Performance Pillar

P2 – Performance Management

Examiner's Answers

SECTION A

Answer to Question One

(a)

Average time per unit for the first 560 units:

$Y = ax^b$

$Y = 8 \times 560^{-0.1520}$

Y = 3.057 hours

Total time for 560 units = 560 x 3.057 = 1,712 hours

Time allowed for actual production	1,712 hours
Actual hours	3,500 hours
Original standard hours	4,480 hours

Direct labour efficiency variances:

Planning variance:	
(4,480 hours – 1,712 hours) x $15	$41,520 Favourable
Operating variance:	
(3,500 hours – 1,712 hours) x $15	$26,820 Adverse
Direct labour rate variance:	
(3,500 hours x $15) - $57,750	$ 5,250 Adverse

(b)

Target costing applies to organisations that are forced to accept the market price for a particular item. The organisation uses this market price together with a desired profit target to determine the cost at which the item must be produced. The organisation then sets out to achieve this cost as an average unit cost throughout the life of the product.

Learning curves may be an important part of target costing but it depends on the nature of the manufacturing process. In a machine intensive environment it may be that significant learning curves do not exist and therefore in these environments learning curves could be said to be irrelevant to target costing. However, in labour intensive environments the effect of learning may be extremely significant and important because target costs may only be achieved once a certain level of activity has been reached. It may only be during this post learning period that costs are lowered sufficiently to meet the desired target cost.

Answer to Question Two

(a)

Quality conformance costs are costs that are deliberately incurred by an organisation in order to minimise quality failures. Quality non-conformance costs are costs that are incurred by an organisation as a consequence of quality failures that have occurred. There is a relationship between these categories of costs to the extent that the more that is spent on conformance costs the lower should be the level of quality failures and therefore the lower the non-conformance costs. Organisations must decide on their position in this quality/cost trade off. The scenario indicates that CAL has positioned itself in the middle of the range of possible positions because some of its competitors supply lower quality products whereas others supply higher quality products.

(b)(i)

Customer demand is 20,000 good items, but 2% of the items supplied are faulty therefore the total number of items to be supplied is:

20,000 x 100/98 = 20,408 so that 2% (i.e. 408) are returned for free replacement.

The cost of these 408 units that are replaced free of charge is $45 per unit = $18,360

However, there is a further cost of this failure because if it could be eliminated the market share would increase to 25%. This would result in an additional 5,000 units of sales which each earn a contribution of $15 = $75,000.

As a result the non-conformance cost of these faulty items is $93,360.

(b)(ii)

If these failures had been discovered before delivery some of these costs could have been avoided. Although the item might still have been faulty and needed replacement, the lost sales would be avoided as would the delivery cost of the faulty items. Thus the cost of this failure could potentially have been reduced to an internal failure cost of 408 units x $40 = $16,320 a saving of $77,040.

Answer to Question Three

(a)

QW is presently using a form of just-in-time (JIT) production system because each item that is produced is specific to the order placed by the customer. Consequently QW does not hold an inventory of finished items. QW does not use a JIT purchasing system because of the risk of being unable to fulfil customer orders due to lack of materials, however its raw material inventory levels are kept to a minimum which is in keeping with the JIT philosophy. This system encourages efficiency amongst the workforce because any delays may result in lost orders.

The proposed production system for the metal ornaments is a completely different system that is based on constant rates of production and fluctuating levels of finished goods inventory to smooth out the peaks and troughs of demand. This type of system would allow QW to predict the raw materials that it requires with greater certainty, but can lead to inefficient production and obsolete finished goods inventory. This is because managers often believe that it is good to produce as many of the item as possible without too much thought for the cost implications of holding high inventory holdings on cost. It is important that inventory levels are carefully monitored if losses due to obsolescence and damage are to be avoided.

(b)

A TQM system is essential if the production system is a JIT system because any failings cannot be remedied by supplying items from inventory. However the same is not true of a constant rate production system. In a constant rate production system, any failings can be hidden because items are sold from inventory. It is important therefore that such failings are reported via the performance reporting system.

As a consequence the focus on quality is less critical for a constant rate production system and as a result it is harder to convince employees of the need to be committed to such a philosophy.

Answer to Question Four

(a)

An annual budgeting system is a system of preparing a set of budgets for a 12 month period, usually coinciding with the financial year of the company.

A rolling budget system is a system of budgeting that is continuous. Once the budget has been prepared it is added to each month, or perhaps quarterly, thus ensuring that a budget always exists for the next 12 months and possibly for longer depending on the company's budgeting policy.

One of the key differences between these two systems is that, when a rolling budget system is being used, managers see budgeting as part of their ongoing planning and decision making processes, rather than as a separate exercise which is used to measure their performance.

In some organisations, where rolling budgets are used, the unexpired portion of the budget is also updated monthly or quarterly to reflect any changes in operational circumstances since the budget was originally prepared. There is much debate as to whether this amounts to changing the original budget or preparing a latest annual forecast.

(b)

The manager of the Southern depot has raised two specific issues with the current annual budgeting system.

One of these is his argument that the budgets become out of date due to changing operational circumstances. Whether or not rolling budgets provide a solution to this issue depends on the organisation's philosophy of the use of rolling budgets. If the view is that they should be used to plan for future budget years so as to ensure that managers can make better decisions for those years, but not change the current year's budget, then a rolling budget will not be the solution to this problem. However, the manager can now effect changes to future budget periods, as yet unapproved, in the light of those circumstances.

If the rolling budget system allows revision of the remaining part of the plan for the current budget year then their use will solve the argument that the original budget has become out of date.

It is important to consider the use of the budget. There are two main uses: operational control and strategic decision making. From an operational control perspective care must be taken to ensure that a rolling budget does not become a vehicle for eliminating variances caused by actual performance. Once a budget has been set and approved, then any unexpected changes to circumstances should be reported via the budgetary control system using variance analysis including planning variances as appropriate.

From a strategic decision making perspective, it is important to use the rolling budget process to determine whether strategies need to be revised in the light of the current operational circumstances.

The second of the manager's arguments relates to the lack of authority for actions in respect of future periods. The rolling budget method does have a role here because as it is continuously being updated then if each update is approved by the Board of Directors, managers will always have authority to carry out decisions in line with the approved budget for the next 12 months or more. This is a weakness of the annual budgeting system, especially towards the end of the current year when next year's budget is still to be approved. Managers can often find that they do not have authority for decisions which will impact on the early part of the next budget year until that year has almost started.

If DW were to introduce a system of rolling budgets then this would enable the depot manager to plan and improve their decisions, for example with regard to recruiting and training employees, and to evaluate alternative operating methods and possible capital investments based on the budgets that have been agreed for the next 12 months or more.

Answer to Question Five

Cost driver rates:

Accounts preparation and advice	580,000 / 18,000 hours = $32.22 per hour
Requesting missing information	30,000 / 250 times = $120 per request
Issuing fee payment reminders	15,000 / 400 times = $37.50 per reminder
Holding client meetings	60,000 / 250 meetings = $240 per meeting
Travelling to clients	40,000 / 10,000 miles = $4 per mile

Client costs:

	Client		
	A	*B*	*C*
	$	*$*	*$*
Accounts preparation and advice	32,222	8,055	10,955
Requesting missing information	480	1,200	720
Issuing fee payment reminders	75	300	375
Holding client meetings	960	240	480
Travelling to clients	600	2400	0
Total costs	34,337	12,195	12,530
Total costs on original basis*	40,280	10,070	13,695
Client fees – new basis	41,204	14,634	15,036
Client fees – original basis	48,336	12,084	16,434
Increase / (Decrease)	(7,132)	2,550	(1,398)

*$725,000 / 18,000 hours = $40.28 per hour

SECTION B

Answer to Question Six

(a)

Resources required to meet demand:

	L	*M*	*Total*
Maximum demand (units)	400	700	
Direct labour (hours)	1,600	1,400	3,000
Direct material (kg)	800	6,300	7,100
Machine hours	400	1,400	1,800

Direct material is the limiting factor.

Product	*L*	*M*
	$	*$*
Unit selling price	70	90
Variable costs per unit:		
Direct labour ($7 per hour)	28	14
Direct material ($5 per kg)	10	45
Machine hours ($10 per hour)	10	20
Contribution per unit	22	11
Contribution per kg	11	1.22
Ranking	1	2
Make (units)	400	577
Uses(kg of material)	800	5,193
Contribution	$8,800	$6,3477

Total contribution $15,147

(b)

Direct labour	4L + 2M <	2,300
Direct material	2L + 9M <	2,550
Machine hours	1L + 2M <	1,100

Z = 22L + 11M

(c)

Product L 400 Other value **0**

The value of 400 represents the optimum production of product L in units, the other value is the unsatisfied demand which can be seen to be zero because the output from the plan is 400 units which is the same as the maximum demand for the product.

Product M 194 Other value **506**

The value of 194 represents the optimum production of product M in units, the other value is the unsatisfied demand which can be seen to be 506 because the output from the plan is 194 units and the maximum demand for the product was 700 units, hence the unsatisfied demand is 700 – 194 = 506 units.

Machine hours 312

The value of 312 is the number of unused machine hours. This can be proven by comparing the outputs to the machine hours available:

400 units of L use 1 hour each =	400 hours
194 units of M use 2 hours each =	388 hours
Total hours used	788 hours
Hours available	1,100 hours
Hours unused	312 hours

Direct material $ 1.22

The value of $1.22 is the shadow price of the direct materials. This is the maximum additional price that should be paid for an extra kg of direct material above the resource's base cost of $5 per kg. The fact that there is a shadow price for this resource confirms that it is a binding constraint.

This shadow price can be proven because 1 extra kg of direct material would be used to increase the output of product M. Each unit of M requires 9 kg so 0.11 additional units of M could be produced from 1 extra kg of material. Each unit of M yields a contribution of $11 so 0.11 units yields $1.22 contribution.

Labour hours 312

The value of 312 is the number of unused direct labour hours.

Contribution $**10,934**

The value of $10,934 is the contribution earned from the optimum production plan. It can be proved by:

400 units of L earn $22 each =	$8,800
194 units of M earn $11 each =	$2,134
	$10,934

Answer to Question Seven

(a)

The ROI for each of the last three years was:

2008	40/ 400 = 10.00%
2009	56/ 320 = 17.50%
2010	62/ 256 = 24.22%

There has been a gradual improvement in ROI throughout the three year period. However, this summary ratio hides the detailed performance of S division.

1. It is stated that the values have been adjusted to remove the effects of inflation. It can thus be seen that sales and cost of sales are constant throughout the period and therefore there has been no significant change in the volumes of activity during the period:

2. The gross profit margin has been constant at approximately 67% mark-up throughout the three year period

3. Other operating costs have increased throughout the three year period. These costs are inclusive of depreciation which is being calculated using 20% reducing balance and in fact if depreciation is excluded the underlying operating costs have increased by $4,000 in 2009 and more significantly in 2010.

In conclusion the improvement in ROI during the three year period is a function of the depreciation policy rather than of the performance of the division.

(b)

The investment has a positive net present value of $24,536 and therefore from a company perspective it should go ahead. However, from the divisional manager's point of view, assuming that the results of 2011 are the same as those of 2010 other than the specific changes as a result of the investment and ignoring inflation.

If the investment does not go ahead then the results in 2011 will be:

	$000	
Sales	400	
Cost of sales	240	
Gross profit	160	
Other operating costs	85.2	($98 - $64 + $51.2)
Pre-tax operating profit	74.8	
Capital invested	204.8	($256 - $51.2)

ROI $74.8 / $204.8 = 36.5%

But if the investment does go ahead, the results will be:

	$000	
Sales	400	
Cost of sales	216	($240,000 x 0.9)
Gross Profit	184	
Other operating costs*	97.2	
Pre-tax operating profit	86.8	
Capital invested**	252.8	

The ROI in 2011 if the investment in the new machine goes ahead would be $86,800 / $252,800 = 34.3%

This is lower than the ROI that would be achieved in 2011 by continuing with the existing equipment and therefore the manager is unlikely to go ahead with the investment.

* In 2010 the other operating costs value of $98,000 includes $64,000 depreciation of equipment and $34,000 of other costs. The new depreciation charge for 2011 will be $63,200 so assuming the other costs remain unchanged the total other operating costs for 2011 will be $97,200.

	$000
** Original NBV	256
Less NBV of replaced machine	40
	216
Cost of new machine	100
	316
Depreciation at 20%	63.2
NBV at the end of 2011	252.8

(c)

Using the figures from part (b) above:

Without investment:

	$
Pre-tax operating profits	74,800
Notional capital charge ($204,800 x 8%)	16,380
Residual Income	58,420

With investment:

	$
Pre-tax operating profits	86,800
Notional capital charge ($252,800 x 8%)	20,220
Residual Income	66,580
Increase in Residual Income	8,160

This is consistent with the company's NPV based decision above.

ALTERNATIVE CALCULATION BASED ON INCREMENTAL VALUES:

	$
Increase in capital $48,000 x 8%	(3,840)
($60,000 - $12,000 depreciation)	
Savings in direct costs	24,000
Increase in depreciation	
($60,000 x 20%)	(12,000)
Increase in Residual Income	8,160

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 examines candidates' knowledge and understanding of learning curves and their effect on performance measurement and the importance of learning curves in target costing.

Question Two examines candidates' knowledge of quality costs.

Question Three examines candidates' knowledge of alternative production systems and their effect on inventory and on TQM.

Question Four examines candidates' ability to explain the differences between alternative budgeting systems and their effect on planning and decision making.

Question Five examines candidates' ability to apply the principles of Activity Based Costing to Direct Customer Profitability Analysis.

Section B – Compulsory

Question Six examines candidates' knowledge and understanding of scarce resources problems and their solution using linear programming.

Question Seven examines candidates' understanding of divisional performance appraisal and how it affects divisional decision making.