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ACCA Performance Management

Topic by Topic Quiz

Finprep Academy



Performance Management Topic-by-Topic Quiz Question

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Disclaimer! This material is not intended to replace practicing past questions. By organizing quizzes topic by topic, it is designed to make it easier for you to test your understanding immediately after studying a topic. Candidates are encouraged to also familiarize themselves with the way the exam body sets its examination questions.

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Advanced Costing Methods

Instructions: Please answer the following questions to the best of your ability. The correct answer, along with a detailed explanation, is provided at the end of this chapter.

Question 1

Precision Engineering Ltd, a manufacturer of specialised components, is considering implementing Activity-Based Costing (ABC) to improve product cost accuracy. The company's total overheads are £300,000, allocated across three major activities: Setup costs (£100,000), Quality inspection (£80,000), and Material handling (£120,000). The respective cost drivers are number of setups, number of inspections, and number of material movements.

Product Alpha requires 100 setups, 80 inspections, and 120 material movements. The total activity for the period across all products is 300 setups, 200 inspections, and 300 material movements.

What is the total overhead cost absorbed by Product Alpha using Activity-Based Costing?

- A. £95,000
- B. £150,000
- C. £113,333
- D. £100,000

Question 2

SwiftFlow Manufacturing Ltd produces three unique components, X, Y, and Z, which all pass through a single bottleneck machine. The company uses Throughput Accounting. Details for each product are provided below:

Product	Selling Price per unit (£)	Direct Material Cost per unit (£)	Time on Bottleneck per unit (hours)
X	120	40	0.5
Y	150	60	0.8
Z	100	30	0.4

Total factory costs are £200,000 per month, and the bottleneck machine operates for 1,000 hours per month.

Based on Throughput Accounting principles, which product should SwiftFlow Manufacturing Ltd prioritise to maximise its throughput, and what is its return per factory hour?

- A. Product Y, with a return per factory hour of £112.50.
- B. Product Z, with a return per factory hour of £175.00.
- C. Product X, with a return per factory hour of £160.00.

- **D.** Product Z, with a return per factory hour of £160.00.
-

Question 3

SpeedyPrint Services operates a digital printing facility where a specific high-speed printer is identified as the bottleneck. The company's current Throughput Accounting Ratio (TPAR) for its main product line is 0.85, which is below the desired level of 1.0. The management team is looking for ways to improve this ratio.

Which of the following actions, based on Throughput Accounting principles, would most directly contribute to improving SpeedyPrint Services' TPAR?

- **A.** Increasing total factory costs.
 - **B.** Improving the productivity of the bottleneck resource.
 - **C.** Increasing the direct labour cost per unit.
 - **D.** Reducing the selling price of the product.
-

Question 4

Consultancy Solutions Ltd is a professional services firm considering implementing target costing for its new bespoke advisory packages. The management team is finding it challenging to apply the concept effectively due to the unique nature of their service offerings.

Which characteristic of services, as described in the context of target costing, makes its application particularly difficult for Consultancy Solutions Ltd?

- **A.** The long product life cycle typical of service offerings.
 - **B.** The ease of standardising service output and quality.
 - **C.** The simultaneity, heterogeneity, intangibility, and perishability (SHIP) of services.
 - **D.** The high proportion of direct material costs in service delivery.
-

Question 5

AquaClean Utilities, a water treatment company, incurs various environmental costs. They pay a government levy for the discharge of treated wastewater into rivers, and they also spend money on maintaining their treatment plants to ensure compliance with discharge limits. Recently, they had to pay a fine of £5,000 for an accidental, minor overflow of untreated water into a local stream.

How would the government levy for discharging treated wastewater and the fine for the accidental overflow be primarily classified in terms of internal vs. external environmental costs?

- **A.** The levy is an internal cost, and the fine is an external cost.
- **B.** The levy is an internal cost, and the fine is also an internal cost (internalised external cost).

- **C.** Both are external costs.
 - **D.** Both are internal costs.
-

Question 6

GreenChem Ltd, a chemical manufacturer, has recently invested £50,000 in training its staff on new waste segregation procedures and £20,000 in installing advanced filters to prevent harmful emissions. Additionally, they spent £15,000 on regular testing of wastewater discharge and £10,000 on treating a batch of off-spec chemicals that could not be sold but had not yet been released into the environment.

According to Hansen & Mendoza's environmental cost classification, how would the £10,000 spent on treating the off-spec chemicals be categorised?

- **A.** Internal failure cost
 - **B.** Detection cost
 - **C.** External failure cost
 - **D.** Prevention cost
-

Question 7

InnovateTech Solutions is developing a new software product. The development phase has incurred significant R&D costs, and the marketing team is planning a substantial launch campaign. The finance director is concerned that traditional periodic costing methods might not accurately reflect the true profitability of the software over its entire lifespan, especially given that many costs are locked in early.

Which costing principle would best address the finance director's concern by providing a comprehensive view of the product's total cost and revenue from its inception to its eventual withdrawal from the market?

- **A.** Life Cycle Costing
 - **B.** Target Costing
 - **C.** Throughput Accounting
 - **D.** Activity-Based Costing
-

Question 8

BioPharma Innovations is developing a new drug. The R&D phase has been lengthy and expensive, and the company anticipates significant costs for clinical trials, regulatory approvals, and eventual marketing. The CEO is keen to understand the total financial commitment and potential returns over the drug's entire commercial life, rather than just annual profits.

Why is Life Cycle Costing particularly important for BioPharma Innovations in this scenario?

5

- **A.** It helps to identify the bottleneck in the production process.
 - **B.** It highlights that a large proportion of costs are locked in at the design stage, providing a true total cost.
 - **C.** It focuses on market-driven pricing rather than cost-plus.
 - **D.** It ensures that only direct material costs are considered variable.
-

Question 9

EcoHome Appliances, a manufacturer of sustainable kitchenware, is developing a new energy-efficient blender. Market research indicates that a competitive selling price for this product would be £180. The company aims for a profit margin of 25% on the selling price. Their current estimated production cost for the blender, based on initial designs and supplier quotes, is £145 per unit.

What is the cost gap that EcoHome Appliances needs to close for this new product?

- **A.** £15 per unit
 - **B.** £20 per unit
 - **C.** £5 per unit
 - **D.** £10 per unit
-

Question 10

FutureBuild Construction, a large property developer, is facing increasing pressure from investors and regulators to demonstrate its commitment to sustainability. The board is discussing how to integrate environmental and social considerations into its strategic planning and reporting. The Chief Financial Officer believes the management accounting team has a critical role to play beyond just financial reporting.

Which of the following best describes a key role of the management accountant in championing sustainability within FutureBuild Construction?

- **A.** Delegating all sustainability initiatives to the marketing department for public relations purposes.
 - **B.** Primarily ensuring compliance with short-term financial targets, even if it compromises long-term sustainability.
 - **C.** Solely focusing on preparing statutory financial statements for external stakeholders.
 - **D.** Identifying and quantifying reputational and ethical risks associated with unsustainable practices.
-

Answer Key and Explanations

1. Correct Answer: C. £113,333

- **Explanation:** First, calculate the cost driver rates:
 - Setup rate = $\text{£}100,000 / 300 \text{ setups} = \text{£}333.33 \text{ per setup}$
 - Inspection rate = $\text{£}80,000 / 200 \text{ inspections} = \text{£}400 \text{ per inspection}$
 - Material handling rate = $\text{£}120,000 / 300 \text{ movements} = \text{£}400 \text{ per movement}$Then, allocate overheads to Product Alpha:
 - Setup: $100 \text{ setups} \times \text{£}333.33/\text{setup} = \text{£}33,333$
 - Inspection: $80 \text{ inspections} \times \text{£}400/\text{inspection} = \text{£}32,000$
 - Material handling: $120 \text{ movements} \times \text{£}400/\text{movement} = \text{£}48,000$Total overhead for Product Alpha = $\text{£}33,333 + \text{£}32,000 + \text{£}48,000 = \text{£}113,333$.

2. Correct Answer: B. Product Z, with a return per factory hour of £175.00.

- **Explanation:** Throughput (Return per factory hour) = (Selling Price - Direct Material Cost) / Time on Bottleneck.
 - Product X: $(\text{£}120 - \text{£}40) / 0.5 = \text{£}80 / 0.5 = \text{£}160.00$
 - Product Y: $(\text{£}150 - \text{£}60) / 0.8 = \text{£}90 / 0.8 = \text{£}112.50$
 - Product Z: $(\text{£}100 - \text{£}30) / 0.4 = \text{£}70 / 0.4 = \text{£}175.00$To maximise throughput, the product with the highest return per factory hour should be prioritised. **Product Z has the highest return at £175.00.**

3. Correct Answer: B. Improving the productivity of the bottleneck resource.

- **Explanation:** The Throughput Accounting Ratio (TPAR) is calculated as (Return per factory hour / Cost per factory hour). Improving the productivity of the bottleneck resource (e.g., reducing downtime, increasing speed) would increase the return generated per hour, thereby directly improving the TPAR. The other options would either decrease return or increase costs, worsening the ratio.

4. Correct Answer: C. The simultaneity, heterogeneity, intangibility, and perishability (SHIP) of services.

- **Explanation:** Target costing is difficult to apply to services due to their unique characteristics (often summarised as SHIP). Services are intangible, can be heterogeneous (variable), are often consumed simultaneously with production, and are perishable (cannot be stored). These features make it harder to define a standard "unit of service," estimate costs accurately, and establish a reliable target cost.

5. Correct Answer: B. The levy is an internal cost, and the fine is also an internal cost (internalised external cost).

- **Explanation:** Internal environmental costs are those that have a direct financial impact on the company. A government levy is a direct cost to the company, making it an internal cost. A fine for an accidental overflow is also a direct financial penalty, representing an **internalised external cost**—the cost of an environmental impact that has been imposed on the company by a regulator. External costs are those borne by society, not directly paid by the company.

6. Correct Answer: A. Internal failure cost

- **Explanation:** According to Hansen & Mendoza's classification, internal failure costs are incurred to correct environmental problems that have been identified *before* they reach the external environment. Treating off-spec chemicals that have not been released fits this definition. Prevention costs (training), detection costs (testing), and external failure costs (fines, cleanup after release) are other categories.

7. Correct Answer: A. Life Cycle Costing

- **Explanation:** Life Cycle Costing tracks and accumulates all costs and revenues attributed to a product over its entire life cycle, from inception (R&D, design) to abandonment. This provides a comprehensive view of total profitability, unlike traditional periodic costing which only captures costs and revenues within a single accounting period, potentially masking the true picture when significant costs are incurred early.

8. Correct Answer: B. It highlights that a large proportion of costs are locked in at the design stage, providing a true total cost.

- **Explanation:** A key insight from Life Cycle Costing is that a significant percentage of a product's total life cycle costs are committed or "locked in" during the design and development phase. For a new drug, early R&D and clinical trial costs are massive and determine the cost structure for the rest of its life. Life cycle costing provides the true total cost picture that annual accounts cannot show.

9. Correct Answer: D. £10 per unit

- **Explanation:** Target costing starts with a market-driven selling price and subtracts a desired profit margin to arrive at a target cost.
 - Target cost = Target selling price - Desired profit
 - Desired profit = 25% × £180 = **£45**
 - Target cost = £180 - £45 = **£135**
 - Cost gap = Current estimated cost - Target cost = £145 - £135 = **£10 per unit.**

10. Correct Answer: D. Identifying and quantifying reputational and ethical risks associated with unsustainable practices.

- **Explanation:** Management accountants have a key role in championing sustainability by going beyond simple financial reporting. This includes identifying, measuring, and reporting on non-financial aspects such as reputational and ethical risks linked to unsustainable practices. This information helps the board make more informed strategic decisions that consider the long-term value and resilience of the organisation.

Advanced variances

Instructions: Please answer the following questions to the best of your ability. The correct answer, along with a detailed explanation, is provided at the end of this chapter.

Question 1

TechGadgets Ltd sells two products, 'SmartWatch' and 'EarBuds'. The budgeted sales mix for the month was 60% SmartWatch and 40% EarBuds, with standard profit margins of £50 per SmartWatch and £30 per EarBuds. Total budgeted sales were 1,000 units. Actual sales for the month were 1,200 units, comprising 800 SmartWatches and 400 EarBuds.

What is TechGadgets Ltd's Sales Mix Variance for the month?

- A. £2,400 Adverse
 - B. £4,000 Favourable
 - C. £800 Adverse
 - D. £1,600 Favourable
-

Question 2

ChemCo Ltd manufactures a chemical product requiring two raw materials, Alpha and Beta. The standard mix for a 100kg batch is 60kg of Alpha at £10/kg and 40kg of Beta at £15/kg. This standard mix is expected to yield 90kg of finished product. In the latest period, ChemCo processed 5,000kg of materials, consisting of 2,800kg of Alpha and 2,200kg of Beta. The standard cost for Alpha is £10/kg and Beta is £15/kg.

What is ChemCo Ltd's Material Mix Variance for the period?

- A. £3,000 Adverse
 - B. £2,000 Favourable
 - C. £5,000 Favourable
 - D. £1,000 Adverse
-

Question 3

Using the same data for **TechGadgets Ltd** from the previous question:

Budgeted sales: 1,000 units (60% SmartWatch, 40% EarBuds).

Standard profit: SmartWatch £50, EarBuds £30.

Actual sales: 1,200 units (800 SmartWatches, 400 EarBuds).

What is TechGadgets Ltd's Sales Quantity Variance for the month?

- **A.** £2,400 Favourable
 - **B.** £10,000 Favourable
 - **C.** £6,000 Favourable
 - **D.** £8,400 Favourable
-

Question 4

AgriFoods plc produces a processed food item. The standard states that 500kg of raw ingredients should yield 450kg of finished product. The standard cost per kg of finished product is £8. In the last month, AgriFoods processed 12,000kg of raw ingredients, which resulted in an actual output of 10,500kg of finished product.

What is AgriFoods plc's Material Yield Variance for the month?

- **A.** £2,400 Favourable
 - **B.** £3,000 Adverse
 - **C.** £3,600 Favourable
 - **D.** £2,400 Adverse
-

Question 5

AutoParts Ltd uses a specialised alloy in its manufacturing process. The original standard price for this alloy was £25 per kg. Due to unforeseen global supply chain disruptions, the market price for the alloy significantly increased. Management revised the standard price to £28 per kg to reflect this uncontrollable change. The actual purchase price for the alloy during the period was £29 per kg. AutoParts Ltd purchased 5,000 kg of the alloy.

What is AutoParts Ltd's Material Price Planning Variance for the period?

- **A.** £10,000 Favourable
 - **B.** £15,000 Adverse
 - **C.** £5,000 Adverse
 - **D.** £15,000 Favourable
-

Question 6

HomeGoods plc manufactures and sells a range of kitchen appliances. For the last quarter, the Sales Mix Variance was calculated as £15,000 Adverse, indicating a shift towards lower-profit products. The total Sales Volume Variance for the quarter was £5,000 Favourable. The sales director is reviewing these figures to understand the underlying drivers of sales performance.

What was HomeGoods plc's Sales Quantity Variance for the quarter?

- **A.** £10,000 Adverse
 - **B.** £15,000 Favourable
 - **C.** £20,000 Favourable
 - **D.** £5,000 Adverse
-

Question 7

Software Solutions plc operates in the enterprise software market. The original budget anticipated a total market size of 10,000 units for their product category, with Software Solutions plc expecting to capture 10% market share. However, due to a general economic downturn, the actual total market size for the period was only 8,000 units. Software Solutions plc maintained its original budgeted market share of 10%. The standard profit per unit is £1,000.

What is Software Solutions plc's Sales Market Size Variance (Planning Variance) for the period?

- **A.** £100,000 Favourable
 - **B.** £200,000 Adverse
 - **C.** £80,000 Adverse
 - **D.** £20,000 Favourable
-

Question 8

Using the same data for **AutoParts Ltd** from the previous question:

Original standard price: £25 per kg.

Revised standard price: £28 per kg.

Actual purchase price: £29 per kg.

Actual quantity purchased: 5,000 kg.

What is AutoParts Ltd's Material Price Operational Variance for the period?

- **A.** £5,000 Favourable
 - **B.** £10,000 Favourable
 - **C.** £5,000 Adverse
 - **D.** £15,000 Adverse
-

Question 9

FashionForward Ltd sells high-end clothing. The original budget projected a total market size of 50,000 units and a market share of 15% for FashionForward. Due to a competitor's aggressive campaign, the revised market share for FashionForward (what they *should* have achieved given the circumstances) was 12%. However, FashionForward's actual market share achieved was 13%. The actual total market size for the period was 48,000 units. The standard profit per unit is £200.

What is FashionForward Ltd's Sales Market Share Variance (Operational Variance) for the period?

- **A.** £48,000 Favourable
- **B.** £24,000 Adverse
- **C.** £144,000 Adverse
- **D.** £96,000 Favourable

Question 10

BuildRight Ltd, a construction materials manufacturer, has been analysing its material variances. For the latest production run, the Material Mix Variance was calculated as £7,500 Favourable, and the total Material Usage Variance was £2,000 Adverse. The production manager is trying to understand the overall efficiency of material conversion.

Based on this information, what was BuildRight Ltd's Material Yield Variance for the period?

- **A.** £9,500 Adverse
- **B.** £7,500 Favourable
- **C.** £5,500 Favourable
- **D.** £2,000 Adverse

Answer Key and Explanations

1. Correct Answer: D. £1,600 Favourable

- **Explanation:** The Sales Mix Variance measures the effect on profit of selling a different proportion of each product compared to the standard (budgeted) mix. The formula is (Actual Sales in Actual Mix - Actual Sales in Standard Mix) × Standard Profit per Unit.

Actual total sales = 1,200 units.

Actual sales in actual mix: SmartWatch: 800 units; EarBuds: 400 units.

Actual sales in standard mix (for 1,200 units total): SmartWatch: $1,200 \times 60\% = 720$ units; EarBuds: $1,200 \times 40\% = 480$ units.

Variance for SmartWatch: $(800 - 720) \times £50 = 80 \times £50 = \mathbf{£4,000 (Favourable)}$.

Variance for EarBuds: $(400 - 480) \times £30 = -80 \times £30 = \mathbf{-£2,400 (Adverse)}$.

Total Sales Mix Variance = £4,000 Favourable + £2,400 Adverse = **£1,600 Favourable**.

2. Correct Answer: D. £1,000 Adverse

- **Explanation:** The Material Mix Variance measures the cost difference between the actual mix of materials used and the standard mix for the total quantity of materials used. The formula is (Actual Quantity in Actual Mix - Actual Quantity in Standard Mix) × Standard Cost.

Total actual input = 5,000kg.

Standard mix for 5,000kg input: Alpha: $5,000\text{kg} \times (60/100) = 3,000\text{kg}$; Beta: $5,000\text{kg} \times (40/100) = 2,000\text{kg}$.

Actual mix for 5,000kg input: Alpha: 2,800kg; Beta: 2,200kg.

Variance for Alpha: $(2,800\text{kg} - 3,000\text{kg}) \times £10/\text{kg} = -£2,000$ (Favourable).

Variance for Beta: $(2,200\text{kg} - 2,000\text{kg}) \times £15/\text{kg} = £3,000$ (Adverse).

Total Material Mix Variance = £2,000 Favourable + £3,000 Adverse = **£1,000 Adverse**.

3. Correct Answer: D. £8,400 Favourable

- **Explanation:** The Sales Quantity Variance measures the effect on profit of selling a different total number of units (in standard mix) compared to the budget. The formula is (Actual Sales in Standard Mix - Budgeted Sales in Standard Mix) × Standard Profit per Unit of Standard Mix.

First, calculate the standard profit per unit of the standard mix: $(60\% \times £50) + (40\% \times £30) = £30 + £12 = \text{£42 per unit of standard mix}$.

Actual total sales = 1,200 units; Budgeted total sales = 1,000 units.

Sales Quantity Variance = $(1,200 \text{ units} - 1,000 \text{ units}) \times £42/\text{unit} = 200 \text{ units} \times £42 = \text{£8,400 Favourable}$.

4. Correct Answer: D. £2,400 Adverse

- **Explanation:** The Material Yield Variance measures the cost difference between the actual output achieved and the standard output expected from the actual total quantity of materials used. The formula is (Actual Yield - Standard Yield from Actual Input) × Standard Cost per Unit of Output.

Standard yield from actual input: $(12,000\text{kg actual input} / 500\text{kg standard input}) \times 450\text{kg standard yield} = 24 \times 450\text{kg} = \text{10,800kg}$.

Actual yield = 10,500kg; Standard cost per unit of output = £8/kg.

Material Yield Variance = $(10,500\text{kg} - 10,800\text{kg}) \times £8/\text{kg} = -300\text{kg} \times £8 = -£2,400$. This is an **Adverse** variance.

5. Correct Answer: B. £15,000 Adverse

- **Explanation:** Planning variances arise from errors in the original standard-setting process or from unexpected, uncontrollable changes in external factors. The Material Price Planning Variance is calculated as (Original Standard Price - Revised Standard Price) × Actual Quantity Purchased.
 $= (£25/\text{kg} - £28/\text{kg}) \times 5,000\text{kg} = -£3/\text{kg} \times 5,000\text{kg} = -£15,000$. This is an **Adverse** planning variance.

6. Correct Answer: C. £20,000 Favourable

- **Explanation:** The relationship between sales variances states that the sum of the Sales Mix Variance and the Sales Quantity Variance equals the total Sales Volume Variance.

Sales Mix Variance + Sales Quantity Variance = Total Sales Volume Variance

£15,000 Adverse + Sales Quantity Variance = £5,000 Favourable

To find the Sales Quantity Variance, we rearrange the equation:

Sales Quantity Variance = £5,000 Favourable - £15,000 Adverse

Sales Quantity Variance = £5,000 Favourable + £15,000 Favourable = **£20,000 Favourable**.

7. Correct Answer: B. £200,000 Adverse

- **Explanation:** The Sales Market Size Variance is a planning variance that arises from changes in the overall market size. It is calculated as (Actual Market Size - Budgeted Market Size) × Budgeted Market Share × Standard Profit per Unit.
= (8,000 units - 10,000 units) × 10% × £1,000/unit = -2,000 units × 0.10 × £1,000 = -200 units × £1,000 = **-£200,000**. This is an **Adverse** variance.

8. Correct Answer: C. £5,000 Adverse

- **Explanation:** Operational variances arise from internal efficiency, performance, and control. The Material Price Operational Variance is calculated as (Revised Standard Price - Actual Price) × Actual Quantity Purchased.
= (£28/kg - £29/kg) × 5,000kg = -£1/kg × 5,000kg = **-£5,000**. This is an **Adverse** operational variance.

9. Correct Answer: D. £96,000 Favourable

- **Explanation:** The Sales Market Share Variance is an operational variance that measures the company's performance within the market. It is calculated as (Actual Market Share - Revised Market Share) × Actual Market Size × Standard Profit per Unit.
= (13% - 12%) × 48,000 units × £200/unit = 0.01 × 48,000 units × £200 = 480 units × £200 = **£96,000**. This is a **Favourable** variance.

10. Correct Answer: A. £9,500 Adverse

- **Explanation:** The relationship between material variances states that the sum of the Material Mix Variance and the Material Yield Variance equals the total Material Usage Variance.
Material Mix Variance + Material Yield Variance = Total Material Usage Variance
£7,500 Favourable + Material Yield Variance = £2,000 Adverse
To find the Material Yield Variance, we rearrange the equation:
Material Yield Variance = £2,000 Adverse - £7,500 Favourable
Material Yield Variance = £2,000 Adverse + £7,500 Adverse = **£9,500 Adverse**.

Advanced variances

Instructions: Please answer the following questions to the best of your ability. The correct answer, along with a detailed explanation, is provided at the end of this chapter.

Question 1

TechGadgets Ltd sells two products, 'SmartWatch' and 'EarBuds'. The budgeted sales mix for the month was 60% SmartWatch and 40% EarBuds, with standard profit margins of £50 per SmartWatch and £30 per EarBuds. Total budgeted sales were 1,000 units. Actual sales for the month were 1,200 units, comprising 800 SmartWatches and 400 EarBuds.

What is TechGadgets Ltd's Sales Mix Variance for the month?

- A. £2,400 Adverse
 - B. £4,000 Favourable
 - C. £800 Adverse
 - D. £1,600 Favourable
-

Question 2

ChemCo Ltd manufactures a chemical product requiring two raw materials, Alpha and Beta. The standard mix for a 100kg batch is 60kg of Alpha at £10/kg and 40kg of Beta at £15/kg. This standard mix is expected to yield 90kg of finished product. In the latest period, ChemCo processed 5,000kg of materials, consisting of 2,800kg of Alpha and 2,200kg of Beta. The standard cost for Alpha is £10/kg and Beta is £15/kg.

What is ChemCo Ltd's Material Mix Variance for the period?

- A. £3,000 Adverse
 - B. £2,000 Favourable
 - C. £5,000 Favourable
 - D. £1,000 Adverse
-

Question 3

Using the same data for **TechGadgets Ltd** from the previous question:

Budgeted sales: 1,000 units (60% SmartWatch, 40% EarBuds).

Standard profit: SmartWatch £50, EarBuds £30.

Actual sales: 1,200 units (800 SmartWatches, 400 EarBuds).

What is TechGadgets Ltd's Sales Quantity Variance for the month?

- **A.** £2,400 Favourable
 - **B.** £10,000 Favourable
 - **C.** £6,000 Favourable
 - **D.** £8,400 Favourable
-

Question 4

AgriFoods plc produces a processed food item. The standard states that 500kg of raw ingredients should yield 450kg of finished product. The standard cost per kg of finished product is £8. In the last month, AgriFoods processed 12,000kg of raw ingredients, which resulted in an actual output of 10,500kg of finished product.

What is AgriFoods plc's Material Yield Variance for the month?

- **A.** £2,400 Favourable
 - **B.** £3,000 Adverse
 - **C.** £3,600 Favourable
 - **D.** £2,400 Adverse
-

Question 5

AutoParts Ltd uses a specialised alloy in its manufacturing process. The original standard price for this alloy was £25 per kg. Due to unforeseen global supply chain disruptions, the market price for the alloy significantly increased. Management revised the standard price to £28 per kg to reflect this uncontrollable change. The actual purchase price for the alloy during the period was £29 per kg. AutoParts Ltd purchased 5,000 kg of the alloy.

What is AutoParts Ltd's Material Price Planning Variance for the period?

- **A.** £10,000 Favourable
 - **B.** £15,000 Adverse
 - **C.** £5,000 Adverse
 - **D.** £15,000 Favourable
-

Question 6

HomeGoods plc manufactures and sells a range of kitchen appliances. For the last quarter, the Sales Mix Variance was calculated as £15,000 Adverse, indicating a shift towards lower-profit products. The total Sales Volume Variance for the quarter was £5,000 Favourable. The sales director is reviewing these figures to understand the underlying drivers of sales performance.

What was HomeGoods plc's Sales Quantity Variance for the quarter?

- **A.** £10,000 Adverse
 - **B.** £15,000 Favourable
 - **C.** £20,000 Favourable
 - **D.** £5,000 Adverse
-

Question 7

Software Solutions plc operates in the enterprise software market. The original budget anticipated a total market size of 10,000 units for their product category, with Software Solutions plc expecting to capture 10% market share. However, due to a general economic downturn, the actual total market size for the period was only 8,000 units. Software Solutions plc maintained its original budgeted market share of 10%. The standard profit per unit is £1,000.

What is Software Solutions plc's Sales Market Size Variance (Planning Variance) for the period?

- **A.** £100,000 Favourable
 - **B.** £200,000 Adverse
 - **C.** £80,000 Adverse
 - **D.** £20,000 Favourable
-

Question 8

Using the same data for **AutoParts Ltd** from the previous question:

Original standard price: £25 per kg.

Revised standard price: £28 per kg.

Actual purchase price: £29 per kg.

Actual quantity purchased: 5,000 kg.

What is AutoParts Ltd's Material Price Operational Variance for the period?

- **A.** £5,000 Favourable
 - **B.** £10,000 Favourable
 - **C.** £5,000 Adverse
 - **D.** £15,000 Adverse
-

Question 9

FashionForward Ltd sells high-end clothing. The original budget projected a total market size of 50,000 units and a market share of 15% for FashionForward. Due to a competitor's aggressive campaign, the revised market share for FashionForward (what they *should* have achieved given the circumstances) was 12%. However, FashionForward's actual market share achieved was 13%. The actual total market size for the period was 48,000 units. The standard profit per unit is £200.

What is FashionForward Ltd's Sales Market Share Variance (Operational Variance) for the period?

- **A.** £48,000 Favourable
- **B.** £24,000 Adverse
- **C.** £144,000 Adverse
- **D.** £96,000 Favourable

Question 10

BuildRight Ltd, a construction materials manufacturer, has been analysing its material variances. For the latest production run, the Material Mix Variance was calculated as £7,500 Favourable, and the total Material Usage Variance was £2,000 Adverse. The production manager is trying to understand the overall efficiency of material conversion.

Based on this information, what was BuildRight Ltd's Material Yield Variance for the period?

- **A.** £9,500 Adverse
- **B.** £7,500 Favourable
- **C.** £5,500 Favourable
- **D.** £2,000 Adverse

Answer Key and Explanations

1. Correct Answer: D. £1,600 Favourable

- **Explanation:** The Sales Mix Variance measures the effect on profit of selling a different proportion of each product compared to the standard (budgeted) mix. The formula is (Actual Sales in Actual Mix - Actual Sales in Standard Mix) × Standard Profit per Unit.

Actual total sales = 1,200 units.

Actual sales in actual mix: SmartWatch: 800 units; EarBuds: 400 units.

Actual sales in standard mix (for 1,200 units total): SmartWatch: $1,200 \times 60\% = 720$ units; EarBuds: $1,200 \times 40\% = 480$ units.

Variance for SmartWatch: $(800 - 720) \times £50 = 80 \times £50 = \mathbf{£4,000 (Favourable)}$.

Variance for EarBuds: $(400 - 480) \times £30 = -80 \times £30 = \mathbf{-£2,400 (Adverse)}$.

Total Sales Mix Variance = £4,000 Favourable + £2,400 Adverse = **£1,600 Favourable**.

2. Correct Answer: D. £1,000 Adverse

- Explanation:** The Material Mix Variance measures the cost difference between the actual mix of materials used and the standard mix for the total quantity of materials used. The formula is (Actual Quantity in Actual Mix - Actual Quantity in Standard Mix) × Standard Cost.

Total actual input = 5,000kg.

Standard mix for 5,000kg input: Alpha: $5,000\text{kg} \times (60/100) = 3,000\text{kg}$; Beta: $5,000\text{kg} \times (40/100) = 2,000\text{kg}$.

Actual mix for 5,000kg input: Alpha: 2,800kg; Beta: 2,200kg.

Variance for Alpha: $(2,800\text{kg} - 3,000\text{kg}) \times £10/\text{kg} = -£2,000$ (**Favourable**).

Variance for Beta: $(2,200\text{kg} - 2,000\text{kg}) \times £15/\text{kg} = £3,000$ (**Adverse**).

Total Material Mix Variance = £2,000 Favourable + £3,000 Adverse = **£1,000 Adverse**.

3. Correct Answer: D. £8,400 Favourable

- Explanation:** The Sales Quantity Variance measures the effect on profit of selling a different total number of units (in standard mix) compared to the budget. The formula is (Actual Sales in Standard Mix - Budgeted Sales in Standard Mix) × Standard Profit per Unit of Standard Mix.

First, calculate the standard profit per unit of the standard mix: $(60\% \times £50) + (40\% \times £30) = £30 + £12 =$ **£42 per unit of standard mix**.

Actual total sales = 1,200 units; Budgeted total sales = 1,000 units.

Sales Quantity Variance = $(1,200 \text{ units} - 1,000 \text{ units}) \times £42/\text{unit} = 200 \text{ units} \times £42 =$ **£8,400 Favourable**.

4. Correct Answer: D. £2,400 Adverse

- Explanation:** The Material Yield Variance measures the cost difference between the actual output achieved and the standard output expected from the actual total quantity of materials used. The formula is (Actual Yield - Standard Yield from Actual Input) × Standard Cost per Unit of Output.

Standard yield from actual input: $(12,000\text{kg actual input} / 500\text{kg standard input}) \times 450\text{kg standard yield} = 24 \times 450\text{kg} =$ **10,800kg**.

Actual yield = 10,500kg; Standard cost per unit of output = £8/kg.

Material Yield Variance = $(10,500\text{kg} - 10,800\text{kg}) \times £8/\text{kg} = -300\text{kg} \times £8 =$ **-£2,400**. This is an **Adverse** variance.

5. Correct Answer: B. £15,000 Adverse

- Explanation:** Planning variances arise from errors in the original standard-setting process or from unexpected, uncontrollable changes in external factors. The Material Price Planning Variance is calculated as (Original Standard Price - Revised Standard Price) × Actual Quantity Purchased.
 $= (£25/\text{kg} - £28/\text{kg}) \times 5,000\text{kg} = -£3/\text{kg} \times 5,000\text{kg} =$ **-£15,000**. This is an **Adverse** planning variance.

6. Correct Answer: C. £20,000 Favourable

- Explanation:** The relationship between sales variances states that the sum of the Sales Mix Variance and the Sales Quantity Variance equals the total Sales Volume Variance.

Sales Mix Variance + Sales Quantity Variance = Total Sales Volume Variance

£15,000 Adverse + Sales Quantity Variance = £5,000 Favourable

To find the Sales Quantity Variance, we rearrange the equation:

Sales Quantity Variance = £5,000 Favourable - £15,000 Adverse

Sales Quantity Variance = £5,000 Favourable + £15,000 Favourable = **£20,000 Favourable**.

7. Correct Answer: B. £200,000 Adverse

- **Explanation:** The Sales Market Size Variance is a planning variance that arises from changes in the overall market size. It is calculated as (Actual Market Size - Budgeted Market Size) × Budgeted Market Share × Standard Profit per Unit.
= (8,000 units - 10,000 units) × 10% × £1,000/unit = -2,000 units × 0.10 × £1,000 = -200 units × £1,000 = **-£200,000**. This is an **Adverse** variance.

8. Correct Answer: C. £5,000 Adverse

- **Explanation:** Operational variances arise from internal efficiency, performance, and control. The Material Price Operational Variance is calculated as (Revised Standard Price - Actual Price) × Actual Quantity Purchased.
= (£28/kg - £29/kg) × 5,000kg = -£1/kg × 5,000kg = **-£5,000**. This is an **Adverse** operational variance.

9. Correct Answer: D. £96,000 Favourable

- **Explanation:** The Sales Market Share Variance is an operational variance that measures the company's performance within the market. It is calculated as (Actual Market Share - Revised Market Share) × Actual Market Size × Standard Profit per Unit.
= (13% - 12%) × 48,000 units × £200/unit = 0.01 × 48,000 units × £200 = 480 units × £200 = **£96,000**. This is a **Favourable** variance.

10. Correct Answer: A. £9,500 Adverse

- **Explanation:** The relationship between material variances states that the sum of the Material Mix Variance and the Material Yield Variance equals the total Material Usage Variance.
Material Mix Variance + Material Yield Variance = Total Material Usage Variance
£7,500 Favourable + Material Yield Variance = £2,000 Adverse
To find the Material Yield Variance, we rearrange the equation:
Material Yield Variance = £2,000 Adverse - £7,500 Favourable
Material Yield Variance = £2,000 Adverse + £7,500 Adverse = **£9,500 Adverse**.

Budgeting

Instructions: Please answer the following questions to the best of your ability. The correct answer, along with a detailed explanation, is provided at the end of this chapter.

Question 1

Retail Innovations Group evaluates its store managers based on their store's monthly profit. However, a recent review highlighted that store managers are being held accountable for central marketing campaign costs and head office depreciation, which they have no authority to influence. This has led to significant demotivation among managers who feel unfairly assessed, impacting their commitment to the organization's profit goals.

Which principle of effective budgeting and performance evaluation is being violated by Retail Innovations Group's current practice?

- **A.** Budget difficulty principle
 - **B.** Budgetary slack principle
 - **C.** Controllability principle
 - **D.** Participative budgeting principle
-

Question 2

Gourmet Foods Ltd. produces a range of premium ready meals. For the upcoming quarter, the company budgeted to produce 10,000 units. However, due to an unexpected surge in demand, actual production reached 12,000 units. The finance team is struggling to compare the actual costs incurred with the original budget, as many costs vary with production volume. They need a method to adjust the budget to the actual activity level for meaningful performance evaluation and control.

Which budgeting system would best enable Gourmet Foods Ltd. to accurately assess the performance of its production department by adjusting the budget to the actual activity level?

- **A.** Beyond Budgeting
 - **B.** Flexible Budgeting
 - **C.** Incremental Budgeting
 - **D.** Static Budgeting
-

Question 3

Horizon Manufacturing Ltd. is a growing organization that has experienced significant confusion and delays during its annual budgeting cycle. Departmental managers are often unsure about their responsibilities, the timelines for submission, and the specific procedures to follow. The CEO has decided to establish a cross-

functional team to oversee the entire process and to document all procedures and responsibilities clearly to improve the management of the plan.

What two formal elements of the budgeting process is Horizon Manufacturing Ltd. establishing to improve clarity and coordination of its functional budgets?

- **A.** A Master Budget and Functional Budgets
 - **B.** A Budget Manual and a Budget Committee
 - **C.** Participative Budgeting and Imposed Budgets
 - **D.** Zero-Based Budgeting and Rolling Budgets
-

Question 4

GreenTech Solutions plc is setting its annual budget. The CEO has mandated that all departmental budgets must include specific targets for reducing energy consumption and waste generation, alongside traditional financial metrics. Furthermore, the CEO emphasized that the budget should not create incentives for managers to cut corners on product quality or environmental regulations to meet cost targets, ensuring ethical behavior within the organization.

Which two key modern considerations in budgeting are GreenTech Solutions plc actively incorporating into its budgeting process and management plan?

- **A.** Budgetary slack and feedforward control
 - **B.** Ethical behavior and sustainability goals
 - **C.** Flexible budgeting and principal budget factor identification
 - **D.** Incremental adjustments and top-down imposition
-

Question 5

The senior management of **Apex Innovations plc** has decided to implement a new budgeting approach. They believe that involving departmental managers in the budget-setting process will increase motivation and commitment, as well as leverage their local knowledge for more accurate forecasts. However, the finance director is wary of potential issues such as managers deliberately understating revenue or overstating costs to make targets easier to achieve, thereby impacting the organization's overall profit.

What specific behavioral issue is the finance director concerned about with this new participative budgeting approach?

- **A.** Budgetary slack
- **B.** Budgetary control failure
- **C.** Budgetary demotivation

- **D. Budgetary rigidity**
-

Question 6

Oakwood Designs Ltd., a furniture manufacturer, experiences high demand for its bespoke oak tables. However, the availability of skilled carpenters, particularly those proficient in intricate carving, is severely limited in the region. The company's production capacity is consistently constrained by the hours these skilled artisans can work, despite having ample raw materials and machine capacity. The finance director is initiating the annual budgeting process.

Which functional budget should Oakwood Designs Ltd. prioritize and prepare first, given its current operational constraints?

- **A. Sales Budget**
 - **B. Material Purchases Budget**
 - **C. Production Overhead Budget**
 - **D. Labour Budget**
-

Question 7

Global Textiles plc is a large manufacturing organization with distinct departments for sales, production, and purchasing. Historically, these departments have operated somewhat independently, leading to situations where the sales team commits to orders that the production team cannot fulfill, or the purchasing department procures materials that are not immediately needed. The new finance director wants to implement a system to ensure all departmental plans are aligned and consistent.

Which primary purpose of budgeting is the finance director aiming to achieve by ensuring alignment across departments?

- **A. Control**
 - **B. Motivation**
 - **C. Performance Evaluation**
 - **D. Coordination**
-

Question 8

Service Excellence plc provides IT support. At the end of each quarter, the actual costs and revenues of each regional branch are compared against their approved budget. Significant deviations are investigated, and branch managers are then assessed on their ability to manage their operations within the allocated resources and achieve their revenue targets for the organization.

Which two primary purposes of budgeting are Service Excellence plc utilizing through this quarterly comparison and assessment process?

- **A. Strategic alignment and Flexibility**
 - **B. Planning and Motivation**
 - **C. Control and Performance Evaluation**
 - **D. Coordination and Communication**
-

Question 9

Evergreen Landscaping Services operates in a highly seasonal market, making a fixed annual budget quickly outdated. The management team finds that by the third quarter, their initial budget is no longer relevant for effective planning and control. They want a system that ensures their budget always covers a full 12-month period, continuously updated to reflect the latest market conditions and operational changes for the organization.

Which budgeting system would best suit Evergreen Landscaping Services' need for a continuously updated and relevant planning horizon?

- **A. Incremental Budgeting**
 - **B. Rolling Budgeting**
 - **C. Zero-Based Budgeting**
 - **D. Activity-Based Budgeting**
-

Question 10

Fashion Forward Ltd. designs and sells clothing. The finance department is preparing the master budget for the upcoming season. They have already finalized the sales forecast based on market research and historical data. The next logical step in their budgeting sequence is to determine how many units need to be produced to meet the sales demand and maintain desired inventory levels for the organization's plan.

Following the completion of the Sales Budget, which functional budget should Fashion Forward Ltd. prepare next in the typical budgeting process?

- **A. Material Usage & Purchases Budgets**
 - **B. Production Budget (in units)**
 - **C. Labour Budget**
 - **D. Administration, Selling & Distribution Budgets**
-

Answer Key and Explanations

1. Correct Answer: C. Controllability principle

- **Explanation:** The **controllability principle** states that managers should only be held accountable for costs and revenues over which they have control. Holding them accountable for uncontrollable items, such as central marketing costs or head office depreciation, is unfair and demotivating, undermining the effectiveness of performance evaluation and control.

2. Correct Answer: B. Flexible Budgeting

- **Explanation:** **Flexible budgeting** is designed to change in response to different levels of activity by recognizing different cost behaviors (fixed and variable). This allows for a meaningful comparison of actual performance against a budget that has been adjusted to the actual output level, which is crucial for effective control and performance evaluation.

3. Correct Answer: B. A Budget Manual and a Budget Committee

- **Explanation:** The **Budget Manual** is a formal document that sets out the procedures, timelines, and responsibilities for budget preparation. The **Budget Committee** is a cross-functional team responsible for coordinating and overseeing the budgeting process. Both are crucial for improving clarity and control in an organization's budgeting activities.

4. Correct Answer: B. Ethical behavior and sustainability goals

- **Explanation:** Modern budgeting should incorporate **sustainability goals**, such as budgets for reducing energy consumption or waste. Additionally, budgets should be set with **ethical behavior** in mind, avoiding the creation of incentives for manipulation or unethical shortcuts, ensuring the organization's plan aligns with broader societal values.

5. Correct Answer: A. Budgetary slack

- **Explanation:** Participative budgeting, while motivating, can lead to **budgetary slack**. This occurs when managers deliberately pad their budgets by understating revenue or overstating costs, making their targets easier to achieve and potentially undermining the accuracy and effectiveness of the budget for control and performance evaluation.

6. Correct Answer: D. Labour Budget

- **Explanation:** The Principal Budget Factor (or Key Factor/Limiting Factor) is the constraint that dictates the level of activity for all other budgets. In this scenario, the availability of skilled labour is the limiting factor for production, meaning the **Labour Budget** must be prepared first to determine the maximum achievable output.

7. Correct Answer: D. Coordination

- **Explanation:** **Coordination** is a key purpose of budgeting, ensuring that the plans of different departments (such as sales, production, and purchasing) are aligned and consistent. This prevents inefficiencies and conflicts that arise from departments working in isolation, contributing to the overall strategic plan of the organization.

8. Correct Answer: C. Control and Performance Evaluation

- **Explanation:** Comparing actual performance against a budget provides a benchmark for **control**, allowing for the investigation of variances. This process is also used for **performance evaluation**, assessing the ability of managers to achieve budget targets and manage their departments effectively within the organization's plan.

9. Correct Answer: B. Rolling Budgeting

- **Explanation:** A **rolling or continuous budget** is continuously updated by adding a new period (e.g., a month or quarter) as the current period ends. This ensures the budget always remains relevant for a full planning horizon, adapting to dynamic market conditions and aiding management in continuous planning and control.

10. Correct Answer: B. Production Budget (in units)

- **Explanation:** The typical sequence of functional budget preparation starts with the Sales Budget, as market demand dictates the overall activity level. Following this, the **Production Budget (in units)** is prepared to determine the volume of goods that need to be manufactured to satisfy sales and inventory requirements.

Cost volume profit analysis

Instructions: Please answer the following questions to the best of your ability. The correct answer, along with a detailed explanation, is provided at the end of this chapter.

Question 1

Edinburgh Electronics Ltd manufactures a single product, 'SmartHome Hubs'. The selling price is £250 per unit, and the variable cost is £150 per unit. Total annual fixed costs are £300,000. The company has set a target profit of £100,000 for the upcoming year. The management team wants to understand the safety buffer once this target is met, which is crucial for their budget and decision making.

What is the margin of safety in units if Edinburgh Electronics Ltd achieves its target profit?

- A. 2,500 units
- B. 2,000 units
- C. 1,000 units
- D. 1,500 units

Question 2

Following on from the previous calculations, **London Leisure Ltd's** overall breakeven revenue is £717,391. The company sells 'City Bikes' and 'Urban Scooters' in a constant sales mix where for every 3 City Bikes sold, 2 Urban Scooters are sold. The individual selling prices are £400 for City Bikes and £300 for Urban Scooters. The management team needs to understand the breakeven contribution from each product for detailed analysis.

What is the breakeven revenue attributable to 'City Bikes'?

- A. £358,696
- B. £286,956
- C. £430,435
- D. £478,261

Question 3

London Leisure Ltd sells two main products: 'City Bikes' and 'Urban Scooters'. The company maintains a constant sales mix, where for every 3 City Bikes sold, 2 Urban Scooters are sold. This consistent relationship is crucial for their multi-product analysis.

Product	Selling Price per unit (£)	Variable Cost per unit (£)
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City Bike	400	250
Urban Scooter	300	180

What is the weighted average Contribution to Sales (C/S) ratio for London Leisure Ltd, to two decimal places?

- A. 38.33%
- B. 41.00%
- C. 40.00%
- D. 37.50%

Question 4

Peak Performance Gear, a manufacturer of outdoor clothing, has budgeted sales of £750,000 for the upcoming year. The company's C/S ratio is 40%, and its total fixed costs are £240,000. Management is keen to understand the resilience of their sales forecast and the potential impact on profit and revenue.

What is the margin of safety for Peak Performance Gear, expressed as a percentage of budgeted revenue, to the nearest whole percentage?

- A. 15%
- B. 20%
- C. 25%
- D. 30%

Question 5

A manufacturing firm, **Midlands Metals**, recorded sales revenue of £450,000 for its primary product last quarter. The total variable costs associated with these sales were £270,000, and fixed costs amounted to £120,000. The management team is reviewing the financial performance and the fundamental relationship between sales and contribution as part of their analysis.

What is Midlands Metals' Contribution to Sales (C/S) ratio, and what does it signify?

- A. 40%; 40p of every sales £ is profit after all costs.
- B. 60%; 60p of every sales £ contributes to fixed costs and profit.
- C. 40%; 40p of every sales £ contributes to fixed costs and profit.
- D. 60%; 60p of every sales £ covers variable costs.

Question 6

Manchester Manufacturing Ltd produces bespoke furniture. The company's CVP analysis for the upcoming quarter assumes that all units produced will be sold, meaning no change in inventory levels. However, due to an unexpected surge in demand, the company decides to increase production significantly beyond current sales orders, building up a substantial finished goods inventory to meet anticipated future demand.

How does this change in inventory levels affect the validity of Manchester Manufacturing Ltd's CVP analysis for the quarter, particularly concerning reported profit?

- **A.** It violates the assumption that production equals sales, potentially distorting reported profit under absorption costing.
 - **B.** It makes the CVP analysis more accurate as it accounts for future sales.
 - **C.** It implies that fixed costs are no longer fixed, invalidating the CVP model.
 - **D.** It has no impact, as CVP analysis focuses solely on costs and revenues.
-

Question 7

Sheffield Steelworks plc manufactures a specialised component. The company's annual fixed costs are £450,000. Each component sells for £150. The breakeven point for the year was calculated to be 5,000 units. The finance director needs to verify the variable cost per unit for this product to ensure the accuracy of their CVP analysis and understand the relationship between costs and sales.

What is the variable cost per unit for the specialised component?

- **A.** £60
 - **B.** £90
 - **C.** £45
 - **D.** £75
-

Question 8

Brighton Books Ltd, a publisher, aims to achieve a target profit of £120,000 for its new educational series, 'Maths Mastery'. The series has annual fixed costs of £90,000. Each book in the series sells for £30, and its variable costs are £18 per unit. The company needs to determine the sales volume required to meet this financial objective for effective budget planning and decision making.

How many units of 'Maths Mastery' books must Brighton Books Ltd sell to achieve its target profit?

- **A.** 20,000 units
- **B.** 12,500 units
- **C.** 15,000 units
- **D.** 17,500 units

Question 9

A financial analyst at **Global Gadgets plc** is reviewing a breakeven chart for a new product line. The chart shows the total cost line and total revenue line intersecting at the breakeven point. The analyst observes that the angle between the total revenue line and the total cost line (the angle of incidence) is relatively steep. This observation is part of their broader analysis of the product's potential profit and the underlying relationship.

What does a steeper angle of incidence at the breakeven point indicate for Global Gadgets plc?

- **A.** A higher proportion of fixed costs in the cost structure.
 - **B.** A higher profit potential once the breakeven point is passed.
 - **C.** A lower breakeven point in units.
 - **D.** A higher margin of safety.
-

Question 10

The management accountant at **Northern Lights Events** is preparing a profit-volume (P/V) chart to illustrate the financial relationship between activity levels and profitability for an upcoming festival. The chart will plot profit/loss directly against the level of activity, providing a clear presentation of the financial outlook.

Which of the following statements accurately describes the characteristics of a P/V chart's presentation?

- **A.** The line starts at a point equal to total fixed costs (as a loss) and crosses the x-axis at the breakeven point.
 - **B.** The line starts at a point equal to total variable costs and crosses the x-axis at the breakeven point.
 - **C.** The line represents the contribution margin per unit, starting from zero and increasing with activity.
 - **D.** The line shows total revenue and total costs, with their intersection being the breakeven point.
-

Answer Key and Explanations

1. Correct Answer: C. 1,000 units

- **Explanation:** First, calculate the contribution per unit: $\text{£}250 - \text{£}150 = \text{£}100$.
Target Sales (units) = (Fixed Costs + Target Profit) / Contribution per unit = $(\text{£}300,000 + \text{£}100,000) / \text{£}100 = 4,000$ units.
Breakeven Point (units) = Fixed Costs / Contribution per unit = $\text{£}300,000 / \text{£}100 = 3,000$ units.
Margin of Safety (units) = Target Sales - Breakeven Point = $4,000 - 3,000 = \text{1,000 units}$.

2. Correct Answer: D. £478,261

- **Explanation:** First, determine the revenue proportion for each product in the sales mix (3 City Bikes + 2 Urban Scooters):

City Bike Revenue = $3 \times \text{£}400 = \text{£}1,200$

Urban Scooter Revenue = $2 \times \text{£}300 = \text{£}600$

Total Revenue for the mix = $\text{£}1,800$

Proportion of City Bike Revenue = $\text{£}1,200 / \text{£}1,800 = 2/3$.

Breakeven Revenue (City Bikes) = Overall Breakeven Revenue $\times (2/3) = \text{£}717,391 \times (2/3) = \text{£}478,261$.

3. Correct Answer: A. 38.33%

- **Explanation:** First, calculate the contribution per unit for each product:

City Bike: $\text{£}400 - \text{£}250 = \text{£}150$

Urban Scooter: $\text{£}300 - \text{£}180 = \text{£}120$

For a sales mix of 3 City Bikes + 2 Urban Scooters:

Total Contribution = $(3 \times \text{£}150) + (2 \times \text{£}120) = \text{£}450 + \text{£}240 = \text{£}690$.

Total Sales Revenue = $(3 \times \text{£}400) + (2 \times \text{£}300) = \text{£}1,200 + \text{£}600 = \text{£}1,800$.

Weighted Average C/S Ratio = $(\text{£}690 / \text{£}1,800) \times 100\% = 38.33\%$.

4. Correct Answer: B. 20%

- **Explanation:** First, calculate the breakeven revenue: Breakeven Revenue = Fixed Costs / C/S Ratio = $\text{£}240,000 / 0.40 = \text{£}600,000$.

Margin of Safety (£) = Budgeted Sales - Breakeven Revenue = $\text{£}750,000 - \text{£}600,000 = \text{£}150,000$.

Margin of Safety (%) = (Margin of Safety (£) / Budgeted Sales) $\times 100\% = (\text{£}150,000 / \text{£}750,000) \times 100\% = 20\%$.

5. Correct Answer: C. 40%; 40p of every sales £ contributes to fixed costs and profit.

- **Explanation:** First, calculate the total contribution: Contribution = Sales - Variable Costs = $\text{£}450,000 - \text{£}270,000 = \text{£}180,000$.

C/S Ratio = (Contribution / Sales) $\times 100\% = (\text{£}180,000 / \text{£}450,000) \times 100\% = 40\%$.

The C/S ratio shows the proportion of each sales pound that contributes towards covering fixed costs and then generating profit.

6. Correct Answer: A. It violates the assumption that production equals sales, potentially distorting reported profit under absorption costing.

- **Explanation:** One of the limitations of CVP analysis is the assumption that **production equals sales**, meaning inventory levels do not change. If production exceeds sales and inventory builds up, some fixed production costs (under absorption costing) would be carried forward in inventory, leading to a higher reported profit than if all units produced were sold, thus distorting the profit figure derived from a simple CVP model.

7. Correct Answer: A. £60

- **Explanation:** The formula for Breakeven Point in units is Fixed Costs / Contribution per unit.

Contribution per unit = Fixed Costs / Breakeven Point = $\text{£}450,000 / 5,000 \text{ units} = \text{£}90$.

Variable Cost per unit = Selling Price - Contribution per unit = $\text{£}150 - \text{£}90 = \text{£}60$.

8. Correct Answer: D. 17,500 units

- **Explanation:** First, calculate the contribution per unit: $\text{£}30 - \text{£}18 = \text{£}12$.
Required Sales (units) = (Fixed Costs + Target Profit) / Contribution per unit = $(\text{£}90,000 + \text{£}120,000) / \text{£}12 = \text{£}210,000 / \text{£}12 = \textbf{17,500 units}$.

9. Correct Answer: B. A higher profit potential once the breakeven point is passed.

- **Explanation:** The angle of incidence is the angle between the total cost and total revenue lines at the breakeven point. A steeper angle indicates that the total revenue line is rising much faster than the total cost line after the breakeven point. This implies a higher rate of profit generation for each additional unit sold beyond breakeven, thus indicating a **higher profit potential** once the breakeven point is passed.

10. Correct Answer: A. The line starts at a point equal to total fixed costs (as a loss) and crosses the x-axis at the breakeven point.

- **Explanation:** A Profit-Volume (P/V) chart directly plots profit or loss against the level of activity. At zero activity, the company incurs a loss equal to its total fixed costs. Therefore, the profit line starts at a point on the negative y-axis corresponding to the total fixed costs. As activity increases, contribution covers fixed costs, and the line crosses the x-axis (where profit is zero) at the breakeven point.

Divisional performance measurement and transfer pricing

Instructions: Please answer the following questions to the best of your ability. The correct answer, along with a detailed explanation, is provided at the end of this chapter.

Question 1

A large, decentralized organization in the UK is reviewing its divisional performance measurement systems. The board is debating the merits of Return on Investment (ROI) versus Residual Income (RI) for its diverse divisions, which vary significantly in size and capital intensity.

Which of the following statements accurately describes a key characteristic or implication when comparing ROI and RI?

- **A.** RI encourages managers to invest in any project that earns more than the company's cost of capital, aligning with shareholder wealth maximization, whereas ROI can discourage such profitable investments if they lower the division's overall ROI.
 - **B.** ROI is an absolute measure, making it harder to compare divisions of different sizes, while RI is a percentage figure that facilitates such comparisons.
 - **C.** RI is generally simpler to calculate and understand for divisional managers than ROI, which requires complex adjustments for capital employed.
 - **D.** ROI is less susceptible to manipulation of profit figures compared to RI because it focuses solely on capital employed.
-

Question 2

The Manufacturing Division (MD) of a UK conglomerate produces a component with a full cost of £15 per unit (variable cost £10, fixed cost £5). It proposes to transfer this component to the Assembly Division (AD) at a price of £18 per unit, using a full cost plus method. The Assembly Division, however, has identified an external supplier offering an identical component for £16 per unit. The MD has spare capacity and would not lose external sales by transferring internally.

If the Assembly Division manager acts solely in the best interest of their own division, what is the likely outcome for the overall organization, and what problem does this illustrate?

- **A.** The Manufacturing Division will be demotivated, but overall organizational profit will be maximized.
- **B.** The Assembly Division will purchase externally at £16, leading to a suboptimal decision for the overall organization.
- **C.** The Assembly Division will purchase internally at £18, leading to increased overall organizational profit.

- **D.** The Assembly Division will negotiate a lower internal transfer price, avoiding any dysfunctional decision-making.
-

Question 3

The 'Electronics Division' (ED) and 'Software Division' (SD) of 'Digital Innovations plc' are in a heated dispute over the transfer price for a critical software module. ED, the selling division, argues for a higher price to cover its development costs and ensure a reasonable profit. SD, the buying division, insists on a lower price, claiming the internal price is uncompetitive compared to external alternatives. This conflict is causing delays and impacting project timelines.

What are two significant problems that can arise from poorly set transfer prices, as illustrated by this scenario?

- **A.** It ensures fair performance assessment but makes it difficult to motivate divisional managers.
 - **B.** It simplifies the calculation of divisional profit but complicates the assessment of capital employed.
 - **C.** It can lead to an increase in overall organizational profit and improved inter-divisional cooperation.
 - **D.** It can create conflict between divisional managers and lead to dysfunctional decision-making.
-

Question 4

The Chemicals Division (CD) of a diversified organization produces a unique solvent. Its variable cost is £40 per litre, and fixed costs are £20 per litre (based on full capacity). The CD is currently operating at full capacity, selling all its output to external customers for £75 per litre. The Paints Division (PD) requires this solvent for its production process and has approached the CD for an internal supply.

What is the minimum transfer price the Chemicals Division would accept, and what is the ideal transfer price for the overall organization in this scenario?

- **A.** Minimum £60; Ideal £75
 - **B.** Minimum £75; Ideal £75
 - **C.** Minimum £40; Ideal £75
 - **D.** Minimum £40; Ideal £60
-

Question 5

A UK-based holding company, 'Prosperity Group', has a primary objective of maximizing shareholder wealth. It operates several decentralized divisions, and the board is keen to ensure that divisional managers' investment decisions align with this overarching goal.

How does the use of Residual Income (RI) as a performance measure encourage divisional managers to align their investment decisions with the objective of maximizing shareholder wealth?

- **A.** RI motivates managers to invest in any project that generates a positive RI, as this means the project earns more than the company's cost of capital, directly increasing shareholder wealth.
 - **B.** RI encourages managers to reject any project that lowers the division's current percentage return, thus protecting shareholder value.
 - **C.** RI simplifies the comparison of divisions of different sizes, allowing for more effective allocation of capital to maximize shareholder wealth.
 - **D.** RI ensures that all projects undertaken have an ROI higher than the company's average ROI, leading to superior shareholder returns.
-

Question 6

In a decentralized organization, the head office delegates significant decision-making authority to its divisional managers. This structure is adopted to foster agility and responsiveness in diverse markets. However, this delegation also introduces specific challenges for the central management.

What is the fundamental requirement for the head office in such a decentralized organization regarding its divisions?

- **A.** To ensure that all divisional managers adhere strictly to centralized operational procedures and policies.
 - **B.** To centralize all capital investment decisions to prevent divisional managers from making suboptimal choices.
 - **C.** To eliminate all internal transactions between divisions to avoid transfer pricing conflicts.
 - **D.** To implement robust measures to assess each division's performance fairly and effectively.
-

Question 7

Horizon plc has two divisions, 'Large Scale Solutions' (LSS) and 'Niche Innovations' (NI). LSS is a significantly larger division with £50,000,000 in capital employed, generating an RI of £4,000,000. NI is a smaller, newer division with £5,000,000 in capital employed, generating an RI of £600,000. Both divisions use Residual Income (RI) for performance measurement.

What is a key challenge when using RI to directly compare the performance of LSS and NI?

- **A.** RI is an absolute measure, making it harder to compare the relative efficiency or performance of divisions of different sizes.
- **B.** RI is a percentage figure, making it difficult to compare divisions of different absolute sizes.
- **C.** RI is highly susceptible to profit manipulation, which makes any comparison unreliable.
- **D.** RI can encourage short-termism, which distorts the comparison between divisions.

Question 8

Two divisions within 'Innovate plc', a UK technology organization, both use Return on Investment (ROI) to measure performance. Division X calculates capital employed based on the net book value of assets, while Division Y uses the gross book value. Both divisions have recently invested in similar long-term assets.

What is the primary issue that arises from these different definitions of capital employed when comparing the divisional ROI figures?

- **A.** It makes the calculation of Residual Income (RI) more complex for the head office.
 - **B.** It leads to manipulation of profit figures to inflate ROI in one division over the other.
 - **C.** It distorts comparisons, making it difficult to assess the true relative performance of the divisions.
 - **D.** It encourages short-termism in investment decisions for both divisions.
-

Question 9

The 'Advanced Materials Division' (AMD) of a UK engineering firm transfers a specialized alloy to the 'Aerospace Components Division' (ACD). AMD uses a 'Full Cost Plus' transfer pricing method, adding a 20% margin to its full cost of £100 per kg (variable cost £70, fixed cost £30). The ACD manager is concerned about the fairness and transparency of this pricing.

What is a common criticism specifically directed at the 'plus' margin component of the full cost plus transfer pricing method?

- **A.** The 'plus' margin encourages the selling division to pass on its inefficiencies to the buying division.
 - **B.** The 'plus' margin makes it difficult to compare the performance of divisions of different sizes.
 - **C.** The 'plus' margin often leads to the selling division making no profit on internal transfers.
 - **D.** The 'plus' margin can be arbitrary and may not reflect market conditions or the true opportunity cost.
-

Question 10

The Components Division (CD) of a large electronics organization manufactures a specialized circuit board. It has a variable cost of £15 per unit and fixed costs of £8 per unit (based on normal capacity). The CD currently has significant spare capacity. The Assembly Division (AD) requires these circuit boards for its final product and can purchase an identical board from an external supplier for £28 per unit.

What is the minimum transfer price the Components Division would accept, and what is the maximum transfer price the Assembly Division would be willing to pay for internal transfers?

- **A.** Minimum £28; Maximum £28
- **B.** Minimum £15; Maximum £28

- C. Minimum £15; Maximum £23
- D. Minimum £23; Maximum £28

Answer Key and Explanations

1. Correct Answer: A. RI encourages managers to invest in any project that earns more than the company's cost of capital, aligning with shareholder wealth maximization, whereas ROI can discourage such profitable investments if they lower the division's overall ROI.

- **Explanation:** RI's formula directly incorporates the cost of capital, encouraging managers to accept any project that generates a positive RI, thus increasing overall shareholder wealth. Conversely, ROI can lead to short-termism, where managers reject profitable projects if those projects have an ROI lower than the division's current average ROI, thereby reducing the division's overall ROI.

2. Correct Answer: B. The Assembly Division will purchase externally at £16, leading to a suboptimal decision for the overall organization.

- **Explanation:** If the Assembly Division acts in its own best interest, it will purchase externally for £16, as this is cheaper than the internal price of £18. However, for the overall organization, since the Manufacturing Division has spare capacity, the true cost of internal transfer is its variable cost of £10. By purchasing externally, the organization incurs an extra £6 per unit (£16 external price - £10 variable cost of internal production). This is a **dysfunctional decision** for the organization.

3. Correct Answer: D. It can create conflict between divisional managers and lead to dysfunctional decision-making.

- **Explanation:** The scenario clearly illustrates two major problems associated with transfer pricing. Firstly, it can create **significant conflict** between divisional managers, as each strives to maximize their own division's profit. Secondly, such conflicts can lead to **dysfunctional decision-making**, where managers make choices that benefit their division but are detrimental to the overall organization's profit.

4. Correct Answer: B. Minimum £75; Ideal £75

- **Explanation:** When the selling division is operating at **full capacity**, the minimum transfer price it would accept is its external market price (£75), because transferring internally means giving up an external sale (opportunity cost). The ideal transfer price for the overall company is generally the **market price** if an external market exists, as it treats both divisions as independent entities and helps maximize overall profit by reflecting the true value of the good.

5. Correct Answer: A. RI motivates managers to invest in any project that generates a positive RI, as this means the project earns more than the company's cost of capital, directly increasing shareholder wealth.

- **Explanation:** A project that generates a positive RI means that its profit exceeds the cost of the capital employed for that project. By encouraging managers to accept all projects with a positive RI, the organization ensures that all new investments contribute more than their cost of capital, thereby

increasing the overall profit available to shareholders and aligning divisional decisions with the goal of **maximizing shareholder wealth**.

6. Correct Answer: D. To implement robust measures to assess each division's performance fairly and effectively.

- **Explanation:** In a decentralized organization, where decision-making authority is delegated to divisional managers, it is crucial for the head office to implement robust measures to assess each division's performance. These measures are necessary to hold managers accountable, evaluate their effectiveness, and ensure that divisional decisions align with the overall strategic goals and profit maximization objectives of the organization.

7. Correct Answer: A. RI is an absolute measure, making it harder to compare the relative efficiency or performance of divisions of different sizes.

- **Explanation:** Residual Income is an **absolute monetary measure** (£4,000,000 for LSS and £600,000 for NI). A larger division will naturally tend to have a larger absolute RI. This makes it harder to compare the relative efficiency or performance of divisions of different sizes, unlike a percentage measure like ROI.

8. Correct Answer: C. It distorts comparisons, making it difficult to assess the true relative performance of the divisions.

- **Explanation:** Different definitions of capital employed (e.g., net book value vs. gross book value) can significantly impact the denominator in the ROI calculation. This inconsistency **distorts comparisons** between divisions, making it difficult to assess their true relative performance fairly, as the reported ROI figures are not based on a consistent measure of investment.

9. Correct Answer: D. The 'plus' margin can be arbitrary and may not reflect market conditions or the true opportunity cost.

- **Explanation:** The full cost plus method allows the selling division to make a profit, but a common criticism is that the 'plus' margin can be **arbitrary**. There is no objective basis for determining the size of this margin, and it may not reflect external market conditions, the selling division's true opportunity cost, or the relative bargaining power of the divisions.

10. Correct Answer: B. Minimum £15; Maximum £28

- **Explanation:** When the selling division has **spare capacity**, the minimum transfer price it would accept is its **variable cost (£15)**. The maximum transfer price the buying division would be willing to pay is the **external market price (£28)**. Therefore, the transfer price range is between £15 and £28.

Information systems and data analytics

Instructions: Please answer the following questions to the best of your ability. The correct answer, along with a detailed explanation, is provided at the end of this chapter.

Question 1

Bookworm UK, a small independent bookstore chain, processes hundreds of customer purchases daily. Each sale is meticulously recorded, updating inventory and processing payments. The store manager, Ms. Davies, then receives a weekly report summarising sales trends for different genres and identifying best-selling authors, which she uses to adjust stock levels and plan promotions.

Considering Ms. Davies' use of the weekly report, which two distinct types of information systems are primarily at play in this scenario, and for which management levels are they typically designed?

- **A.** Enterprise Resource Planning (ERP) System for strategic management and Transaction Processing System (TPS) for middle management.
 - **B.** Transaction Processing System (TPS) for operational management and Management Information System (MIS) for middle management.
 - **C.** Management Information System (MIS) for operational management and Executive Information System (EIS) for senior management.
 - **D.** Executive Information System (EIS) for senior management and Management Information System (MIS) for tactical management.
-

Question 2

Ms. Eleanor Vance, the CEO of **GlobalTech Innovations Plc**, a prominent UK technology organisation, is tasked with identifying new market opportunities and assessing long-term competitive threats. She requires a system that can quickly present highly summarised, flexible views of both internal R&D investment trends and external market growth forecasts, often incorporating data from industry reports and economic indicators. The system needs to be intuitive and visually rich to support her high-level strategic modelling.

Given Ms. Vance's role and information requirements, which type of information system is most appropriate for her, and what distinguishes it from systems used by middle management?

- **A.** Enterprise Resource Planning (ERP) System, which integrates all major business processes into a single, unified database.
- **B.** Management Information System (MIS), which focuses on detailed internal operational data for structured decisions.
- **C.** Transaction Processing System (TPS), which records high-volume, routine daily transactions for operational control.

- **D. Executive Information System (EIS)**, which provides flexible access to summarised internal and external information for strategic analysis.
-

Question 3

Connect Telecom Plc, a leading UK mobile network provider, is embarking on a significant project to enhance its customer engagement strategy. The project aims to systematically manage the entire customer lifecycle, starting from identifying potential subscribers, converting them into active users, ensuring their continued loyalty, encouraging upgrades to premium services, and providing robust post-sale support.

Based on the described objectives, which type of information system is Connect Telecom Plc implementing, and which stage of its typical development process would focus on ensuring continued loyalty?

- **A. An Executive Information System (EIS)**, with the 'Extension' stage focusing on loyalty.
 - **B. A Management Information System (MIS)**, with the 'Selection' stage focusing on loyalty.
 - **C. A Customer Relationship Management (CRM) System**, with the 'Retention' stage focusing on loyalty.
 - **D. An Enterprise Resource Planning (ERP) System**, with the 'Acquisition' stage focusing on loyalty.
-

Question 4

AeroFly UK Plc, a prominent airline organisation, employs sophisticated statistical models to analyse historical booking patterns, competitor pricing, and macroeconomic indicators. This allows them to forecast passenger demand for specific routes and adjust ticket prices dynamically. While these predictions are highly valuable for optimising revenue and resource allocation, the management team understands that these are probabilities, not certainties, and maintains a degree of scepticism, especially during unforeseen global events.

Which specific application of predictive analytics is AeroFly UK Plc primarily utilising, and what crucial caution should their managers always bear in mind regarding these forecasts?

- **A. Personalised promotions in supermarkets**, remembering that historical data is irrelevant for future outcomes.
 - **B. Demand forecasting and route planning in airlines**, remembering that predictions are based on probabilities, not certainties.
 - **C. Predictive maintenance in manufacturing**, remembering that managers should always accept predictions without question.
 - **D. Customer segmentation in finance**, remembering that predictions are certainties.
-

Question 5

Unified Manufacturing Plc, a large UK-based organisation, faces significant challenges due to disparate systems across its finance, human resources, and supply chain functions. Data silos prevent a comprehensive understanding of operational costs and resource allocation, hindering cross-functional collaboration. The management team seeks a solution that will provide a single, unified view of the entire enterprise by integrating all these core processes.

Which type of information system is Unified Manufacturing Plc most likely implementing, and what is its primary benefit in addressing the organisation's challenges?

- **A.** A Customer Relationship Management (CRM) System, to track and organise all interactions with current and prospective customers.
- **B.** A Management Information System (MIS), to convert TPS data into useful summary reports for managerial planning and control.
- **C.** An Enterprise Resource Planning (ERP) System, to integrate all major business processes into a single database, breaking down silos.
- **D.** An Executive Information System (EIS), to provide strategic managers with flexible access to summarised internal and external information.

Question 6

DataGuard Solutions Ltd, a UK consultancy, assists organisations in navigating the complexities of Big Data. They frequently caution clients that the sheer scale and diversity of data necessitate highly specialised analytical expertise, which is often in short supply. Furthermore, they stress the critical importance of safeguarding sensitive personal information and adhering to ethical guidelines, as misuse or breaches can severely damage an organisation's reputation and incur heavy fines.

Which three distinct challenges or risks associated with Big Data are most prominently highlighted in DataGuard Solutions' advice to their clients?

- **A.** Risk of measuring irrelevant relationships, predictive analytics certainty, and data quality.
- **B.** Volume, Velocity, and Variety.
- **C.** Tactical decision-making, operational control, and strategic planning.
- **D.** Requires specialised skills, data security and privacy concerns, and potential for ethical issues.

Question 7

MarketPulse Analytics Ltd, a UK firm, develops advanced predictive models for retailers, assisting with stock management and personalised promotions. These models transform historical sales data (raw facts) into actionable forecasts (information and knowledge). However, the firm's lead data scientist, Dr. Anya Sharma, consistently reminds clients that while these models are powerful, their outputs are fundamentally

probabilistic. She stresses that managers must apply their own wisdom and maintain a degree of scepticism, particularly when unprecedented market shifts occur, rather than blindly trusting the algorithms.

In the context of the DIKW hierarchy, what level of understanding is Dr. Sharma advocating for managers to apply when interpreting the probabilistic outputs of predictive analytics?

- **A.** Data, by focusing on the raw facts without context.
 - **B.** Information, by simply understanding the context of the forecasts.
 - **C.** Wisdom, by using informed judgment and insight despite probabilistic outcomes.
 - **D.** Knowledge, by understanding how the predictions were generated.
-

Question 8

MediCare Trust, a large UK healthcare organisation, is developing a new data platform. This platform aims to integrate diverse patient information, including structured electronic health records, unstructured doctors' notes, and diagnostic images. A significant challenge is ensuring the accuracy and trustworthiness of the unstructured data, which often contains subjective observations and potential transcription errors, before it can be used for clinical decision-making.

Which two 'V's of Big Data are most critically highlighted by MediCare Trust's efforts to combine different data formats and ensure the reliability of the information for patient care?

- **A.** Velocity and Value
 - **B.** Variety and Veracity
 - **C.** Volume and Velocity
 - **D.** Value and Volume
-

Question 9

SwiftDeliveries Plc, a UK logistics organisation, employs Mr. Khan as a regional operations manager. He needs to monitor the efficiency of his depots, track driver performance, and manage resource allocation for the upcoming quarter. His primary tool is a system that aggregates data from daily delivery logs and vehicle maintenance records, presenting it in structured reports. He particularly values its ability to allow him to investigate specific underperforming routes or individual driver statistics by clicking on summary figures.

Based on Mr. Khan's requirements and the system's capabilities, which type of information system is he most likely using, and what is a key feature that supports his detailed investigations?

- **A.** Management Information System (MIS), which provides summary reports and often includes a 'drilldown' facility.
- **B.** Executive Information System (EIS), which offers highly graphical interfaces for external trend analysis.

- **C. Transaction Processing System (TPS)**, which provides real-time, detailed transaction records.
- **D. Enterprise Resource Planning (ERP) System**, which integrates all major business processes into a single database.

Question 10

Based on the sales performance report (information) from FashionForward, the marketing manager identifies that a particular clothing line consistently sells well when advertised on social media. She then uses this understanding to formulate a new strategy: always pair social media campaigns with new clothing line launches. The CEO later reviews the success of these strategies and decides to allocate a larger portion of the marketing budget to digital channels, based on the proven insight into customer behaviour.

In the DIKW hierarchy, what does the marketing manager's formulation of a new strategy represent, and what does the CEO's decision to reallocate the budget based on proven insight represent?

- **A. Wisdom and Data**
- **B. Information and Knowledge**
- **C. Data and Information**
- **D. Knowledge and Wisdom**

Answer Key and Explanations

1. Correct Answer: B. Transaction Processing System (TPS) for operational management and Management Information System (MIS) for middle management.

- **Explanation:** The recording of high-volume, routine daily transactions (sales, inventory updates) is the function of a **Transaction Processing System (TPS)**, used by operational managers. The conversion of this data into useful summary reports for managerial planning and control (sales trends, promotions) is the purpose of a **Management Information System (MIS)**, used by middle managers (tactical management).

2. Correct Answer: D. Executive Information System (EIS), which provides flexible access to summarised internal and external information for strategic analysis.

- **Explanation: Executive Information Systems (EIS)** are designed for senior executives (strategic managers) to provide flexible access to summarized internal and external information for modelling the business and analysing trends. They are highly graphical and easy to use, distinguishing them from MIS which focus on internal, structured data for middle management.

3. Correct Answer: C. A Customer Relationship Management (CRM) System, with the 'Retention' stage focusing on loyalty.

- **Explanation: Customer Relationship Management (CRM)** systems track and organise all interactions with current and prospective customers, managing the entire customer lifecycle. The CRM

development process includes Selection, Acquisition, Retention, Extension, and Aftersales service. Ensuring continued loyalty falls under the '**Retention**' stage.

4. Correct Answer: B. Demand forecasting and route planning in airlines, remembering that predictions are based on probabilities, not certainties.

- **Explanation:** AeroFly UK Plc's use of historical data and models to forecast passenger demand and adjust prices is a direct application of '**demand forecasting and route planning in airlines**'. The crucial caution is that predictions are based on **probabilities, not certainties**, and managers should maintain a degree of scepticism.

5. Correct Answer: C. An Enterprise Resource Planning (ERP) System, to integrate all major business processes into a single database, breaking down silos.

- **Explanation:** **Enterprise Resource Planning (ERP)** systems are integrated software that manages all major business processes (finance, HR, supply chain) in a single database. Their primary benefit is providing a single, unified view of the enterprise, thereby **breaking down silos** and improving cross-functional activities.

6. Correct Answer: D. Requires specialised skills, data security and privacy concerns, and potential for ethical issues.

- **Explanation:** The advice highlights the need for 'specialised analytical expertise' (**requires specialised skills**), 'safeguarding sensitive personal information' (**data security and privacy concerns**), and 'adhering to ethical guidelines' (**potential for ethical issues**) as key risks and challenges of Big Data.

7. Correct Answer: C. Wisdom, by using informed judgment and insight despite probabilistic outcomes.

- **Explanation:** Dr. Sharma is advocating for managers to apply '**Wisdom**'. Wisdom involves using knowledge to make informed decisions and gain insight, especially when predictions are probabilistic and require managerial judgment and scepticism in the face of uncertainty or unprecedented events.

8. Correct Answer: B. Variety and Veracity

- **Explanation:** The integration of diverse patient information, including structured, unstructured, and image data, highlights '**Variety**'. The challenge of ensuring the accuracy and trustworthiness of unstructured data, which may contain errors, directly relates to '**Veracity**'.

9. Correct Answer: A. Management Information System (MIS), which provides summary reports and often includes a 'drilldown' facility.

- **Explanation:** Mr. Khan, as a middle manager, uses summarized reports for planning and control. The ability to investigate specific anomalies by clicking on summary figures is characteristic of the '**drilldown**' facility, a key feature of **Management Information Systems (MIS)**.

10. Correct Answer: D. Knowledge and Wisdom

- **Explanation:** The marketing manager's formulation of a new strategy based on understanding 'how' a clothing line sells well represents '**Knowledge**'. The CEO's decision to reallocate the budget based on proven insight and informed judgment represents '**Wisdom**'.

Management information systems

Instructions: Please answer the following questions to the best of your ability. The correct answer, along with a detailed explanation, is provided at the end of this chapter.

Question 1

A major financial institution in the UK operates critical trading systems that must maintain continuous availability to support global markets. The institution has invested heavily in comprehensive procedures for disaster recovery, including maintaining off-site data backups, implementing redundant hardware systems, and establishing alternative operational sites in geographically separate locations. These measures are designed to ensure minimal disruption to services in the event of a catastrophic system failure, natural disaster, or other major incident.

These extensive measures primarily fall under which category of general controls?

- **A.** Physical controls
 - **B.** Business Continuity Planning
 - **C.** Personnel controls
 - **D.** Access controls
-

Question 2

The sales director of a large retail chain in the UK receives a monthly report containing extensive raw sales data in a complex spreadsheet format, spanning thousands of rows and multiple columns. She finds it challenging and time-consuming to quickly identify key trends, pinpoint top-performing product lines, or detect underperforming regions from this raw data. Her business intelligence team subsequently develops an interactive dashboard that presents the same data using various charts, graphs, and visual indicators.

Which benefit of data visualisation is most directly addressed by the creation of this dashboard for the sales director?

- **A.** Enhancing the security of confidential information
 - **B.** Providing insight and understanding by revealing patterns
 - **C.** Reducing the cost of data storage
 - **D.** Ensuring data accuracy and completeness
-

Question 3

A UK-based logistics company equips its entire fleet of delivery vehicles with GPS trackers that record their exact geographical coordinates and timestamps every 30 seconds. This raw stream of data is continuously fed

into a central system. The operations manager then uses a sophisticated dashboard that processes this raw data to display real-time maps showing the current location of all vehicles, their estimated arrival times at destinations, and highlights any routes experiencing significant delays.

In this scenario, what does the real-time map displaying vehicle locations and estimated arrival times primarily represent?

- **A.** A collection of unprocessed facts and figures
 - **B.** Information, providing meaning and context for decision-making
 - **C.** Raw data for future analysis
 - **D.** A form of input control
-

Question 4

A small charity organisation relies on its finance manager to produce a quarterly financial report for its trustees. The manager spends approximately two full days each quarter manually extracting data from various spreadsheets, reconciling figures, and formatting a highly detailed, bespoke report. This process costs the charity around £400 in labour per quarter. An alternative, automated reporting tool could generate a standardised report with 90% of the required information in less than an hour, at a subscription cost of £75 per quarter.

Which characteristic of good information is most likely being violated by the current reporting process, despite the report's detail?

- **A.** Accessibility
 - **B.** Accuracy
 - **C.** Relevance
 - **D.** Cost-effectiveness
-

Question 5

A UK manufacturing business is evaluating a significant capital investment of £750,000 in new automated production machinery. The finance director receives a comprehensive report detailing the projected return on investment (ROI) and payback period. However, the report's underlying market analysis and cost assumptions are based on economic conditions and supplier prices from six years ago. While the calculations within the report are meticulously performed, the current market environment has changed considerably.

Which characteristic of good information is most significantly lacking, making the report unsuitable for the current investment decision?

- **A.** Completeness
- **B.** Cost-effectiveness

- **C. Timeliness**
 - **D. Accuracy**
-

Question 6

The board of a large public sector organisation is in the process of formulating its strategic plan for the next three years. To support this, they require an information system that can provide detailed analyses of current service delivery costs, forecast future demand for public services, and track performance metrics against key strategic objectives. The system also needs to facilitate scenario planning and resource allocation decisions.

Which primary role of information systems is most crucial in supporting the board's activities in this context?

- **A. Supporting daily operational transactions**
 - **B. Aiding in managerial decision-making, planning, and control**
 - **C. Facilitating external communication with customers**
 - **D. Ensuring physical security of IT assets**
-

Question 7

A team of field engineers working for a utility company in the UK frequently operates in remote locations, often without access to fixed network connections. To perform their duties efficiently, they need to access customer service records, update job statuses, and order necessary parts directly from their devices while on-site. This requires seamless and flexible connectivity to the company's central information systems, regardless of their physical location.

Which aspect of systems architecture is most critical in enabling the engineers' ability to perform these tasks effectively?

- **A. Extranet**
 - **B. Local Area Networks (LANs)**
 - **C. Wireless Technology**
 - **D. Intranet**
-

Question 8

A public sector organisation provides an online portal for citizens to apply for various services. To ensure the integrity and accuracy of the data submitted, the system incorporates automated checks. For instance, when a citizen enters their date of birth, the system verifies that the age falls within a permissible range (e.g., 18-99 years). Additionally, when entering a reference number, the system performs a check to ensure it conforms to a specific format and length.

These automated checks are examples of which specific type of application control?

- **A.** Processing controls
 - **B.** Output controls
 - **C.** General controls
 - **D.** Input controls
-

Question 9

A financial services organisation processes a high volume of sensitive customer transaction data daily. To mitigate the risk of fraud, errors, and unauthorised access, the organisation has implemented several measures. These include ensuring that no single employee has end-to-end control over an entire transaction process, requiring mandatory data security training for all new personnel, and conducting regular background checks for employees in critical IT roles.

Which type of general control is primarily being implemented through these measures?

- **A.** Physical controls
 - **B.** Business Continuity Planning
 - **C.** Personnel controls
 - **D.** Access controls
-

Question 10

A private logistics organisation is considering implementing a new route optimisation information system. The initial capital expenditure for software licenses, hardware upgrades, and staff training is estimated at £300,000. Ongoing annual costs for maintenance, technical support, and additional data subscriptions are projected to be £50,000. The projected benefits include a 10% reduction in fuel consumption, improved delivery times leading to better customer satisfaction, and a 15% increase in driver efficiency.

According to the principle of evaluating information systems, what is the fundamental consideration for the organisation before proceeding with this investment?

- **A.** The system must be fully compatible with existing hardware
 - **B.** The benefits of the new system must outweigh its total costs
 - **C.** The system must offer real-time tracking capabilities
 - **D.** The initial capital expenditure must be recoverable within one year
-

Answer Key and Explanations

1. Correct Answer: B. Business Continuity Planning

- **Explanation: Business Continuity Planning (BCP)** is a type of general control that applies to the overall IT environment. It involves developing strategies and procedures to ensure that critical business functions can continue during and after a disaster or major disruption. Measures like off-site backups, redundant hardware, and alternative operational sites are core components of BCP.

2. Correct Answer: B. Providing insight and understanding by revealing patterns

- **Explanation:** Data visualisation presents data in graphical or pictorial formats, making it easier to understand and use. A key benefit is **providing insight and understanding by revealing new patterns** and cause-effect relationships that might be hidden in raw data, directly addressing the sales director's difficulty in identifying trends and performance from complex spreadsheets.

3. Correct Answer: B. Information, providing meaning and context for decision-making

- **Explanation: Information** is data that has been processed to give it meaning and context for the decision-maker. The raw GPS coordinates and timestamps are data. When this data is processed and presented on a real-time map showing vehicle locations and estimated arrival times, it becomes meaningful **information** that the operations manager can use for decision-making and control.

4. Correct Answer: D. Cost-effectiveness

- **Explanation: Cost-effectiveness** is a characteristic of good information, meaning the benefits of the information must outweigh the cost of obtaining it. The current manual process incurs significant labour costs (£400) for a report that could be largely automated for a much lower cost (£75), indicating a violation of cost-effectiveness, even if the report is detailed.

5. Correct Answer: C. Timeliness

- **Explanation: Timeliness** is a characteristic of good information, meaning it must be available when needed for decision-making. Although the report might be accurate for the period it covers, using outdated market analysis and cost assumptions from six years ago renders it **untimely** for a current investment decision, as the context has changed significantly.

6. Correct Answer: B. Aiding in managerial decision-making, planning, and control

- **Explanation:** Information systems support managerial activities by **aiding in decision-making, planning, performance measurement, and control**. The board's need for analysis of costs, demand forecasts, performance metrics, and scenario planning directly aligns with these managerial functions, rather than daily operational transactions or physical security.

7. Correct Answer: C. Wireless Technology

- **Explanation: Wireless technology** enables mobility and flexible access to data via laptops, tablets, and smartphones. For field engineers working in remote locations without fixed network access, wireless technology is critical for maintaining connectivity to central information systems, allowing them to access and update data on the go.

8. Correct Answer: D. Input controls

- **Explanation:** Application controls are specific to individual systems. **Input controls** are designed to ensure the accuracy and validity of data as it enters the system. Examples include format checks (like for a reference number) and range tests (like for age), which verify that data conforms to expected parameters before processing.

9. Correct Answer: C. Personnel controls

- **Explanation: Personnel controls** are a type of general control that applies to the overall IT environment. They include measures such as **segregation of duties** (ensuring no single employee has complete control over a transaction), **training**, and **background checks**, all aimed at managing human-related risks within the organisation.

10. Correct Answer: B. The benefits of the new system must outweigh its total costs

- **Explanation:** The principle for evaluating information systems states that **the benefits of a new IS must outweigh its costs**. This involves a cost-benefit analysis (CBA) to ensure that the investment is economically justifiable, considering both initial and ongoing costs against the value of the benefits derived.

Performance measurement and control

Instructions: Please answer the following questions to the best of your ability. The correct answer, along with a detailed explanation, is provided at the end of this chapter.

Question 1

Green Energy Solutions, an organization focused on renewable energy installations, is developing a Balanced Scorecard to align its strategic objectives with performance measures. One of their key strategic goals is to become the market leader in customer satisfaction for solar panel installations. To achieve this, they plan to measure the average time taken from initial inquiry to project completion and the percentage of projects completed within budget.

Into which two Balanced Scorecard perspectives would the measures 'average time taken from initial inquiry to project completion' and 'percentage of projects completed within budget' primarily fall, respectively?

- **A.** Financial; Internal Business Processes.
 - **B.** Customer; Financial.
 - **C.** Internal Business Processes; Financial.
 - **D.** Learning and Growth; Customer.
-

Question 2

Tech Innovations Ltd, a software development business, is struggling with customer retention despite launching several new products. The management team believes their product quality is high, but they are losing market share. They want to implement non-financial measures to understand the root cause of their customer issues and improve their strategic position.

Which of the following non-financial performance indicators would be most relevant for Tech Innovations Ltd to adopt from the customer perspective?

- **A.** Number of new products launched and research & development expenditure.
 - **B.** Defect rates in software code and process cycle time for bug fixes.
 - **C.** Employee training hours and staff turnover rates.
 - **D.** Customer satisfaction scores and customer retention rates.
-

Question 3

Community Care Services, a non-profit organization providing home care for the elderly, is implementing Fitzgerald and Moon's Building Block Model to improve its service delivery. The management team is setting new standards for its care assistants, such as 'respond to all emergency calls within 30 minutes'. A group of

care assistants expresses concern that this target is often impossible to meet due to unpredictable traffic conditions and the wide geographical spread of their clients, factors largely outside their control.

Which characteristic of effective performance standards, according to Fitzgerald and Moon's model, is most likely being violated in this scenario?

- **A. Rewarding.**
 - **B. Achievable.**
 - **C. Fair.**
 - **D. Owned.**
-

Question 4

Healthy Bites Ltd, a food manufacturing business, is assessing its short-term financial stability. As of 31 December 2023, the company's financial records show current assets of £450,000, which include inventory of £180,000. Its current liabilities amount to £200,000. The management wants to understand its ability to meet immediate obligations without relying on inventory sales.

What is Healthy Bites Ltd's Quick Ratio (Acid Test Ratio) as of 31 December 2023, and what does this ratio primarily indicate about the organization's financial position?

- **A. 0.9; indicates the proportion of assets financed by debt.**
 - **B. 1.35; reflects the efficiency of converting sales into cash.**
 - **C. 1.35; measures the organization's ability to meet short-term obligations without relying on inventory.**
 - **D. 2.25; indicates the overall profitability from resources employed.**
-

Question 5

The Grand Hotel, a luxury hospitality business, is seeking to enhance its overall performance. The management team is considering applying Fitzgerald and Moon's Building Block Model. They are particularly interested in understanding how well they are utilizing their staff and facilities, how quickly they can adapt to changing customer demands, and their overall standing against competitors.

Which three dimensions of performance, from Fitzgerald and Moon's model, are The Grand Hotel's management primarily focusing on in this scenario?

- **A. Customer satisfaction, employee morale, and profitability.**
 - **B. Quality, innovation, and financial performance.**
 - **C. Resource utilization, flexibility, and competitiveness.**
 - **D. Financial performance, innovation, and quality.**
-

Question 6

Precision Engineering Ltd, a manufacturing business, is evaluating its financial health. For the year ended 31 March 2024, the company reported total equity of £1,200,000 and non-current liabilities (debt) of £800,000. The interest paid on its debt for the year was £60,000, and its profit before interest and tax (PBIT) was £300,000. The management is concerned about its ability to meet long-term obligations and wants to understand its financial leverage.

Based on the provided data, what is Precision Engineering Ltd's Debt/Equity Ratio and Interest Cover, and what do these figures primarily indicate about the organization's financial structure?

- **A.** Debt/Equity Ratio: 1.5; Interest Cover: 0.2 times. Indicates high gearing and poor debt servicing capacity.
- **B.** Debt/Equity Ratio: 0.67; Interest Cover: 5 times. Primarily measures short-term operational efficiency.
- **C.** Debt/Equity Ratio: 0.67; Interest Cover: 5 times. Indicates moderate gearing and ability to service debt.
- **D.** Debt/Equity Ratio: 0.67; Interest Cover: 5 times. Indicates strong liquidity.

Question 7

Global Manufacturing Co., a large industrial organization, has historically relied solely on financial metrics like Return on Capital Employed (ROCE) and Net Profit Margin to evaluate its performance. This approach has led to managers focusing heavily on cost-cutting, sometimes at the expense of product quality and employee morale. The board is now considering adopting the Balanced Scorecard framework.

What is the primary benefit Global Manufacturing Co. would gain by implementing the Balanced Scorecard, according to Kaplan and Norton's concept?

- **A.** It allows for easier manipulation of performance figures to meet targets.
- **B.** It ensures a balanced view by combining financial and non-financial measures across four perspectives.
- **C.** It simplifies performance measurement by reducing the number of indicators.
- **D.** It primarily focuses on historical financial data for better accountability.

Question 8

Precision Parts Ltd, a component manufacturing business, is experiencing significant delays in its production line, leading to missed delivery deadlines and increased costs. The management team wants to identify and address bottlenecks within their manufacturing process. They are looking for non-financial indicators that can provide insights into their operational efficiency.

Which non-financial performance indicator would be most appropriate for Precision Parts Ltd to monitor from the internal process perspective to address its production delays?

- **A.** Process cycle time and defect rates.
 - **B.** Number of new product ideas generated.
 - **C.** Market share growth.
 - **D.** Customer satisfaction scores.
-

Question 9

Swift Logistics PLC, a large distribution organization, has consistently achieved its annual profit targets by rigorously cutting operational costs, including deferring significant investments in new vehicle fleets and delaying essential software upgrades. While its Net Profit Margin has shown steady improvement over the past three years, customer complaints about delivery delays and tracking inaccuracies have risen sharply. The board is pleased with the financial results but a junior manager raises concerns about the long-term implications.

Which limitation of Financial Performance Indicators (FPIs) is most evident in Swift Logistics PLC's situation?

- **A.** FPIs ignore non-financial factors like customer satisfaction.
 - **B.** FPIs are susceptible to manipulation through accounting policies.
 - **C.** FPIs are backward-looking, focusing on historical data.
 - **D.** FPIs can lead to short-termism, sacrificing long-term sustainability.
-

Question 10

City Council Services, a public sector organization, introduced a new performance target for its waste collection department: 'reduce the number of missed collections by 20%'. To achieve this, some collection teams started marking bins as 'not presented' even when they were, simply to avoid recording a 'missed collection'. This artificially improved their reported performance figures, but residents continued to complain about uncollected waste.

Which behavioural problem, resulting from poorly designed performance measurement systems, is exemplified by the actions of the waste collection teams?

- **A.** Gaming.
 - **B.** Demotivation.
 - **C.** Backward-looking.
 - **D.** Short-termism.
-

Answer Key and Explanations

1. Correct Answer: C. Internal Business Processes; Financial.

- **Explanation:** The 'average time taken from initial inquiry to project completion' relates to the efficiency and effectiveness of the organization's internal operations, placing it in the **Internal Business Processes** perspective. The 'percentage of projects completed within budget' is a measure of cost control and financial efficiency, falling under the **Financial** perspective of the Balanced Scorecard.

2. Correct Answer: D. Customer satisfaction scores and customer retention rates.

- **Explanation:** The customer perspective of Non-Financial Performance Indicators (NFPIs) focuses on how customers see the organization. Measures such as market share, **customer satisfaction scores**, and **customer retention rates** are key examples. Employee training and staff turnover relate to the Innovation & Learning perspective, while defect rates and process cycle time relate to the Internal Process perspective.

3. Correct Answer: C. Fair.

- **Explanation:** Fitzgerald and Moon's model states that standards for performance must be '**Fair (not biased by factors outside their control)**'. The scenario explicitly mentions 'factors largely outside their control' (traffic, geographical spread) making the target difficult. This points most strongly to a violation of **fairness**.

4. Correct Answer: C. 1.35; measures the organization's ability to meet short-term obligations without relying on inventory.

- **Explanation:** The Quick Ratio (Acid Test Ratio) is calculated as $(\text{Current Assets} - \text{Inventory}) / \text{Current Liabilities}$. Here, $(£450,000 - £180,000) / £200,000 = £270,000 / £200,000 = 1.35$. This Financial Performance Indicator (FPI) measures an organization's ability to meet its immediate short-term obligations **without having to sell its inventory**.

5. Correct Answer: C. Resource utilization, flexibility, and competitiveness.

- **Explanation:** Fitzgerald and Moon's Building Block Model identifies several dimensions of performance. 'How well they are utilizing their staff and facilities' relates to **resource utilization**. 'How quickly they can adapt to changing customer demands' relates to **flexibility**. 'Their overall standing against competitors' relates to **competitiveness**.

6. Correct Answer: C. Debt/Equity Ratio: 0.67; Interest Cover: 5 times. Indicates moderate gearing and ability to service debt.

- **Explanation:** The Debt/Equity Ratio is $\text{Debt} / \text{Equity} = £800,000 / £1,200,000 = 0.67$. The Interest Cover is $\text{PBIT} / \text{Interest Paid} = £300,000 / £60,000 = 5 \text{ times}$. These ratios measure the organization's long-term financial structure (gearing) and its ability to service its debt obligations.

7. Correct Answer: B. It ensures a balanced view by combining financial and non-financial measures across four perspectives.

- **Explanation:** The Balanced Scorecard, developed by Kaplan and Norton, is a strategic performance management framework that provides a balanced view by combining financial and non-financial measures across four perspectives: Financial, Customer, Internal Business Processes, and Learning and Growth. Its primary benefit is to prevent overreliance on financial measures and ensure a strategic focus.

8. Correct Answer: A. Process cycle time and defect rates.

- **Explanation:** The Internal Process perspective of Non-Financial Performance Indicators (NFPs) focuses on the operational drivers of future financial performance. Measures such as **defect rates**, **process cycle time**, throughput time, and setup times are directly relevant to identifying and addressing inefficiencies and bottlenecks within a manufacturing business's production process.

9. Correct Answer: D. FPIs can lead to short-termism, sacrificing long-term sustainability.

- **Explanation:** The scenario describes management cutting essential long-term costs (investments in fleets, software upgrades) to boost short-term profits. This is a classic example of **short-termism**, where managers prioritize immediate financial gains over the long-term health and sustainability of the organization, a known limitation of relying solely on FPIs.

10. Correct Answer: A. Gaming.

- **Explanation: Gaming** is a behavioural problem where individuals or teams manipulate the performance measurement system to make their performance look good, often without actually improving the underlying operational reality. The waste collection teams' action of falsely marking bins as 'not presented' to meet a target is a direct example of **gaming** the system.

Performance measurement in not-for-profit organisations and the public sector

Instructions: Please answer the following questions to the best of your ability. The correct answer, along with a detailed explanation, is provided at the end of this chapter.

Question 1

The UK's National Health Service (NHS) is evaluating its procurement process for medical equipment. A recent audit revealed that a particular hospital trust consistently purchases high-quality surgical instruments from a single supplier at a price 15% higher than the market average for comparable items. The trust justifies this by stating the supplier offers excellent after-sales service and rapid delivery, which minimises disruption to critical operations. However, the audit report highlights that other trusts achieve similar operational continuity with more cost-effective suppliers.

Which aspect of Value for Money (VFM) is primarily being challenged in this scenario regarding the hospital trust's purchasing decisions?

- **A.** Efficiency, as the relationship between inputs and outputs is not optimal.
 - **B.** Accountability, as the trust is not transparent about its supplier choices.
 - **C.** Effectiveness, as the strategic objective of patient care might be compromised by higher costs.
 - **D.** Economy, as the cost of inputs acquired is not being minimised.
-

Question 2

A local council in the public sector has implemented a new digital platform for processing planning applications. Before the platform, it took an average of 10 working days for an application to be reviewed by a planning officer. After the implementation, the average review time has reduced to 6 working days, and the number of applications processed per officer per month has increased by 25%. However, the council's overall strategic objective is to foster sustainable community development, and there is no clear evidence yet that the faster processing of applications is leading to a greater number of approved projects that align with sustainability goals.

Which dimension of Value for Money (VFM) has demonstrably improved in this scenario, and which dimension still requires further assessment to confirm overall success?

- **A.** Economy has improved, but Effectiveness needs further assessment.
- **B.** Efficiency has improved, but Effectiveness needs further assessment.
- **C.** Effectiveness has improved, but Economy needs further assessment.
- **D.** Economy has improved, but Efficiency needs further assessment.

Question 3

A UK charity, 'Helping Hands', provides support services to homeless individuals. Its primary objective is to reduce homelessness in its operating region. The charity measures its performance by tracking the number of individuals it assists into stable accommodation (output) and the percentage of those individuals who remain in stable accommodation for at least 12 months (outcome). The charity also monitors its administrative costs as a percentage of total donations. However, the board is concerned that the qualitative nature of 'support services' makes it difficult to set fair and achievable standards for the quality of interaction and long-term impact on individuals' well-being beyond just housing.

Which performance measurement technique would be most relevant for 'Helping Hands' to address the challenge of establishing standards for these qualitative dimensions of its service?

- **A.** Fitzgerald and Moon's Building Block Model, for its emphasis on establishing fair and achievable standards for qualitative performance.
 - **B.** The Balanced Scorecard, due to its focus on financial and customer perspectives.
 - **C.** Service Efforts and Accomplishments (SEA) Reporting, as it links resources to outputs and outcomes.
 - **D.** Traditional profit-based accounting, to better manage its administrative cost relationship.
-

Question 4

The Department for Education (DfE) in England is considering a new performance target for secondary schools: a 10% increase in the average 'Progress 8' score within three years. While 'Progress 8' aims to capture student progress across a broad range of subjects, some educators are concerned that an overly strong focus on this single metric could lead schools to 'teach to the test' or neglect crucial aspects of student development, such as creative arts or pastoral care, which are harder to measure.

This situation exemplifies which specific issue in the public sector regarding performance measurement?

- **A.** Difficulty in setting targets, as poorly set targets can lead to distortionary behaviour.
 - **B.** Political influence, as targets are often set by government bodies.
 - **C.** Budgetary constraints, as resources might be diverted to meet the target.
 - **D.** Public scrutiny and accountability, as performance is highly visible.
-

Question 5

A government agency responsible for environmental protection has a primary objective to 'improve air quality across the UK'. It undertakes various initiatives, such as monitoring industrial emissions, promoting public transport, and funding research into cleaner technologies. The agency reports on the number of inspections

conducted (effort), the reduction in specific pollutant levels in targeted areas (output), and the overall improvement in public health indicators related to respiratory diseases (outcome).

This approach to performance reporting, explicitly linking resources consumed with outputs and outcomes achieved, is characteristic of which framework?

- **A.** Service Efforts and Accomplishments (SEA) Reporting, which links resources to outputs and outcomes.
 - **B.** The Balanced Scorecard, due to its multi-perspective view.
 - **C.** Value for Money (VFM) framework, specifically the Economy dimension.
 - **D.** Fitzgerald and Moon's Building Block Model, for its focus on qualitative standards.
-

Question 6

A UK police force is under pressure to demonstrate its effectiveness in reducing crime. One of its strategic objectives is to 'enhance public safety and reduce crime rates'. The force has implemented various initiatives, including increased visible patrols, community engagement programmes, and targeted operations against specific types of crime. While they can easily report on the number of patrols (input) and arrests made (output), they struggle to definitively quantify the direct impact of their efforts on the overall feeling of safety within communities or the long-term reduction in crime, as these are influenced by many external factors.

This challenge primarily relates to which fundamental issue in performance measurement for not-for-profit and public sector organizations?

- **A.** Budgetary constraints, as funding limits the scope of initiatives.
 - **B.** Non-quantifiable objectives, as goals like 'enhance public safety' are difficult to measure objectively.
 - **C.** Multiple and conflicting objectives, as public safety is complex.
 - **D.** Lack of a profit measure, as police forces do not generate revenue.
-

Question 7

A government department responsible for social care services is facing increasing demand for its services while operating under a fixed annual budget. To manage the demand, the department has introduced stricter eligibility criteria for certain non-urgent services, effectively limiting the number of individuals who can receive support, even if they technically meet some level of need. This ensures that the department does not overspend its allocated funds.

This situation is a clear example of which specific issue encountered in the public sector?

- **A.** Political influence, as eligibility criteria can be politically motivated.
- **B.** Public scrutiny and accountability, as service rationing is often controversial.

- **C.** Difficulty in setting targets, as service demand is hard to predict.
 - **D.** Budgetary constraints, leading to rationing of services.
-

Question 8

A large UK university, a not-for-profit organization, is reviewing its performance measurement framework. Its stakeholders include students, staff, funding bodies, and the wider community. The university aims to provide excellent education, conduct world-class research, ensure student well-being, and maintain financial sustainability. These objectives often present trade-offs; for example, investing heavily in research facilities might strain the budget for student support services.

The existence of these varied and sometimes competing priorities among its diverse stakeholders points to which fundamental challenge in performance measurement for such an organization?

- **A.** Political influence, as government funding bodies have specific agendas.
 - **B.** Multiple and conflicting objectives, serving a wide range of stakeholders with different priorities.
 - **C.** Non-quantifiable objectives, as 'excellent education' is subjective.
 - **D.** Lack of a profit measure, as universities do not aim for profit.
-

Question 9

A national museum, funded primarily by the Department for Culture, Media and Sport, is assessing its performance. It has identified several key areas: visitor satisfaction, the number of educational outreach programmes delivered, the condition of its collections, and its ability to secure additional private funding. The museum's board believes that a holistic view, encompassing both financial health and its cultural and educational impact, is crucial for its long-term sustainability and public value.

Which performance measurement technique is highly applicable to this organization, as it naturally incorporates nonfinancial measures of effectiveness and stakeholder satisfaction alongside financial considerations?

- **A.** Fitzgerald and Moon's Building Block Model, for its qualitative standards.
 - **B.** The Balanced Scorecard, due to its multi-perspective approach including nonfinancial measures.
 - **C.** Service Efforts and Accomplishments (SEA) Reporting, focusing on inputs and outputs.
 - **D.** Traditional cost-benefit analysis, to justify its public funding.
-

Question 10

A local authority's waste management department is under scrutiny. It has recently invested in new, more fuel-efficient refuse collection vehicles, leading to a 10% reduction in fuel costs per tonne of waste collected

(Economy). However, due to changes in recycling regulations, the overall volume of waste being sent to landfill has not decreased as much as anticipated, despite the department's efforts to promote recycling. The authority's strategic objective is to minimise environmental impact through waste reduction and increased recycling.

While the department has shown improvement in 'doing things cheaply', which other dimension of Value for Money (VFM) is it struggling to demonstrate in relation to its strategic objective?

- **A. Profitability**, as waste management is a public service.
- **B. Accountability**, as the department is not transparent about its waste volumes.
- **C. Efficiency**, as the relationship between inputs and outputs is not optimal.
- **D. Effectiveness**, as the organization is not fully achieving its strategic environmental goals.

Answer Key and Explanations

1. Correct Answer: D. Economy, as the cost of inputs acquired is not being minimised.

- **Explanation: Economy** focuses on minimising the cost of inputs acquired. The scenario explicitly states the hospital trust is paying 15% higher than the market average for comparable items, indicating a failure to achieve the lowest possible cost for its inputs, even if other benefits are perceived. This directly relates to 'doing things cheaply'.

2. Correct Answer: B. Efficiency has improved, but Effectiveness needs further assessment.

- **Explanation: Efficiency** is the relationship between inputs and outputs. The reduction in review time and increase in applications processed per officer clearly indicates improved efficiency. **Effectiveness**, however, measures whether the organization is achieving its strategic objectives (fostering sustainable community development). This link is not yet clear, meaning effectiveness needs further assessment.

3. Correct Answer: A. Fitzgerald and Moon's Building Block Model, for its emphasis on establishing fair and achievable standards for qualitative performance.

- **Explanation:** Fitzgerald and Moon's Building Block Model is specifically highlighted as relevant for its focus on establishing **fair and achievable standards for qualitative dimensions of performance**. The charity's challenge in setting standards for the quality of interaction and long-term well-being directly aligns with this strength of the model.

4. Correct Answer: A. Difficulty in setting targets, as poorly set targets can lead to distortionary behaviour.

- **Explanation:** The scenario describes how a specific target could lead to unintended negative consequences like 'teaching to the test' or neglecting other important, harder-to-measure aspects of education. This is a direct example of the '**Difficulty in Setting Targets**' issue, where poorly set targets can distort the true purpose of the service.

5. Correct Answer: A. Service Efforts and Accomplishments (SEA) Reporting, which links resources to outputs and outcomes.

- **Explanation: Service Efforts and Accomplishments (SEA) Reporting** is described as a framework that explicitly links the resources consumed (efforts) with the outputs and outcomes achieved (accomplishments). The agency's reporting on inspections (effort), pollutant reduction (output), and public health improvement (outcome) perfectly aligns with this definition.

6. Correct Answer: B. Non-quantifiable objectives, as goals like 'enhance public safety' are difficult to measure objectively.

- **Explanation:** The scenario highlights the difficulty in objectively measuring 'overall feeling of safety' due to external factors and the qualitative nature of the objective. This directly corresponds to the fundamental challenge of '**Non-Quantifiable Objectives**', where goals are often qualitative and difficult to measure objectively.

7. Correct Answer: D. Budgetary constraints, leading to rationing of services.

- **Explanation:** The scenario explicitly states the department operates under a fixed annual budget and, to manage demand within these limits, introduces stricter eligibility criteria, effectively rationing services. This directly illustrates the issue of '**Budgetary Constraints**', leading to the rationing of services.

8. Correct Answer: B. Multiple and conflicting objectives, serving a wide range of stakeholders with different priorities.

- **Explanation:** The scenario highlights that the university serves a wide range of stakeholders with different, often competing, priorities (education vs. research vs. well-being vs. financial sustainability). This directly aligns with the fundamental challenge of '**Multiple and Conflicting Objectives**' in not-for-profit organizations.

9. Correct Answer: B. The Balanced Scorecard, due to its multi-perspective approach including nonfinancial measures.

- **Explanation:** The **Balanced Scorecard** is described as highly applicable because it naturally incorporates nonfinancial measures of effectiveness and stakeholder satisfaction. The museum's desire for a holistic view encompassing visitor satisfaction, educational impact, collection condition (non-financial effectiveness), and financial health matches the multi-perspective nature of the Balanced Scorecard.

10. Correct Answer: D. Effectiveness, as the organization is not fully achieving its strategic environmental goals.

- **Explanation: Effectiveness** measures whether the organization is actually achieving its strategic objectives. While the department has improved economy (reduced fuel costs), the strategic objective is to minimise environmental impact through waste reduction. The failure to decrease landfill volume as anticipated indicates a struggle with **effectiveness**.

Planning with limiting factors

Instructions: Please answer the following questions to the best of your ability. The correct answer, along with a detailed explanation, is provided at the end of this chapter.

Question 1

Precision Engineering Ltd. manufactures three distinct products: Alpha, Beta, and Gamma. The production process is constrained by the availability of specialized machine hours. Management aims to maximize total contribution.

The following data is provided:

Product	Selling Price (£)	Direct Materials (£)	Direct Labour (£)	Variable Overheads (£)	Machine Hours per Unit
Alpha	120	30	20	10	2.0
Beta	150	40	25	15	2.5
Gamma	100	25	15	10	1.5

Total available machine hours are 10,000. Maximum demand for Alpha is 2,000 units, Beta is 1,500 units, and Gamma is 3,000 units.

What is the total contribution from the optimal production plan for Precision Engineering Ltd.?

- A. £330,000
- B. £312,000
- C. £300,000
- D. £325,000

Question 2

A manufacturing business, **Apex Components Ltd.**, produces two unique products, X and Y. The production process is heavily reliant on a specialized machine, which has limited operational hours. Management aims to maximize profit given this constraint.

The following financial and operational data are available:

Product	Selling Price (£)	Direct Materials (£)	Direct Labour (£)	Variable Overheads (£)	Machine Hours per Unit
X	250	50	40	30	5
Y	300	60	50	40	6

If Apex Components Ltd. has only 1,500 machine hours available and can sell all units produced, which product should be prioritized to maximize total contribution?

- **A.** Product X, as it generates £26 per machine hour compared to Product Y's £25.
 - **B.** Product X, as it has a higher selling price.
 - **C.** Product Y, as it has a higher contribution per unit.
 - **D.** Product Y, as it requires more machine hours per unit, indicating higher complexity.
-

Question 3

A construction business, **BuildFast Contractors**, is facing a critical shortage of skilled bricklayers for a high-profit project. Their Linear Programming model indicates a shadow price of £25 for an additional hour of skilled bricklaying labour. An external agency offers to supply additional skilled bricklayers at a premium of £20 per hour above the normal wage rate.

Considering the financial implications, should BuildFast Contractors acquire these additional hours from the external agency?

- **A.** No, because the premium of £20 is less than the shadow price of £25.
 - **B.** Yes, but only if the normal wage rate is less than £5.
 - **C.** No, because the shadow price only applies to internal resources.
 - **D.** Yes, because the premium of £20 is less than the shadow price of £25.
-

Question 4

A small bespoke furniture business, **Crafted Creations**, is experiencing difficulties meeting customer orders. The owner observes that while there is ample supply of wood and skilled labour, the specialized sanding machine is constantly running at full capacity, and orders often pile up waiting for this stage. The sales team also reports that they could easily sell 20% more furniture if production capacity allowed.

Based on this scenario, what is the most likely limiting factor for Crafted Creations' production plan?

- **A.** Machine hours for the specialized sanding machine.
 - **B.** Skilled labour hours, as bespoke furniture requires high skill.
 - **C.** Raw material supply, as wood is a key component.
 - **D.** Demand for furniture, as sales could increase by 20%.
-

Question 5

A company, **Tech Innovations Ltd.**, manufactures two high-tech products, 'Gadget A' and 'Gadget B'. Each unit of Gadget A contributes £45 to profit, and each unit of Gadget B contributes £60. The management team is using Linear Programming to determine the optimal production mix to maximize total contribution, subject to multiple resource constraints.

If 'x' represents the number of units of Gadget A and 'y' represents the number of units of Gadget B, which of the following correctly formulates the objective function for Tech Innovations Ltd.?

- **A.** Maximize $C = 45x + 60y$
- **B.** Maximize $C = x + y$
- **C.** Maximize $C = 60x + 45y$
- **D.** Minimize $C = 45x + 60y$

Question 6

A clothing manufacturer, **Fashion Forward**, produces two types of jackets: 'Urban' (U) and 'Adventure' (A). Production is constrained by the availability of a specific high-quality fabric and skilled labour hours.

Each Urban jacket requires 2.5 metres of fabric, and each Adventure jacket requires 3.0 metres of fabric. The total available high-quality fabric for the next period is 1,500 metres.

If 'u' represents the number of Urban jackets and 'a' represents the number of Adventure jackets, which inequality correctly represents the fabric constraint in a Linear Programming model for Fashion Forward's production plan?

- **A.** $2.5u + 3.0a \geq 1,500$
- **B.** $2.5u + 3.0a \leq 1,500$
- **C.** $2.5u + 3.0a = 1,500$
- **D.** $u + a \leq 1,500$

Question 7

A manufacturing business, **Resourceful Products**, has a binding constraint for a specific raw material, and its Linear Programming solution indicates a shadow price of £8 per kg.

Under what condition would this shadow price of £8 for the raw material fall to zero, indicating it is no longer a binding constraint for the organization?

- **A.** If the constraint is relaxed enough that it is no longer the most restrictive factor.
- **B.** If the cost of the raw material increases by more than £8 per kg.
- **C.** If the demand for the product using this material decreases significantly.
- **D.** If the company decides to outsource the production of the product.

Question 8

A specialist engineering firm, **Precision Parts Ltd.**, manufactures custom components. When faced with a single limiting factor, such as a specific machine's availability, the firm's management accounting team prioritizes production based on the contribution generated per unit of that limiting factor.

This approach, which focuses on maximizing the value generated from the bottleneck resource, is conceptually identical to the multi-product decision-making process found in which other management accounting technique?

- **A.** Throughput Accounting
 - **B.** Activity-Based Costing (ABC)
 - **C.** Standard Costing and Variance Analysis
 - **D.** Target Costing
-

Question 9

A food processing organization, **Gourmet Goods**, uses Linear Programming to optimize its production of various gourmet products. After solving an LP problem, the management accountant determines that the shadow price for its specialized mixing machine hours is £12.

What is the most accurate interpretation of this shadow price for Gourmet Goods' financial planning?

- **A.** The total contribution would increase by £12 if one more unit of the specialized mixing machine hours were available.
 - **B.** The cost of one hour of specialized mixing machine time is £12.
 - **C.** The company has £12 of unused capacity in its mixing machines.
 - **D.** The company should pay exactly £12 for an additional hour of machine time.
-

Question 10

A company, **Future Innovations Ltd.**, consistently identifies its research and development (R&D) department's specialized equipment as a bottleneck, limiting the number of new products it can develop. Management currently uses shadow prices to make short-term decisions about acquiring additional R&D capacity.

According to the Theory of Constraints, what long-term strategy should Future Innovations Ltd. primarily focus on to improve its overall production and development capacity?

- **A.** Increasing the selling price of all products to boost revenue.
- **B.** Outsourcing all non-R&D related activities to external providers.
- **C.** Reducing variable costs in non-bottleneck departments.

- **D.** Investing to increase the capacity of the R&D department's specialized equipment.

Answer Key and Explanations

1. Correct Answer: B. £312,000

- **Explanation:**

1. **Contribution per unit:** Alpha: $£120 - (£30 + £20 + £10) = £60$; Beta: $£150 - (£40 + £25 + £15) = £70$; Gamma: $£100 - (£25 + £15 + £10) = £50$.
2. **Contribution per machine hour:** Alpha: $£60/2.0 = £30$; Beta: $£70/2.5 = £28$; Gamma: $£50/1.5 = £33.33$.
3. **Rank:** 1st Gamma, 2nd Alpha, 3rd Beta.
4. **Allocate hours:** Produce all Gamma ($3,000u \times 1.5hrs = 4,500hrs$). Remaining $5,500hrs \rightarrow$ produce all Alpha ($2,000u \times 2.0hrs = 4,000hrs$). Remaining $1,500hrs \rightarrow$ produce Beta ($1,500hrs / 2.5hrs/u = 600u$).
5. **Total Contribution:** Gamma ($3,000 \times £50$) + Alpha ($2,000 \times £60$) + Beta ($600 \times £70$) = $£150,000 + £120,000 + £42,000 = £312,000$.

2. Correct Answer: A. Product X, as it generates £26 per machine hour compared to Product Y's £25.

- **Explanation:** To prioritize products with a single limiting factor, calculate the contribution per unit of the limiting factor.
 - Product X Contribution = $£250 - (£50 + £40 + £30) = £130$. Contribution per machine hour = $£130 / 5hrs = £26/hr$.
 - Product Y Contribution = $£300 - (£60 + £50 + £40) = £150$. Contribution per machine hour = $£150 / 6hrs = £25/hr$.Product X has a higher contribution per machine hour (£26 vs £25), so it should be prioritized.

3. Correct Answer: D. Yes, because the premium of £20 is less than the shadow price of £25.

- **Explanation:** The shadow price (£25) represents the maximum extra amount a company should be willing to pay to acquire one more unit of the scarce resource. Since the premium (£20) is less than the shadow price, each additional hour would generate a net gain of £5 in contribution. Therefore, it is financially beneficial to acquire the hours.

4. Correct Answer: A. Machine hours for the specialized sanding machine.

- **Explanation:** A limiting factor is a resource in short supply that stops the company from fulfilling unlimited demand. In this scenario, the specialized sanding machine is constantly at full capacity, causing orders to pile up. This indicates that **machine hours** are restricting the organization's ability to meet demand, making it the principal budget factor.

5. Correct Answer: A. Maximize $C = 45x + 60y$

- **Explanation:** The objective function in Linear Programming aims to **maximize total contribution**. Given that 'x' represents units of Gadget A (£45 contribution) and 'y' represents units of Gadget B (£60 contribution), the total contribution (C) is **$C = 45x + 60y$** , and the goal is to maximize this value.

6. Correct Answer: B. $2.5u + 3.0a \leq 1,500$

- **Explanation:** Constraints represent the limitations of resources. The total fabric used for 'u' Urban jackets (2.5u) and 'a' Adventure jackets (3.0a) **cannot exceed** the total available fabric (1,500 metres). Therefore, the constraint is **$2.5u + 3.0a \leq 1,500$** .

7. Correct Answer: A. If the constraint is relaxed enough that it is no longer the most restrictive factor.

- **Explanation:** The shadow price is only valid within a specific relevant range. Once the constraint is relaxed enough that it is no longer the binding constraint (i.e., another factor becomes the bottleneck), its shadow price falls to zero. Further increases in that resource would not increase total contribution.

8. Correct Answer: A. Throughput Accounting

- **Explanation:** The approach of prioritizing products based on their contribution per unit of the limiting factor is conceptually identical to the multi-product decision-making process in **Throughput Accounting**, which aims to maximize throughput (Sales - Material Costs) per unit of the bottleneck resource.

9. Correct Answer: A. The total contribution would increase by £12 if one more unit of the specialized mixing machine hours were available.

- **Explanation:** The shadow price is defined as the **increase in total contribution** that would be achieved if one more unit of the scarce resource were made available. It represents the maximum extra amount a company should be willing to pay for that additional unit.

10. Correct Answer: D. Investing to increase the capacity of the R&D department's specialized equipment.

- **Explanation:** In the long term, management should focus on **elevating the bottleneck**, as per the Theory of Constraints. This means investing to increase the capacity of the limiting factor. For Future Innovations Ltd., this involves investing to increase the capacity of the R&D department's specialized equipment.

Pricing

Instructions: Please answer the following questions to the best of your ability. The correct answer, along with a detailed explanation, is provided at the end of this chapter.

Question 1

LuxuryYachts Ltd manufactures bespoke yachts. They are considering a 5% price increase for their entry-level model, which currently sells for £1,000,000. Market analysis suggests that for every 1% increase in price, the quantity demanded falls by 0.75%.

If LuxuryYachts Ltd implements the 5% price increase, what will be the approximate percentage change in total revenue, and what does this imply about the price elasticity of demand?

- **A.** Total revenue would decrease by approximately 1.25%; demand is elastic.
 - **B.** Total revenue would increase by approximately 3.75%; demand is elastic.
 - **C.** Total revenue would remain unchanged; demand is unit elastic.
 - **D.** Total revenue would increase by approximately 1.06%; demand is inelastic.
-

Question 2

Precision Engineering Co. manufactures specialised components. They have received a one-off order from a new customer for 500 units of a component that is similar to their standard product but requires minor modifications. The standard product has a variable cost of £80 per unit and sells for £120. The special order will incur an additional £5 per unit for modification and requires a specific raw material that costs £10 per unit, which is not used in the standard product. Fixed costs are £50,000 per month and will not be affected by this order.

What is the minimum price per unit Precision Engineering Co. should charge for this special one-off order to ensure it makes a positive contribution to fixed costs and profit?

- **A.** £90.00
 - **B.** £120.00
 - **C.** £80.00
 - **D.** £95.01
-

Question 3

MediCare Devices plc produces a unique diagnostic tool. The demand equation for this tool is $P = 1,000 - 0.2Q$, where P is the price in £ and Q is the quantity. The total cost function is $TC = 100Q + 50,000$. The company aims to maximise its profit.

What is the maximum profit MediCare Devices plc can achieve from selling this diagnostic tool?

- A. £962,500
 - B. £850,000
 - C. £900,000
 - D. £1,012,500
-

Question 4

ElectroCharge Ltd manufactures advanced electric vehicle charging stations. They are considering a price adjustment for their latest model. Currently, at a price of £1,200, they sell 500 units per month. Market research suggests that if they reduce the price to £1,000, the quantity demanded would increase to 700 units per month. The finance director wants to understand the impact on total revenue.

Based on the provided data, what is the price elasticity of demand (PED) for ElectroCharge Ltd's charging station, and what would be the expected impact on total revenue if the price is reduced from £1,200 to £1,000? (Use the midpoint formula for PED and round to two decimal places).

- A. -1.83; Total revenue would increase.
 - B. -0.55; Total revenue would decrease.
 - C. -0.55; Total revenue would increase.
 - D. -1.83; Total revenue would decrease.
-

Question 5

UrbanBikes plc produces a popular range of electric bicycles. The marketing department has estimated the demand for their premium model to be $P = 2,500 - 0.5Q$, where P is the price in £ and Q is the quantity of bikes sold per month. The total cost function for this model is $TC = 500Q + 1,500,000$. The management's primary objective is to maximise profit.

To achieve profit maximisation, what is the optimal selling price and quantity for UrbanBikes plc's premium electric bicycle?

- A. Quantity = 3,000 units; Price = £1,000.
 - B. Quantity = 2,500 units; Price = £1,250.
 - C. Quantity = 1,500 units; Price = £1,750.
 - D. Quantity = 2,000 units; Price = £1,500.
-

Question 6

70

Gourmet Coffee Roasters is introducing a new blend of artisanal coffee. At a price of £12 per 250g bag, they anticipate selling 800 bags per week. However, if they increase the price to £15, sales are expected to drop to 650 bags per week. The marketing team needs a linear demand equation to model potential sales at different price points.

Assuming a straight-line demand curve, which of the following equations correctly represents the demand for Gourmet Coffee Roasters' new blend?

- **A.** $P = 12 - 0.02Q$
- **B.** $P = 15 - 0.02Q$
- **C.** $P = 28 - 0.02Q$
- **D.** $P = 28 - 0.05Q$

Question 7

InnovateTech Ltd is launching two new products simultaneously in the UK market:

- **Product A:** A revolutionary medical diagnostic device, patented and with no direct competitors, targeting hospitals with large research budgets.
- **Product B:** A new brand of energy-efficient LED light bulbs, entering a highly competitive market dominated by established brands, where market share is crucial for long-term survival.

Which pricing strategies would be most appropriate for Product A and Product B, respectively, given InnovateTech Ltd's market conditions and objectives?

- **A.** Product A: Cost-Plus Pricing; Product B: Volume Discounting.
- **B.** Product A: Price Skimming; Product B: Penetration Pricing.
- **C.** Product A: Penetration Pricing; Product B: Price Skimming.
- **D.** Product A: Price Discrimination; Product B: Relevant Cost Pricing.

Question 8

BudgetAirlines plc is a new entrant into the highly competitive short-haul flight market in the UK. Their strategy involves offering significantly lower fares than established carriers to quickly attract a large customer base and gain market share. They closely monitor the pricing of rivals and adjust their fares dynamically to remain the cheapest option on popular routes.

Which two factors are most critically influencing BudgetAirlines plc's pricing decisions?

- **A.** Customer Demand and Product Life Cycle Stage.
- **B.** Costs and Legal and Regulatory Environment.
- **C.** Corporate Objectives and Product Life Cycle Stage.

- **D. Competitors and Corporate Objectives.**

Question 9

CityLink Transport operates a commuter train service. They charge significantly higher fares during peak morning and evening rush hours compared to off-peak times in the middle of the day and weekends, even though the cost of operating the train is largely the same. This strategy aims to manage demand and maximise revenue from different customer segments.

Which pricing strategy is CityLink Transport employing?

- **A. Product-Line Pricing.**
- **B. Cost-Plus Pricing.**
- **C. Volume Discounting.**
- **D. Price Discrimination.**

Question 10

ArtisanCrafts Ltd produces handmade ceramic mugs. The demand for their mugs is given by $P = 40 - 0.05Q$. The marginal cost (MC) of producing each mug is constant at £10. The company's objective is to maximise profit.

What is the optimal selling price per mug for ArtisanCrafts Ltd to maximise its profit?

- **A. £25**
- **B. £40**
- **C. £30**
- **D. £10**

Answer Key and Explanations

1. Correct Answer: D. Total revenue would increase by approximately 1.06%; demand is inelastic.

- **Explanation:** The price elasticity of demand (PED) is $-0.75\%/1\% = -0.75$. Since $|PED| < 1$, demand is inelastic. For inelastic demand, a price increase increases total revenue. A 5% price increase leads to a $5\% \times 0.75 = 3.75\%$ decrease in quantity. New revenue = $105 \times 96.25 = 10,106.25$, a **1.06% increase** from the original 10,000.

2. Correct Answer: D. £95.01

- **Explanation:** For a one-off order, the minimum price is based on relevant (incremental) costs. Fixed costs are irrelevant. Relevant cost per unit = Standard variable cost (£80) + Modification cost (£5) +

Specific raw material (£10) = **£95**. To make a positive contribution, the price must be just above £95, such as **£95.01**.

3. Correct Answer: A. £962,500

- **Explanation:** Profit is maximised where $MR = MC$. MR from demand $P=1,000-0.2Q$ is $MR=1,000-0.4Q$. MC from $TC=100Q+50,000$ is $MC=100$. Set $1,000-0.4Q=100 \rightarrow Q=2,250$. Price $P=1,000-0.2(2,250)=£550$. Total Revenue = $£550 \times 2,250 = £1,237,500$. Total Cost = $100(2,250)+50,000 = £275,000$. Profit = $£1,237,500 - £275,000 = \mathbf{£962,500}$.

4. Correct Answer: A. -1.83; Total revenue would increase.

- **Explanation:** Using the midpoint formula: $((700-500)/((500+700)/2)) / ((1000-1200)/((1200+1000)/2)) = (200/600) / (-200/1100) = 0.3333 / -0.1818 = \mathbf{-1.83}$. Since $|PED| > 1$, demand is elastic, so a price decrease leads to an increase in total revenue.

5. Correct Answer: D. Quantity = 2,000 units; Price = £1,500.

- **Explanation:** Profit maximisation occurs where $MR = MC$. MR from $P=2,500-0.5Q$ is $MR=2,500-Q$. MC from $TC=500Q+1,500,000$ is $MC=500$. Set $2,500 - Q = 500 \rightarrow Q = \mathbf{2,000 \text{ units}}$. Price $P = 2,500 - 0.5(2,000) = 2,500 - 1,000 = \mathbf{£1,500}$.

6. Correct Answer: C. $P = 28 - 0.02Q$

- **Explanation:** Using points (800,12) and (650,15): Slope $b = (15-12)/(650-800) = 3/-150 = \mathbf{-0.02}$. Using point-slope form $P - 12 = -0.02(Q - 800) \rightarrow P - 12 = -0.02Q + 16 \rightarrow \mathbf{P = 28 - 0.02Q}$.

7. Correct Answer: B. Product A: Price Skimming; Product B: Penetration Pricing.

- **Explanation:** **Price Skimming** (high initial price) is suitable for innovative, patented products with no competition. **Penetration Pricing** (low initial price) is appropriate for entering a highly competitive market to quickly gain market share.

8. Correct Answer: D. Competitors and Corporate Objectives.

- **Explanation:** BudgetAirlines' strategy of offering lower fares and monitoring rivals shows the strong influence of **Competitors**. Their aim to quickly attract customers and gain market share is a direct reflection of their **Corporate Objectives** (market penetration).

9. Correct Answer: D. Price Discrimination.

- **Explanation:** **Price Discrimination** involves charging different prices to different customer groups for the same product or service based on their willingness to pay. CityLink Transport's peak vs. off-peak pricing is a classic example, as the cost of providing the service is largely the same.

10. Correct Answer: A. £25

- **Explanation:** Profit maximisation occurs where $MR = MC$. MR from $P=40-0.05Q$ is $MR=40-0.1Q$. MC is constant at £10. Set $40 - 0.1Q = 10 \rightarrow Q = 300$ units. Optimal price $P = 40 - 0.05(300) = 40 - 15 = \mathbf{£25}$.

Quantitative techniques

Instructions: Please answer the following questions to the best of your ability. The correct answer, along with a detailed explanation, is provided at the end of this chapter.

Question 1

Robotics Assembly Co. is producing a new type of industrial robot. The first unit took 1,000 hours to assemble. The company operates on an 80% learning curve. The management needs to estimate the total time required to produce the first 4 units for a tender.

Using the learning curve formula ($Y = aX^b$) and assuming an 80% learning rate (where $b = -0.3219$), what is the *total* cumulative time required to produce the first 4 units? (Round cumulative average time per unit to two decimal places before calculating total time).

- A. 2,880.00 hours
 - B. 2,720.00 hours
 - C. 2,400.00 hours
 - D. 2,560.00 hours
-

Question 2

Following on from the previous analysis, **Precision Parts Ltd's** management accountant has determined the variable cost per unit to be £10.00. They now need to identify the fixed cost component of their production expenses for accurate cost modelling.

What is the total fixed cost per month for Precision Parts Ltd, based on the High-Low method?

- A. £60,000
 - B. £65,000
 - C. £75,000
 - D. £70,000
-

Question 3

The finance director of **Innovate Tech Ltd** has presented a detailed budget based on sophisticated forecasting models. While the models suggest a certain outcome, the experienced sales director believes that recent market shifts, not captured by historical data, warrant a different approach. The management team is debating whether to strictly follow the model's output or adjust based on the sales director's qualitative insights.

In the context of the limitations of quantitative techniques, what is their intended role in relation to managerial judgment?

- **A.** They should be used to inform managerial judgment, not replace it.
 - **B.** They are irrelevant if managerial judgment contradicts their findings.
 - **C.** They should always replace managerial judgment, as they are objective.
 - **D.** They are only useful if they confirm existing managerial judgment.
-

Question 4

Automated Systems plc is considering applying the learning curve concept to estimate labour costs for a new production line. However, the production process is highly automated and machine-paced, with very little manual intervention. The management accountant is concerned about the applicability of the learning curve in this specific context.

Which of the following is a recognised limitation of the learning curve concept that would be relevant to Automated Systems plc's situation?

- **A.** It only applies to tasks with a very high initial production time.
 - **B.** The learning rate is always constant, making it difficult to adjust for changes.
 - **C.** It overestimates the cost savings from increased production.
 - **D.** The learning curve effect does not apply to all tasks, especially machine-paced ones.
-

Question 5

Advanced Composites Ltd has been manufacturing a new type of lightweight panel for aircraft. Initially, the production time per unit decreased significantly with each batch. However, after producing 5,000 units, the production manager observed that the average time taken to produce subsequent panels has stabilised and no further significant reductions are occurring.

In the context of the learning curve, what term describes the point at which the learning effect ends and the time per unit stabilises for Advanced Composites Ltd?

- **A.** The efficiency plateau
 - **B.** The saturation point
 - **C.** The optimal production level
 - **D.** The steady state
-

Question 6

Fresh Produce Wholesalers is analyzing its weekly demand for certain perishable goods. The management accountant observes that while there's an overall upward trend in demand, the weekly variations due to

seasonal factors (e.g., holidays) appear to be relatively constant in absolute terms, regardless of the overall demand level. They are considering which time series model to apply.

Which time series model assumes that seasonal variations are constant in absolute terms and would be most appropriate for Fresh Produce Wholesalers in this scenario?

- **A.** The Multiplicative Model
 - **B.** The Additive Model
 - **C.** The Moving Average Model
 - **D.** The Exponential Smoothing Model
-

Question 7

Digital Dynamics Ltd is investigating the relationship between its advertising expenditure and monthly sales revenue. After conducting a statistical analysis, the management accountant calculated a correlation coefficient (r) of +0.92. The marketing director is keen to understand what this figure implies for their future advertising plan.

What does a correlation coefficient of +0.92 indicate about the relationship between advertising expenditure and sales revenue for Digital Dynamics Ltd?

- **A.** There is a strong positive linear relationship.
 - **B.** There is no linear relationship.
 - **C.** There is a weak negative linear relationship.
 - **D.** There is a perfect negative linear relationship.
-

Question 8

Seaside Souvenirs Ltd experiences significant fluctuations in its monthly sales revenue. Sales are consistently higher during the summer months (June-August) and lower in winter. Over the past five years, there has also been a gradual increase in overall sales volume. The management accountant is using time series analysis to forecast future sales.

In the context of time series analysis for Seaside Souvenirs Ltd, what component would primarily describe the regular, higher sales during the summer months?

- **A.** Trend (T)
 - **B.** Cyclical Variations (C)
 - **C.** Random Variations (R)
 - **D.** Seasonal Variations (S)
-

Question 9

A manufacturing company, **Precision Parts Ltd**, is analyzing its production costs for a specific component. In its busiest month, 12,000 units were produced at a total cost of £185,000. In its quietest month, 7,000 units were produced at a total cost of £135,000. The management accountant needs to determine the variable cost per unit for budgeting purposes.

Using the High-Low method, what is the variable cost per unit for Precision Parts Ltd?

- **A.** £9.50 per unit
 - **B.** £10.50 per unit
 - **C.** £10.00 per unit
 - **D.** £11.00 per unit
-

Question 10

Aero-Tech Innovations is developing a new, complex drone assembly process. Initial estimates suggest the first unit will take 200 hours to assemble. The production manager anticipates a significant learning effect as workers gain experience. The management team needs to understand how this will impact the average time per unit for subsequent production batches.

According to the learning curve concept, what phenomenon describes the expected decrease in the average time per unit as Aero-Tech Innovations' workers gain experience in assembling the new drone?

- **A.** The average time (or cost) per unit decreases by a constant percentage each time the cumulative production doubles.
 - **B.** The total time taken for production increases proportionally with output.
 - **C.** The law of diminishing returns.
 - **D.** The fixed costs per unit decrease as production volume increases.
-

Question 11

A management accountant at **Swift Logistics plc** has performed a regression analysis to model the total fuel cost (y) based on the total mileage covered by its fleet (x). The resulting equation is $y = 5,000 + 0.75x$. The management team needs to understand the meaning of the 'a' and 'b' values in this context for future budgeting and performance analysis.

In the regression equation $y = 5,000 + 0.75x$, what does the value '5,000' primarily represent for Swift Logistics plc?

- **A.** The total fuel cost.
- **B.** The variable cost per mile.

- **C.** The fixed fuel cost (intercept).
- **D.** The total mileage covered.

Answer Key and Explanations

1. Correct Answer: D. 2,560.00 hours

- **Explanation:** Using the learning curve formula $Y = aX^b$, where $a = 1,000$ hours, $b = -0.3219$, and $X = 4$ units.
 $Y = 1,000 \times 4^{(-0.3219)} = 1,000 \times 0.64 = \mathbf{640 \text{ hours}}$ (cumulative average time per unit).
Total time for first 4 units = Average time \times Number of units = $640 \times 4 = \mathbf{2,560 \text{ hours}}$.

2. Correct Answer: B. £65,000

- **Explanation:** Fixed cost can be found using either the high or low point. Using the high point (12,000 units, £185,000) and variable cost of £10.00 per unit:
Fixed Cost = Total Cost at high point - (Variable Cost per Unit \times Units at high point)
Fixed Cost = £185,000 - (£10 \times 12,000) = £185,000 - £120,000 = **£65,000**.

3. Correct Answer: A. They should be used to inform managerial judgment, not replace it.

- **Explanation:** A key limitation of quantitative techniques is that they are based on past data and assumptions. They are useful tools for informing and supporting managerial judgment, but they should not replace it, especially when there are qualitative insights or changes in the business environment not reflected in the historical data.

4. Correct Answer: D. The learning curve effect does not apply to all tasks, especially machine-paced ones.

- **Explanation:** The learning curve effect is primarily driven by human learning and repetition. It applies less to machine-paced tasks where the speed of production is determined by the machinery, not by the workers' experience, making it less relevant for Automated Systems plc's highly automated process.

5. Correct Answer: D. The steady state

- **Explanation:** In learning curve theory, the **steady state** refers to the point where the learning effect has plateaued and the time or cost per unit stabilises at a constant level. Further reductions in production time are no longer significant.

6. Correct Answer: B. The Additive Model

- **Explanation:** The **Additive Model** (Actual = Trend + Seasonal + Random) assumes that seasonal fluctuations are constant in absolute terms, regardless of the underlying trend. This aligns with the observation that variations are constant in absolute terms, making it the appropriate model.

7. Correct Answer: A. There is a strong positive linear relationship.

- **Explanation:** The correlation coefficient (r) ranges from -1 to +1. A value of **+0.92** is very close to +1, indicating a **strong positive linear relationship**. This means that as advertising expenditure increases, sales revenue also strongly tends to increase.

8. Correct Answer: D. Seasonal Variations (S)

- **Explanation:** In time series analysis, **Seasonal Variations (S)** are short-term fluctuations that recur over a fixed period, such as within a year. The consistent higher sales during summer months perfectly fit this definition.

9. Correct Answer: C. £10.00 per unit

- **Explanation:** Using the High-Low method:
Variable cost per unit = (Cost at high activity - Cost at low activity) / (High activity units - Low activity units)
= (£185,000 - £135,000) / (12,000 - 7,000) = £50,000 / 5,000 = **£10.00 per unit.**

10. Correct Answer: A. The average time (or cost) per unit decreases by a constant percentage each time the cumulative production doubles.

- **Explanation:** This is the fundamental definition of the learning curve effect. As workers gain experience, the average time taken to produce each unit reduces at a predictable rate (e.g., 80% of the previous average) every time cumulative output doubles.

11. Correct Answer: C. The fixed fuel cost (intercept).

- **Explanation:** In the regression equation $y = a + bx$, 'a' (the intercept) represents the fixed element of the cost. Here, **5,000** represents the fixed fuel cost that is incurred regardless of mileage (e.g., insurance, road tax, basic standing charges).

Relevant costing

Instructions: Please answer the following questions to the best of your ability. The correct answer, along with a detailed explanation, is provided at the end of this chapter.

Question 1

Evergreen Landscaping is considering a special, one-off contract to design and install a unique garden feature. The contract requires:

- **Materials:** 20 units of 'Exotic Stone'. 10 units are in inventory, purchased for £30 each. These have no other use and could be sold for £5 each as decorative offcuts. The remaining 10 units must be purchased at £35 each.
- **Labour:** 50 hours of specialist design labour. Evergreen has 20 hours of idle capacity. The remaining 30 hours must be diverted from a regular project that generates £40 contribution per hour. Specialist designers are paid £25 per hour.
- **Equipment:** A specific laser leveller is needed for 1 week. Evergreen owns one, which could otherwise be hired out for £200 per week. Its net book value is £1,500.
- **Overheads:** The contract will require a temporary site manager for £500 and an additional £100 for specific insurance. Evergreen also allocates general fixed overheads at £10 per direct labour hour.

What is the total relevant cost for this special contract?

- A. £2,650
 - B. £3,150
 - C. £3,650
 - D. £4,150
-

Question 2

The 'Coastal Retreats' division of **Horizon Hospitality Group** has consistently reported losses. Its annual financial data shows:

- Revenue: £400,000
- Variable Costs: £250,000
- Specific Fixed Costs (avoidable if shut down): £100,000
- Allocated Head Office Fixed Costs (unavoidable): £80,000

If the division is shut down, there would be a one-off redundancy cost of £20,000 for the division's staff. What would be the financial impact on Horizon Hospitality Group's overall profit if Coastal Retreats is shut down?

- **A.** An increase in profit of £30,000
 - **B.** An increase in profit of £10,000
 - **C.** A decrease in profit of £70,000
 - **D.** A decrease in profit of £50,000
-

Question 3

Willowbrook Furniture Ltd. has received an enquiry for a special order of 100 bespoke chairs. The company has the following information:

- Each chair requires 2 kg of Material X. 50 kg of Material X is in inventory, purchased for £8/kg. This inventory has no other use and could be sold for scrap at £2/kg. The remaining Material X needs to be purchased at £9/kg.
- Each chair requires 3 hours of skilled labour. Willowbrook has 150 hours of idle skilled labour. Any additional hours must be diverted from regular production, which yields a contribution of £15 per hour. Skilled labour is paid £12 per hour.
- Variable overheads are £5 per direct labour hour.
- A special jig costing £200 would need to be purchased for this order. This jig would have no residual value.

What is the minimum acceptable price for this special order?

- **A.** £8,100
 - **B.** £7,200
 - **C.** £6,850
 - **D.** £7,550
-

Question 4

Cityscape Construction is tendering for a small, urgent project requiring 400 hours of specialist bricklaying labour. The company currently has 150 hours of idle bricklaying capacity. An additional 100 hours can be diverted from a less urgent project, which would result in a lost contribution of £25 per hour. The remaining hours would need to be covered by overtime, paid at £20 per hour, which is £5 above the standard hourly wage.

What is the total relevant labour cost for this urgent project?

- **A.** £8,000
- **B.** £6,500
- **C.** £7,500

- D. £7,000
-

Question 5

Maplewood Components Ltd. currently manufactures a specialised part, 'Part Z', for its main product. The annual production is 10,000 units. The current manufacturing costs per unit are:

- Direct Materials: £8
- Direct Labour: £6
- Variable Overheads: £4
- Fixed Overheads (allocated): £7

An external supplier has offered to supply Part Z for £20 per unit. If Maplewood buys Part Z, 60% of the allocated fixed overheads would be avoided, and the labour currently used to make Part Z would be redeployed to another project, saving £30,000 in external contract labour costs annually.

What is the relevant cost per unit of **making** Part Z for the make-or-buy decision?

- A. £22.20
 - B. £18.20
 - C. £25.20
 - D. £20.00
-

Question 6

Chiltern Manufacturing Ltd is considering a special contract. This contract requires 500 kg of Material Alpha. Material Alpha is currently in inventory, having been purchased six months ago for £12 per kg. Due to a recent market downturn, Material Alpha could now be purchased for £10 per kg. However, Material Alpha is regularly used in Chiltern's standard product line, where each kg contributes £15 to covering fixed costs and profit. If not used for the special contract, it would be used in regular production.

What is the relevant cost of Material Alpha for the special contract?

- A. £6,000
 - B. £5,000
 - C. £7,250
 - D. £7,500
-

Question 7

Sunrise Bakery is considering a special order for 1,000 gourmet cakes. Each cake requires 0.5 kg of a special flour, 'Golden Grain'. Sunrise has 100 kg of Golden Grain in inventory, which was purchased for £4 per kg. This inventory has an alternative use in a less profitable regular product line, where it would save £3 per kg in purchasing a substitute ingredient. Any additional Golden Grain required would need to be purchased at the current market price of £4.50 per kg.

What is the total relevant cost of Golden Grain flour for this special order?

- **A.** £2,000
 - **B.** £2,400
 - **C.** £2,100
 - **D.** £2,250
-

Question 8

A project manager at **Zenith Innovations plc** is preparing a cost analysis for a potential new product launch, which is a short-term, one-off decision. She has included the original research and development costs incurred two years ago, the depreciation of existing machinery that will be used, and an allocation of general administrative overheads.

Which of these costs should be considered irrelevant for this decision, according to the principles of relevant costing?

- **A.** All three: original research and development costs, depreciation of existing machinery, and allocated general administrative overheads.
 - **B.** Only the depreciation of existing machinery and allocated general administrative overheads.
 - **C.** Only the original research and development costs.
 - **D.** Only the original research and development costs and allocated general administrative overheads.
-

Question 9

Oceanic Fisheries Ltd. processes fish. At the split-off point, 'Fish Fillets' can be sold for £15 per kg. Alternatively, they can be further processed into 'Smoked Salmon Fillets'. The further processing costs are £8 per kg, and the Smoked Salmon Fillets can be sold for £24 per kg. The joint processing costs up to the split-off point are £10 per kg.

Should Oceanic Fisheries process the Fish Fillets further into Smoked Salmon Fillets?

- **A.** No, because the joint processing costs are too high.
- **B.** No, because the selling price of Smoked Salmon Fillets is less than the total cost per kg.
- **C.** Yes, because the total revenue from Smoked Salmon Fillets is higher than Fish Fillets.

- **D.** Yes, because the incremental revenue exceeds the incremental costs.

Question 10

Peak Performance plc is evaluating a one-off order for bespoke sports equipment. The order requires 200 metres of a specialised fabric, 'FlexiWeave', which is currently in inventory. This fabric was purchased for a cancelled project at a cost of £25 per metre. FlexiWeave has no other use within Peak Performance's operations and cannot be sold back to the supplier. Its only alternative is to be disposed of, incurring a cost of £2 per metre, or it could be sold as scrap for £3 per metre.

What is the relevant cost of the FlexiWeave fabric for this special order?

- **A.** £400
- **B.** £0
- **C.** £500
- **D.** £600

Answer Key and Explanations

1. Correct Answer: B. £3,150

- **Explanation:**
 - **Materials:** Inventory (10 units) relevant cost = higher of £0 and NRV (£5) = **£50**. Purchased (10 units) relevant cost = **£350**. Total = **£400**.
 - **Labour:** Idle (20 hours) = **£0**. Diverted (30 hours) = $30 \times (\text{£}25 \text{ wage} + \text{£}40 \text{ lost contribution}) = \text{£}1,950$. Total = **£1,950**.
 - **Equipment:** Opportunity cost of foregone hire income = **£200**.
 - **Overheads:** Incremental site manager (£500) + insurance (£100) = **£600**. Allocated overheads are irrelevant.
 - **Total** = $\text{£}400 + \text{£}1,950 + \text{£}200 + \text{£}600 = \text{£}3,150$.

2. Correct Answer: C. A decrease in profit of £70,000

- **Explanation:**
 - Contribution lost = Revenue - Variable Costs = $\text{£}400,000 - \text{£}250,000 = \text{£}150,000$.
 - Costs saved = Specific Fixed Costs = **£100,000**.
 - Net operational impact = Costs saved - Contribution lost = $\text{£}100,000 - \text{£}150,000 = -\text{£}50,000$.
 - One-off redundancy cost = **£20,000**.

- Total financial impact = $-\text{£}50,000 - \text{£}20,000 = -\text{£}70,000$ (a decrease in profit).

3. Correct Answer: B. £7,200

• **Explanation:**

- **Materials:** Inventory (50 kg) relevant cost = $50 \times \text{£}2 = \text{£}100$. Purchased (150 kg) = $150 \times \text{£}9 = \text{£}1,350$. Total = **£1,450**.
- **Labour:** Idle (150 hrs) = $\text{£}0$. Diverted (150 hrs) = $150 \times (\text{£}12 + \text{£}15) = \text{£}4,050$. Total = **£4,050**.
- **Variable Overheads:** $300 \text{ hrs} \times \text{£}5 = \text{£}1,500$.
- **Special Jig: £200**.
- **Total** = $\text{£}1,450 + \text{£}4,050 + \text{£}1,500 + \text{£}200 = \text{£}7,200$.

4. Correct Answer: D. £7,000

• **Explanation:**

- **Idle (150 hrs): £0**.
- **Diverted (100 hrs):** $100 \times (\text{standard wage } \text{£}15 + \text{lost contribution } \text{£}25) = 100 \times \text{£}40 = \text{£}4,000$.
- **Overtime (150 hrs):** $150 \times \text{£}20 = \text{£}3,000$.
- **Total** = $\text{£}0 + \text{£}4,000 + \text{£}3,000 = \text{£}7,000$.

5. Correct Answer: C. £25.20

• **Explanation:**

- Avoidable costs per unit: DM ($\text{£}8$) + DL ($\text{£}6$) + VOH ($\text{£}4$) + Avoidable FOH ($\text{£}7 \times 60\% = \text{£}4.20$) = **£22.20**.
- Opportunity cost of labour redeployment: $\text{£}30,000 / 10,000 \text{ units} = \text{£}3.00$.
- Total relevant cost of making = $\text{£}22.20 + \text{£}3.00 = \text{£}25.20$.

6. Correct Answer: D. £7,500

- **Explanation:** When materials have an alternative use (regular production), the relevant cost is the opportunity cost of that alternative use. The contribution forgone from using it in regular production is **£15 per kg**. Relevant cost = $500 \text{ kg} \times \text{£}15/\text{kg} = \text{£}7,500$.

7. Correct Answer: C. £2,100

- **Explanation:** Total needed = $1,000 \text{ cakes} \times 0.5 \text{ kg} = 500 \text{ kg}$.
 - Inventory (100 kg) relevant cost = $100 \times \text{£}3$ (saving from alternative use) = **£300**.
 - Purchased (400 kg) = $400 \times \text{£}4.50 = \text{£}1,800$.
 - **Total** = $\text{£}300 + \text{£}1,800 = \text{£}2,100$.

8. Correct Answer: A. All three: original research and development costs, depreciation of existing machinery, and allocated general administrative overheads.

- **Explanation:** Relevant costs are future, incremental cash flows.
 - Original R&D costs are **sunk costs**.
 - Depreciation is a non-cash item and represents an allocation of a past cost.
 - Allocated general overheads are arbitrary and not incremental to the decision.

9. Correct Answer: D. Yes, because the incremental revenue exceeds the incremental costs.

- **Explanation:** For further processing decisions, joint costs are sunk and irrelevant.
 - Incremental revenue = £24 (Smoked) - £15 (Fillets) = **£9 per kg**.
 - Incremental costs = **£8 per kg**.
 - Since £9 > £8, further processing is beneficial.

10. Correct Answer: D. £600

- **Explanation:** The material has no other use and would be scrapped. The relevant cost is the higher of £0 and the net realisable value from sale. The opportunity cost of using it is the scrap revenue forgone (£3 per metre), plus the disposal cost avoided (£2 per metre) is not a cash inflow, but the net realisable value is the sale price. The relevant cost is 200 metres × £3/metre = **£600**. The original purchase price is a sunk cost.

Risk and uncertainty

Instructions: Please answer the following questions to the best of your ability. The correct answer, along with a detailed explanation, is provided at the end of this chapter.

Question 1

GreenEnergy Solutions, a UK firm, is deciding on a new investment project (P1, P2, or P3). The future states of nature (High Demand, Medium Demand, Low Demand) have unknown probabilities. The potential profits (£'000) are:

Project	High Demand (£'000)	Medium Demand (£'000)	Low Demand (£'000)
P1	1,200	600	200
P2	1,500	500	(100)
P3	800	700	300

To minimise the maximum possible regret, which project should GreenEnergy Solutions choose using the Minimax Regret criterion for its decision making?

- A. P2
- B. P3
- C. P1
- D. P1 or P3, as they have similar maximum regrets.

Question 2

AgriHarvest Ltd, a UK agricultural supplier, is deciding whether to invest in a new crop variant. The profit depends on the weather conditions (Good, Average, Poor) with known probabilities. The payoffs (£'000) and probabilities are:

Strategy	Good Weather (Prob=0.4)	Average Weather (Prob=0.3)	Poor Weather (Prob=0.3)
Invest	1,500	600	(1,200)
Do Not Invest	0	0	0

AgriHarvest Ltd is considering purchasing a perfectly accurate weather forecast.

What is the Value of Perfect Information (VOPI) for AgriHarvest Ltd's decision?

- A. £270,000
- B. £360,000
- C. £180,000

- **D. £450,000**

Question 3

MediCare Innovations, a UK healthcare technology firm, is deciding between two new medical device projects: 'Device A' and 'Device B'. The profitability of each project depends on the probability of successful clinical trials (p).

- Device A: Profit = £10,000,000 if trials succeed, £(2,000,000) if trials fail.
- Device B: Profit = £7,000,000 if trials succeed, £1,000,000 if trials fail.

Let ' p ' be the probability of successful clinical trials. The probability of failure is $(1-p)$.

At what probability of successful clinical trials (p) would the Expected Value (EV) of Device A become equal to the Expected Value (EV) of Device B, making the decision indifferent between the two projects? (Round to two decimal places).

- **A. 0.25**
- **B. 0.67**
- **C. 0.33**
- **D. 0.50**

Question 4

A UK retail chain, **HighStreet Fashion**, is considering two strategies for its upcoming winter collection: a 'Premium Line' or a 'Budget Line'. The financial outcomes (profit in £) depend on the economic climate, with probabilities estimated as follows:

Economic Climate	Probability	Premium Line Profit (£)	Budget Line Profit (£)
Strong	0.4	1,200,000	800,000
Moderate	0.3	800,000	1,000,000
Weak	0.3	300,000	1,000,000

Based on the Expected Value (EV) concept, which strategy should HighStreet Fashion choose, and what is its associated EV?

- **A. Premium Line; EV = £800,000**
- **B. Budget Line; EV = £920,000**
- **C. Budget Line; EV = £900,000**
- **D. Premium Line; EV = £780,000**

Question 5

Horizon Innovations, a UK start-up, is launching a completely novel product with no historical data or comparable market information, making it impossible to assign probabilities to future demand states (High, Medium, Low). The company's founder is known for being extremely cautious and prioritises avoiding significant losses above all else, even if it means foregoing potentially higher gains. The potential profits (£'000) for three launch strategies (L1, L2, L3) are:

Strategy	High Demand (£'000)	Medium Demand (£'000)	Low Demand (£'000)
L1	900	400	100
L2	1,500	300	(200)
L3	700	600	250

Given the founder's risk aversion and the conditions of uncertainty, which decision making criterion should be applied, and which strategy would Horizon Innovations choose?

- **A.** Maximax criterion; L2
- **B.** Expected Value criterion; L3
- **C.** Maximin criterion; L3
- **D.** Minimax Regret criterion; L1

Question 6

SwiftDeliver Logistics, a UK courier service, is evaluating two expansion strategies. Strategy X has an Expected Value (EV) of £500,000 with potential outcomes ranging from a £100,000 loss to a £1,200,000 profit. Strategy Y also has an EV of £500,000, but its outcomes range more narrowly from a £300,000 profit to a £700,000 profit. The board is concerned about the significant downside risk associated with Strategy X, despite its higher potential upside.

Given that both strategies have the same Expected Value, what is the primary reason the board might hesitate to choose Strategy X, and what limitation of EV analysis does this highlight?

- **A.** Strategy X involves more complex calculations, making its EV less reliable.
- **B.** EV analysis is only suitable for decisions under uncertainty, not risk.
- **C.** Strategy X has a lower maximum potential payoff, which EV analysis fails to capture.
- **D.** EV analysis is a long-run average and ignores the variability (risk) of outcomes, which is higher for Strategy X.

Question 7

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A UK pharmaceutical company, **PharmaGen Ltd**, is developing a new drug for a common ailment. Based on extensive clinical trials and historical data from similar drugs, they estimate a 70% chance of the drug passing regulatory approval and a 30% chance of failure. Separately, PharmaGen is also exploring a completely novel gene-editing therapy, the market reaction to which is entirely unknown due to its unprecedented nature and lack of comparable products.

In the context of PharmaGen's strategic decision making, which of the following statements accurately distinguishes between the two situations described?

- **A.** Both situations represent uncertainty, as future outcomes are never guaranteed.
 - **B.** Both situations represent risk, as potential outcomes can be identified.
 - **C.** The drug approval process represents risk, while the gene-editing therapy represents uncertainty.
 - **D.** The drug approval process represents uncertainty, while the gene-editing therapy represents risk.
-

Question 8

Urban Developments PLC, a UK property developer, is evaluating a large-scale residential project. Their initial financial model shows a positive Net Present Value (NPV), but this is highly dependent on several key assumptions, such as construction cost per square meter, average selling price per unit, and the probability of obtaining planning permission. The project manager wants to understand which of these variables, if it changes, would most significantly impact the project's viability and potentially alter the initial go/no-go decision.

Which quantitative technique should Urban Developments PLC employ to identify the critical variables that have the most influence on the project's outcome and where to focus attention for more accurate estimates?

- **A.** Expected Value analysis
 - **B.** Value of Perfect Information
 - **C.** Minimax Regret criterion
 - **D.** Sensitivity analysis
-

Question 9

Global Logistics PLC, a UK shipping company, is facing a complex strategic decision regarding expanding its fleet or investing in new port infrastructure. This decision involves several sequential choices and uncertain outcomes, such as market demand fluctuations and regulatory changes, each with estimated probabilities. The management team needs a clear, diagrammatic tool to visualise and analyse these multi-stage options.

Which of the following statements accurately describes the fundamental concept and process of using a decision tree for Global Logistics PLC's strategic analysis?

- **A.** It is a diagrammatic tool representing a sequence of decisions and outcomes, solved from right to left by calculating Expected Values.
- **B.** It is a method to determine the sensitivity of a decision to changes in a single variable.
- **C.** It is a tool for identifying the maximum possible regret by constructing a regret table.
- **D.** It is a technique used when probabilities of outcomes are unknown, focusing on optimistic or pessimistic payoffs.

Question 10

Using the same payoff table as in the previous question, **LeisureParks UK** is now considering a very cautious approach due to recent economic volatility. The business wants to ensure the best possible outcome even if the worst-case scenario occurs.

Strategy	Boom (£'000)	Normal (£'000)	Recession (£'000)
S1	800	400	100
S2	1,200	300	(50)
S3	600	500	200

Which strategy would LeisureParks UK choose if it applies the Maximin criterion for its decision?

- **A.** S2
- **B.** S1 or S2, as they offer the highest potential.
- **C.** S1
- **D.** S3

Answer Key and Explanations

1. Correct Answer: C. P1

- **Explanation:** The Minimax Regret criterion chooses the strategy with the smallest maximum regret.
 - **P1** maximum regret: £300,000 (see table in explanation).
 - **P2** maximum regret: £400,000.
 - **P3** maximum regret: £700,000.
 Project P1 has the smallest maximum regret.

2. Correct Answer: B. £360,000

- **Explanation:**

- EV without perfect information = $EV(\text{Invest}) = 0.4 \times £1,500,000 + 0.3 \times £600,000 + 0.3 \times (-£1,200,000) = £420,000$. $EV(\text{Do Not Invest}) = £0$. Best EV = £420,000.
- EV with perfect information = $(0.4 \times £1,500,000) + (0.3 \times £600,000) + (0.3 \times £0) = £780,000$.
- VOPI = $£780,000 - £420,000 = \mathbf{£360,000}$.

3. Correct Answer: D. 0.50

- **Explanation:** Set $EV(A) = EV(B)$:
 $p \times £10M + (1-p) \times (-£2M) = p \times £7M + (1-p) \times £1M$
 $£10Mp - £2M + £2Mp = £7Mp + £1M - £1Mp$
 $£12Mp - £2M = £6Mp + £1M$
 $£6Mp = £3M$
 $p = \mathbf{0.50}$.

4. Correct Answer: B. Budget Line; EV = £920,000

- **Explanation:**
 - $EV(\text{Premium}) = (0.4 \times £1,200,000) + (0.3 \times £800,000) + (0.3 \times £300,000) = £810,000$.
 - $EV(\text{Budget}) = (0.4 \times £800,000) + (0.3 \times £1,000,000) + (0.3 \times £1,000,000) = \mathbf{£920,000}$.
The Budget Line has a higher EV.

5. Correct Answer: C. Maximin criterion; L3

- **Explanation:** The Maximin criterion (pessimistic approach) chooses the strategy with the highest worst-case payoff.
 - L1 worst-case = £100,000
 - L2 worst-case = -£200,000
 - L3 worst-case = $\mathbf{£250,000}$ (highest).

6. Correct Answer: D. EV analysis is a long-run average and ignores the variability (risk) of outcomes, which is higher for Strategy X.

- **Explanation:** A key limitation of Expected Value (EV) is that it ignores the variability (risk) of outcomes. While both strategies have the same EV, Strategy X has a wider range of potential outcomes, including a significant loss, indicating higher risk, which EV does not capture.

7. Correct Answer: C. The drug approval process represents risk, while the gene-editing therapy represents uncertainty.

- **Explanation:** **Risk** exists when probabilities of outcomes can be estimated (70% success, 30% failure). **Uncertainty** exists when probabilities are unknown and cannot be reliably estimated, as with the novel gene-editing therapy.

8. Correct Answer: D. Sensitivity analysis

- **Explanation: Sensitivity analysis** (what-if analysis) examines how a decision changes when input variables are altered. It helps identify critical variables that have the most influence on the outcome, showing where estimates need to be most accurate.

9. Correct Answer: A. It is a diagrammatic tool representing a sequence of decisions and outcomes, solved from right to left by calculating Expected Values.

- **Explanation:** A decision tree is a diagrammatic tool used to represent and analyze a sequence of decisions under risk. The process involves solving the tree from **right to left**, calculating the Expected Value (EV) at each outcome node, and selecting the branch with the highest EV at each decision node.

10. Correct Answer: D. S3

- **Explanation:** The Maximin criterion (pessimistic) chooses the strategy with the highest worst-case payoff.
 - S1 worst-case = £100,000
 - S2 worst-case = -£50,000
 - S3 worst-case = **£200,000** (highest).

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