4.2 Costs, revenue, profit and perfect competition

Name: _____ Class: _____ Date: _____ **Total: 26 marks**

KEY WORDS diminishing marginal returns • economies of scale • marginal cost • normal profit • price taker • shut-down point

Objective

Build the skills to answer HL exam questions on **costs**, **revenue** and **profit**, the profit-maximizing rule, and **perfect competition** in the short and long run.

You must be able to:

- explain the law of diminishing marginal returns and the shapes of short-run cost curves
- explain economies and diseconomies of scale
- distinguish normal profit, abnormal profit and losses, and apply MC = MR
- explain short-run and long-run equilibrium in perfect competition, and the shut-down rule
- explain allocative and productive efficiency

1 Key knowledge and worked examples

■ Costs, revenue and perfect competition

Short run: at least one factor is fixed (e.g. the factory). **Long run:** all factors can change.

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Law of diminishing marginal returns: adding more of a variable factor (workers) to a fixed factor eventually makes each extra worker add **less** output, so **marginal cost (MC) rises**. This gives U-shaped average cost curves.

cost	meaning
total fixed cost (TFC)	does not change with output (rent)
total variable cost (TVC)	changes with output (materials)
average total cost (ATC)	TC $\div Q$
average variable cost (AVC)	TVC $\div Q$
marginal cost (MC)	the extra cost of one more unit: ΔTC $\div \Delta Q$; it cuts ATC and AVC at their lowest points

Long run: economies of scale (bulk buying, specialization, financial, technical) lower long-run average cost (LRATC) as the firm grows; **diseconomies of scale** (poor communication, low motivation, coordination) raise it.

Revenue: total revenue TR = $P \times Q$; average revenue AR = P; marginal revenue (MR) = extra revenue from one more unit.

Profit: economic costs include the **opportunity cost** of the owner's resources. **Normal profit** (TR = TC) is the minimum to keep the firm in the industry; **abnormal profit** is profit above that; a **loss** is TR < TC. **Profit maximization: produce where MC = MR** (and MC is rising).

Perfect competition: many firms, identical products, no barriers, perfect information. Each firm is a **price taker**: P = AR = MR (a horizontal line).

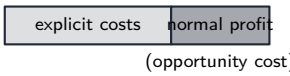
- **Short run:** a firm can make abnormal profit (P > ATC) or a loss (P < ATC).
- **Long run:** abnormal profit attracts new firms, so supply rises and price falls until **P = minimum ATC**: only normal profit. Losses make firms leave until normal profit returns.
- **Shut-down rule:** in the short run, keep producing if $P \geq$ AVC (variable costs are covered); shut down if P < AVC. In the long run, leave if P < ATC.

Efficiency: allocative efficiency: P = MC (MSB = MSC); **productive** efficiency: production at minimum ATC. Perfect competition achieves both in the long run.

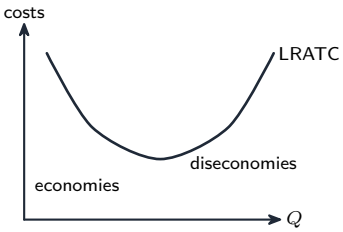
Answer shapes: label every curve (MC, ATC, AVC, P = MR); mark Q where MC = MR; shade profit or loss as $(P - \text{ATC}) \times Q$.

2 Practice

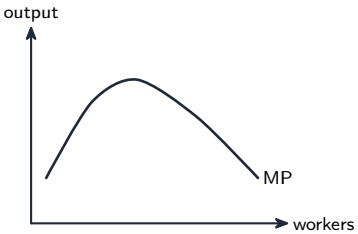
2.1 Define **normal profit**. [2]



2.2 State **two** sources of economies of scale. [2]



2.3 Explain why a firm's marginal cost curve eventually rises in the short run. [4]

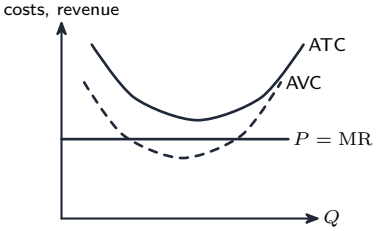


2.4 The table shows the total cost ($) of a firm in perfect competition. The market price is $12.

Calculate the profit-maximizing output and the profit. [3]

Q	0	1	2	3	4	5
TC	10	18	24	32	44	60

2.5 A firm's price is $5, its AVC is $4 and its ATC is $6. Explain whether it should continue to produce in the short run. [3]



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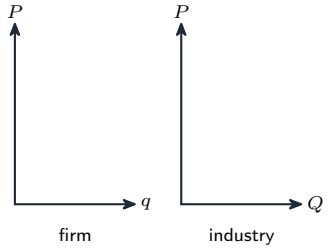
3 Exam-style questions

3.1 A new technology lowers costs for all firms in a perfectly competitive industry.

(a) Using diagrams, explain how the industry moves from short-run abnormal profit to long-run equilibrium. [6]

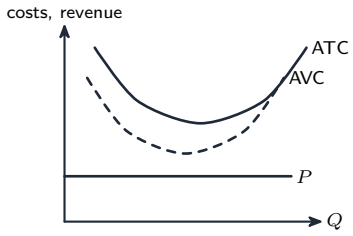
[[drawlines:6]]

(b) Explain why long-run equilibrium is allocatively and productively efficient. [2]



3.2 A small farm in a competitive market sells corn at a price below its average variable cost.

Explain, with reference to costs, why it should shut down in the short run. [4]



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Solutions

Marking: **M1** a correct method, **A1** the correct answer, **B1** an independent mark.

Each answer shows the steps, then the **result**.

2.1

the minimum profit needed to keep a firm in its current industry; when total revenue equals total economic cost, including opportunity cost

2.2

any two: bulk buying of inputs at lower prices; specialization of workers and managers; cheaper borrowing for large firms (financial); large, efficient machines (technical)

2.3

in the short run at least one factor, e.g. capital, is fixed; as more workers are added, each has less capital to work with; so after a point each extra worker adds less output: diminishing marginal returns; each extra unit of output then needs more labour, so its cost (MC) rises

2.4

MC: $8, 6, 8, 12, 16$; MC = MR = \$12 at $Q = \mathbf{4}$; profit $= 48 - 44 = \$\mathbf{4}$

2.5

the price is below ATC, so it makes a loss; but the price is above AVC, so it covers all variable costs and part of its fixed costs; shutting down would mean losing all fixed costs, so it should continue in the short run

3.1

(a) lower costs shift the firm's MC and ATC down; at the old price, P > ATC: abnormal profit, shaded; no barriers to entry, so new firms enter; industry supply shifts right and price falls; entry continues until P = minimum ATC: normal profit only; correctly labelled side-by-side firm and industry diagrams

(b) P = MC, so the value of the last unit to consumers equals its cost: allocative efficiency; output at minimum ATC: productive efficiency

3.2

if it produces, revenue does not cover variable costs; so every unit adds to the loss; if it shuts down, the loss is only its fixed costs; producing would give a loss larger than fixed costs, so shutting down minimizes the loss

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