

Investment appraisal: an e-bike fleet or a tour van?

Student tasks | Original TBS lesson for A level Business (Edexcel 9BS0 content, Theme 3, section 3.3.2 Investment appraisal)

Seaview Bikes hires bicycles to visitors in a seaside town. The owner has enough money and borrowing for ONE new project this year. Use payback, the average rate of return and net present value to compare the two projects, then decide which one she should choose.

Before you start you should know: payback is the time it takes for the net cash inflows to repay the initial cost. Average rate of return (ARR) = average annual profit / initial cost x 100, where total profit = total net cash inflows - initial cost. Net present value (NPV) = total present value of the net cash inflows - initial cost. You need a calculator. This is original classroom practice, not an exam paper. Seaview Bikes and every figure are fictional.

The two projects

£	Project A: e-bike fleet	Project B: tour van
Initial cost (Year 0)	40,000	25,000
Net cash inflow, Year 1	12,000	10,000
Net cash inflow, Year 2	14,000	9,000
Net cash inflow, Year 3	16,800	8,000
Net cash inflow, Year 4	17,200	7,000

Project A: 12 electric bikes for longer rides; more visitors are expected to book them each year as word spreads. Project B: a minivan with bike racks for guided coastal tours; demand is expected to fall slightly as the novelty wears off. For payback, assume each year's inflow arrives evenly through the year, and give payback in years and whole months, rounding part-months up. For NPV, treat each year's inflow as arriving at the end of that year. Give ARR to one decimal place and present values to the nearest £.

Starter: which technique?

Match each description to payback, ARR or NPV.

Description	Technique
(i) How long it takes to get the money back	
(ii) Future cash turned into today's money, minus the cost	
(iii) Average yearly profit as a percentage of the cost	

Task 1: payback

£	Cost (Year 0)	Year 1	Year 2	Year 3	Year 4
Project A	40,000	12,000	14,000	16,800	17,200
Project B	25,000	10,000	9,000	8,000	7,000

Payback: inflows arrive evenly through each year; give years and whole months, rounding part-months up.
ARR = average annual profit / initial cost x 100, to one decimal place.

a. Calculate the payback period for Project A. Show the cumulative cash flow.

b. Calculate the payback period for Project B.

Task 2: average rate of return

a. Calculate the ARR for Project A.

b. Calculate the ARR for Project B.

c. Which project looks better on payback, and which on ARR? Explain in one sentence.

Task 3: net present value

The owner can borrow at 8% a year, so she uses 8% to discount future cash. Discount factors at 8% (rounded to three decimal places): Year 1 0.926, Year 2 0.857, Year 3 0.794, Year 4 0.735.

a. Complete the table. Present value = net cash inflow x discount factor.

£	Discount factor	A: inflow	A: present value	B: inflow	B: present value
Year 1	0.926	12,000		10,000	
Year 2	0.857	14,000		9,000	
Year 3	0.794	16,800		8,000	
Year 4	0.735	17,200		7,000	
Total present value					
Less initial cost			40,000		25,000
Net present value					

Working space:

b. Why does the same £1,000 have a lower present value in Year 4 than in Year 1?

Task 4: test the forecast

Project A relies on bookings growing. Suppose a rival opens nearby and Project A's inflows in Years 3 and 4 are 20% lower than the forecast of £16,800 and £17,200. Years 1 and 2 stay at £12,000 and £14,000, and the cost is still £40,000. Use the same discount factors: Year 1 0.926, Year 2 0.857, Year 3 0.794, Year 4 0.735. Project B's NPV and payback do not change.

a. Calculate Project A's new inflows for Years 3 and 4 and its new NPV.

b. Calculate Project A's new payback period (inflows evenly through each year, part-months rounded up).

c. Project B's NPV is £3,470 and its payback is 2 years 9 months (check them against your own). Does Project A still have a higher NPV than Project B? What does this test tell the owner?

Task 5: decide

Write about 100 words recommending Project A or Project B. Use at least three figures from your answers. Name one limitation of investment appraisal that could change your decision.

Exit ticket

a. Why is a pound received in four years' time worth less to a business than a pound today?

b. A project costs £10,000 and brings in £3,000 a year, evenly through each year, for four years. Calculate its payback period.
