INSTITUTE OF ACTUARIES OF AUSTRALIA

2B LIFE INSURANCE **APRIL 2008 EXAMINATIONS**

Marking Guide

Level of difficulty.

	Aims	KU	SJ	CJ	Total
1a	1	4			4
1b	1		4		4
1c	2, 5			4	4
2a	1, 2	3			3
2b	5	3			3
2c	1, 2		6		6
2d	1, 2			3	3
3a	2	5			5
3b	2, 4, 8		4		4
3c	2, 4, 12			8	8
4a	1, 2		5		5
4b	12		4		4
4c	2, 12			8	8
5a	7	4			4
5b	5, 8		7		7
5c	8			8	8
6a	9, 13	4			4
6b	4, 13		8		8
6c	4, 13			8	8
		23	38	39	100

INSTITUTE OF ACTUARIES OF AUSTRALIA

2B LIFE INSURANCE **APRIL 2008 EXAMINATIONS**

Answer all 6 questions.

QUESTION 1 (12 Marks)

Analysis

Component	Aim	KU	SJ	CJ	Total
1a	1	4			4
1b	1		4		4
1c	2, 5			4	4
Total		4	4	4	12

Question

PYL Life writes individual stepped premium death insurances. All of PYL Life's products are fully underwritten. PYL Life distributes its products through a dedicated adviser network to which it pays commissions of 125% of the first year's premium and 7.5% of subsequent years' premiums. Best estimate lapse rates are 20% in year 1, 15% in year 2, and 12.5% in year 3 and onwards. Profit margins are positive but relatively low due to adverse claims experience. PYL Life uses the projection method for calculating policy liabilities.

PYL Life has just appointed a new Financial Controller (FC) who has a background in short-tail general insurance businesses.

a) The FC has noted your use of grouped policy data (model points) in the policy liability calculations. He has expressed concern that this approach will result in a less accurate valuation than would be the case using individual policy data. How would you respond to these concerns? (4 marks)

b) The FC has done some further background reading and has come across the accumulation method for determining MoS policy liabilities. What features of PYL Life's business complicate the use of the accumulation method for this business? (4 marks)

c) The FC has read your latest Financial Condition Report and has commented on an item in your analysis of profit entitled "discount rate changes". The analysis of profit table is as follows for the last three years:

Profit Analysis Item	2006 $m	2007 $m	2008 $m
Earnings on Shareholder's Capital	2.0	2.3	2.6
Planned Profits	2.8	2.6	2.2
Economic Assumption Changes	1.4	-2.0	-1.7
…			

The FC has queried why the impact of economic assumption changes is so large and almost wiped out planned profits in the last two years when, after discussion with the claims manager, "most of our claims are settled and paid within a few months of the date of death and our investments are held in matching short term fixed interest securities". What points would you make to the FC in response? (4 marks)

END OF QUESTION

Solutions Question 1

a)

- The use of approximate methods is allowable under AS1.04 so long as the results are not materially different to a full valuation process
- Testing against a full individual policy liability calculation has confirmed this
- The selection of the grouping criteria (“model points”) is made to ensure that the material features of the portfolio are still reflected in the modelled data
- Modelled data is reconciled to key policy statistics to ensure validity of modelling
- It may not be viable to run the full dataset in a timely manner due to data limitations / time to run models etc (particularly for runs of a stochastic nature) and therefore an approximate approach needs to be used

Marking guide:
- **1 mark for noting approximate methods are allowable so long as results are not materially different to a full valuation**
- **1 mark for referring to previous testing to confirm no material difference to full individual policy liability calculation**
- **1 mark for selection of model points to ensure material features of portfolio are reflected**
- **1 mark for reconciliation of modeled data to key policy statistics**
- **1 mark for constraints in use of projection method that necessitate an approximate approach**

To a maximum of 4 marks (KU)

b)

- The high acquisition costs for PYL Life’s business means that the DAC is large and material. Ignoring the DAC is therefore not an option. Under an accumulation method, an approximate allowance must be made for the run-off of the DAC that does not result in a policy liability that differs materially from the result that would be obtained under a projection approach
- The lapse assumptions for PYL Life’s business vary by duration which complicates the DAC run-off
- PYL Life’s business is fully underwritten so there is likely to be initial selection effects. This further complicates the run-off of the DAC
- A projection is likely to be needed to test for loss recognition given low profit margins

Marking guide:
- **1 mark for noting high acquisition costs mean DAC can’t be ignored**
- **1 mark for noting lapse assumptions vary which complicates DAC run-off**
- **1 mark for noting initial selection further complicates DAC run-off**
- **1 mark for noting projection needed to test for loss recognition**

To a maximum of 4 marks (SJ)

c)

- The FC is referring to the accrued liability components of PYL Life’s policy liabilities such as the IBNR and RBNA reserves and possibly Unearned Premium Reserves (per his general insurance background), which would normally be settled in a relatively short period of time. As the investments broadly match these liabilities, changes in economic assumptions have a minimal effect on the profit result.

- PYL Life's business has a large DAC implicit in the policy liabilities which effectively represents a portion of future premiums that recover historic acquisition costs. This future cashflow stream has a much longer term than the accrued liability components. The value of the DAC is therefore sensitive to changes in the economic assumptions (noting AS1.04 requires that at each valuation date, the prospective policy liabilities are determined using the economic assumptions prevailing at that time)
- The planned profits are low because profit margins are low so the impact of economic assumption changes looks even larger relative to planned profits

Marking guide:

- **1 mark for noting IBNR and RBNA are short term liabilities that are well matched by the assets so changes in economic assumptions for this component of the liabilities has a minimal effect on profit**
- **2 marks for noting PYL Life has a large DAC with a relatively long outstanding term and therefore sensitive to changes in economic assumptions**
- **1 mark for noting planned profits are relatively low**

To a maximum of 4 marks (CJ)

QUESTION 2 **(15 Marks)**

Analysis

Component	Aim	KU	SJ	CJ	Total
2a	1, 2	3			3
2b	5	3			3
2c	1, 2		6		6
2d	1, 2			3	3
Total		6	6	3	15

Question

Link Life has been in operation for just over 12 months in Australia. It specialises in investment-linked superannuation products, including deferred annuities and allocated pensions.

A single statutory fund has been established to write this business. Link Life has had a modest start to its Australian operations with new business inflows 10% lower than planned. Shareholders' capital is invested with the same asset mix as policyholders' funds, and there have not been any capital transfers since operations began.

You have just been employed as the Appointed Actuary for Link Life.

a) **The policy liabilities for Link Life comprise the Life Investment Contract Liability and the Management Services Element (which Link Life calls the Deferred Acquisition Cost Asset or "DAC"). What are the key issues you will need to consider in determining the DAC for Link Life's business?**

(3 marks)

b) **After 12 months of operation, Link Life needs to produce its first set of annual financial statements. Your work experience student has followed the valuation procedures manual and produced a draft profit analysis based on the first version of the profit and loss statement:**

	Actual $'000	Budget $'000	Variance $'000
Earnings on Capital	**70**	**80**	**-10**
Management Fees			
- Upfront	**2250**	**2500**	**-250**
- Ongoing	**405**	**500**	**-95**
	2655	**3000**	**-345**
Acquisition Expenses	**-2700**	**-3000**	**300**
Maintenance Expenses	**-200**	**-200**	**0**
Total Expenses	**-2900**	**-3200**	**300**
DAC Movement	**405**	**490**	**-85**
Shareholder Profit	**230**	**370**	**-140**

Given this analysis and what you know about Link Life's first year of operation, what are the likely causes of the DAC movement being smaller than expected? (3 marks)

c) The profit and loss statement produced by the Finance Department shows the actual Shareholder Profit is $487,000 compared to the $230,000 shown in the draft profit analysis. Your student is puzzled by the "unexplained" profit difference. You suspect there may be an issue with the Life Investment Contract Liability component of the policy liabilities. What investigations and checks would you ask your student to perform to help them determine where a problem may have arisen with this component of the policy liabilities? (6 marks)

d) On further investigation, your work experience student has discovered that there were some "operational issues" in unit pricing in the last week of the financial year. You discuss this further with the unit pricing team who inform you that excessive management fees were deducted from policyholders in the last 3 weeks of the financial year. Further, the policy administration team informs you that there are monies received from policyholders during the same period which have been recorded as income, but have not yet been allocated to individual policyholder accounts. How would these discoveries influence your valuation of Link Life's policy liabilities? (3 marks)

END OF QUESTION

Solutions Question 2

a)

- The allocation of expenses between acquisition and maintenance especially for a company in start up
- The withdrawal and drawdown assumptions given the company has very little experience to draw on
- The determination of any upfront fees or surrender penalties

Marking guide:
- **0.5 mark for expense allocation between acquisition and maintenance**
- **0.5 mark for noting expense allocation issues for a startup company**
- **0.5 mark for withdrawal / drawdown assumptions**
- **0.5 marks for noting limited experience on which to set withdrawal / drawdown assumptions**
- **1 mark for upfront fees and / or surrender penalties**

To a maximum of 3 marks (KU)

b)

- 10% lower sales volumes causing acquisition costs and upfront fees to be lower than budgeted. This would reduce the net amount available for deferral in the DAC
- Withdrawal / drawdown rates were probably higher than budget (with a possible shock lapse event or at least far higher lapses than anticipated given the size of the variance), as ongoing fees were well below 90% of budget and the difference is unlikely to be explained by lower than budget policyholder earnings. This would also cause a faster amortisation of the DAC by reducing in-force volumes. Note that the net amount to be deferred is $50,000 lower than budget but the DAC movement is $85,000 lower than budget
- The earnings on capital were lower than budget which means that policyholder earning rates were also lower than budget (as they are invested in the same way). This would reduce ongoing fees earned during the year and result in a higher amortisation of the DAC

Marking guide:
- **1 mark for lower sales volumes**
- **1 mark for higher lapse rates**
- **1 mark for lower policyholder investment earnings**

To a maximum of 3 marks (KU)

Note: students may note that approximate methods may be used (e.g. straight line amortisation) which are not directly affected by experience items, however they should still note the above lapse and earnings experience items which should be taken into account in ensuring the results are appropriate

c)

- Investigate the valuation data and ensure that there is consistency between the data actually used and the policy administration system

- Investigate policyholder cashflows during the year for consistency with the general ledger, unit pricing system and policy administration system
- Reconcile movement in units on issue from opening balance, units created, and units redeemed preferably at a product level
- Investigate checks on unit pricing movements during the year to see if there are any large unexplained movements (and therefore potential errors)
- Ensure any adjustments to published unit prices to strike valuation unit prices are appropriate (e.g. alignment of tax provisions)
- Other checks may include ensuring number of units x unit prices = surrender value, net asset value divided by number of units = unit prices, checking management fees deducted in unit pricing to ensure these are accurate and appropriate, or other reasonable checks applicable to this component of the policy liabilities

Marking guide
- **1 mark for investigation of valuation data and consistency to policy admin system**
- **1 mark for investigation of policyholder cashflows during year for consistency**
- **1 mark for reconciliation of units on issue preferably at product level**
- **1 mark for investigation of unit pricing movements during year**
- **1 mark for checking adjustments to strike valuation unit prices**
- **1 mark for any other sensible suggested checks or investigations**

To a maximum of 6 marks (SJ)

d)
- Link Life's policy liabilities should be adjusted (assuming no other adjustments are made elsewhere on the balance sheet)
- The policy liabilities should be increased by the amount of the excess fees deducted, on the basis that these will be refunded to policyholders. Allowance for any investment earnings on these fees, and taxation, should be made
- The policy liabilities should be further increased by the amount of the monies received that have not yet been allocated to individual policyholder accounts. Allowance for any investment earnings on these amounts, and taxation, should be made

Marking guide
- **1 mark for increase by excess fees amount**
- **1 mark for increase by unallocated monies amount**
- **1 mark for noting allowance for investment earnings and tax impact on both amounts**

To a maximum of 3 marks (CJ)

Note: Answers suggesting no adjustment is required is a serious misunderstanding which should be noted in marker comments.

QUESTION 3 **(17 Marks)**

Analysis

Component	Aim	KU	SJ	CJ	Total
3a	2	5			5
3b	2, 4, 8		4		4
3c	2, 4, 12			8	8
Total		5	4	8	17

Question

IAP Life has a statutory fund with a large block of closed participating investment account (Par IA) business, and another statutory fund where various other open non-participating term insurance products are written. In respect of the participating investment account business, policyholders and shareholders participate in profits in the ratio of 80% / 20%.

a) **You have been given the following information in respect of the participating investment account business. Calculate the Value of Supporting Assets as at 31 December 2008 for this business. Assume that nil tax applies to the statutory fund in which this business is written. State any other assumptions you need to make.** **(5 marks)**

	Par IA $'000
31/12/2007 Valuation	
Policy Liabilities	261,574
Policyholder Retained Profits	72,111
Shareholder Retained Profits	18,028
Cost of Declared Interest	3,876
2008 Investment Earnings	30,773
2008 Cashflow Items	
Premiums	0
Death Claims	-3,214
Surrender Claims	-76,434
Maintenance Expenses	-2,990
Total Cashflow Items	-82,638
2008 Non-Investment Experience Profits / (Losses)	
Deaths	132
Surrenders	382
Maintenance Expenses	-186
Total Non-Investment Experience Profits	328
Cost of Best Estimate Interest	3,974

b) The CFO has asked you to advise on the implications of making a large one-off special interest declaration on:

- **i) The Policyholder Retained Profits of the statutory fund**
- **ii) The policy liabilities at 31 December 2008 for the investment account business**
- **iii) The reported MoS profit for year ending 31 December 2009 for the participating investment account business**
- **iv) The capital adequacy requirement of the participating statutory fund**

What points would you make to the CFO in respect of each of the above items?
(4 marks)

c) The Risk Product General Manager has noted that the rapid growth in the term insurance portfolio is causing considerable strain on the capital resources of IAP Life. He has suggested that a far better way of utilising the policyholders' assets would be to arrange a "loan" to the non-participating statutory fund using the participating statutory fund's assets. What are the key considerations that you as the Appointed Actuary would need to make, and what other issues would the Board and management need to consider?
(8 marks)

END OF QUESTION

Solutions Question 3

a)

VSA	=	Policy Liabilities at 31/12/07
	+	Cost of Declared Interest at 31/12/07
	+	2008 Investment Earnings
	+	2008 Cashflow Items
	-	2008 Non-Investment Experience Profit
	-	Cost of Best Estimate Interest
	-	Expected Shareholder profit

	Policy Liabilities at 31/12/07	261,574
Plus	Cost of Declared Interest at 31/12/07	3,876
Plus	2008 Investment Earnings	30,773
Plus	2008 Cashflow Items	-82,638
Less	2008 Non Investment Experience Profit	328
Less	Cost of Best Estimate Interest	3,974
Less	Expected Shareholder Profit	994
=	VSA at 31/12/2008	208,290

Marking guide:
- **1 mark correct opening policy liabilities plus cost of declared interest**
- **0.5 mark for correct investment earnings**
- **0.5 mark for correct cashflows**
- **1 mark for correct inclusion of non-investment experience profit**
- **1 mark for correct inclusion of best estimate interest**
- **1 mark for correct inclusion of expected shareholder profit = 25% x 3974 = 994**

To a maximum of 5 marks (KU)

b)

i) A large special one-off interest declaration would reduce PRP as the interest declaration would be larger than the policyholder profit emergence for the year

ii) The policy liabilities at 31/12/2008 would remain unchanged as the declaration is an appropriation of profit

iii) The shareholder’s MoS profit for the year to 31/12/2009 would, all other things being equal, increase. This is because the declaration will result in a higher VSA and Cost of Best Estimate Interest next year than if it did not occur.

iv) The PRP effectively acts as a “buffer” to absorb adverse changes in experience. To the extent that PRP is diminished, there may be a higher capital adequacy requirement arising.

Marking guide:
- **1 mark for correct PRP impact**
- **1 mark for correct policy liabilities impact**
- **1 mark for correct shareholder profit impact in year to 31/12/2009**
- **1 mark for correct capital adequacy requirement impact**

To a maximum of 4 marks (SJ)

c)

- There are no Life Act prohibitions on the arrangement. However, there would be a number of very important considerations and issues that need to be addressed.
- The Appointed Actuary would need to ensure that policyholders' reasonable expectations (PRE) are not compromised by the loan.
- This may including ensuring that the terms of the loan are on an arms length commercial basis, including the payment of a commercial rate of return commensurate with the risk being undertaken by the participating policyholders.
- The Appointed Actuary would also need to ensure that the effective investment mix of the participating statutory fund after the loan still meets the fund's investment guidelines (including limits on the size of the loan and the exposure to IAP Life), so as to ensure policyholders' expectations in relation to crediting rates are maintained.
- The Appointed Actuary would also need to be satisfied that the overall financial security of each statutory fund is not compromised.
- This would require appropriate treatment of the "loan" in the capital adequacy requirements determination, in particular ensuring that there is no "double counting" involved and consideration of credit risk reserves for the participating statutory fund.
- It may also require the holding of additional capital to ensure that PRE are secured.
- It may also require ensuring that appropriate amendments to target surplus levels are made for each statutory fund

Other Issues to consider

- Notwithstanding the above, the Board should also consider the potential for conflicts of interest between shareholders and policyholders interests (e.g. if IAP Life was in danger of defaulting on the loan), and should be aware that the Appointed Actuary's advice in such a situation would need to give adequate protection to policyholders' interests
- Management and the Board would need to ensure the arrangement is adequately reflected in the financial statements so as to give a true and fair picture of the underlying substance of the transaction. In particular, the segmented balance sheets of the statutory funds would need to show the loan explicitly, and the income statement would need to show the transfer of investment returns on the loan.
- As the participating business is in quite rapid run-off, this solution may only be relatively short term given the loan exposure will need to reduce broadly in line with the runoff. Other capital financing options should also be considered.

Marking guide:
- **1 mark for noting no Life Act prohibitions**
- **1 mark for ensuring policyholders' reasonable expectations are not compromised**
- **1 mark for reasonable discussion of the need for commercial loan terms between the par and non-par funds**

- **0.5 marks for reasonable discussion of the investment mix of the participating fund**
- **1 mark for ensuring overall fund security is not compromised**
- **0.5 marks for reasonable discussion of treatment of loan in capital adequacy**
- **0.5 marks for potential for additional capital to ensure policyholder reasonable expectations are maintained**
- **0.5 marks for ensuring target surplus for each statutory fund remains appropriate**
- **1 mark for Board consideration of potential conflicts of interest and AA advice needing to give adequate protection to policyholders' interests**
- **0.5 mark for management and the Board needing to ensure that the financial statements adequately reflect the substance of the transaction**
- **0.5 mark for relatively rapid run-off of participating business making the solution potentially a short term one**

To a maximum of 8 marks (CJ)

QUESTION 4 **(17 Marks)**

Analysis

Component	Aim	KU	SJ	CJ	Total
4a	1, 2		5		5
4b	12		4		4
4c	2, 12			8	8
Total		0	9	8	17

Question

You have just been employed as the Appointed Actuary of Book Life, an Australian life insurer. Book Life has a large existing portfolio of highly profitable individual yearly renewable risk business, providing lump sum and disability covers. In force individual risk premiums currently total $100m.

In early 2007, Book Life won the tender for a large superannuation based group risk scheme for a 3 year term, which offers life cover and TPD cover for small sums insured and minimal underwriting. Book Life came on risk for this portfolio from 1 July 2007. The total annual premium for this scheme is $80m, and the premium rates are guaranteed for the 3 year term.

The tender was very competitive and Book Life won the business by offering heavily discounted premium rates for this scheme.

You are now carrying out the policy liability valuation at 30 June 2008 for Book Life's annual financial statements. Your actuarial student has provided you with the following information and proposed best estimate assumptions regarding the scheme. She has told you that the actual claims experience for the 12 months to 30 June 2008 is in line with the pricing assumptions used in the tender for the scheme:

		2007-08 Actual	2008-09 Assumed	2009-10 Assumed
Earned Premium $m	**Life**	50	50	50
	TPD	30	30	30
Incurred Claims Ratio	**Life**	98%	98%	98%
	TPD	95%	95%	95%
Expense Ratio	**Life**	6%	6%	6%
	TPD	6%	6%	6%
IBNR & RBNA $m	**Life**	15		
	TPD	20		

a) Calculate the MoS policy liabilities for this scheme as at 30 June 2008. Assume it is in a separate Related Product Group to the existing individual risk business, that the appropriate risk free discount rate to use is 6% p.a., and that unearned premiums are included elsewhere in the balance sheet liabilities. State any other assumptions you need to make. (5 marks)

b) The CFO takes you aside to forewarn you that the CEO will be "extremely unhappy" when he sees your valuation results. He asks you why you can't simply "reduce the liabilities" just for this year. How would you respond? (4 marks)

c) As expected, the CEO of Book Life has called you to express his "total disagreement" with your valuation results. He questions whether your assumptions regarding the group risk scheme are valid. He also questions you as to why Book Life needs to recognise a capitalised loss on the group risk scheme when the rest of Book Life's business is so profitable. He also tells you that he has a good relationship with the scheme trustees and is confident that in the repricing at the 3 year mark, Book Life can achieve a significant increase in premium rates without putting the business at risk of leaving. Draft your memo in response to the issues raised in the CEO's phone call. (8 marks)

END OF QUESTION

Solutions Question 4

a)

- IBNR and RBNA need to be included in the total policy liability
- Based on the best estimate loss ratio and expense ratio (the best information available in the question), this business is in loss recognition and a loss recognition amount needs to be calculated
- Calculation of loss recognition stream is as follows:
    - -$2.3m in FY09(= 50 x (0.98 + 0.06 – 1) + 30 x (0.95 + 0.06 – 1))
    - -$2.3m in FY10 (= 50 x (0.98 + 0.06 – 1) + 30 x (0.95 + 0.06 – 1))
- Assuming the profit stream emerges on average half way through the year, the present value of the profit stream is $4.3m (or if assumed at end of year, $4.2m)
- Policy liability = $15m + $20m + $4.3m = $39.3m (assuming IBNR / RBNA includes claims handling allowance already)

Marking guide
- **1 mark for including IBNR & RBNA**
- **0.5 mark for stating either that it is assumed claims handling expense allowance has been made in the IBNR / RBNA, or making a reasonable assumption of the claims handling expense allowance**
- **1 mark for noting need to calculate loss recognition amount**
- **1 mark for adopting best estimate loss ratio and expense ratio assumptions as derived.**
- **1 mark for correct calculation of loss recognition stream**
- **1 mark for correct calculation of capitalised loss (allocate full mark if an end of year cashflow assumption is used)**

To a maximum of 5 marks (SJ)

b)

- The Life Act requires Appointed Actuaries to comply with actuarial standards including AS1.04
- AS1.04 requires best estimate assumptions to be used in determining policy liabilities, so deliberately lowering (or overstating) the results is prohibited.
- The assumptions could be reviewed again but the assumptions adopted cannot be below the best estimate assumptions. Note: the key point with this question is that the Appointed Actuary is being asked to artificially depress the policy liabilities. Students may attempt to discuss revising / reviewing of assumptions but any answer which suggests other than a best estimate can be adopted is a serious misunderstanding which should be noted in marker comments
- Fellows of the Institute of Actuaries of Australia are professionally bound to follow relevant standards as set by regulatory bodies and the Institute.
- The auditors / actuarial auditors will be auditing my valuation and any deliberate bias in the valuation will most likely be detected
- My advice to the Board is to assist them in signing off that the financial statements give a true and fair view of Book Life's financial position and that they comply with relevant accounting and professional standards

Marking guide

- **1 mark for noting Life Act requirements**
- **1 mark for noting AS1.04 requires best estimate assumptions in deriving policy liabilities**
- **0.5 mark for noting it would be possible to review the assumptions made again (but that lower than best estimate cannot be adopted)**
- **1 mark for noting Fellows are professionally bound to adhere to relevant standards**
- **0.5 mark for noting auditors / actuarial auditors role**
- **0.5 mark for noting advisory role to Board in enabling them to sign off that the financial statements are true and fair**

To a maximum of 4 marks (SJ)

c)

To: CEO, Book Life
From: Appointed Actuary
Subject: Valuation Results

I refer to our phone conversation and the issues you raised with the valuation results for Book Life.

The determination of policy liabilities is governed by Actuarial Standards which have legislative force. I am required to sign off that Book Life's policy liabilities have been determined in accordance with the relevant Standard.

The assumptions used to determine policy liabilities are to be made on a best estimate basis. The claims experience for the first twelve months has been in line with the pricing assumptions. Whilst there is volatility associated with claims experience, I am yet to see any evidence that different or lower claims assumptions are warranted.

Expense assumptions could be lowered if there was genuine evidence from Book Life's budgets that expense levels could be reduced. However I note that whilst this may reduce the size of the capitalised loss, this would have no impact on the claims ratios adopted which are the main reason for the capitalised loss arising.

This Standard also introduces the concept of "Related Product Group". Under the Standard, the new group risk scheme cannot be combined with the existing individual risk business because the pricing structure is very different between the two, as are the benefit characteristics (fully underwritten individual risk versus limited underwriting group business). Further the scheme represents a very significant share of Book Life's business overall and warrants being treated separately.

This Standard also requires that capitalised losses must be assessed at the RPG level. Consequently, I am unable to offset the losses on the scheme against the existing risk business.

I also note that the scheme's contractual arrangement with Book Life is for 3 years only.

The Standards require that the actual liabilities under the contract are valued. Unfortunately, without contractual evidence, I am unable to take into account your good relationship with the fund trustees and the potential for the future repricing of the scheme.

Whilst the reporting of a capitalised loss is an unfortunate outcome for Book Life, I note that the heavily discounted premium rates for the scheme mean that this result is a true and fair reflection of Book Life's results. I recommend that Book Life carefully consider its future participation in this market if it needs to continue to discount premium rates so heavily to win business.

Yours sincerely
Appointed Actuary

Marking guide

- **1 mark for noting Actuarial Standards (AS1.04) that the Appointed Actuary is bound to follow**
- **1 mark for noting best estimate assumptions are required**
- **1 mark for noting claims experience in line with pricing so far so no evidence for adopting different assumptions**
- **0.5 marks for noting expense assumptions could be revised if Book Life's budget reflected lower expenses in future, but this would not affect the claims ratios**
- **0.5 marks for noting a different expense allocation could also influence the expense assumptions in future, but this would still need to reasonably reflect the true expenses associated with the scheme**
- **1 mark for noting Related Product Group concept**
- **1 mark for explaining why the group scheme must be a separate RPG to the individual risk business**
- **1 mark for noting offsetting losses and profits between RPGs is prohibited**
- **1 mark for noting that the scheme is under a 3 year contract and without contractual evidence future repricing cannot be taken into account**
- **0.5 mark for noting that a "true and fair" view of this scheme would reflect a loss because of the heavily discounted premium rates Book Life offered**
- **1 marks for simplicity and clarity of explanation**
- **1 marks for objectivity in approach (for example, mentioning assumptions could reviewed if further experience / evidence comes to light) and appropriate language for dealing with a CEO (respectful, professional style)**

To a maximum of 8 marks (CJ)

QUESTION 5 **(19 Marks)**

Analysis

Component	Aim	KU	SJ	CJ	Total
5a	7	4			4
5b	5, 8		7		7
5c	8			8	8
Total		4	7	8	19

Question

You have recently been employed by GHJ Life as its Valuation Actuary. GHJ Life operates in Australia and is a wholly owned subsidiary of KLA Holdings. GHJ Life's two product lines are:

- **Superannuation investment linked deferred annuities and allocated pensions sold through GHJ Life's financial planning network, which charge a single flat management fee of 2.0% p.a. of Funds Under Management (FUM), but which also offers a large account rebate of up to 0.1% p.a. The large account rebate was introduced to the product during the year.**
- **Death, TPD and trauma covers for low sums insured and with minimal underwriting, distributed through direct mailing to the customer base of KLA Holdings. The new business written during 2007 had negative profit margins because of poor response rates to GHJ Life's mailings.**

GHJ Life uses the MoS valuation method for both statutory financial reporting and internal management reporting purposes. Overall, profit margins for both products are positive, but have been declining in recent years mainly due to growth in management expenses. Despite this, GHJ Life has managed to pay a dividend to KLA Holdings each year. GHJ Life has also recently started calculating its Embedded Value as an additional management reporting tool.

a) **What are the two components of an Embedded Value and what are the main steps you would need to take in order to calculate them? (4 marks)**

b) **The Financial Controller has read your Embedded Value report as at 31 December 2007. He has noted that the Embedded Value decreased during 2007. He has asked you how this has occurred when a positive MoS profit was recorded for 2007. What features of GHJ Life's experience during the year might help to explain this result, and what other factors might be significant contributors to this result? (7 marks)**

c) **KLA Holdings has been approached by FBM Holdings who wishes to sell its life insurance company, SDF Life. SDF Life writes similar products to GHJ Life and also distributes its products in a similar way as GHJ Life. As part of KLA Holdings' deliberations about the approach, you have been provided with the latest appraisal value that SDF Life has calculated for its own internal management reporting purposes. The CFO of KLA Holdings has asked you to advise on the key issues that would need to be considered in using SDF Life's**

appraisal value as an input to the Board's considerations about the purchase price that might be offered for SDF Life. Draft your memo in response to the CFO's request. (8 marks)

END OF QUESTION

Solutions Question 5

a)

- The two components are adjusted net worth (ANW) and value of in-force (VIF) business

Main steps for ANW
- Obtain balance sheet for GHJ Life by statutory fund and shareholder's fund
- Determine capital adequacy requirements by statutory fund and the management capital requirements for the shareholder's fund
- ANW = Total Asset Value (adjusted where necessary) less Capital Adequacy Requirements for each statutory fund
- ANW = Net asset value (adjusted where necessary) for the shareholder's fund

Main steps for Value of In Force Business
- Develop cashflow projection model for GHJ's two product lines
- Develop best estimate assumptions including allowance for capital adequacy requirements consistent with ANW
- Determine the risk discount rate applicable
- Calculate VIF

Marking guide:
- **0.5 marks for components**
- **2 marks for valid set of steps in ANW**
- **2 marks for valid set of steps in VIF**

To a maximum of 4 marks (KU)

Note: students may note that different capital level may be used in the EV (e.g. capital adequacy or capital adequacy plus target surplus). As long as capital overall is described consistently students should still be awarded marks.

b)

The features from GHJ Life's experience that help to explain the result are:
- GHJ Life paid a dividend during the year which resulted in a reduction in adjusted net worth and EV (but which has no effect on MoS profits)
- Negative new business profit margins on the risk business would result in slightly lower MoS profits as these could be offset against in-force profit margins. However, they would generate an immediate embedded value loss
- Maintenance expense assumptions were revised upwards at the current valuation. The value impact of this would be immediately reflected in the VIF. However under MoS this change would have no effect on current year profit, but rather would emerge as a reduction in future planned profits. [Note: the experience this year would not be a significant contributor as both EV and MoS profit reflect experience during the year]
- The adverse impact on future fee revenues of the introduction of the large account rebate on the investment linked business would be immediately reflected in the VIF. However under MoS this change would have no effect on current year profit. [Note: the experience this year would not be a significant contributor as both EV and MoS profit reflect experience during the year]

Other factors that may be significant contributors are

- Changes in decrement rate assumptions. The value impact of this would be immediately reflected in the VIF. However under MoS this change would have no effect on current year profit, but rather would emerge as a reduction in future planned profits. [Note: the experience this year would not be a significant contributor as both EV and MoS profit reflect experience during the year]
- An increase in the risk discount rate due to an increase in the equity risk premium adopted
- An increase in the capital adequacy reserves per unit of business, as the cost of holding additional capital would be reflected in the EV immediately but is not reflected in the MoS profit
- A change in investment earnings assumptions for the investment linked business which reduces future fee revenues based on FUM. [Note this would not be a significant contributor for the risk business as AS1.04 would require an effective revaluation of the AERC similar to the VIF impact]

Marking guide:
Features from GHJ Life's experience:
- **1 mark for valid point regarding dividend**
- **1 mark for valid point regarding negative new business profit margins on risk business**
- **1 mark for valid point regarding increased maintenance expense assumptions**
- **1 mark for valid point regarding introduction of large account rebate**

Other factors:
- **1 mark for valid point regarding changes in decrements rates such as claims or lapses**
- **1 mark for valid point regarding risk discount rate change**
- **1 mark for valid point regarding capital adequacy reserves change**
- **1 mark for valid point regarding investment earnings point**

To a maximum of 4 marks for features from GHJ's experience and a maximum of 3 marks for other factors (SJ)

c)

To: CFO
From: Actuary
Subject: Use of SDF Life AV in Purchase Considerations

You asked me to advise on the key issues that would need to be considered in using SDF Life's appraisal value as an input to the Board's considerations about the purchase price that might be offered for SDF Life.

In order to use SDF Life's AV, it is highly likely some adjustments, probably significant, would need to be made.

Probably the most important consideration is in respect of the Value of New Business (VNB). Careful attention would need to be paid to the new business volumes allowed for in SDF's VNB, and whether these will remain valid following a purchase.

In particular, SDF Life's VNB is exclusively tied up in its links to FBM's financial planning network, and its access to FBM's customer base. So in respect of the investment linked business, the VNB would be highly dependent on the planners' willingness to continue recommending SDF Life's product. In respect of the risk business, the VNB is highly dependent on whether SDF Life's exclusive access to the FBM customer base will continue. I recommend that KLA Holdings give careful attention to SDF Life's future distribution arrangements under new ownership in considering this aspect of the AV.

The expense assumptions used should be another key area of consideration and adjustment. The expense savings that KLA Holdings would be able to extract by combining GHJ Life and SDF Life could be factored into the VIF and VNB calculations. I recommend that KLA Holdings carefully consider the savings that could be made in order appropriately adjust the AV.

There are a number of other items that should be considered:

- The risk discount rate to be adopted for the AV, which should adequately reflect the return that KLA Holdings wishes to achieve from the business
- The potential for any "shock lapse" from the change in ownership and the subsequent effect on the VIF should be considered. For example, the risk of the financial planners moving their clients away from SDF Life or the risk product customers deciding to move their business elsewhere
- Review of other assumptions such as decrement rates, lapse rates and capital adequacy reserves
- SDF Life's asset valuation basis would need to be reviewed and confirmed as reflecting an appropriate fair value of the assets
- SDF Life may also have assets whose value is tied to its continuation as part of FBM Holdings, such as intercompany receivables or future income tax benefits. The value and recoverability of these assets would need to be reviewed.
- SDF Life would also have adopted a level of capital adequacy reserves (and possibly target surplus) in its appraisal value. We would need to review this and confirm it is appropriate given the risks undertaken by SDF Life
- Some review of key operational risk issues such as unit pricing systems and policy administration systems should be conducted to ensure that adequate economic capital (via target surplus) is held and the cost of this capital is appropriately reflected in the value
- SDF Life may have a franking balance and we would need to confirm their value or otherwise to KLA Holdings
- KLA's ability to retain the services of key staff of SDF is an issue that needs to be addressed

I would be happy to discuss this further at your convenience.

Yours truly,
Actuary

Marking guide:

- **1 mark for reasonable general discussion of new business volume assumptions**
- **1 mark for discussion of the distribution issues that would impact new business volumes**
- **1 mark for reasonable discussion of expense savings**

- **1 mark for valid point regarding risk discount rate**
- **1 mark for valid point regarding shock lapse consideration**
- **1 mark for valid point regarding review of other assumptions**
- **1 mark for any additional reasonable point up to a maximum of 2 marks**
- **0.5 mark for valid point regarding asset valuation basis**
- **0.5 mark for valid point regarding assets whose value depends on continuation as part of FBM**
- **0.5 mark for valid point regarding capital adequacy reserves (or target surplus) review**
- **0.5 mark for valid point regarding franking balances**
- **0.5 mark for mentioning the issue of key staff retention**
- **1 mark for clarity of expression and focus on key issues in memo**

To a maximum of 8 marks (CJ)

INSTITUTE OF ACTUARIES OF AUSTRALIA

2B LIFE INSURANCE **APRIL 2008 EXAMINATIONS**

QUESTION 6 **(20 Marks)**

Analysis

Component	Aim	KU	SJ	CJ	Total
6a	9, 13	4			4
6b	4, 13		8		8
6c	4, 13			8	8
Total		4	8	8	20

Question

First Stage Life (FSL) is a life insurance company operating in the small Pacific Island of Jomu. FSL has just been acquired by Parent Life, a large Australian life insurer, and you have been appointed as FSL's Actuary.

FSL writes simple guaranteed investment account business, where the company guarantees to credit a fixed rate of return to policyholders' single premium deposits with policy terms varying between 1 and 5 years.

Product design in Jomu is largely driven by the availability of Jomu Reserve Bank Bonds (JRBBs), which are zero coupon bonds with interest payable on maturity, with available terms ranging from 3 months to 3 years, and guaranteed by the government of Jomu. Historically, the available yields on JRBBs have generally been far in excess of crediting rates on investment account business offered in the market, reflecting policyholders' unsophisticated approach to life insurance and a lack of competition in the market. However yields are volatile largely due to occasional bouts of political instability in the country, and the sovereign credit risk rating of Jomu is equivalent to junk bond status.

The Ministry of Finance, the local life insurance regulator, has established that life insurers in Jomu writing this sort of business need to hold capital reserves of 8% of the accumulated account balances. In addition, life insurers must hold a minimum of 30 million kopoks (the local currency) in order to obtain a life insurance license.

a) **Jomu's financial reporting regime uses the same reserves as the regulatory requirements. What would you expect the reported profit of a cohort of FSL's business to look like over the expected life of the policies and why?**
(4 marks)

b) **Parent Life's Chief Actuary has asked for an assessment of Jomu's capital requirements against the Australian Capital Adequacy Standard. How would you apply each element of AS3.04 in deriving the overall capital adequacy reserve (capital reserves over and above the accumulated account balances) for FSL's business, and how significant do you think each element would be?**
(8 marks)

c) **Based on your calculations, capital of 4% of accumulated account balances would be sufficient under the Australian Capital Adequacy Standard. A local**

Board member, who is keen to impress FSL's new owner, has seen the results of your calculations. He has suggested to you that since the local requirements are clearly conservative, FSL should immediately repatriate all capital in excess of local regulatory requirements back to Parent Life. Draft a memo (including your recommendations) to the Board member responding to this suggestion. (8 marks)

END OF QUESTION

Solutions Question 6

a)

- The reported profit would show a loss on inception / in year 1
- This is because the regulatory capital requirement of 8% of account balances needs to be provided for up front, together with any acquisition costs
- In following periods there would be positive reported profits emerging
- This is because investment income should exceed the guaranteed crediting rate plus expenses, and the regulatory capital requirement will be released as the business runs off
- On policy maturity remaining regulatory capital would be released resulting in a large positive profit.

Marking guide:
- **1 mark for reported loss on inception**
- **1 mark for capital strain and acquisition costs causing the reported loss**
- **1 mark for following period positive reported profits**
- **1 mark for investment income exceeding crediting rate plus expenses, and release of regulatory capital as business runs off**
- **1 mark for noting large profits on policy maturity as remaining regulatory capital is released**

To a maximum of 4 marks (KU)

b)

- Capital Adequacy Liability
    - AS3.04 specifies a maximum of the mid-swap rate to be used for Australian insurers. JRRB yields are unlikely to exceed the equivalent of the mid-swap rate in Jomu so this would not generate a significant capital requirement. Whilst available JRBBs are reasonably matching, there is some reinvestment risk for longer term policies (4-5 years). Some assessment of this should be made which would potentially require modeling of JRRB yields to size the reinvestment risk.
    - Expense margins would likely be at the higher end of the range suggested in AS3.04.
    - Given the above the Capital Adequacy Liability is unlikely to be a significant contributor to the capital adequacy reserve.
- Inadmissible Assets Reserve
    - This would likely only make a small contribution to the overall capital adequacy reserves. [Note: Students may note that assets may not be valued at market value in which case this could rise to a sizeable component of capital adequacy reserves. This is valid too but there is nothing in the question to suggest the asset valuation basis].
    - FSL may also have intangible assets on its balance sheet for which a reserve may be required but these would likely not be material in the overall context of FSL's business
    - The asset concentration limits will not apply to FSL given it is entirely invested in JRRBs.

- Resilience reserves
  - This will likely be the major contributor to the capital adequacy reserves for this business. This is because the CTV (accumulated account balances) does not move in harmony with the market value of JRRBs. The Australian AS3.04 "shocks" are unlikely to be appropriate for use in Jomu. Consequently the application of the resilience reserve will require historic analysis of the JRRB market to determine the "shocks" that broadly result in a similar probability of occurrence.
- Credit risk
  - There needs to be some consideration of credit risk in the resilience reserve.
  - The credit rating of Jomu is effectively junk bond and applying the credit risk factors in AS3.04 would give a very material reserve.
  - At least some allowance should therefore be made for credit risk [Note: students may discuss the fact that it may not be a reasonable outcome for FSL to be secured to a higher credit standing than the government of Jomu. This is reasonable provided that they have noted credit risk is considered and some allowance made].
- New Business Reserve
  - This may generate a material capital adequacy reserve depending on how quickly FSL is growing.
  - In applying this part of the Standard to FSL, it would be appropriate to adopt either the local regulatory capital adequacy reserve as the equivalent of the Solvency Requirement, or the sum of the inadmissible and resilience reserves determined previously. The application of Offset Statutory Capital would reflect some portion of the minimum capital requirement of 30 million kopoks.

Marking guide
- **2 marks for reasonable discussion of capital adequacy liability component**
- **1 mark for reasonable discussion of inadmissible assets reserve component**
- **2 marks for reasonable discussion of resilience reserve "shock test" component**
- **1 mark for noting that credit risk needs to be at least considered and some reserve held**
- **1 mark for noting that strict application of AS3.04 would result in a very material reserve which may not be a sensible or appropriate outcome**
- **1 mark for reasonable discussion of the New Business Reserve**

To a maximum of 8 marks (SJ)

c)

To: FSL Board Member
From: Actuary
Subject: Excess Capital

Thank you for your suggestion regarding the repatriation of all capital in excess of Jomu's regulatory requirements back to Parent Life.

However, I strongly recommend that yourself and the other Board members resolve to hold a level of capital in excess of regulatory requirements within FSL. Within Australia, this level of capital is usually called Target Surplus.

I also recommend that the Board adopt a formal policy for determining what level of Target Surplus should be maintained by FSL.

While the local regulatory requirements are conservative, there are nevertheless consequences for breaching these requirements that could have adverse effects on FSL, including a loss of confidence by our policyholders and damage to our reputation and standing with the Jomu government.

Despite good management, from time to time adverse market conditions or other events may cause FSL to breach the regulatory requirements. Target Surplus is designed to provide a buffer against such fluctuations.

The key question the Board needs to answer is "how certain do we want to be of not breaching regulatory requirements over the next year"?

I also recommend the following:

- Discussions with Parent Life in order to develop guidelines for future capital injections into FSL, as this will also have an important bearing on Board's views around the level of Target Surplus to hold
- Consideration of other capital management solutions that may be available to FSL, such as reinsuring FSL's liabilities back to Parent Life. Any such arrangement may reduce the capital required to be held in FSL
- Assessment and consideration of the taxation implications of any capital transfers.

I would be more than happy to attend the next Board meeting to discuss this question of a Target Surplus policy with the Board, as well as any other recommendations raised in this memo.

Yours sincerely
Actuary

Marking guide

- **1 mark for recommending holding some capital in excess of regulatory capital requirements and for adopting a formal policy**
- **1 mark for noting consequences of regulatory capital breach**
- **1 mark for noting random fluctuations can cause breach and that target surplus provides a buffer against this**
- **1 mark for noting key Board decision is around risk of breaching in a specified time frame**
- **1 mark for recommending discussions with Parent Life around capital injections into FSL**
- **0.5 mark for suggesting consideration of other solutions, such as reinsuring liabilities back to Parent Life and whether these would be effective in reducing the capital that needs to be held in FSL**
- **1 mark for recommending consideration of any taxation implications**
- **1 mark for offering to discuss with Board and drafting a policy from there**
- **2 marks for use of simple language, non-technical terms, and clarity of memo**

To a maximum of 8 marks (CJ)