced.

A replacement machine will cost \$300 000, which will be paid on purchase. The replacement machine is expected to last for three years. It will need complete maintenance check-up in year 2 at a cost of \$75 000.

The existing machine assembles 4000 units per year.

The number of units assembled by the replacement machine is expected to be 35% lower in year 1 than the existing machine due to the time lost during installation and testing.

Resource Pack/Accounting/A Level (Paper 3)

In year 2 it is expected that 4500 units will be assembled and this will increase by 20% each year compared to the previous year.

The replacement machine will produce units at a cost of \$24 each. From year 2 this will increase by 25% each year compared to the previous year.

The selling price will be \$45 per unit. This will increase by 30% each year compared to the previous year.

The cost of capital is 14%.

The following is an extract from the present value tables for \$1.

	14%
Year 1	0.877
Year 2	0.769
Year 3	0.675

It is assumed that all production will be sold.

REQUIRED

(a) Distinguish between the payback method of investment appraisal and the net present value method. [4]

(b) Calculate the expected net cash flows for **each** year for the replacement machine. [8]

(c) Calculate the payback period for the replacement machine. [2]

(d) Calculate the net present value for the replacement machine. Assume that revenues are received and costs are paid at the end of each year. [6]

(e) (i) Analyse the benefits to the business of purchasing the replacement machine. [3]

(ii) Recommend whether or not the managers of Artem Limited should purchase the replacement machine. Justify your answer. [2]

June 2016

Q # 16 Alexander intends to start a new project producing either Product X or Product Y. Each product will require an additional capital cost of \$50 000. Both products are expected to last 4 years. The following information is available on Product X:

1 Sales volume in year 1 would be 10 000 units with a selling price of \$7.

2 The volume would rise by 5% in year 2 and by another 5% in year 3.

3 Popularity is then expected to fall in year 4 and there would be a 20% fall in volume.

4 The selling price would not change.

5 The variable costs will be \$3 per unit in year 1, will rise to \$4 in year 2 and will then remain unchanged.

6 Annual fixed costs payable will be \$11 000 and will remain unchanged.

REQUIRED

(a) Calculate the net cash flows for **each** year and in **total** for Product X. [8]

Additional information

Alexander's cost of capital is 10% and the discount factors are:

Year 1	0.909
Year 2	0.826
Year 3	0.751
Year 4	0.683

REQUIRED

(b) Calculate the net present value of Product X. [7]

Additional information

Alexander has carried out the same calculations for Product Y. He has calculated the net present value of Product Y as \$30 400.

REQUIRED

(c) Advise Alexander which product he should make based solely on the net present value. Justify your answer. [2]

(d) State **one** advantage and **one** disadvantage of using net present value for investment appraisal. [2]

(e) Explain why Alexander may or may not use the payback method of investment appraisal. [3]

(f) State **three** non-financial factors Alexander should consider when choosing between Product X and Product Y. [3]

Nov 2016

Resource Pack/Accounting/A Level (Paper 3)

Q # 17 N Limited is planning a new project, which has an initial cost of \$225 000. If the project runs for four years the marginal revenues and costs will be as follows:

Year	Revenues \$	Costs \$
1	100 000	31 000
2	110 000	40 000
3	125 000	59 000
4	90 000	48 000

The directors have two options.

Option 1 To stop the project at the end of year 2 when the scrap value of the project's assets will amount to \$175000

Option 2 To continue with the project until the end of year 4 when the scrap value of the assets will be \$75 000

The company's cost of capital is 10%. Discount factors for this cost of capital are as follows:

Year	Discount factor
1	0.909
2	0.826
3	0.751
4	0.683

REQUIRED

- (a) Calculate the net present value (NPV) of each option. [10]
- (b) Advise the directors which option they should choose. Justify your answer. [2]

Additional information

Before the directors make a decision, the finance director wishes to have further data on the project.

REQUIRED

- (c) Calculate, to two decimal places, the sensitivity of the option selected in your answer to (b) to changes in the initial cost of the project. [3]
- (d) Calculate, to two decimal places, the accounting rate of return (ARR) of the option selected in your answer to (b). (Add scrap value to cost when calculating average investment.) [6]
- (e) Explain to the directors which is the more valid method of investment appraisal. Give reasons. [4]

Nov 2016

Q # 18 The main cutting machine of LH Limited needs to be replaced. A replacement machine will cost \$260000.

The current machine cuts 40 000 units a year. The number of units is expected to be reduced by 10% in year 1 due to the time taken to install the new machine. The number of units is expected to increase to 42000 units a year for both year 2 and year 3.

The following information is available.

- 1 The cost of capital is 14%.
- 2 It is assumed that revenues are received and costs are paid at the end of the year.
- 3 Each unit of production costs \$26 to manufacture. This will increase to \$27.80 in year 2 and \$28.50 in year 3.
- 4 Each unit is expected to sell for \$30 in years 1 and 2, increasing by 5% in year 3.
- 5 It is assumed that all production is sold.

The following is an extract from the present value table for \$1.

	12%	14%	16%	18%	20%
Year 1	0.893	0.877	0.863	0.847	0.833
Year 2	0.797	0.769	0.743	0.718	0.694
Year 3	0.712	0.675	0.641	0.609	0.579

REQUIRED

- (a) Distinguish between the net present value method of investment appraisal and the internal rate of return. [4]
- (b) Calculate the expected net present value for the replacement machine. [9]
- (c) Calculate the expected internal rate of return of the replacement machine. [7]
- (d) Analyse the benefits to LH Limited of purchasing the replacement machine. [5]

March 2017

Q # 19 Tisha is considering buying a new machine for her factory. The machine will cost \$125000. At the end of Year 5 the machine will be sold for \$65000. The machine will be used to manufacture one of Tisha's existing products. The following information is available:

- 1 The current annual sales volume of the existing product is 10000 units. This will remain constant over the 5-year period.

Resource Pack/Accounting/A Level (Paper 3)

2 The selling price per unit is currently \$12. Tisha plans to increase this to \$13 per unit to help cover her costs of the new machine.

3 The variable cost is currently \$5 per unit. This is expected to fall to \$3 per unit by using the new machine.

4 The maintenance cost for the new machine will increase the annual fixed costs by \$5000.

5 At the end of Year 1, Tisha will have to pay a one-off service fee of \$1000.

REQUIRED

(a) Prepare one table which shows the change in cash flows for each of the Years 0 to 5 that arise as a result of the purchase of the machine. [5]

(b) Calculate the payback period for the machine. [2]

(c) State three reasons why payback may be a useful investment appraisal technique. [3]

Additional information

Tisha's cost of capital is 10%. Discount factors are as follows:

Year	Discount factor
0	1.000
1	0.909
2	0.826
3	0.751
4	0.683
5	0.621

REQUIRED

(d) Calculate the Net Present Value (NPV) of buying the machine. [3]

Additional information

When using a discount factor of 20%, the machine had a negative NPV of \$24953.

REQUIRED

(e) Calculate the Internal Rate of Return (IRR) of the machine to three decimal places. [4]

June 2017

Q # 20 Wong Ho owns a small factory. A machine has started to break down regularly and needs to be replaced.

A replacement machine is expected to cost \$55 000. It is expected to last 5 years and will be depreciated using the straight-line method of depreciation. At the end of the period the machine will be scrapped with no residual value.

The following information is available for the replacement machine:

1 The selling price for each unit produced by the machine is expected to be \$40 for years 1 and 2. This is expected to increase by 25% for year 3.

There is no expected change for year 4. However, the selling price is expected to increase by a further 10% for year 5.

2 The cost of production for each unit produced is expected to be \$20 for years 1 and 2. This will increase by 25% for year 3 and then remain unchanged.

3 The present value for the net cash flows for the years 1 to 5 have been calculated as follows:

Year	Discount factor 14%	Present value \$
1	0.877	3 683.40
2	0.769	6 536.50
3	0.675	9 483.75
4	0.592	14 977.60
5	0.519	21 019.50

REQUIRED

(a) Distinguish between the payback method of investment appraisal and the net present value method. [4]

(b) Calculate the expected net present value for the replacement machine. [1]

(c) (i) Calculate the annual net cash flows for years 1 to 5 for the replacement machine. [5]

(ii) Calculate the payback period for the replacement machine. [2]

(iii) Calculate the number of units for each year that Wong Ho expects to produce with the replacement machine. [8]

(d) Recommend whether or not Wong Ho should purchase the replacement machine. Justify your answer. [5]

Nov 2017

Resource Pack/Accounting/A Level (Paper 3)

Q # 21 Daniyar has run a successful manufacturing business for several years.

He currently has \$140 000 in the business bank account.

Daniyar is considering replacing one of his current machines with either Machine A or Machine B. The following information is available:

	Machine A	Machine B
Cost	\$210 000	\$161 500
Expected life	5 years	4 years
Annual net cash inflows	?	\$51 000
Payback period	2 years and 11 months	?
Net present value	?	\$7412
Average rate of return	?	?

All revenue and expenditure is expected to accrue evenly throughout the life of each machine.

Annual net cash flows for each machine stay the same every year.

The cost of capital is 8%.

The discount factors are:

Year 1	0.926
Year 2	0.857
Year 3	0.794
Year 4	0.735
Year 5	0.681

The company policy is to depreciate all non-current assets over their expected life using the straight-line method. Neither machine will have any residual value.

Required

- (a) Explain the difference between the net present value and payback methods of investment appraisal. [4]
- (b) Calculate:
 - (i) the payback period for Machine B [2]
 - (ii) the net present value for Machine A [8]
 - (iii) the average rate of return for both machines. [6]
- (c) Advise Daniyar which machine he should purchase. Justify your decision. [5]

March 2018

Q # 22 Jason is considering investing in building a property in order to receive rental income. He could buy the land now (year 0) for \$100 000. Construction costs of \$180 000 would be paid in year 1.

The building would have ten flats and each would have an annual rental of \$5000. Jason thinks that he could rent out flats as follows:

Year	Number of flats rented out
1	Nil
2	7
3	8
4	10

Total annual maintenance and management charges for the flats would cost \$12 000 plus 10% of the rent received.

At the end of the year 4 he would sell the building. Jason has consulted two different property dealers, Alan and Bob. Alan estimates the building could be sold for \$290 000. Bob estimates it could be sold for \$315 000.

Jason's cost of capital is 10%. The discount factors to be used to account for this are as follows.

Year 1	0.909
2	0.826
3	0.751
4	0.683

All cash flows are assumed to take place on the last day of the year.

Required

- (a) (i) Calculate the net present value (NPV) of investing in the building, using Alan's estimation of the sale proceeds. [12]
 (ii) Calculate the net present value (NPV) of investing in the building, using Bob's estimation of the sale proceeds. [3]
- (b) Calculate the sales proceeds at the end of year 4 which would result in a net present value (NPV) of zero. [3]
- (c) Advise Jason whether or not he should proceed with investing in the building. Justify your answer. [5]
- (d) State two reasons why the calculation of the payback period is a less useful investment appraisal technique than the calculation of net present value (NPV). [2]

June 2018

Q # 23 Marie is considering a project to produce a new product. To make it she will need to buy a new machine at a cost of \$250 000 with a useful life of 4 years.

The following information is available.

1 Sales volume in units is expected to be:

Year	Units
1	20 000
2	22 000
3	23 000
4	18 000

2 The selling price will be \$30 per unit and will remain unchanged.

3 The labour costs are \$15 per unit. These are expected to increase by 2% in Year 3. There are no further expected changes in labour costs per unit in Year 4.

4 The material needed for each unit is 3 kilos at \$2.75 per kilo. Material cost per kilo will remain unchanged.

5 The annual fixed costs are \$107 500. This includes the depreciation charge for the new machine.

6 The new machine will have no residual value.

Required

(a) Prepare a table to show the expected annual net cash flows arising from the project. [7]

Additional information

Marie's cost of capital is 10%. Discount factors are as follows.

Year	Discount factor
0	1.000
1	0.909
2	0.826
3	0.751
4	0.683

(b) Calculate the Net Present Value (NPV) of the project. [4]

(c) Calculate the Accounting Rate of Return (ARR) for the project. [3]

Additional information

Marie expects an ARR of 20% on all projects.

(d) Recommend whether or not Marie should proceed with the project. Justify your answer. [3]

(e) Calculate for Year 1 the sensitivity of the project profit:

(i) to the selling price [2]

(ii) to the material cost. [2]

(f) Explain the significance of the figures calculated in (e)(i) and (ii). [4]

Nov 2018

Q # 24 Asif is considering running a farming business, growing soya beans. He could rent land at an annual cost of \$800 per field. He has two options:

Option 1	Rent 5 fields
Option 2	Rent 10 fields

After 5 years he intends to retire.

The purchase of farm machinery requires an outlay of \$30 000 if 5 fields are farmed. If 10 fields are farmed then the necessary farm machinery would cost \$38 000. In either case the machinery would have no scrap value at the end of the 5-year period.

Other information is as follows:

Soya beans yields were expected to be:

1000 kilos per field in Year 1
2000 kilos per field in Year 2
3000 kilos per field in each of Years 3, 4 and 5

Selling prices were expected to be:

\$900 per 1000 kilos of soya beans in each of Years 1 and 2
\$1100 per 1000 kilos of soya beans in each of Years 3, 4 and 5.

Labour costs were expected to be 20% of sales.

The annual costs of seeds is expected to be \$200 per field

Required

(a) Calculate the annual net cash flow for Option 1. [8]

(b) Calculate the accounting rate of return (ARR) for Option 1. [4]

(c) Calculate the ARR for Option 2. [5]

(d) State:

(i) One advantage of using ARR in comparison to other methods of investment appraisal

(ii) Two disadvantages of using ARR in comparison to other methods of investment appraisal. [3]

(e) Discuss other financial and non-financial factors which may affect Asif's decision to run a farming business. [5]

Nov 2018

Q # 25 The directors of T Limited are considering investing in Machine A at a cost of \$950 000 to manufacture a new product. The estimated cash flows from the new product are as follows:

	Cash inflows	Cash outflows
	\$	\$
Year 1	640 000	240 000
Year 2	660 000	260 000
Year 3	400 000	200 000
Year 4	300 000	200 000

Machine A has a useful life of 4 years. The residual value is zero

(a) Calculate the accounting rate of return (ARR) of Machine A. [5]

(b) Calculate the payback period of Machine A. [3]

(c) State two advantages and two disadvantages of using the payback method of investment appraisal. [4]

Additional information

The cost of capital is 8%. The discount factors are:

	7%	8%
Year 1	0.935	0.926
Year 2	0.873	0.857
Year 3	0.816	0.794
Year 4	0.763	0.735

(d) Calculate the net present value (NPV) of Machine A. [3]

(e) Calculate the internal rate of return (IRR) of Machine A. [5]

Additional information

Machine B can also be used to manufacture the new product. The following information is available for machine B.

Cost	\$920 000
Useful life	4 years
Residual value	Nil
Accounting rate of return	13.59%
Payback period	3 years 6 months
Net present value at 8% discount rate	\$20 200

T Limited has limited cash and is likely to borrow money to buy either Machine A or Machine B.

(f) Advise the directors of T Limited which machine they should buy. Justify your answer. [5]

May 2019

Q # 26 Gerry manufactures a product using Machine B. The following budgeted information is available in respect of this for the year ending 31 December 2019.

	\$
Total annual cash inflows from sales	800 000
Total annual cash outflows for cost of sales	416 000

Gerry has decided to purchase a new machine, Machine X, at a cost of \$600 000, to replace Machine B on 1 January 2020. The new machine will have a useful life of 3 years with no residual value. It is expected that Machine X will produce the following results:

- 1 Each year sales will be 5% more than the sales in the previous year.
- 2 Gross margin will increase by 2% in 2020 and this gross margin will then remain constant.
- 3 Machine maintenance costs will be:

	\$
2020	10 000
2021	20 000
2022	30 000

4 Other operating costs (excluding depreciation) will be \$120 000 per year

(a) Calculate for Machine X:

- (i) the net cash flow for each year [5]
- (ii) the payback period [3]
- (iii) the accounting rate of return to two decimal places. [5]

(b) State two advantages and two disadvantages of using the payback method of investment appraisal. [4]

Additional information

Gerry's cost of capital is 10%. The relevant discount factors are:

Year 1	0.909
Year 2	0.826
Year 3	0.751

(c) Calculate the net present value (NPV) of Machine X. [3]

(d) Advise Gerry whether or not he should purchase Machine X. Justify your answer using two financial and two non-financial factors. [5]

May 2019

Q # 27 The directors of P Limited plan to launch a new product which has an expected life of 4 years. A new machine is required for this and the directors are considering buying Machine X. Details of Machine X are as follows

	Year 0	Year 1	Year 2	Year 3	Year 4
	\$	\$	\$	\$	\$
Cost	400 000				
Annual receipts		390 000	420 000	460 000	370 000
Annual payments		280 000	280 000	270 000	250 000

The machine has a useful life of 4 years with no residual value. It will be depreciated using the straight-line method

(a) Calculate the accounting rate of return (ARR) of Machine X. [5]

(b) State two advantages and two disadvantages of using ARR. [4]

Additional information

P Limited's cost of capital is 10%

The following are the discount factors for 10%

Year 1	0.909
Year 2	0.826
Year 3	0.751
Year 4	0.683

(c) Calculate the net present value (NPV) of Machine X. [5]

Additional information

P Limited requires an internal rate of return (IRR) of 13% on any capital investment. If a discount factor of 16% is used, Machine X will have a negative NPV of \$13 130.

(d) Calculate the IRR of Machine X. [3]

Additional information

A similar machine, Machine Y, is available. It also has a useful life of 4 years. The following information for Machine Y is available

Initial cost	\$480 000
NPV	\$33 200
ARR	25%
IRR	13.5%

(e) Advise the directors of P Limited which machine they should buy. Justify your answer. [5]

Additional information

The directors are also considering buying another machine, Machine Z, at a cost of \$110 000. This will be used to produce another product which has an expected life of 3 years. The annual receipts from the sale of the product will be \$100 000. Annual payments will be \$45 000. This will remain constant for each of the 3 years. P Limited's cost of capital remains at 10%.

The directors are confident about the accuracy of their forecast for annual payments. They are not confident about their forecast for annual receipts.

(f) Calculate the annual receipts which give a zero NPV for Machine Z. [3]

Nov 2019

Q # 28 Ronaldo is considering introducing a new product which will require the purchase of a new machine.

There are two machines available, Machine A and Machine B, but only one may be acquired. Both machines will be scrapped after five years with no residual value.

The following information is available for Machine A

	\$
Cost	225 000
Revenue generated in year 1	80 000
Direct costs in year 1	20 000

Resource Pack/Accounting/A Level (Paper 3)

Revenues are expected to increase by 10% every year to year 4 and then decrease by 25% in year 5. Direct costs are expected to increase by 5% in year 3 and by a further 6% in year 5

(a) Calculate the accounting rate of return (ARR) for Machine A to two decimal places. [10]

Additional information

Ronaldo has a cost of capital of 10%. Discount factors are as follows:

Year	1	0.909
	2	0.826
	3	0.751
	4	0.683
	5	0.621

(b) Calculate the net present value (NPV) of Machine A. [4]

Additional information

The payback period for Machine A is 3 years and 3 months.

(c) State three advantages and three disadvantages of using the payback method of investment appraisal. [6]

Additional information

The following data are available for Machine B.

Payback period	2 years and 10 months
ARR	23.58%
NPV	\$24 858

(d) Advise Ronaldo which machine he should purchase. Justify your answer. [5]

Nov 2019

Resource Pack/Accounting/A Level (Paper 3)

Q # 29 The directors of W Limited plan to buy a machine costing \$480000 from an overseas manufacturer.

The machine has an estimated useful life of four years with no residual value.

Estimated receipts and payments are as follows:

	Receipts \$	Payments \$
Year 1	260 000	90 000
Year 2	290 000	120 000
Year 3	330 000	140 000
Year 4	130 000	80 000

The cost of capital of W Limited is 10%.

The discount factors are as follows:

	7%	10%
Year 1	0.935	0.909
Year 2	0.873	0.826
Year 3	0.816	0.751
Year 4	0.763	0.683

(a) Calculate for the proposed investment:

- (i) The payback period (in months) [3]
- (ii) The net present value (NPV) [4]
- (iii) The internal rate of return (IRR). [4]

(b) Advise the directors whether or not they should buy the machine. Justify your answer by reference to your calculations in part (a) [4]

Additional information

The cost of the machine, \$480000, includes the purchase price plus a 20% tariff (import duty) on the purchase price. Due to a recent trade agreement, it is highly probable that the 20% tariff will be abolished

On the basis that the tariff is to be abolished, the directors have recalculated the payback period and NPV and decided to buy the machine.

(c) Comment on the directors' decision to buy the machine when the tariff is abolished. Support your answers with relevant calculations. [6]

(d) Explain why the directors of W Limited use the payback period and NPV to make their investment decisions. [4]

March 2020