

Cambridge IGCSE · Economics 0455 · Notes

Population

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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 factors that make a population grow or shrink:** the birth rate, the death rate and net migration (immigration minus emigration).
2. **Explain why population grows at different rates in different countries:** how and why birth rates, death rates and net migration differ between countries.
3. **Explain the effects of changes in the size and structure of a population**, including:
 - the idea of an **optimum population**;
 - the effects of a population **increasing** or **decreasing**;
 - the effects of changes in the **age** and **gender** make-up of a population.

You must be able to **read and interpret a population pyramid**. You will never be asked to draw one.

You also need the simple calculations that go with these: births from a birth rate, natural increase, the change in population, and a part of a population as a percentage.

Understand it

What makes a population change

A country's population changes in only four ways: people are **born**, people **die**, people **arrive** to live there (**immigration**) and people **leave** to live elsewhere (**emigration**).

- The **birth rate** is the number of live births in a year for every 1 000 people in the population.
- The **death rate** is the number of deaths in a year for every 1 000 people.
- **Natural increase** is births minus deaths. As a rate: birth rate – death rate. If the death rate is higher, there is a **natural decrease**.
- **Net migration** is immigration minus emigration. More arriving than leaving is **net immigration** (positive); more leaving is **net emigration** (negative).

Putting them together:

$$\text{change in population} = (\text{births} - \text{deaths}) + (\text{immigrants} - \text{emigrants})$$

Because the rates are **per thousand**, the number of births is the population $\times$ birth rate $\div$ 1 000. A town of 60 000 with a birth rate of 15 has $60\,000 \times 15 \div 1\,000 = 900$ births in the year. The rate itself does not depend on the size of the country: a large country and a small one can have the same birth rate.

Three results follow, and multiple-choice questions test all three:

1. **A population can still grow when its birth rate falls**, as long as the birth rate stays above the death rate (and migration does not cancel it out).
2. **A population can shrink even when births exceed deaths**, if net emigration is larger than the natural increase.
3. **Natural increase leaves migration out**. To compare natural increase between countries, look only at birth rate – death rate.

Why birth rates differ between countries

Birth rates are usually **high** in low-income countries and **low** in high-income countries. The reasons:

- **Children as workers and as a pension**. Where farming is done by hand and there are few state pensions, children add to family income and look after parents in old age.
- **High infant mortality**. If many babies die young, parents have more children so that some survive.
- **Little access to, or knowledge of, contraception** (birth control), and less education, especially for girls.
- **Early marriage**, so women have more years in which to have children.
- **Culture and religion** that value large families.

Birth rates **fall** as countries develop: more girls stay in education and more women go out to work, so they marry and have children later; **raising children costs more** (schooling, housing, childcare); contraception is easier to get; fewer babies die; and pensions mean parents no longer depend on their children in old age.

Why death rates differ between countries

Death rates are lower where there is **good healthcare** (doctors, hospitals, medicines, vaccination), **clean water and sanitation**, a **good diet**, **safe housing and working conditions**, and **peace**. Poverty, famine, disease, war and pollution raise them.

Life expectancy, the average number of years a person can expect to live, rises as the death rate falls. It can **fall** when healthcare or diet gets worse, when drug use, obesity or pollution rise, when poverty and inequality grow, or in a war or pandemic.

A country's death rate also depends on its **age structure**: a country with many old people can have a higher death rate than a poorer country with a very young population, even though its healthcare is better.

Why net migration differs between countries

People move for **pull factors** (things that attract them to a country) and **push factors** (things that drive them out of their own).

Pull factors	Push factors
higher wages and more jobs	unemployment and low pay
better healthcare and education	poor healthcare and schooling
a higher standard of living	poverty, famine
family already living there	war, conflict, crime, persecution
safety, political stability	natural disasters, pollution, climate change

So high-income countries tend to have **net immigration** and low-income countries **net emigration**.

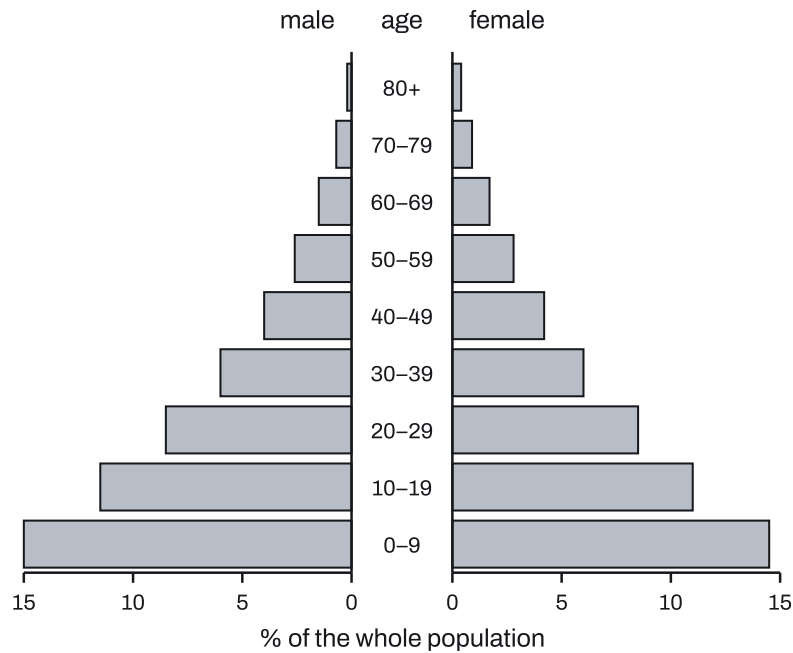
Governments also change migration: strict entry rules, language tests and limits on how long workers can stay reduce immigration; letting workers bring their families, settle permanently or move without a test increases it.

Why population grows faster in some countries

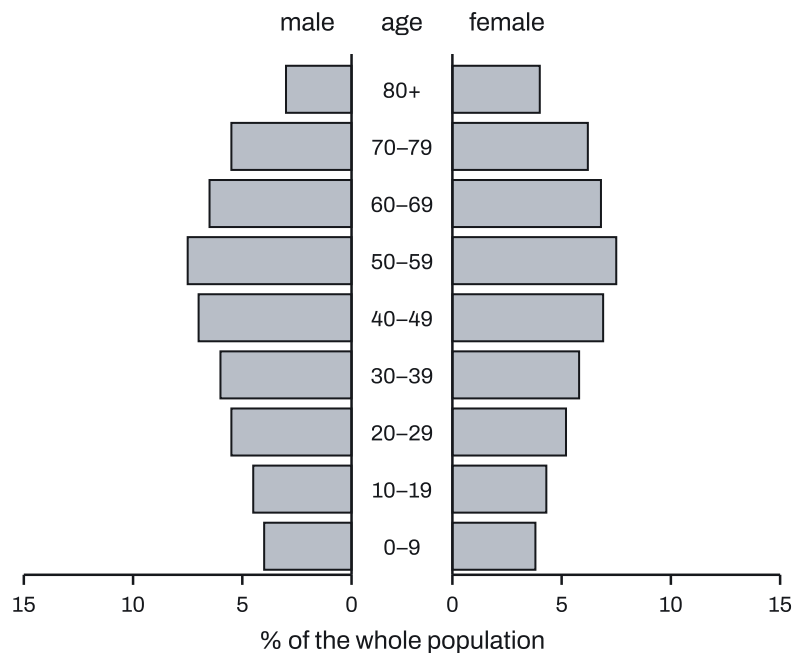
Low-income countries often grow fastest because **death rates have fallen** (modern medicine, vaccination, clean water and sanitation) while **birth rates are still high**. The gap between the two is a large natural increase. In many high-income countries the birth rate has fallen close to, or below, the death rate, so the population grows slowly or only through immigration.

Population pyramids

A **population pyramid** shows the structure of a population by **age** and **gender** (sex). Each bar is one age group: males on one side, females on the other. The length of a bar is the number, or the percentage, of people in that group. A pyramid shows age and gender; it does not show birth rates, death rates or incomes directly. You read those from its **shape**.

Country A: a young population

wide base: high birth rate
 narrow top: high death rate, short lives

Country B: an ageing population

narrow base: low birth rate
 wide top: low death rate, long lives

How to read a pyramid:

- **The base** shows the birth rate. A **wide base** (Country A: 29.5% aged 0–9) means a **high birth rate**; a **narrow base** (Country B: 7.8% aged 0–9) means a **low** one. A base narrower than the bars just above it means the birth rate has been **falling**.
- **The top** shows the death rate and life expectancy. A **narrow top** that shrinks fast means a **high death rate** and short lives; a **wide top** means a **low death rate** and **long life expectancy**.

- **The middle** shows the working-age population. A bulge in the young adult groups often means **immigration** of workers; a dent can mean **emigration** of young adults, or a past war or disease.
- **The two sides** show the gender balance. Women usually outnumber men in old age because they live longer; more men than women can come from male immigrant workers; fewer men can come from war, male emigration or dangerous jobs.

Comparing over time. If a pyramid gets **narrower at the base** and **wider at the top** over 50 years, both the birth rate and the death rate have fallen. If the top widens, people are living longer.

Percentages or numbers? If the axis shows **percentages**, two pyramids tell you nothing about which country has more people. If it shows **millions**, you can compare sizes too.

The two shapes are often called **expanding** (Country A: young, fast-growing, typical of a low-income country) and **ageing** or **constrictive** (Country B: old, slow-growing or shrinking, typical of a high-income country).

Dependants and the dependency ratio

People of **working age** (roughly 16 to 64) produce most of the output and pay most of the taxes. Children and retired people are **dependants**: they consume goods and services but mostly do not work. The **dependency ratio** compares the two:

$$\text{dependency ratio} = \frac{\text{number of dependants}}{\text{number of working age}} \times 100$$

Using the 20–59 groups as "working age" in the diagrams: Country A has 52% + 5.4% = 57.4% dependants and 42.6% of working age, so about 135 dependants for every 100 people of working age, nearly all of them children. Country B has 16.6% + 32% = 48.6% dependants and 51.4% of working age, about 95 per 100, most of them old. As Country B keeps ageing, its large 50–59 groups will retire and its ratio will rise.

A **high** dependency ratio means each worker's output and taxes must support more people.

The labour force

The **labour force** is everyone of working age who is **employed or actively seeking work** (so the unemployed are part of it). Its size depends on the population:

The labour force grows when	The labour force shrinks when
net immigration of working-age people	net emigration of working-age people
a higher birth rate (but only about 16 years later)	a low birth rate (years later)
the retirement age rises	the retirement age falls, or more people retire as the population ages
more women join the labour force	young people stay longer in education
the school-leaving age falls	war or disease kills people of working age

Only some changes act **at once**: a lower retirement age cuts the labour force immediately, but a fall in the birth rate only cuts it when those children would have reached working age. An unemployed person finding a job does not change the size of the labour force.

The optimum population

The **optimum population** is the size of population that gives the **highest output (GDP) per head**, given the country's land, capital and technology.

Population (millions)	0.5	1.0	1.5	2.0	2.5
GDP (\$bn)	6	15	27	34	40
GDP per head (\$)	12 000	15 000	18 000	17 000	16 000

GDP keeps rising as population rises, but GDP per head peaks at 1.5 million: that is the optimum.

- Below the optimum, the country is **underpopulated**: there are too few workers to make full use of its resources, so more people raise output per head (more specialisation, a bigger market, economies of scale).
- Above it, the country is **overpopulated**: extra people add less and less output because land and capital are limited, so output per head falls and there is pressure on food, housing, jobs and services.

The optimum is not fixed: new technology, more capital or better education raise the output each person can produce and move the optimum up.

Effects of an increase in population

Possible benefits

- A **larger labour force**: more workers, so the economy can produce more (higher productive capacity) and wage costs may be lower.
- A **larger market**: more consumers, so **demand rises** for food, housing, clothing and services; firms sell more, may grow and gain **economies of scale**, and invest more.
- More tax revenue** from more workers and spending.
- If the country is **below its optimum**, output per head rises.
- Immigrants may bring **skills** and fill jobs that local workers do not want.

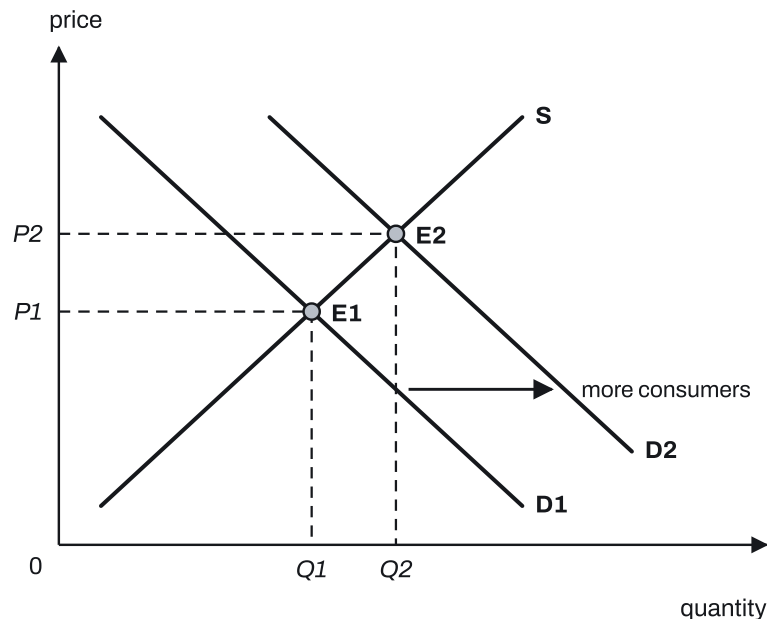
Possible costs

- If jobs do not grow as fast as the labour force, **unemployment** rises.
- If output grows more slowly than population, **GDP per head falls**, so living standards may fall.
- Pressure on resources**: more demand for food, water, energy and land; more **pollution** and congestion; housing shortages and higher house prices.
- More spending is needed on **schools, healthcare and infrastructure**, which has an **opportunity cost**.
- If growth comes from a **high birth rate**, there are many child dependants for years before they can work.

- If the country goes **beyond its optimum**, output per head falls.

Whether the effect is good or bad depends on **why** the population is growing (births or working-age immigrants), on whether the country is **above or below its optimum**, and on whether there are enough **jobs and capital** for the extra people.

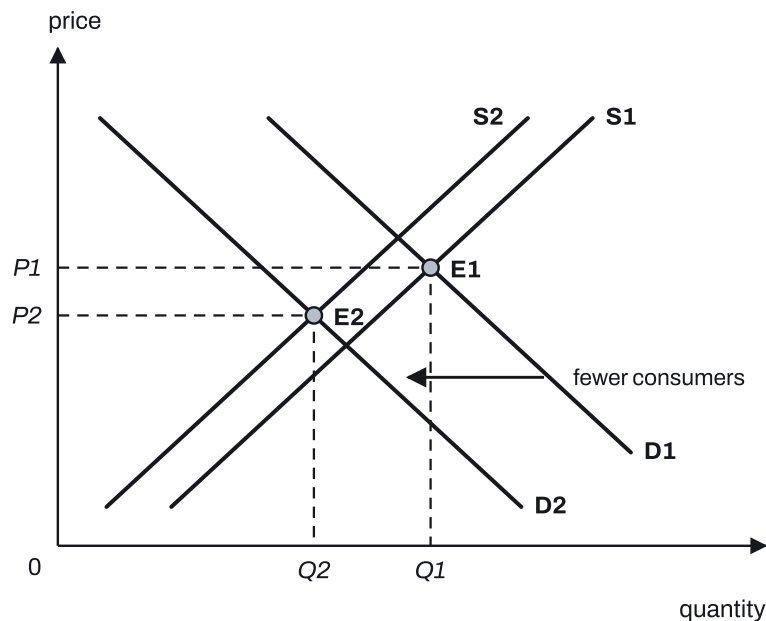
On a market. A larger population means more consumers, so **demand** for a product such as clothing **shifts right**: price and quantity both rise.



Effects of a decrease in population

A falling population (from a low birth rate, a high death rate or net emigration) has roughly the reverse effects: a **smaller labour force** and possible **labour shortages**, a **smaller market** and lower total demand, less tax revenue, and, if the fall comes from a low birth rate, an **older** population. On the other side: less pressure on resources and the environment, less spending needed on schools, and if the country was **above** its optimum, output per head can rise.

On a market. Fewer consumers shift **demand left**. Fewer workers can also shift **supply left**. The quantity traded falls; the price falls if demand falls by more than supply.



An ageing population

A population **ages** (its average age rises) when:

- the **birth rate falls**: fewer young people join at the bottom;
- **life expectancy rises** (the death rate falls) through better healthcare and diet: more people reach old age;
- **young adults emigrate**: the young leave and the old stay.

A fall in the death rate, on its own, both **increases** a population and **ages** it. A falling birth rate together with a falling death rate **must** age it.

Effects of an ageing population

Possible costs

more **retired** people, so a **smaller labour force** and a **higher dependency ratio**

the government spends more on **state pensions** and **healthcare** (more transfer payments), and collects less income tax, so its **budget deficit** may grow, or it must raise taxes or cut spending on education and infrastructure (**opportunity cost**)

older workers may have **out-of-date skills**, find new technology harder, and be less **mobile** (occupationally and geographically)

Possible benefits

older workers have **experience** and skills, so can be productive and reliable, and can train younger workers

older people often have **savings**, which can fund investment, and spending power

firms supplying older people (healthcare, care homes, leisure) gain

Possible costs

more **saving** and less spending by the old may reduce total demand

Possible benefits

labour shortages push firms to invest in **capital** and new technology, raising productivity

Governments respond by **raising the retirement age**, encouraging **immigration** of young workers, and helping more women and older people to work.

A young population

A large share under 16 (Country A) means **costs now**: a high dependency ratio, heavy spending on schools (an opportunity cost), and low output and tax per person. It brings **benefits later**: a large, mobile and adaptable future labour force, lower labour costs and a growing market. A **falling birth rate** cuts child dependants and school spending now and lets more women work; kept up for decades, it leads to labour shortages and an ageing population.

Migration: effects on the receiving and the sending country

The country receiving immigrants

- **For**: a larger labour force and productive capacity, so higher output and economic growth; immigrants are usually of **working age**, so they **lower** the average age and the dependency ratio; they fill jobs local workers do not want and skill shortages; they pay taxes and spend, raising demand; skilled immigrants bring new ideas.
- **Against**: competition for jobs may raise unemployment among local workers; migrants willing to work for less may **push down wages**; more pressure on **housing**, schools, healthcare and transport; some earnings are sent abroad (remittances) rather than spent locally; if unskilled, productivity may be low.

The country losing emigrants

- **For**: emigrants send money home (**remittances**), which supports families, cuts poverty and brings in foreign currency (secondary income on the current account); unemployment falls if there were not enough jobs; workers may return with **new skills**, knowledge and savings, and start firms.
- **Against**: a **brain drain** of skilled and young workers lowers output and productivity; the government loses tax revenue and the cost of having educated them; the population **ages**; firms face labour shortages.

Changes in gender balance

Women usually outnumber men because they live longer, and because men are more likely to emigrate for work, die in wars or work in dangerous jobs; male immigrant workers or a preference for sons can give more men. A shortage of one gender among working-age people changes the size of the labour force and, later, the birth rate.

Key facts and formulas

There is no formula list for 0455. "Learn it" means you must remember it.

Formula or fact	Status
Birth rate = live births per year per 1 000 of the population	Learn it
Death rate = deaths per year per 1 000 of the population	Learn it
Number of births = $\frac{\text{population} \times \text{birth rate}}{1000}$ (the same for deaths)	Learn it
Natural increase = births – deaths (rate: birth rate – death rate; migration not included)	Learn it
Net migration = immigration – emigration	Learn it
Change in population = natural increase + net migration	Learn it
Population growth rate (%) = $\frac{\text{change in population}}{\text{population at the start}} \times 100$	Learn it
A rate per thousand $\div 10$ = the rate as a percentage	Learn it
Dependency ratio = $\frac{\text{dependants (young and old)}}{\text{people of working age}} \times 100$	Learn it
Percentage of a group = $\frac{\text{part}}{\text{whole}} \times 100$	Learn it
Optimum population: the population size that gives the highest output (GDP) per head	Learn it
Labour force: people of working age who are employed or seeking work	Learn it

How to do it

We have tagged 65 questions on this topic (2021–2026): 34 multiple choice on Paper 1 and 31 structured questions on Paper 2. Four multiple-choice questions repeat another, so 61 are different; repeats are counted below. Nine questions have parts of more than one type, so the counts add up to 77.

Question type	Questions
Identify what makes a population grow or shrink	14
Discuss the effects of migration on an economy	9
Calculate or interpret population statistics	8
Analyse or discuss the effects of an ageing population	7
Explain what changes the size of the labour force	7
Interpret a population pyramid	6
Explain the causes of an ageing population	5
Discuss the effects of a larger population on an economy	5

Question type	Questions
Analyse or discuss the effects of a young population or a changing birth rate	4
Explain the causes of migration and how to attract workers	4
Explain why birth rates, death rates, life expectancy or gender balance differ	3
Analyse the relationship between a population variable and another variable in data	3
Draw a demand and supply diagram for a population change	2

Written answers (marks per command word are in "How to get the marks"). Plan: **point** → **developed chain** → **for Discuss, the other side with new reasons** → **a judgement saying what it depends on**. Identify (2 marks) needs two correct items; Explain (4 marks) **two points, each identified and explained**; Analyse (6 marks) **two or three effects, each built into a chain**; Discuss (6 or 8 marks) **two developed points each side and a judgement**.

1. Identify what makes a population grow or shrink (14 questions)

Thirteen multiple choice; one Paper 2 Explain (4 marks).

Multiple choice. Add up the four flows: births minus deaths, plus arrivals minus departures. Use the three results in "What makes a population change" (growth despite a falling birth rate; shrinking despite births exceeding deaths; natural increase leaves migration out) and "Why population grows faster in some countries" (high birth rates, falling death rates). Falling access to a healthy diet plus a rising cost of raising children means more deaths and fewer births, so a falling population.

Paper 2: "Explain two reasons for a high population growth rate" (4 marks). Identify a reason (1) and give **its cause** (1): a high birth rate, because of early marriage or little birth control; a low death rate, because of good healthcare; net immigration, because of high wages. Naming "high birth rate" without its cause loses the second mark.

2. Discuss the effects of migration on an economy (9 questions)

Paper 2 Discuss (6 or 8 marks) and Analyse (6 marks); two multiple choice.

1. **Check the direction and the country:** immigration is arriving, emigration is leaving; is the question about the country they leave or the one they join?
2. **For and against:** two developed chains each, from "Migration: effects on the receiving and the sending country".
3. **Judge:** it depends on the migrants' skills and age, whether there are jobs for them, and whether housing and services can expand.

Variations you will meet:

- **"Advantages from people working abroad"** (6 marks): only effects on the **home** country score (remittances, current account, returners' skills and firms, lower unemployment).

- **"Does immigration increase the budget surplus?"**: more taxpayers against more spending on schools and healthcare, and earnings sent abroad.
- **Multiple choice**: net immigration usually **enlarges the labour force**; net emigration of 20–40 year olds gives an **ageing population**.

3. Calculate or interpret population statistics (8 questions)

Six multiple choice (counting repeats) and two Paper 2 one-mark calculations. Use the formulas in "Key facts and formulas":

1. $\text{births} = \text{population} \times \text{birth rate} \div 1\,000$;
2. to compare natural increase, compare **birth rate – death rate**, ignoring migration;
3. a country shrinks only if net emigration beats natural increase: work out the natural increase **in people** first;
4. percentages: $\text{part} \div \text{whole} \times 100$, with the whole the question names (labour force, not population).

For graphs of BR and DR over time, the population rises in a year where the BR line is above the DR line and falls where it is below (with no migration).

4. Analyse or discuss the effects of an ageing population (7 questions)

Three multiple choice; Paper 2 Analyse (6 marks), Discuss (6 or 8 marks), Explain (4 marks).

Multiple choice. Old people draw pensions and use healthcare. So expect higher transfer payments and healthcare spending, a higher dependency ratio and a bigger budget deficit.

Paper 2: "Analyse how an ageing population may affect economic growth" (6 marks).

1. Saying that growth may rise or fall earns one mark in total; the other marks come from the chains.
2. Build chains from the table in "An ageing population", covering both directions: smaller labour force, out-of-date skills, more saving and diverted government spending reduce growth; experience and spending power raise it.
3. Stay on **total** demand and output: a change in **what** older people buy is not credited.

Variations: "Is a high share over 64 a benefit?" (8 marks) uses both columns of that table; "Will an ageing **labour force** reduce productivity?" is about older workers, not pensioners; "advantages of raising the retirement age" (4 marks): bigger labour force, lower pension spending, more income tax.

5. Explain what changes the size of the labour force (7 questions)

Four multiple choice (counting repeats); Paper 2 Explain (4 marks) and Define (2 marks).

Use the table in "The labour force": identify the cause (1) and explain how it changes the number employed **or seeking work** (1), saying **when** it acts. "Which causes an immediate fall?": A **lower retirement age**. "A large rise in the working-age population": the factor of production that grows is **labour**.

6. Interpret a population pyramid (6 questions)

Four multiple choice; Paper 2 Explain (4 marks).

Base = birth rate, top = death rate and life expectancy, sides = gender, axis = percentages or numbers.

The bullets under "Population pyramids" settle every multiple-choice question.

- **"Explain two influences on the shape"** (4 marks): name an influence (1) and what it does to the shape (1): birth rate → base; death rate or life expectancy → top; working-age immigration → middle; gender balance → sides.
- **"How does A's structure differ from B's?"** (4 marks): **compare** with figures from both: "A has a larger share under 20 than B (52% against 16.6%), suggesting a higher birth rate; B has a much larger share over 60 (32% against 5.4%), showing longer lives".

7. Explain the causes of an ageing population (5 questions)

Three multiple choice; Paper 2 Identify (2 marks) and Explain (4 marks). Use the three causes in "An ageing population", each with **why** it happened (for Explain).

Multiple choice. A falling birth rate **and** a falling death rate **must** age a population. A fall in the death rate on its own both increases and ages it. If the birth rate falls, the death rate rises and working-age adults emigrate, **every** age group shrinks.

8. Discuss the effects of a larger population on an economy (5 questions)

Paper 2 Explain (4 marks) and Discuss (6 or 8 marks). Take two benefits and two costs from "Effects of an increase in population", then **judge** with the **optimum population**: growth helps below it and harms beyond it. If a source gives an optimum, use its numbers. "Does high population growth mean high economic growth?": more workers and demand against falling output per head and years of child dependants.

9. Analyse or discuss the effects of a young population or a changing birth rate (4 questions)

Paper 2 Analyse (6 marks) and Discuss (8 marks). Use "A young population": costs now against benefits later. For a falling birth rate, judge by the time scale and whether immigration makes up for fewer births. A smaller labour force does not on its own lower the unemployment **rate**.

10. Explain the causes of migration and how to attract workers (4 questions)

Paper 2 Define (2 marks), Explain (2 or 4 marks), Analyse (6 marks), Discuss (8 marks).

1. **Causes** (6 marks): pull and push factors from "Why net migration differs", each with **why** it makes people move. A list without analysis scores at most 3.
2. **Attracting workers**: remove the barriers in that section (language tests, stay limits, no families). In a source-based question, only **the barriers named in the source** score.

3. **Define emigration:** leaving one's own country (1) to live in another (1).

11. Explain why birth rates, death rates, life expectancy or gender balance differ (3 questions)

Paper 2 Identify (2 marks) and Analyse (6 marks). Use "Why birth rates differ", "Why death rates differ" and "Changes in gender balance", giving complete reasons ("more men die in wars", not "war"). Population **size** does not change a rate per thousand.

12. Analyse the relationship between a population variable and another variable in data (3 questions)

Paper 2 Section A (4–5 marks).

1. **State the expected relationship:** inverse (birth rate and average age; schooling and birth rate) or positive (GDP per head and net immigration).
2. **Evidence:** **compare** two countries from the table.
3. **Explain why** (a high birth rate makes children a large share, pulling the average age down).
4. **Exception:** a country that does not fit, compared with another.
5. **Explain the exception:** other influences, such as the death rate or migration.

13. Draw a demand and supply diagram for a population change (2 questions)

Paper 2 Section A (4–5 marks): labelled axes (price, quantity); labelled original curves; the shift (demand right for a bigger population; demand left, and possibly supply left, for a smaller one, as in the two diagrams); both equilibria marked. For "analyse", add a sentence: more consumers, so demand and price rise.

Worked examples

Example 1

A country has a population of 5 million at the start of a year. Its birth rate is 18 per thousand and its death rate is 8 per thousand. During the year, 30 000 people move into the country and 45 000 move out.

- (a) Calculate the natural increase in population. **[2]**
- (b) Calculate the population at the end of the year. **[2]**
- (c) Calculate the population growth rate as a percentage. **[1]**

(a) Births = $5\,000\,000 \times 18 \div 1\,000 = 90\,000$ and deaths = $5\,000\,000 \times 8 \div 1\,000 = 40\,000$ (1). Natural increase = $90\,000 - 40\,000 = \mathbf{50\,000}$ (1).

(b) Net migration = 30 000 – 45 000 = –15 000 (net emigration) (1). Change = 50 000 – 15 000 = 35 000, so the population is **5 035 000** (1).

(c) $35\,000 \div 5\,000\,000 \times 100 = 0.7\%$ (1).

The population still grows, although more people leave than arrive, because the natural increase is larger than the net emigration.

Example 2

Explain two reasons why low-income countries often have a population pyramid with a wide base and a narrow top. [4]

The wide base comes from a high birth rate (1): with little access to birth control and children working on family farms and supporting parents in old age, families have many children, so the youngest age groups are the largest (1).

The narrow top comes from a high death rate and low life expectancy (1): poor healthcare, unclean water and poor diets mean many people die before old age, so each older age group is much smaller than the one below it (1).

Example 3

Analyse how an ageing population may affect a government's budget. [6]

As more people reach retirement age, more people claim state pensions (1), so government spending on transfer payments rises (1). Older people also need more medical care, so spending on healthcare rises too (1). At the same time, as people retire the labour force shrinks, so fewer people pay income tax (1) and retired people with lower incomes spend less, so indirect tax revenue may also fall (1). With spending rising and tax revenue falling, a budget deficit may grow (1), or the government must raise taxes or cut spending on other things such as education, an opportunity cost (1). This may be offset if the government raises the retirement age, so that people work and pay tax for longer (1). (Any 6.)

Example 4

Discuss whether or not a government should encourage immigration to make up for a falling birth rate. [8]

A falling birth rate means fewer children join the population each year, so in time the labour force shrinks and the population ages.

Why it should. Most immigrants are of working age, so they add to the labour force at once, while extra births would take about 16 years to do so. With more workers, firms can fill vacancies and produce more, so output and economic growth rise (developed point for).

Working-age immigrants pay income tax and spend their wages, raising tax revenue and total demand. Because they lower the average age, the dependency ratio falls, so there are more workers to pay for the pensions and healthcare of a growing number of old people (developed point for).

Why it should not. If immigrants compete with local workers for the same jobs, and are willing to work for less, local unemployment may rise and wages may be pushed down (developed point against).

More people need housing, schools, healthcare and transport. If these cannot expand fast enough, house prices rise and services become crowded, and the government must spend more, an opportunity cost. Immigrants also age in turn, so immigration delays the problem rather than solving it (developed point against).

Judgement. It depends on **whether the immigrants have the skills firms are short of** and on **whether housing and services can grow with them**. Where there are labour shortages and spare capacity, immigration is a quick way to keep the labour force growing; where unemployment is already high, or housing is scarce, other policies such as a higher retirement age or support for families may suit better. Both sides are developed and the judgement says what it depends on: Level 3 (6–8 marks).

Common mistakes

- **Mixing up immigration and emigration.** In June 2023 and November 2021 and 2022, some candidates treated emigration as people coming **into** the country, or as moving within a country, so every point they made was wrong. Emigration = leaving; immigration = arriving.
- **Writing about the wrong country.** In November 2022, asked how a country gains or loses from its workers emigrating, some explained the benefits to the countries they moved to.
- **Forgetting migration and death rates.** In March 2026 many candidates thought a fall in the birth rate must shrink a population, or misread net emigration. Always add up all four flows.
- **Confusing a fall in the death rate.** In March 2025 a number of candidates were unsure how a fall in the death rate affects population size: it **increases** it.
- **Per thousand, not per cent.** In June 2022, fewer than half calculated births correctly: the birth rate is per 1 000 people, so divide by 1 000, not 100.
- **The wrong whole in a percentage.** In June 2023 the most common error on an unemployment rate was dividing by the total population instead of the labour force; in another question, some took a percentage of the optimum population instead of the actual one.
- **Not explaining the cause.** In June 2025 many wrote "high birth rate" or "low death rate" without saying **what caused** it, and lost the explanation marks; in June 2023 some said a higher birth rate raises the labour force without noting it only does so in the long run.
- **Leaving out the unemployed.** In June 2021 and June 2022, many defined the labour force as the people employed; it includes those seeking work.
- **Describing instead of comparing pyramids.** In June 2021, when pyramids first appeared on Paper 2, some described each country separately or explained **why** the structures differ instead of **how**.
- **Not knowing what a pyramid shows.** In June 2025 some thought a pyramid measures birth and death rates, or income; it shows age and gender.
- **Ageing population versus ageing labour force.** In March 2021, asked about an ageing **labour force** and productivity, many wrote about pensions and healthcare for retired people. In March 2025 some confused retirement with unemployment, or wrote about changes in **what** older people buy instead of total demand

and growth.

How to get the marks

- **Identify** (2 marks): two correct items, one mark each. If you write more than two, only the first three are read.
- **Define** (2 marks): two parts. Emigration: leaving your country (1) to live in another (1). Labour force: of working age (1), employed or seeking work (1).
- **Explain** (4 marks): two points, each **identified** (1) and **explained** (1). The explanation is a "because" or a "so": a cause behind a high birth rate, or what a shape on a pyramid means.
- **Analyse** (6 marks): chains of links; each correct link is a mark. Where a question allows both directions (an ageing population and growth), stating the direction earns one mark in total; the rest come from the chains.
- **Relationships and diagrams** (4–5 marks): follow the steps in types 12 and 13.
- **Discuss** (8 marks, Section B): levels. Level 3 (6–8) needs **both sides developed** and **evaluation**; a one-sided answer stays in Level 2 (3–5). End with a judgement saying what it **depends on** (the migrants' skills, whether there are jobs, the time scale, the optimum population).
- **Discuss** (6 marks, Section A): up to 4 marks a side. A point turned round to argue the other side does not score twice unless it gives a **new reason**.
- **Use the source**: when asked, use the country's figures (its age structure, its migration) and compare them; copying a sentence earns nothing.
- **Calculations** (1 mark): show the working; give the units (people, %) and watch the zeros in millions.
- **Multiple choice**: 1 mark each, no penalty for guessing. Add up the four flows; read the shape of a pyramid.

Quick check

1. A town has 40 000 people. Its birth rate is 12 per thousand and its death rate 9 per thousand. In the year, 200 people move in and 320 move out. Calculate the population at the end of the year and explain the result.
2. Country P has a birth rate of 30, a death rate of 10 and net migration of –5, all per thousand per year. Country Q has a birth rate of 10, a death rate of 11 and net migration of +4 per thousand.
 - (a) Calculate each country's population growth rate as a percentage.
 - (b) Which country has the higher natural increase rate?
3. A country's GDP at different population sizes is estimated as: 1 million, \$20bn; 2 million, \$50bn; 3 million, \$66bn; 4 million, \$76bn. Calculate GDP per head at each size, identify the optimum population, and say whether a country of 3 million is underpopulated or overpopulated.
4. Explain which single change, other things being equal, makes a population both larger and older.
5. Explain two reasons why a country's labour force may shrink even while its population is growing.

Answers

1. Births = $40\,000 \times 12 \div 1\,000 = 480$; deaths = $40\,000 \times 9 \div 1\,000 = 360$; natural increase = 120 (1). Net migration = $200 - 320 = -120$ (1). The change is $120 - 120 = 0$, so the population stays at **40 000**: the net emigration exactly cancels the natural increase, so births exceeding deaths does not guarantee growth (1).
2. (a) P: $30 - 10 - 5 = 15$ per thousand = **1.5%** (1). Q: $10 - 11 + 4 = 3$ per thousand = **0.3%** (1). (b) P: $30 - 10 = 20$ per thousand; Q: $10 - 11 = -1$ per thousand, a natural decrease. P is higher; Q grows only because of immigration (1).
3. GDP per head: \$20 000, \$25 000, \$22 000 and \$19 000 (1). The optimum is **2 million**, where GDP per head is highest (1). At 3 million the country is above its optimum, so overpopulated: GDP is higher but each extra million adds less output, so GDP per head falls (1).
4. A fall in the death rate (1). People live longer, so fewer leave the population each year and it grows (1); because most of the extra survivors are older people, the share of old people rises and the average age goes up (1).
5. More people are reaching retirement age, so more leave the labour force each year than join it, while the population grows because people are living longer (1 + 1). Young people may stay longer in education, so they join the labour force later, even though they are counted in the population (1 + 1). (Also creditable: a lower retirement age; net emigration of workers while births exceed deaths.)

Past questions to try

- **0455/22/O/N/25 Q1**: parts (b) to (e), causes of an ageing population, emigration, attracting foreign workers and a demand and supply diagram.
- **0455/22/M/J/24 Q4**: part (c), what an economy gains from people working abroad.
- **0455/23/M/J/24 Q3**: part (c), consequences of a large share of under-16s.
- **0455/13/M/J/24 Q26**: which country's population is falling, from birth rates, death rates and net migration.