Marking Guide

Level of difficulty.

Question	Syllabus Aims	Units	Knowledge & Understanding	Straight-forward Judgement	Complex Judgement	Total Marks
1 (a)	1, 2	1	3			3
1 (b)	1, 2	1	6			6
1 (c)	1, 2	1	4			4
1 (d)	1, 2, 5	1, 3			3	3
2 (a)	1, 2	1	3			3
2 (b)	1, 2	1		4		4
2 (c)	1, 2, 7, 9	1, 4, 5			4	4
2 (d)	1, 2	1		3		3
2 (e)	1, 2, 7, 9	1, 4, 5			2	2
3 (a)	1	1	2			2
3 (b)	3, 4	2		6		6
3 (c)	3, 4	2			3	3
3 (d)	3, 4, 12	2, 6			6	6
4 (a)	5, 6	3		7		7
4 (b)	5, 6	3		6		6
4 (c)	6	3			5	5
5 (a)	7, 13	4, 6		4		4
5 (b)	7, 13	4, 6		5		5
5 (c)	7, 13	4, 6			9	9
6 (a)	10, 11	5	4			4
6 (b)	10, 11	5		3		3
6 (c)	4, 12	2, 6			4	4
6 (d)	12	6			4	4
TOTAL			**22**	**38**	**40**	**100**

Answer all 6 questions.

QUESTION 1 (16 Marks)

Analysis

Component	Aim	KU	SJ	CJ	Total
1 (a)	1, 2	3			3
1 (b)	1, 2	6			6
1 (c)	1, 2	4			4
1 (d)	1, 2, 5			3	3
Total		13		3	16

Question

Combo Life was established on 1 January 2007 from the merger of two medium-sized life insurance companies (the "former" companies) each with a broad range of participating and non-participating life insurance products. The financial reporting date for Combo Life (and the former companies) is 31 December each year.

The businesses of the two former companies have been managed separately to date but it is planned that the relevant statutory funds of the two companies will be merged with effect from 31 December 2007. At the same time Combo Life will introduce a new actuarial modelling system (known as "CLAS") for determining policy liabilities, capital requirements and appraisal values.

You have just been appointed to manage the actuarial department of Combo Life. Your brief is to migrate the existing actuarial systems from the systems of the two former companies to CLAS. It is planned that CLAS will be used for all 31 December 2007 calculations.

(a) List three (3) important sources of information that you would want to study before commencing your work and explain briefly the information you would hope to obtain from each. (3 marks)

(b) What checks would you make to ensure the completeness and accuracy of the policy data and new CLAS system output for the calculations at 31 December 2007? (6 marks)

(c) Describe the main steps you would take to calculate the MoS policy liabilities for a related product group consisting of non-participating policies, using the projection method. (For this part (c) you do not need to consider the issues arising from the merger). (4 marks)

(d) What additional issues would you expect to arise in calculating the MoS policy liabilities at 31 December 2007 for a proposed related product group that consists of participating policies from each of the former companies, and how would you deal with these issues? (3 marks)

QUESTION 1 SOLUTION (16 Marks)

(a) Three main sources of information

Key sources would be:

- Financial condition reports of the two former companies at 31 December 2006 to obtain the valuation data, assumptions, and methods used for all the types of business sold by the former companies. These would also contain general information on pricing, capital position, treatment of participating policies etc.

- The Scheme or other legal documents governing the merger of the two former companies and the merger of the statutory funds to establish the protection of participating policies and any other undertakings or guarantees agreed to protect particular policy types.

- Systems specifications for CLAS and for each of the actuarial modelling systems used by the former companies. This should indicate any systems differences in the new model that might affect the modelling of the combined business.

- The Embedded Value or Appraisal Value reports of the two former companies and their experience investigations to provide an understanding of the inputs and outputs of the existing models of the former companies.

- Specifications of the data systems. This may be useful in identifying the data that is needed to be imported into the CLAS product and to ensure the data on the system is in a consistent format to what is required by CLAS.

Marking guide:
- 1 mark for FCRs and reasons;
- 1 mark for scheme document and reasons;
- 1 mark for systems specifications and reasons;
- 1 mark for AV/EV reports and reasons;
- 0.5 mark for experience investigations and reasons;
- 0.5 mark for data specifications and reasons;
to a maximum of 3 marks (KU).

(b) Checks on data and systems.

Main steps are:

- For each of the former companies separately make sample checks that the valuation data (age, commencement date etc) is complete and reasonable.

- For each of the former companies separately check that the policy data at 31 December 2007 is consistent with the policy data at 31 December 2006 and with the relevant accounting information (eg premiums received) for the 2007 year. Eg Policies at end = Policies at start + new business – exits
and similarly for premiums in force, funds under management etc.

- Often these checks would be done before 31 December on earlier data (eg 2006 data) to ensure any issues are resolved before the valuation date.

- Carry out the normal end of year calculations for each of the former companies separately at 31 December 2007 using the former actuarial models and policy data, and the 2006 assumptions. Carry out an analysis of profit to check the valuation results.

- Repeat the step above using the new assumptions appropriate for the combined business. Check for reasonableness against the results from the step above.

- Sample check the calculations for a selection of model points using the new CLAS system.

- Calculate the policy liabilities using CLAS and the new policy data for Combo Life. Check the results for CLAS vs former system for each of BEL, PVFPM, and PVFSB for each product. Investigate all material differences and make corrections as required.

- Carry out the full liability, capital and AV calculations using CLAS and the new policy data for Combo Life.

- Alternatively the old model results per the December 2006 valuation can be used to compare with the results produced by CLAS with the December 2006 data and assumptions.

Marking guide:
- 0.5 mark for sample reasonableness data checks;
- 1 mark for data consistency checks on old systems;
- 0.5 mark for checks being done prior to 31 December;
- 1 mark for valuation on old models, old assumptions;
- 1 mark for valuation on old models, new assumptions;
- 1 mark for sample checking CLAS calculations;
- 1 mark for CLAS valuation results vs old models;
- 1 mark for a logical progression of checks;
- 1 mark for comparing December 2006 results produced by CLAS and old models;
to a maximum of 6 marks (KU).

(c) MoS Policy Liability Calculation

The main steps are:

- Set new projection assumptions. The profit carrier for the RPG would not change from the previous year.

- Run the CLAS projection models for the RPG on the old assumptions to determine the impact of the current year experience variation

- Run the CLAS projection models for the RPG on the new assumptions to calculate the BEL.

- Calculate the new profit margin on the new assumptions.

- The Margin on Services Liability is calculated as the sum of the Best Estimate Liability and the present value of future profit margins, that is MoSPL = BEL + PVFPM

Marking guide:
- 1 mark for setting new assumptions;
- 1 mark for running the CLAS model for the RPG on old assumptions;
- 1 mark for running the CLAS model for the RPG on new assumptions;
- 1 mark for recalculation of profit margin;
- 1 mark for MoSL = BEL + PVFPM ;
to a maximum of 4 marks (KU).

(d) Potential issues from the merger

- Choice of profit carrier. For a given RPG, hopefully the profit carriers of the two former companies were the same or similar, so no material change is required. If the new profit carrier is different from either or both of the old profit carriers, then there may be a need to retain separate RPGs (because profit carriers cannot be changed once established).

- Identify loss recognition as an issue that needs thought. The RPG may have been in loss recognition in either or both former companies and may be in loss recognition for the combined business. If a previous loss is eliminated because of assumption change, it would be appropriate to recognise the reversal of the previous loss in 2007 year. If the previous loss is eliminated by merger with profitable business, the loss reversal would be spread over future years.

- Given this is participating business, protection of policyholders' reasonable expectations (PRE) by means of ring-fencing or bonus linking as set out in the Scheme documents amalgamating the statutory funds.

Marking guide:
- 1 mark for choice of profit carrier;
- 1.5 marks for loss recognition issues;
- 1 mark for PRE for participating policies;

to a maximum of 3 marks (CJ).

QUESTION 2 (16 Marks)

Analysis

Component	Aim	KU	SJ	CJ	Total
2 (a)	1, 2	3			3
2 (b)	1, 2		4		4
2 (c)	1, 2, 7, 9			4	4
2 (d)	1, 2		3		3
2 (e)	1, 2, 7, 9			2	2
Total		3	7	6	16

Question

You are a share analyst employed by a major firm of stockbrokers, and you specialise in insurance companies.

You recently reviewed the published accounts of Listed Life Limited ("LLL") for the year ending 31 December 2006. LLL writes only retail risk insurance business (term life, TPD, trauma insurance and disability income insurance). You noticed that the Present Value of Future Profit Margins ("PVFPM") reduced during the year. You requested further information and the company provided the following for their two main Product Types:

Value of Future Shareholder Profit Margins for all in force business ($ million)			
Valuation Date – 31 December	**2006**	**2006**	**2005**
Valuation Assumptions	**2006 Basis**	**2005 Basis**	**2005 Basis**
Product Types			
Lump Sum (Term life, TPD & Trauma)	**90**	**90**	**110**
Disability Income	**10**	**0**	**0**
Total	**100**	**90**	**110**

Note that in this presentation, the 2005 Basis and 2006 Basis is taken to incorporate all assumptions including Economic assumptions

(a) Explain the meaning of "Related Product Group" and explain with reasons the Related Product Groups you would expect LLL to maintain. (3 marks)

(b) Identify the most likely causes of the reduction in the PVFPM for the Lump Sum Related Product Groups and give your reasons for your choices. (4 marks)

(c) For each of the causes you have identified in Part (b) of this question, explain the consequences on the Margin on Services profit for the 2006 year and on the change in Appraisal Value for that year. (4 marks)

(d) Identify the most likely causes of the increase in PVFPM for the Disability Income Related Product Group and give your reasons for your choices.
(3 marks)

(e) For each of the causes you have identified in Part (d) of this question, explain the consequences on the Margin on Services profit for the 2006 year and on the change in Appraisal Value for that year. (2 marks)

QUESTION 2 SOLUTION (16 Marks)

(a) Explain Related Product Group

According to Actuarial Standard 7.02 paragraph 5.2, Related Product Group is a grouping of products with:

- similar benefit characteristics and pricing structures
- may not cross subcategories

For retail risk insurance we have all combinations of:

- Ordinary / superannuation (because of subcategories)
- Stepped premiums / level premiums (different pricing structure)
- Lump sum benefits / income benefits (different benefit characteristics) – could also accept further subdivision into the risk types (ie death / TPD / trauma / DII)

Marking guide:
- 1 mark for definition from AS 7.02;
- 1 mark for identifying reasonable list of RPGs;
- 1 mark for relating the RPGs to the definition;
to a maximum of 3 marks (KU).

(b) Causes of reduction in PVFPM for lump sum RPG.

Most likely reasons are:

- The PVFPM for the existing business as at December 2006 is lower compared to December 2005 because the carrier runs off and profit is released for the year.

- It can also happen because the PVFPM for the new business written in 2006 is negative (or, if positive, not large enough to offset the reduction in the PVFPM for existing business). When combined with the PVFPM for the existing business, the combined value of PVFPM for the RPG is reduced.

- Shock lapses during 2006. For example loss of a major distribution outlet and consequent re-writing of existing customers with another life insurance company. This eliminates the PVFPM from the lapsed policies.

Marking guide:
- **1 mark for identifying the run-off of existing business;**
- **1 mark for identifying new business loss or the fact that it was insufficient to offset expected run-off.;**
- **1 mark for explaining effect of new business loss on PVFPM;**
- **1 mark for identifying shock lapses;**
- **1 mark for explaining effect of shock lapses on PVFPM;**

to a maximum of 4 marks (SJ).
NOTE: Changes in assumptions is NOT a valid reason and represents a fundamental misunderstanding, which should be noted in marker comments.

(c) Effect on MoS profit:

- The PVFPM run-off of existing business does not have an impact on MoS profit as this was ‘expected’ in projections.

- A new business loss would result in a small reduction in MoS profit for 2006 because of the negative profit margins recognised in the part year exposure of the new business. A new business shortfall (compared to the run-off of existing business) would not impact MoS profit for 2006.

- The shock lapses will result in a reduction in MoS profit for 2006 because of the loss of the profit margins for the part year following the lapse of these policies. Shock lapses also result in a loss of PVFPM on the lapsed business, which can be large. This is akin to writing off the implicit DAC on the lapsed policies.

Effect on AV:

- The PVFPM run-off of existing business does not have an impact on AV as this was ‘expected’ in projections.

- A new business loss would result in a reduction in the Value of In-force because the PVFPM for the RPG is lower. The Value of New Business may be substantially reduced depending on whether the cause of the new business loss is temporary. The impact of a new business shortfall (compared to the run-off of existing business) depends on whether the value of a single year’s new business is higher or lower than in the previous valuation.

- The shock lapses will result in a reduction in the Value of In-force because of the loss of PVFPM. If the shock lapses are not one-off in nature then the Best Estimate lapse assumption would be increased resulting in further loss in AV but note that the BE assumptions were not changed as at 31 December 2006.

Marking guide:
- **1 mark for normal PVFPM run-off has no impact on MoS profit and AV;**
- **1 mark for NB loss causing a small reduction in MoS profit OR NB shortfall having no impact on MoS profit;**

- 1 mark for shock lapses causing a small reduction in MoS profit;
- 1 mark for NB loss reducing VIF and VNB OR NB Shortfall impact is dependent on comparison to previous years VNB;
- 1 mark for shock lapses reducing VIF;
- 1 mark for potential change in BE lapse assumptions;
to a maximum of 4 marks (CJ).

(d) Increase in PVFPM for DI RPG.

Most likely causes are:

- The positive PVFPM occurs as a result of the assumption changes at the time of the 2006 valuation. This change has the result of reversing previous loss recognition (assuming PVFPM at 31/12/2005 was not exactly 0). (Note that a change in the investment earnings rate caused by a change in market interest rates would not lead to a change of BE assumptions).

- Note there was no material change of BE assumptions for the Lump Sum RPG so change must be related to DI specific factors – for example, most likely DI incidence and recovery rates and/or DI persistency assumptions or DI specific expense assumptions.

Marking guide:
- 1 mark for assumption change as the sole explanation;
- 1 mark for probable loss reversal;
- 1 mark for excluding market related change in BE earnings assumption;
- 1 mark for likely change in DI assumptions;
to a maximum of 3 marks (SJ).

(e) Effect on MoS profit:

- The likely loss reversal will generate a MoS profit in 2006 equal to the loss reversal. The change in DI claims assumptions will not otherwise affect 2006 MoS profit.

Effect on increase in AV:

- The change in assumptions will increase the VIF and most likely also increase the VNB.

Marking guide:
- 1 mark for MoS recognition of the loss reversal;
- 1 mark for increase in VIF and VNB;
to a maximum of 2 marks (CJ).

QUESTION 3 **(17 Marks)**

Analysis

Component	Aim	KU	SJ	CJ	Total
3 (a)	1	2			2
3 (b)	3, 4		6		6
3 (c)	3, 4			3	3
3 (d)	3, 4, 12			6	6
Total		2	6	9	17

Question

You are the appointed actuary of Super Life Limited ("SLL") a company which specialises in superannuation investment and risk insurance products. SLL has a portfolio of group risk insurance policies including group life and TPD, and group salary continuance insurances.

The group risk business consists of a number of medium size (50 to 500 employees) employer group plans. Most plans have 3 year premium rate guarantees. Many plans include a profit share which is paid if the claims experience is favourable. Total premium income from the group risk business is $150 million per year.

The portfolio has been in place for many years and has usually been profitable. Last year SLL made a profit from this portfolio of $7 million. This includes investment earnings on the assets supporting the MoS policy liabilities which are all secure short-term fixed interest securities. The MoS policy liabilities are calculated using the accumulation method.

SLL has been offered the group risk insurance contract for a large fund (annual group risk premiums of $50 million) and the prospect of other related business in future including a large investment mandate. There are some unusual benefit features of the group insurance and there is limited experience available to assist in the pricing. There is also an expectation that claims reporting will be slower than is generally the case for group risk business. On your analysis the expected profit on this portfolio is nil but the result could easily lie in the range profit of $5 million to loss of $5 million.

The management team of SLL wishes to write the contract.

(a) List the component parts of the policy liabilities for this product. (2 marks)

**(b) The Capital Adequacy Requirements for SLL are set out in AS 3.04.
Outline the steps in the calculation of the Capital Adequacy Requirement for the existing group risk business (excluding the proposed new contract), and explain which elements of this calculation are most likely to give rise to a material capital requirement, with reference to the components identified in Part (a) above. (6 marks)**

(c) How is your answer to Part (b) of this question altered after the new contract is included in the portfolio? Please give your reasons. (3 marks)

(d) Draft the "Summary and Recommendations" section of your Section 116 report on the new contract (report to the directors of SLL under Section 116 of the Life Insurance Act), including your summary of the profitability and capital requirement implications for this contract, and any recommendations you would make to mitigate the risks of the new contract. (6 marks)

QUESTION 3 SOLUTION (17 Marks)

(a) Policy Liabilities components

The liabilities under the accumulation method are:

- Unearned premiums (UEP)
- Claims reported but not admitted (RBNA)
- Claims incurred but not yet reported (IBNR)
- Disability income claims in course of payment (CICP)
- Deferred Acquisition Cost (DAC) (but likely to be small for group business due to low initial costs)
- Profit share accrued but not paid.

These liabilities should include claims expenses.

Marking guide:
- 0.5 marks for UEP;
- 0.5 marks for RBNA;
- 0.5 marks for IBNR;
- 0.5 marks for CICP;
- 0.5 marks for DAC;
- 0.5 marks for accrued profit share;
- 0.5 marks for claims expenses;
to a maximum of 2 marks (KU).

(b) Capital adequacy requirement

Working through the CAR components:

In selecting the Capital Adequacy assumptions, the question suggests the qualitative factors in 4.3.2 of AS 3.04 are low / medium which means best estimate assumption loadings of at least 10% for mortality, 20% for TPD and salary continuance insurance (SCI) claims in payment, and 40% for SCI, as well as a loading for servicing expenses.

Offsetting factors are:

- The profit margins in the premium rates (about 5% last year)

- Margins for profit sharing in the premium rates
- Short term premium rate guarantees on average 18 months for an in-force portfolio.

The policy liability held for claims not paid and claims not reported will be based on best estimate assumptions with no margins. Hence, there must be an additional capital adequacy requirement for each of these. This applies also to SCI claims in payment.

The liabilities for unearned premiums may have a capital adequacy requirement depending on the relative sizes of the increased claims assumptions and the premium rate margins. There is likely to be a requirement for SCI at least because of the 40% assumption loading.

These increases to UEP, RBNA, IBNR and CICP will be offset by reductions in profit sharing liabilities.

The most material items are likely to be the products with the highest required margins (SCI, TPD) and the products with the highest claims reserves (SCI, TPD).

The end result is likely to be that the Capital Adequacy Liability is higher than the Current Termination Value which should be the same as the MoS policy liabilities.

Add other liabilities (no info in question)

Add Inadmissible Assets (no info in question)

Resilience Reserve – a resilience reserve is likely because the duration of the assets is short while the duration of the liabilities can be medium (unreported claims) or long (long term CICP).

Minimum of Solvency Requirement may apply if there is an Expense Reserve from AS 2.04.

New Business Reserve **–** no info in question but group risk business usually has low capital requirements overall so this may be nil.

Add Transitional Reserve (no info in question).

Therefore in summary the most material items are likely to be the Capital Adequacy Liabilities for the SCI business (and TPD to a lesser extent) and the Resilience Reserve.

Marking guide:
- **1 mark for CA assumptions (low / medium margin);**
- **1 mark for CAL loadings to UEP, RBNA, IBNR and CICP;**
- **1 mark for CAL offsets (profit margins, profit sharing, short premium guarantees)**
- **1 mark for CAL exceeds CTV and MoSL;**
- **1 mark for resilience reserve;**
- **1 mark for solvency minimum reference to expense reserve;**

- 0.5 mark for New Business Reserve expected to be low / nil
- 1 mark for assessment of the "material" requirements;
to a maximum of 6 marks (SJ).

(c) Effect of new scheme

On best estimate assumption of nil profit this scheme lowers the average profitability of the portfolio which increases the CAL.

Considering 4.3.2 in AS 3.04 the new scheme reduces the reliable data, the reliability of past company experience and the stability of experience for the whole portfolio. Therefore the CA assumption margins should be higher. This will further increase the CAL.

The claims reporting delays are longer than the existing portfolio so the IBNR reserve will be higher and this will further increase the CAL. However, it should be noted that the effect of this assumption will only occur over time as IBNR is built up as the new scheme has had time to build up some exposure.

Marking guide:
- 1 mark for increase in CAL;
- 1 mark for reduced profit margins reason;
- 1 mark for higher CA assumption margins reason;
- 1 mark for higher IBNR reason;
to a maximum of 3 marks (CJ)

(d) Draft S116 report

Summary and recommendations

On the basis of my analysis of this contract the best estimate of profitability is nil. So the contract will at least cover the expected expenses of managing it and the cost of claims, and therefore makes a contribution to our overheads.
Writing this contract will also establish a relationship with a new client with the prospect of additional future business.

On the other hand I am concerned about the uncertainty involved in the pricing due to the unusual benefits and limited data for pricing. I would not be surprised to see the profitability for this scheme anywhere in the range from profit of $5 million to loss of $5 million. This is a very material variation in relation to the overall profitability of our group risk portfolio.

Normally we would seek an additional profit margin to reflect this level of uncertainty rather than a reduced profit margin.

Another aspect of the uncertainty of the claims risk for this contract is that the capital requirement for our group risk portfolio will be increased as described earlier in this report. Despite the increased capital requirement this product is not expected to contribute to increasing profits, so our return on capital is expected to reduce.

I recommend consideration of the following matters to mitigate the risks for this contract:

1. Offering no more than a 12 month premium rate guarantee to limit the mispricing risk;
2. Obtaining reinsurance support on a substantial basis such as a 50% quota share to limit our risk exposure;
3. Special monitoring of the experience of this contract on a monthly basis because of its size and claims risk.

Yours...

Appointed Actuary

Marking guide:
- **1 mark for additional premium to cover risk;**
- **1 mark for lower return on capital;**
- **1 mark for 12 month premium guarantee;**
- **1 mark for substantial reinsurance for this contract;**
- **1 mark for special monitoring for this contract;**
- **1 mark for clarity of expression;**
- **1 mark for professional (balanced) approach in the report;**

to a maximum of 6 marks (CJ)

QUESTION 4 **(18 Marks)**

Analysis

Component	Aim	KU	SJ	CJ	Total
4 (a)	5, 6		7		7
4 (b)	5, 6		6		6
4 (c)	6			5	5
Total			13	5	18

Question

You are the actuary for funds management company Celestial Fund Managers (“CFM”), which manages a series of investment portfolios for its retail customers. The customers access the investment portfolios by purchasing single premium investment linked contracts usually at the recommendation of financial planners.

You have been asked to develop the budget for CFM for the 2008 calendar year to enable management to monitor the performance of the company on a monthly basis. You have been provided with the following information for 2007:

	Budget Results ($ million)	Actual Results ($ million)
Total assets boy	4,150	4,150
Customer liabilities boy	4,050	4,050
Shareholder funds boy	100	100
Single premium income	420	420
Fees paid to planners	20	30
Other expenses	40	44
Redemptions	120	150
Investment income on total assets	364	227
Total assets eoy	4,754	4,573
Customer liabilities eoy	4,634	4,476
Shareholder funds eoy	120	97
Shareholder Profit	20	-3

Where “boy” is beginning of the year and “eoy” is end of the year.

The 2007 Budget numbers were derived from your model of the business of CFM using your best estimate assumptions at the start of 2007. The policy liabilities at the start and end of the year are calculated according to the requirements of Australian equivalents to International Financial Reporting Standards.

In this question please assume:

1. **All numbers are net of tax (that is, ignore tax).**
2. **Single premiums and planners fees are paid at the start of the year and other expenses and redemptions are paid at the end of the year.**

3. Shareholders' funds are invested in the same proportions of CFM's investment portfolios as customers' funds.

(a) Begin the budgeting process by analysing the actual shareholder profit between investment income on the shareholders funds, the planned profit, and the experience profit and further analyse the experience profit between planners' fees, Other expenses and the residual profit. (7 marks)

(b) Suggest a likely cause for each of the three experience variance items from Part (a) and the effect of each on your 2008 budget. (6 marks)

(c) Having then updated your model for 2008, you proceed to prepare a budget for 2008. On the business volumes expected by management your model indicates Other expenses of $45.4 million. The chief accountant has also made an estimate of expenses for 2008 by estimating staff numbers, payrolls, and other expenses allowing for inflation increases in all cases. The result was total expenses of $41.8 million. Explain the steps you would take to reconcile the two estimates of expenses for 2008. (5 marks)

QUESTION 4 SOLUTION (18 Marks)

(a) Analysis of profit

Expected investment earnings rate
= 364 / (4,150 + 420 – 20)
= 8%

Actual Investment earnings rate
= 227 / (4,150 + 420 – 30)
= 5%

Expected earnings on shareholders funds
= 8% * 100
= 8

Total expected shareholder profit
= 20

Planned profit
= 20 – 8
= 12

Actual earnings on shareholders funds
= 5% * 100
= 5

So primary analysis of the actual shareholder profit is:

Earnings on shareholder funds	5
Planned profit	12
Experience profit	-20

Actual shareholder profit	-3

Investment earnings profit
= (5% – 8%) * (4,050 +420 – 30)
= -133.20
Note this relates to customers funds not shareholders funds

Planners' fee profit
= (20 – 30) * 1.08
= -10.8

Other expenses profit
= 40 – 44
= -4.00

Redemption profit
= – (120 – 150) + (4,634 – 4,476)
= 128
Note the movement in reserves includes the investment profit of -133.2
So combine investment profit and redemption profit into residual profit

Check total experience profit
= -133.2 – 10.8 – 4 + 128
= -20

So secondary analysis of the experience profit is:

Planners fees	-10.8
Other expenses	-4.0
Residual	-5.2

Experience profit	-20.0

Marking guide:
- **1 mark for earnings rates (8% and 5%);**
- **1 mark for primary analysis of shareholder profit;**
- **1 mark each for interest, planners' fees, expenses and redemptions profits;**
- **1 mark for reconciliation to total experience profit;**
- **1 mark for residual profit by combining investment and redemption items;**

to a total of 7 marks (SJ).

(b) Cause and effect

Cause of the loss on planners fees could be an unexpected increase in fee rates, a new bonus arrangement or a one-off adjustment to past planners fees. It is not volume related because the new premiums are the same as the model and redemptions are only modestly above expected. If the cause is recurring then the allowance for planners' fees in the model will need to be increased accordingly. If it is one-off in nature there is no need to adjust the model for 2008.

Cause of loss on other expenses could relate to increased redemption payments, costs of resolving past planners fees errors, increases in staffing levels, or to other one-off expenses. If the cause is recurring then the expense allowances in the model will need to be increased accordingly.

Cause of the residual loss is most likely the write-off of DAC (assuming DAC exists) on the higher than expected volumes of redemptions. The investment returns for 2007 are lower than expected and that may have impacted on redemptions. Lower investment returns would also have negatively impacted on 'management fees'. Change the model assumptions to allow for higher redemptions if this is likely to recur in 2008.

Marking guide:
- **1 mark for a sensible reason for fees loss;**
- **1 mark for correct effect on 2008 budget;**
- **1 mark for a sensible reason for expense loss;**
- **1 mark for correct effect on 2008 budget;**
- **1 mark for DAC write-off;**
- **1 mark for change redemption assumption if appropriate;**
- **1 mark for lower investment returns impacting management fees;**
- **0.5 mark for mentioning the cause is not volume related;**

to a total of 6 marks (SJ).

(c) Steps to reconcile

To reconcile model expenses to accountants' budget:
- Gain an understanding of the basis used by the accounting department to arrive at their expense estimates
- Check that the accountants' budget is complete and includes all expense items allowed for in your model
- Check that both estimates are based on the same product mix and volumes of new business
- Check the percentage increase in each expense line (salaries, IT etc) in the accountants' budget and compare this with the overall growth rate of the company
- Check for one-off expenses or savings in the model expenses or in the accountants' budget
- Investigate and adjust any differences as appropriate until the two estimates are

comparable

Marking guide:
- **1 mark understanding the basis for preparing the divisional budgets;**
- **1 mark for completeness of accountants' budget;**
- **1 mark for consistent growth assumptions (sales mix & volumes);**
- **1 mark for % increases by expense line;**
- **1 mark for one-off expenses;**
- **1 mark for adjustments as appropriate;**

to a total of 5 marks (CJ).

QUESTION 5 (18 Marks)

Analysis

Component	Aim	KU	SJ	CJ	Total
5 (a)	7, 13		4		4
5 (b)	7, 13		5		5
5 (c)	7, 13			9	9
Total			9	9	18

Question

AP Life is an Australian life insurance company with a stated intention to expand into Asian markets by acquiring existing companies. You have just been appointed to the acquisition team at AP Life which is currently examining a potential target company ("Target").

Target sells mainly non-participating whole of life and endowment assurance policies. Their products are characterised by very high initial commissions paid to agents (150% of first year's premium) and the new business of Target has increased by 15% each year for the last 5 years as a result.

Target has prepared an appraisal value ("AV") to assist potential buyers to value the company. The AV report provides the following information:

- **Target is required to report its profit on a Statutory Reporting Basis ("SRB").**
- **The SRB requires assets to be held at market value and unrealised capital gains and losses on investments are included in the reported profit.**
- **The SRB reported profit also includes the change in the Statutory Reserve (for policy liabilities) during the year.**
- **The Statutory Reserve is set by a Gross Premium valuation method using assumptions, which are generally more conservative than Best Estimate assumptions.**
- **The capital requirement is set by the local regulator as 125% of the Statutory Reserve.**

The AV has been calculated as follows:

- **Net Worth is set as the Market Value of Assets less the Statutory Reserve.**
- **The Value of In-force is calculated as the present value of future profits from existing business on a Statutory Reserve basis using a risk discount rate of 15% pa.**
- **The Value of Future New Business is calculated as the present value of future profits from future new business on a Statutory Reserve basis using a risk discount rate of 15% pa and allowing for future new business growth of 10% pa in perpetuity.**

The risk discount rate is the rate used in recent transactions of companies similar to Target in the same country. The assumptions used in calculating the AV are current best estimate assumptions for Target as a stand-alone entity.

(a) What two major aspects of the above AV calculation method (other than the selection of the risk discount rate) would you adjust in order to provide a more realistic valuation? Please provide your reasons. (4 marks)

(b) Considering the assumptions used in the AV calculations, which assumptions would you expect to change to reflect the new ownership of AP Life? AP Life has no other operations in the country in which Target is located and is planning to continue selling the same products through the same agents. (5 marks)

(c) The due diligence team has now completed its research on Target and has discovered new information not included in the AV. What is the effect of each of the following and how would you adjust the AV calculation to allow for them?

(i) Target owns an office building which the AP Life property experts believe is worth considerably more than the market value included in the accounts and the AV calculation. (3 marks)

(ii) Some new business has been written through a related company of Target and the acquisition costs for this business were absorbed by the related company and not passed through to Target. In future under the ownership of AP Life, Target will have to meet these acquisition costs itself. (3 marks)

(iii) A major agent for Target, which produces 15% of its new business, has stated that it intends to place its business with another company. (3 marks)

QUESTION 5 SOLUTION (18 Marks)

(a) Adjustments to AV method

Value of capital locked-in

- The value of in-force and the value of new business are both based on the Statutory Reserves and do not allow for the costs of the additional 25% capital requirement.
- The cost arises because the capital earns the fund earnings rate while the earnings and release of this capital are discounted at the risk rate of 15%.

Growth of 10% in perpetuity

- This rate is lower than the growth achieved in the last five years but is unrealistic in perpetuity.
- If AP Life pays for this level of growth in perpetuity there is downside risk and not much upside.
- The growth rate of 10% pa is not consistent with the risk discount rate of 15%.

Marking guide:

- 1 mark for allowing for locked-in capital;
- 1 mark for reason;
- 1 mark for reducing growth rate;

- 1 mark for reason;
to a maximum of 4 marks (SJ).

(b) Assumption adjustments

Note that assumptions relating to mortality or investment earnings are unlikely to change due to the change in ownership

- The assumption for tax may need to be adjusted for an overseas parent in the areas of withholding tax on dividends, imputation credits (if any).
- The expense assumptions need careful review in light of AP Life's plans to run the company.
- There may be additional expenses arising from additional reporting requirements to Australia, eg adoption of MoS reporting.
- Expense savings may be achieved by sharing resources with the parent company or with other subsidiaries in the region.
- There may be expense savings if common systems can be implemented across a number of countries to achieve more scale benefits.
- There may be some back-room processing which can be managed in a lower-wage country.
- May reflect the risk of distributor disenchantment on takeover effecting future sales and lapse assumptions (at least as a sensitivity)

Marking guide:
- 1 mark for tax;
- 1 mark for budgeting actual expenses for new operation;
- 1 mark for additional expenses (MoS reporting);
- 1 mark for reduced expenses (cost sharing, back office);
- 1 mark for NB after sale;
- 1 mark for lapses after sale;
to a maximum of 5 marks (SJ).

(c) Due diligence

(i) Property assets

- Affects only the Net Worth calculation because the other components assume assets equal to the policy liabilities including capital margins
- Adjust the increase in the value of the properties and deduct tax on the unrealised gain
- Add the net increase to the Net Worth

Marking guide:
- 1 mark for adjustment (increase) to Net Worth only;
- 1 mark for reason;
- 1 mark for tax adjustment;
to a maximum of 3 marks (CJ).

(ii) Acquisition costs

- Affects only the value of future new business because the other items are fixed at the valuation date
- Impact is to reduce the value of future new business
- If the new business written through the related company is separately modelled, then increase the acquisition costs in the new business model points for this business
- Otherwise recalculate the average acquisition costs for all new business

Marking guide:
- 1 mark for adjustment (reduction) to VNB only;
- 1 mark for reason;
- 1 mark for method of adjustment;
to a maximum of 3 marks (CJ).

(iii) Loss of Agent

- Direct effect on the value of new business but also an indirect effect on the value of in-force business
- For in-force business may need to allow for higher lapses/surrenders on business written by the departing agent
- For new business remove the new business volumes that were included from the departing agent
- Generally review the loss of the agent to see if the underlying cause could affect other agents
- Unit expense assumptions should be reviewed. Acquisition costs per unit would increase unless there is a corresponding reduction in sales support related costs. Long term maintenance costs may increase due to the lower in force volumes but relatively fixed expense base.

Marking guide:
- 1 mark for identifying there is an effect on VNB and VIF;
- 1 mark for higher lapses on agent's in-force business;
- 1 mark for adjustment to VNB;
- 1 mark for review of cause;
- 1 mark for unit expense assumption review;
to a maximum of 3 marks (CJ).

QUESTION 6 (15 Marks)

Analysis

Component	Aim	KU	SJ	CJ	Total
6 (a)	10, 11	4			4
6 (b)	10, 11		3		3
6 (c)	4, 12			4	4
6 (d)	12			4	4
Total		4	3	8	15

Question

Megabank Life ("ML") is an Australian life insurance company which is a wholly owned subsidiary of Megabank. Its business consists entirely of single premium investment-linked contracts and individual term life insurance policies. All business is written at the branches of Megabank by its salaried sales staff. There are no commission payments.

The assets supporting the investment-linked contracts are in accordance with the investment mandates of the various investment funds. All other assets of ML are invested in secure short-term fixed interest securities, often bank bills acquired through Megabank.

The senior executives at Megabank have expressed concern about the potential variability of reported profits of ML under the newly introduced Australian equivalents to International Financial Reporting Standards ("AIFRS"). As the Enterprise Risk Manager for ML you are asked to review this issue from a risk management perspective.

The notes to the financial statements of ML show the following transition effects (variations) from the previous reporting basis to AIFRS:

	Previous Reporting Basis ($'000)	Effect of Transition to AIFRS ($'000)	AIFRS ($'000)
Life Insurance Contract Liabilities	(120)	(10)	(130)
Life Investment Contract Liabilities	5,300	100	5,400
Deferred Tax Liability	0	20	20

(a) From your general knowledge of AIFRS, explain the most likely causes of each of the variations in the above table. (4 marks)

(b) In relation to the variations to the Life Insurance and Life Investment Contract Liabilities, explain how these changes might affect the variability of ML's reported profits in future. (3 marks)

(c) Due to adverse experience during the year, the level of retained profits has been reduced to the point where ML only just meets its capital adequacy requirement. The Chief Executive Officer of ML proposes to remedy this by reinsuring a quota share of the existing term life business with a life reinsurance company and by reinsuring a quota share of the existing investment business with the funds management subsidiary of Megabank. As the Risk Manager for ML, what do you see as the advantages, disadvantages and any issues arising from these suggestions, and their impact on the capital position of ML? (4 marks)

(d) In relation to the proposal to reinsure the existing term life business in Part (c) of this question, what perspectives do you think that each of the Appointed Actuary, auditor, and independent directors of ML would have on this proposal? (4 marks)

QUESTION 6 SOLUTION (15 Marks)

(a) AIFRS variations

Most likely causes are:

- Under AIFRS the discount rate for valuing insurance contract liabilities is a risk-free rate whereas previously the fund earnings rate was used. This change has the result of increasing the negative amount of the policy liabilities.
- Under AIFRS, changes in discount rates must flow directly through into the calculation of liabilities and not spread through the future profit margins, where previously the standards provided a choice of method. If the latter approach was previously used, this could impact the policy liabilities.
- Under AIFRS the deferral of acquisition costs for investment contracts has been narrowed to incremental costs directly attributable to securing the new business. For ML the salaries of sales staff may not meet the definition and so may not be deferred. This increases the liabilities for this business.
- Under AIFRS, the policy liability for investment contracts is grossed up for the tax on the reduction or removal of deferred acquisition costs and the tax on the DAC is shown explicitly as a tax liability.
- There is also now an effective surrender value floor to the value of the policy liabilities.
- Changes to the insurance contracts liability (from using the risk free rate and flowing changes in discount rates directly to the policy liabilities as per above) will also impact the deferred tax liability;

Marking guide:
- **1 mark for change to risk free discount rate for insurance contracts;**
- **1 mark for change to discount rates flowing to liabilities not future profit margins;**
- **1 mark for change in DAC for investment contracts;**
- **1 mark for deferred tax liability on DAC;**
- **1 mark for deferred tax liability on changed insurance liabilities;**

to a maximum of 4 marks (KU).

(b) Variability in reported profit

For the insurance business the risk free discount rate is reset each year and the present value of this change on future cash flows is reflected in the change in policy liabilities and hence the reported profit each year. Because the policy liabilities are negative it is not straightforward to match the liabilities with assets of a similar duration. The change in the risk discount rate each year can be a major source of profit variability for this business. (Note that even if policy liabilities are well matched, the effect of changes in investment asset values on the capital used to support the policy liabilities will still cause variability in the reported profit).

For the investment business the restrictions on deferring acquisition costs will result in lower profits whenever the rate of growth of the business increases (to the extent that these "non deferrable" acquisition costs increase to generate, or as a result of, this growth). The reverse is true if the rate of growth slows.
On balance the changes to AIFRS would seem likely to increase the variability in reported profits.

Marking guide:
- **1 mark for effect of changes in risk free discount rate for insurance contracts;**
- **1 mark for difficulty in matching assets and liabilities for term life insurance business;**
- **1 mark for effect on restrictions in deferring acquisition costs;**
- **1 mark for overall effect is more variability;**

to a maximum of 3 marks (SJ).

c) Proposals to remedy capital position

Reinsurance of a proportion of the existing term life business should have the effect of passing the capital requirement for this business to the reinsurer and so should strengthen the capital position of ML. The proposal should also reduce the profit variability in future. Other advantages include services such as the provision of underwriting manuals.The disadvantages of reinsurance are the costs of reinsurance, mainly the expenses and profit margins of the reinsurer, as well as increases in administration and system costs. Reinsurance proposals could be obtained and tested to determine whether the advantages outweigh the disadvantages.

The proposal to reinsure the investment business with a fund manager would not be permitted under the Life Insurance Act because the fund manager is not a registered life insurance company. But it would be possible to reinsure with a life reinsurance company and the considerations would then be similar to the reinsurance of the term life business.

Marking guide:
- **1 mark for reinsurance of term life should reduce capital requirement;**
- **1 mark for advantages of term life reinsurance;**
- **1 mark for disadvantages of term life reinsurance**
- **1 mark for the need for a cost / benefit study;**
- **1 mark for reinsurance with fund manager is not permitted under LIA**

to a maximum of 4 marks (CJ).

d) Perspectives of parties

Perspectives of the Appointed Actuary:
- Want to ensure that the Directors make informed decisions and clearly understand the risks of the proposals.
- Want to ensure that a suitable level of target surplus is maintained above the Capital Adequacy requirement to ensure that CAR is met consistently and policyholder interests are protected.
- Want to understand the profit impacts on the company to communicate to management and Directors.

Perspectives of the Auditor:
- Want to ensure a True and Fair view is provided to shareholders, regulators and the general public in the financial statements of ML. Concerned about how this arrangement would impact these statements
- Interested in the actuary's recommendation on target surplus and in the decision on this by the Directors
- Want to ensure that ML's risk management strategy has been followed

Perspectives of the ML independent directors:
- First priority to consider the financial security of the company and the security of customers. Will need to assess the extra security that may be provided by this arrangement.
- Also needs to consider the best interests of the shareholder (Megabank) and the impact of the arrangement on profit.
- Ultimately must assess the risks (in relation to risk tolerance) and make the decision on the proposals after considering the views of the interested parties and overall impacts.

Marking guide:
- **1 mark for two sensible points for perspective of Appointed Actuary;**
- **1 mark for two sensible points for perspective of Auditor;**
- **1 mark for two sensible points for perspective of ML independent directors;**
- **1 mark for showing an understanding of the different roles;**

to a maximum of 4 marks (CJ).

END OF PAPER

