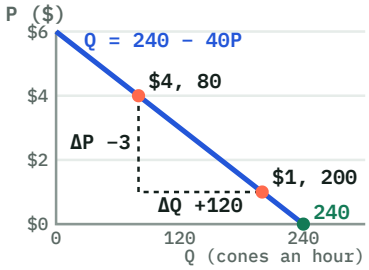
Why is a demand curve a line?

Two dots → one straight line → two numbers: a start and a slope. The kiosk's demand Q = 240 − 40P, its supply Q = 60P − 60, the exam form, a shift vs a move along the line. Tool 1 of the eleven.

1 Two dots

Lia draws · the slope

- **Lia** (draws) + **Sam** (writes formulas) · students on **Coralia** (toy island, dollars) · the beach kiosk of Micro Lesson 2, ice cream cones
- **Demand** = cones people want at each price · dots: `$1 → 200` · `$4 → 80` cones an hour → ruler → one straight line
- **Δ** (Greek delta) = "the change in" · `ΔP = 1 − 4 = −$3` · `ΔQ = 200 − 80 = +120`
- **Slope** = how much Q changes when P rises $1 = `ΔQ ÷ ΔP = 120 ÷ (−3) = −40` → 40 fewer cones per extra $1
- Straight line ⇒ **same slope everywhere** (slide the dot: always −40) ⇒ **2 dots are enough**



2 The formula

Sam writes · a start

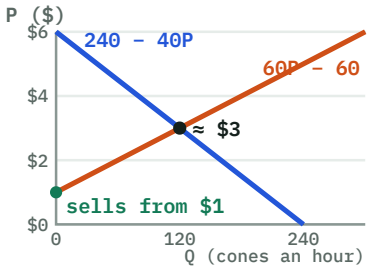
- **Start** = Q at `P = $0` · from $1 down to $0: +40 → `200 + 40 × 1 = 240` ⇒ `Q = 240 − 40P`
- **Linear function** = a rule whose picture is a straight line · `Q = a − bP` (start, slope)
- Use it: `$2 → 240 − 80 = 160` · **choke price** = price where nobody buys (Q = 0): `240 − 40 × 6 = 0 → $6`
- **Inverse form** = P on its own (as on the chart): `40P = 240 − Q → P = 6 − Q ÷ 40` · `120 cones → 6 − 3 = $3`

P	$0	$1	$2	$3	$4	$5	$6
Q	240	200	160	120	80	40	0

3 Supply

a line too

- **Supply** = cones the kiosk wants to sell at each price · `Q = 60P − 60` · slope **+60** (goes up) · start **−60** (below zero)
- Sells from: `60P − 60 = 0 → $1` · below $1 → negative cones → the line stops
- Practice · juice stand `$2 → 20`, `$5 → 140` → slope `120 ÷ 3 = +40` · start `20 − 40 × 2 = −60` → `Qs = 40P − 60` · sells from `60 ÷ 40 = $1.50`
- Where the lines cross = the market price (≈ $3 by eye) → exactly: **Lesson 2**



4 Exam form

start or slope?

- `Qd = a − bP` · `Qs = c + dP` (Qd / Qs = quantity demanded / supplied · IB = International Baccalaureate, higher level) · a, c = **starts** · b, d = **slopes** without the sign
- Kiosk: `a = 240, b = 40` · `c = −60, d = 60` · `Qd = 300 − 10P → a = 300, b = 10`

CHANGES THE START A = shift	CHANGES THE SLOPE B	ALONG THE LINE
heat wave +60 at every price → `300 − 40P` · rival kiosk −40 → `200 − 40P` · line moves, same slope	buyers less price-shy → `240 − 20P` · `240 − 60P` (60 lost per $1)	the kiosk's own price $2 → $3: 160 → 120 cones · price $1: 200 · same line, new point

5 Who made it

the axes

- **René Descartes** · French thinker · La Géométrie ("Geometry"), **1637** → an equation can describe a curve → every graph
- **Antoine Augustin Cournot** (French mathematician) · demand in **1838** with price on the **horizontal** axis
- **Karl Rau** (German) · price **up the side**, **1841** · **Alfred Marshall** (English economist) · Principles of Economics, **1890** → the "Marshallian cross"
- ⇒ a book writes `Q = 240 − 40P`, the chart shows P up the side: same line, axes swapped

6 So what?

tool 1 of 11

- **Eleven tools to read any formula** · **1 · A line is a start and a slope: Q = a − bP**
- Recipe: 2 dots → slope `ΔQ ÷ ΔP` → start (go to $0) → formula → **check** with the other dot
- Practice · lemonade `$2 → 140`, `$5 → 80` → `−20`, start `180`, `Q = 180 − 20P`, choke $9 · bikes `Q = 200 − 25P`: $4 → 100 · choke $8 · `P = 8 − Q ÷ 25`: 150 bikes → $2

Watch out: slope = a **number**, not how steep the picture looks (stretch an axis → looks flatter) · going down to $0 on a demand line **adds**: juice bar ($2, 160), ($6, 40) → start `160 + 30 × 2 = 220`, not 100 · check: `220 − 30 × 6 = 40` ✓