Cambridge AS & A Level · Economics 9708 · Notes

Indifference curves and budget lines A2

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Last checked 5 October 2026

Read first: **Utility**, **Price elasticity, income elasticity and cross elasticity of demand**, **Demand and supply curves**

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What you need to know

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

1. **Explain what an indifference curve and a budget line are.** An indifference curve joins all the combinations of two goods that give a consumer the same total satisfaction. A budget line joins all the combinations of two goods the consumer can just afford when they spend all of their income at the current prices. Put together, they show the consumer's best choice.
2. **Explain what makes the budget line shift.** A change in income moves it in or out without changing its slope; a change in the price of one good swings it round the end on the other good's axis; equal changes in both prices act like a change in income.
3. **Split the effect of a price change** (the **price effect**) into a **substitution effect** and an **income effect**, and show how the two combine for a **normal** good, an **inferior** good and a **Giffen** good, including what this means for the shape of the demand curve.
4. **Explain the limitations of the indifference curve model**: what it assumes about consumers, and where real buying behaviour does not fit.

This topic builds on Utility (marginal utility, the equi-marginal principle and the demand curve) and on income elasticity (normal and inferior goods). It does the same job as marginal utility theory, explaining consumer choice and the demand curve, but it does not need utility to be measured in units, and it separates the two effects of a price change.

Understand it

Indifference curves

Theo spends his money each month on books (good X) and coffees (good Y). He might be just as happy with 2 books and 27 coffees as with 6 books and 9 coffees: he is **indifferent** between them. Joining every combination that gives him that same satisfaction gives an **indifference curve (IC)**. Unlike marginal utility theory, we never count "utils": Theo only has to **rank** combinations as better, worse or just as good.

- **They slope downwards.** With fewer books, Theo needs more coffees to be equally happy.

- **Higher curves mean more satisfaction.** A curve further out has more of both goods. One consumer's set of curves is an **indifference map**.
- **They never cross.** At a crossing point, two different satisfaction levels would be equal, yet one curve has more of both goods than the other somewhere: a contradiction.
- **They are convex to the origin** (bowed in), because of the diminishing marginal rate of substitution.

The marginal rate of substitution

The **marginal rate of substitution (MRS)** of X for Y is the amount of Y the consumer would give up for one more unit of X and stay on the same indifference curve. It is the **gradient** of the indifference curve (ignoring the minus sign).

Theo's curve through 4 books and 18 coffees also passes through 6 books and 12 coffees, 8 books and 9 coffees, and 12 books and 6 coffees. Moving along it:

Move	Coffees given up	Books gained	Coffees given up per book
4 books → 6 books	6	2	3
6 books → 8 books	3	2	1.5
8 books → 12 books	3	4	0.75

The more books Theo has, the less he will give up for another one. This **diminishing MRS** makes the curve flatter to the right, so it is convex: each extra book adds less satisfaction, and each coffee lost hurts more as coffees get scarce. In symbols,

$$\text{MRS of X for Y} = \frac{\text{MU}_X}{\text{MU}_Y}.$$

Moving along a curve towards more X and less Y, the MU of X falls and the MU of Y rises, while **total utility stays the same**.

Perfect substitutes (brands the consumer cannot tell apart) have a constant MRS: a **straight-line** IC. **Perfect complements** (left and right shoes) give an **L-shaped** IC. The closer two goods are as substitutes, the less curved the IC.

The budget line

Theo has \$72 a month. Books cost \$9 and coffees cost \$2. If he spends everything,

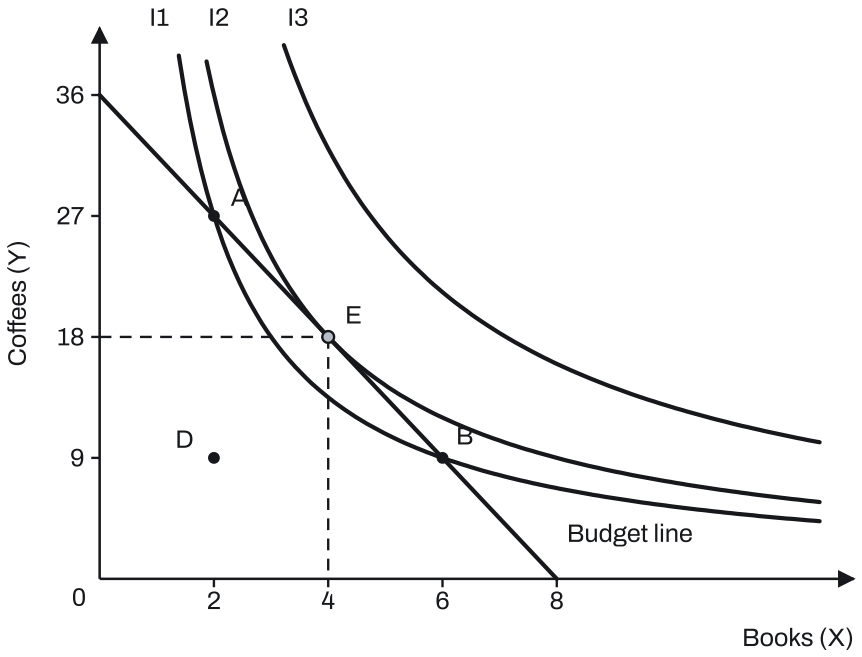
$$9X + 2Y = 72.$$

- All on books buys $72 \div 9 = 8$ books; all on coffees buys $72 \div 2 = 36$ coffees. The **budget line** (BL) joins these intercepts.
- Every point **on** it costs exactly \$72; points **inside** leave money unspent; points **outside** cannot be afforded.

- Its slope is $-\frac{P_X}{P_Y} = -\frac{9}{2} = -4.5$: one more book costs 4.5 coffees. The slope is the **ratio of the prices**, the opportunity cost of X in units of Y.

The budget line shows what the consumer **can** buy; the indifference map shows what they **would like**.

Consumer equilibrium



A rational consumer wants to reach the **highest indifference curve the budget line allows**.

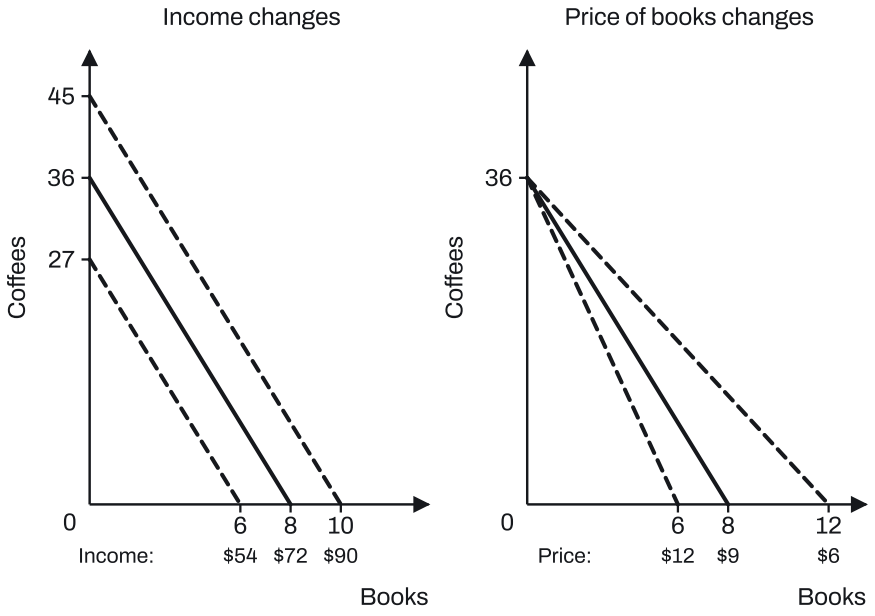
- At A or B (on I1) he spends all \$72, but moving along the line towards E reaches higher curves. At D he leaves money unspent. I3 is out of reach.
- At **E** (4 books, 18 coffees) the budget line is **tangent** to I2. No affordable point is on a higher curve: this is the **consumer's equilibrium**, maximum satisfaction for the given income and prices.

At the tangency the two slopes are equal:

$$\text{MRS} = \frac{\text{MU}_X}{\text{MU}_Y} = \frac{P_X}{P_Y}, \qquad \text{which rearranges to} \qquad \frac{\text{MU}_X}{P_X} = \frac{\text{MU}_Y}{P_Y}.$$

At E, the slope of I2 is $18 \div 4 = 4.5$, the same as $9 \div 2$. The rearranged form is the equi-marginal principle from Utility. At A, I1 is steeper than the budget line: Theo values a book at more coffees than it costs, so he gains by buying more books.

Shifts in the budget line



Only **income** and the **two prices** move the budget line. Tastes, preferences and advertising move the indifference curves instead.

- **Income changes:** a **parallel** shift (same slope). At $90 Theo's intercepts are 10 books and 45 coffees.
- **One price changes:** the line **pivots** about the **other** good's intercept. Books at $6: still 36 coffees, but now 12 books, so the line swings out and gets flatter. A price rise swings it in.
- **Both prices change by the same percentage:** a parallel shift, like an income change. A 25% sales tax on both makes each intercept $1 \div 1.25 = 0.8$ of what it was.
- **Income and both prices change by the same percentage:** no change.
- **Prices rising faster than money income** cut **real income**: the line shifts in, onto a lower IC.
- **Relative prices** are the **slope**. With X on the horizontal axis, X relatively dearer means a steeper line; Y relatively dearer, a flatter line.

Income changes: normal and inferior goods

When income rises, the budget line shifts out in parallel and the consumer moves to a tangency on a higher curve. A good bought **more** of is **normal** (positive income elasticity); a good bought **less** of is **inferior** (negative income elasticity), such as cheap own-brand food. Both cannot be inferior: the extra income must buy more of at least one.

Price changes: the substitution effect and the income effect

When the price of a good falls, two things happen at once.

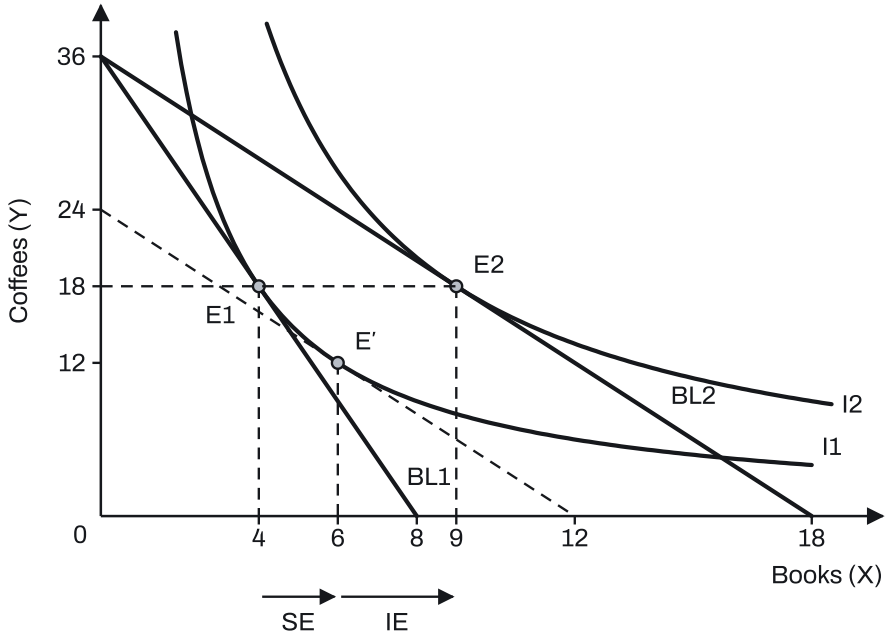
1. **It is cheaper relative to the other good**, so the consumer switches towards it: the **substitution effect**. It always moves quantity opposite to price, for every type of good.

2. **Real income rises**, because the same money buys more: the **income effect**. More of a normal good, less of an inferior good.

The total change in quantity demanded is the **price effect**: price effect $=$ substitution effect $+$ income effect.

To separate them, take away just enough income to put the consumer back on the **original** IC at the new prices: a dashed **compensated budget line**, **parallel to the new budget line** and **tangent to the original IC**.

- **Substitution effect:** the movement **along the original indifference curve**, from the old equilibrium to the point where the compensated line touches it.
- **Income effect:** the movement between the **two parallel lines** (compensated and new), from that point to the new equilibrium.



For Theo, when books fall from \$9 to \$4:

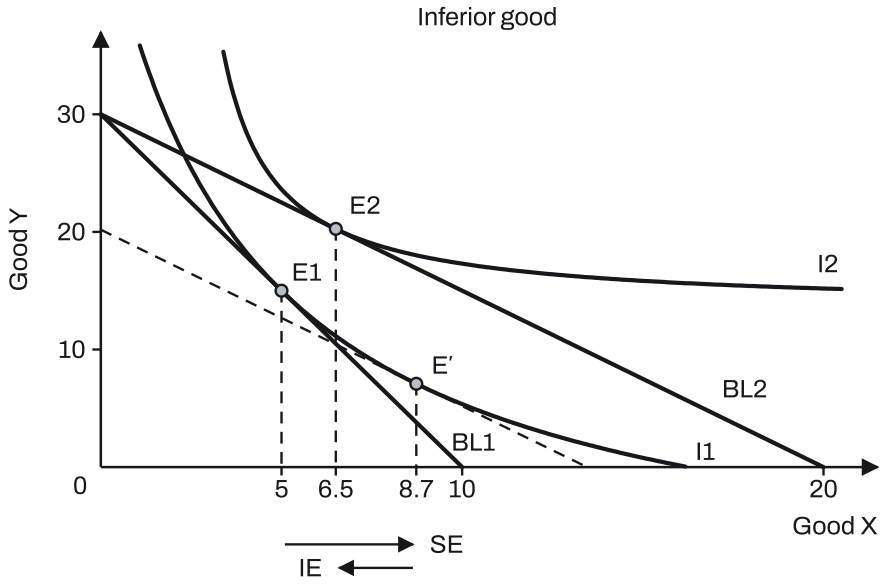
- The new budget line runs from 36 coffees to 18 books. His new equilibrium is E2: 9 books, 18 coffees. The **price effect** is $9 - 4 = +5$ books.
- The compensated line, at the new price ratio $4 \div 2$, needs only \$48 to touch I1, at E′ (6 books, 12 coffees). So the **substitution effect** is $6 - 4 = +2$ books: books are relatively cheaper, so he swaps coffees for books.
- The **income effect** is $9 - 6 = +3$ books: the price fall leaves him as well off as an extra \$24 would ($72 - 48$), and books are a normal good for him.

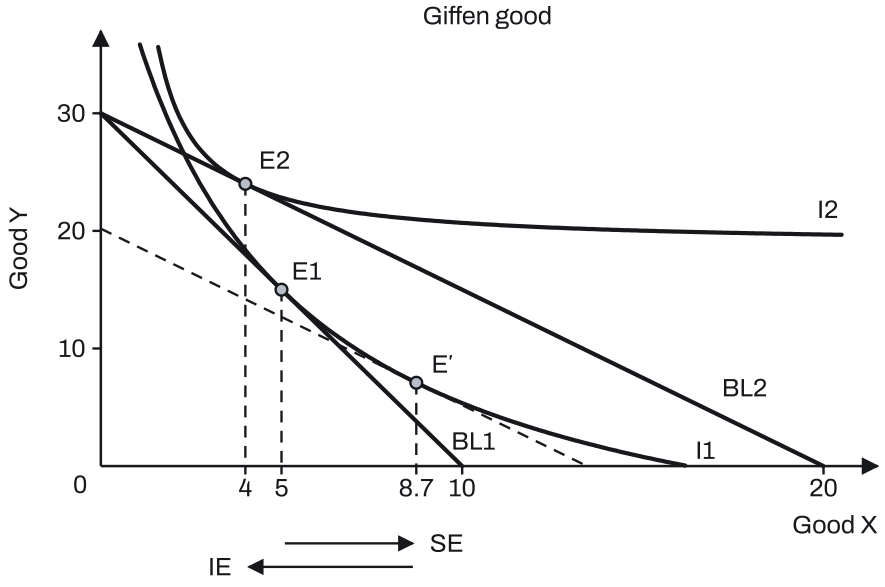
Both effects raise the quantity of books. The income effect is larger here because books take half of Theo's budget; for a good with a tiny budget share (salt), it is tiny.

Normal, inferior and Giffen goods

The substitution effect is always in the opposite direction to the price change. The income effect decides the rest.

Good	Income effect of a price **fall**	Overall effect of a price fall	Demand curve
Normal	more bought: works **with** the substitution effect	quantity rises by more than the substitution effect	slopes down, flatter
Inferior (not Giffen)	less bought: works **against** the substitution effect, but is **smaller**	quantity still rises, by less than the substitution effect	slopes down, steeper
Giffen	less bought: works against the substitution effect and is **larger**	quantity **falls**	slopes **up**





In the fourth diagram the price of X halves, and in both panels the substitution effect alone would raise X from 5 to about 8.7 units.

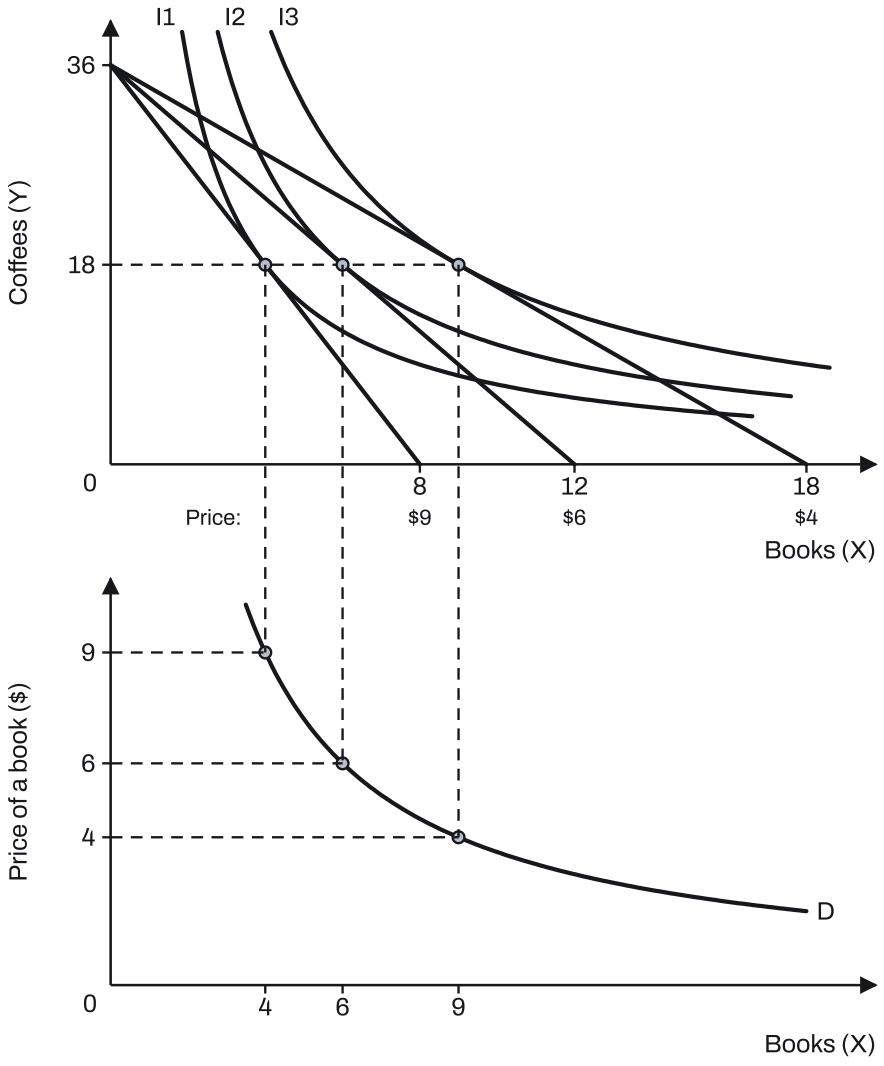
- **Inferior good (top panel):** the income effect takes about 2.2 units back, to 6.5. Quantity still rises, but less than for a normal good, so the demand curve is **steeper** (more price-inelastic).
- **Giffen good (bottom panel):** the income effect (about 4.7 units back) outweighs the substitution effect, and quantity **falls** to 4. The demand curve slopes **upwards**.

Every Giffen good is inferior, but few inferior goods are Giffen. The income effect is only that strong for a **staple** taking a **large share of a low income**, such as rice for a very poor household: when its price rises, the family can no longer afford a little meat or vegetables and buys even more rice instead.

Price rises reverse every arrow: a normal good's quantity falls a lot, an inferior good's a little, and a Giffen good's rises.

"Positive" and "negative" are used in more than one way: the income effect is **positive** for a normal good and **negative** for an inferior one, but the substitution effect may be called negative (opposite to price) or, for a price fall, positive (quantity rises). Check what each option says happens to quantity.

Deriving the demand curve



Change only the price of X, holding income, the other price and tastes constant. Each price gives a new tangency, and each tangency one **price and quantity** pair: together they make the **individual demand curve**. For Theo, books at \$9, \$6 and \$4 give 4, 6 and 9 books. The same method gives a steeper curve for an inferior good and an upward-sloping one for a Giffen good. A change in **income** shifts the whole demand curve instead.

Assumptions

The consumer is **rational** and always maximises satisfaction; can **rank** every combination **consistently** (if A equals B and B equals C, A equals C); prefers **more to less**; has **perfect knowledge**; chooses between **two divisible goods**; and faces given income, prices and tastes. Income, prices and tastes may change (the lines are redrawn), but the consumer never stops maximising satisfaction.

Limitations

- **Rationality**: real consumers follow habit, impulse, advertising and friends, and can be addicted; advertising can even reshape their ICs.
- **Two goods only**, when real choices involve hundreds.
- **Ranking every bundle** consistently is unrealistic, and nobody can observe a real indifference map.
- **Indivisible, one-off goods** (a car, a fridge) do not fit smooth curves.
- **Static**: tastes change, so the map dates quickly.
- **Limited predictions**: a price fall raises quantity for normal and most inferior goods, so demand alone does not reveal the type of good; real Giffen goods are rare, and status goods can also have demand rising with price.
- **In its favour**: it needs only a ranking, explains the downward-sloping demand curve and its exceptions, separates the two effects, and its **limited income** assumption is clearly realistic.

Key facts and formulas

There is no formula list in the 9708 exam, so everything here is "Learn it".

Formula	Status
Budget line: $P_X X + P_Y Y = M$, where M is income	Learn it
Budget line intercepts: at most $\frac{M}{P_X}$ of X, or at most $\frac{M}{P_Y}$ of Y	Learn it
Slope of the budget line, with X on the horizontal axis: $-\frac{P_X}{P_Y}$ (the opportunity cost of one unit of X in units of Y)	Learn it

Formula	Status
Marginal rate of substitution of X for Y $=$ the gradient of the indifference curve (without the sign) $= \frac{\mathrm{MU}_X}{\mathrm{MU}_Y}$	Learn it
Consumer equilibrium: the budget line is tangent to the highest reachable indifference curve, so $\mathrm{MRS} = \frac{P_X}{P_Y}$, equivalent to $\frac{\mathrm{MU}_X}{P_X} = \frac{\mathrm{MU}_Y}{P_Y}$	Learn it
Price effect $=$ substitution effect $+$ income effect	Learn it

Rules to learn:

- Income changes: parallel shift. One price changes: pivot about the other good's intercept. Both prices change by the same percentage: parallel shift. Income and both prices change by the same percentage: no change.
- Substitution effect: along the original IC, always opposite to the price change. Income effect: between the two parallel budget lines.
- Normal good: the two effects work together. Inferior: they work against each other and the substitution effect is larger. Giffen: they work against each other and the income effect is larger, so the demand curve slopes upwards.

How to do it

We tagged 57 questions for this topic (2021–2026): 45 Paper 3 multiple choice and 12 Paper 4 essays. For the essays we count only the parts about indifference curves; **9708/42/F/M/22 Q3** has two such parts, so the counts below add up to 58.

Question type	Questions
Income, substitution and price effects for normal, inferior and Giffen goods (multiple choice)	12
What an indifference curve is and its properties (multiple choice)	10
What a budget line shows and what sets its slope (multiple choice)	8
What shifts or pivots the budget line (multiple choice)	8
Income and substitution effects for different goods (13-mark part, 2021–2022)	5
Evaluate indifference curve analysis of a price change (20-mark essay, 2023–2025)	5
Assumptions and limitations of the model (multiple choice)	3
New budget line after a price or income change (multiple choice, calculation)	2
The consumer's equilibrium on a diagram (multiple choice)	2
Explain indifference curves and budget lines, or derive a demand curve (12-mark part, 2021–2022)	2

Question type	Questions
Discuss whether demand always falls when price rises (25-mark essay, 2022)	1

1. Income, substitution and price effects for normal, inferior and Giffen goods (12 questions)

All multiple choice (**9708/32/F/M/25 Q5**, **9708/32/F/M/23 Q3**, **9708/33/O/N/22 Q6**, **9708/32/O/N/22 Q6**, **9708/32/M/J/22 Q6**, **9708/32/F/M/22 Q6**, **9708/33/O/N/21 Q7**, **9708/32/M/J/21 Q5** and others).

1. **Find the price change.** A budget line that pivots out along the X axis is a fall in the price of X; one that pivots in is a rise.
2. **Find the three points**: old equilibrium, the point where the dashed line (parallel to the new budget line) touches the **old** curve, and the new equilibrium.
3. **Substitution effect** = old equilibrium → touching point, along the old curve. **Income effect** = touching point → new equilibrium, between the parallel lines. A distance between two parallel lines is never the substitution effect.
4. **Classify**: income effect in the same direction as the substitution effect, normal; opposite but smaller, inferior; opposite and larger, Giffen.

Variations:

- **Statements in words**: opposite and larger is Giffen; opposite and smaller, inferior.
- **An inferior good's demand curve** (**9708/32/F/M/25 Q5**): the negative income effect partly cancels the substitution effect, so the curve is **steeper** than for a normal good.
- **Direction tables** for an inferior good: price rise, substitution effect "buy less", income effect "buy more"; reverse both for a fall.
- **An income change only** (**9708/32/F/M/22 Q6**): more bought, normal; less bought, inferior.
- **The other good** (**9708/33/O/N/21 Q7**): if the quantity of Y rises when the price of X falls, X and Y are complements; if it falls, they are substitutes.
- **"Spending on other goods" on the vertical axis** (**9708/31/O/N/22 Q6**): more spent on other goods after X gets cheaper means less spent on X, so X's demand is **price-inelastic**, not Giffen.

2. What an indifference curve is and its properties (10 questions)

All multiple choice (**9708/32/F/M/26 Q2**, **9708/34/O/N/25 Q2**, **9708/34/M/J/25 Q1**, **9708/33/O/N/24 Q2**, **9708/31/O/N/24 Q2**, **9708/32/F/M/24 Q2**, **9708/33/O/N/23 Q2**, **9708/32/O/N/23 Q2**, **9708/32/M/J/23 Q2**, **9708/32/O/N/21 Q4**). Check each option against the four properties and the MRS in "Understand it". Traps: an IC is not what can be afforded; it is convex, not concave; the gaps between curves need not be equal; a straight-line IC means perfect substitutes, not diminishing marginal utility. **Moving along one curve** leaves total utility unchanged; towards less X and more Y, the MU of X rises and the MU of Y falls. **Same curve as (10, 10)?** Less of one good needs more of the other: (9, 11) can be, (10, 11) cannot.

3. What a budget line shows and what sets its slope (8 questions)

All multiple choice (**9708/32/O/N/25 Q2**, **9708/32/O/N/22 Q5**, **9708/31/O/N/22 Q5**, **9708/32/M/J/22 Q5**, **9708/31/O/N/21 Q5**, **9708/33/M/J/21 Q4**, **9708/31/M/J/21 Q4**, **9708/32/F/M/21 Q4**). Pick the option about the **maximum combinations affordable with all income spent**. Spending is the same at every point on the line; affordable points are **on or inside** it; the slope is $P_X \div P_Y$ (the MRS is the IC's slope, not the budget line's). It is not about preferences, and it is not a PPC.

4. What shifts or pivots the budget line (8 questions)

All multiple choice (**9708/33/M/J/25 Q3**, **9708/32/M/J/25 Q1**, **9708/32/F/M/22 Q5**, **9708/33/M/J/22 Q5**, **9708/33/O/N/21 Q6**, **9708/33/O/N/22 Q5** and others).

1. Ask what changed and apply the shift rules in "Understand it". Preferences, tastes and quality never move the budget line; income tax shifts it in.
2. **Prices rising faster than money income**: shift in, so the new equilibrium is on a **lower** IC.
3. **Which good is relatively dearer?** With X on the horizontal axis, X relatively dearer = steeper line; Y relatively dearer = flatter line.

5. Income and substitution effects for different goods (5 questions)

The 13-mark (b) parts of 25-mark Paper 4 questions in 2021–2022 (**9708/41/M/J/21 Q3**, **9708/43/M/J/21 Q3**, **9708/42/O/N/21 Q3**, **9708/43/O/N/21 Q3**, **9708/42/F/M/22 Q3**): split a price change into the two effects and compare goods, or say whether demand curves always slope down, or whether inferior goods have more inelastic demand. Marked in four levels (Level 4: 9–13).

Answer plan

1. **Define** IC and BL; show the starting tangency.
2. **Price change**: the line pivots; define the **substitution effect** (relative prices, along the original IC) and the **income effect** (real income, parallel lines).
3. **Normal good**: a diagram with both effects in the same direction.
4. **A second type** (inferior, Giffen or both): a diagram with an opposing income effect, comparing sizes. The top level needed **at least two types of good** with both effects in the right direction.
5. **Demand curve**: normal, down and flatter; inferior, down and steeper (more inelastic); Giffen, up.
6. **Conclusion** answering the question.

The 2021 report said the better answers went through all three cases: effects reinforcing, a smaller opposing income effect, and a larger one.

6. Evaluate indifference curve analysis of a price change (5 questions)

Paper 4 Section B, 20 marks (**9708/41/M/J/25 Q2**, **9708/43/M/J/25 Q2**: using the analysis to explain how a price change affects an individual's demand; **9708/41/M/J/24 Q3**, **9708/43/M/J/24 Q3**: a price rise for a normal good compared with a Giffen good; **9708/42/O/N/23 Q2**: deriving the demand curves for a normal and an inferior good). Table A gives up to 14 for knowledge and analysis (Level 3: 11–14), Table B up to 6 for evaluation (Level 2: 4–6, needing a justified conclusion and developed evaluative comments). **Without a diagram the mark for knowledge and analysis is capped at Level 2 (8 marks in June 2025).**

Answer plan

1. **Knowledge (AO1)**: IC, indifference map, BL and the key assumptions.
2. **Equilibrium (AO2)**: the tangency, with a labelled diagram; MRS equals the price ratio.
3. **The price change (AO2)**: pivot, new tangency, then the substitution effect (along the old IC) and income effect (parallel lines), with a diagram for **each good the question names**. Both effects are needed for Level 3.
4. **Link to demand (AO2)**: downward, steeper or upward.
5. **Evaluation (AO3)**: the limitations, each developed. For "extent" questions also weigh **how big** the effects are: price elasticity, the **shape of the IC** (close substitutes, a flatter curve, mean a big substitution effect) and the **share of income** spent on the good (a big share, a big income effect).
6. **The other side (AO3)**: what the model gets right.
7. **Judgement (AO3)**: answer the question's words, for example: useful for the direction of the response and why it differs between goods, less useful for predicting its size for a real consumer.

The 2024 report said many candidates drew correct diagrams but few assessed the **extent** of the difference, which is where the evaluation marks were.

7. Assumptions and limitations of the model (3 questions)

All multiple choice (**9708/32/O/N/24 Q2**, **9708/33/M/J/23 Q3**, **9708/31/M/J/23 Q3**).

The model never allows a consumer to **change their objective** of maximising satisfaction (income, prices and tastes may change). The assumption that fits reality best is a **limited income**.

8. New budget line after a price or income change (2 questions)

Multiple choice with numbers (**9708/32/M/J/24 Q2**, **9708/31/O/N/23 Q2**).

1. **Find the missing prices or income** from the intercepts: price = income ÷ intercept.
2. **Apply the change** and work out each new intercept: income ÷ new price.
3. Only the intercept of the good whose price changed moves (a pivot), unless income changed too.

9. The consumer's equilibrium on a diagram (2 questions)

Multiple choice (**9708/33/M/J/24 Q2**, **9708/31/M/J/24 Q2**). Maximum satisfaction is where the budget line **touches** (is tangent to) the highest IC it reaches, not where it cuts a lower one, and not on a curve beyond it. Read that point's quantities off both axes, checking which good is on which axis.

10. Explain indifference curves and budget lines, or derive a demand curve (2 questions)

The 12-mark (a) parts in 2021–2022 (**9708/42/M/J/21 Q3**: the demand curve for an inferior good; **9708/42/F/M/22 Q3**: what ICs and BLs are, and whether together they support rational decision making). Marked in four levels (Level 4: 9–12). The (a) parts on consumer equilibrium in **9708/43/M/J/21 Q3** and **9708/43/O/N/21 Q3** could be answered with either theory; they are counted under Utility.

Answer plan: define IC and BL with a diagram and show the tangency; then either plot each price against its equilibrium quantity (with both effects for an inferior good), or, when asked to evaluate, weigh the rationality assumptions (always maximising, ranking combinations, no pull from advertising or fashion).

11. Discuss whether demand always falls when price rises (1 question)

A 25-mark essay (**9708/42/M/J/22 Q2**), four levels (Level 4: 18–25). Type 5's plan, ending with the exception: a **Giffen good** (a status good can be mentioned too). The top level needed the size and sign of both effects, the Giffen case and an evaluative comment.

Worked examples

Example 1

With \$48 a month, Amara can buy at most 8 notebooks or at most 16 pens. Her income then rises by 25% and the price of pens doubles, while the price of notebooks stays the same. After these changes, what is the opportunity cost of one notebook, and what is the largest number of pens she can buy?

	Opportunity cost of one notebook	Largest number of pens
A	1 pen	10
B	2 pens	10
C	1 pen	8
D	0.5 pens	20

[1]

Prices first: a notebook costs $48 \div 8 = \$6$ and a pen $48 \div 16 = \$3$. Afterwards income is $48 \times 1.25 = \$60$ and a pen costs \$6. The most pens is $60 \div 6 = 10$ (and the most notebooks is also $60 \div 6 = 10$). The slope of the new budget line is the price ratio $6 \div 6 = 1$, so one notebook now costs one pen (it was 2 before). B keeps the old price ratio, C forgets the income rise ($48 \div 6 = 8$), and D forgets the pen price change ($60 \div 3 = 20$) and also turns the old price ratio upside down ($3 \div 6 = 0.5$). The answer is **A** (1).

Example 2

When the price of good G falls, a consumer's quantity demanded of G changes from 20 to 17 units a week. If the consumer's real income had been held constant, the price fall would have raised quantity demanded to 24 units. Which statement is correct?

A G is an inferior good but not a Giffen good, and the income effect is –7 units.

B G is a Giffen good, and the income effect is –7 units.

C G is a Giffen good, and the income effect is –3 units.

D G is a normal good, and the substitution effect is +4 units.

[1]

Substitution effect (real income constant) $= 24 - 20 = +4$; price effect $= 17 - 20 = -3$; so income effect $= -3 - 4 = -7$. A negative income effect larger than the substitution effect means a Giffen good. C gives the price effect as the income effect; G is not normal (D). The answer is **B** (1).

Example 3

Nadia spends her monthly allowance on two goods: meals at a restaurant and instant noodles. Her allowance rises, and prices stay the same. Using indifference curves and budget lines, explain how she chooses what to buy, and why the rise in her allowance changes her purchases of the two goods differently. **[12]**

Model answer (each paragraph, with the level descriptor it meets; marked like the 2021–2022 12-mark parts, Level 4: 9–12):

1. **Indifference curves.** An indifference curve joins all the combinations of restaurant meals and noodles that give Nadia the same satisfaction. It slopes down and is convex because of the diminishing marginal rate of substitution; higher curves give more satisfaction and curves never cross. *(Accurate knowledge of indifference curves.)*
2. **The budget line.** Her budget line shows the most meals and noodles she can buy with her whole allowance at current prices; its slope is the ratio of the two prices. *(Accurate knowledge of the budget line.)*
3. **Equilibrium.** As a rational consumer, she chooses the point where the budget line just touches the highest indifference curve it can reach: the rate at which she is willing to swap noodles for meals (the MRS) equals the rate at which she can swap them (the price ratio). *Diagram to draw: meals and noodles on the axes, the budget line tangent to I1 at E1. (Clear explanation of equilibrium, with a diagram.)*

4. **The rise in her allowance.** With prices unchanged, the budget line shifts out in parallel, and she moves to a tangency E2 on a higher curve, I2. *(Correct analysis of the shift.)*
5. **Why the goods change differently.** Restaurant meals are a **normal good**: with more income she buys more. Instant noodles are an **inferior good**: she replaces some of them with meals. *On the diagram, E2 must have more meals and fewer noodles than E1.* Both could not be inferior, because she spends the whole, larger allowance. *(Developed analysis linking the income change to the type of good: Level 4.)*
6. **Conclusion.** Because the slope is unchanged, this is a pure **income effect**: positive for meals, negative for noodles. *(Clear conclusion that answers the question: 12/12.)*

Example 4

Assess whether the substitution effect or the income effect of a price change matters more in deciding how a consumer's demand for a good responds. **[20]**

Model answer (outline of each paragraph):

1. **The model.** A rational consumer chooses where the budget line is tangent to the highest indifference curve: the MRS equals the price ratio. A fall in the price of good X pivots the budget line outwards along the X axis, and the consumer moves to a new tangency on a higher curve. *(AO1: definitions, equilibrium, with a labelled diagram.)*
2. **Splitting the effect.** A compensated budget line, parallel to the new one and tangent to the original curve, separates the change. The **substitution effect** is the move along the original curve, caused only by the change in **relative prices**; it always raises the quantity of X when its price falls. The **income effect** is the move between the parallel lines, caused by the rise in **real income**; its direction depends on the good. *(AO2: both effects explained with the diagram: the third diagram in this note.)*
3. **Analysis of the three cases.** For a normal good both effects raise quantity; for an inferior good the income effect cuts quantity but is smaller, so quantity still rises; for a Giffen good the income effect is larger and quantity falls. *(AO2: diagrams for an inferior and a Giffen good, as in the fourth diagram: with paragraphs 1–2, Table A Level 3.)*
4. **For the substitution effect.** It always works in the same direction and, for most goods, decides that direction: demand curves slope down because of it. It is large when the good has close substitutes (a flatter IC). Most goods take a small share of income, so the income effect is tiny: a cut in the price of toothpaste mostly makes people switch brands. *(AO3: developed evaluative comment.)*
5. **For the income effect.** When a good takes a large share of the budget, the income effect can be big: in the third diagram, books take half of Theo's spending and the income effect (+3) beats the substitution effect (+2). It also makes an inferior good's demand more inelastic and, for a Giffen staple, reverses the response. *(AO3: the other side, developed.)*
6. **What it depends on, and a limit.** It depends on how close the substitutes are, the good's share of income and whether it is normal or inferior. And the split exists only in the model: we only ever observe the total response. *(AO3: weighs the factors and the model.)*
7. **Conclusion.** For most everyday goods, with close substitutes and a small share of the budget, the substitution effect matters more: it sets the direction of the response and most of its size. The income effect matters more for goods that take a large share of income, above all staples bought by poor

households, where it can make demand inelastic or even upward-sloping. So the substitution effect matters more in general, but the income effect decides the important exceptions. *(Justified conclusion that answers "whether ... matters more": Table B Level 2, 6/6.)*

(Table A Level 3: 14; Table B Level 2: 6; **20/20**.)

Common mistakes

- **Crossing indifference curves.** The November 2021 report noted answers whose curves crossed, so the equilibrium could not be found. Draw the higher curve clearly above the lower one everywhere.
- **Diagrams that don't match the text.** Examiners in 2021 and March 2022 saw diagrams where the two effects could not be told apart, or that did not support the written answer. Label every curve (I1, I2, BL1, BL2), the equilibria (E1, E2, E′) and the quantities on the X axis, and refer to them in your text.
- **Confusing the two effects.** The substitution effect is **along the original curve**; the income effect is **between the parallel budget lines**. In March 2023, many candidates took the whole move from E1 to E2 as the income effect; in November 2022, many chose a distance between parallel lines as the substitution effect.
- **Getting the direction of the income effect wrong** for an inferior good, or treating every inferior good as a Giffen good. A Giffen good needs the income effect to be **larger** than the substitution effect.
- **Pivoting on the wrong axis, or moving the budget line for a change in tastes.** A change in the price of X moves only the X intercept; tastes move the ICs, not the budget line.
- **Leaving out the diagram** when the question asks for one. The June 2024 report, and the 2024 and 2025 mark schemes, say answers without a diagram could not get above Level 2 for knowledge and analysis.
- **Describing without judging.** The June 2024 report said few answers addressed **how far** the effects differ. Use price elasticity, the slope of the indifference curve and the share of income to weigh the size of each effect.
- **Weak evaluation of rationality.** In March 2022, the better answers said exactly what rationality assumes (always maximising satisfaction, being able to rank combinations, no pull from advertising or fashion) and why real consumers differ.

How to get the marks

- **Multiple choice with diagrams**: find which budget line moved and how (parallel or pivot), mark the three points E1, E′, E2, and read each effect off the X axis.
- **Multiple choice with numbers**: work out the prices from the intercepts first (price = income ÷ intercept), then the new intercepts.
- **Definitions** that earn the AO1 marks: indifference curve (equal satisfaction, two goods), indifference map, MRS, budget line (all income spent, given prices), consumer equilibrium (tangency, highest reachable curve), substitution and income effects, normal, inferior and Giffen goods.

- **"Explain" and "Analyse"**: a developed chain each time, for example price falls → budget line pivots out → relatively cheaper (substitution effect) and real income up (income effect) → direction of each for this type of good → overall change → what that means for the demand curve.
- **"With the help of a diagram"**: the diagram is required, not optional. Draw it large, with labelled axes (good X, good Y), at least two ICs that do not cross, the budget lines and the compensated line dashed.
- **"Evaluate", "Assess", "Discuss", "Consider"** (20 marks): Table A (14) rewards accurate knowledge and developed analysis with fully explained diagrams; Table B (6) rewards **developed** evaluative comments and a **justified conclusion that answers the question's exact words**. A conclusion that only repeats the analysis stays in Level 1 of Table B.
- **Two types of good**: when a question names two (normal and Giffen, normal and inferior), analyse both with their own diagrams and compare them directly.
- **Use the terms the mark schemes reward**: indifference map, diminishing MRS, tangency, relative prices, real income, substitution, income and price effects, rational consumer.

Quick check

1. Kemi has $90 to spend on cinema tickets (X) at $15 and magazines (Y) at $6. Find the intercepts of her budget line and its slope, with X on the horizontal axis, and say what the slope means.
2. Both prices in question 1 fall by 20% while Kemi's income stays the same. Describe the change in her budget line and give the new intercepts.
3. At Ravi's current combination, the gradient of his indifference curve shows he would give up 3 units of Y for one more unit of X. X costs $4 and Y costs $2, and he spends all his income. Is he in equilibrium? If not, what should he do?
4. The price of good Z rises. A consumer's quantity of Z falls from 30 to 22 units a week. With real income held constant, it would have fallen to 25 units. Find the substitution effect and the income effect, and say what kind of good Z is.
5. Explain why every Giffen good is an inferior good, but most inferior goods are not Giffen goods. **[4]**

Answers

1. Most tickets $= 90 \div 15 = 6$; most magazines $= 90 \div 6 = 15$. Slope $= -\frac{15}{6} = -2.5$: each extra cinema ticket costs 2.5 magazines (the opportunity cost of a ticket).
2. A parallel shift outwards, because the price ratio, and so the slope, is unchanged. New prices are \$12 and \$4.80, so the intercepts are $90 \div 12 = 7.5$ tickets and $90 \div 4.80 = 18.75$ magazines (each 25% higher, since $1 \div 0.8 = 1.25$). It is the same as a 25% rise in income.
3. No. His MRS is 3 but the price ratio is $4 \div 2 = 2$: he values one more X at 3 Y, but it costs only 2 Y. He should buy more X and less Y. As he does, his MRS falls until it equals 2, where his budget line is tangent to the highest indifference curve he can reach.
4. Substitution effect $= 25 - 30 = -5$ units. Income effect $= 22 - 25 = -3$ units. The price rise cuts real income and the consumer buys less Z because of it, so Z is a **normal** good: both effects work in the same direction.
5. A Giffen good is one where a fall in price reduces quantity demanded (1). The substitution effect always raises quantity when price falls, so this can only happen if the income effect cuts quantity, which means the good is inferior (1). It also needs the income effect to be larger than the substitution effect (1). For most inferior goods the income effect is small, because the good takes only a small share of income, so the substitution effect wins and demand still slopes down; only staples taking a large share of a poor household's income have such a large income effect (1).

Past questions to try

- **9708/31/O/N/23 Q2**: a new budget line after a price rise.
- **9708/32/F/M/23 Q3**: reading the substitution and income effects off a diagram.
- **9708/33/O/N/24 Q2**: which statement about indifference curves is false.
- **9708/42/O/N/23 Q2**: evaluating indifference curve analysis to derive demand curves for normal and inferior goods.