5.2 Location and break-even analysis

Name: _____ Class: _____ Date: _____ **Total: 30 marks**

KEY WORDS break-even output • contribution • margin of safety • outsourcing • offshoring • reshoring

Objective

Build the skills to answer exam questions on **location** decisions, reorganizing production (outsourcing, offshoring, reshoring) and **break-even analysis** .

You must be able to:

- explain quantitative and qualitative location factors
- distinguish outsourcing, offshoring, insourcing and reshoring
- calculate contribution, break-even output, margin of safety and the output for a target profit
- draw and read a break-even chart and show the effect of changes in price or costs
- explain the limitations of break-even analysis

1 Key knowledge and worked examples

■ Location

Quantitative factors can be measured: cost of land and rent, wages, transport costs, government grants and taxes. **Qualitative factors** are harder to measure: quality of infrastructure, skills of local workers, closeness to customers or suppliers, local culture, political stability, the owners' preferences, ethics.

Reorganizing production: outsourcing (subcontracting): another firm does part of the work (e.g. cleaning, IT); **offshoring**: moving work to another country; **insourcing**: bringing work back in-house; **reshoring**: bringing work back to the home country.

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■ Break-even analysis

term	formula
contribution per unit	price − variable cost per unit
total contribution	contribution per unit × output
break-even output	$\frac{\text{fixed costs}}{\text{contribution per unit}}$
margin of safety	actual output − break-even output
output for a target profit	$\frac{\text{fixed costs} + \text{target profit}}{\text{contribution per unit}}$
profit	total contribution − fixed costs

A **break-even chart** shows fixed costs (horizontal line), total costs (starting at fixed costs) and total revenue (from the origin). Break-even is where total revenue meets total costs. A **price rise** makes the revenue line steeper and lowers break-even output; a **rise in costs** raises break-even output.

Limitations: assumes all output is sold; assumes price and variable cost per unit stay the same; hard to use for many products; costs are not always simply fixed or variable.

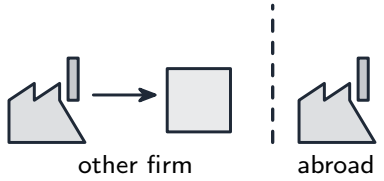
Answer shapes: contribution first → break-even → margin of safety → interpret → limitations.

2 Practice

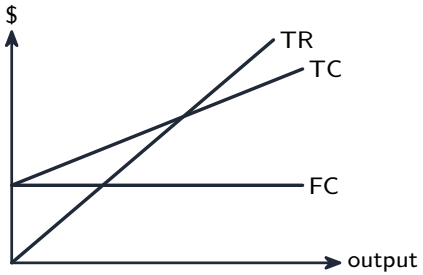
2.1 Define **contribution per unit**. [2]

price − variable cost = ?

2.2 Distinguish between outsourcing and offshoring. [2]



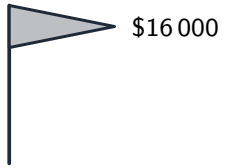
2.3 A firm has fixed costs of \$24,000 a month. It sells each unit for \$20; the variable cost is \$12 per unit. It sells 4 000 units a month. Calculate the break-even output and the margin of safety. [4]



2.4 Explain **two** qualitative factors a hotel chain should consider when choosing the location of a new hotel. [4]



2.5 For the firm in question 2.3, calculate the output needed for a profit of \$16,000 a month. [2]



3 Exam-style questions

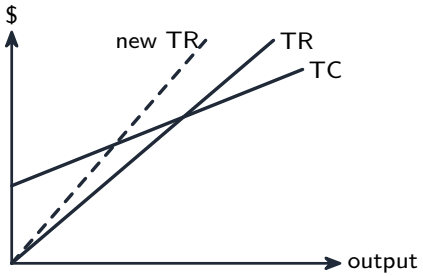
3.1 Oakline Furniture must choose a site for a new factory. The data for two sites are shown.

	site A	site B
rent per year	\$60 000	\$110 000
average wage	\$2 400/month	\$3 000/month
distance to main customers	400 km	30 km
government grant	\$150 000	none
skilled carpenters nearby	few	many

Discuss which site Oakline should choose. [10]

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3.2 The firm in question 2.3 plans to raise its price from \$20 to \$24, with no change in costs.



(a) Calculate the new break-even output. [2]

(b) Explain **two** limitations of using break-even analysis to make this decision. [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

selling price per unit minus variable cost per unit; the amount each unit adds towards paying fixed costs and then profit

2.2

outsourcing: another firm is paid to carry out some of the work; offshoring: moving work or production to another country, either to the firm's own plant or to a subcontractor

2.3

contribution $= 20 - 12 =$ \$8; break-even $= 24\,000 \div 8 =$ **3 000** units; margin of safety $= 4\,000 - 3\,000 =$ **1 000** units

2.4

any two, explained: closeness to attractions, business districts or airports, which affects demand; safety and political stability of the area; quality of local infrastructure and transport links; availability of skilled hospitality staff / local culture and image of the area

2.5

$(24\,000 + 16\,000) \div 8 =$ **5 000** units

3.1

award up to [10]: site A: lower rent and wages, so lower costs; a government grant reduces start-up costs; but far from main customers, so higher transport costs and slower delivery; few skilled carpenters, so training costs and possible quality problems; site B: close to customers and skilled workers; but higher rent and wages; quantitative comparison of annual costs from the table; qualitative factors such as infrastructure and image; judgement linked to Oakline's priorities, e.g. quality and delivery speed for furniture; conclusion supported by data

3.2

(a) contribution $= 24 - 12 =$ \$12; $24\,000 \div 12 =$ **2 000** units

(b) any two, explained: assumes the same quantity will be sold at the higher price, but demand may fall; assumes costs stay the same at every output, e.g. no bulk discounts; assumes all output is sold with no stock left; ignores competitors' reactions

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