

Costs

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What you need to know

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

1. **Explain why accurate cost information matters to a business**, and what goes wrong when its cost figures are guesses.
2. **Tell apart the types of cost**: fixed and variable costs (how a cost behaves when output changes), and direct and indirect costs (whether a cost can be traced to one product or department).
3. **Compare full costing and contribution costing**: what each method does with fixed (indirect) costs, the uses and limitations of full costing, how contribution costing works, the difference between contribution and profit, the limitations of contribution costing, and when contribution costing should and should not be used.
4. **Use cost information to make decisions**: average, marginal and total cost; costs as a basis for prices; costs to monitor and improve performance, including calculating profit; and contribution to decide whether to accept a special order.
5. **Use break-even analysis**: what it is and why it matters; calculate and interpret the break-even level of output, contribution, the margin of safety and the level of profit, both from figures and from a break-even chart; and explain its uses and limitations.

Understand it

Why cost information matters

A business can only know whether it is making a profit if it knows what it spends. Cost information is the record of what each activity, product, department or site costs. Managers use it to:

- **set prices** that cover costs and leave a profit;
- **calculate profit or loss**, for the whole business and for each product or site;
- **find where money is wasted** and cut costs that add nothing for customers;
- **set budgets** and check spending against them (each department or product can be a **cost centre**, a part of the business whose costs are recorded separately);
- **compare** this year with last year, one site with another, or the business with its rivals;

- **make decisions:** whether to launch a product, accept an order, close a branch, buy a machine, or move premises;
- **work out break-even** and the margin of safety;
- **support a loan application**, since a bank wants evidence that costs, and therefore repayments, can be met.

Accurate matters because every one of these decisions inherits the error. If a swimming school believes each lesson costs 9 dollars to run (pool hire and the instructor's time) when it really costs 11.50 dollars, a 12 dollar fee looks comfortable but leaves only 50 cents a lesson, and the school may even advertise the lessons that earn it least. Accurate figures are hard to get when costs change often (fuel, raw materials, energy), when overheads are shared, and when the business is new and has no past figures.

Types of cost

By how a cost behaves when output changes:

- **Fixed costs** stay the same whatever the level of output, at least in the short run: rent, insurance, salaries, loan interest, the website subscription. They must be paid even if nothing is sold. They are only fixed up to capacity: a business that outgrows its workshop must rent a bigger one.
- **Variable costs** change in direct proportion to output: raw materials, packaging, components, a commission paid per item sold, the fuel for each delivery. Make nothing and they are zero.
- **Semi-variable costs** have a fixed part and a variable part, such as a phone contract with a monthly fee plus a charge per call, or staff on a basic wage plus overtime.

By whether a cost can be traced to one product or cost centre:

- **Direct costs** can be linked to a particular product, service or department: the wood in a table, the wages of the chef in a restaurant's kitchen, the hire of a coach for one school trip.
- **Indirect costs (overheads)** are shared by the whole business and cannot be traced to one product: head-office rent, the finance team's salaries, the company's advertising, insurance for the whole building.

The two ways of sorting are **different**. Most direct costs are variable, but not all: the salary of a factory manager who only runs one product line is direct but fixed. "Direct cost" does not mean "variable cost".

Total, average and marginal cost

Take a workshop that makes wooden chopping boards, with fixed costs of 2,000 dollars a month and variable costs of 6 dollars a board.

- **Total cost** = fixed costs + total variable costs. At 500 boards: $2000 + 6 \times 500 = 5000$ dollars.
- **Average cost** (unit cost) = total cost $\div$ output. At 500 boards: $5000 \div 500 = 10$ dollars a board. At 1,000 boards it falls to $(2000 + 6000) \div 1000 = 8$ dollars, because the fixed costs are spread over more boards.
- **Marginal cost** is the increase in total cost when one more unit is made. Here it is 6 dollars: the fixed costs do not change, so only the variable cost is added.

Average cost tells a manager the lowest price that covers all costs at that output. Marginal cost tells them what an **extra** unit really costs, which is what matters for a one-off order.

Costs and prices

Cost-plus pricing adds a mark-up to the average cost: boards costing 10 dollars each with a 40% mark-up sell at $10 \times 1.4 = 14$ dollars. It guarantees each sale covers its costs, if the cost figure and the sales forecast are right. Its weakness is that it ignores what customers will pay and what rivals charge. Costs also set the **floor** for any price: in the short run a price must at least cover variable cost per unit, and in the long run it must cover full cost, or the business makes a loss.

Full costing

Full costing (absorption costing) shares **all** costs, fixed and variable, direct and indirect, out among the products or cost centres, so that each product carries a share of the overheads. It needs a **basis** for sharing the indirect costs: sales revenue, floor space, labour hours, machine hours, or simply equal shares.

Highfield Garden Centre has three departments. Its head-office and site overheads are 60,000 dollars a year.

Department	Revenue	Direct costs	Floor space
Plants	150,000	95,000	40%
Furniture	90,000	62,000	50%
Café	60,000	33,000	10%

Sharing the overheads by **floor space** (24,000, 30,000 and 6,000 dollars):

Department	Revenue – direct costs	Share of overheads	Profit
Plants	55,000	24,000	31,000
Furniture	28,000	30,000	(2,000)
Café	27,000	6,000	21,000

Furniture seems to make a loss. Share the same 60,000 dollars by **revenue** instead (50%, 30% and 20% of the 300,000 dollar total, so 30,000, 18,000 and 12,000 dollars) and Furniture makes $28000 - 18000 = 10000$ dollars profit. Nothing about the furniture department changed, only the basis. The total profit is 50,000 dollars either way.

Uses of full costing: it is simple; it makes sure every product's price is set with all costs in mind, so overheads are covered in the long run; it gives a full cost per unit for cost-plus pricing; and it is the method required when valuing inventory for published accounts.

Limitations of full costing: there is no single correct basis for sharing overheads, so the result is partly arbitrary; a product can be made to look unprofitable by the choice of basis (as Furniture did); the figures can be misleading for decisions such as closing a department or accepting an extra order; and sharing overheads

in a business with many products takes time.

Contribution costing

Contribution costing (marginal costing) does **not** share out the fixed overheads. Each product is judged by its **contribution**: the money left from its revenue after paying its own variable (direct) costs. All the contributions together then pay the fixed costs, and whatever is left over is profit.

$$\begin{aligned}\text{contribution per unit} &= \text{price} - \text{variable cost per unit} \\ \text{total contribution} &= \text{total revenue} - \text{total variable costs} \\ \text{profit} &= \text{total contribution} - \text{fixed costs}\end{aligned}$$

Contribution is not profit. Contribution is what a product adds towards paying the fixed costs; profit is what is left once **all** the fixed costs are paid. A product can have a positive contribution while the business as a whole makes a loss.

Highfield's three departments contribute 55,000, 28,000 and 27,000 dollars, 110,000 dollars in all, so profit is $110000 - 60000 = 50000$ dollars. If Furniture were closed, its 28,000 dollar contribution would disappear but the 60,000 dollars of overheads would remain, so profit would fall to $55000 + 27000 - 60000 = 22000$ dollars. Under full costing by floor space Furniture looked like a loss-maker; contribution costing shows that closing it would cost the business 28,000 dollars of profit.

When contribution costing is used: deciding whether to accept a special order; deciding whether to keep or drop a product, department or branch; choosing which products to make when capacity is limited; and setting short-term prices. It suits a business with several products and large shared overheads.

When it is not used: setting long-run prices (prices based only on variable costs may never cover the overheads); valuing inventory in published accounts; and businesses whose costs are mostly fixed (capital-intensive firms such as a power station), where variable costs are a small part of the picture.

Limitations of contribution costing: it ignores the fixed costs a product causes, so it can make a product look better than it is; splitting every cost into fixed and variable is not always possible (semi-variable costs); managers may hang on to a fading product because its contribution is still positive, using up capacity and attention a newer, more profitable product could have; and low prices set from contribution may spread to regular customers and cut profit.

Special orders

A **special order** is a one-off order, usually at a price below the normal price. Using contribution:

1. Contribution of the order = (order price – variable cost per unit) × units, minus any **extra** fixed costs the order alone causes (a new mould, extra delivery, overtime premium).
2. If the business has **spare capacity**, its fixed costs are paid already, so a positive contribution adds that amount to profit.
3. If it is at **full capacity**, the order would push out normal sales: compare the order's contribution with the contribution lost.

Then weigh the non-financial factors: will regular customers ask for the same low price; is it the start of a long-term customer; will rushing it hurt quality or delivery times for other customers; does it damage the brand if sold cheaply; and does the business have the staff and materials.

Break-even analysis

Break-even analysis uses a business's costs and revenue to find the output at which total revenue exactly covers total costs, the **break-even output**, so the business makes neither a profit nor a loss. Each unit sold adds its contribution; once the contributions add up to the fixed costs, every further unit's contribution is profit.

$$\text{break-even output} = \frac{\text{fixed costs}}{\text{contribution per unit}} = \frac{\text{fixed costs}}{\text{price} - \text{variable cost per unit}}$$

Kestrel Kites sells kites at 25 dollars each. Variable costs are 10 dollars a kite and fixed costs are 6,000 dollars a month. Contribution per kite is $25 - 10 = 15$ dollars, so it breaks even at $6000 \div 15 = 400$ kites a month.

The **margin of safety** is how far actual (or forecast) output is above break-even output: how much sales could fall before the business makes a loss. If Kestrel sells 550 kites, the margin of safety is $550 - 400 = 150$ kites, or $150 \div 550 \times 100 = 27.3\%$ of sales. Worked from output figures, the margin of safety is a number of **units**. It can also be given as a percentage of sales, or as sales revenue above break-even revenue: here $150 \times 25 = 3750$ dollars.

Profit at any output above break-even is the margin of safety times the contribution per unit: $150 \times 15 = 2250$ dollars. Check: revenue $550 \times 25 = 13750$, total cost $6000 + 550 \times 10 = 11500$, profit $13750 - 11500 = 2250$ dollars.

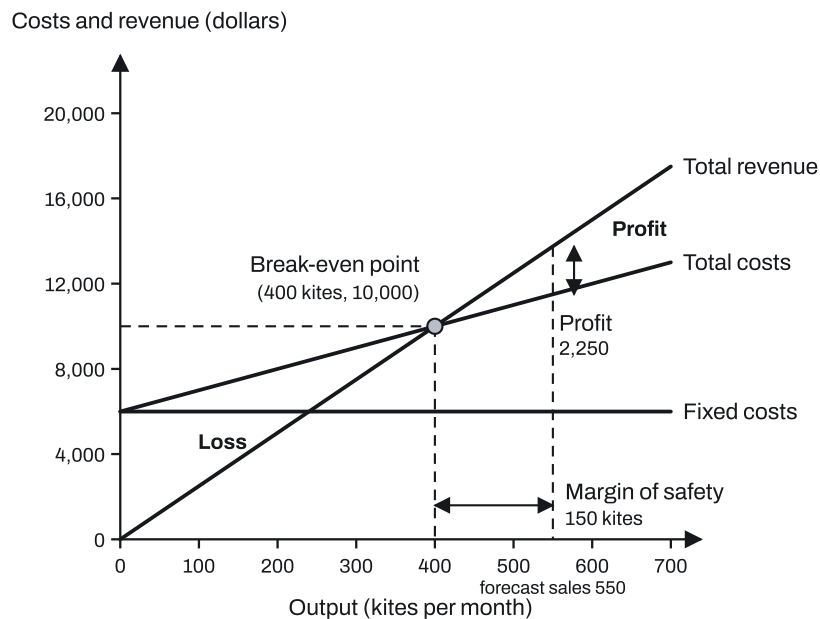
Two more results come straight from the formula:

- **Output needed for a target profit** = $(\text{fixed costs} + \text{target profit}) \div \text{contribution per unit}$. For a profit of 3,000 dollars Kestrel needs $(6000 + 3000) \div 15 = 600$ kites.
- **Price needed to break even at a given output** = $\text{fixed costs} \div \text{output} + \text{variable cost per unit}$. To break even on 300 kites Kestrel would need to charge $6000 \div 300 + 10 = 30$ dollars.

The break-even chart

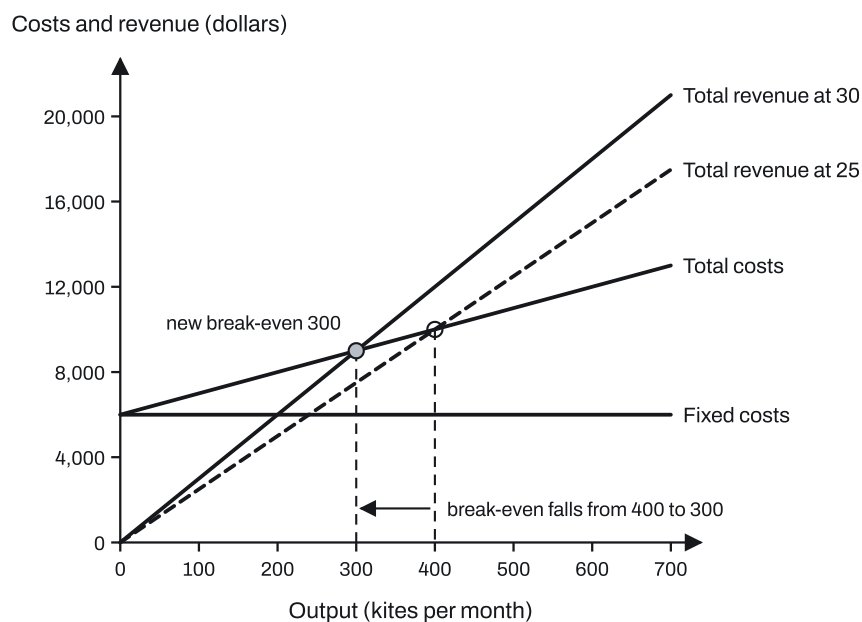
A **break-even chart** shows the same facts as a graph, with output on the horizontal axis and costs and revenue in dollars on the vertical axis.

- **Fixed costs**: a horizontal line at 6,000 dollars.
- **Total costs**: starts at 6,000 dollars (the fixed costs, at zero output) and rises by 10 dollars for every kite.
- **Total revenue**: starts at zero and rises by 25 dollars for every kite.



Where total revenue crosses total costs is the **break-even point**. To the left the business makes a loss (costs above revenue); to the right a profit. The **vertical** gap between the two lines at any output is the profit or loss there. To read the break-even output from a chart, go straight down from the crossing point to the output axis.

A chart makes "what if" questions easy to see. If Kestrel raises its price to 30 dollars, the total revenue line becomes steeper and crosses total costs sooner: contribution rises to 20 dollars and break-even falls to $6000 \div 20 = 300$ kites.



Each change moves a line:

Change	What happens on the chart	Break-even output
Price rises	Total revenue line pivots upwards from the origin	Falls
Variable cost per unit falls	Total costs line pivots down about its starting point	Falls

Change	What happens on the chart	Break-even output
Fixed costs fall	Fixed and total costs lines shift down	Falls
Price falls, or costs rise	The opposite	Rises

Uses and limitations of break-even analysis

Uses (why it is important):

- It shows how many units must be sold to cover costs, and so whether a product, new business or new site is realistic given the size of the market and the capacity.
- The margin of safety shows how risky a plan is: a small margin means a small fall in sales brings a loss.
- It shows the output needed for a target profit, and the profit or loss at any output.
- "What if" testing: the effect of a price change, a cheaper supplier, a pay rise or new premises, before committing to it.
- It supports decisions on pricing, location, buying equipment and launching products, and it is evidence in a business plan for a bank loan.
- It is quick to calculate and easy for non-specialists to understand.

Limitations:

- It assumes **every unit made is sold**; in reality inventory builds up, goods spoil or are returned.
- It assumes **one selling price** at every output; in reality firms offer quantity discounts, run promotions, or lower the price to reach more buyers.
- It assumes **variable cost per unit stays the same**; in reality bulk buying lowers it and overtime raises it.
- It assumes **fixed costs stay fixed**; in reality they step up when capacity is expanded.
- It assumes every cost is either fixed or variable; **semi-variable** costs do not fit neatly.
- It works best for a **single product**; with several products the fixed costs must be shared out, which is arbitrary.
- It is only a **forecast**, built on estimates of sales and costs, and it ignores changes outside the business (a new competitor, a recession) and non-financial factors.

Key facts and formulas

There is no formula list for this subject in the exam. "Learn it" means you must remember it.

Fact or formula	Status
Fixed costs do not change with the level of output in the short run; variable costs change in proportion to output	Learn it
Direct costs can be traced to one product, service or cost centre; indirect costs (overheads) are shared and cannot	Learn it

Fact or formula	Status
Total cost = fixed costs + total variable costs	Learn it
Total variable costs = variable cost per unit × output	Learn it
Average (unit) cost = total cost ÷ output	Learn it
Marginal cost: the increase in total cost when output rises by one unit	Learn it
Profit = total revenue – total costs (direct costs + indirect costs)	Learn it
Profit margin = profit ÷ revenue × 100	Learn it
Full costing: every cost, fixed and variable, is shared out among the products or cost centres	Learn it
Contribution costing: only variable (direct) costs are charged to products; fixed costs are paid from total contribution	Learn it
Contribution per unit = price – variable cost per unit	Learn it
Total contribution = total revenue – total variable costs = contribution per unit × units sold	Learn it
Profit = total contribution – fixed costs	Learn it
Break-even output = fixed costs ÷ contribution per unit	Learn it
Output for a target profit = (fixed costs + target profit) ÷ contribution per unit	Learn it
Fixed costs = break-even output × contribution per unit	Learn it
Price needed to break even at a given output = fixed costs ÷ output + variable cost per unit	Learn it
Margin of safety = actual (or forecast) output – break-even output, in units	Learn it
Margin of safety as a percentage = margin of safety ÷ actual output × 100	Learn it

Fact or formula	Status
Profit = margin of safety × contribution per unit	Learn it
Contribution of a special order = (order price – variable cost per unit) × units – any extra fixed costs of the order	Learn it

How to do it

We have tagged 48 questions on this topic (2021–2025), on Papers 1, 2 and 3. 30 of them have parts of more than one type, so the counts add up to 82.

Question type	Questions
Define or explain a cost / break-even term	12
Calculate profit, total cost or change in profit from cost and revenue data	10
Explain or analyse uses / benefits of break-even analysis	8
Explain or analyse uses of (accurate) cost information	7
Calculate break-even output	6
Explain limitations of break-even analysis	6
Calculate contribution / profit of an order, contract or division	6
Recommend accepting an order / contract / closure using contribution	6
Explain how to change costs or break-even, or how a decision affects costs	4
Explain limitations of contribution costing / problems allocating fixed (indirect) costs	4
Calculate or explain profit margin	4
Work backwards from break-even data (price, unit contribution, fixed costs)	3
Calculate margin of safety	3
Evaluate the importance (or limits) of break-even analysis or cost information	3

The marks are for four skills: **K** (knowledge: a correct point or definition), **App** (application: using the business in the question), **An** (analysis: a chain of causes and consequences) and **Eval** (evaluation: a supported judgement). Below, (K), (App), (An) and (Eval) after a sentence show the mark it earns; (1) in a calculation is one mark.

1. Define or explain a cost / break-even term (12 questions)

Two sizes:

- **Define [2]** (Paper 1 Section A): 2 marks for the **whole** idea, 1 for half of it. Learn the definitions so that every part is there:
 - fixed costs: costs that do not change **when output changes** (in the short run); "costs that don't change" alone is half;
 - variable costs: costs that change **in proportion to output**;
 - direct costs: costs that can be traced **to one product or cost centre**; indirect costs: shared costs that **cannot** be traced to one product;
 - marginal cost: the increase in total cost when output goes up by **one unit**;
 - full costing: **all** costs, fixed and variable, **shared out among the products or cost centres** (both halves are needed);
 - margin of safety: how far **actual output is above break-even output** (a formula, a percentage version or a labelled chart also counts);
 - break-even analysis: using cost and revenue data to find the output at which revenue **just covers** costs (and so the margin of safety and profit).
- **Explain the term [3]** (Paper 2 (a)(ii)): the meaning (K), then two more points of development or application: an example from the case, how it is used, or how it differs from a similar term. For direct costs in a hotel: "costs that can be linked to one cost centre (K), such as the wages of the housekeeping staff who clean the guest rooms (App), unlike the hotel's head-office costs, which are shared (App)."
- **Identify one fixed cost [1]**: rent, insurance, salaries, loan interest.

Do not mix up margin of safety with marginal cost, or price with cost. Writing "direct costs are variable costs" scores nothing.

2. Calculate profit, total cost or change in profit from cost and revenue data (10 questions)

Paper 2 (b)(i), [3]. The case gives a table of revenue and costs, usually split into direct and indirect.

1. Write the formula: $\text{profit} = \text{revenue} - (\text{direct costs} + \text{indirect costs})$ (1).
2. Work out a correct stage: total costs, or one year's profit (1).
3. Finish and give the answer with its units (1).

Variants:

- **Change in profit between two years** (or with and without a plan): work out each profit, then later — earlier. A fall must be shown as **negative** (minus sign or brackets) or described as a "decrease"; otherwise the last mark is lost. A percentage change is accepted only with the % sign.
- **A change described in words**, such as "revenue rises by 20% and direct costs by 3 million dollars": build the new revenue and new costs first, then the new profit, then the change.
- **Total costs from revenue and profit**: $\text{total costs} = \text{revenue} - \text{profit}$.
- **Total direct cost from a cost per unit**: $\text{cost per unit (or per job)} \times \text{number of units}$, then add the indirect costs.
- **Several products or sizes**: profit for each, then add, and remember to take off **fixed costs** once.

- **Discounts or a cost cut by a percentage** (say, fixed costs down by a quarter): change only the figure named. A 25% cut leaves 75% of the cost.

The final mark is given on your own figures (own figure rule), so show each stage.

3. Explain or analyse uses / benefits of break-even analysis (8 questions)

- **[3]** (Paper 2, one use for the case business): name the use (K), explain how it helps (1), and use the case, ideally your break-even or margin of safety answer (1).
- **[8]** (Paper 1 Section B (a), two benefits): **1 K + 1 App + 2 An** for each.

For the [8]:

1. **K**: two **different** uses: output needed to cover costs or reach a target profit; margin of safety as a measure of risk; testing a price or cost change; supporting a decision (pricing, location, new product, new equipment); evidence for a loan; quick and simple.
2. **App**: on Paper 1 there is no case, so give an example business ("a bakery opening a second shop").
3. **An**: carry each one through to a consequence. For example: the margin of safety is only 5% of sales (App) → a small drop in demand would cause a loss (An) → the owner looks for a cheaper unit to rent or tests a higher price before opening, so the new shop is less likely to fail (An).

A list of what you need to draw the chart (fixed costs, variable costs, revenue) is not a use. "It tells you the break-even point" is weak on its own: say what the business **does** with it.

4. Explain or analyse uses of (accurate) cost information (7 questions)

- **[3]** (Paper 2): one use, explained, with case data (a cost rise in the table, the fall in profit you calculated).
 - **[8]** (Paper 1 Section B): two uses, each **1 K + 1 App + 2 An**.
1. **K**: pick from: setting prices that cover costs; calculating profit and finding loss-making products or sites; cutting unnecessary costs; budgets and cost centres; break-even and margin of safety; special-order and closure decisions; investment decisions and loan applications; comparing with past years or rivals.
 2. **App**: on Paper 2 use the case figures; on Paper 1 give a type of business.
 3. **An**: a chain to performance: a bicycle workshop knows exactly what each type of repair costs in parts and mechanics' time → it quotes prices that sit above those costs → every job adds to profit → when parts prices rise it can see which repairs to re-price before profit falls.
 4. If the question says **accurate**, say what goes wrong with **inaccurate** figures: prices that fail to cover costs, a profitable product dropped, a loan refused.

"So the business can survive" is too vague to earn a mark.

5. Calculate break-even output (6 questions)

Paper 2 (b)(i), **[3]**.

1. Formula: break-even output = fixed costs $\div$ (price – variable cost per unit) (1).
2. Contribution per unit: price – variable cost per unit (1).
3. Divide and give the answer in **units** (1). Round **up** if it is not a whole number: you cannot sell part of a unit, and rounding down leaves a small loss.

Variants:

- **Only total variable costs are given:** variable cost per unit = total variable costs $\div$ units, then carry on.
- **A proposed change** (a new pay scheme, a new supplier, a price rise): use the **new** fixed and variable cost figures, not the current ones.
- **Per day, per month, per venue:** answer in the same units as the data.
- **Units such as customers, rooms, tickets or packs:** break-even comes out in whatever the price is charged per.

6. Explain limitations of break-even analysis (6 questions)

[3]: name one limitation (K), explain why it makes the result unreliable (1), and apply it to the case (1). Two limitations for [4]: 2 K + 2 explanations.

1. **K:** all output sold; constant price; constant variable cost per unit; fixed costs that stay fixed; costs that will not split into fixed and variable; straight-line costs and revenue; one product only; ignores capacity and external changes; only a forecast.
2. **Explain:** what really happens and what it does to the answer: "a toy maker that produces 1,000 board games for the Christmas season may still hold 200 in January, so it sells fewer than it made and needs a higher output than the chart shows to cover its costs."
3. **Apply:** use the case: perishable goods, seasonal demand, several products, a planned price change, your break-even figure.

"The data might be wrong" or "it takes time" is not accepted on Paper 2: it is true of any technique. A limitation tied to the business in the question scores far better than a list.

7. Calculate contribution / profit of an order, contract or division (6 questions)

Older A Level Paper 3 (2021–2022) case questions, about [4]–[6]; special orders are now in the AS syllabus, so expect the same calculation on Paper 2.

1. Contribution per unit for the order = order price – variable cost per unit.
2. Total contribution = contribution per unit $\times$ units (times the number of years or months if the contract runs for several).
3. If asked for **profit**: take off the fixed costs that belong to it (for a whole division or kitchen), or the **extra** fixed costs the order causes. For a one-off order with spare capacity, the existing fixed costs are **not** taken off again.
4. A price change with a price elasticity figure: find the new quantity first, then the new total contribution, and compare.

8. Recommend accepting an order / contract / closure using contribution (6 questions)

[12]-style recommendation (old Paper 3, likely as an evaluation now). Use your calculation, then the wider picture:

1. **The number:** a positive contribution adds to profit if there is spare capacity; closing a site with a positive contribution lowers profit, because its share of the overheads is still paid.
2. **For:** spare capacity used, fixed costs spread, a new customer or market, staff kept busy, the chance of repeat orders.
3. **Against:** regular customers wanting the same low price; capacity needed for full-price orders; extra costs (overtime, delivery, a new tool); risk of late payment; damage to the brand; the contract's length and risk.
4. **Judgement:** accept or reject, saying which factor decides it **for this business** and what it depends on (how much spare capacity, whether the price stays secret, how big the customer is).

9. Explain how to change costs or break-even, or how a decision affects costs (4 questions)

- **Lower the break-even output [3]:** raise the price, lower variable cost per unit, or lower fixed costs (K). Explain the effect: higher contribution per unit, so fewer units are needed to cover fixed costs (or a steeper revenue line, a flatter total cost line, a lower fixed cost line on the chart). Show it with a quick calculation if you can.
- **Reduce variable costs [3]:** a cheaper supplier, bulk-buying discounts, less waste, more efficient machinery. Explain **one** way fully: more than one, briefly, earns less.
- **[8] impact of a decision on costs** (expanding abroad, new machinery, moving premises): which costs rise (transport, tariffs, translation and marketing, training) and which may fall (economies of scale, cheaper labour or materials), with a chain to profit or price.
- **Choosing between two machines or vehicles:** compare the **cost per year:** (purchase price — resale value) $\div$ years of use, plus yearly running costs. A van costing 24,000 dollars, sold for 6,000 dollars after 6 years, costs $18000 \div 6 = 3000$ dollars a year, plus its maintenance and insurance. Then weigh reliability, capacity and how it is financed.

10. Explain limitations of contribution costing / problems allocating fixed (indirect) costs (4 questions)

- **Limitation of contribution costing [3] or two limitations [8]:** from "Contribution costing" above: ignores overheads, so can overstate how well a product does; not a sound base for long-term prices; costs hard to split; not used for inventory in published accounts; unsuited to businesses with mostly fixed costs; keeps weak products going. Explain the effect and, for [8], add a chain: prices based on contribution $\rightarrow$ the overheads are not recovered $\rightarrow$ the year's profit falls short and the business may have to borrow to pay its rent.
- **Problem of allocating fixed costs [3]:** there is no fair basis, so the choice of basis decides which product looks profitable. If the case has already shown a product "making a loss" after a share of overheads, use it: dropping it would lose its contribution while the overheads stay, so total profit falls.

11. Calculate or explain profit margin (4 questions)

2021 Paper 2 only.

1. Profit margin = $\text{profit} \div \text{revenue} \times 100$ (1). "Profit margin" on its own means the margin after **all** costs (net); gross profit margin uses revenue minus cost of sales only.
2. Find the profit first, from revenue minus all the costs given (1), then divide (1). Give the % sign.
3. **Ways to raise it:** raise price (if demand is not too sensitive), cut variable costs, cut overheads; say why revenue must not fall by more.
4. **Why one market's margin is higher:** a higher price there, or lower costs per unit there.

12. Work backwards from break-even data (price, unit contribution, fixed costs) (3 questions)

Rearrange the break-even formulas. Write which one you use (1), find the missing stage (1), answer (1).

- **Unit contribution:** price — variable cost per unit; or (total revenue — total variable costs) $\div$ units; or profit $\div$ margin of safety. Any route earns the marks.
- **Fixed costs:** break-even output $\times$ contribution per unit. If you are given sales and the margin of safety, find break-even output first: sales — margin of safety. Using the sales figure instead of break-even output is the classic slip.
- **Price to break even at a set output:** fixed costs $\div$ output + variable cost per unit.
- Missing totals: fixed costs = total costs — total variable costs; price = total revenue $\div$ units.

13. Calculate margin of safety (3 questions)

[2]–[3].

1. Formula: margin of safety = actual output — break-even output (1).
2. Find the two figures (1): break-even from the formula or **read off a chart** (straight down from where total revenue meets total costs); actual output from the case (it may be given as a percentage of capacity, or as an average).
3. Subtract and give the answer in the same terms as the data (1): units when you worked from output (or a percentage of actual output). A dollar sign on a unit answer cost a mark in **9609/22/F/M/24 Q1** (b)(i). If the data are in revenue, the margin of safety is sales revenue above break-even revenue, in dollars.

14. Evaluate the importance (or limits) of break-even analysis or cost information (3 questions)

Paper 1 Section B (b) [12], or a Paper 2 (d) [12] (a [20] essay in 2021). Marks: 2 K, 2 App, 2 An, 6 Eval.

1. **K:** what the technique is and what it shows.

2. **App:** the features of **this** business throughout: its costs, prices, products, how certain its sales are, whether it is new.
3. **An:** why it helps (the uses above, each with a chain), then its limits, and what else matters: market research, cash flow forecasting, product quality, marketing, staff.
4. **Eval:** a judgement **for this business**, weighing the technique against at least one alternative, and saying what it depends on: how reliable the estimates are, how many products it makes, how stable its costs and prices are. Judge as you go, not only in a closing paragraph that repeats earlier points.

For a business where quality and service matter most (luxury hotel, specialist restaurant), argue that cutting costs can damage the very thing customers pay for.

Worked examples

Example 1

Glow & Wick is a sole trader making soy-wax candles at home and selling them at weekend markets and online. Each candle sells for 14 dollars. Wax, wick, glass jar and label cost 5 dollars per candle. Fixed costs (market pitch fees, insurance, website fees) are 3,600 dollars a month. The owner forecasts sales of 520 candles a month.

- (a) Calculate Glow & Wick's break-even output per month. [3]
- (b) Calculate the margin of safety and the forecast monthly profit. [3]
- (c) Explain one limitation for Glow & Wick of using break-even analysis. [3]

(a) Break-even output = fixed costs $\div$ (price – variable cost per unit) (1).

Contribution per candle = $14 - 5 = 9$ dollars (1).

Break-even output = $3600 \div 9 = 400$ candles a month (1).

(b) Margin of safety = forecast output – break-even output = $520 - 400 = 120$ candles (1), which is $120 \div 520 \times 100 = 23.1\%$ of forecast sales.

Profit = margin of safety $\times$ contribution per unit = $120 \times 9 = 1080$ dollars a month (1). Check: revenue $520 \times 14 = 7280$, total costs $3600 + 520 \times 5 = 6200$, profit $7280 - 6200 = 1080$ dollars (1).

(c) Break-even analysis assumes the variable cost per unit stays the same at every output (K). In fact the price of wax and glass jars can change from month to month, and if Glow & Wick buys in bulk it may get a discount, so its 5 dollar cost per candle will not stay fixed (1). With a contribution of only 9 dollars a candle, a 1 dollar rise in materials would push break-even up from 400 to $3600 \div 8 = 450$ candles, cutting the margin of safety from 120 to 70 (App).

Example 2

Inkwell Press prints calendars and diaries. It can print 12,000 items a month and currently prints and sells 9,000, at a normal price of 5 dollars each. Paper, ink, binding and packing cost 2.40 dollars per item. Fixed costs are 13,500 dollars a month and, under full costing, are shared equally over the 9,000 items. A charity asks for a one-off order of 2,000 calendars at 3.20 dollars each.

- (a) Calculate the full cost per calendar. [2]
- (b) Calculate the contribution the charity order would make. [3]
- (c) Explain one reason why Inkwell Press might refuse the order even though it makes a positive contribution. [3]

(a) Fixed cost per item = $13500 \div 9000 = 1.50$ dollars (1). Full cost per calendar = $2.40 + 1.50 = 3.90$ dollars (1).

On full costing the order looks like a loss of 70 cents a calendar.

(b) Total contribution = (order price – variable cost per unit) $\times$ units (1).

Contribution per calendar = $3.20 - 2.40 = 0.80$ dollars (1).

Total contribution = $0.80 \times 2000 = 1600$ dollars (1).

Comment (not part of the marks): Inkwell has 3,000 items of spare capacity, so the 2,000 calendars need no extra fixed costs: monthly profit rises from $9000 \times 2.60 - 13500 = 9900$ dollars to $9900 + 1600 = 11500$ dollars.

(c) Regular customers may hear about the lower price (K). Shops that pay 5 dollars a calendar could demand a similar discount, or buy their calendars through the charity instead (1). If its 9,000 normal sales lost even 0.70 dollars a calendar, Inkwell's profit would fall by 6,300 dollars, far more than the 1,600 dollars the order adds (App).

Example 3

Sparkle Bay runs six car-wash sites. A wash costs 8 dollars. Water, detergent and power cost 2.10 dollars per wash. Last year its Riverside site did 12,000 washes; besides the 2.10 dollars per wash, its staff wages were 45,800 dollars. Under full costing each site is also given a 30,000 dollar share of head-office overheads, and on that basis Riverside made a loss. One other site has a water recycling system that brings water, detergent and power down to 1.40 dollars per wash.

Analyse two ways Sparkle Bay could use cost information to improve its performance. [8]

Working (not asked for, but strong application): Riverside's revenue is $12000 \times 8 = 96000$ dollars and its direct costs are $12000 \times 2.10 + 45800 = 71000$ dollars, so its contribution to overheads is $96000 - 71000 = 25000$ dollars. After its 30,000 dollar share of overheads it shows a loss of $25000 - 30000 = -5000$ dollars. Recycling would save $(2.10 - 1.40) \times 12000 = 8400$ dollars a year there.

The first way is to decide which sites to keep open (K). Under full costing Riverside shows a loss of 5,000 dollars, but its revenue covers its own direct costs with 25,000 dollars to spare (App). Head-office overheads would not fall if Riverside closed, so closing it would cut group profit by 25,000 dollars (An); accurate cost information stops Sparkle Bay making a decision that looks sensible but makes it poorer, and points it instead at raising Riverside's number of washes (An).

The second way is to compare costs between sites and cut waste (K). Comparing cost per wash shows that the recycling site spends 70 cents less on every wash than Riverside (App). Fitting recycling at Riverside would save 8,400 dollars a year (An), enough to turn its 5,000 dollar loss after overheads into a profit of 3,400 dollars, without raising the price and risking customers going to rival car washes (An).

Each way earns K + App + two links of analysis: $2K + 2App + 4An = 8$.

Example 4

Bounce Hub plans to open an indoor trampoline park in a warehouse on the edge of a city. Its monthly fixed costs (warehouse lease, insurance, salaried staff, loan repayments on the trampolines) are forecast at 54,000 dollars. Each visit adds 3 dollars of variable costs (grip socks, card payment fees, cleaning). The planned price is 18 dollars for an hour's jump. Safety rules limit the park to 6,000 visits a month. Bounce Hub would also run birthday parties and a café.

Evaluate the usefulness of break-even analysis to Bounce Hub in planning the new park. **[12]**

Working: contribution per visit = $18 - 3 = 15$ dollars, so break-even = $54000 \div 15 = 3600$ visits a month. At full capacity the margin of safety is $6000 - 3600 = 2400$ visits and the profit $2400 \times 15 = 36000$ dollars a month. At 22 dollars, contribution would be 19 dollars and break-even $54000 \div 19 = 2842.1$, so 2,843 visits.

Knowledge. Break-even analysis finds the number of visits at which revenue just covers all the park's costs, and from it the margin of safety and the profit at any number of visits (K). It needs the fixed costs, the variable cost per visit and the price (K).

Why it is useful. Bounce Hub must sell 3,600 visits a month, 60% of the most the park can take, before it makes any profit (App). That warns the owners that the plan is risky: even a full park gives a margin of safety of only 2,400 visits (App), so if the novelty wears off after the first few months, the park could slip into a loss while the lease and loan payments carry on (An). They can test alternatives before signing the lease: a 22 dollar price lowers break-even to 2,843 visits (An), and a smaller warehouse would lower fixed costs; each test shows how much safer the plan becomes (An). The figures also form part of the business plan the bank will want to see before lending for the trampolines (An).

Why it is limited. The visit forecast is a guess for a business that has never traded, so 3,600 may be far from what happens (Eval). It treats the park as one product, yet parties and the café have different prices and costs and will help pay the lease, so they would need their own share of the fixed costs, which is arbitrary (Eval). Visits will be much higher in school holidays than in term time, and extra holiday staff make some costs semi-variable, so a single monthly break-even hides months of loss (Eval).

Judgement. Break-even analysis is very useful to Bounce Hub because most of its costs are fixed and committed before the doors open, so knowing that 3,600 visits a month are needed is the key test of whether the park is worth opening (Eval). But the answer is only as reliable as the visit forecast and the split of costs, which are uncertain for a new park with three sources of income (Eval). It is most useful alongside market research into how many local families would come and at what price, and a monthly cash flow forecast for the quiet term-time months; used alone, it gives a precise number that may be wrong (Eval).

The marks: 2 K, 2 App, 2 An, and 6 Eval for a judgement in the context of this trampoline park that weighs the technique's usefulness against its limits and says what it depends on.

Common mistakes

- **Half a definition.** "Fixed costs are costs that don't change" is only half the idea: say they don't change **when output changes** (June 2021, June 2023). The same goes for full costing: name **all** costs **and** say they are shared among products.
- **Confusing similar terms.** Marginal cost (the addition to total cost from one extra unit) is not the margin of safety; price is not cost; direct is not the same as variable (March 2022, June 2023).
- **Including fixed costs in a special-order decision.** When there is spare capacity, the order only needs to beat its variable cost per unit; taking off the fixed costs again makes a good order look like a loss (June 2021).
- **Forgetting the fixed costs in a profit calculation**, when profit is wanted rather than contribution (June 2022).
- **Not knowing the break-even formula.** Trying to make revenue equal costs by trial and error wastes time and often misses. Learn $\text{fixed costs} \div (\text{price} - \text{variable cost per unit})$ (March 2025, November 2022).
- **Break-even as a time**, such as "the business breaks even in March". It is a number of units of output (November 2021, June 2022).
- **Mixing up the units of the margin of safety.** Worked from output figures, the answer is in units (or a %): a \$ sign on a unit answer loses a mark. Only when it is worked from revenue is it in dollars (sales revenue above break-even revenue).
- **Using sales instead of break-even output** when working back to fixed costs: subtract the margin of safety first.
- **A "use" of break-even that is just its definition.** "It shows the break-even point" is what it is, not what a business does with it: say the decision it helps with (June 2021).
- **Generic limitations.** "The data could be wrong" is true of any technique and is not accepted; pick a real assumption of break-even and tie it to the business (June 2022).
- **No sign on a fall in profit.** A change from 22 to 20 is -2 , or "a decrease of 2"; writing 2 loses the last mark.
- **Ignoring the case.** On Paper 2 every explanation needs the business's own figures or situation; using your (b)(i) answer is the easiest way (March 2025, June 2023).

How to get the marks

- **Command words.** *Define*: the complete idea in a sentence. *Calculate*: formula, working, answer with its units. *Explain*: a point, how or why it matters, and the case. *Analyse*: two points, each developed through a chain of at least two links to a consequence. *Evaluate*: both sides, then a supported decision for the business in the question.
- **Calculations [3]**: formula (1), a correct stage such as contribution per unit or total costs (1), answer (1). The last mark is given on your own figures if one earlier step went wrong, so write each stage. Units matter: units of output for break-even and margin of safety, dollars for profit, % sign for a percentage.
- **Explain [3]**: one K mark for a correct point, then explanation and context. Without the K mark nothing else is awarded.
- **Analyse two [8]**: label them ("The first use is ... The second use is ..."); each gets 1 K, 1 App and 2 An.
- **Evaluate [12]**: 2 K, 2 App, 2 An, 6 Eval. The top band needs a judgement **in context** that weighs the technique against at least one alternative or limit and says what the answer depends on. Half the marks are evaluation, so give it a similar share of the answer.
- **Use the numbers.** Quote your break-even output, margin of safety or profit change in the explanation that follows: it is the easiest application mark on the paper.
- **Keep contribution and profit apart.** Say which one you mean every time; examiners reward answers that use the right one for the decision.

Quick check

1. Classify each cost of a hair salon as fixed or variable, and as direct or indirect: (a) the salon's rent; (b) shampoo and colour used on each client; (c) a stylist's commission of 15% of each haircut; (d) the receptionist's salary.
2. A business sells a product for 42 dollars. Variable costs are 22 dollars a unit and fixed costs are 28,800 dollars a month. It expects to sell 2,000 units a month. Calculate the break-even output, the margin of safety (in units and as a percentage) and the monthly profit.
3. A business breaks even at 800 units, has a contribution of 7.50 dollars a unit and forecasts sales of 1,100 units. Calculate its fixed costs and its forecast profit.
4. A dental practice's figures (\$000): last year revenue 310, direct costs 140, indirect costs 95; this year revenue 336, direct costs 158, indirect costs 99. Calculate the change in profit.
5. Explain the difference between contribution and profit. [3]

Answers

1. (a) Fixed and indirect: it does not change with the number of clients and is shared by the whole salon. (b) Variable and direct: it rises with each client served and is traced to each service. (c) Variable and direct: paid per haircut. (d) Fixed and indirect: the same each month and supports every service.
2. Contribution per unit = $42 - 22 = 20$ dollars. Break-even = $28800 \div 20 = 1440$ units. Margin of safety = $2000 - 1440 = 560$ units, that is $560 \div 2000 \times 100 = 28\%$. Profit = $560 \times 20 = 11200$ dollars (check: $84000 - (28800 + 44000) = 11200$).
3. Fixed costs = $800 \times 7.50 = 6000$ dollars. Margin of safety = $1100 - 800 = 300$ units, so profit = $300 \times 7.50 = 2250$ dollars.
4. Last year: $310 - (140 + 95) = 75$. This year: $336 - (158 + 99) = 79$. Change = $79 - 75 = 4$, an increase of 4,000 dollars ($4 \div 75 \times 100 = 5.3\%$).
5. Contribution is revenue minus variable costs: what sales add towards paying the fixed costs (1). Profit is what is left after **all** costs, fixed and variable, are paid, so profit = total contribution – fixed costs (1). A bakery whose bread contributes 4,000 dollars a month still makes a loss if its rent, salaries and other fixed costs are 5,000 dollars, so a positive contribution does not mean a profit (1).

Past questions to try

- 9609/22/F/M/25 Q1: part (b), break-even when the variable cost per unit must first be found from the totals, then one limitation.
- 9609/22/O/N/23 Q2: part (b), fixed costs worked back from the margin of safety and contribution per unit.
- 9609/22/M/J/22 Q1: part (b), profit across several products and the problem of sharing out fixed costs.
- 9609/34/M/J/21 Q2: the effect of a special order on profit using contribution, then whether to accept it.