

Performance Pillar

P2 – Performance Management

Examiner's Answers

SECTION A

Answer to Question One

(a)

The optimum selling price occurs where marginal cost = marginal revenue.

Marginal cost is assumed to be the same as variable cost. From the data it can be seen that the costs of direct materials, direct labour and variable overhead total \$18.75 per unit.

The price at which there is zero demand can be calculated to be $\$45 + ((130,000 / 10,000) \times \$1) = \$58$

There is a change in demand of 10,000 units for every \$1 change in selling price so the equation of the selling price is:

$$\$58 - 0.0001x$$

And thus the equation for marginal revenue is:

$$\$58 - 0.0002x$$

Equating marginal cost and marginal revenue gives:

$$18.75 = 58 - 0.0002x$$

$$39.25 = 0.0002x$$

$$39.25 / 0.0002 = x = 196,250$$

If $x = 196,250$ then the optimum selling price is:

$$\$58 - (0.0001 \times 196,250) = \$38.375$$

There is thus a contribution of $\$38.375 - \$18.75 = \$19.625$ per unit.

Annual contribution = $\$19.625 \times 196,250$ units =	\$3,851,406.25
Less annual fixed overhead costs	\$ 360,000.00
Annual profit	\$3,491,406.25

(b)

- (i) If the actual direct material cost per unit were lower than expected then the effect of this would be to reduce the variable cost and hence the marginal cost per unit. There would be no change to the price equation but this would impact on the solution of the optimal selling price and quantity, the result of which would be to lower the selling price and thus increase the quantity sold. The opposite would apply if the direct material cost per unit were to increase.
 - (ii) Any change in the fixed overhead cost would have no effect on the optimal selling price and quantity sold.
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Answer to Question Two

Life cycle costing collects the costs of the cost object (each client in DTG's case) over their lifetime, irrespective of accounting years. This allows the total profit of each client to be measured.

DTG would need to set up a system to record the time spent, its cost, the cost of disbursements and the fee income derived from its client so that these values could be accumulated over the client's lifetime.

This would start with the initial meeting with the potential client because although this cost could not be charged to the client it is still a cost that has been incurred. If they become a client then other costs will be incurred in setting them up on the system as a client. At this stage no fee income has been earned because no services have yet been provided so the client is loss making. DTG would hope to gradually recover these initial costs by providing services until the client becomes profitable to them.

For those clients where DTG is being engaged on a one-off basis for each assignment there will be non-chargeable set up costs before each assignment is agreed. These costs need to be reflected in the fees charged for the services that are to be provided. Where a continuous role is agreed then discounted fee rates may be applied to recognise the reduced amount of setup costs.

DTG will also need to record the cost of time spent on non-chargeable activities after the service has been provided such as chasing the client for payment. They will also need to record the value of referrals that the client has made to them. This is often difficult to measure but may perhaps be identified by the smaller amount of time required to convert a lead from an existing client into a new client compared with the time required to convert other prospects into clients.

DTG can then measure the profits of each of its clients since their initial appointment and consequently determine which of them are most and least profitable.

Answer to Question Three

Kaizen Costing is a system of costing that focuses on achieving small incremental improvements in the production process with the objective of reducing costs. Improvement is the aim and responsibility of every worker in every activity at all times in a Kaizen Costing system. As a result of involving all workers significant overall cost reductions can be achieved over time.

Both Standard Costs and Kaizen Costing may be used as part of a performance measurement process, however there are significant differences between their approach.

A standard cost is often set annually in advance of the budget year and is rarely updated during the year. Performance is measured against these standard costs and variances determined. If appropriate, planning and operational variance analysis is used to distinguish variances that are within the manager's control. It is quite common for only adverse variances to be further investigated since once the target has been achieved (or beaten with a favourable variance) no further action is required.

Kaizen Costing is different in this respect because it exists in an environment of continual improvement. Therefore Kaizen cost goals are often updated monthly to reflect the improvement that has already been achieved and to challenge workers to improve still further.

Consequently rather than being a target to be achieved and then simply maintained, Kaizen Costing provides a constantly moving target. If this technique were used to measure performance using traditional variance analysis it would be difficult to measure trends over time, however it would discourage workers from relaxing their efforts once a target has been achieved.

Answer to Question Four

(a)

Mix variance

	<i>Standard Mix</i>	<i>Actual</i>	<i>Difference</i>	<i>Price</i>	<i>Variance</i>
A	450 litres	600 litres	+150 litres	(\$23.75 - \$30)	\$937.50 A
B	337.5 litres	250 litres	-87.5 litres	(\$23.75 - \$30)	\$546.875 F
C	562.5 litres	500 litres	-62.5 litres	(\$23.75 - \$15)	\$546.875 A
					\$937.50 A

Mix variance – alternative calculation

	<i>Standard Mix</i>	<i>Actual</i>	<i>Difference</i>	<i>Price</i>	<i>Variance</i>
A	450 litres	600 litres	+150 litres	\$30	\$4,500 A
B	337.5 litres	250 litres	-87.5 litres	\$30	\$2,625 F
C	562.5 litres	500 litres	-62.5 litres	\$15	\$937.50 F
					\$937.50 A

Yield variance

1,350 litres of input should yield 1,125 litres of output, but output was only 1,000 litres so there is a shortfall of 125 litres.

125 litres of output at the revised standard direct material cost of \$28.50 per litre of output = \$3,562.50 Adverse.

(b)

The Production Manager's decision to substitute some of chemical B with chemical A to avoid the increased cost caused by the worldwide price increase of chemical B has not been very successful as is shown by the adverse operational cost variances.

There was a significant increase in the total input volume needed to produce 1000 litres of output, possibly because the mix of chemicals being used was no longer optimum. This may have caused the adverse yield variance.

In addition, there was an adverse mix variance because a lower proportion of chemical C was used. It seems that the manager used chemical A instead of chemical B, but chemical A was originally the most expensive chemical and cost as much per litre as the revised price of chemical B that it replaced.

The Production Manager has taken action to reduce the effect of the worldwide price increase of chemical B, however, since the company has a separate purchasing department then it is they who are responsible for the purchasing function and therefore they should be responsible for the effect of price changes not the Production Manager.

Apart from the financial effects of the manager's decision there are a number of other issues to be considered. The manager may not have the authority to change the mix of the spray without consulting the company's chemical advisors. The alternative mix may not be as effective as a crop protector as the original mix and may even be harmful to the crops or to customers that consume them.

Answer to Question Five

(a)

A typical Balanced Scorecard measures the performance of an organisation from four perspectives: customer perspective; internal business perspective; innovation and learning perspective; and financial perspective.

The Balanced Scorecard demonstrates that the achievement of financial objectives is often the result of achieving other non-financial targets which lead to the financial targets being achieved. For example, if customers are happy with the products and services being provided then this will often result in increased sales which improve profits and therefore financial objectives are achieved.

Thus by measuring non-financial performance and taking action when targets are not achieved, the result will be improved financial performance. This is because the cause of the financial performance has been reviewed, whereas financial performance indicators alone do not identify the causes of performance, simply the effect of it.

(b)

A number of non-financial indicators could be identified:

- The number of take-offs that are on time is a measure of the efficiency of the airline in preparing the aircraft for a flight. Aircraft do not earn revenue while they are standing on the tarmac. This is a measure of the efficiency of internal processes and is part of the internal business perspective.
 - The number of new routes operated by the airline is a measure of the innovation of the airline to develop new services for its customers. The greater the number of routes the more customer choice, which also increases the number of customers that would consider ZJET for their flights. This measure is part of the innovation and learning perspective.
 - Within the customer perspective, ZJET could use the number of missed calls due to all of the telephone operators being busy. Customers will expect a speedy answer when they telephone and undue delays may result in the customer ringing off before the call is answered. The negative impression gained by the customer may result in current and future business being lost.
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SECTION B

Answer to Question Six

(a)

<i>Product</i>	<i>W</i> \$	<i>X</i> \$	<i>Y</i> \$	<i>Z</i> \$	<i>Total</i> \$
Sales	1,300,000	2,260,000	2,120,000	1,600,000	7,280,000
Direct materials	300,000	910,000	940,000	500,000	2,650,000
Direct labour	400,000	1,040,000	640,000	600,000	2,680,000
Overhead:					
Machine related	80,000	78,000	32,000	120,000	310,000
Batch related	50,000	65,000	40,000	75,000	230,000
Gross contribution	470,000	167,000	468,000	305,000	1,410,000
Overhead:					
Product specific	500,000	50,000	100,000	50,000	700,000
Net contribution	(30,000)	117,000	368,000	255,000	710,000
General overhead					310,000
Profit				400,000	

(b)

- (i) The profit statement that is presented shows that two of WTL's products are profitable and the other two are loss making. However this statement is unsuitable for decision making. Although it shows the revenues and costs attributed to each product it makes arbitrary assumptions with regard to the company's overhead costs and uses these assumptions to attribute these overhead costs to each product.

The statement does not consider the causes of the overhead costs and the extent to which they are avoidable if the company were to decide on particular courses of action. For example, some of the overhead costs are product specific and would be avoided if the product were to be discontinued. This is not clear from the statement that has been presented.

- (ii) The profit statement shows that Product W has a negative net contribution and therefore from a financial perspective it should be discontinued as this would increase the company's profits by \$30,000. This is in contrast to the original profit statement which showed that products W and Y were profitable and products X and Z were loss making. Products X, Y and Z should be continued because they all have a positive net contribution.

The discontinuance of product W will release resources that were previously used by that product. If there is sufficient demand for products X, Y, or Z then WTL may be able to increase its output of these other products and increase its profits by even more than \$30,000.

(c)

The specific fixed cost of product W is \$500,000.

The gross contribution to sales ratio of product W is $\$470,000 / \$1,300,000 = 0.36154$

Therefore, the breakeven sales value is $\$500,000 / 0.36154 = \$1,382,973$; and the breakeven sales volume is $\$1,382,973 / \$13 = 106,383$ units.

However, since production must be in batches of 100 units then to break even 1,064 batches would have to be produced and sold.

For every unit produced that was not sold there is a cost of \$8.30, and the gross contribution from each unit sold is \$4.70. Therefore the breakeven sales volume is:

$$106,383 + Z$$

$$\text{Where } Z = 4.70x - 8.30(17 - x) = 4.70x + 8.30x - 141.1 = 13x - 141.1$$

$$Z = 141.1 / 13 = 10.86$$

Proof:

$$10.86 @ \$4.7 = \$51.04$$

$$17 - 10.86 @ 8.3 = \$50.96$$

Therefore the breakeven sales volume is $106,383 + 11 = 106,394$.

(d)

Value Analysis is a technique that improves the processes of production so as to achieve a reduction in cost without compromising the quality or usefulness of the product.

WTL would need to compare its products with those provided by its competitors to see if their products offer features that are not found in the products of their competitors. WTL it would then have to determine whether these features are important to their customers. If they are not important then these features could be removed without affecting the value of the product. Alternatively, WTL should review the design of its products as it may be able to produce them using different, lower cost, materials without affecting the customer's perception of the product. This would enable WTL to reduce its costs and thereby increase its profit.

Answer to Question Seven

(a)

An analysis of the sales is as follows:

	<i>Internal</i>	<i>External</i>	<i>Total</i>
Number of components	50,000	150,000	200,000
	<i>\$000</i>	<i>\$000</i>	<i>\$000</i>
Sales value	768,000	3,072,000	3,840,000
Variable cost	<u>3,84,000</u>	<u>1,152,000</u>	<u>1,536,000</u>
Contribution	<u>384,000</u>	<u>1,920,000</u>	<u>2,304,000</u>

(b)

- (i) Currently Division Y is operating at 80% capacity and producing 200,000 components each year. Division Y therefore has existing capacity for up to a further 50,000 components. The increase in division T's capacity by 25% equals 12,500 units which will be sold at a unit selling price of \$60,000.

Division Y has sufficient capacity to supply the additional components to division T.

Assuming that the current transfer pricing policy continues and that there are no other cost changes the variable cost per unit of these sales will be \$28,800 thus yielding a unit contribution of \$31,200.

This has a present value of $\$31,200 \times 12,500 \text{ units} \times 2.487 = \$ 969,930,000$

The residual value of the equipment has a present value of:
 $\$400\text{m} \times 0.751$

\$ 300,400,000
\$1,270,330,000
\$1,350,000,000
(\$ 79,670,000)

But the capital investment cost is
 Resulting in an NPV of

The manager of Division T will not want to go ahead with the investment.

- (ii) From an overall perspective TY will also consider the effect of the investment on Division Y. It has already been stated above that Division Y has sufficient capacity to produce the additional 12,500 components.

It has also been determined above that the transfer price represents a 100% mark up on their variable cost so Division Y's contribution would increase by:

$12,500 \text{ components} \times \$7,680 = \$96,000,000 \text{ per annum.}$

This has a present value of $\$96,000,000 \times 2.487 = \$238,752,000.$

Therefore the investment is worthwhile overall because it has an NPV of \$159,082,000. Consequently the decision would be different if it were being made from the perspective of TY.

(c)

The variable cost per component incurred by Division Y is $\$1,536,000,000 / 200,000 = \$7,680.$ If this were used as the transfer price then the internal sales value would be \$3,840,000,000 so it seems that the transfer price is based on variable cost plus a 100%

mark up.

At the current level of operations (80% of capacity), the fixed cost is equal to \$9,750 per unit, so the total unit cost is \$17,430.

As a result it can be seen that Division Y has sold components to Division T which yield a positive contribution but which are being sold at below total cost and at a discount to the market price of \$20,480.

The manager of Division T would argue that since Division Y has spare capacity then it does not have any unsatisfied external demand. Therefore the transfer price should reflect the opportunity cost to Division Y of those sales. This is their variable cost, since the fixed cost would be incurred whether the internal sales took place or not. The manager of Division T will therefore feel that they are being overcharged and the transfer price should be \$7,680 per component.

The manager of Division Y would argue that the internal sales are making a loss. The full cost is \$17,430 per unit and they would not be able to manufacture the components without incurring the fixed costs. The manager of Division Y would also be keen to point out that the internal price is significantly lower than the market price that Division Y is charging on its external sales.

For the company as a whole the transfer price that is used has no effect unless it changes the decisions being made by the divisional managers so that they are sub-optimal for the company. As shown in part (b) above the transfer price does change the decision made by the manager of Division T so that it is a sub-optimal decision. Consequently the transfer price is not appropriate if sub-optimal decision making is to be avoided.

The Senior Examiner for P2 Performance Management offers to future candidates and to tutors using this booklet for study purposes, the following background and guidance on the questions included in this examination paper.

Section A – Compulsory

Question One This question tests candidates knowledge and understanding of the relationship between selling price and demand to interpret the data provided and then requires them to calculate the optimum selling price and hence profit for a product in part (a) and then to explain the effect of cost changes on the optimum selling price of the product in part (b). This question addresses the following learning outcome: *apply an approach to pricing based on profit maximisation in imperfect markets.*

Question Two This question tests candidates' knowledge of Customer Life Cycle costing and how its use may impact on the profits of an organisation. This question addresses the following learning outcome: *discuss the concept of life cycle costing and how life cycle costs interact with marketing strategies at each stage of the life cycle.*

Question Three This question tests candidates understanding of Kaizen Costing and its use for performance measurement compared to standard costing and variance analysis. This question addresses the following learning outcome: *explain the concepts of continuous improvement and Kaizen Costing that are central to total quality management.*

Question Four This question tests candidates' knowledge of the use of variance analysis to measure performance by requiring candidates to calculate variances and discuss their meaning following the decision taken by the company's Production director. This question addresses the following learning outcome: *evaluate performance using fixed and flexible budget reports.*

Question Five This question tests candidates understanding of the Balanced Scorecard. This question addresses the following learning outcome: *compare and contrast traditional approaches to budgeting with recommendations based on the balanced scorecard.*

Section B – Compulsory

Question Six This question tests candidates' ability to interpret the data provided to determine the profit or loss of each of a company's products, and to recommend which, if any, should be discontinued. Then candidates were required to calculate the breakeven volume for one of the products, and finally in part (d) to explain how Value Analysis could be used to improve the company's profits. This question addresses the following learning outcomes: *interpret variable/fixed cost analysis in multiple product contexts to break-even analysis and product mix decision making, including circumstances where there are multiple constraints and linear programming methods are needed to identify optimal solutions and compare and contrast value analysis and functional cost analysis.*

Question Seven This question tests candidates' ability to interpret the data provided and measure the performance of two companies within a group and the impact that internal transactions and their transfer prices have on the decisions made by each company. Finally candidates are asked to explain the appropriateness of the transfer pricing policy. This question addresses the following learning outcomes: *discuss alternative measures of performance for responsibility centres and discuss the likely consequences of different approaches to transfer pricing for divisional decision making, divisional and group profitability, the motivation of divisional management and the autonomy of individual divisions.*