BUS.FI3 Break-even analysis

AQA 8132 · Calculator allowed · about 65 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions in the spaces provided. Show your working for every calculation: method marks are available even if your final answer is wrong. Cedar Crest Candles, used throughout this pack, is a fictional business.

1 Which one of the following best describes the 'break-even point' for a business?

- ☐ A) The level of output at which total revenue equals total costs
- ☐ B) The level of output at which a business makes its maximum possible profit
- ☐ C) The level of output at which fixed costs equal variable costs
- ☐ D) The level of output at which a business runs out of stock

(Total for Question 1 is 1 mark)

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2 Which one of the following formulas correctly calculates the contribution per unit?

- ☐ A) Selling price per unit minus variable cost per unit
- ☐ B) Selling price per unit minus fixed costs
- ☐ C) Total revenue minus total costs
- ☐ D) Fixed costs divided by selling price per unit

(Total for Question 2 is 1 mark)

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3 State two pieces of information needed to calculate a business's break-even output.

(Total for Question 3 is 2 marks)

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4 Cedar Crest Candles, a fictional candle-making business, sells a box of candles for 12.00 pounds. The variable cost of making one box is 4.00 pounds.
Calculate the contribution per box. Show your working.

(Total for Question 4 is 2 marks)

5 Cedar Crest Candles' fixed costs are 3,200 pounds per month. Using your answer to question 4, calculate the break-even output (number of boxes) per month. Show your working.

(Total for Question 5 is 3 marks)

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6 Calculate Cedar Crest Candles' total revenue at the break-even point of 400 boxes found in question 5. Show your working.

(Total for Question 6 is 2 marks)

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7 Calculate Cedar Crest Candles' total costs at the break-even point of 400 boxes (fixed costs plus variable costs for 400 boxes), and confirm this equals your answer to question 6. Show your working.

(Total for Question 7 is 2 marks)

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8 State what it means for a business's total revenue to equal its total costs, as shown in questions 6 and 7.

(Total for Question 8 is 1 mark)

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9 In its first month, Cedar Crest Candles sells 520 boxes. Using your answer to question 5, calculate the margin of safety, in boxes. Show your working.

(Total for Question 9 is 2 marks)

10 Calculate Cedar Crest Candles' profit for the month, if it sells 520 boxes. Show your working.

(Total for Question 10 is 3 marks)

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11 Noah is thinking about raising the selling price to boost profit.

(a) If Cedar Crest Candles raises its selling price to 14.00 pounds per box (variable cost unchanged at 4.00 pounds), calculate the new contribution per box. Show your working. **(2)**

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(b) Using your answer to part a, calculate the new break-even output at the higher price of 14.00 pounds, assuming fixed costs stay at 3,200 pounds. Show your working. **(2)**

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(Total for Question 11 is 4 marks)

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12 State two possible effects on Cedar Crest Candles of raising its selling price, referring to your answers above.

(Total for Question 12 is 2 marks)

13 Alternatively, Noah is considering investing in a more efficient candle-making machine, which would raise fixed costs to 4,000 pounds a month (from 3,200 pounds) but is expected to have no effect on the selling price or variable cost per box.

(a) Using the original contribution of 8.00 pounds per box (question 4), calculate the new break-even output with fixed costs of 4,000 pounds. Show your working. **(2)**

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(b) Explain the effect on the break-even output of this increase in fixed costs, referring to your answers to questions 5 and 13a. **(2)**

(Total for Question 13 is 4 marks)

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14 Cedar Crest Candles wants to make a target profit of 1,600 pounds per month, using the original figures (selling price 12.00 pounds, variable cost 4.00 pounds, fixed costs 3,200 pounds).
Calculate the number of boxes it must sell to achieve this target profit. Show your working.
(Hint: target output = (fixed costs + target profit) / contribution per box.)

(Total for Question 14 is 3 marks)

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15 State two reasons why break-even analysis, although a useful planning tool, has limitations for a business like Cedar Crest Candles.

(Total for Question 15 is 2 marks)

16 Noah is deciding between two ways to boost Cedar Crest Candles' profit: raising the selling price to 14.00 pounds per box (question 11), which lowers the break-even output to 320 boxes but might reduce the number of boxes sold, or investing in the new machine (question 13), which raises the break-even output to 500 boxes. Cedar Crest Candles currently sells 520 boxes a month (question 9).

Recommend which option Noah should choose. Justify your answer using the figures given in this pack.

(Total for Question 16 is 9 marks)

Mark scheme · BUS.FI3 Break-even analysis

Question 1

- **B1** A cao
- **Answer: A**

Question 2

- **B1** A cao
- **Answer: A**

Question 3

- **B1** the selling price per unit and the variable cost per unit (to find contribution)
- **B1** the business's fixed costs
- **Answer: Selling price per unit, variable cost per unit, and fixed costs.**

Question 4

- **M1** 12.00 - 4.00 seen
- **A1** 8.00 pounds cao
- **Answer: 8.00 pounds.**

Question 5

- **B1** break-even output = fixed costs / contribution per unit, stated or implied
- **M1** 3,200 / 8.00 seen (ft from question 4)
- **A1** 400 boxes cao
- **Answer: 400 boxes.**

Question 6

- **M1** 400 x 12.00 seen (ft from question 5)
- **A1** 4,800 pounds cao
- **Answer: 4,800 pounds.**

Question 7

- **M1** 3,200 + (400 x 4.00) seen
- **A1** 4,800 pounds cao (matches question 6, confirming break-even)
- **Answer: 4,800 pounds.**

Question 8

- **B1** the business is neither making a profit nor a loss (it is breaking even)
- **Answer: The business is neither making a profit nor a loss; it is breaking even.**

Question 9

- **M1** 520 - 400 seen (ft from question 5)
- **A1** 120 boxes cao
- **Answer: 120 boxes.**

Question 10

- **M1** 520 x 8.00 seen (= 4,160)
- **M1** 4,160 - 3,200 seen
- **A1** 960 pounds cao
- **Answer: 960 pounds.**

Question 11

- (a) **M1** 14.00 - 4.00 seen
- (a) **A1** 10.00 pounds cao
- **(a) Answer: 10.00 pounds.**
- (b) **M1** 3,200 / 10.00 seen (ft from part a)
- (b) **A1** 320 boxes cao
- **(b) Answer: 320 boxes.**

Question 12

- **B1** the break-even output falls, from 400 boxes to 320 boxes, because each box now contributes more towards fixed costs
- **B1** however, a higher price may reduce the number of boxes actually sold, since demand may fall if customers see it as too expensive
- **Answer: Break-even falls from 400 to 320 boxes, but demand/sales volume may fall at the higher price.**

Question 13

- (a) **M1** 4,000 / 8.00 seen
- (a) **A1** 500 boxes cao
- **(a) Answer: 500 boxes.**
- (b) **B1** identifies that the break-even output rises, from 400 boxes to 500 boxes
- (b) **B1** explains why: more boxes now need to be sold just to cover the higher fixed costs before any profit is made
- **(b) Answer: Break-even output rises from 400 to 500 boxes, because more boxes must now be sold to cover the higher fixed costs before any profit is made.**

Question 14

- **M1** 3,200 + 1,600 seen (= 4,800)
- **M1** 4,800 / 8.00 seen
- **A1** 600 boxes cao
- **Answer: 600 boxes.**

Question 15

- **B1** it assumes every box made is sold, and that selling price and variable cost per box stay constant regardless of how many are made or sold, which may not be realistic
- **B1** it does not account for a business selling more than one product with different costs and prices, or for external factors like changing demand
- **Answer: Any two, e.g. assumes all output is sold at a constant price/cost; does not allow for multiple products or changing demand.**

Question 16

- **Level 1** (1-3): Makes simple, undeveloped comments about the two options, with little or no use of the pack's figures and no clear recommendation.
- **Level 2** (4-6): Gives a developed argument for or against one option, using some of the pack's figures, but does not fully weigh both sides or reach a clearly justified recommendation.
- **Level 3** (7-9): Weighs the evidence for and against both options, using the break-even and margin of safety figures from this pack, and reaches a justified recommendation supported by that analysis.
- **Indicative content:**
  - Raising the price lowers the break-even output from 400 to 320 boxes (question 11b), meaning at current sales of 520 boxes the margin of safety would grow from 120 boxes (question 9) to 200 boxes, comfortably improving Cedar Crest Candles' safety margin, provided sales do not fall much because of the higher price.
  - Investing in the machine raises the break-even output to 500 boxes, only 20 boxes below current sales of 520, sharply shrinking the margin of safety and making the business riskier in the short term, even though faster production might support higher output/sales in future.
  - Against raising the price: demand could fall if customers are price-sensitive, which could reduce sales below the current level and undo the benefit.
  - Against the machine: fixed costs rise permanently to 4,000 pounds, which the business must now cover every month regardless of demand.
  - Judgement: since raising the price improves the margin of safety to 200 boxes and requires no upfront capital outlay, while investing in machinery shrinks the margin of safety to just 20 boxes and raises risk in the short term, the safer initial choice is to raise the price, provided Noah is confident demand will not fall by more than the 200-box margin of safety it creates.