Answers

1 (a) (i) Sales price variance and sales volume variance

Sales price variance = (actual price – standard price) x actual volume

	Actual price	Standard price	Difference	Actual volume	Sales price Variance
	\$	\$	\$		\$
Plasma TVs	330	350	-20	750	15,000 A
LCD TVs	290	300	-10	650	6,500 A
					21,500 A

Sales volume contribution variance = (actual sales volume - budgeted sales volume) x standard margin

	Actual sales volume	Budgeted sales volume	Difference	Standard margin	Sales volume variance
				\$	\$
Plasma TVs	750	590	160	190	30,400 F
LCD TVs	650	590	60	180	10,800 F
	1,400	1,180			41,200 F

(ii) Material price planning and purchasing operational variances

Material planning variance = (original target price – general market price at time of purchase) x quantity purchased $(\$60 - \$85) \times 1,400 = \$35,000 \text{ A}.$

Material price operational variance = (general market price at time of purchase – actual price paid) x quantity purchased. $(\$85 - \$80) \times 1.400 = \$7.000 \text{ F}.$

(iii) Labour rate and labour efficiency variances

Labour rate variance = (standard labour rate per hour - actual labour rate per hour) x actual hours worked.

Actual hours worked by temporary workers:

Total hours needed if staff were fully efficient = $(750 \times 2) + (650 \times 1.5) = 2,475$.

Permanent staff provide 2,200 hours therefore excess = 2,475 - 2,200 = 275.

However, temporary workers take twice as long, therefore hours worked = $275 \times 2 = 550$

Labour rate variance relates solely to temporary workers, therefore ignore permanent staff in the calculation.

Labour rate variance = $(\$14 - \$18) \times 550 = \$2,200 \text{ A}$.

Labour efficiency variance = (standard labour hours for actual production – actual labour hours worked) x standard rate.

 $(275 - 550) \times $14 = $3,850 A.$

(b) Explanation of planning and operational variances

Before the material price planning and operational variances were calculated, the only information available as regards material purchasing was that there was an adverse material price variance of \$28,000. The purchasing department will be assessed on the basis of this variance, yet, on its own, it is not a reliable indicator of the purchasing department's efficiency. The reason it is not a reliable indicator is because market conditions can change, leading to an increase in price, and this change in market conditions is not within the control of the purchasing department.

By analysing the materials price variance further and breaking it down into its two components – planning and operational – the variance actually becomes a more useful assessment tool. The planning variance represents the uncontrollable element and the operational variance represents the controllable element.

The planning variance is a really useful for providing feedback on just how skilled management are in estimating future prices. This can be very easy in some businesses and very difficult in others.

The operational variance is more meaningful in that it measures the purchasing department's efficiency given the market conditions that prevailed at the time. It therefore ignores factors that the purchasing department cannot control, which in turn, stops staff from becoming demotivated.

2 Turnover

Turnover has decreased from \$72.025 million in 2009 to \$66.028 million in 2010, a fall of 8.3%. However, this must be assessed by taking into account the change in market conditions, since there has been a 20% decline in demand for accountancy training. Given this 20% decline in the market place, AT Co's turnover would have been expected to fall to \$57.62m if it had kept in line with market conditions. Comparing AT Co's actual turnover to this, it's actual turnover is 14.6% higher than expected. As such, AT Co has performed fairly well, given market conditions.

It can also be seen from the non-financial performance indicators that 20% of students in 2010 are students who have transferred over from alternative training providers. It is likely that they have transferred over because they have heard about the improved service that AT Co is providing. Hence, they are most likely the reason for the increased market share that AT Co has managed to secure in 2010.

Cost of sales

Cost of sales has decreased by 19.2% in 2010. This must be considered in relation to the decrease in turnover as well. In 2009, cost of sales represented 72.3% of turnover and in 2010 this figure was 63.7%. This is quite a substantial decrease. The reasons for it can be ascertained by, firstly, looking at the freelance staff costs.

In 2009, the freelance costs were \$14.582m. Given that a minimum 10% reduction in fees had been requested to freelance lecturers and the number of courses run by them was the same year on year, the expected cost for freelance lecturers in 2010 was \$13.124m. The actual costs were \$12.394m. These show that a fee reduction of 15% was actually achieved. This can be seen as a successful reduction in costs.

The expected cost of sales for 2010 before any cost cuts, was \$47.738m assuming a consistent ratio of cost of sales to turnover. The actual cost of sales was only \$42.056m, \$5.682m lower. Since freelance lecturer costs fell by \$2.188m, this means that other costs of sale fell by the remaining \$3.494m. Staff costs are a substantial amount of this balance but since there was a pay freeze and the average number of employees hardly changed from year to year, the decreased costs are unlikely to be related to staff costs. The decrease is therefore most probably attributable to the introduction of online marking. AT Co expected the online marking system to cut costs by \$4m, but it is probable that the online marking did not save as much as possible, hence the \$3.494m fall. Alternatively, the saved marking costs may have been partially counteracted by an increase in some other cost included in cost of sales.

Gross profit

As a result of the above, the gross profit margin has increased in 2010 from 27.7% to 36.3%. This is a big increase and reflects very well on management.

Indirect expenses

- Marketing costs: These have increased by 42·1% in 2010. Although this is quite significant, given all the improvements that AT Co has made to the service it is providing, it is very important that potential students are made aware of exactly what the company now offers. The increase in marketing costs has been rewarded with higher student numbers relative to the competition in 2010 and these will hopefully continue increasing next year, since many of the benefits of marketing won't be felt until the next year anyway. The increase should therefore be viewed as essential expenditure rather than a cost that needs to be reduced.
- Property costs: These have largely stayed the same in both years.
- Staff training: These costs have increased dramatically by over \$2 million, a 163·9% increase. However, AT Co had identified that it had a problem with staff retention, which was leading to a lower quality service being provided to students. Also, due to the introduction of the interactive website, the electronic enrolment system and the online marking system, staff would have needed training on these areas. If AT Co had not spent this money on essential training, the quality of service would have deteriorated further and more staff would have left as they became increasingly dissatisfied with their jobs. Again, therefore, this should be seen as essential expenditure.
 - Given that the number of student complaints has fallen dramatically in 2010 to 84 from 315, the staff training appears to have improved the quality of service being provided to students.
- Interactive website and the student helpline: These costs are all new this year and result from an attempt to improve the quality of service being provided and, presumably, improve pass rates. Therefore, given the increase in the pass rate for first time passes from 48% to 66% it can be said that these developments have probably contributed to this. Also, they have probably played a part in attracting new students, hence improving turnover.
- Enrolment costs have fallen dramatically by 80.9%. This huge reduction is a result of the new electronic system being introduced. This system can certainly be seen as a success, as not only has it dramatically reduced costs but it has also reduced the number of late enrolments from 297 to 106.

Net operating profit

This has fallen from \$3.635m to \$2.106m. On the face of it, this looks disappointing but it has to be remembered that AT Co has been operating in a difficult market in 2010. It could easily have been looking at a large loss. Going forward, staff training costs will hopefully decrease. Also, market share may increase further as word of mouth spreads about improved results and service at AT Co. This may, in turn, lead to a need for less advertising and therefore lower marketing costs.

It is also apparent that AT Co has provided the student website free of charge when really, it should have been charging a fee for this. The costs of running it are too high for the service to be provided free of charge and this has had a negative impact on net operating profit.

Note: Students would not have been expected to write all this in the time available.

Workings (Note: All workings are in \$'000)

1. Turnover

Decrease in turnover = \$72,025 - \$66,028/\$72,025 = 8.3%

Expected 2010 turnover given 20% decline in market = \$72,025 x 80% = \$57,620

Actual 2010 turnover CF expected = \$66,028 - \$57,620/\$57,620 = 14.6% higher

2. Cost of sales

Decrease in cost of sales = \$42,056 - \$52,078/\$52,078 = 19.2%

Cost of sales as percentage of turnover: 2009 = \$52,078/\$72,025 = 72.3%

2010 = 42,056/66,028 = 63.7%

Freelance staff costs: in $2009 = \$41,663 \times 35\% = \$14,582$

Expected cost for $2010 = $14,582 \times 90\% = $13,124$

Actual 2010 cost = \$12,394

\$12,394 - \$14,582 = \$2,188 decrease

2,188/14,582 = 15% decrease in freelancer costs

Expected cost of sales for 2010, before costs cuts, = \$66,028 x 72·3% = \$47,738.

Actual cost of sales = \$42,056.

Difference = \$5,682, of which \$2,188 relates to freelancer savings and \$3,494 relates to other savings.

3. Gross profit margin

2009: \$19,947/\$72,025 = 27.7%

2010: \$23,972/\$66,028 = 36.3%

- 4. Increase in marketing costs = 4.678 3.291/3.291 = 42.1%
- 5. Increase in staff training costs = \$3,396 \$1,287/\$1,287 = 163.9%
- 6. Decrease in enrolment costs = \$960 5,032/5,032 = 80.9%
- 7. Net operating profit

Decreased from \$3,635 to \$2,106. This is fall of 1,529/3,635 = 42.1%

3 (a) Optimum production plan

Define the variables

Let x = no. of jars of face cream to be produced

Let y = no. of bottles of body lotion to be produced

Let C = contribution

State the objective function

The objective is to maximise contribution, C

C = 9x + 8y

State the constraints

Silk powder $3x + 2y \le 5,000$ Silk amino acids $1x + 0.5y \le 1,600$ Skilled labour $4x + 5y \le 9,600$

Non-negativity constraints:

 $x, y \ge 0$

Sales constraint:

 $y \le 2,000$

Draw the graph

Silk powder 3x + 2y = 5,000If x = 0, then 2y = 5,000, therefore y = 2,500

If y = 0, then 3x = 5,000, therefore x = 1,666.7

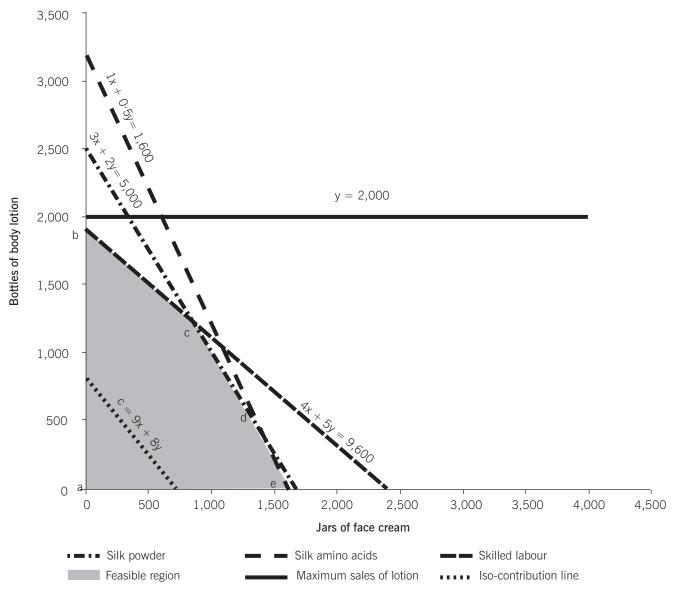
Silk amino acids 1x + 0.5y = 1,600If x = 0, then 0.5y = 1,600, therefore y = 3,200

If y = 0, then x = 1,600

Skilled labour 4x + 5y = 9,600

If x = 0, then 5y = 9,600, therefore y = 1,920

If y = 0, then 4x = 9,600, therefore x = 2,400



Solve using iso-contribution line

If
$$y = 800$$
 and $x = 0$, then if $C = 9x + 8y$

$$C = (8 \times 800) = 6,400$$

Therefore, if
$$y = 0$$
, $9x = 6,400$
Therefore $x = 711 \cdot 11$

Using the iso-contribution line, the furthest vertex from the origin is point c, the intersection of the constraints for skilled labour and silk powder.

Solving the simultaneous equations for these constraints:

$$4x + 5y = 9,600$$
 $x 3$

$$3x + 2y = 5,000$$
 x 4

$$12x + 15y = 28,800$$

$$12x + 8y = 20,000$$

Subtract the second one from the first one

$$7y = 8,800$$
, therefore $y = 1,257 \cdot 14$.

If
$$y = 1,257 \cdot 14$$
 and:

$$4x + 5y = 9,600$$

Then $5 \times 1,257 \cdot 14 + 4x = 9,600$

Therefore x = 828.58

If
$$C = 9x + 8y$$

$$C = \$7,457 \cdot 22 + \$10,057 \cdot 12 = \$17,514 \cdot 34$$

(b) Shadow prices and slack

The shadow price for silk powder can be found by solving the two simultaneous equations intersecting at point c, whilst adding one more hour to the equation for silk powder.

$$12x + 15y = 28,800$$

 $12x + 8y = 20,004$

Subtract the second one from the first one

7y = 8,796, therefore y = 1,256.57

 $3x + (2 \times 1,256.57) = 5,001.$

Therefore $x = 829 \cdot 29$

 $C = (9 \times 829.29) + (8 \times 1,256.57) = $17,516.17$

Original contribution = \$17,514.34

Therefore shadow price for silk powder is \$1.83 per gram.

The slack for amino acids can be calculated as follows:

 $(828.58 \times 1) + (0.5 \times 1,257.14) = 1,457.15$ grams used.

Available = 1,600 grams.

Therefore slack = 142.85 grams.

4 (a) Cost per unit under full absorption costing

Total annual overhead costs:	\$
Machine set up costs	26,550
Machine running costs	66,400
Procurement costs	48,000
Delivery costs	54,320
	195,270

Overhead absorption rate:

	Α	В	С	Total
Production volumes	15,000	12,000	18,000	
Labour hours per unit	0.1	0.15	0.2	
Total labour hours	1.500	1.800	3.600	6.900

Therefore, overhead absorption rate = \$195,270/6,900 = \$28.30 per hour

Cost per unit:

	Α	В	С
	\$	\$	\$
Raw materials (\$1.20 x 2/3/4kg)	2.4	3.6	4.8
Direct labour (\$14.80 x 0.1/0.15/0.2hrs)	1.48	2.22	2.96
Overhead (\$28·30 x 0·1/0·15/0·2 hrs)	2.83	4.25	5.66
Full cost per unit	6.71	10.07	13.42

(b) Cost per unit using ABC costing

Cost	dr	IVA	rς٠

Cost per delivery

Cost pools	\$	Cost driver
Machine set up costs	26,550	36 production runs $(16 + 12 + 8)$
Machine running costs	66,400	32,100 machine hours (7,500 + 8,400 + 16,200)
Procurement costs	48,000	94 purchase orders $(24 + 28 + 42)$
Delivery costs	54,320	140 deliveries (48 + 30 + 62)
	195,270	
Cost per machine set up	\$26,550/36	= \$737·50
Cost per machine hour	\$66,400/32,	100 = \$2.0685
Cost per order	\$48,000/94	= \$510.6383

\$54,320/140 = \$388

Allocation of overheads to each product:

	A \$	B \$	C \$	Total \$
Machine set up costs	11,800	8,850	5,900	26,550
Machine running costs	15,514	17,375	33,510	66,400
Procurement costs	12,255	14,298	21,447	48,000
Delivery costs	18,624	11,640	24,056	54,320
	58,193	52,163	84,913	195,270
Number of units produced	15,000	12,000	18,000	
	\$	\$	\$	
Overhead cost per unit	3.88	4.35	4.72	
Total cost per unit	Α	В	С	
	\$	\$	\$	
Materials	2.4	3.6	4.8	
Labour	1.48	2.22	2.96	
Overheads	3.88	4.35	4.72	
	7.76	10.17	12.48	

(c) Using activity-based costing

When comparing the full unit costs for each of the products under absorption costing as compared to ABC, the following observations can be made:

Product A

The unit cost for product A is 16% higher under ABC as opposed to traditional absorption costing. Under ABC, it is \$7.76 per unit compared to \$6.71 under traditional costing. This is particularly significant given that the selling price for product A is \$7.50 per unit. This means that when the activities that give rise to the overhead costs for product A are taken into account, product A is actually making a loss. If the company wants to improve profitability it should look to either increase the selling price of product A or somehow reduce the costs. Delivery costs are also high, with 48 deliveries a year being made for product A. Maybe the company could seek further efficiencies here. Also, machine set up costs are higher for product A than for any of the other products, due to the larger number of production runs. The reason for this needs to be identified and, if possible, the number of production runs needs to be reduced.

Product B

The difference between the activity based cost for B as opposed to the traditional cost is quite small, being only \$0·10. Since the selling price for B is \$12, product B is clearly profitable whichever method of overhead allocation is used. ABC does not really identify any areas for concern here.

Product C

The unit cost for C is 7% lower under ABC when compared to traditional costing. More importantly, while C looks like it is making a loss under traditional costing, ABS tells a different story. The selling price for C is \$13 per unit and, under ABC, it costs \$12.48 per unit. Under traditional absorption costing, C is making a loss of \$0.42 per unit. Identifying the reason for the differences in C, it is apparent that the number of production runs required to produce C is relatively low compared to the volumes produced. This leads to a lower apportionment of the machine set up costs to C than would be given under traditional absorption costing. Similarly, the number of product tests carried out on C is low relative to its volume.

ABC is therefore very useful in identifying that C is actually more profitable than A, because of the reasons identified above. The company needs to look at the efficiency that seems to be achieved with C (low number of production runs less testing) and see whether any changes can be made to A, to bring it more in line with C. Of course, this may not be possible, in which case the company may consider whether it wishes to continue to produce A and whether it could sell higher volumes of C.

5 (a) Difficulties in the public sector

In the public sector, the objectives of the organisation are more difficult to define in a quantifiable way than the objectives of a private company. For example, a private company's objectives may be to maximise profit. The meeting of this objective can then be set out in the budget by aiming for a percentage increase in sales and perhaps the cutting of various costs. If, on the other hand, the public sector organisation is a hospital, for example, then the objectives may be largely qualitative, such as ensuring that all outpatients are given an appointment within eight weeks of being referred to the hospital. This is difficult to define in a quantifiable way, and how it is actually achieved is even more difficult to define.

This leads onto the next reason why budgeting is so difficult in public sector organisations. Just as objectives are difficult to define quantifiably, so too are the organisation's outputs. In a private company the output can be measured in terms of sales revenue. There is a direct relationship between the expenditure that needs to be incurred i.e. needs to be input in order to achieve the desired level of output. In a hospital, on the other hand, it is difficult to define a quantifiable relationship between inputs and outputs. What is more easy to compare is the relationship between how much cash is available for a particular

area and how much cash is actually needed. Therefore, budgeting naturally focuses on inputs alone, rather than the relationship between inputs and outputs.

Finally, public sector organisations are always under pressure to show that they are offering good value for money, i.e. providing a service that is economical, efficient and effective. Therefore, they must achieve the desired results with the minimum use of resources. This, in itself, makes the budgeting process more difficult.

(b) Incremental and zero-based budgeting

'Incremental budgeting' is the term used to describe the process whereby a budget is prepared using a previous period's budget or actual performance as a base, with incremental amounts then being added for the new budget period.

'Zero-based budgeting', on the other hand, refers to a budgeting process which starts from a base of zero, with no reference being made to the prior period's budget or performance. Every department function is reviewed comprehensively, with all expenditure requiring approval, rather than just the incremental expenditure requiring approval.

(c) Stages in zero-based budgeting

Zero-based budgeting involves three main stages:

- 1. Activities are identified by managers. These activities are then described in what is called a 'decision package'. This decision package is prepared at the base level, representing the minimum level of service or support needed to achieve the organisation's objectives. Further incremental packages may then be prepared to reflect a higher level of service or support.
- 2. Management will then rank all the packages in the order of decreasing benefits to the organisation. This will help management decide what to spend and where to spend it.
- 3. The resources are then allocated based on order of priority up to the spending level.

(d) No longer a place for incremental budgeting

The view that there is no longer a place for incremental budgeting in any organisation is a rather extreme view. It is known for encouraging slack and wasteful spending, hence the comment that it is particularly unsuitable for public sector organisations, where cash cutbacks are being made. However, to say that there is no place for it at all is to ignore the drawbacks of zero-based budgeting. These should not be ignored as they can make ZBB implausible in some organisations or departments. They are as follows:

- Departmental managers will not have the skills necessary to construct decision packages. They will need training for this and training takes time and money.
- In a large organisation, the number of activities will be so large that the amount of paperwork generated from ZBB will be unmanageable.
- Ranking the packages can be difficult, since many activities cannot be compared on the basis of purely quantitative measures. Qualitative factors need to be incorporated but this is difficult.
- The process of identifying decision packages, determining their purpose, costs and benefits is massively time consuming and therefore costly.
- Since decisions are made at budget time, managers may feel unable to react to changes that occur during the year. This
 could have a detrimental effect on the business if it fails to react to emerging opportunities and threats.

It could be argued that ZBB is more suitable for public sector than for private sector organisations. This is because, firstly, it is far easier to put activities into decision packages in organisations which undertake set definable activities. Local government, for example, have set activities including the provision of housing, schools and local transport. Secondly, it is far more suited to costs that are discretionary in nature or for support activities. Such costs can be found mostly in not for profit organisations or the public sector, or in the service department of commercial operations.

Since ZBB requires all costs to be justified, it would seem inappropriate to use it for the entire budgeting process in a commercial organisation. Why take so much time and resources justifying costs that must be incurred in order to meet basic production needs? It makes no sense to use such a long-winded process for costs where no discretion can be exercised anyway. Incremental budgeting is, by its nature, quick and easy to do and easily understood. These factors should not be ignored.

In conclusion, whilst ZBB is more suited to public sector organisations, and is more likely to make cost savings in hard times such as these, its drawbacks should not be overlooked.

Fundamentals Level – Skills Module, Paper F5 Performance Management

December 2010 Marking Scheme

1	(a)	(i)	Sales price variance Sales volume variance	Marks 3
		(ii)	Purchasing planning variance Purchasing efficiency variance	1 1 -1 2
		(iii)	Actual hours worked Labour rate variance Labour efficiency variance	3 2 2 2 7
	(b)	Eac	h valid reason	1 5
				_20

	_	Marks
2	Turnover 8·3% decrease Actual t/o 14·6% higher Performed well CF market conditions Transfer of students	0.5 0.5 1
	Max. turnover	3
	Cost of sales 19·2% decrease 63·7% of turnover 15% fee reduction from freelance staff Other costs of sale fell by \$3·555m Online marking did not save as much as planned	0.5 0.5 2 2 1 5
	Max. COS	5
	Gross profit – numbers and comment	1
	Indirect expenses: Marketing costs 42·1% increase Increase necessary to reap benefits of developments Benefits may take more than one year to be felt	0.5 1 0.5
	Property costs – stayed the same	0.5
	Staff training 163.9% increase Necessary for staff retention Necessary to train staff on new website etc Without training, staff would have left Less student complaints	0.5 1 1 1 1
	Interactive website and student helpline Attracted new students Increase in pass rate	1 1
	Enrolment costs Fall of 80·9% Result of electronic system being introduced Reduced number of late enrolments	0.5 1 1
	Max. Indirect expenses	9
	Net operating profit Fallen to \$2·106 Difficult market Staff training costs should decrease in future Future increase in market share Lower advertising cost in future Charge for website Max. net operating profit	0.5 1 1 1 1 1 -1 3
		3 20

			Marks
3	(a)	Optimum production plan Assigning letters for variables Defining constraint for silk powder Defining constraint for amino acids Defining constraint for labour Non-negativity constraint Sales constraint: x Sales constraint: y Iso-contribution line worked out The graph:	0.5 0.5 0.5 0.5 0.5 0.5 0.5
		Labels Silk powder Amino acids Labour line Demand for x line Demand for y line Iso-contribution line Vertices a—e identified Feasible region shaded Optimum point identified Equations solved at optimum point Total contribution	0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5
	(b)	Shadow prices and slack Shadow price Slack	4 2 6 20
4	(a)	Contribution per unit Overhead absorption rate Cost for A Cost for B Cost for C	2 1 1 1
	(b)	Cost under ABC Correct cost driver rates Correct overhead unit cost for A Correct overhead unit cost for B Correct overhead unit cost for C Correct cost per unit under ABC	5 1 1 1 1 —————————————————————————————
	(c)	Using ABC to improve profitability One mark per point about the Gadget Co	1 6 20

			Marks
5	(a)	Explanation Difficulty setting objectives quantifiably Difficulty in saying how to achieve them Outputs difficult to measure No relationship between inputs and outputs Value for money issue	2 1 2 2 2 5
		Maximum	5
	(b)	Incremental and zero-based budgeting Explaining 'incremental budgeting' Explaining 'zero-based budgeting'	2 2 4
	(c)	Stages involved in zero-based budgeting Each stage	3
	(d)	Discussion Any disadvantage of inc. that supports statement (max. 3) Incremental budgeting is quick and easy Any disadvantage of ZBB that refutes statement (max. 3) Easier to define decision packages in public sector more appropriate for discretionary costs Conclusion	1 1 1 2 2 2
		Maximum	8
			20