

Cambridge AS & A Level · Economics 9708 · Notes

Production possibility curves AS

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Read first: [Scarcity, choice and opportunity cost](#), [Factors of production](#)

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What you need to know

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

1. **Explain what a production possibility curve (PPC) is and what it shows:** the maximum combinations of two goods (or two groups of goods) an economy can produce when it uses all its resources fully and efficiently with its current technology.
2. **Explain the shape of the PPC:** a **straight line** shows **constant** opportunity cost; a curve that bows outward (**concave to the origin**) shows **increasing** opportunity cost, and why.
3. **Explain the causes and consequences of shifts in a PPC:** what makes it shift outward or inward (or pivot), and what that means for the economy's output and growth.
4. **Explain the significance of a position within the PPC:** what a point inside, on or outside the curve tells you about the economy.

Understand it

The topic on scarcity, choice and opportunity cost showed a PPC with points inside, on and outside the curve, and how the concave shape gives rising opportunity costs. The topic on factors of production showed the curve shifting outward and inward. This note brings those ideas together and adds what the exam asks about them.

What a PPC is and why every economy has one

A **production possibility curve** (also called a production possibility frontier) shows the **maximum** output of one good that can be produced for each output of the other, when:

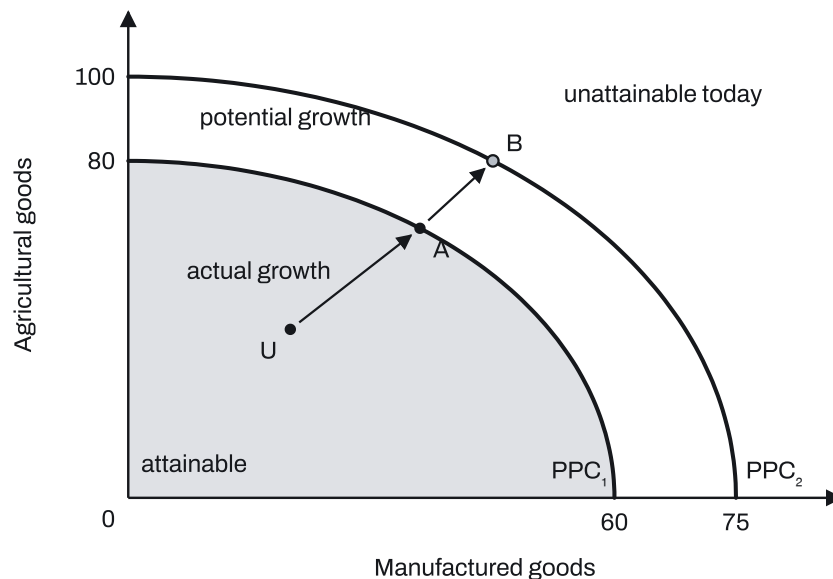
- all the economy's resources (land, labour, capital, enterprise) are used,
- they are used efficiently,
- and technology and the quantity and quality of resources are **fixed** at today's levels.

Every economy has one because its resources are **scarce** and have **alternative uses**: the same land, workers and machines could make either good, so more of one means less of the other. The curve does **not** show what people want to buy, what goods cost, or which point the economy should choose. It shows only

what **can** be produced.

The two axes are always two **named goods** (or groups of goods), such as agricultural and manufactured goods, or consumer and capital goods. The curve must **touch both axes**: each end shows all resources used for one good.

Points on, inside and outside the curve



Position	What it means
On the curve (A)	All resources are employed and used efficiently: productive efficiency . More of one good can only come with less of the other, so any move along the curve has an opportunity cost .
Inside the curve (U)	Some resources are unemployed (idle workers, empty factories) or used inefficiently (poor methods, workers in jobs that don't suit them). The economy could make more of both goods .
Outside the curve	Unattainable with today's resources and technology. It can only be reached if the curve shifts outward.

Three things follow from a point inside the curve:

- **You still know the output of both goods** at that point; you just know it is below what is possible.
- **Moving from U towards the curve has no opportunity cost**: the extra output comes from resources that were idle, so nothing has to be given up. From U to A the economy gains $36 - 20 = 16$ manufactured goods and $64 - 40 = 24$ agricultural goods.
- **It is not permanent**. A recession pushes an economy inside its PPC (demand falls, firms cut output and lay off workers); a recovery, or policies that cut unemployment, move it back towards the curve. But it can last a long time if unemployment is structural (workers' skills don't match the jobs available) or if a planned economy keeps allocating resources badly.

Productive efficiency means being **on** the curve. Every point on the curve is productively efficient, but they are not all equally good for society: **allocative efficiency** is the one point on the curve that matches what consumers want most. A PPC cannot show which point that is, because it does not show preferences.

Actual growth and potential growth

The diagram shows the two kinds of economic growth, and they must not be mixed up:

- **Actual growth** (U to A): real output rises because **unemployed resources are put to work**. The point moves from inside the curve towards it. The PPC does **not** move. It is limited: once the economy reaches the curve, it can go no further this way.
- **Potential growth**, a rise in **productive capacity** (PPC_1 to PPC_2): the economy can produce **more of both goods** because it has **more or better resources** or **better technology**. The curve shifts outward. Here PPC_2 is 25% further out: A (36, 64) becomes B (45, 80). This is what sustains growth in the long run, and it has no opportunity cost in the sense of a trade-off between the two goods: more of both becomes possible.

Why the curve shifts

A shift happens only when the economy's **capacity** changes: the quantity or quality of the factors of production, or the technology used to combine them.

Outward shift (more can be made)	Inward shift (less can be made)
More labour: population growth, immigration, a higher retirement age, more people choosing to work	Less labour: emigration, an ageing population retiring, a later school-leaving age, a war or epidemic
Better labour: education, training, better health (human capital)	Skills lost: skilled workers emigrating, a collapse in schooling or health
More capital: investment in machines, factories, infrastructure	Capital destroyed: war, earthquake, floods, or too little investment to replace worn-out capital
New land or natural resources found, land reclaimed or irrigated	Land lost: erosion, desertification, rising sea levels, exhausted mines
New technology or better methods that raise productivity	
More enterprise: more people starting firms and innovating	

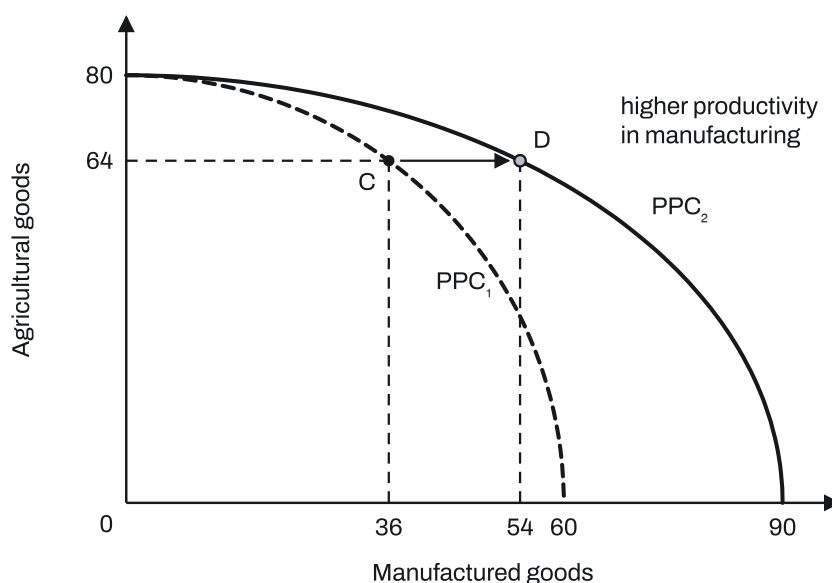
What does **not** shift the curve: a change in what consumers want, in prices, in taxes or subsidies on one good, or in imports and exports. These change **which point** the economy chooses (or what it consumes), not what it is able to produce. Using idle resources does not shift it either: that is a movement from inside towards the curve.

Shift or movement?

- A **movement along** the curve is a **reallocation of existing resources** from one good to the other. It has an opportunity cost.
- A **movement from inside to the curve** is using **unemployed resources**. No opportunity cost.
- A **shift** is a change in the **quantity or quality of resources or technology**. It changes the maximum output of both goods (or of one, if it pivots).

When only one end moves: a pivot

If a change affects only one good, only that good's end of the curve moves, and the curve **pivots** around the other end.



Productivity rises in manufacturing only (say, a new machine that only factories can use). If every resource went into farming, output would be 80 as before, so the agricultural end stays put. But every resource moved into manufacturing now makes more, so the manufactured end moves out from 60 to 90. At any output of agricultural goods except the maximum, more manufactured goods can be made: at 64 agricultural goods, 54 instead of 36, a rise of $\frac{18}{36} = 50\%$.

The pivot also changes opportunity costs:

- **Manufactured goods become cheaper in terms of agricultural goods.** The first 36 manufactured goods used to cost $80 - 64 = 16$ agricultural goods; on PPC_2 they cost only about 6.7.
- **Agricultural goods become dearer in terms of manufactured goods.** Going from no agricultural goods to 64 used to mean giving up $60 - 36 = 24$ manufactured goods; now it means giving up $90 - 54 = 36$.

The rule: the good whose productivity rises has a **lower** opportunity cost; the **other** good has a **higher** one, because each unit of it now means giving up more of the improved good. A fall in productivity in one industry (a drought that only hits farms) pivots the curve **inward** along that good's axis, and the opportunity costs change the other way. When two changes happen at once, deal with each good's end of the curve separately.

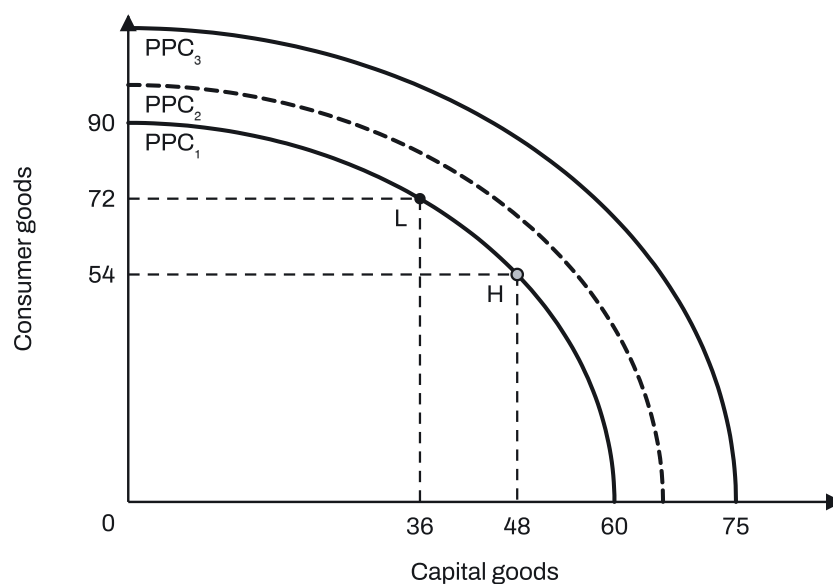
The shape of the curve

- **Straight line: constant opportunity cost.** Each extra unit of one good costs the same amount of the other, wherever the economy is on the line. This happens when resources are **equally suited** to making both goods, so moving any of them loses the same output. The slope tells you the cost: a straight PPC from 120 units of food to 40 units of machines means each machine costs $120 \div 40 = 3$ units of food.
- **Concave to the origin (bowed outward): increasing opportunity cost.** Each extra unit of a good costs more of the other than the unit before. The reason is that resources are **specialised**: some land, workers and machines are much better at one good than the other. When the economy starts making more of a good, it moves the resources least suited to the other good first, so little is lost. As it goes on, it has to move resources that are very good at the other good and not much use for this one, so more and more is lost for each extra unit. This is true **for both goods**, in both directions, which is why the curve is steep at one end and flat at the other.

Most real economies have concave PPCs, because resources are rarely equally good at everything. Nearest the axis of a good (when the economy already makes a lot of it), its opportunity cost is **largest**.

The PPC is **not** about returns to scale, prices or demand: its shape comes only from how well resources transfer between the two goods.

Capital goods now, growth later



When the axes are **consumer goods** and **capital goods**, the choice of point today affects where the curve is tomorrow.

- **Moving from L to H** gives the economy $48 - 36 = 12$ more capital goods and $72 - 54 = 18$ fewer consumer goods: an opportunity cost of $18 \div 12 = 1.5$ consumer goods for each capital good. People's **current living standards fall**, because they consume less now.

- **But capital goods are used to make other goods.** More machines, factories and infrastructure mean more capacity in future, so the PPC shifts out further: to PPC_3 (25% further out) after H, compared with PPC_2 (10% further out) after L.
- **The trade-off is between now and the future.** A country that chooses mostly consumer goods enjoys higher living standards now but grows more slowly. How far the curve actually shifts depends on whether the investment is in useful capital, whether workers have the skills to use it, and how long it takes to build.

Consequences of shifts

- **Outward shift:** higher potential output, so the economy can produce more of both goods and raise living standards (if the new capacity is used). It also makes points that were unattainable reachable.
- **Inward shift:** less can be produced, so living standards fall unless the economy finds new resources or better technology.
- **A shift does not by itself mean output rises.** If demand is weak, an economy with a bigger PPC may just have more spare capacity: its point stays where it was, further inside the new curve.

Key facts and formulas

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

Fact	Status
PPC: the maximum combinations of two goods with all resources used efficiently and given technology	Learn it
A PPC exists because resources are scarce and have alternative uses	Learn it
Axes: two named goods; the curve touches both axes	Learn it
On the curve: productive efficiency; inside: unemployed or inefficiently used resources; outside: unattainable	Learn it
Opportunity cost of a move along the curve = amount of the other good given up	Learn it
Opportunity cost of one more unit of X = $\frac{\text{units of Y given up}}{\text{units of X gained}}$	Learn it
Straight-line PPC: constant opportunity cost; concave PPC: increasing opportunity cost (resources not equally suited)	Learn it
Straight-line PPC: opportunity cost of one X = $\frac{\text{maximum Y}}{\text{maximum X}}$	Learn it
Actual growth: from inside towards the curve; potential growth: the curve shifts outward	Learn it

Fact	Status
The PPC shifts only with the quantity or quality of resources or technology	Learn it
A change affecting one good pivots the curve along that good's axis	Learn it

How to do it

In the questions we have tagged for this topic (54 questions, 2021–2025), we counted only the parts about this topic: one part in each question, except November 2025 Paper 22 Q3 and June 2025 Paper 21 Q2, where both parts are about the PPC, so 56 parts.

Question type	Questions
Multiple choice (concept)	33
Multiple choice (calculation)	4
Essay part (a), 8 marks	14
Data response, 2–4 marks	3
Essay part (b), 12 marks	2

1. Multiple choice (concept) (33 questions)

1. **Sketch the diagram** in the margin if the question gives one in words, and label the points.
2. **Decide what the question is testing:** a position (on, inside, outside), a shift or pivot, the shape, or what a PPC is.
3. **Check each option against the rules above.** Cross out options about prices, demand, consumer preferences, taxes or trade: a PPC shows none of them.

Variations you will meet:

- **Points on, inside and outside the curve** (11 questions). Only points **on** the curve use all resources; points inside mean unemployed or inefficiently used resources; points outside can't be reached now. A move from inside to the curve is **actual growth** with **zero opportunity cost**; an outward shift is growth in **productive capacity**. A move along the curve towards capital goods means fewer consumer goods now, so current living standards fall. When a question traces several changes over time (resources lost, then a recession, then a recovery), take them in order: a loss of resources shifts the curve **in**; a recession moves the point **inside** the curve; a recovery moves it back **towards** the curve without shifting it. Better working practices that use idle or part-time workers more fully move the economy from inside towards the curve.
- **What causes a shift or pivot, and which curve results** (10 questions). More or better resources or technology: out. Fewer workers (emigration, a later school-leaving age), lost land or destroyed capital: in. A change in **one** industry only: a pivot along **that** good's axis, the other end fixed. After a pivot, the good

that became easier to make has the lower opportunity cost, the other good the higher one. Changes in consumer choice, prices, taxes and subsidies, or trade never shift the curve. If growth is **positive but slowing**, output still rises, so the new point is still further out than today's, just not as far as before.

- **The shape: constant or increasing opportunity cost** (9 questions). Straight line: constant. Concave: increasing, for **both** goods, because some resources are better at producing one good than the other. On a concave curve, the cost of more X is largest when the economy already makes a lot of X. Watch for distractors about returns to scale, efficiency of one industry, or demand.
- **What a PPC is and why it exists** (3 questions). The **maximum** output with **existing** resources and technology (not "ever", not actual demand, not the minimum). It exists because resources are scarce and have alternative uses. Its slope shows the opportunity cost of one good in terms of the other; it does not show preferences or growth.

2. Multiple choice (calculation) (4 questions)

1. **Read the two combinations** (from the table, the figures in the stem, or the axes).
2. **Opportunity cost = the amount of the other good given up**: old output minus new output of that good.
3. **Per unit**, if asked: divide by the units of the good gained.

Variations you will meet:

- **Two combinations in the stem**: a firm moves from 50 units of A and 300 of B to 70 of A and 240 of B; the 20 extra units of A cost $300 - 240 = 60$ units of B, or 3 units of B each. Beware options that give the new level (240) or the change in the good gained (20).
- **Read off an axis**: find each point's coordinates first, then subtract.
- **Compare two producers or several PPCs**: work out the opportunity cost per unit for each (maximum of one good $\div$ maximum of the other, if the PPCs are straight). The producer with the **lower** opportunity cost of a good should specialise in it (this is comparative advantage, from the topic on international trade). When several curves are drawn and you must find where one good is cheapest to make, pick the curve that gives up the **least** of the other good for each unit of it.

3. Essay part (a), 8 marks (14 questions)

Point-marked: up to **3** marks for knowledge and understanding (AO1), **3** for analysis (AO2) and **2** for evaluation (AO3, one of which is kept for a justified conclusion).

Answer plan, about one side of writing:

1. **An accurate diagram** (AO1): two **named goods** on the axes (not P and Q, not X and Y, never "quantity" and "price"), the curve **touching both axes**, points and arrows labelled, the change marked (a movement, a shift, a point inside). Most questions give up to 3 AO1 marks for the diagram and definitions.
2. **Define** the key terms the question uses (PPC, opportunity cost, productive capacity) (AO1).
3. **Analyse**: three developed points that **use the diagram**, each a chain: what happens to resources $\rightarrow$ where that puts the economy on the diagram $\rightarrow$ what that means for output of the two goods (AO2).

4. **The other side** (AO3, 1 mark): "it depends on..." (the shape of the curve, how easily resources move between goods, whether there are unemployed resources, the time it takes).
5. **Justified conclusion** (AO3, 1 mark): answer the question in a sentence with a reason.

Variations you will meet:

- **Movement along versus shift, and whether the opportunity cost is equal** (4 questions). Movement = reallocating **existing** resources, more of one good and less of the other, so it has an opportunity cost; shift = a change in the **quantity or quality** of resources or **technology**, so more (or less) of **both** can be made and there is no trade-off. For "is the opportunity cost always equal?" or "does opportunity cost determine the shape?": constant on a straight line (resources equally suited), rising on a concave curve (resources specialised), so it depends on how easily resources transfer from one good to the other; conclude that in most economies it rises.
- **Scarcity, choice and opportunity cost, constant and increasing** (3 questions). Scarcity is the curve itself; choice is picking a point on it; opportunity cost is what a move along it gives up; then explain the shape: straight line = the same rate of trade-off, concave = a rising rate, because resources are not equally good at both. Draw both shapes if the question asks for the difference.
- **Capital goods versus consumer goods and future growth** (3 questions). Short run: a move along the curve towards capital goods means fewer consumer goods, so consumers are worse off now. Long run: more capital raises capacity, so the PPC shifts out further and consumers can have more of both later. Evaluate: the investment must be in productive capital and used well, it takes time, and a very poor country may not be able to afford to cut consumption. A limitation of choosing more consumer goods is slower future growth.
- **A position inside the curve, and growth from unused resources** (3 questions). Inside means unemployed or inefficiently used resources and less of both goods than possible. Moving to the curve is actual growth from using spare resources (for example, more of the existing labour force in work); it does **not** shift the PPC. Growth in productive capacity is an outward shift (for example, more natural resources or new technology). For "is it permanent?": weigh cyclical unemployment (temporary) against structural unemployment or persistent inefficiency (long-lasting).
- **The effect of changes in the factors of production** (1 question). Show each change with its own shift; a fall in quantity shifts in, a rise in quality shifts out; the net effect depends on which is larger.

4. Data response, 2–4 marks (3 questions)

Parts that say "with the help of a PPC diagram, demonstrate / consider the impact of..." in a case study.

1. **Diagram mark**: axes as two goods, **one of them the good in the case study** if there is one, the curve touching both axes (straight or concave is fine).
2. **Change marks**: show exactly what the case describes: an outward shift touching both axes for more capacity (population growth, investment in new technology), or a **movement along** the curve for a switch between goods.
3. **Evaluation mark** (4-mark parts): one sentence on "the extent": the size of the shift depends on productivity, retirement age or how well the new technology is used; or the opportunity cost rises as more of the new good is produced.

Variation: a producer **starting** to make a new good: begin at the axis of the other good (zero of the new good), then move along the curve; each extra unit of the new good costs more as output grows, if the curve is concave.

5. Essay part (b), 12 marks (2 questions)

"Assess whether/the extent to which [one cause] is the only way (or always necessary) to shift the PPC outward." Levels-marked: Table A gives up to **8** marks for knowledge and analysis (AO1 + AO2: Level 3 is 6–8, Level 2 is 3–5, Level 1 is 1–2) and Table B up to **4** for evaluation (AO3: Level 2 is 3–4, with a justified conclusion; Level 1 is 1–2). A one-sided answer gets **no** evaluation marks.

Answer plan, about two sides of writing:

1. **Define** the PPC and an outward shift as a rise in productive capacity; draw the shift.
2. **Side one: the cause in the question**, two or three developed chains. More workers (higher participation, immigration, later retirement) or more of any factor → more can be produced of both goods → the PPC shifts out, provided the other factors are there to work with.
3. **Side two: other causes**, two or three developed chains. Better **quality** of resources (education, training, health) raises output per worker with no more workers; **technology** lets the same resources make more; more **capital** or **enterprise** raises capacity; more of one factor alone gives smaller and smaller gains if the others are fixed.
4. **Evaluation:** which matters most depends on what the economy is short of, how easily each can be raised (an ageing population limits labour; training takes years), the cost and opportunity cost of each.
5. **A justified conclusion:** "no, it is not the only way / not always necessary, because...", saying in which circumstances each cause matters most.

Worked examples

Example 1

The table shows some combinations on a country's PPC.

Cloth (million metres)	0	10	20	30	40	50
Wheat (thousand tonnes)	90	86	78	64	40	0

What is the opportunity cost of increasing cloth output from 20 to 40 million metres?

- **A** 20 million metres of cloth
- **B** 38 thousand tonnes of wheat
- **C** 40 thousand tonnes of wheat
- **D** 78 thousand tonnes of wheat

[1]

Wheat falls from 78 to 40 thousand tonnes, so the economy gives up $78 - 40 = 38$ thousand tonnes of wheat. The answer is **B**. (1)

A is what is gained, not what is given up. C is the new wheat output and D the old one; the opportunity cost is the **difference**. Notice that the cost rises: the first 20 million metres cost only $90 - 78 = 12$ thousand tonnes, so this PPC shows increasing opportunity cost.

Example 2

A country produces agricultural goods and manufactured goods. A long drought permanently reduces the fertility of its farmland. Manufacturing is not affected.

What happens to its PPC, and to the opportunity cost of producing agricultural goods?

PPC	opportunity cost of agricultural goods
A pivots inward along the agricultural goods axis	falls
B pivots inward along the agricultural goods axis	rises
C pivots inward along the manufactured goods axis	rises
D shifts inward along both axes	stays the same

[1]

Only farming loses productivity, so only the agricultural end of the curve moves in; the manufactured end stays where it is. Each unit of agricultural goods now needs more resources, which must come from manufacturing, so more manufactured goods are given up for each one: its opportunity cost rises. The answer is **B**. (1)

Example 3

A country's unemployment rate falls from 9% to 5% while its labour force stays the same size. With the help of a production possibility curve diagram, explain how this change would be shown and consider whether it can continue to raise the country's output in future. [8]

Diagram: a concave PPC with "Manufactured goods" and "Agricultural goods" on the axes, touching both axes, a point U inside the curve and an arrow from U to a point A on (or nearer) the curve. (AO1, 1)

A PPC shows the maximum combinations of two goods an economy can produce when all its resources are used efficiently with its current technology (AO1, 1). A point inside the curve means some resources, here workers, are unemployed, so the economy produces less of both goods than it could (AO1, 1).

The fall in unemployment means the share of the labour force in work rises from 91% to 95%, about 4.4% more workers employed (AO2, 1). These workers were already part of the labour force, so the economy's capacity has not changed and the PPC does not shift; instead the economy moves from U towards the curve (AO2, 1). Because the extra output comes from resources that were idle, the economy produces more of both goods without giving any up, so this actual growth has no opportunity cost (AO2, 1).

But this kind of growth cannot continue for ever. Once the economy is on its PPC, output can only rise if the curve shifts outward, through more or better resources or new technology; some unemployment will also remain as people change jobs, so the economy may never reach the curve exactly (AO3, 1).

So the fall in unemployment raises output now, but only up to the PPC; lasting growth in output needs investment, training or technology to shift the curve outward (AO3, 1, justified conclusion).

Total: $3 + 3 + 2 = 8$.

Example 4

Assess whether a major natural disaster will always shift an economy's production possibility curve inward.

[12]

Introduction. A PPC shows the maximum output of two goods an economy can produce with its resources and technology. An inward shift means productive capacity has fallen: less of both goods can be produced even if every resource left is used. A natural disaster, such as an earthquake, flood or cyclone, affects both the resources and how they are used.

Why it may shift the PPC inward. A disaster can destroy **capital**: factories, machinery, roads, ports and power stations. With less capital, each worker produces less, so the maximum output of both goods falls and the curve shifts inward. It can reduce **labour**, if people are killed, injured or leave the area, and the loss of skilled workers lowers the quality of labour too. It can damage **land**: floods and salt water can make farmland infertile for years, which pivots the curve inward along the agricultural axis in particular. And rebuilding uses resources that would otherwise have added to capacity.

Why it may not. Much of the damage may be to how resources are **used** rather than to the resources themselves. If roads are blocked and power is cut, factories and workers are idle for a time: the economy moves to a point **inside** an unchanged PPC, and it moves back as services are restored. A disaster that hits only one region or industry may leave most of the country's capacity untouched, so the curve hardly moves or only pivots. And rebuilding can raise capacity: destroyed capital may be replaced with newer, more productive capital and better infrastructure, so after some years the PPC can end up **further out** than before, especially if aid or insurance pays for the investment.

(Table A: developed chains on both sides, accurate use of the PPC, the difference between a shift and a point inside: Level 3, 8 marks.)

Evaluation and conclusion. Whether the PPC shifts inward depends on how much of the economy's stock of capital, labour and land is actually destroyed, compared with how much is only made idle for a while, and on how quickly and how well the country can rebuild. A small or rich economy with insurance and access to finance may see only a temporary move inside its curve; a poor economy that loses much of its capital and farmland, and cannot afford to replace it, is likely to see a lasting inward shift. So a major disaster does not **always** shift the PPC inward: it always reduces output in the short run, but it shifts the curve inward only when it destroys resources that are not quickly replaced.

(Table B: a developed, balanced judgement that answers the question and says what it depends on: Level 2, 4 marks.)

Total: $8 + 4 = 12$.

Common mistakes

- **Diagram labels and shape.** The most common error in every year: axes labelled "P and Q", "X and Y" or even "quantity of labour and quality of labour", curves that do not touch both axes, or a demand and supply diagram instead of a PPC. Each costs the diagram mark. Label the axes with two real goods.
- **Shifting the curve when resources become unemployed.** A rise in unemployment or a recession is a movement to a point **inside** the curve, not an inward shift. Examiners report many answers that shifted the PPC left here. Likewise, using unused resources is a move towards the curve, not an outward shift, and it does not come from "newly discovered" resources (those shift the curve).
- **Showing a reallocation of resources as a swivel or shift.** Producing more capital goods and fewer consumer goods is a **movement along** the curve. The shift comes later, as a result of the extra capital.
- **Ignoring the shape of the curve.** When asked about opportunity cost on a PPC, most candidates drew an accurate curve but did not say why it is concave, so they lost the mark for increasing opportunity cost. Say: resources are not equally suited to both goods.
- **Asserting long-run effects without the diagram.** Writing "more goods will be produced in future" without showing the outward shift kept many answers to 4 or 5 marks out of 8.
- **"All I know about the PPC" answers.** Drawing and describing points inside, on and outside the curve when the question asks about something else wastes time and earns nothing.
- **Confusing actual and potential growth.** Actual growth: a move from inside towards the curve. Potential growth: an outward shift. Keep them separate and give a cause of each.
- **No evaluation.** Many answers analysed well but gave no judgement, or judged a different question (for example "the most significant impact" when the question asked about the most **immediate** one).

How to get the marks

- **Command words.** *Explain*: reasons linked by "because", "so", "which means"; no evaluation needed. *Consider, assess, discuss, to what extent*: explain, then weigh the other side and reach a judgement.
- **Diagrams are marked for accuracy.** Named goods on both axes, curve(s) touching both axes, points and shifts labelled, arrows showing direction. A straight line or a concave curve are both accepted unless the question is about the shape.
- **Then use the diagram in words.** Refer to its points ("from A to B...") in the analysis; a diagram with no explanation earns only the diagram mark.
- **Part (a) (8 marks) is point-marked, $3 + 3 + 2$.** Three knowledge marks (diagram, definitions), three analysis marks (developed points tied to the diagram), two evaluation marks (a "depends on" point and a justified conclusion).
- **Part (b) (12 marks) is levels-marked, $8 + 4$.** Level 3 needs developed, accurate analysis of **both** sides, focused on the question; the top evaluation level needs a conclusion that answers the question and says why. Descriptions of terms in the question earn nothing on their own.

- **Data response parts** reward a correct diagram and one or two short points; don't write an essay. For a 4-mark "consider the extent" part, add one evaluative sentence.
- **Use the exact words:** productive capacity, potential output, actual growth, unemployed resources, reallocation, constant and increasing opportunity cost, productive efficiency.
- **Multiple choice:** one mark each with no penalty for guessing, so answer every question; sketch the curves, and read for "not", "most likely" and "largest".

Quick check

1. An economy is producing at a point inside its production possibility curve. What can be concluded?
 - **A** It is using all its resources efficiently.
 - **B** It could produce more of both goods without any opportunity cost.
 - **C** Its production possibility curve is about to shift inward.
 - **D** It is producing the maximum possible output of one of the goods.
2. A country's PPC is a straight line from 120 units of food to 40 machines. (a) What is the opportunity cost of one machine? (b) Of 10 more machines? (c) Of one unit of food? (d) Why is the cost the same wherever the country is on the line?
3. Use the table in Example 1. What is the opportunity cost of the first 10 million metres of cloth, and of the last 10 million metres? How many times larger is the second, and why?
4. Use the second diagram (the pivot). (a) At 64 agricultural goods, by what percentage can manufactured output rise? (b) What happens to the opportunity cost of producing 64 agricultural goods, measured in manufactured goods given up?
5. Explain two reasons why an economy's production possibility curve might shift inward. **[4]**

Answers

1. **B.** Inside the curve some resources are unemployed, so putting them to work adds output of both goods and nothing has to be given up. A describes a point on the curve; C confuses a position with a shift; D describes an end of the curve. (1)
2. (a) $120 \div 40 = 3$ units of food. (b) $10 \times 3 = 30$ units of food. (c) $40 \div 120 = \frac{1}{3}$ of a machine. (d) The line has the same slope everywhere, because the resources are assumed to be equally suited to both goods, so each switch loses the same amount.
3. First 10 million metres: $90 - 86 = 4$ thousand tonnes of wheat (0.4 thousand tonnes per million metres). Last 10 million metres: $40 - 0 = 40$ thousand tonnes (4 thousand tonnes per million metres), $40 \div 4 = 10$ times as much. The last resources moved into cloth are the ones best suited to growing wheat, so moving them loses the most wheat.
4. (a) From 36 to 54: $\frac{54-36}{36} = 50\%$. (b) It rises from $60 - 36 = 24$ to $90 - 54 = 36$ manufactured goods, because the resources used for farming could now make more manufactured goods.
5. Emigration of workers (1) reduces the quantity of labour, so less of both goods can be produced even with full employment (1). A natural disaster or war that destroys capital such as factories and roads (1) means each worker has less equipment, so the maximum output falls (1). Other valid reasons: an ageing population retiring, loss of farmland, skilled workers leaving (lower quality of labour). Any two developed points reach the 4 marks.

Past questions to try

- **9708/13/M/J/24 Q2:** which movement along a concave PPC has the largest opportunity cost.
- **9708/14/M/J/22 Q2:** two changes at once and their effect on a farmer's PPC.
- **9708/13/O/N/23 Q3:** opportunity costs from two producers' production table.
- **9708/21/O/N/21 Q2:** part (a), what happens to resources in a movement along and a shift of the PPC.