3.5 Investment appraisal and budgets

Name: _____ Class: _____ Date: _____ **Total: 20 marks**

KEY WORDS payback period • average rate of return • net present value • discount factor • budget • variance

Objective

Build the skills to answer exam questions on **investment appraisal** (payback period and average rate of return; NPV at HL) and, at HL, **budgets** and variance analysis.

You must be able to:

- calculate and interpret the payback period
- calculate and interpret the average rate of return (ARR)
- compare investment projects using numbers and non-financial factors

1 Key knowledge and worked examples

Investment appraisal

Payback period: the time it takes for the net cash flows from a project to repay its cost. Add the net cash flows year by year (the **cumulative** cash flow) until it reaches the cost; for part of a year, months $= \dfrac{\text{amount still needed}}{\text{net cash flow in that year}} \times 12$.

Average rate of return (ARR):

$$\text{ARR} = \frac{(\text{total net cash flows} - \text{cost}) \div \text{years}}{\text{cost}} \times 100$$

method	strengths	limitations
payback	simple; favours quick returns, which lowers risk and helps cash flow	ignores cash after payback; ignores the time value of money
ARR	uses all cash flows; easy to compare with interest rates	ignores timing and the time value of money

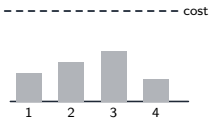
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Non-financial factors: effects on staff and morale, the environment, the firm's image and objectives, the accuracy of forecasts, and risks such as changes in demand or costs.

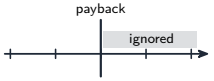
Answer shapes: cumulative table → payback in years and months → ARR with working → compare → judgement with non-financial factors.

2 Practice

2.1 Define **payback period**. [2]



2.2 State **two** limitations of the payback method. [2]



2.3 Project A costs \$50,000. Its net cash flows are \$15,000, \$20,000, \$25,000 and \$10,000 in years 1–4. Calculate its payback period in years and months. [4]

year	0	1	2	3	4
net cash flow (\$000)	−50	15	20	25	10

2.4 Calculate the average rate of return (ARR) for project A. [2]



3 Exam-style questions

3.1 Peak Print can buy one of two machines, each costing \$50,000. Machine A (project A above) is cheaper to run but produces lower quality. Machine B's net cash flows are \$10,000, \$15,000, \$25,000 and \$30,000 in years 1–4; it is more automated, so two jobs would be cut. Peak Print has a weak cash position.

Using payback, ARR and other information, recommend which machine Peak Print should buy. [10]

\$000	0	1	2	3	4
machine A	−50	15	20	25	10
machine B	−50	10	15	25	30

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Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

Each answer shows the steps, then the **result**.

2.1

the length of time; for the net cash flows from an investment to repay its initial cost

2.2

any two: ignores cash flows after the payback point; ignores the time value of money; does not measure profitability; relies on forecasts

2.3

cumulative: 15 000, 35 000 after 2 years; still needed 15 000 of year 3's 25 000; $15\,000 \div 25\,000 \times 12 = 7.2$ months; payback = **2 years 7 months**

2.4

total net cash flows = 70 000; $(70\,000 - 50\,000) \div 4 = 5\,000$ per year; ARR = $5\,000 \div 50\,000 \times 100 =$ **10**%

3.1

award up to [10]: machine A: payback 2 years 7 months, ARR 10%; machine B: cumulative 10 000, 25 000, 50 000: payback exactly 3 years; ARR = $(80\,000 - 50\,000) \div 4 \div 50\,000 \times 100 = 15\%$; A pays back sooner: important given the weak cash position; B is more profitable overall; non-financial: B cuts two jobs: lower morale, redundancy costs, image; B's higher quality may win customers; forecasts for later years are less certain; judgement, e.g. A if cash is the priority, B if long-term profit is; recommendation justified by the case

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