

Firms and production

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What you need to know

This topic has three syllabus outcomes. In plain words, you should be able to:

1. **Explain the demand for factors of production:** why a firm wants more or fewer workers, machines or land. The influences are **demand for the product** the factor makes, the **price of the factor** and of **other factors**, how **available** the factor is, and how **productive** it is.
2. **Explain labour-intensive and capital-intensive production:** what each one means, **why** a firm or a country chooses one or the other, and the **advantages and disadvantages** of each.
3. **Explain production and productivity:** the **difference** between them, and what **influences** each one.

Understand it

Production and productivity

Production is the **total output** of goods and services a firm, industry or country makes in a period: 640 loaves a day, 3 million cars a year.

Productivity is **output per unit of input**: how much each worker, hour, machine or hectare produces. **Labour productivity** is the one you will use most:

$$\text{labour productivity} = \frac{\text{total output}}{\text{number of workers (or worker-hours)}}$$

A bakery with 4 bakers, each working 8 hours, that makes 640 loaves a day has a labour productivity of $640 \div 4 = 160$ loaves per worker a day, or $640 \div 32 = 20$ loaves per worker-hour.

The two can move in **different directions**. A firm makes 4000 units with 50 workers one year and 3600 units with 40 workers the next:

	Year 1	Year 2	Change
Output (production)	4000	3600	down 10%
Workers	50	40	down 20%
Output per worker (productivity)	80	90	up 12.5%

Production **fell** but productivity **rose**, because the number of workers fell by more than output. Examiners report this mix-up every few years: more output does **not** always mean higher productivity, and higher productivity does not always mean more output.

What raises production? More factors of production (more workers, more machines, more land) **or** higher productivity from the factors already there. Demand matters too: firms produce more when demand for their product rises.

What raises productivity? Anything that lets each input produce more:

- **Education and training:** skilled workers work faster, make fewer mistakes and can use advanced machines.
- **More and better capital (technology):** a worker with a modern machine produces far more than one with hand tools. Investment keeps capital up to date; old, broken capital lowers productivity.
- **Motivation:** higher wages, bonuses, good working conditions and good relations between managers and workers make workers try harder and stay longer (less time lost to strikes and to training replacements).
- **Health:** healthy, well-fed workers work harder and take fewer days off sick.
- **Specialisation and organisation:** splitting a job into tasks, and good management that cuts waste.
- **Quality of the other factors:** fertile land, good infrastructure (roads, power, internet), and efficient institutions with little bureaucracy.

Low productivity comes from the opposite: poor education, little training, old capital, poor health, low morale and wasted resources.

Why productivity matters. If each worker produces more, the **cost per unit** (average cost) falls, since the same wage bill is spread over more output. A firm can then cut its prices, raise its profits, or pay higher wages. For a country, higher productivity means more output from the same resources (economic growth) and cheaper, better exports, so its goods are more **internationally competitive**: exports rise, imports fall, and the current account improves. It can cut jobs if demand doesn't rise (the same output needs fewer workers), but it can also create jobs if lower prices raise demand.

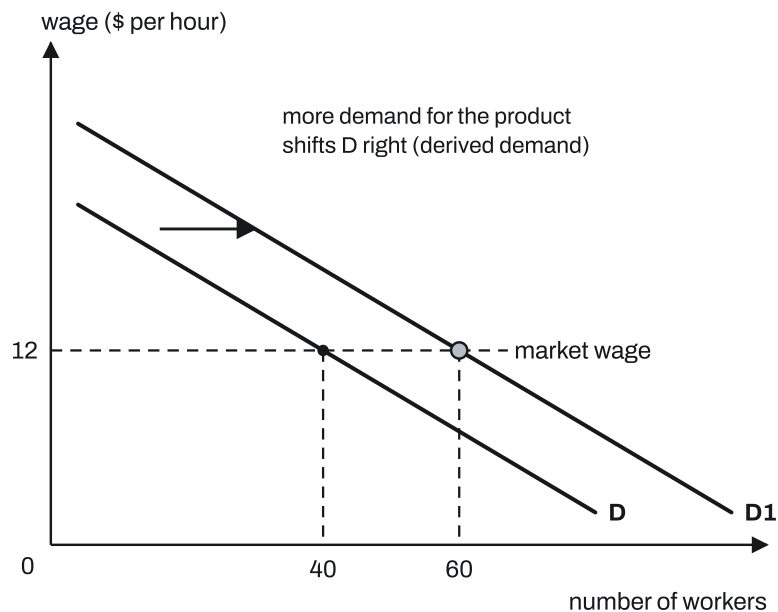
The demand for factors of production

Firms don't want workers or machines for their own sake; they want them to make products to sell. So the demand for a factor of production is a **derived demand**: it is **derived from the demand for the product** the factor helps to make. If people buy more meals, restaurants hire more chefs.

The main influences on a firm's demand for a factor:

- **Demand for the product.** Higher demand for the product → the firm expands output → it wants more of the factor. Lower demand → it needs fewer.
- **The price of the factor itself.** The lower the wage, the more workers a firm wants (a movement along its demand curve for labour); the higher the wage, the fewer.

- **The price of other factors.** If machines that can **replace** workers become cheaper, firms switch to machines and demand fewer workers. If a factor used **together** with labour gets cheaper (for example the machines workers operate), firms may expand and want more workers too.
- **Productivity.** A more productive factor produces more for the same cost, so firms want more of it. If artificial intelligence makes machines more productive, the demand for those machines rises.
- **Availability.** A firm can only use factors it can get. A shortage of skilled workers pushes firms towards machines; plentiful labour makes labour-intensive methods easy.
- **Other influences** named in mark schemes: government **subsidies** (a wage subsidy makes workers cheaper), the **season** (farms want more workers at harvest), and the **size** of the firm.



A change in the **wage** moves the firm **along** its demand curve for labour. A change in **anything else** (demand for the product, the price of machines, productivity, subsidies) **shifts** the curve.

Labour-intensive and capital-intensive production

Every product can be made in more than one way. A firm chooses the **mix** of factors it uses.

- **Labour-intensive production** uses a **high proportion of labour** relative to capital: labour is the largest part of costs. Examples: hairdressing, tailoring, fruit picking by hand, teaching, law, restaurants that cook each meal to order.
- **Capital-intensive production** uses a **high proportion of capital** (machines, equipment, technology) relative to labour. Examples: electricity generation, oil refining, car assembly with robots, large grain farms using combine harvesters.

It is the **proportion** that matters: a capital-intensive factory still has workers, and a labour-intensive salon still has equipment. Countries are described the same way: a country where labour is plentiful and cheap tends to be labour-intensive; one where capital is relatively cheap and labour expensive tends to be capital-intensive.

Why a firm chooses labour-intensive production

- **Labour is cheap and plentiful** relative to capital: low wages, a large supply of workers, or capital that is expensive (high interest rates on loans to buy it).
- **The product is a personal service or made to order**: customers want individual attention, or each item is different (a tailor, a wedding cake).
- **Labour is flexible and creative**: workers can switch tasks, adapt to changes in demand, spot problems and suggest better methods.
- **Output is small**, so expensive machinery would stand idle.
- **The government subsidises employment** to reduce unemployment.
- **Workers are unskilled**, so they couldn't use high-tech equipment anyway.

Why a firm chooses capital-intensive production

- **Labour is expensive or hard to get**: rising wages, a higher minimum wage, powerful trade unions, or a shortage of skilled workers.
- **Capital is cheaper or more productive**: lower machine prices, lower interest rates, new technology, or grants (for example foreign aid) to buy equipment.
- **Large output of a standard product**: machines work fast and non-stop, so average cost falls and the firm gains economies of scale.
- **Consistency and accuracy**: machines make every item the same, with fewer errors.

	Labour-intensive	Capital-intensive
Advantages	Flexible; personal service and variety (each item can be made individually); low set-up costs; creates many jobs; workers can suggest improvements	Low average cost at high output; fast, round-the-clock production; consistent quality, fewer mistakes; economies of scale; no strikes or sick days
Disadvantages	Higher average cost at high output; quality can vary with each worker; wages, training, strikes and absence; slower	Very expensive to buy (high fixed costs); breakdowns stop production; less flexible; standardised products, less variety; can cause job losses

Costs change shape. When a firm switches from labour to capital, its **fixed costs** (the machines) rise and its **variable costs** (wages that change with output) fall, so fixed costs become a bigger share of total cost and variable costs a smaller share. Output per worker usually rises.

For the economy, labour-intensive production keeps unemployment low and spreads income widely, so less is spent on unemployment benefits; but if it is less efficient, costs and prices are higher and exports less competitive. Capital-intensive production raises productivity and competitiveness but may cut jobs, at least in the short run.

Key facts and formulas

This topic has no formula list in the exam. "Learn it" means you must remember it.

Formula or fact	Status
labour productivity = $\frac{\text{total output}}{\text{number of workers}}$ (or $\div$ worker-hours)	Learn it
percentage change = $\frac{\text{new} - \text{old}}{\text{old}} \times 100$	Learn it
Production = total output; productivity = output per unit of input	Learn it
Demand for a factor is a derived demand : it comes from demand for the product	Learn it
Influences on demand for a factor: demand for the product, its price, prices of other factors, productivity, availability	Learn it
Influences on productivity: education and training, capital and technology, motivation (wages, conditions), health, organisation, quality of other factors	Learn it
Labour-intensive: high proportion of labour to capital; capital-intensive: high proportion of capital to labour	Learn it
Switching to capital-intensive: fixed costs' share rises, variable costs' share falls	Learn it

How to do it

We have tagged 39 questions on this topic (2021–2025): 21 multiple choice on Paper 1 and 18 structured questions on Paper 2, each with one part about firms and production, so 39 question parts in all. They came up this often.

Question type	Question parts
Multiple choice (concept)	15
Explain (4 marks)	8
Multiple choice (calculation)	6
Analyse (6 marks)	5
Discuss (6 or 8 marks)	5

1. Multiple choice (concept) (15 question parts)

1. **Decide which idea is tested**: demand for a factor, labour- versus capital-intensive, or productivity.
2. **Look for the direction**: does the change make the factor more or less wanted, cheaper or dearer, more or less productive?

3. **Eliminate** options that confuse production with productivity, or that give a disadvantage when the question asks for an advantage.

Variations you will meet:

- **Labour- versus capital-intensive** (8 parts): a labour-intensive firm offering a personal service keeps customers more satisfied and can make **each item individually**; a capital-intensive firm has **low average cost** at high output. A capital-intensive country has relatively **cheap capital**; a labour-intensive one relatively **cheap labour**, and its output **depends mainly on labour**. What pushes firms towards capital: higher wages or minimum wages, strong unions, more productive capital, **grants** to buy equipment; a **rise in interest rates** makes capital dearer, so it is the least likely cause. Switching to capital lowers **variable costs as a share of total cost**.
- **Demand for a factor** (5 parts): demand for labour rises with **demand for the product** and with **labour productivity**; it falls when labour gets dearer or when a substitute factor gets cheaper. More productive machines (for example with artificial intelligence) raise the **demand for capital**. High productivity with few workers in farming points to **mechanisation**.
- **Raising productivity** (2 parts): **training** and **good industrial relations** raise productivity; fewer customers, lower pay or less investment don't.

2. Explain (4 marks) (8 question parts)

Two points, each 1 mark to identify + 1 mark to explain. Give exactly two, clearly separated; examiners only look at the first few.

Variations you will meet:

- **Influences on productivity, causes of low productivity, or ways a firm can raise its workers' productivity** (3 parts): name the influence (1), then say **how** it changes output per worker (1). "Training (1): workers learn new skills, so each one produces more per hour and makes fewer mistakes (1)." Saying only "training increases productivity" repeats the question and earns just the identify mark.
- **Labour- or capital-intensive** (3 parts): why a firm adopts labour-intensive production (cheap or plentiful labour; a personal service; flexible, creative workers; wage subsidies; unskilled workers); two advantages of capital-intensive production (low average cost; fast, non-stop output; consistent quality; economies of scale); the **difference** between the two (the proportion of labour to capital, with an example of each). For an advantage, say what happens to **average cost**, not just that "labour costs fall", since machines cost money too.
- **Influences on demand for factors of production** (1 part): demand for the product (derived demand), the factor's own price, the price of substitute or complementary factors (say which way: machines cheaper → fewer workers), productivity, quality and skills.
- **How new technology benefits firms** (1 part): higher productivity → lower average cost → lower prices, more sales and profits; better quality; fewer errors; lower labour costs.

3. Multiple choice (calculation) (6 question parts)

1. **Divide output by labour** (workers or hours) for every option. Don't compare total outputs.
2. For a **percentage change**, find productivity **before** and **after**, then use $\frac{\text{new}-\text{old}}{\text{old}} \times 100$.

Variations you will meet:

- **Highest productivity in a table** (3 parts): for example, workshops where 6 workers make 30 units, 10 make 60, 12 make 66 and 20 make 90 give 5, 6, 5.5 and 4.5 units per worker, so the second is most productive although it doesn't make the most.
- **Percentage change, or production versus productivity** (2 parts): if 4 workers each make 6 items a day (24 in total) and after reorganising the team makes 36, productivity goes from 6 to 9 per worker, a **50% rise** (not $36 - 24 = 12$, and not the change in the total). If a firm halves its workforce and output rises by 25%, **both** production and productivity rise: productivity is $1.25 \div 0.5 = 2.5$ times as high, a 150% rise.
- **All inputs doubled, output up by less** (1 part): if land, labour and capital all double but output rises by only half, cost per unit rises: **diseconomies of scale** (from the topic *Firms*).

4. Analyse (6 marks) (5 question parts)

A mark per link. Write **three developed chains** (point → how → result the question asks about). A list caps you at 2 or 3 of 6.

Variations you will meet:

- **How labour-intensive production benefits an economy, or why a firm becomes more capital-intensive** (2 parts): for labour-intensive, more jobs → lower unemployment → higher incomes and less poverty, less spent on unemployment benefits; flexible, personal service. Keep to what is special about labour-intensive production; examiners saw answers drift into what the government does with extra tax. For capital-intensive, rising wages or union power → labour dearer than machines; new, cheaper or more productive technology; large output → economies of scale; consistent quality.
- **The effects of higher productivity** (2 parts): on the current account: more output per worker → lower average cost → lower prices and better quality → exports more competitive and imports less → exports up, imports down. On unemployment, both ways: the same output needs fewer workers, so jobs may go; but lower costs and prices raise demand, output and jobs.
- **What influences a farmer's (or any firm's) demand for labour** (1 part): demand for the food (derived demand), the wage, workers' skills and productivity, the price and productivity of machines (cheaper drones or harvesters → fewer workers), the type and size of farm, subsidies, the season.

5. Discuss (6 or 8 marks) (5 question parts)

The 8-mark parts are levels-marked: Level 3 (6–8) needs **both sides developed** and a judgement. The 6-mark Section A parts give up to 4 marks for each side. Either way, aim for **two developed points each side**, then a conclusion.

Plan:

1. **Define** the key term in one line (labour-intensive, productivity, training).
2. **Why it might**: two chains, each ending at the group in the question (consumers, the firm, the economy).
3. **Why it might not**: two **new** points, not the first side turned round.
4. **Judgement**: what it depends on (the cost of the machines or training, whether savings are passed on, how long it lasts, whether workers stay).

Variations you will meet:

- **Labour- or capital-intensive production and consumers or the economy** (3 parts): does labour-intensive production harm an economy (for: higher costs, less competitive, less reliable, strikes; against: jobs, lower unemployment, flexibility, personal service)? Do consumers benefit when firms become capital-intensive or buy new capital (for: lower costs and prices, better and more consistent quality, new products, more output; against: prices raised to pay for the machines, teething problems while workers learn, standardised products and less variety, breakdowns)? Keep the focus on **consumers**; examiners gave no credit for workers losing their jobs in a consumer question.
- **Productivity** (2 parts): do firms benefit from training their workers (for: higher productivity, lower average cost, better quality, less waste, more motivated workers who stay, ready to fill promoted posts; against: the cost of training, lost output while workers train, training may not work, trained workers ask for higher wages or leave for rival firms)? Will an ageing labour force reduce productivity (for: less mobile, more health problems, less at ease with new technology; against: more experience and skill, and firms may invest in machines)? Examiners saw answers about an ageing **population** and pensions, which missed the question.

Worked examples

Example 1

A furniture workshop employed 12 workers and made 480 chairs a month. It then bought new machines, and now employs 10 workers who make 600 chairs a month.

- (a) Calculate the labour productivity of the workshop before and after the change. **[2]**
 - (b) Calculate the percentage change in labour productivity. **[1]**
 - (c) Calculate the percentage change in production. **[1]**
 - (d) State whether the workshop has become more labour-intensive or more capital-intensive, and explain why. **[2]**
- (a) Before: $480 \div 12 = 40$ chairs per worker a month (1). After: $600 \div 10 = 60$ chairs per worker a month (1).
- (b) $\frac{60 - 40}{40} \times 100 = 50\%$ rise (1).
- (c) $\frac{600 - 480}{480} \times 100 = 25\%$ rise (1).

(d) More capital-intensive (1): it now uses more machines and fewer workers, so capital is a higher proportion of the factors it uses (1).

Example 2

Explain two influences on a hotel's demand for workers. [4]

Demand for hotel rooms (1): the demand for labour is derived from the demand for the product, so when more tourists book rooms the hotel needs more cleaners and receptionists (1).

The price of machines that can replace workers (1): if self-service check-in machines become cheaper, the hotel may use them instead of receptionists, so it demands fewer workers (1).

Example 3

Analyse why a clothing manufacturer may become more capital-intensive. [6]

Wages may have risen (1), for example because of a higher minimum wage (1), so labour has become more expensive compared with machines and replacing some workers lowers the firm's costs (1).

New technology may make sewing machines faster and cheaper (1), so each machine produces more shirts per hour (1), cutting the average cost of each shirt (1).

If demand for its clothes grows, the firm produces on a large scale (1); machines can run day and night making identical shirts with fewer errors (1), which gives economies of scale and consistent quality (1). (Any 6.)

Example 4

Discuss whether or not higher labour productivity will benefit a firm's workers. [8]

Labour productivity is output per worker in a given time.

Why it might. When each worker produces more, the firm's average cost falls, so it earns more profit on each item. It can afford to pay higher wages and bonuses, and its workers may win a share of the gain, especially if they belong to a trade union (developed point for).

Lower average cost also lets the firm cut its prices and sell more than its rivals. As its sales grow it needs more output, so jobs become more secure and workers may get promoted or trained further (second developed point for).

Why it might not. If demand for the product doesn't rise, the firm can make the same output with fewer workers, so some workers may lose their jobs, especially if the higher productivity came from new machines (developed point against).

The gain may go to the owners as profit, not to workers as wages. Higher productivity may also come from workers being pushed to work faster, which raises stress and lowers job satisfaction (second developed point against).

Judgement. Workers are most likely to benefit when the higher productivity comes from training and when demand for the product is rising, so the firm grows and shares its gains. They are least likely to benefit when it comes from replacing workers with machines in a market where demand is flat. Both sides are developed and the conclusion says what the answer depends on, so this meets the Level 3 descriptor (6–8 marks).

Common mistakes

- **Confusing production with productivity.** Production is total output; productivity is output **per worker** (or per hour). A firm can produce less while becoming more productive. Examiners have noted this confusion in several years.
- **Working out the percentage change from the wrong numbers.** Find productivity before and after, then divide the change by the **old** value. In one multiple-choice question over a quarter of candidates used total output instead of output per worker.
- **Repeating the question instead of explaining.** "Better working conditions increase productivity" earns only the identify mark. Say **why**: workers are more motivated, so they work harder and are absent less.
- **Saying capital-intensive production "reduces labour costs" and stopping there.** Machines cost money too: say what happens to **average cost** (cost per unit).
- **Defining labour- and capital-intensive without the idea of proportion.** Say it is the **proportion** of labour to capital, and give an example of each (a law firm; a power station).
- **Writing about workers in a consumer question.** In "Will consumers benefit from capital-intensive production?", job losses don't count unless you link them to consumers.
- **Answering a different question.** Asked about an ageing labour force and productivity, many wrote about pensions; asked about labour-intensive production, some wrote about government tax revenue. Keep every chain tied to the question's words.
- **Thinking a higher wage shifts the demand curve for labour.** A wage change is a movement **along** the curve; the curve shifts only when something else changes, such as demand for the product.

How to get the marks

- **Explain two ...** (4 marks): identify (1) + develop (1), twice. The development must say **how**: "because workers learn to use the machines, each produces more per hour".
- **Analyse** (6 marks): three developed chains, each ending at the result the question names (average cost, prices, exports, unemployment). Use the firm or industry in the question: a farm's demand for labour depends on harvests and machinery.
- **Discuss** (6 or 8 marks): two developed points each side, then a judgement saying **what it depends on**. Stick to the group the question names.
- **Calculations:** show the division and the percentage formula, give units (chairs per worker, cakes per hour), and say what the result means.
- **Use the terms:** productivity, derived demand, labour-intensive, capital-intensive, average cost, fixed and variable costs, economies of scale, international competitiveness.

- **Multiple choice:** 1 mark each, no penalty for guessing, so answer every one.

Quick check

1. What is most likely to **reduce** a firm's demand for labour?
 - **A** a rise in demand for the firm's product
 - **B** a fall in the price of machines that can do the workers' jobs
 - **C** a rise in the productivity of the firm's workers
 - **D** a fall in the wage rate
2. A farm had 20 workers who harvested 600 kg of fruit a day. Now it has 15 workers who harvest 540 kg a day. What has happened?
 - **A** labour productivity rose by 20% and production fell by 10%
 - **B** labour productivity fell by 10% and production rose by 20%
 - **C** labour productivity and production both fell
 - **D** labour productivity rose by 25% and production fell by 10%
3. A factory has 8 workers who each work 40 hours a week and make 1600 units a week in total. After training, the same workers make 2080 units in the same hours. Calculate output per worker-hour before and after, and the percentage change.
4. Which change is most likely to make a firm **more labour-intensive**?
 - **A** a rise in the minimum wage
 - **B** a fall in interest rates
 - **C** a government grant for buying machinery
 - **D** a fall in the wages of unskilled workers
5. Explain two advantages of labour-intensive production. **[4]**

Answers

1. **B.** Cheaper machines replace workers, so the firm wants fewer of them. A and C raise demand for labour; D moves the firm along its demand curve to employ **more** workers. (1)
2. **A.** Productivity: $600 \div 20 = 30$ kg, then $540 \div 15 = 36$ kg per worker, a rise of $\frac{36-30}{30} \times 100 = 20\%$.
Production: $\frac{540-600}{600} \times 100 = -10\%$. (1)
3. Worker-hours = $8 \times 40 = 320$. Before: $1600 \div 320 = 5$ units per worker-hour. After: $2080 \div 320 = 6.5$ units per worker-hour. Change: $\frac{6.5-5}{5} \times 100 = 30\%$ rise.
4. **D.** Cheaper labour makes it worth using more workers compared with machines. A makes labour dearer; B and C make capital cheaper. (1)
5. Flexibility (1): workers can switch tasks or change what they make when demand changes, which a machine built for one job can't (1). Personal service (1): each item or customer gets individual attention, so the firm can make products to order and keep customers satisfied (1). (Also: low set-up costs; creates jobs; workers can suggest better methods.)

Past questions to try

- 0455/21/O/N/23 Q4: part (d), whether labour-intensive production will harm an economy.
- 0455/22/M/J/24 Q4: part (d), whether consumers benefit from firms buying new capital equipment.
- 0455/21/M/J/23 Q3: part (c), how higher labour productivity can increase a current account surplus.
- 0455/11/M/J/24 Q12: production and productivity after fewer workers and new machinery.