

Cambridge AS & A Level · Business 9609 · Notes

The nature of operations

AS

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Last checked 5 October 2026

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What you need to know

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

1. **Say how land, labour, capital and enterprise are used** as the resources a business puts into its operations.
2. **Follow the transformational process** from the inputs a business takes in to the outputs it sells.
3. **Show how operations add value**, and weigh how much they matter compared with other parts of the business.
4. **Explain why efficiency, effectiveness, productivity and sustainability matter**, and tell the four ideas apart.
5. **Measure labour productivity** and say what the figure tells a manager.
6. **Analyse what happens to a business when it makes its operations more sustainable**: the gains and the costs.
7. **Weigh up capital-intensive operations**: what they do well and where they fall short.
8. **Weigh up labour-intensive operations** in the same way.
9. **Tell job, batch, flow and mass customisation apart**, with the advantages and disadvantages of each.
10. **Explain the problems a business meets when it switches from one of these methods to another**.

Inventory, capacity, outsourcing and quality are separate topics.

Understand it

What "operations" means

A business's **operations** are everything it does to make the product or deliver the service it sells. A surfboard workshop's operations are cutting and shaping boards; a dentist's are examining and treating patients; a mobile phone network's are keeping its masts and servers running.

To produce anything, a business draws on four kinds of resource, the **factors of production**:

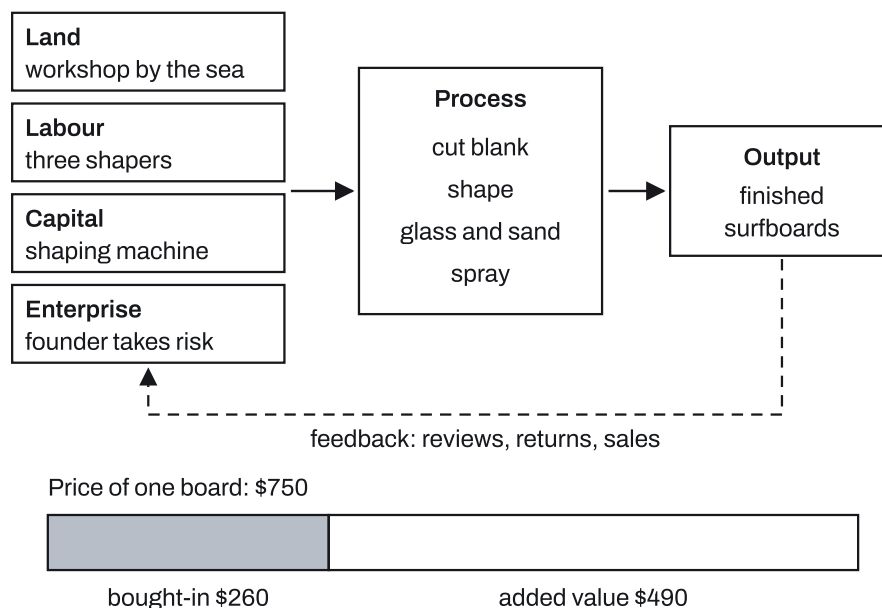
- **Land**: everything nature provides, plus the place where the work happens: a plot, a building's site, water, minerals, timber, crops.

- **Labour:** human effort, whether hands-on (a welder) or mental (an accountant).
- **Capital:** goods made by people that are used to make other things: tools, machines, vehicles, computers, buildings. In this topic it does **not** mean money.
- **Enterprise:** the person who has the idea, brings the other three together and carries the risk if it fails.

The transformational process

Operations take resources in at one end and send something worth more out at the other. This is the **transformational process**, and it has three stages:

1. **Inputs:** the factors of production, plus the materials, parts, energy and services the business buys from others.
2. **Process (transformation):** the work done on the inputs: cutting, mixing, assembling, checking, packing; or, in a service, the treatment, the advice or the repair.
3. **Outputs:** the finished good or service that reaches the customer.



Information also flows backwards. Reviews, returned goods and sales figures tell the business what to change about its inputs or its process.

Adding value

Added value is what the business adds on top of what it paid other firms:

$$\text{added value} = \text{selling price} - \text{cost of bought-in materials and services}$$

A surfboard that sells for \$750 and uses \$260 of foam, fibreglass, resin, fins and electricity has $750 - 260 = 490$ dollars of added value. Wages, rent and the owner's profit all have to be paid out of that \$490, so added value is bigger than profit.

Operations can increase added value from either side of the subtraction.

Customers are willing to pay more when the operation gives them:

- **better quality**: fewer faults, longer life, a service done properly the first time;
- **a better design** or features they want;
- **a product shaped to them**: their size, their colours, their name;
- **speed and convenience**: short waiting times, delivery, opening when customers need it;
- **something no rival can copy**, a **unique selling point (USP)**, such as a hand-finished touch or a technique only this firm uses.

Each unit costs less in bought-in inputs when the operation:

- wastes less material and energy, and spoils fewer items;
- buys more cheaply or from more reliable suppliers.

Operations are not the only source of added value. **Marketing** creates the brand, the image and the packaging that let one firm charge more than another for a near-identical product, and **people** (skilled, well-trained staff) matter most in services. How much operations matter depends on what the customer is paying for: for a basic commodity bought on price, low-cost production is most of the story; for a fashion label, the brand may count for more than the factory.

Efficiency, effectiveness, productivity and sustainability

These four words are close, and examiners reward the precise one. Take a drive-through car wash.

Term	The idea	At the car wash
Efficiency	Using few resources for each unit produced, so each unit costs little	Litres of water, kilowatt-hours and staff minutes used per car
Effectiveness	Doing what the operation is meant to achieve for its customers	Every car comes out spotless, with no scratches, without a long queue
Productivity	How much is produced per unit of one input over a period	Cars washed per attendant per hour
Sustainability	Being able to carry on producing in future without running down what production relies on	Recycling its rinse water; keeping trusted staff and a reliable supplier

An operation can score well on one and badly on another. A car wash that saves water by cutting the rinse is efficient but not effective if cars leave dirty. One that keeps four attendants on every car is effective but inefficient.

Why each one matters:

- **Efficiency** keeps unit costs down, so the business can undercut rivals or enjoy a wider margin at the same price.
- **Effectiveness** keeps customers coming back. Low cost is worthless if the product fails or arrives late.
- **Productivity** is the most widely used yardstick of efficiency, and the one that can be measured most easily.

- **Sustainability** decides whether the business can keep producing in five or ten years' time.

Measuring labour productivity

Labour productivity compares a period's output with the labour used to produce it:

$$\text{labour productivity} = \frac{\text{output in the period}}{\text{number of workers}} \quad \text{or} \quad \frac{\text{output in the period}}{\text{total hours worked}}$$

A tyre-fitting garage has 5 fitters who each work 40 hours a week and fit 1,600 tyres between them. Per fitter, productivity is $1600 \div 5 = 320$ tyres a week. The fitters work $5 \times 40 = 200$ hours in all, so per hour it is $1600 \div 200 = 8$ tyres per fitter-hour.

Why managers measure it:

- **Labour cost per unit.** Wages are spread over the output, so higher productivity means less wage cost inside each unit, and the firm can price more keenly.
- **Comparison.** The figure can be set against last month, another branch or a rival. A falling trend shows a problem early; a rise after training or new equipment shows whether the spending worked.
- **Decisions.** It shows how many staff a big order needs, which team needs training, and whether buying equipment would pay off.
- **Control.** Targets can be set and checked, and good performance rewarded.

Its limits: it ignores quality (rushing raises output and faults together); it is hard to measure where there is no countable output, as in nursing or teaching; and a rise may come from new machines rather than from the workers themselves.

When productivity falls, every unit carries more labour cost. In a dental laboratory where each technician is paid \$900 a week, a fall from 12 crowns per technician a week to 9 raises the wage cost of a crown from $900 \div 12 = 75$ dollars to $900 \div 9 = 100$ dollars, a rise of 33.3%. The lab must either accept a thinner margin or charge dentists more. A fall can also mean late orders, staff who are poorly trained or unhappy, or worn equipment, so the cause needs finding before a cure is chosen.

Raising productivity and efficiency

Each of these raises output for the same input, or keeps output with less:

- **Training:** staff learn quicker methods and make fewer errors that need redoing.
- **Motivation:** pay linked to output (piece rate, bonuses) or non-financial rewards (praise, responsibility, team working) make people put in more effort.
- **Better tools and technology:** a modern machine or better software lets each person achieve more.
- **Changing how the work is done (process innovation):** a better layout, fewer steps, standard ways of working, staff suggestions put into practice.
- **Cutting waste:** less scrap, less waiting, less material that has to be thrown away.
- **Hiring experienced staff,** and **planning** so materials and people are ready when needed.

None is free: training takes people off the job, machines cost money, and higher pay adds cost, so the gain must outweigh it.

Sustainability of operations

Mark schemes accept two meanings, and a good answer says which one it is using.

- **Keeping the operation going:** the business protects what its output depends on (skilled staff, reliable suppliers, sound finances, products that sell) so that production does not have to shrink later.
- **Protecting the environment and resources:** producing in a way that does not use up natural resources or damage the environment, so production can continue for future generations.

Read the question and the case: a plan to close loss-making branches and keep good staff is about keeping the operation going; a question about energy, packaging or emissions is about the environment.

Typical measures: using less energy and water, switching to renewable power, recyclable or refillable packaging, cutting waste and reusing offcuts, cleaner transport, buying from certified suppliers, repairing equipment instead of replacing it; and for keeping going, holding on to skilled staff and concentrating on the profitable parts of the business.

What the measures do to a business:

Gains	Costs and risks
Lower bills for energy, water, materials and waste in the long run	Large up-front spending on equipment or new suppliers
A reason for some customers to choose it, and maybe pay more	Higher prices may drive away customers who buy on price
A better reputation, with investors and with job applicants	Disruption while processes and suppliers change
Less exposed to rising fuel and material prices	Staff need retraining; some resist
Ready for tougher laws or taxes; possible grants	Gains may be slow and hard to measure
Production can continue in future	Rivals that skip the cost may undercut it for a while

Different **stakeholders** feel it differently: customers may get a product they prefer but pay more; staff may need new skills; some suppliers lose contracts; neighbours gain from less pollution; owners may see profit dip before it rises.

Capital-intensive and labour-intensive operations

An operation is **capital intensive** when machines and equipment do most of the work and relatively few people are needed: a cement works, a microchip plant, an automated car-wash tunnel. It is **labour intensive** when people do most of the work and little equipment is used: a landscape gardener, a translation agency, a

tattoo studio. Most firms sit between the two. Where a firm sits depends on its product, how much it produces, what labour costs compared with machines, and how much finance it can raise.

Capital-intensive operations

Benefits	Limitations
High output from each worker	Very expensive to set up; often needs loans, which carry interest
Low cost per unit at large volumes (economies of scale)	High fixed costs, so more must be sold to break even
Every item the same; fewer human errors	Costly to maintain; needs skilled technicians
Machines can run day and night	A breakdown can halt all output
Smaller wage bill	Equipment dates as technology improves (obsolescence)
Machines can do dangerous or precise work	Hard to switch to different products or one-off orders
	Dull, repetitive jobs, and job losses, can hurt morale

Automation, robots, **computer-aided design (CAD)** (drawing and testing products on a computer) and **computer-aided manufacture (CAM)** (computers controlling the machines that make them) are forms of capital-intensive operation, with the same strengths and weaknesses.

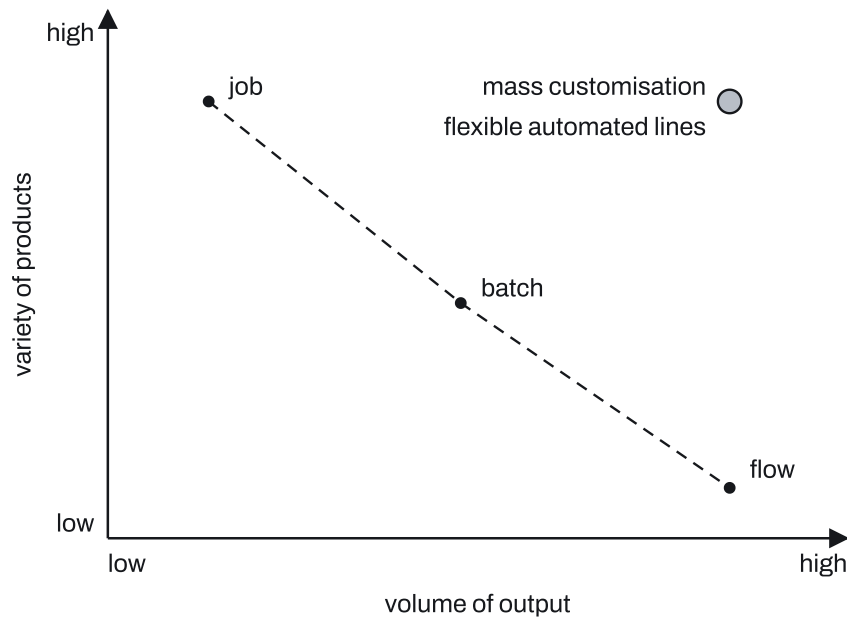
Labour-intensive operations

Benefits	Limitations
Little capital needed to start or grow	Wages, training, recruitment and holiday cover go on every year
Flexible: tasks, products and staff numbers can change quickly	Quality depends on who did the work
Each item can be made to the customer's wishes, with care over detail	Slower, so lower productivity and a higher cost per unit
Staff can solve problems and suggest improvements	Illness, holidays and staff leaving interrupt output
Personal contact builds customer loyalty	Disputes over pay or conditions can stop work
"Made by hand" can be a selling point	Skilled people may be scarce, which limits growth

The four operations methods

- **Job production:** one item at a time, each different and made to a single customer's specification, with work on it finished before the next order starts. A commissioned stained-glass window, a ship, a made-to-measure wedding cake.

- **Batch production:** a set quantity of one version is made together and passes through each stage as a group; then the equipment is reset for a different version. A brewery making 2,000 litres of one beer, cleaning the tanks, then making another.
- **Flow production:** an identical product moves without stopping from one stage to the next, in very large numbers, usually on a line. An oil refinery, a factory canning tomatoes.
- **Mass customisation:** high-volume production on flexible, computer-controlled lines in which each unit is set up to the buyer's own choices. Spectacle frames picked online in a chosen colour and size, with lenses ground to the buyer's prescription.



The dashed line is the usual trade-off: more volume means less variety. Mass customisation escapes it by combining the low unit cost of volume with an item that feels personal, and a good answer about it needs **both** halves.

Method	Advantages	Disadvantages
Job	Gives each customer exactly what they want; high quality; premium price; varied, satisfying work	High cost per unit; slow, long waits; needs skilled staff and versatile tools; no economies of scale
Batch	Some variety with some economies of scale; one set of equipment serves several products; can switch version as demand changes	Time lost resetting equipment between batches; part-finished goods pile up; work can be repetitive
Flow	Lowest cost per unit; very high, fast output; uniform quality; easy to automate	Enormous set-up cost; no variety; needs large, steady demand; one stoppage halts the whole line; monotonous jobs
Mass customisation	A personal product near mass-production cost; a USP and a higher price; made after the order, so little unsold stock	Costly flexible machinery and IT systems; complex to run; waits longer than for a standard product

Problems of changing method

Firms move from job to batch or batch to flow as demand grows, or from flow to mass customisation as buyers want more choice. The switch brings problems:

- **Finance:** new equipment and a new layout cost a lot; loans add interest and repayments; a small firm may not be able to raise the money.
- **Disruption:** output falls during the changeover, so orders may slip.
- **Staff:** retraining; some skills are no longer needed, which can mean job losses, low morale and resistance.
- **Demand:** the new method only pays if sales are big and steady enough; otherwise the new capacity stands idle and unit costs rise.
- **Lost USP:** a product valued for being individual or hand-made can lose its appeal, and its premium price, once it is standardised.
- **Quality and reputation:** teething problems on new equipment can damage the brand.

Which problems matter most depends on the case: how big the firm is, what finance it has, how skilled its staff are, how varied its product is, and how demand is changing.

Key facts and formulas

There is no formula list for 9609. Everything here must be learned.

Formula	Status
Labour productivity per worker = $\frac{\text{output in the period}}{\text{number of workers}}$	Learn it
Labour productivity per labour hour = $\frac{\text{output in the period}}{\text{total hours worked}}$	Learn it
Total hours worked = number of workers × hours worked by each	Learn it
Added value = selling price – cost of bought-in materials and services	Learn it
Percentage change = $\frac{\text{new} - \text{old}}{\text{old}} \times 100$	Learn it
Factors of production: land, labour, capital, enterprise	Learn it
Transformational process: inputs → process → outputs	Learn it
Operations methods: job, batch, flow, mass customisation	Learn it

How to do it

We have tagged 48 questions on this topic (2021–2026), on Papers 1 and 2. 19 of them have parts of more than one type, so the counts add up to 69.

Question type	Questions
Define or explain an operations term	19
Benefits and limitations of capital-intensive or labour-intensive operations	10
Advantages and disadvantages of a method, or of changing method	6
Evaluate whether a business should change its method	5
Ways to improve labour productivity or efficiency	5
Why labour productivity matters	5
How operations add value	5
Sustainability of operations	5
Technology in operations	4
Calculate labour productivity	2
Intellectual capital (older syllabus)	2
Explain a stage of the transformational process	1

Marks go to four skills: **K** (knowledge), **App** (application to the business or a named kind of business), **An** (analysis: a chain of causes and consequences) and **Eval** (a supported judgement). In the examples, (K), (App), (An) and (Eval) after a sentence show what it earns.

1. Define or explain an operations term (19 questions)

Paper 1, two marks: give the full idea for 2; half of it earns 1. Never lean on the words in the term itself: "batch production is producing in batches" shows nothing.

Term	The two parts that earn the marks
Labour productivity	How much is produced (1) for each worker or each hour of work in a stated period (1)
Capital intensive	Machinery and equipment make up most of the resources used (1), with comparatively few workers (1)
Labour intensive	People's work makes up most of the resources used (1), with comparatively little machinery (1)
Job production	A single, unique item made to one customer's specification (1); work on it finishes before another order is begun (1)
Batch production	A quantity of one version made together, moving through each stage as a group (1), before the equipment is reset for another version (1)
Flow production	Identical items moving without a break through every stage (1), in very large numbers, usually on a line (1)
Mass customisation	High-volume production on flexible equipment (1) where each unit is set up to the buyer's own choices (1)

Term	The two parts that earn the marks
Factors of production	The resources needed to make any good or service (1): land, labour, capital and enterprise (1)
Transformation process	Turning inputs such as materials and labour (1) into outputs worth more to customers (1)
Efficiency	How few resources an operation uses for each unit it produces (1), which decides how cheaply each unit is made (1)
Sustainability	Being able to keep producing in future (1) without using up what that production relies on, such as staff, finance or natural resources (1)
Added value	The selling price (1) minus the cost of the bought-in materials and services (1)
CAD / CAM	Computers used to design products (CAD) (1); computers used to control the machines that make them (CAM) (1)

Paper 2, three marks: 1 K for the meaning, then 2 App for showing it at work: how it applies to this business, or a fitting example of your own. Nothing else is credited without the K mark, so open with the meaning. Copying a line from the case is not an example.

2. Benefits and limitations of capital-intensive or labour-intensive operations (10 questions)

These come as a one-mark identify, a three-mark explain (1 K + 2 App) or an eight-mark analysis of two points.

- 1. Check two things before writing:** which kind of operation, and whether the question wants benefits or limitations.
- 2. K:** take a point from the tables above that belongs to **this** kind of operation. For a labour-intensive limitation, say the cost is labour cost (wages, training, recruitment), not just "costs".
- 3. App:** use the case (number of staff, skills, the product, the market, the finance, any figures), or on Paper 1 a kind of business where the point clearly applies.
- 4. An:** build a chain of at least two links to a result for the business: a breakdown → no output for days → orders delivered late → customers move to a rival.

Variations you will meet:

- **One-mark identify:** a few words, but specific: "a new team must be trained before output can grow", not "training".
- **Eight marks on Paper 2** is marked by levels: 2 K + 2 App + 4 An, so two different points, each tied to the case and each with a developed chain. **Eight marks on Paper 1** is 4 per point (1 K, 1 App, 2 An).
- **"The benefits" with no number:** two well-developed benefits reach full marks.

3. Advantages and disadvantages of a method, or of changing method (6 questions)

Usually eight marks: one advantage and one disadvantage, or two of one kind.

1. **K** from the methods table; **App** from the case; then a chain to cost, price, quality, revenue or profit.
2. Give **only what is asked**: when the question asks for advantages, disadvantages earn nothing.
3. For a change of method, the problems are under "Problems of changing method"; the gains are the next method's advantages (more output, lower unit cost, less waiting).

Variations you will meet:

- **Two advantages of a change, three marks**: two short points, each with its own reason.
- **Batch to flow on Paper 1**: remember flow **raises** output; the risks are cost, inflexibility, monotony and the need for steady demand.
- **Mass customisation**: link the personal product to the low unit cost; one half alone is a partial answer.

4. Evaluate whether a business should change its method (5 questions)

Paper 2 part (d), twelve marks: **2 K, 2 App, 2 An, 6 Eval**.

1. **K**: say what the present and the proposed methods are.
2. **App**: use the case's facts: how it produces now, how varied the product is, demand and its trend, the cost of the change and the finance available, staff skills, the brand, any figures (productivity, lead time, costs). A quick calculation is strong application.
3. **An**: one chain for the change and one against is enough for the 2 marks. For: more output → lower unit cost → lower price or wider margin. Against: big investment → borrowing → interest and repayments squeeze cash; or a standard product → the hand-made appeal goes → the premium price goes.
4. **Eval**: answer the question **for this business**, with reasons from its facts, and say **what the answer depends on**: whether demand is large and steady, whether finance can be raised, whether customers pay for uniqueness or for low prices, how staff will react. A partial change (some batch, some job; or changing in stages) is a strong judgement when the case supports it.

Variations you will meet:

- **Impact on stakeholders of a change**: take two or three groups (staff, customers, owners, suppliers), give a chain for each, and judge which group is affected most and why.

5. Ways to improve labour productivity or efficiency (5 questions)

Paper 1: an explain for three marks (one way or two), or an analyse for five (1 K + 2 App + 2 An).

1. **K**: name a way: training, motivation and pay linked to output, better equipment, process innovation, a better layout, cutting waste, experienced staff, better planning of materials and staff.
2. **App**: show **how** it lifts output per input: "a bonus for each batch finished above target gives staff a reason to work faster, so output per hour rises".
3. **An** (for five marks): carry it on to a result (unit cost falls → lower prices or a wider margin), and add a limit if there is room (training costs money and takes people off the job).

For **labour** productivity, the way must make **each worker** produce more. Replacing staff with machines changes the method; it does not answer the question. "Two ways" for three marks needs each way briefly explained.

6. Why labour productivity matters (5 questions)

- **Reasons to measure it** (eight marks for two, or five for one): cost per unit and price competitiveness; comparison over time and with rivals; a guide to training, motivation and investment decisions; control and target setting. Do not open with a definition; the K mark is for the **reason**.
- **Effects on a business of a fall** (eight marks): pick two different effects and take each to a result, using the case's cause: labour cost per unit rises → margin shrinks or price must rise → sales or profit fall; or orders take longer → deadlines missed → customers go elsewhere.
- **Older twenty-mark essay on whether success depends on productivity**: explain why it matters (in labour- and capital-intensive firms), then weigh it against quality, the brand, demand, the market and management, and judge.

7. How operations add value (5 questions)

- **One way a business adds value, three marks**: name the **concept** (quality, design, USP, convenience, efficiency), explain why customers pay more or cost falls (App), and tie it to the case (App). Naming a case feature without the concept, or defining added value, is not enough.
- **Two ways operations add value, eight marks**: two ways from "Adding value", each with a chain: fewer faults → buyers trust the product → a higher price → more added value per unit.
- **Importance of operations to a business's added value, twelve marks**: K: added value and the transformational process; App: the case's process stages and products; An: how operations raise price and cut cost; Eval: weigh against marketing and people, then judge for this business: does its customer pay mainly for a low price (operations matter most) or for the brand (marketing may matter more)?
- **Recommend ways to increase the value added by a service**: two or three ideas that suit that service (speed, convenience, personal attention, extras), each costed against its benefit, then a recommendation.

8. Sustainability of operations (5 questions)

- **Two benefits, eight marks**: two gains from the table, each with a chain: solar panels on the roof → smaller electricity bills each month → lower cost per unit → wider margin.
- **Paper 1 essay on how important sustainability is for a kind of business, twelve marks**: K: what sustainable operations are; App: what it would mean in that industry (its energy use, its raw materials, its packaging or transport, its customers); An: a gain and a cost; Eval: compare it with that industry's other operational priorities (cost, quality, speed, reliable supply) and judge which matters most to its buyers, and on what that depends. The top band needs the judgement in the context of that kind of business.
- **Whether a plan will improve sustainability, or its impact on stakeholders, twelve marks**: first decide which meaning the case points to. Selling unprofitable sites or cutting staff is about **keeping the operation going** (finance, profit, staff, customers), not about the environment.

9. Technology in operations (4 questions)

All on 2021–2022 papers. Treat automation, CAD and CAM as capital-intensive operations and use that table: speed, accuracy, consistency and lower unit cost against cost, training, breakdowns, obsolescence and job losses. For an essay on whether technology makes a firm more competitive, weigh the gains (shorter design time, precision, lower costs) against the costs and against other sources of competitiveness (price, brand, service).

10. Calculate labour productivity (2 questions)

Three marks: the formula, the right figures, the answer.

1. Write the formula.
2. If you are given hours per person, find **total hours** first: workers × hours each.
3. Divide output by total hours (per labour hour) or by the number of workers (per worker), and give the unit.

Either measure is accepted unless the question names one. Dividing output by **one** person's hours does not give full marks. Use the period the question asks for: an annual figure for annual data.

11. Intellectual capital (older syllabus) (2 questions)

From 2021–2022 papers only; the term is not in the 2026–2028 syllabus. It means the value of a business's knowledge: staff skills, know-how, customer relationships, designs and systems. It is built through training, research and sharing knowledge.

12. Explain a stage of the transformational process (1 question)

Three marks: name **one** stage (K), say what happens in it (App) and give an example (App). Do not walk through all three stages, and do not drift into added value.

Worked examples

Example 1

FixPoint repairs cracked phone and tablet screens while customers wait. Its staff in a typical week:

Staff	Number	Hours each per week
Full-time technicians	4	38
Part-time technicians	2	19

Together they complete 532 repairs a week. About one repair in twelve has to be done again because a part was fitted wrongly. The two part-time technicians joined this year and learned by watching others; FixPoint has no training programme.

(a)(ii) Explain the term efficiency. [3]

(b)(i) Calculate FixPoint's labour productivity per labour hour in a typical week. [3]

(b)(ii) Explain one way FixPoint could raise its labour productivity. [3]

(a)(ii) Efficiency is about how few resources an operation uses for each unit it makes, which keeps the cost of each unit low (K). About one FixPoint repair in twelve has to be done twice, so the technician's time and the replacement part used the first time are wasted (App). If every repair were right first time, the same staff hours and parts would complete more paid repairs, so FixPoint would be more efficient (App).

(b)(i) Labour productivity = $\frac{\text{output}}{\text{total labour hours}}$ (1)

Total labour hours = $4 \times 38 + 2 \times 19 = 152 + 38 = 190$, so $\frac{532}{190}$ (1) = 2.8 repairs per labour hour (1).

(b)(ii) FixPoint could train its technicians (K). The two part-time technicians picked up the work by watching others, so a short course in fitting each type of screen would teach them the quickest correct method (App). Fewer repairs would need redoing, so more of each hour goes on new repairs and output per labour hour rises above 2.8 (App).

Example 2

Silk Road Noodles (SRN) makes dried noodles in a fully automated factory. Last year its owners raised \$3 million for the production line by selling new shares to two investors. Nine operators run the line, which makes 45,000 packs a day in three shapes. A new shape needs a new cutting die, which takes two weeks to make and fit, and the line cannot run while it is fitted. Two of SRN's supermarket customers have asked for limited-edition shapes for festival seasons. Only two engineers in the region are trained to repair the line, and one of them has just moved abroad. In May a fault stopped the line for three days.

Analyse two ways in which SRN's reliance on automated equipment could harm its performance. [8]

Way 1: it cannot easily change what it makes. Equipment built to turn out large runs of a standard product is slow and costly to adapt (K). Each new noodle shape means a new die and two weeks with the line stopped, yet two supermarkets want festival shapes (App). If SRN agrees, it loses two weeks of output, about $14 \times 45\,000 = 630\,000$ packs, for each new shape, so its unit costs rise (An); if it refuses, the supermarkets may give the limited editions, and later their regular orders too, to a more flexible rival, so SRN's sales fall (An).

Way 2: when the machines stop, everything stops. A capital-intensive business depends on its machines and on the few specialists who can fix them (K). The fault in May cost $3 \times 45\,000 = 135\,000$ packs, and now only one engineer in the region can repair the line (App). The next breakdown could last longer while SRN waits for help from further away (An), so supermarket deliveries are missed, SRN may lose shelf space, and revenue falls while its costs, such as the operators' wages, still have to be paid (An).

Two different points, each with case facts and a chain of two or more links: $2\text{ K} + 2\text{ App} + 4\text{ An} = 8$.

Example 3

Alder Saddlery (AS) makes leather horse saddles by job production. Each saddle is fitted to one horse and rider, takes 35 hours of a saddler's time and sells for \$3,200; the leather and other bought-in materials cost \$600. Its 7 saddlers each work 1,650 hours a year. AS sells every saddle it makes, mostly to riders who come back for a new one when they change horse.

A chain of riding-equipment shops has offered a three-year contract to buy 500 standard saddles a year, in four sizes, at \$1,400 each. To make them AS would cut parts in batches: a leather-cutting press costing \$160,000 would cut the parts for 50 saddles at once, and each standard saddle would take 14 hours of a saddler's time and \$480 of materials. AS would make fitted saddles in the hours left over. AS has \$70,000 in the bank.

Evaluate whether accepting the shop chain's offer is the right decision for AS. [12]

Knowledge. Job production makes one unique item at a time to a customer's specification (K). Batch production makes a group of one version together, stage by stage, then resets for another version (K).

What the offer does. The saddlers have $7 \times 1650 = 11\,550$ hours a year, enough now for $11\,550 \div 35 = 330$ fitted saddles (App). The contract would use $500 \times 14 = 7000$ hours, leaving 4550 hours for only $4550 \div 35 = 130$ fitted saddles (App).

For accepting. Saddles per saddler would rise from $330 \div 7 = 47.1$ to $(130 + 500) \div 7 = 90$ a year, and a three-year contract gives AS a guaranteed buyer for most of its output, so its income relies less on individual riders (An). Revenue would rise from $330 \times 3200 = 1\,056\,000$ dollars to $130 \times 3200 + 500 \times 1400 = 1\,116\,000$ dollars.

Against accepting. Added value would fall. Now it is $330 \times (3200 - 600) = 858\,000$ dollars; with the contract it would be $130 \times 2600 + 500 \times (1400 - 480) = 798\,000$ dollars, \$60,000 less, before paying for a press that costs \$160,000 when AS has only \$70,000, so it must borrow \$90,000 (An). And with fitted saddles cut from 330 to 130 a year, many of the riders who return to AS would be turned away, and some may not come back.

Judgement. AS should not accept the offer as it stands (Eval). It would bring \$60,000 more revenue but \$60,000 less added value, so AS would make more saddles, take on a loan, and have less left to pay its saddlers and itself (Eval). The contract would only match today's added value at \$1,520 a saddle, since $500 \times (1520 - 480) = 520\,000$ dollars plus the 338 000 from 130 fitted saddles equals today's 858 000 (Eval). So AS should ask the chain for more than \$1,520, or for fewer saddles, before buying the press (Eval). At a better price, part-batch production makes sense: the three-year contract steadies income while fitted saddles keep the returning riders and the reputation behind the \$3,200 price (Eval). The decision depends most on the price the chain will pay and on whether AS can recruit more saddlers, since extra staff would let it take the contract without turning its riders away (Eval).

Example 4

Hue Paints (HP) makes household paint and sells 2 million litres a year to DIY stores at an average of \$6 a litre. Bought-in materials and services cost \$3.40 a litre. Last year its profit was \$1.6 million. A DIY chain that buys 35% of HP's paint has told its suppliers that from 2027 it will stock only paint made with lower emissions and sold in recyclable tins.

HP's operations manager plans to:

- fit solar panels to the factory roof for \$900,000, cutting the electricity bill from \$260,000 to \$110,000 a year;
- switch to tins made from recycled plastic, which cost \$0.15 more per litre of paint;
- install a system for \$200,000 that cleans and reuses the water used to wash the mixing tanks, saving \$40,000 a year.

HP has \$700,000 of retained profit it could use.

Evaluate whether HP's plan will increase its profit over the next five years. [12]

Knowledge. The three measures are ways of making HP's operations more sustainable: they reduce the energy, new plastic and water HP takes from the environment to make its paint (K). Profit is revenue minus all costs, so the plan raises profit only if the savings and any sales it protects outweigh what it costs (K).

The costs and savings. The plan needs $900\,000 + 200\,000 = 1\,100\,000$ dollars up front, \$400,000 more than HP's retained profit (App). Each year it saves $(260\,000 - 110\,000) + 40\,000 = 190\,000$ dollars, but the new tins cost $0.15 \times 2\,000\,000 = 300\,000$ dollars a year more, so running costs rise by \$110,000 a year (App). The solar panels take $900\,000 \div 150\,000 = 6$ years to pay back, longer than five years (An).

What the plan protects. The DIY chain buys $0.35 \times 2\,000\,000 = 700\,000$ litres a year, which bring HP $700\,000 \times (6 - 3.40) = 1\,820\,000$ dollars of added value a year (An). Without recyclable tins and lower emissions HP could lose all of it from 2027, more than last year's whole profit of \$1.6 million.

Judgement. Measured against today, the plan is unlikely to raise HP's profit within five years: running costs rise, \$400,000 must be borrowed, and the solar panels do not pay for themselves in time (Eval). But the real comparison is with doing nothing, and that risks \$1.82 million of added value a year from the chain, so the plan is very likely to leave HP's profit far higher than it would otherwise be (Eval). HP could also recover the tin cost: a rise of \$0.15 a litre is only $0.15 \div 6 \times 100 = 2.5\%$ on its price (Eval). So HP should go ahead with the recyclable tins and the solar panels, because they are what the chain asks for, borrowing the \$200,000 the panels need beyond its retained profit, and add the water system, which takes $200\,000 \div 40\,000 = 5$ years to pay back, once that loan is under control (Eval). The answer depends most on whether the chain really enforces its rule, and on whether DIY stores accept a 2.5% price rise (Eval).

Common mistakes

- **Writing about the wrong kind of operation.** In March 2026 some answers asked for a drawback of labour-intensive production discussed machines and automation; in June 2023 some answers about labour productivity turned into answers about labour-intensive firms. Underline the term before you start.

- **"It costs more" with no reason.** For a labour-intensive limitation, the cost must be shown to come from people: pay, training, recruiting (March 2026).
- **Defining a term with its own words.** Repeating the words of the term shows no understanding (June 2022): "flow production is when production flows" earns nothing. Explain the idea in other words.
- **Vague everyday meanings.** Efficiency in an exam means output compared with the inputs used, not "working well" (March 2022).
- **Definitions that earn nothing.** When a question asks why labour productivity matters, opening with what it is uses time but gains no mark (June 2023).
- **Treating extra output as extra sales.** More units only become revenue if buyers want them (June 2023). Argue from the lower cost per unit, or from demand the case shows is not being met.
- **Several stages, or added value, for "one stage".** A question about one stage of the transformational process wants a single stage explained with an example (June 2023).
- **Quoting the case without the concept.** Repeating a business's feature does not show how it adds value until you name the idea behind it, such as a USP or convenience; and a definition of added value is not a way of adding it (March 2026).
- **The wrong sense of sustainability.** Some questions mean keeping production going (March and June 2023); a question about a manufacturer's competitiveness rewarded the environmental meaning (March 2025). Decide from the question and say which you mean.
- **Half of mass customisation.** Its advantage comes from joining personal products with high-volume costs; talking about only one side misses the point (June 2022).
- **Saying flow production cuts output, or mixing up batch and flow** (June 2021).
- **Generic lists.** A list of batch production's advantages that never uses the case stays at the bottom level (March 2022).
- **Answering more than was asked.** Disadvantages earn nothing in an "advantages" question, and evaluation earns nothing in an "analyse" question (March 2021, June 2022).
- **Calculation slips:** a monthly figure when the data are annual, or the formula upside down (June 2021).

How to get the marks

- **Command words.** *Identify*: a few exact words. *Define*: the meaning in full, both parts. *Explain*: the point, then how or why, with an example or the case. *Analyse*: develop each point through causes and consequences; no judgement needed. *Evaluate*, *Discuss*, *Recommend*: both sides, then a supported judgement.
- **Three-mark explain:** the K mark comes first; without it the application marks are not given.
- **Five-mark analyse (Paper 1):** 1 K, 2 App, 2 An: one point, applied, with a developed chain.
- **Eight-mark analyse two:** two different points, each with K, its own case fact and a chain of at least two links to a result for the business. A third point adds nothing.
- **Twelve-mark evaluate:** 2 K, 2 App, 2 An, 6 Eval. Half the marks are for judgement, so keep the analysis short (one chain each way) and give the conclusion real space. The top level needs a judgement **in context**: what this business should do or how true the view is for this kind of business, why, and what it

depends on.

- **Calculations:** formula, figures, answer with a unit. Show working, because a wrong figure used correctly earns the later marks.
- **Use the numbers.** A quick calculation from the case (productivity, a percentage change, added value) turns a general point into application and makes a judgement convincing.
- **Name the concept** behind a case detail. "Each board is shaped to the surfer's weight" is context; calling it the firm's USP, so surfers accept a higher price, earns the knowledge.

Quick check

1. Name the operations method used in each: (a) an architect designing one house for a particular family; (b) a salt works filling identical bags of table salt non-stop on a line; (c) a T-shirt printer printing 500 shirts with one design, then changing its screens for the next design; (d) a watch brand whose website lets each buyer choose the case, strap and dial colour, assembled to order on a computer-controlled line.
2. A translation agency's 15 translators each work 32 hours a week and translate 2,880 pages a week in total. Calculate labour productivity (a) per translator per week and (b) per labour hour. (c) If output per labour hour falls by 12.5% with the same staff and hours, how many pages a week will be translated?
3. A landscape gardener charges \$4,500 for a garden makeover; the plants, paving and skip hire it buys in cost \$1,700. Calculate the added value, and explain one way its operations could increase it. **[3]**
4. Using a city bus company, explain the difference between efficiency and effectiveness.
5. A pet-food maker makes eight recipes in batches. Explain one problem it might face in changing to flow production. **[3]**

Answers

1. (a) Job. (b) Flow. (c) Batch. (d) Mass customisation.
2. (a) $2880 \div 15 = 192$ pages per translator a week. (b) Total hours = $15 \times 32 = 480$, so $2880 \div 480 = 6$ pages per labour hour. (c) $6 \times (1 - 0.125) = 5.25$ pages per hour, so $5.25 \times 480 = 2520$ pages a week.
3. Added value = $4500 - 1700 = 2800$ dollars. One way: offer a finished design drawn up on a computer before work starts (K). Customers can see and change their garden in advance, so they are more confident and will pay more for the makeover (App), while the plants and paving still cost \$1,700, so the added value rises above \$2,800 (App).
4. Efficiency is about the resources used for each journey or passenger: a bus company that carries more passengers per litre of fuel, or per driver, is more efficient. Effectiveness is achieving what the service is for: buses that run to the timetable, reach every stop and get passengers there safely. Running fewer, fuller buses may be efficient but not effective if passengers are left waiting at stops.
5. Flow production suits one standard product made non-stop, so it is inflexible (K). A continuous line would be set up for one or two recipes, so the maker could no longer switch between its eight recipes as easily as it does with batches (App), and pet owners who buy the recipes it drops may switch to other brands, so sales fall (App).

Past questions to try

- **9609/22/M/J/25 Q2:** part (c), an advantage and a disadvantage of job production for a small business.
- **9609/13/O/N/23 Q6:** part (a), two ways operations add value.
- **9609/21/M/J/24 Q2:** part (c), two effects of a fall in productivity.
- **9609/23/O/N/24 Q1:** part (d), whether a new business should move to flow production, with cost data for two methods.