

5.5 Break-even analysis

Break-even charts

Break-even charts are a graphical representation of a company's costs and revenues. It is very helpful to see costs and revenue figures in graphic form because it makes visually spotting the break-even point easy. Seeing the impact of changing costs and revenues is also helpful.

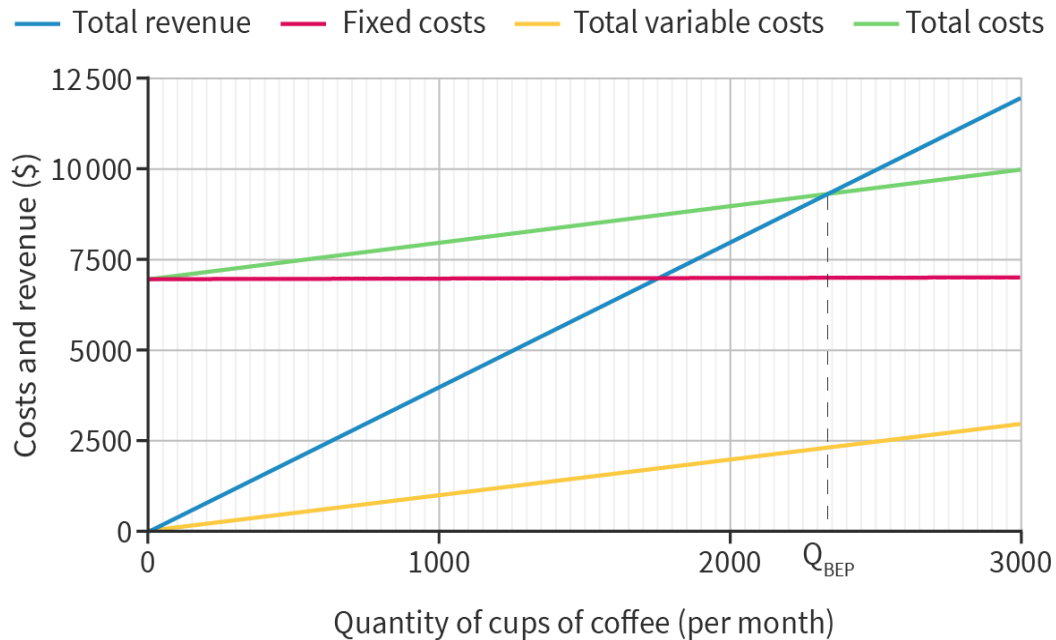


Figure 1. Total revenue, fixed costs, variable costs and total costs for a coffee shop with one coffee product.

In IB examinations, it is extremely common to be asked to construct a break-even chart. Although this is a relatively simple task, many students lose marks as they rush their work and make simple mistakes. So it is good to learn how to do it right!

Constructing a break-even chart

Exam tip

Students often make mistakes when drawing charts for the exam. You may wish to draw your charts in pencil so you can easily correct mistakes. When you are finished, you can quickly go over it in pen to darken the lines on the IB graph paper so it will scan better and be easier for the examiner to read.

Using the information from Divia's Driving School in the previous section, you can explore how to construct a break-even chart. Again, the key figures to remember are:

- Selling price = \$15
- Variable costs per unit = \$3
- Fixed costs = \$800
- Actual output = 80 lessons
- Break-even quantity = 67 lessons



Figure 2. Divia needs to sell 67 driving lessons per month for her driving school business to break-even.

Credit: Deepak Sethi, Getty Images

Step 1: Calculate the break-even quantity

You already completed this in the previous section activity, finding that the break-even quantity for Divia's Driving School is 67 lessons.

Step 2: Construct a quick table to record information for the cost and revenue lines

Because you only need two points to draw each line, it is helpful to choose two quantity values from the x -axis and complete the cost and revenue information with those values, as in **Table 1** below.

Table 1. A quick table to record two values for each variable.

Quantity of lessons	Variable costs (\$)	Fixed costs (\$)	Total costs (\$)	Total revenue (\$)
0	0	800	800	0
140	420	800	1220	2100

Zero is a logical starting point and easy to calculate cost and revenue values, as you can see in the first row of **Table 1**. The second quantity should be at least double the break-even quantity. Choosing a quantity that is double the break-even gives your graph symmetry and ensures that you can clearly see a range of values for profit as well as losses.

Step 3: Draw the two axes

The x -axis shows different quantities of production, so is labelled 'Output' or 'Quantity'.

The maximum quantity on the x -axis should be at least double the BEP. This way, the BEP can be in the middle of the graph, and it becomes easier to draw and to analyse. Consider a logical way to space out the scale. In this case, it makes sense to label up to 150 and use each grid line to represent 5 units.

The y -axis is labelled 'Revenue and costs', both of which are measured in \$, or whichever currency is used in the case study.

The maximum value on the y -axis will be the total revenue at the highest quantity registered on the x -axis, in this case \$2100. Consider a logical way to space out the scale. In this example, it makes sense to label up to \$2500 and use each grid line to represent \$100.

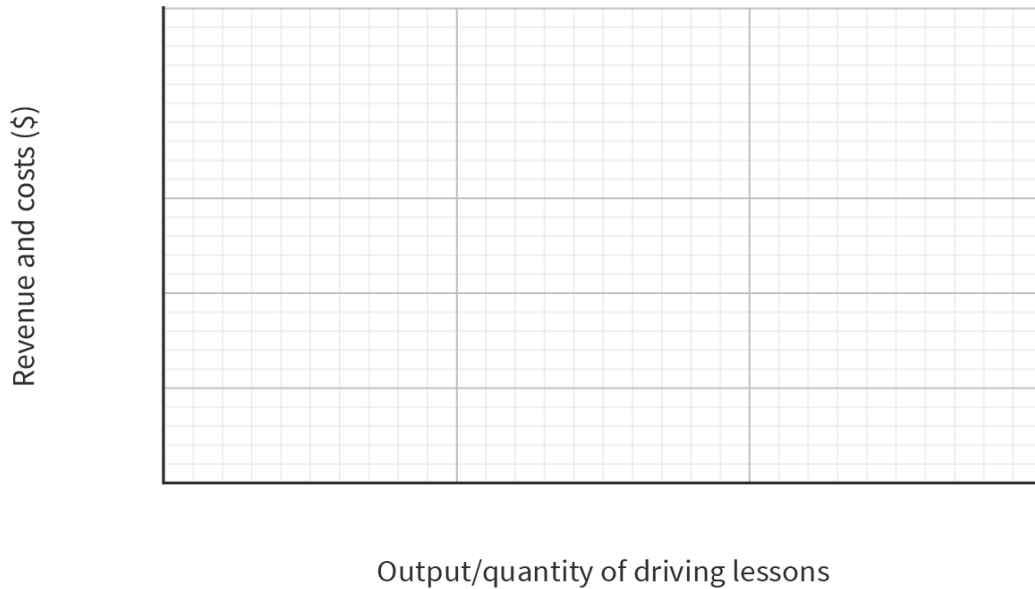


Figure 2. Draw the two axes of the break-even chart.

Step 4: Draw the fixed costs line

Fixed costs can be defined as those costs that do not vary directly with output. So, no matter what the level of output, they remain the same. This makes drawing the fixed costs line easy. It is always a straight horizontal line cutting the y-axis at the level of fixed cost. For Divia's Driving school, the fixed costs are \$800.

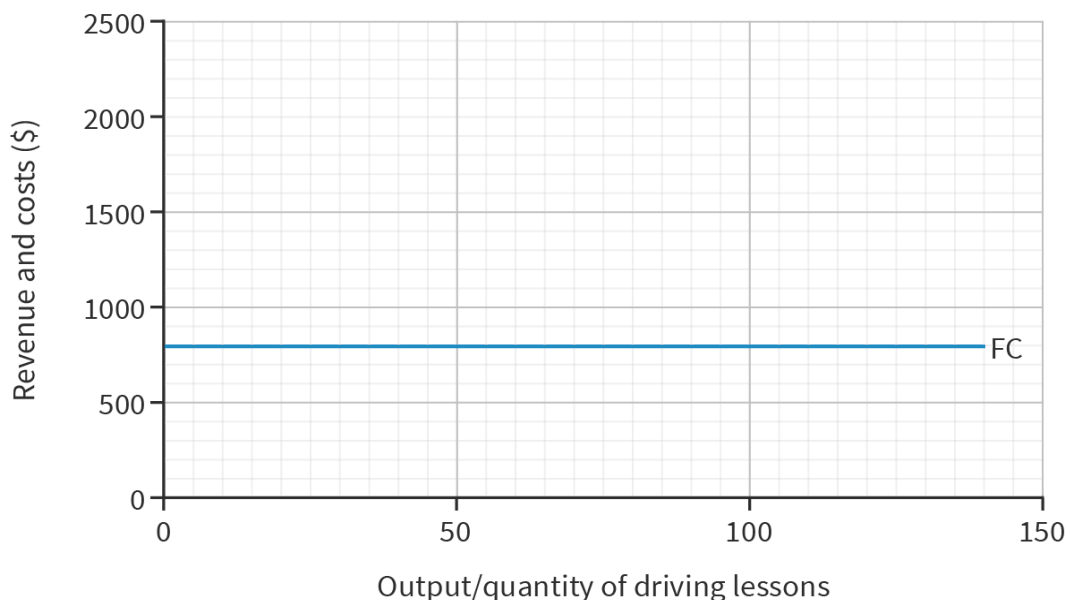


Figure 3. Add the fixed costs (FC) line to the break-even chart.

Step 5: Draw the total costs line

As you can see from the table, total costs can be calculated by simply adding together fixed costs and total variable costs. Since total variable costs are always zero when output is zero, this means that the total costs line will always start on the y-axis, at the same point as the fixed cost line.

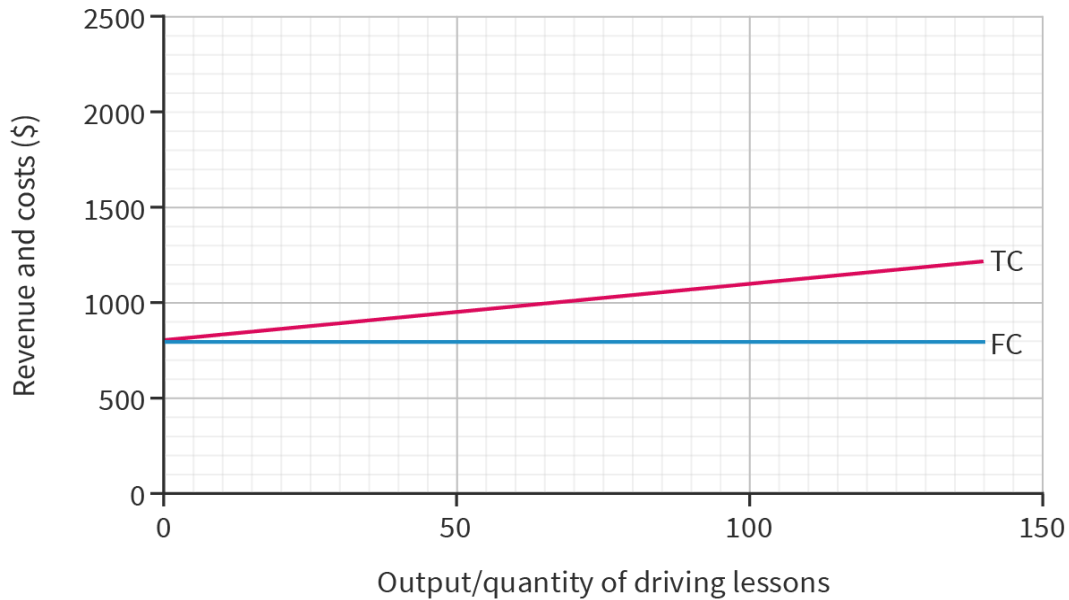


Figure 4. Draw the total costs (TC) line.

Step 6: Draw the total revenue line

Total revenue is all the money a business receives from selling goods and services. If a business sells zero quantity, then its total revenue will be zero. Therefore, the total revenue line always begins at the origin.

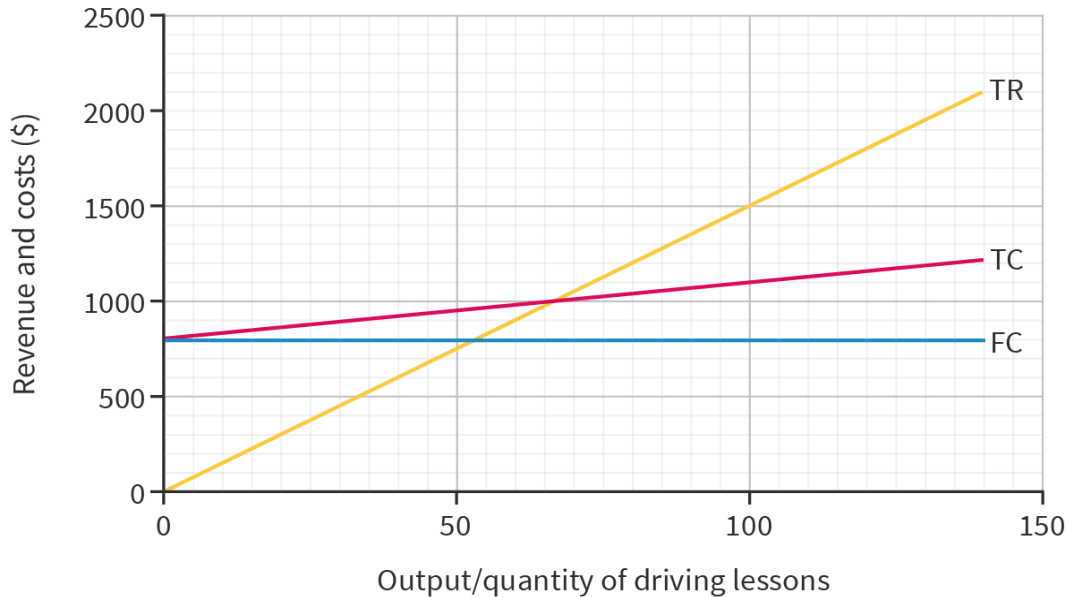


Figure 5. Draw the total revenue (TR) line.

Step 7: Mark the break-even point

Break-even quantity is the output where total revenue and total costs are the same. No profit or loss is made. On a break-even chart, it can be found at the point where the total cost and total revenue lines cross. You can indicate the break-even quantity with a dotted line.

At this point, you need to check that your total revenue line intersects with the total cost line at the break-even point (BEP) level of output that you calculated in Step 1.

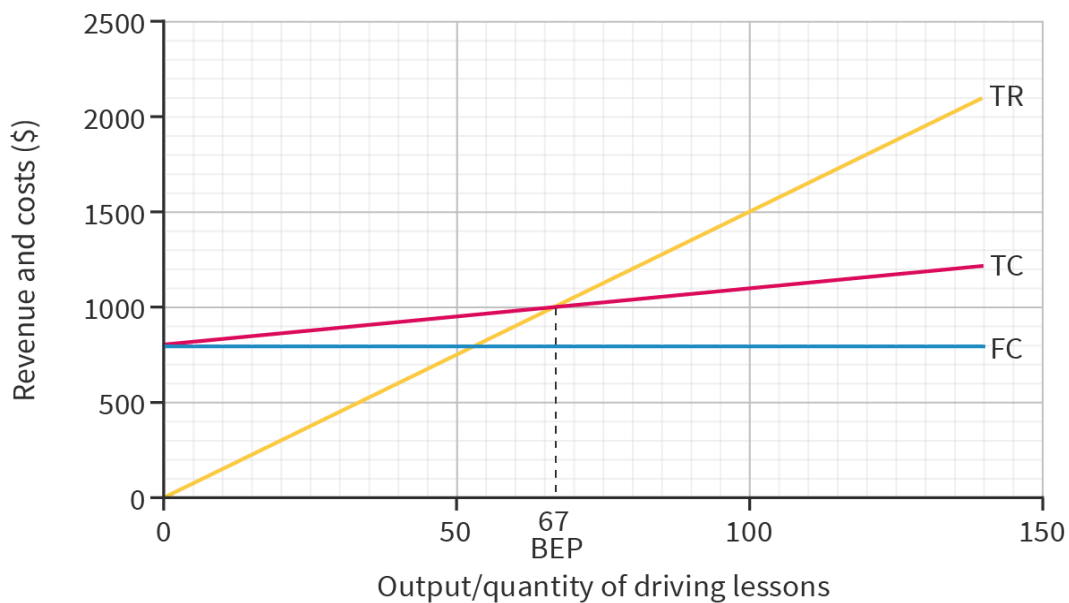


Figure 6. Mark the break-even point (BEP).

Step 8: Mark the current (or planned) output and indicate the margin of safety (if the question requires)

The margin of safety is the difference between the actual, current (or planned) level of output and the break-even point. This can easily be added to a break-even chart by finding the output figure on the x -axis and then marking the difference between that and the break-even point.

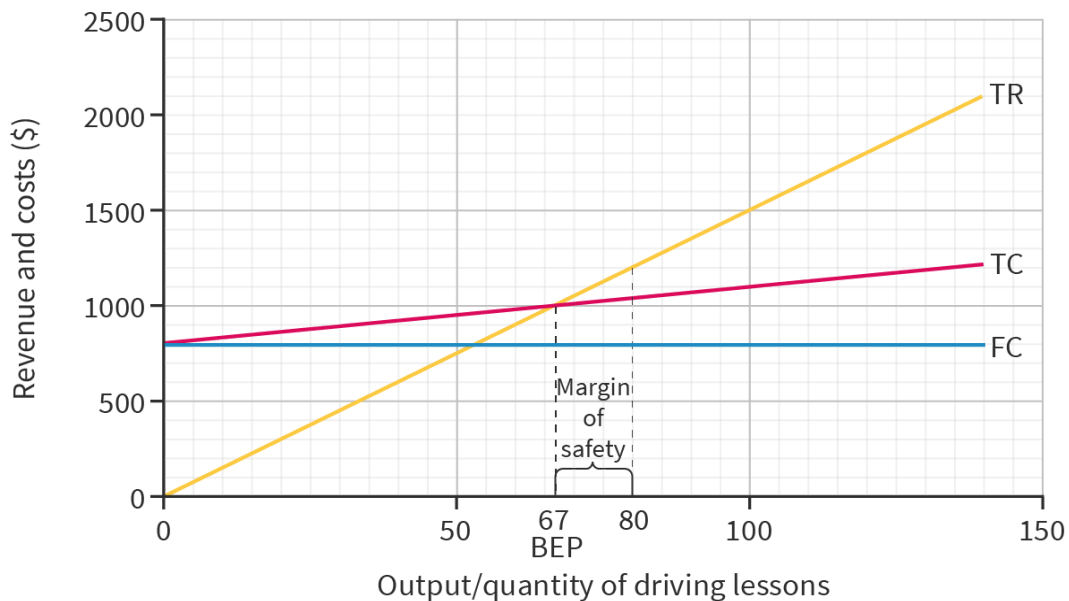


Figure 7. Mark the current (or planned) output and indicate the margin of safety.

Step 9: Shade in the profit and loss

A company will only make a profit if its output is greater than its break-even point. If it fails to achieve these sales levels, it will make a loss. Any output to the right of the break-even point will lead to profit, while any output to the left of the break-even point represents a loss.

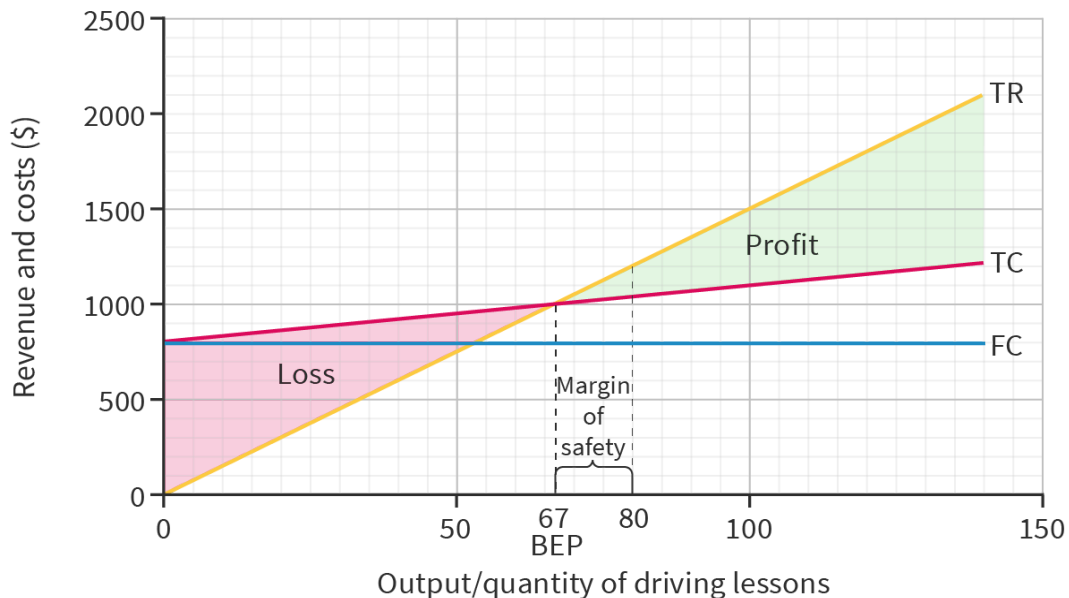


Figure 8. Shade in the profit and loss.

Exam tip

When you construct a break-even chart, you are expected to draw it to scale. This means that you need to be very careful how to number the quantities on the x-axis and the costs/revenues on the y-axis. This is a simple step that many students are not able to execute properly, especially under time constraints.

Make use of the grid lines on graph paper to help you scale your axes properly. Once you have the maximum values for each axis, you must break down that number into uniform distances using the grid lines. So if the maximum quantity you have on your graph is 1000, you might consider making each grid line worth 50 (which would make use of 20 grid lines on your graph paper). If the maximum quantity is 200, then each grid line might be worth 10.

It is useful just to practise identifying an appropriate scale and labelling numbers on an axis as a separate skill. You could ask your teacher to set out some exercises just for this.

Activity

Learner profile: Thinkers

Approaches to learning: Thinking skills (transfer)

In [Section 5.5.1 \(/study/app/y12-business-management-a-hl-may-2024/sid-351-cid-174702/book/calculating-breakeven-id-39496\)](https://study/app/y12-business-management-a-hl-may-2024/sid-351-cid-174702/book/calculating-breakeven-id-39496), you carried out an activity to calculate the following information for a pizza restaurant:

- the break-even quantity

- the target output for the desired level of profit
- the margin of safety at the target output

Now use the cost and revenue information to create a break-even chart for the same pizza restaurant, making sure you:

- include a title
- label both axes
- draw lines for fixed costs, total costs, and total revenue
- identify (mark the quantity of) the break-even point (BEP)
- identify the margin of safety at the target output