Answers

1 (a)

	Keypads	Display screens
Variable costs	$	$
Materials ($160k x 6/12) + ($160k x 1·05 x 6/12)	164,000	
($116k x 1·02)		118,320
Direct labour	40,000	60,000
Machine set-up costs		
($26k – $4k) x 500/400	27,500	
($30k – $6k) x 500/400		30,000
	231,500	208,320
Attributable fixed costs		
Heat and power ($64k – $20k)/($88k – $30k)	44,000	58,000
Fixed machine costs	4,000	6,000
Depreciation and insurance ($84/$96k x 40%)	33,600	38,400
	81,600	102,400
Total incremental costs of making in-house	313,100	310,720
Cost of buying (80,000 x $4·10/$4·30)	328,000	344,000
Total saving from making	14,900	33,280

Robber Co should therefore make all of the keypads and display screens in-house

(Note: It has been assumed that the fixed set-up costs only arise if production takes place.)

(Alternative method)

Relevant costs	Keypads	Display screens
	$	$
Direct materials		
($160,000/2) + $160,000/2 x 1·05	164,000	
$116,000 x 1·02		118,320
Direct labour	40,000	60,000
Heat and power		
$64,000 – (50% x $40,000)	44,000	
$88,000 – (50% x $60,000)		58,000
Machine set up costs:		
Avoidable fixed costs	4,000	6,000
Activity related costs (w1)	27,500	30,000
Avoidable depreciation and insurance costs:		
40% x $84,000/$96,000	33,600	38,400
Total relevant manufacturing costs	313,100	310,720
Relevant cost per unit:	3·91375	3·884
Cost per unit of buying in	4·1	4·3
Incremental cost of buying in	0·18625	0·416

As each of the components is cheaper to make in-house than to buy in, the company should continue to manufacture keypads and display screens in-house.

Working 1
Current no. of batches produced = 80,000/500 = 160.
New no. of batches produced = 80,000/400 = 200.
Current cost per batch for keypads = ($26,000 – $4,000)/160 = $137·5.
Therefore new activity related batch cost = 200 x $137·5 = $27,500.
Current cost per batch for display screens = ($30,000 – $6,000)/160 = $150.
Therefore new activity related batch cost = 200 x $150 = $30,000.

(b) The attributable fixed costs remain unaltered irrespective of the level of production of keypads and display screens, because as soon as one unit of either is made, the costs rise. We know that we will make at least one unit of each component as both are cheaper to make than buy. Therefore they are an irrelevant common cost.

	Keypads	Display screens
	$	$
Buy	4·1	4·3
Variable cost of making ($231,500/80,000)	2·89	
($208,320/80,000)		2·6
Saving from making per unit	1·21	1·7
Labour hour per unit	0·5	0·75
Saving from making per unit of limiting factor	2·42	2·27
Priority of making	1	2

Total labour hours available = 100,000.
Make maximum keypads, i.e. 100,000, using 50,000 labour hours (100,000 x 0·5 hours)
Make 50,000/0·75 display screens, i.e. 66,666 display screens.
Therefore buy in 33,334 display screens (100,000 – 66,666).

Note 1: It is equally as acceptable to have treated the heat and power costs as variable and include them in the above. It will not have changed the outcome and is an entirely acceptable interpretation of the scenario.

Note 2: If a production run cannot be stopped part way through, then the company would only be able to make 66,400 and would have to buy 33,600, since production takes place in batches of 400 units.

(c) Non-financial factors

- The company offering to supply the keypads and display screens is a new company. This would make it extremely risky to rely on it for continuity of supplies. Many new businesses go out of business within the first year of being in business and, without these two crucial components, Robber Co would be unable to meet demand for sales of control panels. Robber Co would need to consider whether there are any other potential suppliers of the components. This would be useful as both a price comparison now and also to establish the level of dependency that would be committed to if this new supplier is used. If the supplier goes out of business, will any other company be able to step in? If so, at what cost?
- The supplier has only agreed to these prices for the first two years. After this, it could put up its prices dramatically. By this stage, Robber Co would probably be unable to begin easily making its components in house again, as it would probably have sold off its machinery and committed to larger sales of control panels.
- The quality of the components could not be guaranteed. If they turn out to be poor quality, this will give rise to problems in the control panels, leading to future loss of sales and high repair costs under warranties for Robber Co. The fact that the supplier is based overseas increases the risk of quality and continuity of supply, since it has even less control of these than it would if it was a UK supplier.
- Robber Co would need to establish how reliable the supplier is with meeting promises for delivery times. This kind of information may be difficult to establish because of the fact that the supplier is a new company. Late delivery could have a serious impact on Robber Co's production and delivery schedule.

2 (a) Deriving a target price and cost in a manufacturing company

Step 1: A product is developed that is perceived to be needed by customers and therefore will attract adequate sales volumes.

Step 2: A target price is then set based on the customers' perceived value of the product. This will therefore be a market based price.

Step 3: The required target operating profit per unit is then calculated. This may be based on either return on sales or return on investment.

Step 4: The target cost is derived by subtracting the target profit from the target price.

Step 5: If there is a cost gap, attempts will be made to close the gap. Techniques such as value engineering may be performed, which looks at every aspect of the value chain business functions, with an objective of reducing costs while satisfying customer needs.

Step 6: Negotiation with customers may take place before deciding whether to go ahead with the project.

(b) Four characteristics of services

- **Spontaneity:** unlike goods, a service is consumed at the exact same time as it is made available. No service exists until it is being experienced by the consumer.
- **Heterogeneity/variability:** services involve people and, because people are all different, the service received may vary depending on which person performs it. Standardisation is expected by the customer but it is difficult to maintain.
- **Intangibility:** unlike goods, services cannot be physically touched.

– **Perishability:** unused capacity cannot be stored for future use.

(Also acceptable characteristics are that 'No transfer of ownership takes place when a service is provided' and 'service industries rely heavily on their staff, who often have face-to-face contact with the customer, and represent the organisation's brand'.)

(c) Deriving target costs

(i) For services under the 'payment by results' scheme

The obvious target price is the pre-set tariff that is paid to the trust for each service. This is known with certainty and since the trust is a not for profit organisation, there may not be any need to deduct any profit margin from the tariff. Problems may arise because of the fact that it is already known that costs sometimes exceed the pre-set tariff. These issues are discussed in (d).

(ii) For transplant and heart operations

For these operations, the trust is paid on the basis of its actual costs incurred. However, since the trust only has a restricted budget for such services, it is still important that it keeps costs under control. The target cost could be based on the average cost of these services when performed in the past, or the minimum cost that it has managed to provide such services on before, in order to encourage cost savings. It is important that quality is not affected, however.

Note: All reasonable suggestions would be acceptable.

(d) Difficulties for the Sickham UHS Trust in using target costing

The main difficulties for the trust are as follows:

It is difficult to find a precise definition for some of the services
In order for target costing to be useful, it is necessary to define the service being provided. Whilst the introduction of the pre-set tariff will make this more easy for some services, as this definition can be used, for other services not covered by the tariff, definition could be difficult.

It is difficult to decide on the correct target cost for services
For the pre-set tariff services, the obvious target cost would be the pre-set tariff. However, bearing in mind that the Trust knows that some services can be provided at less than this and some services cannot be provided at this price at all, one has to question whether it is right to use this as the target cost. A target cost which is unachievable could be demotivational for staff and one which is easily met will not provide an incentive to keep costs down.

As regards the other operations, the target can be set at a level which is both achievable but feasible, so this should result in less of an issue.

It would be difficult to use target costing for new services
The private sector initially developed the use of target costing in the service sector with the intention that it should only be used for new services rather than existing ones. Considering the work that a hospital performs particularly, it would be difficult to establish target costs when there is no comparative data available, unless other hospitals have already provided services and the information can be obtained from them.

The costing systems at the Sickham UHS Trust are poor
If costs are to be analysed in depth, the analysis must be based on accurate and timely costing systems, which do not appear to currently exist at the Sickham UHS Trust. A large part of the hospitals' costs for services are going to be overhead costs and these need to be allocated to services on a consistent basis. This is not currently happening.

Note: Only three difficulties were required.

3 (a)

Quarter	Actual volume of sales '000 units	Centred moving average '000 units	Seasonal percentage
2010			
Q3	900		
Q4	1,100		
2011			
Q1	1,200	1068·75	1·1228
Q2	1,000	1112·50	0·8989
Q3	1,050	1162·50	0·9032
Q4	1,300	1206·25	1·0777
2012			
Q1	1,400	1243·75	1·1256
Q2	1,150	1287·50	0·8932

The average seasonal variations can now be calculated to see whether any adjustment to the percentages is required, since they must be 4·0 in total.

Since the averages total 4·0057, each one needs to be reduced by 0·0014

	Q1	Q2	Q3	Q4	
2010			0·9080	1·0820	
2011	1·1228	0·8989	0·9032	1·0777	
2012	1·1256	0·8932			
Total	2·2484	1·7921	1·8112	2·1597	
Average	1·1242	0·8960	0·9056	1·0799	4·0057
Rounded	1·1228	0·8946	0·9042	1·0785	4·0001

The difference of 0·0001 is due to rounding and can be ignored.
The average trend of the centred moving averages is (1,287·5 – 1,068·75)/5 = 43,750 units.
Therefore forecast centred moving average for Q3 in 2012 = 1,287,500 + 43,750 = 1,331,250.
Adjusted for seasonal variation: 1,331,250 x 0·9042 = 1,203,716·25 units.

Forecast centred moving average for Q4 of 2012 = 1,287,500 + (2 x 43,750) = 1,375,000.
Adjusted for seasonal variation = 1,375,000 x 1·0785 = 1,482,937·5 units.

Note: Other methods are equally as acceptable to answer 3(a). Candidates could have worked back from the centred moving averages provided in the question for 2012 quarters 3 or 4 and they could also have used linear regression.

(b) Likely impact on the staff and business

Staff

– Since the budgeting style has been an imposed one rather than a participative one, morale amongst staff is likely to be low, since they have not been involved in the process at all.

– Additionally, since sales targets appear to be unachievable and staff have not received performance related bonuses, staff are not motivated to try and achieve targets since they feel like they are impossible to achieve. Team spirit will be low and an atmosphere of 'doing the bare minimum' is likely to exist.

– Since budgets are imposed from the top down, the culture will not be one in which operational management generate ideas, as they will feel like they are not appreciated and that their views are not taken into account.

Business

– Since sales levels are overestimated, production volumes must also be too high. As well as this leading to high inventory costs because actual sales are then lower than expected, since the product is also perishable, waste levels have probably been high. These will be significant costs to the company.

– Also, when customers do receive their goods, it is likely that they will be close to their expiry date, since they will have been taken from inventory that has been held for some time. This will be frustrating for customers because products may then perish before the end customer gets to use them. Also, it is likely that a sauce that is two months old does not taste as good as a sauce that is only a few days old. Both of these factors may be causing damage to the company's reputation.

– Too many staff are probably being employed in the business, bearing in mind that the staffing levels will be related to forecast production volumes. One can only assume that whilst initially, production volumes relate to the forecast, as it becomes apparent that sales are not as high as anticipated and inventory levels increase, production slows down. Staff are probably sitting idle for some of the time, which is demotivating for them and costly to the company.

4 (a) Variance calculations

Sales market share:	
Revised budgeted sales	900 units
Actual sales	960 units
	60 units
at std contribution per unit of $44	$2,640 F
Sales market size	
Original budgeted sales	1,000 units
Revised budgeted sales	900 units
	100 units
at std contribution per unit of $44	$4,400 A

$44 ($80 – $36)		
Material price (SP – AP) x AQ		
= ($3 – $3·05) x 3,648	$182 A	
Material usage (SQAP – AQ) x SP		
(3,840 – 3,648) x $3	$576 F	
Labour efficiency (SHAP – AH) x SR		
(1,920 – 1,824) x $10	$960 F	
Variable overhead efficiency (SHAP – AH) x SR		
(1,920 – 1,824) x $2	$192 F	
Variable overhead expenditure		
(AHSR – actual cost) = $3,648 – $3,283	$365 F	
Total	$151 F	

Reconciliation Statement	**$**	**$**
Budgeted sales revenue	80,000	
Budgeted standard variable cost	(36,000)	
Budgeted contribution		44,000
Sales contribution variances		
– market share	2,640	
– market size	(4,400)	(1,760)
		42,240
Variable cost variances		
Materials		
– price	(182)	
– usage	576	394
Labour efficiency		960
Variable overhead		
– efficiency	192	
– expenditure	365	557
Actual contribution		44,151

(b) TQM and standard costing

- TQM relies on a culture of continuous improvement within an organisation. For this to succeed, the focus must be on quality, not quantity. The cost of failing to achieve the desired level of quality must be measured in terms of internal and external failure costs.
- Traditional variance analysis focuses on quantity rather than quality. This could mean that, for example, lower grade labour is used in an attempt to reduce costs. This would be totally at odds with a TQM culture, which is the basis of the problem of the two systems running side by side.
- A traditional standard system allocates responsibility for variances to the different departmental managers. When a TQM system is adopted, all employees' roles in ensuring quality are highlighted and everyone is seen as equally important in the quality assurance process. This difference would make it difficult for the two systems to co-exist.
- Traditional standard costing systems usually make allowances for waste. This would be totally contrary to the TQM philosophy, which aims to eliminate all waste.
- Continuous improvement makes the standard cost system less relevant due to regular small changes to the process.

It would seem to be the case that the two systems would struggle to co-exist at Lock Co.

5 (a) ROI

Return on investment

= net profit/net assets

Division B
$311,000 x 12/$23,200,000 = 16·09%

Division C
$292,000 x 12/$22,600,000 = 15·5%

(b) Residual income

	B $'000	C $'000
Net profit	3,732	3,504
Less: imputed interest charge		
$22·6 x 10%		(2,260)
$23·2m x 10%	(2,320)	
Residual income	1,412	1,244

(c) Performance of the two divisions

ROI

Divisions B and C have ROIs of 16·09% and 15·5% respectively, compared to the target of 20%. This suggests that the divisions have not performed well, but the reason for this is that now, uncontrollable head office costs are being taken into effect before calculating the ROI. The target ROI has not been reduced to reflect the change in the method being used to calculate it. Using the old method, ROI would have been as follows:

B: ($311,000 + $155,000) x 12/$23·2m = 24·1%
C: ($292,000 + $180,000) x 12/$22·6m = 25·06%

From this it can be seen that both divisions have actually improved their performance, rather than it having become worse.

RI

From the residual income figures, it can clearly be seen that both Division B and C have performed well, with healthy RI figures of $1·4m and $1·2m respectively, even when using net profit rather than controllable profit as bases for the calculations. The cost of capital of the company is significantly lower than the target return on investment that the company seeks, making the residual income figure show a more positive position.

(d) Division B's ROI with investment

Depreciation = 2,120,000 – 200,000/48 months = $40,000 per month.
Net profit for July = 311k + ($600k x 8·5%) – $40k = $322k
Annualised net profit: $322k x 12 = $3,864k.
Opening net assets after investment = $23,200k + $2,120 = $25,320k.
ROI = $3,864k/25,320k = 15·26%

Therefore, Division B will not proceed with the investment, since it will cause a decrease in its ROI.

If RI is calculated with the investment, the result is as follows:

	B $'000
	3,864
Less: imputed interest charge	
$25·32m at 10%	(2,532)
Residual income	1,332

This calculation shows that, if the investment is undertaken, RI is actually lower than without the investment. So, if either ROI or RI is considered by Division B's manager when deciding whether to undertake the investment, the investment will not be undertaken. This decision will be in the best interests of the company as a whole, since the RI of the investment alone is actually negative ($132k – $212k = $(80k)).

(e) Behavioural issues

The staff in both divisions have been used to meeting targets and getting rewarded appropriately. Suddenly, they will find that even though in reality divisional performance has improved, neither division is meeting its ROI target. This will purely be as a result of the inclusion of the head office costs. The whole basis of being assessed on uncontrollable apportioned costs is questionable in the first place. However, if it is going to be done this way, at the least the target ROI must be revised.

Staff are likely to become frustrated with a new system which is inherently unfair. This could give rise to staff organising themselves together in order to oppose the system. At the least, they are likely to become quickly demotivated, working slower than possible and perhaps withdrawing things like voluntary overtime. The cost to the company as a whole is likely to be high and the situation needs to be resolved as quickly as possible.

			Marks
1	**(a)**	Incremental cost of buying in	
		Direct materials	1
		Direct labour	0·5
		Heat and power	1
		Set-up costs	3
		Depreciation and insurance	1
		Total cost of making/cost per unit of making	0·5
		Conclusion	1
			8
		(Method 2)	
		Direct materials	1
		Direct labour	0·5
		Heat and power	1
		Avoidable fixed costs	1
		Activity related costs (w1)	2
		Avoidable depreciation and insurance	1
		Total relevant cost of manufacturing/cost per unit	0·5
		Conclusion	1
			8
	(b)	If 100,000 control panels made	
		Variable cost of making per unit	1
		Saving from making	1
		Saving per labour hour	1
		Ranking	1
		Make 100,000 keypads	1
		Make 66,666 display screens	1
		Buy 33,334 display screens	1
			7
	(c)	Non-financial factors	
		Per factor	1 or 2
		Maximum	5
		Total marks	**20**

			Marks
2	**(a)**	Steps	
		Develop product	1
		Set target price	1
		Set profit margin	1
		Set target cost	1
		Close gap	1
		Value engineering	1
		Negotiate	1
		Maximum	6
	(b)	Characteristics	
		Spontaneity	1
		Heterogeneity	1
		Intangibility	1
		Perishability	1
		Other	1
		Maximum marks	4
	(c)	Deriving target costs	
		(i) Scheme target costs	2
		(ii) Other services' target costs	2
	(d)	Difficulties	
		Each difficulty explained	2
			6
		Total marks	**20**

3	**(a)**	Predicting sales volumes	
		Seasonal percentages	3
		Average seasonal variations	2
		Average trend of centred moving average	1
		Forecast moving average for Q3	1
		Adjusted for seasonal variation	1
		Forecast moving average for Q4	1
		Adjusted for seasonal variation	1
			10
	(b)	Likely impact	
		Per point discussed	2
			10
		Total marks	**20**

			Marks
4	**(a)**	Reconciliation statement	
		Variance calculations	
		Market share	1·5
		Market size	1·5
		Material price	1
		Material usage	1
		Labour efficiency	1
		Variable overhead efficiency	1
		Variable overhead expenditure	1
		Reconciliation statement	4
			12
	(b)	TQM and standard costing	
		Per valid discussion point	2
		Conclusion	1
		Maximum marks	8
		Total marks	**20**
5	**(a)**	ROI	
		ROI for B	1
		ROI for C	1
			2
	(b)	RI calculations	
		RI for B	1·5
		RI for C	1·5
			3
	(c)	Discussion	
		ROI discussion	2
		RI discussion	2
		Extra ROI calculation under old method	1
		Valid conclusion drawn	1
		Maximum marks	6
	(d)	ROI/RI after investment	
		ROI calculation	2
		RI calculation	1
		Comments and conclusion	2
			5
	(e)	Behavioural issues	
		ROI of investment	
		Per valid point	1
			4
		Total marks	**20**