Investment appraisal and cash flows

Questions and Answers (A level)

Question 1

March 2017

6 The main cutting machine of LH Limited needs to be replaced. A replacement machine will cost \$260,000.

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 42 000 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 p	present v	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]

Question	Answer									
6(a)	Net present value method of capital investment appraisal uses the present value of the net cash flows less the initial investment. (cash inflows less cash outflows (1) using todays prices levels (1) at the company's cost of capital (1)									
	max (2) The internal rate of return method of capital investment appraisal also uses the present values of cash flows. (1) However it represents the true interest rate earned by the investment over the course of its economic life (1). This rate will cause the net present value to be returned to zero. (1) max (2)									
6(b)	NPV at 14%	9								
	Net cash flow DF \$ 0 (260 000) 1 (260 000) 1 1 144 000 0.877 126 288 1of 2 92 400 0.769 71 055.60 1of 3 126 000 0.675 85 050 1of NPV 22 393.60 1of									
	Working: Units 1									

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Question	Answer							
6(c)	ower rate + (different in rate · (low rate npv/low rate npv + high rate npv) 14% (1) + (6% (1) × 22 393.60 (1of)/22 393.60 + 2 968.40) = 19.3% (1of)							
	at 20% NPV is							
	Net cash flow DF \$ 0 (260 000) 1 (260 000) (1) 1 144 000 0.833 119 952 * 2 92 400 0.694 64 125.60 *(1)* 3 126 000 0.579 72 954 * NPV (2968.40) (1) of							
6(d)	The net cash flow generated over the 3 years is \$102400 (1). This cash can be put to other uses within the business (1). Production levels have increased up to 42000 from 40000 (1). This means that the business can increase its market (1) and potentially its profit (1) max The net present value is positive with a cost of capital at 14%. (1) The discounted net cash flows exceed the initial cost of the investment (1) The internal rate of return is larger than the cost of capital (1) The return of the investment is greater than the cost (1) Max 5							
		25						

November 2017

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 \$55000. 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	3683.40
2	0.769	6536.50
3	0.675	9 483.75
4	0.592	14977.60
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]

PUBLISHED 2017

Question	Answer	Marks							
5(a)	Payback does not consider the time value of money, (1) whereas net present value does. (1) Payback calculates the time it takes to cover the initial cost of the investment and does not consider the net cash flow after the payback period. (1) Net present value considers the discounted cash flows for the whole life of the investment. (1)								
5(b)	Net present value is:								
	Cost (55 000.00) Total present values 55 700.75 Net present value 700.75 (1)								
5(c)(i)	Annual net cash flows:								
	Year Present value \$ Discount factor Net cash flows \$ 1 3 683.40 0.877 4 200 (1) 2 6 536.50 0.769 8 500 (1) 3 9 483.75 0.675 14 050 (1) 4 14 977.60 0.592 25 300 (1) 5 21 019.50 0.519 40 500 (1)								
5(c)(ii)	Payback period is therefore 4 years (10F) and (2950/40500 × 365) 27 days (10F)	2							
5(c)(iii)	Units for each year are:	8							
	Year Net cash flow From (c)(i) Contribution per unit Units 1 4 200 40 - 20 = 20 (1) (years 1 and 2) 210 (1 OF) 2 8 500 40 - 20 = 20 (1) (years 3 and 4) 425 (1 OF) 3 14 050 50 - 25 = 25 (1) (years 3 and 4) 562 (1 OF) 4 25 300 50 - 25 = 25 (1) (years 3 and 4) 1012 (1 OF) 5 40 500 55 - 25 = 30 (1) (1 OF)								

Question	Answer	Marks
5(d)	The machine has a positive net present value, but it is very small. (1) The payback is within the life of the machine. However, it is very late by being in the fifth year. (1) Wong Ho should purchase the machine as it has a positive net present value (1), it pays back within the life of the machine	5
	(1) and it increases the production level. (1)	
	Wong Ho should not purchase the machine as the data is all estimated (1) and could be wrong. If the small positive net present value becomes negative, (1) the payback does not happen in the lifetime and the production does not exceed the current production levels. (1) There may be additional potential costs, (1) such as training. (1)	
	1 for decision and max 4 for explanation	

May june 2018

Jason is considering investing in building a property in order to receive rental income.

He could buy the land now (year 0) for \$100000. Construction costs of \$180000 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.

Answer the following questions in the Question Paper. Questions are printed here for reference only.

- (a) (i) Calculate the net present value (NPV) of investing in the building, using Alan's estimation of the sale proceeds.
 - (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]

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Question		Answer										Marks				
5(a)(i)		Year	Inflo	VS		Outflows			t cash llow		count	Discour cash fk				12
		0				100 000		(1	00 000)			(100	000)	(1)]	
		1				180 000	(1)	(1	80 000)		0.909	(163	620)	(1) OF]	
		2	35	000	}	15 500	(1)		19 500		0.826	16	107	(1) OF]	
		3	40	000	} (1)	16 000	(1)		24 000		0.751	18	024	(1) OF]	
		4	50	000		17 000	(1)		33 000		0.683	22	2 539	(1) OF]	
												(206	950)			
		4	290	000							0.683	198	070	(1)]	
		NPV										(8	880)	(1) OF		
5(a)(ii)	Year Inflows Outflows Net cash flow Discount cash flows							3								
			Discour	nted c	ash flows	before sales	proceeds				(206	950) (1) OF			
			4		315 000				(.683	215	145 (1)			
			NPV								8	3 195 (1) OF			
5(b)	206950 (1) OF = \$303 001 (1) OF											3				

Question	Answer		l		
5(c)	Both positive and negative NPVs are small in relation to the outlay.				
	Decision would depend on how risk-averse Jason is.		l		
	The project pays back even at the lower sales value.		l		
	There are a lot of assumptions being made even without the final sales proceeds.		l		
	Jason may get more for the building if he sold the flats individually rather than as a block.		I		
	Accept other valid points.		I		
	(1) for decision and (max 4) for comments				
5(d)	Payback ignores the time value of money	2			
	Payback ignores the length of a project		l		
	Payback ignores cash flows arising after the payback period		l		
	Projects with the same NPVs could have different patterns of cash movements and hence have different payback periods.		l		
	Accept other valid points.				
	Any two for (1) mark each		I		

March 2018

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.

Answer the following questions in the Question Paper. Questions are printed here for reference only.

Explain the	difference	between	the n	et pre	esent	value	and	payback	methods	of	investment
appraisal.											[4]

(b) Calculate:

(i)	the payback period for Machine B	ľ
	ule payback period for Macrille D	14

(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]

Question		Answer		Marks
6(a)	Net present value uses discounted rates to calculate the not. (1) The net present value method considers all (1) the cash considers those cash flows up to the date of payback. (1)	flows of a capital investment	, , , , , ,	4
6(b)(i)	Payback is 3 years (1) and 2 months (1)			2
6(b)(ii)	year net cash flow \$ 0 (210 000) 1 72 000 (W1) 2 72 000	1 0.926 0.857	ent value \$ (210 000) 66 672 (1) OF 61 704 (1) OF	8
	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	0.794 0.735 0.681 Net present value	57 168 (1) OF 52 920 (1) OF 49 032 (1) OF 77 496 (1) OF	

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		, obliging	
Question		Answer	Marks
6(b)(iii)	ARR Machine A Cost of investment	72 000 – 210 000 / 5 = 30 000 profit (1) OF 210 000 / 2 = 105 000 (1)	6
	ARR = 30 000 / 105 000 · 1	00 = 28.57% (1) OF	
	Machine B Cost of investment	51 000 - 161 500 / 4 = 10 625 (1) 161 500 / 2 = 80 750 (1)	
	ARR	10 625 / 80 750 · 100 = 13.16% (1) OF	
6(c)	Decision (1) plus (4) for ju	stification	5
	Machine A has a greater an	nual cash flow of \$72 000 compared to \$51 000. (1)OF	
	Machine A has the greater	cash flows and expected life (1)OF, NPV (1)OF, ARR (1)OF and quicker payback. (1)OF	
	Daniyar should choose mad	chine A (1) provided that it can be financed (1).	
	Max 5		

May June 2019

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.

Answer the following questions in the Question Paper. Questions are printed here for reference only.

- (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]

Question	Answer	Marks
5(a)(i)	2020 2021 2022	5
5(a)(ii)	2 years + [(\$600 000 - \$591 000) / \$313 050 × 365] = 2 years (1) OF 11 days (2) OF	3
5(a)(iii)	\$ 2020	5

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Question	Answer	Marks
5(b)	Advantages:	4
	Easy to compute (1)	
	Easy to understand (1)	
	Good for initial screening (1)	
	Good for business which requires short time to recover its investment (1)	
	Disadvantages:	
	Does not consider time value of money (1)	
	Does not consider cash flows after the payback period (1)	
	Projects may have different patterns of cash inflows (1)	
	Max 2 for advantages max 2 for disadvantages. Accept other valid points.	
5(c)	Inflows PV	3
	Year 0	

Question	Answer	Marks
5(d)	Machine X should be purchased (1) because it has a positive NPV (1) OF	5
	The payback is less than the useful life of the machine (1) OF	
	The ARR is more than the cost of capital (1) OF	
	The quality of the product is better (1)	
	The maintenance costs should be lower than Machine B (1)	
	Machine X may have a positive environmental impact (1)	
	There may be additional training costs incurred with machine X (1)	
	1 mark for decision Max 2 for financial factors Max 2 for non-financial factors	
	Accept other valid points.	

October 2019

R Limited does not hold any inventory.

The non-current assets schedule of R Limited for the year ended 31 December 2018 was as follows.

	Equipment	Motor vehicles	Total
	\$000	\$000	\$000
Cost			
At 1 January 2018	190	220	410
Additions	80	-	80
Disposals	-	(40)	(40)
At 31 December 2018	270	180	450
Accumulated depreciation			
At 1 January 2018	47	96	143
Charge for the year	27	21	48
Eliminated on disposals	-	(17)	(17)
At 31 December 2018	74	100	174
Net book value			
At 31 December 2018	196	80_	276
At 1 January 2018	143	124	267
•			

The statement of changes in equity of R Limited for the year ended 31 December 2018 was as follows.

	Ordinary share capital (\$1 shares)	Share premium	General reserve	Retained earnings	Total
	\$000	\$000	\$000	\$000	\$000
At 1 January 2018	1000	100	25	150	1275
Issue of shares	120	24			144
Transfer			50	(50)	-
Ordinary dividend paid				(80)	(80)
Profit for the year				135	135
At 31 December 2018	1120	124	75	155	1474

The following information is also available.

- 1 Finance charges for the year amounted to \$16 000. All had been paid by the year-end.
- 2 Proceeds from the sale of the motor vehicle were \$30 000.
- 3 During the year trade receivables increased by \$22,000 and trade payables decreased by \$18,000.
- 4 The net increase in cash and cash equivalents during the year was three times the amount of the overdraft at the start of the year.

Answer the following questions in the Question Paper. Questions are printed here for reference only.

- (a) Identify the type of business which keeps no inventory of goods for resale. [1]
- (b) Prepare the statement of cash flows for R Limited for the year ended 31 December 2018 in accordance with IAS 7. (Ignore taxation.) [18]
- (c) State why the revaluation of a non-current asset is not disclosed in a statement of cash flows.

Additional information

The finance director of R Limited has produced the cash budget for the year ending 31 December 2019. This shows at that date the company will again have an overdraft.

(d) Discuss the possible reasons for this.

[5]

Question			A	nswer		Mark
4(a)	Service / tertiary business (1)					
4(b)	R Limit Statement of cash flows for th		ended	31 Dece	mber 2018	1
		\$000		\$000		
	Profit from operations (135 + 16)			151	(1)	
	Depreciation – equipment	27	(1)			
	 motor vehicles 	21	(1)	48		
	Profit on disposal			(7)	(1)	
	Increase in trade receivables			(22)	(1)	
	Decrease in trade payables			(18)	(1)	
	Cash from operations			152	(1) OF	
	Interest paid			(16)	(1)	
	Net cash from operating activities			136	(1) OF	
	Cash flow from investing activities					
	Purchase of non-current assets	(80)	(1)			
	Proceeds of sale of non-current assets	30	(1)			
	Net cash used in investing activities			(50)	(1) OF	
	Cash from financing activities					
	Proceeds of issue of shares	144	(1)			
	Dividend paid	(80)	(1)			
	Net cash from financing activities			64	(1) OF	
	Net increase in cash and cash equivalents			150	(1) OF	
	Cash and cash equivalents 1 Jan 2018			(50)	(1) OF	
	Cash and cash equivalents 31 Dec 2018			100	(1) OF	

Question	Answer	Marks
4(c)	Because the revaluation of a non-current asset does not involve any movement of funds (1)	1
4(d)	Possible answers:	5
	Reduced profit / increased expenses for the year (1)	
	Decrease in trade payables / paying payables more quickly (1)	
	Increase in trade receivables / receivables paying more slowly (1)	
	Purchase of non-current assets (1)	
	Payment of dividend (1)	
	Repayment of loans / debentures (1)	
	Accept other valid points.	
	Max 5	