SOLUTIONS TO END-OF-CHAPTER QUESTIONS CHAPTER 12

❯ RECALL AND REVIEW

❯Question 12.1

The following are examples of non-financial factors that will affect make or buy decisions:

- The skills and knowledge that will be lost: if a decision is made to cease production of a part and to buy that part in from an outside supplier, the knowledge and skills used in the production of that part will be lost forever. The company will either have to redeploy the employees who made this part within the organisation or make them redundant.

- Continuity of supply: companies making the make or buy decision must consider the long-term consequences of this decision. Depending on an outside supplier for parts may make the company vulnerable to disruptions in the supply chain and take control of the production process out of the company's hands. The price of the outsourced parts may be cheaper now, but once the company is dependent on an outside supplier, then that outside supplier has the power to set future prices for the parts.

- Quality: while the parts may currently meet the quality threshold of the buying company, it is important to establish whether this will always be the case or whether the quality of parts bought in will decline over time. Products that incorporate lower quality inputs will require more maintenance during the warranty period or result in returned products and requests for refunds from dissatisfied customers.

- Reputation: should the quality of the final product fall below customers' expectations, then the company's reputation as a supplier of quality products may suffer, resulting in lost sales, lost profits and lost cash and, ultimately, in closure.

- Pricing: production of parts in-house enables the company to control the price of its inputs and, as a result, to control the selling price of the final product. Outsourcing the production of parts to an external party removes that control over both the cost of inputs and the selling price of the final product.

❯Question 12.2

The assumptions underlying marginal costing are as follows:

- Variable costs can be determined with the required level of precision to enable accurate calculations to be made.

- Variable costs are strictly linear. This means that variable costs vary directly in line with production levels and that each additional unit of production incurs exactly the same variable costs as all the other units of production.

- Fixed costs are constant and predictable.
- Prices are stable.

>> DEVELOP YOUR UNDERSTANDING

>> Question 12.3

(a) Contribution for one unit of production and sales is the selling price less the variable costs of production.

(b) Relevant costs in decision making are the costs that will be incurred if a certain course of action is followed. Relevant costs include opportunity costs.

(c) Irrelevant costs are those costs that will not change whatever course of action is chosen. Irrelevant costs in decision making include fixed costs and sunk costs.

(d) Sunk costs are those costs incurred in the past that have no further influence on decisions to be made in the future.

(e) Opportunity cost is the cost of choosing one alternative course of action over another.

(f) Break-even point is the point at which the revenue from sales = the total costs of the business both fixed and variable. The break-even point in sales units is given by dividing the total fixed costs by the contribution per unit of sales.

(g) The margin of safety is the current sales in units – the break-even point in sales units.

(h) A target profit is the sales in units required to generate a given level of profit. This is calculated by dividing the profit required by the contribution per unit and adding the break-even number of sales units.

>> Question 12.4

Podcaster University Press

Current profit: selling 200,000 text books at £30 each:

- Contribution per book: £30 selling price – £10 variable production costs = £20.
- Current profit: (200,000 sales × £20 contribution) – £3,000,000 fixed costs = £1,000,000.

Option 1: reduce selling price to £25 per book resulting in sales of 275,000 books:

- Contribution per book will now be: £25 selling price – £10 variable production costs = £15.
- Expected profit: (275,000 sales × £15 contribution) – £3,000,000 fixed costs = £1,125,000.

Option 2: reduce selling price to £21 per book resulting in sales of 360,000 books:

- Contribution per book now falls to: £21 selling price – £10 variable production costs = £11.
- Expected profit: (360,000 sales × £11 contribution) – £3,000,000 fixed costs = £960,000.

Option 1, reducing the selling price to £25 to sell 275,000 books per annum will result in a higher profit, whereas option 2 will result in a reduction in profit when compared with the current selling price of £30 and annual sales of 200,000 books. Therefore, Podcaster University Press should consider investigating option 1 further.

≫ Question 12.5

(a) Variable cost per table: £37 material + £25 wages + £13 variable overhead = £75

Break-even point in tables: £120,000 fixed costs ÷ £15 contribution per table sold (£90 selling price – £75 variable cost = £15 contribution per table) = 8,000 tables

(b) Margin of safety: 10,000 tables sold – the break-even point of 8,000 tables = 2,000 tables

(c) Sales of tables in units needed to make a profit of £150,000: (£120,000 fixed costs + £150,000 target profit) ÷ £15 contribution per table sold (£90 selling price – £75 variable cost = £15 contribution per table) = 18,000 tables

(d) New variable cost per table: £42 material + £25 wages + £13 variable overhead = £80

Sales of tables in units needed to make a profit of £150,000: (£120,000 fixed costs + £150,000 target profit) ÷ £5 contribution per table sold (£85 selling price – £80 variable cost = £5 contribution per table) = 54,000 tables

≫ Question 12.6

		£	£
Sales	(350 × £170)		59,500
Variable costs:			
Direct materials	(350 × £30)	10,500	
Direct labour	(350 × £35)	12,250	
Other variable costs	(350 × £15)	5,250	
Total variable costs			28,000
Total contribution			31,500
Fixed costs	(£180,000 ÷ 12) + (£60,000 ÷ 12)		20,000
Profit for January			**11,500**

≫ Question 12.7

(a)

	The relevant costs of making 8,500 part A7635s in-house £000	The relevant costs of buying 8,500 part A7635s from Lakers plc £000
Material	250	—
Labour	100	—
Fixed overhead	450	170
Equipment maintenance	90	—
Cost of purchasing the part	—	760
Total	**890**	**930**

The relevant costs in this decision are those costs that will change if the parts are bought in from Lakers plc. Buying in the parts will mean that no material or labour costs will be incurred, so £250,000 and £100,000 will be saved on materials and labour respectively. Of the £450,000 fixed overhead allocated to 8,500 part A7635s, £280,000 of these costs will be saved by buying in the parts, so only £170,000 (£450,000 − £280,000 = £170,000) of this fixed overhead will still be incurred if the parts are bought in. Machinery maintenance costs of £90,000 will no longer be incurred if the parts are bought in, so this is a further relevant cost and a further saving from buying in the parts rather than making them in-house.

(b) Spears Limited should continue to make the part in-house as it will cost £40,000 more to buy in 8,500 part A7635s from Lakers plc.

▶▶▶ TAKE IT FURTHER

▶▶▶ Question 12.8

Big Bucks University

(a) Relevant costs

- The lecturer costs are not relevant to the decision on how many students to recruit as the lecturers will be paid whether the modules run or not. The lecturer costs are thus sunk costs and irrelevant to the decision on student recruitment. If new staff were to be recruited to teach these modules, then these costs would be relevant.

- The overhead costs for each room allocated to the modules are also irrelevant as these costs will be incurred whether the courses run or not. Costs that are allocated out of central over-heads do not arise from the decision to run the modules and so are not relevant.

- The book and handout costs are relevant as these will vary directly in line with the number of students recruited to each module. For every additional module student recruited, a further cost of £100 for books and handouts will be incurred. These costs, along with the directly variable income from each student recruited to each module, will be relevant to the decision of how many students to recruit to each module in order to break even.

(b) Break-even point for each module

- Contribution per student: £400 module fee − £100 variable cost = £300 contribution

- Fixed costs per module: lecturer: £60 × 60 hours = £3,600

- Fixed costs per module: central overhead costs allocated: £1,200

- Total fixed costs per module: £3,600 + £1,200 = £4,800

- Break-even point: £4,800 (fixed costs) ÷ £300 (contribution per student) = 16 students

(c) Margin of safety if 25 students are recruited to each module

- 25 students recruited

- 16 students required to break even

- Therefore, margin of safety = 25 − 16 = 9 students

(d) Profit or loss at different recruitment levels

- Profit or loss at different recruitment levels will be determined by the number of students above or below the break-even point × the contribution per student

- 14 students recruited = 2 students (14 − 16) below the break-even point
- Loss incurred if 14 students are recruited = 2 × £300 = £600
- 30 students recruited = 14 students (30 −16) above the break-even point
- Profit earned if 30 students are recruited = 14 × 300 = £4,200

(e) Break-even point if the university decides to charge £340 per student per module

- Contribution per student now falls to: £340 − £100 = £240
- Fixed costs are unchanged at £4,800
- Break-even point = £4,800 ÷ £240 = 20 students

≫≫ Question 12.9

Gurjit Limited

(a) Current profit made at a level of sales and production of 5,000 ink jet printers per annum

	£	£
Sales: 5,000 × £40.00		200,000
Direct materials 5,000 × £9.50	47,500	
Direct labour 5,000 × £11.25	56,250	
Direct expense 5,000 × £3.65	18,250	
Total direct costs of production	**122,000**	
Fixed overhead 5,000 × £5.60	28,000	
Total costs		150,000
Profit on sales and production of 5,000 ink jet printers		**50,000**

(b) Profit expected at a level of sales and production of 10,000 ink jet printers per annum (in-house production of printers)

	£	£
Sales: 10,000 × £40.00		400,000
Direct materials 10,000 × £9.50	95,000	
Direct labour 10,000 × £11.25	112,500	
Direct expense 10,000 × £3.65	36,500	
Total direct costs of production	**244,000**	
Fixed overhead 5,000* × £5.60	28,000	
Total costs		272,000
Profit on sales and production of 10,000 ink jet printers		**128,000**

*No, this is not a misprint! Remember that fixed costs do not change, so, if the overhead absorbed is based on a level of production and sales of 5,000 units, this fixed overhead will not change if production and sales are higher. If you calculated fixed overheads to be £56,000, double the cost for 5,000 units, you should go back over the Marginal v. absorption costing section of Chapter 12 to prove to yourself that fixed costs do not change over a given period, in this case one year.

(c) Profit expected at a level of sales and production of 10,000 ink jet printers per annum and purchasing the finished ink jet printers from Anand Limited

	£	£
Sales: 10,000 × £40.00		400,000
10,000 finished ink jet printers from Anand Limited	200,000	
Additional quality control costs	40,000	
Total incremental costs of the buy decision	**240,000**	
Fixed overhead 5,000 × £5.60	28,000	
Total costs		268,000
Profit on sales and production of 10,000 ink jet printers		**132,000**

Expected profit from this option is £132,000, which is £4,000 higher than making the printers in-house. Relevant costs to take into account in this option are the costs of buying the finished products from Anand Limited and the additional quality control costs that will be incurred to make sure that the printers delivered meet the requirements of Gurjit Limited. These incremental costs (the costs that will be incurred if this option is adopted) are £240,000, which is £4,000 lower than the total direct costs of production that Gurjit Limited will incur if the company manufactures the printers themselves.

Therefore, on cost grounds, you would advise the directors of Gurjit Limited to cease in-house production of ink jet printers and transfer production to Anand Limited.

(d) Additional factors that the directors of Gurjit Limited should take into account in this decision, other than costs and profit, and points you might have included and developed further are as follows:

- Loss of internal expertise on the transfer of production to an outside party.

- Loss of control over production of ink jet printers.

- Any interruption to Anand Limited's production of printers through, for example, strikes, will mean that the products are not reaching the market and the reputation of Gurjit Limited will suffer damage.

- Additional costs to the reputation of Gurjit Limited should the products produced by Anand Limited fall short of customers' expectations.

- The additional quality control costs are only an estimate and these might be higher than the anticipated £40,000. Any increase in these costs might be greater than the total additional £4,000 profit that the directors expect to make by outsourcing production.

- Loss of confidentiality about product design and manufacture. Anand Limited could take the product and redesign and redevelop it and start producing a more advanced version itself, leading to Gurjit Limited losing all their customers and sales.

》》Question 12.10

Diddle Limited

Step 1: calculate the quantity of limiting factor used in the production of each product:

Clio: Material used: £30 ÷ £6 = 5 kg

Diana: Material used: £12 ÷ £6 = 2 kg

Athena: Material used: £42 ÷ £6 = 7 kg

Step 2: calculate the contribution per unit of limiting factor delivered by each product:

	Contribution per unit of limiting factor	Ranking
Clio	£30/5 kg per unit = £6 of contribution per unit of material used	2
Diana	£16/2 kg per unit = £8 of contribution per unit of material used	1
Athena	£35/7 kg per unit = £5 of contribution per unit of material used	3

The highest contribution per unit of limiting factor is delivered by Diana statues, which use just 2 kg of material in each unit and deliver a total contribution of £16 per product.

Step 3: calculate the contribution maximising production schedule:

Product	Kg of material per unit	Quantity produced	Kg of material used	Kg of material remaining	Contribution per unit	Total contribution
	Kg	Units	Kg	Kg	£	£
Diana	2	900	1,800	1,200	16	14,400
Clio	5	198	990	210	30	5,940
Athena	7	30	210	Nil	35	1,050
Total material used (kg)			**3,000**	**Total contribution**		**21,390**

Adopting the sales director's idea of maximising production of Athenas:

- 3,000 kg of material ÷ 7 kg per BE = 428 Athenas produced with 4 kg of material left over.

- Contribution from 428 Athenas = 428 × £35 = £14,890, well below the contribution maximising schedule above.

- As demand for Athenas is limited to 200 units, this would also mean that contribution for the month would only be 200 × £35 = £7,000 with 228 Athenas left unsold at the end of the month.