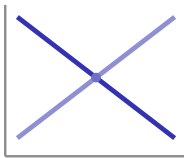


The Price System

A-Level Economics ■ Topic 2

A-Level Economics



What we will cover

- 1 Demand & marginal utility
- 2 Supply
- 3 Price elasticity (PED)
- 4 YED, XED & PES
- 5 Market equilibrium
- 6 Consumer & producer surplus



buyers & sellers meet

1

Demand and supply

Demand and what shifts it

A fictional coffee market: classify each event

- 1 Coffee's own price falls from \$7 to \$6; other conditions stay fixed.
- 2 The price of tea, a substitute, rises.
- 3 Consumers' income rises. No income elasticity is given.

Attempt: movement along or shift? State the direction where the information permits it. Draw and label the change.

The **law of demand** 需求定律 holds other conditions constant. An income rise needs a normal/inferior-good assumption before choosing a direction.

Demand and supply: the definitions that matter

demand 需求	the quantity buyers are willing and able to buy at each price 价格 in a period of time – not just a wish
market demand 市场需求	add up the quantity <i>all</i> consumers 消费者 want at each price – horizontal summation of the individual demand curves 需求曲线
supply 供给	the quantity producers 生产者 are willing and able to <i>sell</i> at each price in a period
movement	a change in the good's own price moves you <i>along</i> the curve
shift	a change in a non-price determinant 决定因素 moves the whole curve

“Willing *and able*” is the phrase: wanting a Ferrari is not demand. Define the relationship at each price, in a stated period, as the task requires.

The two laws, and the words they use

Check the three demand cases

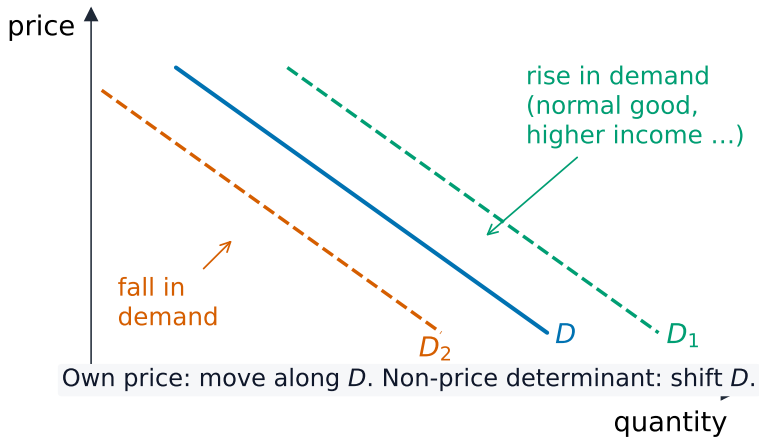
Own price falls: quantity demanded rises *along* the original curve.

Tea becomes dearer: coffee demand shifts right if they are substitutes.

Income rises: demand shifts right for a normal good, left for an inferior good; the case does not tell us which.

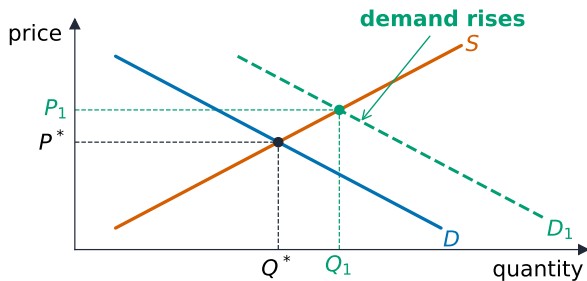
A change in **quantity demanded** 需求量 refers to an amount at one price. A change in demand changes the relationship across prices.

Demand and what shifts it, in detail



A change in income, tastes or related prices shifts the whole curve (D_1 right, D_2 left); a change in the good's own price is a movement along it.

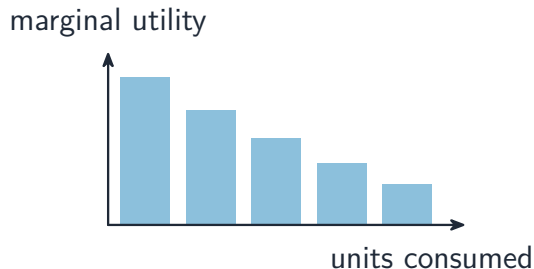
With supply fixed



$$D \uparrow \text{ (S fixed)} \Rightarrow P_e \uparrow \text{ and } Q_e \uparrow$$

With supply fixed, a rise in demand ($D \rightarrow D_1$) raises both the equilibrium price and the equilibrium quantity.

Marginal utility



Diminishing marginal

utility 边际效用递减: later units add less satisfaction.

Try: marginal utilities for four units are 12, 9, 6 and 3. Find total utility after each unit.

Check: 12, 21, 27, 30. Total utility still rises while marginal utility is positive.

Topic 7 preview: falling marginal utility helps explain willingness to pay in a simple model. It is not, by itself, a general proof of the law of demand.

Supply and what shifts it

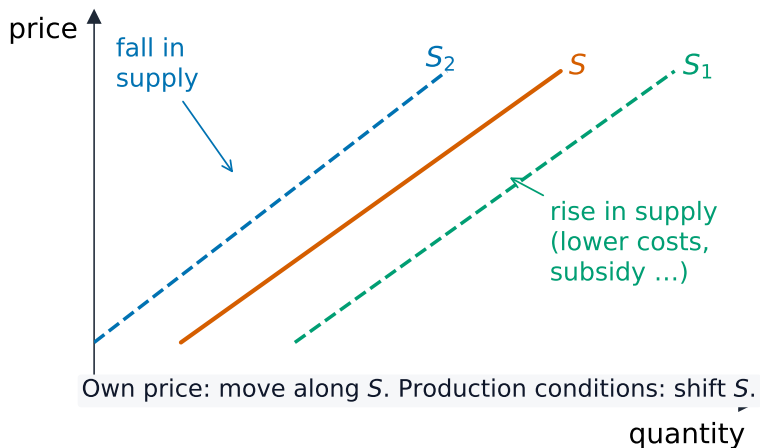
A bakery faces three separate changes

- 1 Its bread price rises; input costs are unchanged.
- 2 Flour becomes cheaper; the bread price is unchanged.
- 3 A new oven makes more bread from the same inputs.

Attempt: choose movement along or shift, and explain why the bakery offers more at the given price.

Own price: movement along supply. Lower input cost or better technology: supply shifts right. Compare output at the same price when identifying a shift.

Supply and what shifts it, in detail



Lower costs, better technology or a subsidy shift supply right (S_1); higher costs or a tax shift it left (S_2).

What shifts the supply curve

**costs of
production** 生产成本

wages, raw materials, energy – higher costs shift supply **left**

technology

better technology lowers cost per unit and shifts supply **right**

taxes and subsidies

a per-unit producer tax shifts supply left; a per-unit subsidy shifts it right

**the number of
firms** 企业

more firms in the market means more supply at every price

weather

weather can alter crop yields and supply

expectations

a storable good may be withheld if sellers expect a higher future price

Bread price alone: move along supply. Flour cost, technology or a per-unit producer tax: compare quantities offered at the same bread price.

2

Elasticity

Price elasticity of demand

$$PED = \frac{\% \Delta \text{quantity}}{\% \Delta \text{price}}$$

$|PED| > 1$ **elastic** 富有弹性 (responds a lot); $|PED| < 1$ **inelastic** 缺乏弹性 (responds little).

Worked example

price +10%, quantity -25% $\Rightarrow PED = -2.5$ (elastic)

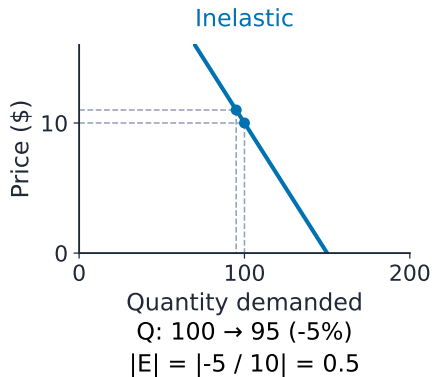
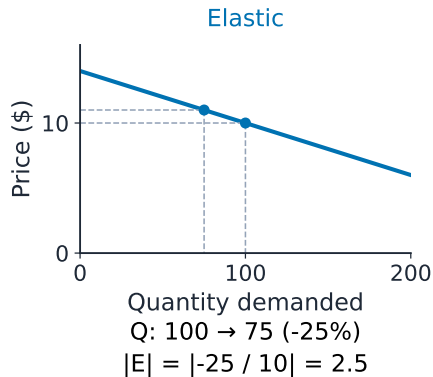
Reading a PED value

PED = 0	perfectly inelastic – quantity does not respond at all
$0 < \mathbf{PED} < 1$	inelastic – quantity changes <i>less</i> than price, in percentage terms
$ \mathbf{PED} = 1$	unit elastic – they change in the same proportion
$ \mathbf{PED} > 1$	elastic – quantity changes <i>more</i> than price
$ \mathbf{PED} = \infty$	perfectly elastic – any price rise loses every buyer
the formula	$\frac{\% \Delta Q_d}{\% \Delta P}$, and it is negative for downward-sloping demand

Compare the **percentage** changes, never the absolute ones. State whether your value is signed or a magnitude; use the sign for YED and XED.

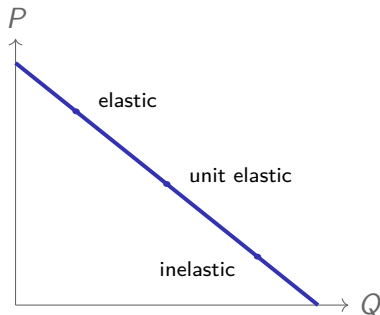
Price elasticity of demand, in detail

Price: 10 → 11 (+10%); both quantities start at 100



Worked example: price +10%, quantity -25%, so $PED = \frac{-25\%}{+10\%} = -2.5$ (elastic).

Same slope, different price elasticity



For $Q = 10 - P$, $\Delta Q / \Delta P = -1$.

$$PED = \frac{\Delta Q}{\Delta P} \frac{P}{Q}$$

P	Q	Point	PED
8	2		-4
5	5		-1
2	8		-0.25

Point elasticity 点弹性 changes along a straight line. The midpoint maximizes $TR = PQ$ on this curve; a unit-elastic segment instead has constant revenue.

PED and total revenue

Two goods: both start at price \$10 and sales of 100 units

Price rises to \$11. Good A sells 95 units; good B sells 75. Other determinants stay fixed. Use initial values for percentage changes.

Calculate before the answer:

- 1 PED for each good, including its sign and magnitude.
- 2 Revenue before and after the price rise: $TR = PQ$.
- 3 Can the higher-revenue case alone establish higher profit?

What PED tells a firm about its revenue

Good A: inelastic

$$PED_A = \frac{-5}{10} = -0.5$$

$$TR_0 = P_0 Q_0 = 10(100) = \$1000$$

$$TR_1 = P_1 Q_1 = 11(95) = \$1045$$

Price and revenue rise together.

Good B: elastic

$$PED_B = \frac{-25}{10} = -2.5$$

$$TR_0 = P_0 Q_0 = 10(100) = \$1000$$

$$TR_1 = P_1 Q_1 = 11(75) = \$825$$

Price rises but revenue falls.

Profit 利润 also depends on cost. PED alone gives neither profit nor tax revenue; government tax revenue requires the tax per unit and taxed quantity.

Who uses an elasticity, and for what

Apply the reasoning: 9708/21 O/N/25, Q2(a)

Explain why demand may respond less to a price rise this week than over a year. Then judge whether time is the decisive factor for this product.

A commuter may keep using petrol immediately, then change travel method or car. More available substitutes can increase responsiveness.

Evaluate: a remote worker with no viable alternative may still have inelastic demand after a year. Availability of alternatives matters alongside time.

The official task needs a formula, analysis and a reasoned judgement. A petrol-station photograph alone cannot establish an elasticity value.

Income and cross elasticity

Calculate, interpret, then make a business decision

Income rises 20%.

Restaurant-meal demand rises 30%.

Tea price rises 10%.

Coffee demand rises 4%.

Printer price rises 10%.

Ink demand falls 6%.

Attempt: choose YED or XED, keep its sign, and classify each case. Hold other determinants fixed.

Normal/inferior uses an income change. Substitutes/complements uses another good's price. Own-price PED identifies neither relationship.

Worked YED and XED decisions

$$YED = \frac{\% \Delta Q_d}{\% \Delta Y}$$

$$YED_{\text{meals}} = \frac{30}{20} = +1.5$$

Normal good, income elastic: a luxury.

$$XED_{\text{coffee,tea}} = \frac{4}{10} = +0.4$$

Positive: substitutes.

$$XED = \frac{\% \Delta Q_A}{\% \Delta P_B}$$

$$XED_{\text{ink,printer}} = \frac{-6}{10} = -0.6$$

Negative: complements.

Business implication: dearer printers may reduce ink sales; plan output using the expected price change, not the sign alone.

Which elasticity matters for this business?

Prepare for 9708/21 O/N/25, Q2(b)

A restaurant estimates $YED = +1.5$ and XED with a close rival $= +0.8$. Consider two separate forecasts: income rises 2%; the rival cuts its price 10%.

Attempt: estimate each demand change. Explain when YED or XED would be more useful for planning, and identify a limit of the estimates.

Which elasticity matters for this business?

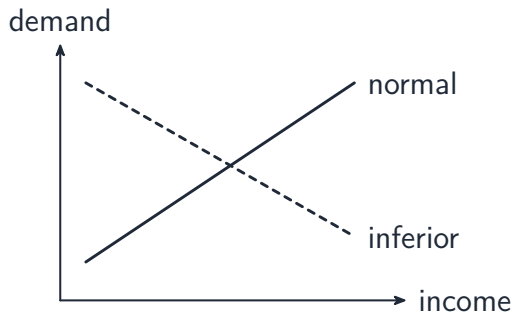
Prepare for 9708/21 O/N/25, Q2(b)

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Attempt: estimate each demand change. Explain when YED or XED would be more useful for planning, and identify a limit of the estimates.

Income case: $\% \Delta Q = YED(\% \Delta Y) = 1.5(2) = +3\%$. Rival case: $\% \Delta Q = XED(\% \Delta P_B) = 0.8(-10) = -8\%$. The decision and expected changes determine usefulness; neither elasticity is always superior.

Income elasticity of demand

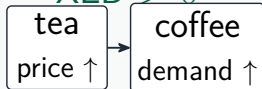


As income rises, demand for a normal good rises but an inferior good falls

Cross elasticity of demand

substitutes

$$XED > 0$$

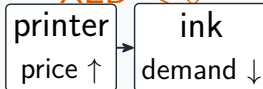


tea +10%, coffee +4%:

$$XED = +0.4$$

complements

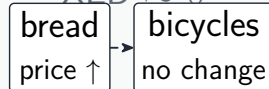
$$XED < 0$$



used together, so both
are bought less

unrelated

$$XED \approx 0$$



one price says nothing
about the other good

The sign of XED: positive for substitutes, negative for complements, about zero for unrelated goods

Price elasticity of supply

Attempt before seeing the two curves

Both firms start at price 10 and quantity 100. Price rises to 12; firm A supplies 110 units and firm B supplies 140.

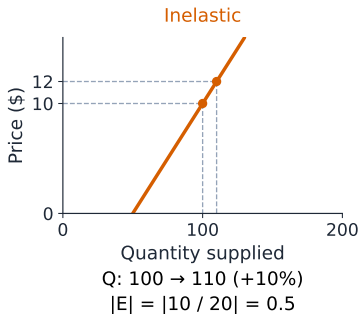
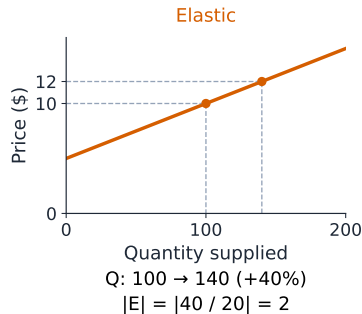
$$PES = \frac{\% \Delta Q_s}{\% \Delta P}$$

Calculate each firm's PES using initial values for the percentage changes. Classify each response.

If supply is fixed in the **momentary** 瞬时 period, PES is zero. The **short run** 短期 fixes at least one factor; the **long run** 长期 allows all factors to adjust. Neither period alone gives a numerical PES.

Compare supply responses using percentages

Price: 10 → 12 (+20%); both quantities start at 100



The same 20% price rise gives quantity rises of 10% and 40%: PES 0.5 and 2.
Slope alone is not elasticity.

What makes supply elastic

spare capacity 闲置产能	unused machines and workers, so firms can quickly make more
stocks 库存	goods already in a warehouse that can be sold fast
factor mobility	how easily land, labour and capital can move into the industry
time – momentary	supply is fixed; nothing can be changed
time – short run	at least one factor is fixed; stocks or spare capacity can still allow a response
time – long run	all factors are variable, usually allowing more adjustment

More time usually allows more adjustment. Explain the relevant constraint: capacity, stocks, factor mobility or production time; do not infer PES above 1 from time alone.

Which supply constraint would the policy remove?

Prepare for 9708/02/SP/23, Q3(b)

Compare refrigeration and worker training as ways to improve agricultural supply responsiveness. Could either make *all* farm products elastic?

Refrigeration can preserve saleable stocks for a later price rise; it helps only where the product can be stored and facilities are affordable.

Training can improve skills and ease labor constraints; it does not remove a fruit tree's biological growing time.

Judgement: match policy to the binding constraint and the product. A supply shift after a subsidy does not by itself prove a higher PES.

3

Equilibrium and surplus

Market equilibrium

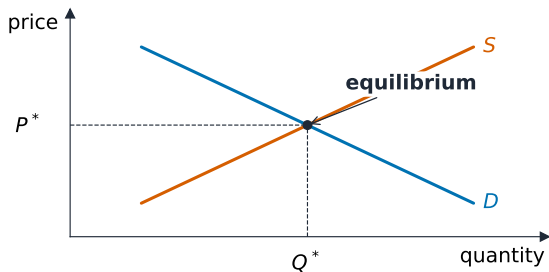
Fictional market: $Q_d = 12 - P$, $Q_s = P - 2$

Price (\$)	Q_d	Q_s	$Q_d - Q_s$
4	8	2	6
6	6	4	2
7	5	5	0
8	4	6	-2

Attempt: find equilibrium. At \$6 and \$8, identify the imbalance and the pressure on price if prices can adjust.

Equilibrium 均衡 means quantity demanded equals quantity supplied at the same price; it does not mean that the whole curves are identical.

Market equilibrium, in detail



equilibrium: $Q_d = Q_s$ at (P^*, Q^*) (market clears)

$$Q_d = Q_s$$

$$12 - P = P - 2$$

$$P^* = \$7, \quad Q^* = 5$$

At \$6: **shortage** 短缺 of 2 units.

At \$8: **excess supply** 超额供给 of 2 units.

The illustration shows the mechanism; the table gives this market's values. With other conditions fixed and flexible prices, the imbalance creates pressure towards equilibrium.

Relationships between markets

Trace the connection between markets

Joint demand 共同需求

More printer purchases can raise demand for ink: complements.

Alternative demand 替代需求

Dearer tea can raise coffee demand: substitutes.

Derived demand 派生需求

More bread demand can raise bakeries' demand for workers.

Joint supply 联合供给

More beef production also produces more hides, increasing leather supply.

Draw the curve for the market being asked about. A change in one market can shift a related market's curve; these are not all own-price movements.

Shifts and surplus

Before the cost increase: $P_D = 12 - Q$, $P_S = 2 + Q$

At equilibrium $Q^* = 5$, $P^* = \$7$. Demand's price intercept is 12; supply's is 2. Assume a competitive market with no external effects.

$$CS = \frac{1}{2} Q^* (P_{D,0} - P^*)$$

$$CS = \frac{1}{2} (5) (12 - 7) = \$12.50$$

$$PS = \frac{1}{2} Q^* (P^* - P_{S,0})$$

$$PS = \frac{1}{2} (5) (7 - 2) = \$12.50$$

Consumer surplus 消费者剩余 is below demand and above price; **producer surplus** 生产者剩余 is above supply and below price. Total surplus is \$25.

Can a higher price mean lower producer surplus?

Apply 9708/22 O/N/25, Q2(a): fictional numbers

Demand stays $P_D = 12 - Q$. Higher input costs change supply from $P_S = 2 + Q$ to $P_{S,1} = 4 + Q$. Previously $P = \$7$, $Q = 5$, $PS = \$12.50$.

Attempt: find the new equilibrium, producer surplus and total revenue. Judge the claim: “Producers always gain when price rises because costs increase.”

Use the new supply intercept when measuring producer surplus. Price is what sellers receive; production cost is also changing.

Higher cost: work through the producer outcome

$$P_D = P_{S,1}$$

$$12 - Q = 4 + Q$$

$$Q_1 = 4, \quad P_1 = \$8$$

$$TR_1 = P_1 Q_1 = 8(4) = \$32$$

$$PS_1 = \frac{1}{2} Q_1 (P_1 - P_{S,0,1})$$

$$PS_1 = \frac{1}{2} (4) (8 - 4) = \$8$$

$$CS_1 = \frac{1}{2} Q_1 (12 - P_1)$$

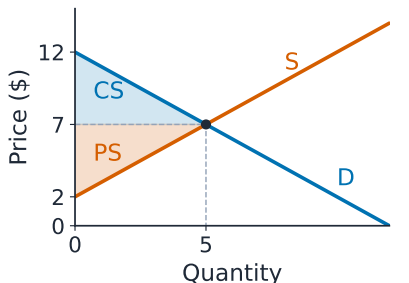
$$CS_1 = \frac{1}{2} (4) (12 - 8) = \$8$$

Price rises from \$7 to \$8, yet PS falls from \$12.50 to \$8 and revenue from \$35 to \$32. This example disproves “always”; other demand/supply responses can give other outcomes.

Shifts and surplus, in detail

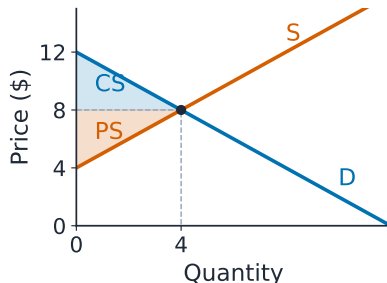
Demand: $P = 12 - Q$; supply: $P = 2 + Q$, then $P = 4 + Q$

Before: lower costs



$P = 7$; $Q = 5$; $CS = PS = \$12.5$

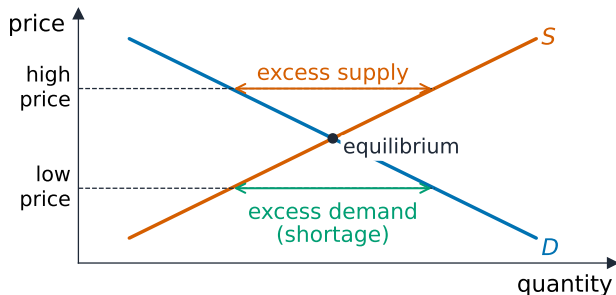
After: higher costs



$P = 8$; $Q = 4$; $CS = PS = \$8$

Higher production costs shift supply up/left. A higher market price alone does not establish a producer gain: compare the new quantity and the new cost curve.

Disequilibrium



P too high $\Rightarrow$ surplus $\cdot$ P too low $\Rightarrow$ shortage $\cdot$ price
adjusts toward P^*

Other conditions fixed and prices flexible: a shortage pushes price up; excess supply pushes price down.

The price mechanism doing its three jobs

Work through the coffee shortage at \$6

The market demands 6 units and supplies 4. Explain how a flexible price could respond, and how it affects resource allocation.

Signalling 信号传递: unmet demand tells sellers more coffee is wanted at the current price.

Rationing 配给: a rising price reduces quantity demanded; willingness *and ability* to pay affect who buys.

Incentive 激励: a higher price makes extra supply worthwhile, other costs fixed.

These are pressures within the model, not a promise of instant adjustment. Contracts, price controls or changing conditions can prevent the simple path.

Exam tips

- Quote the **elasticity formula** and interpret the value: PED magnitude inelastic (< 1), elastic (> 1); link PED to total revenue.
- Distinguish a **movement along** (a price change) from a **shift** (a non-price factor) of demand or supply.
- Use the **sign** of XED (substitutes +, complements $-$) and YED (normal +, inferior $-$).
- On a diagram, label **consumer and producer surplus** and show how a price change alters each.

4

Recap

Topic 2 – key takeaways

1

Demand & supply

own price moves along; other causes shift

2

PED

$|PED| > 1$ elastic; $|PED| < 1$ inelastic

3

YED & XED

normal/inferior;
substitutes/complements

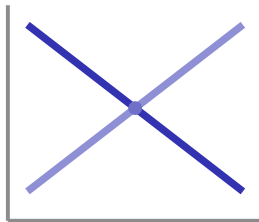
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Equilibrium

Quantity demanded equals
quantity supplied

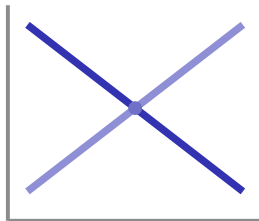
Check yourself

- 1 A subsidy shifts supply which way?
- 2 If $|PED| = 0.4$, is demand elastic or inelastic?
- 3 An inferior good has YED of what sign?
- 4 When is competitive equilibrium an efficient benchmark?



Check yourself

- 1 A subsidy shifts supply which way?
- 2 If $|PED| = 0.4$, is demand elastic or inelastic?
- 3 An inferior good has YED of what sign?
- 4 When is competitive equilibrium an efficient benchmark?



Answers 1. right (supply rises) 2. inelastic 3. negative 4. when there are no market failures