# 3.4 Production and costs

Name: _____ Class: _____ Date: _____ **Total: 20 marks**

**KEY WORDS** marginal cost • average total cost • marginal product

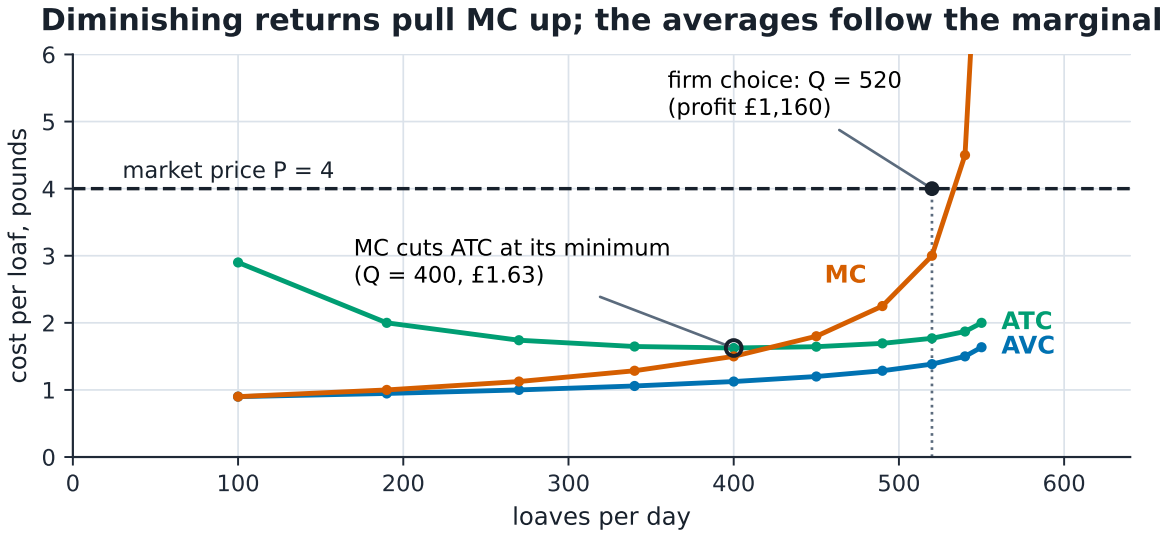
## Objective

Derive marginal and average costs from a production table; locate minimum ATC and explain the crossing; run the produce/shutdown rules at a given price; keep the short run and the long run apart.

## 1 Key knowledge and worked examples

### ■ Production first, costs after

$MC = w/MPL$: the wage divided by the **marginal product** . As **diminishing returns** bite, MC rises; the averages chase it, and MC cuts **average total cost** at its minimum. **Fixed cost** never moves with output; **variable cost** does.




*Diminishing returns pull MC up; the averages follow the marginal*



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■ **Worked example. Nimbus's eighth and ninth bakers**

Eighth baker: MPL 30, MC 90/30 = £3.00 – below the £4 price, so hire ✓. Ninth: MPL 20, MC 90/20 = £4.50 > 4 – do not. Output 520, profit $4 \times 520 - 920 =$ £1,160 ✓. Produce while $P \geq MC$; shut below minimum AVC (£0.90).

## 2 Practice

A coffee cart pays each worker £60 a day; its espresso machine costs £150 a day however much it sells. Daily cups by workers:

| **L** | **1** | **2** | **3** | **4** | **5** | **6** |
|---|---|---|---|---|---|---|
| cups | 60 | 110 | 150 | 180 | 200 | 210 |

**2.1** Compute MPL, MC, AVC and ATC for $L = 1, 2, 3$. [4]

**2.2** Where does ATC bottom out on this table (compute it for the remaining rows), and why does MC pass through that minimum? [4]

**2.3** The market price of a cup is £2.00. How many workers does the cart employ, and what profit or loss does the day show? Verify the loss is smaller than shutting down would be. [4]



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**2.4** A price war drops the cup to £0.95. What does the cart do, and why, with numbers? [3]

**2.5** The owner says: "ATC falls from L = 1 to L = 4 – that's our economies of scale kicking in." Correct him in two lines. [2]

**2.6** True or false with one line each: (a) the £150 machine is irrelevant to how many cups to sell; (b) MC can be computed from the change in ATC; (c) the shutdown rule compares price with ATC. [3]



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