

# Quantitative skills

## Breakeven

### Method

Breakeven is the point at which a business makes neither a profit nor a loss. Therefore it is where sales revenue is equal to total costs (e.g. £10 000 - £10 000 = £0).

The formula for calculating the breakeven number of units is:

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

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

A window cleaner business has calculated its fixed costs to be £10 000 per year. It charges each household £8 on average for cleaning their windows. The variable costs have been calculated as £2 for cleaning the windows of each property, including water, detergent and petrol.

Using the above information, we can calculate the number of houses the window cleaner business needs to breakeven, as follows:

$$\frac{\text{Fixed costs (£10 000)}}{\text{Selling Price Per Unit (£8)} - \text{Variable Costs Per Unit (£2)}}$$

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 £10 000.

Therefore, the breakeven point is 1 667 houses (always round up to the next whole unit). That is to say that the window cleaner business needs to clean the windows of 1 667 houses to cover all their costs before they made a profit. For every house above 1 667 they will earn a profit of £6, since all costs have been covered.

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NB: if variable costs or sales revenue are given as 'total' figures instead of 'per unit' figures, then divide the total figures by the number of units produced in order to get the 'per unit' figure (the per unit figure is needed for the breakeven formula).

For example,

If total sales revenue from selling 50 products is £1 000, then the selling price per unit is:

$$\frac{\text{£1 000}}{50} = \text{£20 per unit}$$

### Example 1

Use the information below and the breakeven formula to calculate the breakeven point in units:

|                      |         |
|----------------------|---------|
| Fixed costs          | £34 000 |
| Total variable costs | £10 000 |
| Units produced       | 2 000   |
| Selling price        | £15     |

Answer:

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### Example 2

A dog walker charges £10 to walk a dog for an hour. They incur variable costs of £3 per hour and have to cover fixed costs of £3 000 a year. How many dogs does the dog walker need to walk per year to breakeven?

Answer:

### Example 3

An ice cream seller charges £1.20 for an ice cream. They have fixed costs of £1 000 **per month** and variable costs include 20p for a cone, 5p for a flake, 15p for the ice cream and 3p for the sauce.

Calculate how many ice creams need to be sold **a year** to breakeven. (Hint: you need to ensure fixed costs are calculated for the year)

Answer:

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### Example 4

The variable costs per unit incurred by a business making glass windows amount to £33 per window. The company produces 5 000 windows per year and incur fixed costs of £1 200 000 per year. The company sells each window for £150.

Calculate the number of windows that need to be sold to breakeven

Answer:

### Example 5

Use the information in the table below to calculate the breakeven number of units for a business selling furniture cabinets.

|                               |          |
|-------------------------------|----------|
| <b>Fixed Costs</b>            | £300 000 |
| <b>Selling Price Per Unit</b> | £150     |
| <b>Contribution per unit</b>  | £30      |

Answer:

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### Example 6

Track Tyres Ltd sell tyres for £80 each. They have fixed costs per year of £450 000 and the cost paid per tyre from their suppliers is £50. They have other variable costs of £10 per tyre they sell. Calculate the breakeven number of tyres they have to sell if fixed costs increase by £20 000 and suppliers increase the cost per tyre by 10%

Answer:

### Example 7

Use the information in the table below to calculate the breakeven number of units for a business selling luxury candles.

|                               |          |
|-------------------------------|----------|
| <b>Fixed Costs</b>            | £300 000 |
| <b>Selling Price Per Unit</b> | £15      |
| <b>Variable Cost per Unit</b> | £3       |

Answer:

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### Example 8

Use the information below to calculate the breakeven point in units:

|                             |         |
|-----------------------------|---------|
| <b>Fixed costs</b>          | £30 000 |
| <b>Total variable costs</b> | £2 500  |
| <b>Units produced</b>       | 500     |
| <b>Selling price</b>        | £20     |

Answer:

### Example 9

A taxi driver has fixed costs of £5 000 per year. They pay variable costs of £1.25 per mile and charge an average of £2.50 per mile to passengers. The total amount of chargeable miles driven by the taxi driver is 18 000 in a year.

Calculate the number of chargeable miles the taxi driver needs in order to breakeven.

Answer:

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### Example 10

Use the information below to calculate the breakeven point in units:

|                               |         |
|-------------------------------|---------|
| <b>Fixed costs</b>            | £45 000 |
| <b>Variable cost per unit</b> | £2      |
| <b>Units sold</b>             | 500     |
| <b>Selling price per unit</b> | £6.50   |

Answer:

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### Answers

#### Example 1

3,400 units

#### Example 2

429

#### Example 3

15 584

#### Example 4

10 256

#### Example 5

10 000

#### Example 6

30 000

#### Example 7

25 000

#### Example 8

2 000

#### Example 9

4 000

#### Example 10

10 000