Calculating Contribution and Breakeven

Method and Worked Example

Calculating Breakeven – Formula Method

Breakeven is the point at which a business makes neither a profit nor a loss. On a breakeven diagram, breakeven is shown by the intersection where Total Revenue is equal to Total Costs.

The formula for calculating the breakeven number of units is:

$$\frac{\text{Fixed Costs}}{\text{Selling Price Per Unit - Variable Cost Per Unit}}$$

The selling price per unit minus variable cost per unit is also known as "contribution per unit".

This is because any positive difference between selling price per unit and variable cost per unit 'contributes' to paying off the fixed costs. Once all the fixed costs have been covered by the contribution, a business has reached breakeven. This is because all costs (fixed and variable) have been covered.

Let's consider an example:
Naveed is a window cleaner. He has calculated his annual fixed costs to be £15 000. Naveed charges each household £8 on average for cleaning their windows. His variable costs are £2 per house (including water, detergent and petrol).

The number of houses Naveed needs to be clean the windows in order to breakeven is calculated as follows:

$$\frac{\text{Fixed costs (£15 000)}}{\text{Selling Price Per Unit (£8) — Variable Costs Per Unit (£2)}} = 2\ 500 \text{ houses}$$

Therefore, Naveed needs to clean the windows of **2 500** houses in order to **breakeven** (i.e. to cover all of his costs before making a profit).

The contribution for cleaning the windows of each house is £6 (£8 - £2). This means that £6 from each house contributes towards paying the fixed costs of £15 000.

So, for house 2 501, Naveed will make a **profit** of £6, since all the costs have been covered by cleaning the windows of the first 2 500 houses.

Calculating Breakeven – Chart Method

The breakeven point can also be identified by constructing and completing a breakeven diagram. The points below will take you through this process using the same information (above) in Naveed's window cleaning business to illustrate this. The number of houses that Naveed currently cleans windows at is 5 000 a year.

1. The X axis is labelled 'Revenue / Costs (£)'.

2. The Y axis is labelled 'Quantity (units)'.

3. The fixed cost line is drawn.

   a. Since fixed costs do not change with the level of output, the fixed line will be a horizontal line at the £15 000 marker on the X axis.

4. The variable cost line is drawn.

   a. The variable cost line is drawn from zero since if Naveed did not clean any windows, he would not incur any variable costs because variable costs vary directly with output.

   b. The current output of 5 000 is a guide to drawing the variable cost line. Since variable costs per unit are £2, this means that for 5 000 houses Naveed incurs a total of £10 000 variable costs (5 000 x £2). The line can be extended beyond this point as a straight line, since variable costs are proportional to output.

5. The total cost line is drawn

   a. Total costs are the sum of fixed costs and variable costs

   b. At an output of zero, total costs will be equal to fixed costs, since no variable costs are incurred. Therefore, the total costs line will begin at the fixed costs line at zero output.

   c. Again, the guide of 5 000 units can be used to calculate total costs at this level: fixed costs of £15 000 are added to total variable costs of £10 000 to give total costs of £25 000 for an output of 5 000 units. The total costs line is then drawn from the fixed cost line to the £25 000 market at an output of 5 000 units.

6. The total revenue line is drawn

   a. The total revenue line is drawn from zero since if Naveed did not clean any windows, he would not earn any revenue.

   b. The current output of 5 000 is a guide to drawing the total revenue line. Since revenue per house is £8, this means that for 5 000 houses Naveed earns total revenue of £40 000 (5 000 x £8). The line can be extended beyond this point as a straight line, since sales revenue is proportional to output.

7. To identify the breakeven point in units, identify where the Total Costs line crosses the Total Revenue line. This is the point at which Total Costs are equal to Total Revenue. Draw a broken vertical line from this point to the X-axis. The point at which the dotted line meets the X-axis is the breakeven number of units. As you can see from the chart, this is 2 500 units (or houses in this case) and is the same number calculated by using the formula method earlier on.

Calculating Breakeven - Chart Method
Naveed Example
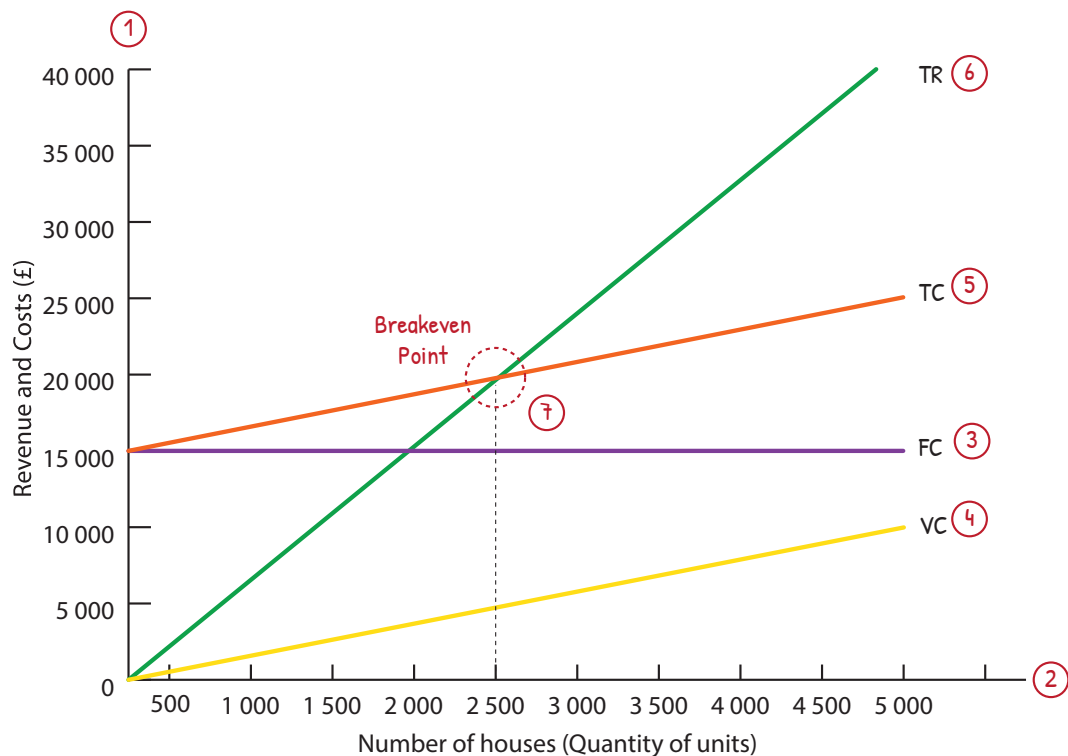
Question 1

Rachael Thornton is a massage therapist in East Anglia. The following information is available about Rachel's business.

Fixed costs per year (including rent)	£10 000
Variable costs per massage (including essential oils)	£10
Number of massage therapy sessions last year	400
Price per 60-minute massage	£50

a) Use the breakeven formula and the information above to calculate how many 60-minute massage therapy sessions Rachel has to complete to breakeven.

b) Construct a breakeven chart using the information above to illustrate how many 60-minute massage therapy sessions Rachel has to complete to breakeven.

Question 2a

The Teeny Tiny T-shirt Company sells t-shirts for children as discounted prices. The owner, Trish Thomas, prides herself in the affordability of the t-shirts she sells, which are all £10. Trish has fixed costs amounting to £120 000 a year. The average cost of each t-shirt is £4 and Trish has other variable costs of £1 per unit. Trish aims to sell 30 000 in the next 12-month, based on sales in previous years.

a) Use the breakeven formula and the information above to calculate how many t-shirts Trish needs to sell in order to break even.

b) Construct a breakeven chart using the information above to illustrate how many t-shirts Trish needs to

sell in order to break even.

Question 2b

Trish is concerned about increasing competition of other clothing retailers offering similar low prices to her own. Trish is considering reducing her selling price to £9 per t-shirt. In order to be able to afford to do this, she has negotiated with her supplier for a 10% discount on the t-shirts she buys from them. Other variable costs of £1 per unit and fixed costs of £120 000 remain the same.

a) Use the breakeven formula and the **new** information above to calculate how many t-shirts Trish needs to sell in order to break even (round your answer up to the nearest whole number)

b) Calculate the difference in the number of t-shirts Trish needs to sell to breakeven between the original breakeven point (in part 2a) and the new breakeven point calculated in part 2b.

c) What has happened to the number of t-shirts Trish needs to sell if she decides to sell the t-shirts for £9 compared to £10?
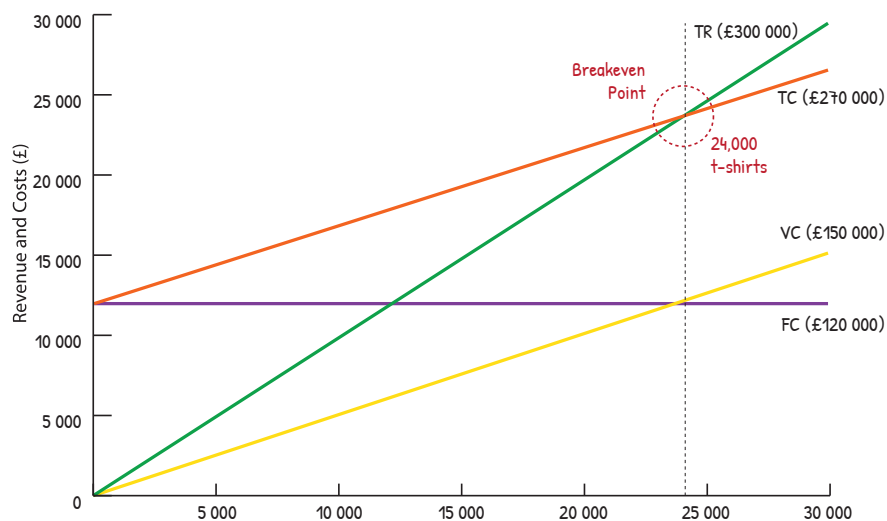
Answers

Question 1

a) 250 sessions
b)
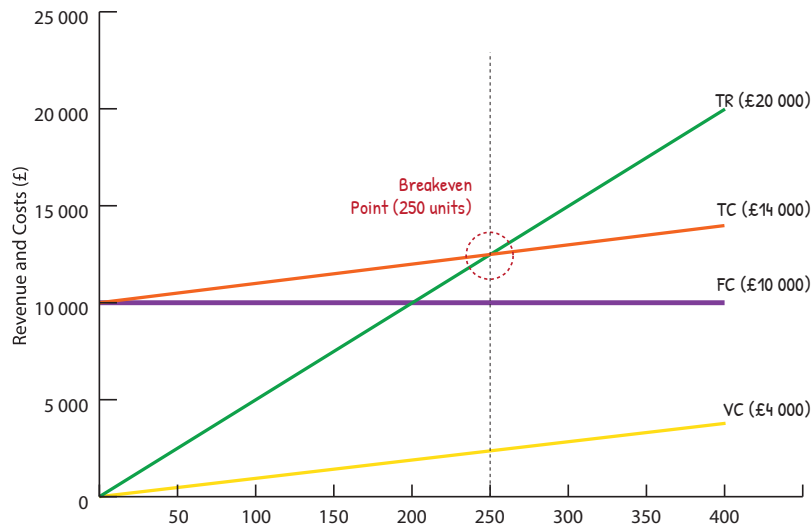
Question 2a

a) 24 000 t-shirts
b)

Question 2b

a) £120 000 / [(£9 – (0.9 x £4) - £1) = 27 273 (to the nearest whole number)]
b) 3 273 t-shirts
c) Increased