Elasticity

Price elasticity of demand is a measurement of the change in the consumption of a product in relation to a change in its price.

$$\text{Price elasticity of demand} = \frac{\text{percentage change in } Q_d}{\text{percentage change in Price}}$$

slope of demand curve.

Determinants of price elasticity of demand: (5)

1) Availability of close substitutes:

few substitutes → Q_d falls a little → less elastic

more substitutes → Q_d falls quite a lot

→ more elastic demand

2) Length of the time involved:

The price elasticity of demand is directly proportional to the time period.

→ We generally stick to commodity and respond very late to the price changes. (Qd is high)
However, we can substitute the original product if its price changes in the long run.

3) Luxuries vs necessities:

- necessities → Qd remains same ($\Delta P > 0$)
  → inelastic (less)

(comfort goods in between these 2)

- luxuries → Qd ↑ → more elastic

4) Definition of the market:

broader market → more substitutes → Qd ↓
→ less elastic

narrow market → less substitutes → Qd ↑
→ more elastic

5) Share of the good in the consumer's budget

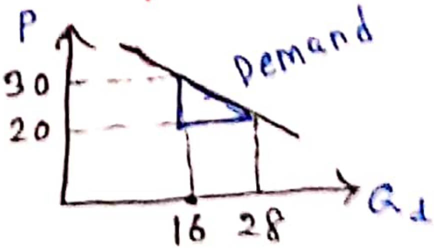
small fraction of budget → Qd ↓
→ less elastic

Midpoint Formula:

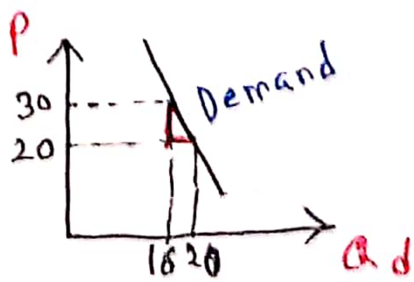
$$\text{Price elasticity of demand} = \frac{Q_2 - Q_1}{\frac{Q_1 + Q_2}{2}} \div \frac{P_2 - P_1}{\frac{P_1 + P_2}{2}}$$

Diffenent kinds of price elasticity of demand:

- Elastic demand: If the quantity demanded is responsive to changes in price (the percentage change in quantity demanded will be greater than the percentage change in price) the demand is elastic. (>1)



- Inelastic demand:
  when the quantity demanded is not very responsive to price, (change in Q_d < change in price), the demand is inelastic. (<1)



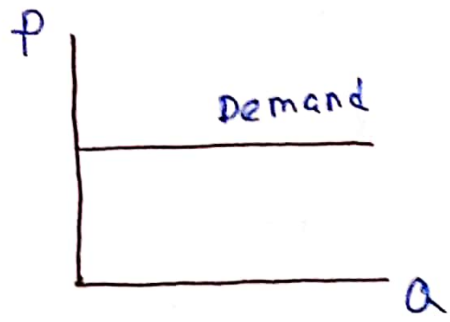
N.B:
- The flatten the curve is
→ big slope → elasticity (more)

• Unit-elastic: Unit elastic demand is the economic theory that assumes a change in product price causes an equal and proportional change in the quantity demanded.

If the percentage change in demand for the product is equal to the percentage change in price, the demand is unit-elastic. (= 1)

• Perfectly elastic: (∞)

If the quantity demanded is infinitely responsive to price changes, the demand is perfectly elastic.

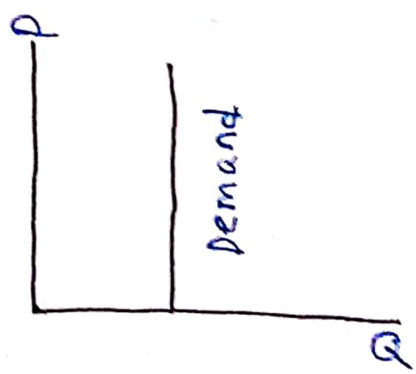


(~~Vertical~~ Line)
Horizontal

— increase in price → Q_d falls to zero.

• Perfectly inelastic: (0)

If the quantity demanded is completely unresponsive to price changes, the demand is perfectly inelastic.



(vertical line)

— price increases/decreases – Q_d remains the $\boxed{\text{same}}$ ($\Delta Q_d = 0$)

Relationship between price elasticity and total revenue

- **Total revenue:** Total amount of funds a firm receives from selling a good / service.

\# Total revenue = price per unit × number of units sold.

Elastic Demand:

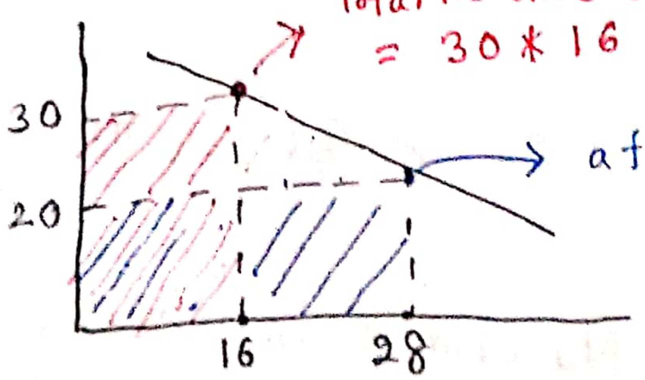
- price increases → Q_d decreases even more
  ∴ Total revenue decreases

$$\boxed{\Delta Q_d > \Delta P \text{ as elasticity} > 1}$$

- price decreases → Q_d increases even more
  ∴ Total revenue increases

→ negative relationship between price and total revenue

Total revenue before price reduction = 30 * 16 = 480 dollars



after = 20 × 28 = $560

Inelastic demand:

- price increases → Q_d decreases less

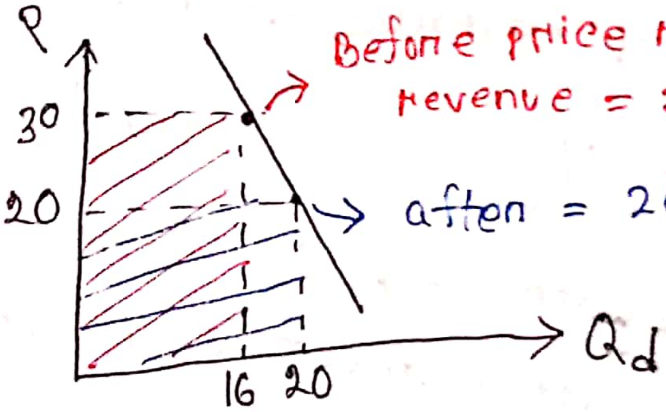
  ∴ Total revenue increases

$\Delta Q_d < \Delta P$ as elasticity < 1

- price decreases → Q_d increases less

  ∴ Total revenue decreases

→ positive relationship between price and total revenue



Before price reduction, total revenue $= 30 \times 16 = 480$

after $= 20 \times 20 = 400$

Unit elastic demand:

change in price doesn't affect total revenue

- price increases → Q_d increases proportionally the same

  ∴ No change in total revenue

Cross-price elasticity of demand.

formula : $\dfrac{\text{percentage change in } Q_D \text{ of one good}}{\text{percentage change in price of another good}}$

In economics, the cross elasticity of demand measures the percentage change of the quantity demanded for a good to the percentage change in the price of another good, ceteris paribus.

Subsitute products :

→ price increases → $Q_d \uparrow$ of another one

∴ cross-price elasticity - positive

Complementary products :

→ price increases — $Q_d \downarrow$ of another one

∴ cross-price elasticity - negative

unrelated products :

cross-price elasticity = 0

- change in price doesn't affect Q_D

Income elasticity of demand:

Formula: $\dfrac{\text{percentage change in } Q_D}{\text{percentage change in income}}$

The income elasticity of demand measures the responsiveness of quantity demanded to changes in income.

→ Normal and a necessity:

change in income doesn't affect Q_D

$\therefore$ elasticity < 1 $[\Delta Q_D < \Delta P]$

(zero to one)

→ Normal and a luxury:

change in income → Q_D changes more

$\therefore$ elasticity > 1 $[\Delta Q_D > \Delta P]$

→ Inferior goods:

income increases → Q_D decreases

$\therefore$ elasticity – negative

Defition:

Necessity: A good is a necessity if the quantity demanded is not very responsive to changes in income.

Luxury: A good is a luxury if the quantity demanded is very responsive to changes in income.

Inferior: A good is inferior if the quantity demanded falls when income increases

Price elasticity of supply measures the responsiveness to the supply of a good/service after a change in its market price.

formula: $\dfrac{\text{percentage change in } Q_s}{\text{percentage change in price}}$

slope of supply-curve

Determinants of the price elasticity of supply:

1) Length of the time involved:

short period of time — supply less
$\therefore$ elasticity < 1 (inelastic)

2) Type of industry:

some industries can increase Q_s by operating machinery for additional hours
$\rightarrow$ elasticity > 1

3) Availability of inputs:

less input/more production cost $\rightarrow Q_s$ decreases $\rightarrow$ elasticity < 1 (inelastic)

4) Existing capacity:

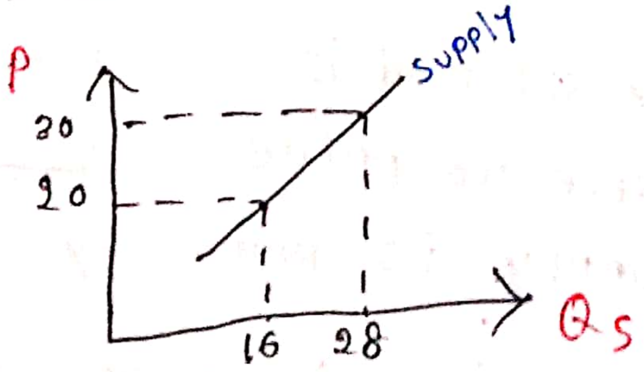
excess production capacity → Q_s increases

→ elasticity > 1 (even in short run)

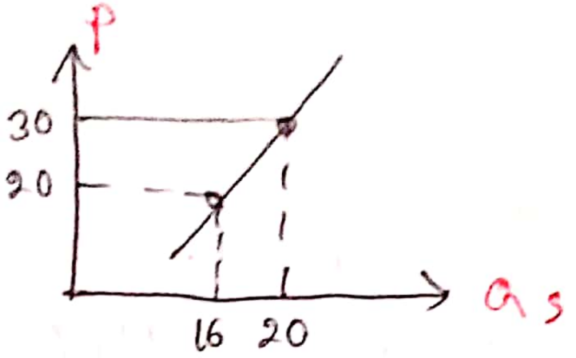
5) Inventories held: If it's easy to keep inventories of a product, supply will be rather elastic. keeping stock allows producers to increase supply by selling part of the inventories even if the production can't be increased immediately.

☐ Different kinds of price elasticity of supply:

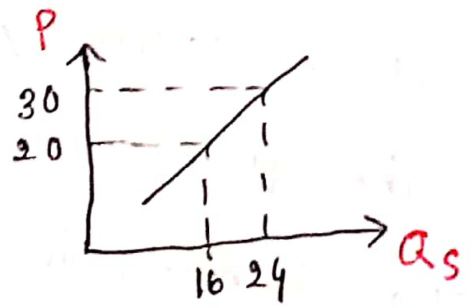
- Elastic demand: If the quantity supplied is highly responsive to changes in price, the demand is elastic (>1)



- **Inelastic demand:** When the quantity supplied is not very responsive to price, the demand is inelastic. (< 1)

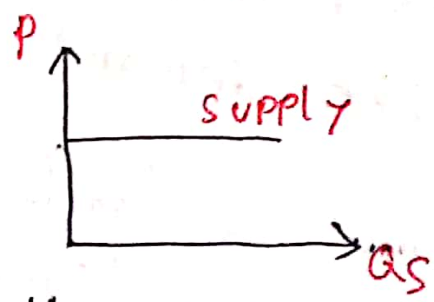


- **Unit-elastic:** If the percentage change in supply for the product is equal to the percentage change in price, the supply is unit-elastic (= 1)



$$\text{elasticity} = \frac{\frac{24-16}{16}}{\frac{30-20}{20}} = 1$$

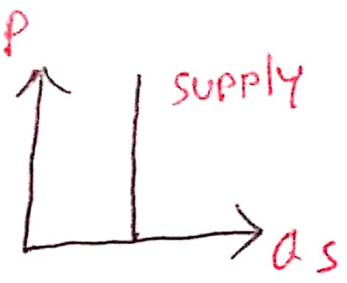
- **Perfectly elastic:** (∞)



If the quantity supplied is infinitely responsive to price changes, the supply is perfectly elastic

– increase in price → Qd becomes infinite

• Perfectly inelastic (= 0)



(vertical)

If the quantity supplied is completely unresponsive to price changes, the supply is perfectly inelastic.

– change in price doesn't affect Qs ($\Delta Q_s = 0$)