

Cambridge AS & A Level · Accounting 9706 · Notes

Investment appraisal A2

Read online at pastopic.com/cambridge/accounting-9706/notes/investment-appraisal

Last checked 30 September 2026

Read first: [Costs and cost behaviour](#), [Traditional costing methods](#)

© 2026 Pastopic. Free for personal study. Please share the link, not the file.

What you need to know

By the end of this topic you should be able to:

1. **Work out the future net cash flows of a project:** the cash that will come in and go out because of it, year by year, starting with the outlay at Year 0.
2. **Apply four appraisal methods** to those cash flows:
 - **payback:** how long it takes for the cash coming in to repay the outlay;
 - **accounting rate of return (ARR)** = $\frac{\text{average profit}}{\text{average investment}} \times 100$;
 - **net present value (NPV):** the total of the discounted cash flows;
 - **internal rate of return (IRR):** the discount rate at which the NPV is zero.
3. **Give the advantages and disadvantages** of each method.
4. **Make and justify a decision** (invest or not, or which project) using the figures.
5. **Explain why non-financial factors matter** and give examples.

Two things are **not** examined: **discounted payback**, and any **residual (scrap or resale) value** of an asset at the end of a project. You may see scrap values in older past papers; skip those parts.

Understand it

Capital investment and relevant cash flows

A **capital investment** means spending a large sum now (a machine, a licence, a building) to earn cash over several years. Investment appraisal asks: is the cash that comes back worth the cash that goes out?

The methods (except ARR) use **cash flows, not profits**. For each year you want the project's **net cash flow** = cash in – cash out, counting only cash that happens **because of** the project and **in the future**:

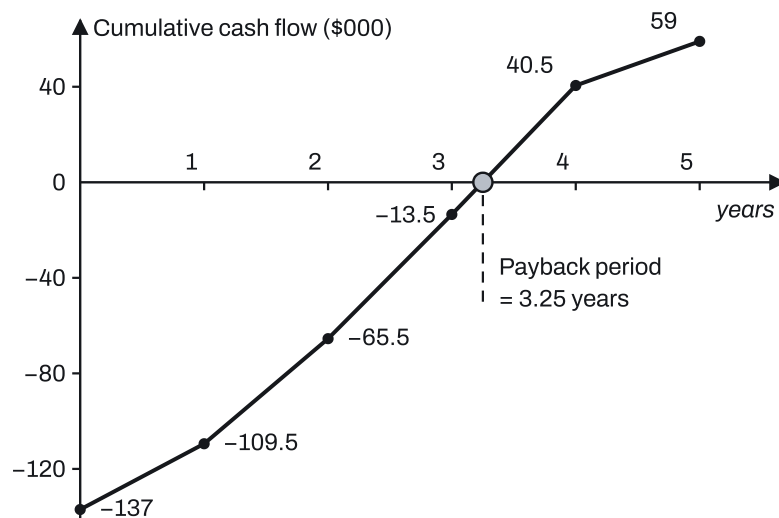
- **Include:** sales receipts, running costs, rent, fees, grants, extra advertising, a replacement part bought halfway, and any profit lost on another product that the project pushes out (an **opportunity cost**).
- **Exclude: depreciation** (it is not a cash payment; the cash left when the machine was bought), and any cost that stays the same whether or not the project goes ahead.

Time is counted in whole years. **Year 0** is "now": the outlay. Every other flow is treated as happening at the **end** of its year.

If fixed overheads are given "**including** depreciation", take the depreciation off to get the cash fixed cost. If you are given **profit**, add depreciation back to get the cash flow.

Payback

The **payback period** is the time it takes for the net cash inflows to add up to the outlay. Keep a running (cumulative) total starting from the negative outlay; payback is where it reaches zero.



If the cash comes in evenly during a year, the part-year is $\frac{\text{amount still to recover}}{\text{that year's cash flow}}$. Above, \$13 500 is still needed at the end of year 3 and year 4 brings in \$54 000, so payback is $3 + \frac{13\,500}{54\,000} = 3.25$ years, or 3 years 3 months.

A shorter payback means the money is back sooner, so there is less time for things to go wrong. But payback ignores everything after the payback point and treats \$1 in year 3 the same as \$1 now.

Accounting rate of return (ARR)

ARR is the only method that uses **profit**. Over the whole life:

$$\text{total profit} = \text{total net cash inflows} - \text{cost of the investment}$$

because the cost is written off as depreciation over the life. Then

$$\text{average profit} = \frac{\text{total profit}}{\text{number of years}}, \quad \text{average investment} = \frac{\text{cost}}{2}, \quad \text{ARR} = \frac{\text{average profit}}{\text{average investment}} \times 100.$$

The average investment is half the cost because the asset's book value falls steadily from the full cost to nothing, so on average half of it is tied up. Compare the ARR with the business's target return or its current return on capital employed.

The time value of money

\$1 now is worth more than \$1 in two years' time: you could invest it now and earn a return, and money received later is less certain. The **cost of capital** is the cost of financing the project (interest on loans, the return shareholders expect), so it is the **minimum return** a project must earn.

Discounting turns a future cash flow into its value today, its **present value (PV)**:

$$PV = \text{cash flow} \times \text{discount factor}, \quad \text{discount factor} = \frac{1}{(1 + r)^n}$$

The exam always gives the factors, rounded to 3 decimal places. At 9%, \$1 000 received at the end of year 2 is worth $1\,000 \times 0.842 = \$842$ today.

Net present value (NPV)

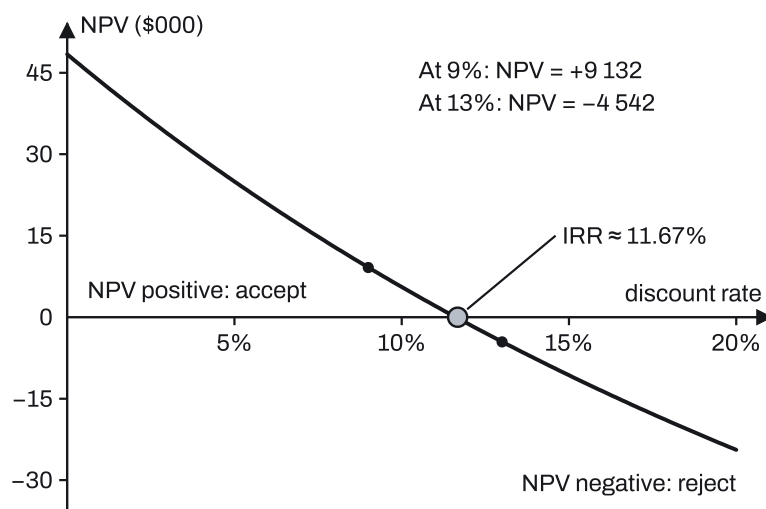
$$NPV = \text{total PV of the inflows} - \text{outlay}.$$

The Year 0 outlay is not discounted (its factor is 1). If the NPV is **positive**, the project earns **more** than the cost of capital, so on financial grounds **accept** it. If it is **negative**, reject it. Between two projects, choose the higher NPV.

When the cash flow is the same every year, add the factors first and multiply once (an **annuity factor**): at 9%, $0.917 + 0.842 + 0.772 + 0.708 = 3.239$.

Internal rate of return (IRR)

A higher discount rate shrinks every future flow, so the NPV falls as the rate rises. The **IRR** is the rate at which the NPV is exactly zero: the project's own rate of return. Accept a project whose IRR is **above** the cost of capital.



You find it by **interpolation**: work out the NPV at one rate where it is positive and one where it is negative, then assume the NPV falls in a straight line between them. Because the real curve bends slightly, the answer is an estimate: 11.67% here, against a true rate of about 11.6%.

Non-financial factors

The methods measure only money. A decision also depends on things that are hard to put a figure on: staff morale and the need for training, job gains or losses in the area, product quality, reliability and after-sales service, customer goodwill, the effect on the environment, the firm's reputation and competitive position, and how reliable the estimates are. Every cash flow in an appraisal is a **forecast**, so the result is only as good as the estimates.

Comparing the methods

Method	Advantages	Disadvantages
Payback	Simple to work out and understand; favours projects that return cash quickly, which lowers risk and helps liquidity	Ignores cash flows after the payback point; ignores the time value of money
ARR	Simple; gives a percentage that can be compared with the current return on capital employed or a target; looks at the whole life	Uses profit, not cash, so depends on accounting choices such as the depreciation method; ignores the timing of profits and the time value of money; ignores the size of the project
NPV	Allows for the time value of money; uses every cash flow over the whole life; cash is more objective than profit; gives the gain in today's money	Harder to explain; needs a cost of capital, which is hard to set; depends on estimates
IRR	Allows for the time value of money; gives a percentage that is easy to compare with the cost of capital	Only an estimate by interpolation; a percentage ignores the size of the project, so it can favour a small project over one with a bigger NPV

NPV is generally seen as the most reliable method.

Key facts and formulas

There is no formula list in 9706 exams, so every formula here must be learnt.

Formula	Status
Net cash flow = cash inflows – cash outflows (no depreciation)	Learn it
Cash flow = profit + depreciation; cash fixed costs = fixed costs including depreciation – depreciation	Learn it
Straight-line depreciation (no residual value) = $\frac{\text{cost}}{\text{life in years}}$	Learn it
Payback = full years + $\frac{\text{amount still to recover}}{\text{next year's cash flow}}$; months = fraction $\times 12$	Learn it
Total profit = total net cash inflows – cost of the investment	Learn it
ARR = $\frac{\text{average profit}}{\text{average investment}} \times 100$, average investment = $\frac{\text{cost}}{2}$	Learn it
PV = cash flow $\times$ discount factor (Year 0 factor = 1)	Learn it
NPV = total PV of inflows – outlay	Learn it

Formula	Status
Equal annual flows: $PV = \text{annual flow} \times \text{sum of the factors}$	Learn it
$IRR = L + (H - L) \times \frac{NPV_L}{NPV_L - NPV_H}$, where L, H are the lower and higher rates and NPV_H is negative	Learn it
Flow needed in year n to fill an NPV gap = $\frac{\text{shortfall in NPV}}{\text{year } n \text{ discount factor}}$	Learn it

How to do it

In the Paper 3 and Paper 4 questions we have tagged for this topic (19 questions, 16 different ones, 2021–2025), the types came up this often. Every one is a 25-mark case question that mixes several types, so the counts add up to far more than 19.

Question type	Questions
Advise which project / whether to invest, justified	18
Calculate NPV	17
Calculate net cash flows for each year	13
Recalculate NPV after a change (what-if / sensitivity)	11
State or discuss advantages and disadvantages of a method	10
Calculate ARR	10
Calculate IRR by interpolation	8
Explain a term or how a method works	6
Work back to a value giving a target NPV	6
Calculate payback period	4
Non-financial factors and estimating cash flows	2
Name another appraisal method	2

1. Advise which project / whether to invest, justified (18 questions)

Usually 5–7 marks: up to 6 for comments and 1 for a clear decision backed by a comment. Short 2–3 mark versions want two results-based comments and the decision.

- Use your results first**, one point each: NPV positive or negative (or which is higher); IRR above or below the cost of capital; ARR against the target or the current return; payback short or long; NPV is usually seen as the best method.
- Then the money around it**: the size of the outlay and how it will be financed; the risk, since every figure is an estimate (a longer payback or a bigger outlay means more risk); what happens after the project ends.

3. **Then non-financial points from the case:** staff training, quality of output, reliability and repairs, after-sales service, local jobs, spare capacity, the owner's other aims.
4. **Decide** in one sentence and give the reason: "Buy machine X, because it has the higher NPV and its IRR is above the 10% cost of capital."

Variations you will meet:

- **Two projects that disagree** (one has the higher NPV, the other the shorter payback): say which method you trust (NPV) and why, then weigh the risk.
- **A choice with no figures**, such as keeping an old product going or designing a new one: argue both sides from the case (costs saved, training, whether sales will last, planning for the future), then decide.

2. Calculate NPV (17 questions)

1. Set out a table: **Year | Net cash flow | Discount factor | Present value.**
2. Year 0 is the outlay, in brackets, with factor 1.
3. Multiply each year's flow by its factor (use the factors given, not your own). A negative year's flow gives a negative PV.
4. Add the column: that total is the NPV. Show a negative NPV in brackets or with a minus sign.

Variations you will meet:

- **Equal annual flows:** multiply once by the sum of the factors (Example 3).
- **Two options:** work out each NPV and compare; or work out the NPV of the **differences** between them year by year.
- **Small sums:** the method is the same even if the figures are in hundreds of dollars; keep the decimals the question uses.

3. Calculate net cash flows for each year (13 questions)

1. Make a column for each kind of cash (sales, variable costs, fixed costs, rent, fees, grants, equipment) and a row for each year, starting at Year 0.
2. **Sales** = units × price; **variable costs** = units × cost per unit. Watch for prices or costs that change from year to year.
3. **Fixed costs:** use cash only. If depreciation is included, take it off: fixed costs including depreciation of \$50 900 with depreciation of \$23 400 means \$27 500 of cash.
4. Put **one-off items** in the year they are paid: the outlay at Year 0, a replacement at the end of year 2, a grant in year 1.
5. Add across each row. A year can have a **negative** net cash flow.

Variations you will meet:

- **Profit given:** cash flow = profit + depreciation.
- **Something linked to sales**, such as 20% of customers also paying a rental fee, or an admin cost per unit sold: work it from that year's units.

- **A table of changes**, such as fewer services but more repairs: each column is the change, and the total change goes on to be discounted.

4. Recalculate NPV after a change (what-if / sensitivity) (11 questions)

Examiners change one estimate to see whether the decision still holds: lower sales, a higher cost of capital, an extra cost, an extension to the project.

1. **Either** redo the whole table with the new figures,
2. **or** (usually quicker) discount only the **changes** (the extra outlay, the extra or lost cash each year) and add that to the old NPV.
3. State the new NPV or the **change** and whether it is an **increase or a decrease**, if asked.
4. Say whether the **decision changes** (a positive NPV turning negative, for example).

Variations you will meet:

- **A new cost of capital:** redo the table with the new factors; if you already worked out the NPV at that rate for the IRR, reuse it.
- **"Explain the impact"** with a figure you already have: NPV now negative, so do not invest (2 marks).
- **Keep going or stop early:** a year with a negative net cash flow after fixed costs that would be paid anyway may still have a **positive contribution**, so stopping early would make things worse.
- **"Sensitivity analysis"** means asking "what if" an estimate is wrong, and seeing how far it can move before the decision changes.

5. State or discuss advantages and disadvantages of a method (10 questions)

One mark per point. Learn two advantages and two disadvantages for each method from the table in "Understand it", and make each point about **this** method, not a vague "it is easy". "Discuss whether to use payback" wants points both ways (quick cash lowers risk; but it ignores later flows and the time value of money). "Should other methods also be used?" wants both sides and a decision: more methods take time and still rest on the same estimates, but they show different sides such as risk; NPV is the most widely accepted.

6. Calculate ARR (10 questions)

1. **Total profit** = total net cash inflows over the life – the cost of the investment. (Or add up each year's profit = cash flow – depreciation.)
2. **Average profit** = total profit ÷ number of years.
3. **Average investment** = cost ÷ 2.
4. $ARR = \frac{\text{average profit}}{\text{average investment}} \times 100$, usually to 2 decimal places.

Variations you will meet:

- **Profit per year given:** average profit is that figure; the average investment is still cost ÷ 2.
- **A project that takes capacity from an existing product:** take off the profit you would lose. If a product earning \$28 500 a year gives up 20% of its capacity, you lose \$5 700 a year, or \$17 100 over 3 years. A new product making \$19 300 profit over those 3 years leaves the business only \$2 200 better off, so the ARR on its own

flatters it.

7. Calculate IRR by interpolation (8 questions)

1. Use the NPV at the cost of capital (usually positive) as NPV_L at rate L .
2. Work out the NPV at the higher rate given, H ; it should be negative.
3.
$$IRR = L + (H - L) \times \frac{NPV_L}{NPV_L + |NPV_H|}$$
4. Give it to 2 decimal places. It must lie **between** the two rates; if not, check your signs.

Variation: "Explain how IRR is found or used": two NPVs at two rates, one positive and one negative, then the point between them where the NPV would be zero; accept if the IRR is above the cost of capital, and between two projects prefer the higher.

8. Explain a term or how a method works (6 questions)

Two marks each, so give the idea and one more detail:

- **Payback period:** the time taken for the net cash inflows to recover the outlay.
- **Cost of capital:** the cost of financing the investment (loan interest, shareholders' expected return), so the minimum return a project must make.
- **Net cash inflow:** total cash received less total cash paid in a period, including both revenue and capital items.
- **Sensitivity analysis:** appraisals rest on forecasts of sales, prices and costs; sensitivity analysis works out what happens if one of those changes.
- **Why a project can pay back but have a negative NPV:** payback does not discount, so undiscounted flows can cover the outlay while discounted ones do not, especially if most cash comes late.
- **Why zero NPV is not zero profit:** NPV is discounted and uses cash; profit is not discounted and is after depreciation, so a zero-NPV project still makes a profit.
- **Why a smaller outlay pays back sooner** with the same cash flows: there is less to recover.

9. Work back to a value giving a target NPV (6 questions)

1. Find the **gap**: the NPV you have and the NPV you need (usually zero, or the other option's NPV).
2. Divide the gap by the **discount factor** of the year in which the extra cash would arrive: that is the extra cash needed in that year.
3. If costs change too (such as extra advertising), discount those first and include them in the gap.
4. For a **level** annual flow giving NPV zero, divide the outlay by the **sum** of the factors.

Variation: flows that must follow a pattern (for example, each later year 10% lower than the one before, or two equal years and then falls). Don't use level flows: keep the pattern.

1. Write each year's flow as a multiple of the first year's flow, x .
2. Weight each discount factor by that multiple and add them up.
3. $x = \text{outlay} \div \text{that weighted total}$.
4. Scale back up year by year to get each flow.

For example, a project costs \$87 600, the cost of capital is 9%, and each year's inflow must be 15% lower than the year before, over 3 years. The flows are x , $0.85x$ and 0.85^2x , so the weighted total is

$$0.917 + 0.842 \times 0.85 + 0.772 \times 0.85^2 = 0.917 + 0.7157 + 0.55777 = 2.19047.$$

Then $x = 87\,600 \div 2.19047 = \$39\,991$, so the flows needed are \$39 991, \$33 993 ($0.85x$) and \$28 894 (0.85^2x), working from the unrounded x . Check: their present values add up to \$87 600, so the NPV is zero.

Three of the six older questions ask for a scrap value or sale proceeds that would give a target NPV. Residual values are no longer examined, so you will not meet that version.

10. Calculate payback period (4 questions)

1. Start at minus the outlay and add each year's net cash flow (not discounted).
2. Stop at the year in which the total turns positive.
3. Part-year = amount still to recover at the start of that year $\div$ that year's cash flow.
4. Give it as the question asks: in years (2.75 years) or in years and months (fraction $\times 12$: 2 years 9 months).

11. Non-financial factors and estimating cash flows (2 questions)

- **Why ignored by the methods:** the methods only use amounts in money, and these factors cannot be measured in money.
- **Examples** (one mark each): staff morale, customer satisfaction, the environment, competitive advantage, job losses in the area.
- **How future cash inflows are estimated:** market research, sales of similar existing or competitors' products, sales budgets.

12. Name another appraisal method (2 questions)

One mark: name a method the question has **not** already used: payback, ARR, NPV or IRR (not discounted payback).

Worked examples

The bold codes show where marks are earned, as in Cambridge mark schemes. The number is how many marks.

- **M1** method mark: for a correct method, even if the numbers slip.
 - **A1** accuracy mark: for a correct answer; it needs the M mark before it.
 - **B1** mark for a correct result on its own, with no method needed.
-

Example 1

A business can buy a machine for \$137 000. It will last 5 years and have no residual value. The expected net cash inflows are:

Year	1	2	3	4	5
Net cash inflow (\$)	27 500	44 000	52 000	54 000	18 500

(a) Calculate the payback period in years and months. **[3]**

(b) Calculate the accounting rate of return to two decimal places. **[4]**

(a)

Year	Net cash flow (\$)	Cumulative (\$)
0	(137 000)	(137 000)
1	27 500	(109 500)
2	44 000	(65 500)
3	52 000	(13 500)
4	54 000	40 500

B1 for the cumulative totals. Payback falls in year 4, with \$13 500 still to recover. **M1** for $\frac{13\,500}{54\,000} \times 12 = 3$ months.

Payback = 3 years 3 months. **A1**

(b) Total net cash inflows = 27 500 + 44 000 + 52 000 + 54 000 + 18 500 = \$196 000.

Total profit = 196 000 – 137 000 = \$59 000. **B1** (taking off the cost is the step most often missed).

Average profit = 59 000 ÷ 5 = \$11 800. **B1**

Average investment = 137 000 ÷ 2 = \$68 500. **B1**

$ARR = \frac{11\,800}{68\,500} \times 100 = 17.23\%$. **A1**

The same total comes from yearly profits: each year's cash flow less depreciation of $137\,000 \div 5 = \$27\,400$.

Example 2

A company is considering a machine costing \$70 200 to make a new product for 3 years. The machine will have no residual value and will be depreciated by the straight-line method. The product sells for \$19.00 a unit and has variable costs of \$11.60 a unit. Fixed overheads, **including depreciation**, will be \$50 900 a year. Expected sales are 7 200 units in year 1, 8 300 units in year 2 and 6 400 units in year 3. The cost of capital is 9%; the discount factors are 0.917 (year 1), 0.842 (year 2) and 0.772 (year 3).

(a) Calculate the net cash flow for each of years 1 to 3. **[4]**

(b) Calculate the NPV of the machine and state whether it should be bought. **[4]**

(c) The marketing manager suggests spending \$7 400 on advertising in year 1. She expects this to raise sales by 1 150 units in each of years 2 and 3. Calculate the change in NPV, stating whether it is an increase or a decrease. **[4]**

(a) Contribution per unit = 19.00 – 11.60 = \$7.40. Depreciation = $70\,200 \div 3 = \$23\,400$, so cash fixed costs = $50\,900 - 23\,400 = \$27\,500$. **B1** for removing depreciation.

Year	Contribution (\$)	Cash fixed costs (\$)	Net cash flow (\$)
1	$7\,200 \times 7.40 = 53\,280$	(27 500)	25 780
2	$8\,300 \times 7.40 = 61\,420$	(27 500)	33 920
3	$6\,400 \times 7.40 = 47\,360$	(27 500)	19 860

B1 for the contribution column, **B1** for the fixed cost column, **B1** (own figure) for the net cash flows.

(b)

Year	Net cash flow (\$)	Factor	Present value (\$)
0	(70 200)	1.000	(70 200)
1	25 780	0.917	23 640
2	33 920	0.842	28 561
3	19 860	0.772	15 332
		NPV	(2 667)

B1 for the outlay at Year 0, **M1** for discounting each flow, **A1** for $\text{NPV} = -\$2\,667$. The NPV is negative, so on financial grounds the machine should **not** be bought. **B1** (own figure).

(c) Discount only the changes:

Year	Change (\$)	Factor	Present value (\$)
1	(7 400) advertising	0.917	(6 786)
2	$1\,150 \times 7.40 = 8\,510$	0.842	7 165
3	8 510	0.772	6 570
		Change in NPV	6 949

B1 for 8 510, **M1** for discounting the advertising and the extra contribution in the right years, **A1** for \$6 949, **B1** for "an increase". (Fixed costs do not change, so only the contribution is extra.)

The NPV becomes $-2\,667 + 6\,949 = \$4\,282$, now positive, so the advertising would change the decision.

Example 3

A company can buy a machine for \$158 000. It will last 4 years with no residual value, and will produce net cash inflows of \$51 600 a year. The cost of capital is 9%.

Year	1	2	3	4
Factor at 9%	0.917	0.842	0.772	0.708
Factor at 13%	0.885	0.783	0.693	0.613

(a) Calculate the NPV. [3]

(b) Calculate the IRR to two decimal places. [4]

(c) Calculate the ARR to two decimal places. **[3]**

(d) Calculate the NPV if the annual net cash inflow turns out to be \$48 600, and the lowest annual inflow at which the machine is still worthwhile. Comment on what these figures show about the risk of the project. **[5]**

(e) Advise the directors whether to buy the machine. Justify your answer. **[5]**

(a) Sum of the 9% factors = 3.239. **B1**

NPV = $51\,600 \times 3.239 - 158\,000 = 167\,132 - 158\,000 = \$9\,132$. **M1 A1**

(b) Sum of the 13% factors = 2.974. NPV at 13% = $51\,600 \times 2.974 - 158\,000 = 153\,458 - 158\,000 = -\$4\,542$. **M1 A1**

$$\text{IRR} = 9\% + 4\% \times \frac{9\,132}{9\,132 + 4\,542} = 9\% + 4\% \times \frac{9\,132}{13\,674} = 11.67\%.$$

M1 for the formula with your two NPVs, **A1** (own figure). The second diagram in "Understand it" shows this.

(c) Depreciation = $158\,000 \div 4 = \$39\,500$, so profit = $51\,600 - 39\,500 = \$12\,100$ a year. **B1**

Average investment = $158\,000 \div 2 = \$79\,000$. **B1**

$$\text{ARR} = \frac{12\,100}{79\,000} \times 100 = 15.32\%. \text{ **A1**}$$

(d) Revised NPV = $48\,600 \times 3.239 - 158\,000 = 157\,415 - 158\,000 = -\585 . **M1 A1**

- The NPV falls from \$9 132 to −\$585, so the decision would change from buy to do not buy. **(1)**
- The flow needed for NPV zero is $158\,000 \div 3.239 = \$48\,780$, so the annual inflow can fall by only about \$2 820 (5.5%) before the machine stops being worthwhile. **(1)**
- All the figures are estimates, so a margin this small means the directors should be concerned. **(1)**

(e) A model answer (one mark for each developed point, one for the decision):

- The NPV is positive at \$9 132, so the machine should add value. **(1)**
- The IRR of 11.67% is above the 9% cost of capital. **(1)**
- NPV is the most reliable method because it allows for the time value of money. **(1)**
- But the NPV is small compared with the \$158 000 outlay, and a fall of only 5.5% in the annual inflow makes it negative, so the project is risky. **(1)**
- The directors should check whether workers need training on the machine and how reliable the sales forecast is. **(1)**
- **Decision:** buy the machine, as the NPV is positive and the IRR is above the cost of capital, but review the sales estimate first. **(1)**

Common mistakes

- **Leaving depreciation in the cash flows.** It is not cash. Take it out of "fixed costs including depreciation"; add it back to a profit figure. Examiners see this every year.
- **Forgetting to take off the cost in ARR.** Average profit is (total inflows – cost) ÷ years. Many candidates divide the total inflows by the years, and some divide by the full cost instead of the **average** investment (cost ÷ 2).

- **Putting cash in the wrong year.** Proceeds that follow the progress of the work, a replacement bought partway through, or a grant in year 1 must go in the year they happen, not spread evenly.
- **Losing the sign.** A negative NPV must stay negative; in IRR, $NPV_L + |NPV_H|$ adds the two sizes. Mixing up the signs gives an IRR outside the two rates.
- **Using the wrong discount factors**, such as the 10% ones when the question has changed the rate to 12%, or discounting the Year 0 outlay.
- **Finding a new NPV but not the change.** If asked for the change, subtract, give the figure, and say "increase" or "decrease".
- **Not discounting changes.** When costs or revenues change, the change in each year must be multiplied by that year's factor before being added to the old NPV.
- **No calculations when told to "support your answer with calculations".** A written answer alone loses most of the marks.
- **Advice that only repeats the numbers.** Most candidates stop after "NPV is positive". The rest of the marks come from risk, financing, and non-financial points taken from the case.

How to get the marks

- **Tables earn marks row by row and column by column**, and later marks follow your own figures. Label every row and column, show negatives in brackets, and keep going after a slip.
- **Show the working behind each figure**, such as $8\,300 \times 7.40$ or $50\,900 - 23\,400$. A wrong answer with visible working still earns method marks.
- **Accuracy**: round present values to the nearest dollar unless the figures are small; give ARR and IRR to 2 decimal places when asked, with the % sign.
- **"Calculate"** needs the figure; **"State"** needs a short point, one mark each; **"Explain"** needs the idea and why; **"Discuss"** or **"Assess"** needs both sides; **"Advise"** needs points for and against **and** a decision with a reason (the decision mark is lost without the reason).
- **"Justify your answer"**: use your own figures first (NPV, IRR, ARR, payback), then risk and non-financial points from the case. Aim for one more point than the marks for comments.
- **"Calculations are not required"** means none earn marks; spend the time on reasons.
- **Say which way the decision goes** after every what-if: "the NPV is now negative, so the machine should not be bought."

Quick check

1. A project costs \$71 500 and brings in net cash of \$19 500, \$21 900, \$36 120 and \$15 500 in years 1 to 4. Find the payback period in years and months.
2. An investment of \$86 500 lasts 4 years with no residual value. Its net cash inflows total \$125 300. Calculate the ARR to two decimal places.
3. A project costs \$46 500 and brings in \$16 800, \$19 400 and \$17 300 in years 1 to 3. The cost of capital is 9% (factors 0.917, 0.842, 0.772). Calculate the NPV and state whether the project should go ahead.
4. For the project in question 3, find the smallest extra net cash inflow in year 3 that would make the NPV zero.
5. A project has an NPV of \$6 600 at 9% and $-\$2\,200$ at 13%. Calculate the IRR.

Answers

1. Cumulative: $-71\,500 + 19\,500 + 21\,900 = -30\,100$ after year 2. Part-year = $\frac{30\,100}{36\,120} = \frac{5}{6}$, and $\frac{5}{6} \times 12 = 10$ months. Payback = 2 years 10 months.
2. Total profit = $125\,300 - 86\,500 = \$38\,800$; average profit = $38\,800 \div 4 = \$9\,700$; average investment = $86\,500 \div 2 = \$43\,250$. $ARR = \frac{9\,700}{43\,250} \times 100 = 22.43\%$.
3. PVs: $16\,800 \times 0.917 = 15\,405.6$; $19\,400 \times 0.842 = 16\,334.8$; $17\,300 \times 0.772 = 13\,355.6$. Total = $\$45\,096$. $NPV = 45\,096 - 46\,500 = -\$1\,404$. It is negative, so on financial grounds the project should not go ahead.
4. Extra year-3 cash = $\frac{1\,404}{0.772} = \$1\,818.65$, so at least $\$1\,819$.
5. $IRR = 9\% + 4\% \times \frac{6\,600}{6\,600 + 2\,200} = 9\% + 4\% \times 0.75 = 12\%$.

Past questions to try

- **9706/42/F/M/24 Q1:** cash flows with a loss-making final year, IRR from two NPVs, and whether other methods are worth using.
- **9706/43/O/N/23 Q2:** cash flows with depreciation inside the fixed overheads, NPV of two machines, then the change in NPV from an upgrade.
- **9706/43/M/J/23 Q1:** NPV, payback and ARR for one project, then advice.
- **9706/32/F/M/22 Q6:** payback in years and months, ARR, NPV and IRR, then yearly inflows that keep a falling pattern and give NPV zero at a new rate.