

Cambridge IGCSE · Economics 0455 · Notes

Price elasticity of supply (PES)

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Read first: [Supply](#), [Price elasticity of demand \(PED\)](#)

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What you need to know

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

1. **Define price elasticity of supply (PES):** how strongly the quantity supplied of a product responds to a change in **its own price**.
2. **Calculate PES** with the formula, say what the answer means (elastic, inelastic, unitary, perfectly elastic or perfectly inelastic), and **draw and read supply curves** that show different PESs.
3. **Explain the determinants of PES:** the main things that decide whether supply of a product is elastic or inelastic.
4. **Explain why PES matters** for decisions by consumers, producers (firms) and the government.

The whole topic is the same for every candidate (0455 has no Core/Extended split). It works exactly like price elasticity of demand, but it is about **sellers**, not buyers: PES measures how far along the supply curve sellers move when the price changes.

Understand it

What PES measures

When the price of a product rises, firms want to sell more of it, because each unit now earns more (the law of supply, from the Supply note). PES tells you **how much** more. Some firms can respond straight away: a factory making T-shirts with idle machines can run an extra shift. Others cannot: a coffee grower whose new plants take years to produce beans can sell hardly any more this year, however high the price goes.

As with PED, PES compares **percentage** changes:

$$\text{PES} = \frac{\text{percentage change in quantity supplied}}{\text{percentage change in price}}$$

Each percentage change is worked out from the **starting** value:

$$\text{percentage change} = \frac{\text{new} - \text{old}}{\text{old}} \times 100$$

For example, the price of a loaf rises from \$2.00 to \$2.50 and a bakery raises its output from 400 to 600 loaves a day.

- Price: $\frac{2.50-2.00}{2.00} \times 100 = +25\%$.
- Quantity supplied: $\frac{600-400}{400} \times 100 = +50\%$.
- PES = $\frac{+50}{+25} = +2$.

Reading the answer

Price and quantity supplied move in the **same** direction (a price rise brings a rise in quantity supplied, a price fall a fall), so PES is **positive**. Exam options often show it as "+2.0" or just "2.0".

PES	Name	What it means
more than 1	elastic	quantity supplied changes by a bigger percentage than price
less than 1 (but above 0)	inelastic	quantity supplied changes by a smaller percentage than price
exactly 1	unitary (unit elastic)	quantity supplied changes by the same percentage as price
0	perfectly inelastic	quantity supplied does not change at all
infinity	perfectly elastic	sellers will supply any amount at this price, and nothing below it

So the bakery's PES of 2 is elastic: it can raise output by twice the percentage of the price rise.

A PES far above 1 means a firm **can respond quickly** to a change in price. It says nothing about the firm's revenue or its buyers; those belong to demand.

Using the formula backwards

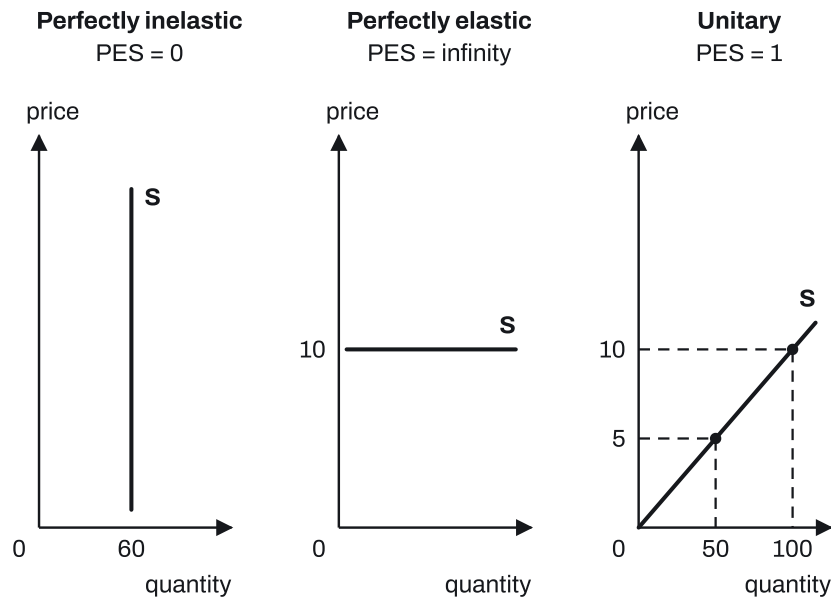
$$\% \text{ change in quantity supplied} = \text{PES} \times \% \text{ change in price}$$

If PES is 0.6 and the price rises by 10%, quantity supplied rises by $0.6 \times 10 = 6\%$. If 500 units were supplied before, 530 are supplied now.

PES on a diagram

A **movement along** the supply curve shows a change in quantity supplied caused by a change in the product's own price: a price rise is an **extension** of supply (a move up the curve), a price fall a **contraction**. PES describes the size of that movement. (A **shift** of the whole curve is caused by something else, such as a change in costs; see the Supply note.)

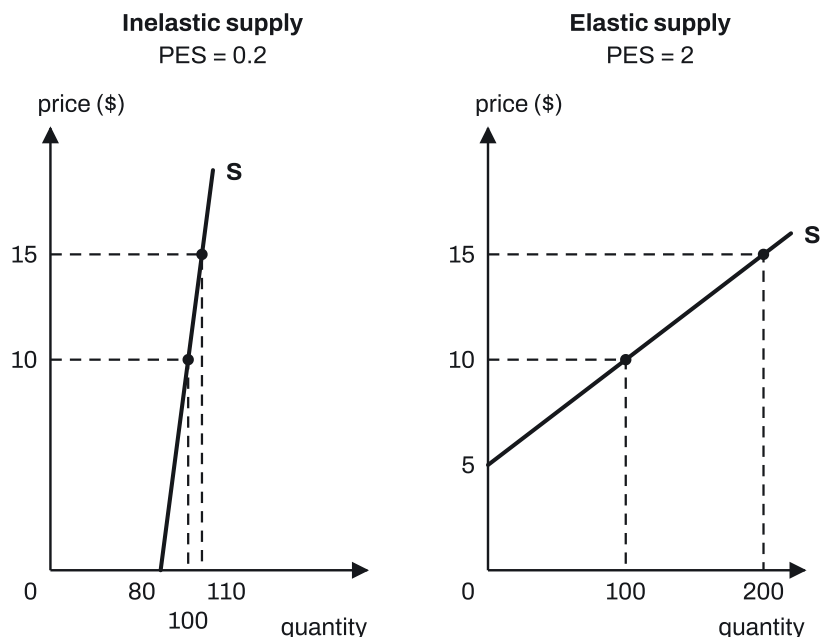
Three special cases have their own shapes:



- **Perfectly inelastic** ($PES = 0$): a **vertical** line. The same quantity is supplied whatever the price, like the seats in a stadium on match day.
- **Perfectly elastic** (PES infinite): a **horizontal** line.
- **Unitary** ($PES = 1$): **any straight line from the origin**, whatever its slope. Price and quantity change by the same percentage all along it: from \$5 to \$10 is +100%, and from 50 to 100 units is +100%.

For other **straight-line** supply curves, look at where the line meets an axis:

- a line that starts on the **price** axis is **elastic** (PES more than 1);
- a line that starts on the **quantity** axis is **inelastic** (PES less than 1 but above 0).



In both diagrams the price rises by 50%, from \$10 to \$15.

- **Left (inelastic):** quantity supplied rises from 100 to 110, which is +10%, so $PES = \frac{10}{50} = 0.2$.

- **Right (elastic):** quantity supplied rises from 100 to 200, which is +100%, so $PES = \frac{100}{50} = 2$.

On diagrams drawn to the same scale, a **steeper** supply curve through the same point is more inelastic.

What makes supply elastic or inelastic

Every determinant comes back to one question: **how easily and quickly can sellers change the amount they offer for sale?**

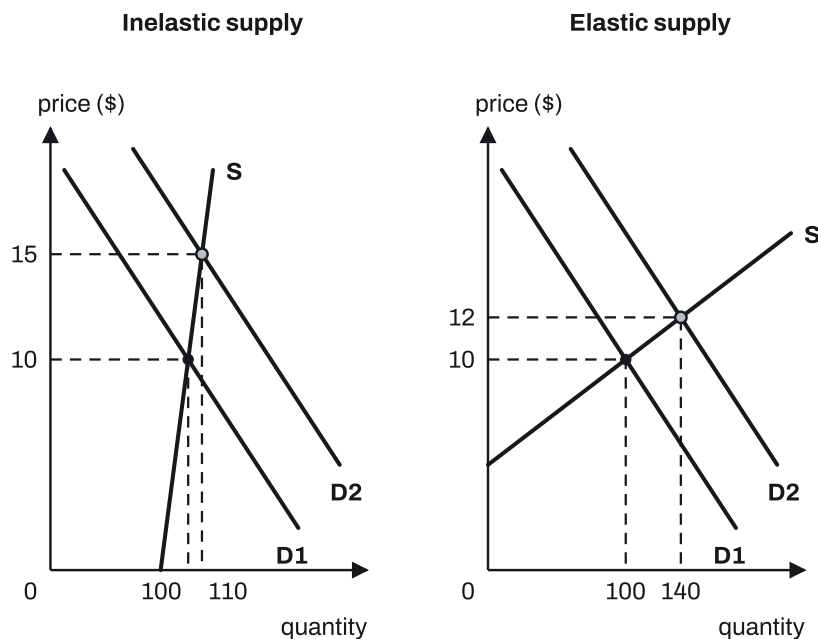
Determinant	More elastic when...	More inelastic when...
Production time	the product is quick and simple to make (bread, T-shirts)	it takes a long time to make or grow (ships, houses, coffee, a new mine)
Stocks and storage	the product keeps well and firms hold stocks, so they can take units out of the warehouse when the price rises	it is perishable (fresh fish, flowers) or costly to store (ships, coal), so there are few stocks
Spare capacity	firms have unused machines, space or workers, so they can raise output quickly	firms are already producing as much as they can
Mobility of factors of production	workers, machines and land can easily switch from other uses or places	resources are specialised or hard to move (a shipyard cannot make cars)
Time period	the period is long: in the long run firms can build new factories, train workers and plant more crops	the period is short: in the short run at least one factor, such as the size of the factory, is fixed
Cost of raising output	extra output costs little more per unit	extra output is very costly, for example overtime pay or scarce materials

Time explains a common exam twist: the supply of a tree crop such as cocoa can be very inelastic this year but much more elastic in the long run, because newly planted trees take several years to bear fruit. The same is true of housing: making building rules simpler may make the supply of houses more elastic in the end, but not straight away, because houses still take a long time to build.

Watch out: substitutes, necessities and the share of income are determinants of price elasticity of **demand**, not supply. Things such as lower costs or better weather **shift** supply; they are not determinants of PES.

Why PES matters

The main idea: when **demand rises**, PES decides whether the market responds mostly with **more output** or mostly with a **higher price**.



- **Inelastic supply (left):** the price rises from \$10 to \$15, but quantity only from 100 to 110.
- **Elastic supply (right):** the price rises only from \$10 to \$12, and quantity from 100 to 140.

The same works in reverse: when demand **falls**, a product with **elastic** supply sees a **bigger fall in quantity** and a smaller fall in price. For a fall in demand for air travel, the more elastic the supply of flights, the more the number of tickets sold falls.

The less elastic the supply, the bigger the price change for a given shift in demand. A product with **perfectly inelastic** supply ($PES = 0$) has the largest price change of all, because none of the extra demand can be met with extra output.

For consumers: when demand rises for a product with inelastic supply (houses in a big city, tickets for a popular concert, food after a poor harvest), consumers face much higher prices and may be unable to buy it at all. With elastic supply, extra demand is met by more output and prices stay fairly stable.

For producers (firms):

- A firm with **elastic** supply can take advantage of a price rise by selling many more units, earning more revenue; one with inelastic supply cannot.
- Firms try to make their supply more elastic: holding stocks, keeping some spare capacity, training workers to do several jobs, using machines that can switch between products, and shortening production time with new technology.
- Producers with inelastic supply, such as farmers, face prices that swing a lot when demand changes, which makes planning harder.

For the government:

- If supply is inelastic, a policy that raises demand (for example grants to first-time house buyers) mainly **raises the price**, not output.

- So governments may try to make supply **more elastic**: relaxing building regulations, training workers so they can move between jobs, improving transport so resources can move, or storing stocks of food and fuel. These take time to work.
- When deciding what to subsidise or where to spend, a government can expect a quick rise in output only where supply is elastic.

Key facts and formulas

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

Formula	Status
$PES = \frac{\% \text{ change in quantity supplied}}{\% \text{ change in price}}$	Learn it
$\% \text{ change} = \frac{\text{new} - \text{old}}{\text{old}} \times 100$	Learn it
$\% \text{ change in quantity supplied} = PES \times \% \text{ change in price}$	Learn it
PES is positive: more than 1 elastic, less than 1 inelastic, 1 unitary, 0 perfectly inelastic, infinite perfectly elastic	Learn it
Vertical supply curve: $PES = 0$. Horizontal: PES infinite. Straight line from the origin: $PES = 1$	Learn it
Straight line starting on the price axis: elastic. Starting on the quantity axis: inelastic	Learn it
Determinants: production time, stocks and storage, spare capacity, mobility of factors, time period, cost of raising output	Learn it
A rise in demand raises the price more, and quantity less, the more inelastic the supply	Learn it

How to do it

In the questions we have tagged for this topic (27 questions, 2021–2025), the parts about this topic are these. Each question has one part on this topic (the Paper 2 questions have their other parts on other topics), so the counts add to 27.

Question type	Question parts
Multiple choice (concept)	14
Multiple choice (calculation)	9
Explain (4 marks)	2

Question type	Question parts
Analyse (6 marks)	2

No Define (2) or Discuss (8) part on this topic has been tagged; sections 3 and 4 end with a model definition and a Discuss plan in case one is set.

1. Multiple choice (concept) (14 question parts)

1. **Find what the question is about:** a determinant, a diagram, the formula, or the effect of PES on a market.
2. **Apply the matching rule** from this note before reading the options.
3. **Cross out options about demand.** Substitutes, necessity and the share of income are PED ideas and are the usual wrong answers.

Variations you will meet:

- **Determinants** (5 parts). Pick the option that makes it easier or quicker to raise output: the good can be **stored**, it takes **little time** to produce, there is **spare capacity**. The most elastic good is the one that is easily stored **and** quick to make. A PES that is low now but high in the long run is explained by a **long production time** (crops that take years to grow, houses that take a long time to build), which is also why a policy to make supply more elastic does not work immediately.
- **Diagrams** (3 parts). Perfectly inelastic supply is the **vertical** line. A PES between 0 and 1 is a straight supply curve that starts on the **quantity** axis; one starting on the price axis is elastic, and one from the origin is unitary.
- **The formula and its meaning** (3 parts). PES is the **percentage** change in quantity supplied divided by the **percentage** change in price. Options using a plain "change" instead of a percentage change, or with price on top, are wrong. A high PES means the firm **can respond quickly** to a change in price.
- **The effect of PES on a market** (2 parts). When demand shifts by the same amount, the product with the **lowest** PES (0 if offered) has the **largest price change**, and the product with the **highest** PES has the **largest change in quantity**.
- **Movement along the supply curve** (1 part). A change in the product's own price moves sellers **along** the curve: a price rise **extends** supply (up the curve), a fall **contracts** it. Read the change in quantity straight from the schedule, for example from 160 to 200 units is an extension of 40. It is never a shift.

2. Multiple choice (calculation) (9 question parts)

1. **Write down what you know:** the old and new prices and quantities, or the percentage changes, or the PES.
2. **Turn raw numbers into percentage changes** from the **old** value.
3. **Divide the right way round:** quantity on top, price underneath.
4. **Sense-check:** PES is positive, and more than 1 only if quantity changed by the bigger percentage.

Variations you will meet:

- **Calculate PES** (8 parts), from figures in the stem, a supply schedule or given percentages. For example, a price rise from \$5 to \$6 (+20%) with quantity supplied rising from 400 to 500 (+25%) gives $PES = \frac{25}{20} = 1.25$. 0.8 is the formula upside down; many candidates also chose 1.2 after muddling the changes. If the percentages are given, just divide: price +10% and quantity +20% give $PES = +2.0$. From a schedule, use the two rows named in the question: from \$1 to \$3 is +200%, and from 3000 to 7000 units is +133.3%, so $PES = 0.67$ (shown as 0.66 in the options).
- **Find the change in quantity supplied** (1 part). Multiply: $PES \times \% \text{ change in price}$, then apply it to the old quantity. With $PES = 1$ and the price rising from \$10 to \$11 (+10%), quantity supplied rises by 10% of 200, which is 20 units.

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

"Explain two reasons why the supply of ships is price-inelastic" or "Explain two influences on the price elasticity of supply of coal", both from source material.

1. **Identify** a reason, using the source (1): "Ships take a long time to build."
2. **Develop** it and **say which way it makes supply** (1): "so shipbuilders cannot raise output quickly when the price rises, which makes supply inelastic."
3. Do the same for a second reason. Give exactly two; extra reasons are not needed and may not be credited. Choose the two the source hints at (long production time, costly storage, stocks).
4. The development mark needs the link to elastic or inelastic. The June 2023 report noted many candidates who picked storage and mine construction for coal, then never said that these make supply inelastic.

If a Define (2) part is set ("define price elasticity of supply"): a measure of how responsive the quantity supplied of a product is (1) to a change in the price of that product (1). The formula, with quantity over price, also earns the marks. "Inelastic supply" means a change in price causes a **smaller percentage** change in quantity supplied.

4. Analyse (6 marks) (2 question parts)

"Analyse the influences on whether supply of a product is elastic or inelastic" or "Analyse the key determinants of price elasticity of supply of a product". 1 mark for each relevant point or developed step, up to 6. A bare list earns few marks: each step must be developed.

1. **Define PES**, or say what elastic and inelastic supply mean (1 or 2): "PES measures how responsive quantity supplied is to a change in price (1). Supply is elastic when quantity supplied changes by a greater percentage than price (1)."
2. **Take a determinant** (1), **explain how it works** (1) and **say which way it pushes PES** (1): "Whether the product can be stored (1). If it can, firms keep stocks and can release them when the price rises (1), so supply is elastic (1)."
3. **Repeat** with two more determinants: spare capacity, production time, the time period (short run with a fixed factor, long run with all factors variable), mobility of factors, the cost of raising output.
4. An example helps a step count: "bread is quicker to produce than a smartphone, so its supply is more elastic (1)".

Three determinants developed like this give 9 creditable points for 6 marks, a safety margin in case one is not accepted.

If a Discuss (8) part is set (for example whether a rise in demand will make a product much dearer, or whether a government can raise the supply of housing quickly): define PES; give two developed reasons why supply may be inelastic here (so the price rises a lot) and two why it may be elastic (so output rises instead); end with a judgement on what it depends on, usually the time period and the level of spare capacity. The plan is shown in full in Example 4.

Worked examples

Example 1

The price of cement rises from \$80 to \$100 a tonne. The quantity supplied rises from 5000 to 5500 tonnes a week. What is the price elasticity of supply of cement?

- **A** 0.4
- **B** 0.5
- **C** 2.0
- **D** 2.5

[1]

Price change: $\frac{100-80}{80} \times 100 = +25\%$. Quantity change: $\frac{5500-5000}{5000} \times 100 = +10\%$. $PES = \frac{10}{25} = 0.4$, so supply is inelastic. The answer is **A**. (1) (D is the formula upside down.)

Example 2

Explain two reasons why the supply of fresh strawberries is price-inelastic. [4]

Strawberries are perishable, so they cannot be stored for long (1). Farmers have no stocks to put on sale when the price rises, so the quantity supplied rises by a smaller percentage than the price (1).

Strawberry plants take months to grow and produce fruit (1), so in the short run farmers cannot increase the harvest quickly, however high the price rises (1).

Two reasons, each identified and developed with the link to inelastic supply: 4 marks.

Example 3

Analyse why the supply of plastic bottles is likely to be more price-elastic than the supply of wheat. [6]

Price elasticity of supply measures how responsive the quantity supplied is to a change in price (1). Supply is elastic if quantity supplied changes by a greater percentage than price (1). Plastic bottles are made in factories in a matter of seconds (1), so when their price rises, producers can raise output quickly, for example by running

an extra shift (1). Wheat takes months to grow and is harvested once a year (1), so after the crop is planted, farmers can hardly change the quantity until the next harvest, making its supply inelastic (1). Bottle factories often have spare capacity, unused machines that can be switched on (1), whereas farmers cannot quickly find more suitable land (1). Bottles do not go off and are cheap to store, so producers can build up stocks and release them when the price rises (1), which also makes supply elastic (1).

Ten creditable points for 6 marks, each linked to the next and each saying which way it pushes PES.

Example 4

Discuss whether or not a rise in demand for electric cars will cause a large rise in their price. [8]

Why the price may rise a lot. If the supply of electric cars is price-inelastic, a rise in demand is met mainly by a higher price rather than more output, because quantity supplied can increase by only a small percentage. Supply may be inelastic in the short run because car factories are already working at full capacity, and building a new factory takes years. Car makers also depend on scarce parts such as batteries, whose production cannot be raised quickly, so extra output would be very costly. Cars are expensive to store, so makers hold few stocks to release when demand rises.

Why the price may not rise much. If car makers have spare capacity, for example because sales of petrol cars are falling, they can switch workers and machines to electric models and raise output quickly. Their supply is then elastic, and the extra demand is met mostly by more cars rather than a higher price. Over a longer period, new factories and battery plants open and more firms enter the market, so supply becomes more elastic and any early price rise is likely to fade.

Judgement. A large price rise is most likely in the short run, when factories are full and parts are scarce, because supply is then inelastic. In the long run supply becomes more elastic, so the rise in demand leads mostly to more cars being produced. How big the price rise is depends mainly on the time period and on how much spare capacity car makers have.

Both sides are developed and linked to PES, and the judgement says what the answer depends on: Level 3 (6–8 marks).

Common mistakes

- **Answering about demand.** Several reports (June 2023, March 2025, November 2021) found many candidates giving determinants of price elasticity of **demand**, such as substitutes, when asked about supply. PES is about how easily **sellers** can change output.
- **Not saying which way a determinant works.** In June 2023 many candidates named storage and the time to build a mine as influences on coal's PES, then lost marks by not saying these make supply inelastic. The March 2025 report found candidates unsure which way an influence pushes. Finish every point with "so supply is more elastic" or "more inelastic".
- **Writing about what shifts supply.** Lower costs or better weather move the whole supply curve. PES is about how far quantity supplied responds to a change in **price** (November 2021 report).

- **Dividing the wrong way round.** PES is quantity change **over** price change. In June 2021, 42% of candidates chose 1.2 instead of 1.25; the report blames inverting the formula or muddling the changes.
- **Vague definitions.** "A change in price causes a small change in supply" is not enough (November 2022 report). Inelastic supply means a change in price causes a **smaller percentage** change in quantity supplied.
- **Using raw changes instead of percentages.** A rise of 100 units means nothing until you divide by the old quantity.
- **Being generic in a source question.** Use the source's facts: ships "take a long time to produce" and "are expensive to store", coal mines "take years to construct".
- **Mixing up the diagrams.** Perfectly inelastic supply is **vertical**. A line from the origin is unitary, whatever its slope; don't judge PES by steepness alone.

How to get the marks

- **Multiple choice is 1 mark with no penalty for a wrong answer.** For calculations, write the formula and both percentage changes in the margin.
- **Define** (2 marks): responsiveness of quantity supplied (1) to a change in the product's own price (1).
- **Explain** (4 marks): two reasons, each **identified** (1) and **developed** (1), and the development must say whether supply is made elastic or inelastic. Give exactly two; extra reasons are not needed and may not be credited.
- **Analyse** (6 marks): chains, not lists. Each point names a determinant, says **how** it works (stocks can be released, spare workers can be taken on, crops take months to grow) and **so what** (supply is more elastic or inelastic). Aim for six linked steps plus a spare. A definition of PES or of elastic and inelastic supply earns a mark.
- **Discuss** (8 marks): define PES, develop at least two points on each side in the context given, then give a judgement saying what the answer depends on. One-sided answers stay in Level 2 (3–5 marks).
- **Use the source material.** "Coal is expensive to store, so there are few stocks and supply is inelastic" earns both marks; "some goods can be stored" often does not.
- **Use the terms precisely:** quantity supplied, price-elastic and price-inelastic supply, stocks, spare capacity, short run and long run.

Quick check

1. The price of a tonne of rice rises from \$20 to \$25. Farmers increase the quantity supplied from 400 to 440 tonnes. Calculate the PES and say whether supply is elastic or inelastic.
2. The PES of a toy is 1.5. Its price rises by 8%, when 2000 toys a week were supplied. How many toys are supplied now?
3. A straight-line supply curve starts on the quantity axis at 50 units. Is supply elastic, inelastic or unitary?
4. Which product is likely to have the most price-elastic supply?
 - **A** fresh milk from a dairy farm with no spare cows

- **B** paper clips from a factory with unused machines
- **C** houses in a city with strict building rules
- **D** diamonds from a mine working at full capacity

5. Define price elasticity of supply. [2]

Answers

1. Price: $\frac{25-20}{20} \times 100 = +25\%$. Quantity: $\frac{440-400}{400} \times 100 = +10\%$. PES = $\frac{10}{25} = 0.4$: inelastic.
2. Quantity supplied rises by $1.5 \times 8 = 12\%$, so $2000 \times 1.12 = 2240$ toys a week.
3. Inelastic (PES between 0 and 1): a straight supply curve starting on the quantity axis is inelastic.
4. **B.** Paper clips are quick to make, easy to store, and the factory has spare capacity, so output can rise quickly when the price rises. The others are perishable, take a long time to produce, or are at full capacity.
(1)
5. How much the quantity supplied of a product responds (1) to a change in the price of that product (1), measured as the percentage change in quantity supplied divided by the percentage change in price.

Past questions to try

- 0455/12/F/M/21 Q8: calculating PES from a supply schedule.
- 0455/12/O/N/23 Q6: which PES gives the biggest price rise when demand increases.
- 0455/21/M/J/23 Q1: part (d), two influences on the PES of coal from the source.
- 0455/12/M/J/25 Q8: which good has the most elastic supply.