Institute of Actuaries of Australia

2008 PART III EXAMINATIONS

Subject Title: **Course 2A Life Insurance**

Date: **Tuesday 29th April**

Time: **09:15 am to 12:30 pm**

Time allowed: Three (3) hours plus fifteen (15) minutes of reading time

Instructions: Each new question (but not each section of a question) must be commenced in a new answer book.

Number of Questions: Six (6)

Question	Marks
1	18
2	17
3	16
4	15
5	17
6	17
Total	**100**

Candidates are required to answer ALL questions.

This paper has 8 pages (excluding this page and the blank back page).

INSTITUTE OF ACTUARIES OF AUSTRALIA

2A LIFE INSURANCE **APRIL 2008 EXAMINATIONS**

QUESTION 1 **(18 marks)**

Your Head of Marketing claims the time is right for the return of traditional participating insurance products in Australia. He thinks that, with the volatile stock market condition, the financial crisis and the economic recession looming in the US, customers will appreciate the long-term stability of traditional participating products more than ever.

Draft an issues paper, addressed to the Head of Marketing, in which you:

a) List the key attributes that the Appointed Actuary would consider for a bonus or profit sharing system. (3 marks)

b) State the steps the company should follow in declaring reversionary bonuses in a financial year. (2 marks)

c) Identify how underwriting for traditional participating products could differ from Yearly Renewable Term products for the same sum insured. (2 marks)

d) Discuss the advantages and disadvantages of traditional participating products for a policyholder. (4 marks)

e) Explain the major risks to the company in writing traditional participating products. (4 marks)

f) Discuss how the investment strategy for traditional participating products would be different from those for investment-linked and for lifetime annuity products. (3 marks)

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QUESTION 2 **(17 marks)**

You are an actuary working in Australia. Your company, Life Adventurer, is venturing into group life insurance, a market segment the company has stayed away from until now.

Your first potential customer is FTA (Free Tigers Association), a group of volunteers dedicating their free time to freeing all tigers held in captivity. Their activities include lunch time demonstrations, lobbying, and sometimes staging hunger strikes inside tiger cages. Their cause is gaining momentum, with more than 10,000 new members in Australia annually. FTA is looking to provide free death cover to members as a means to boost members' loyalty, with slogans like "Free Tigers Free Insurance". The insurance cost will be paid for by FTA out of their membership fee revenue.

Your Head of Product thinks this is a wonderful opportunity, not only for the new business volume, but also for the good publicity it will generate for Life Adventurer, and future potential cross-sells to this customer base. He went as far as hinting he's willing to take very little profit on this deal. It is down to you to make it work. It should be noted that FTA is entering into negotiations with three different insurers at once. Pressure is high.

a) To set mortality assumptions for this group:
- List the sources of information you would rely on.
- Outline the steps you would take.

(Note your own and your company's lack of group life experience).
(3 marks)

b) During the first meeting, FTA representatives expressed very strongly that the cover should have no underwriting requirement and as few exclusion clauses as possible. They wanted a clean and simple cover for their members. List the eligibility conditions & exclusion clauses you think are necessary for this group, with a brief explanation for each. (3 marks)

c) Having reviewed your estimated premium breakdown (table below), your Head of Product is still convinced he could only pitch the offer at $13.5 per month per member. In fact, he overheard a major competitor would offer cover at $12.95 per month per member, well below your proposed premium of $15. He confesses he only hopes to win on Life Adventurer's quality of service and 'a very good relationship with the Head of FTA'.

Premium Breakdown	$ per month per member
Claim cost	12.2
Variable expense	0.9
Fixed expense	0.5
Expected margin	1.4
Total premium	15.0

Note: the cover has a moderate sum insured on a sliding scale such that the premium is the same across different ages and genders.

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Explain to your Head of Product:

i. The possible reasons why the major competitor is able to quote a lower premium than yours. (2 marks)

ii. The concepts of "marginal pricing" and "full costing", relating your answer to the breakdown table above. (2 marks)

iii. The advantages and disadvantages of "marginal pricing" and "full costing", and indicate with reasons the method you would advocate for this deal. (4 marks)

d) The Head of FTA is interested in your quote. He hints that Life Adventurer may win the deal if you are willing to fix the premium for 5 years, with the option to increase the premium in the first 5 years only in an 'adverse claim experience' situation. Draft a possible definition of 'adverse claim experience' to be proposed to FTA. (3 marks)

QUESTION 3 **(16 marks)**

Your company is a newly established but fast growing Australian life insurer. The company's reinsurance contract for its individual risk product portfolio (consisting of Yearly Renewable Death cover only) is up for re-tender. The inforce business is locked in with the existing reinsurer. Only future new business cohorts are being considered.

Your CEO plans to reinsure future new business solely with the reinsurer who offers the best deal, from both a profit maximising and a risk management perspective. He asks you to work on the two quotes he has just received from two major reinsurers.

The quotes are:

Reinsurer A:
Surplus arrangement.
Retention limit of $1 million for each life.
Reinsurance premium rates = 80% of your company's premium rates.
Reinsurance commission = 75% of first year reinsurance premium, and zero thereafter.

Reinsurer B:
Quota share arrangement.
Retention level is 40%, ie. your company retains 40% of each risk.
Reinsurance premium rates = 90% of your company's premium rates.
Reinsurance commission = 50% of first year reinsurance premium, and zero thereafter.

Your actuarial analyst has performed or obtained the following analyses:

New Business Profile

Sum Insured Range ($)	Average SI ($)	Proportion by Lives	Proportion by Cover
0-100,000	60,000	20%	3%
100,001-400,000	251,500	35%	22%
400,001-700,000	548,500	35%	48%
700,001-1,000,000	840,000	5%	10.5%
1000,001-1,500,000	1,320,000	5%	16.5%
1,500,001+	0	0%	0%
Total	400,000	100.0%	100.0%

Planned New Business

	Y1	Y2	Y3
Lives	25,000	30,000	40,000
Average SI ($)	400,000	400,000	400,000
Average Premium ($)	380.00	380.00	380.00

<u>3-Year Business Projections</u>

Year	Lives	Ave SI	Ave Prm	Premium Earned PY1 ($000)	Premium Earned PY2 ($000)	Premium Earned PY3 ($000)	Premium Earned Total ($000)	Claim Incurred Total ($000)
1	25,000	400,000	380	9,500	-	-	9,500	4,275
2	52,500	400,000	380	11,400	8,550	-	19,950	8,978
3	87,250	400,000	380	15,200	10,260	7,695	33,155	14,920

Note: for this exercise you should assume:

- All policies start on the first day of the year.
- All lapses occur on the last day of the year.
- There are no multiple policies on the one life.

a) Estimate the 3-year reinsurance cashflows for each reinsurance quote, stating any further assumptions you make. (4 marks)

b) Based on the information provided, assess the suitability of each reinsurance proposal for your company (from both a profit maximising and a risk management perspective). (4 marks)

c) Explain the other factors which may influence the company's decision in selecting a reinsurer. (4 marks)

d) The CEO indicates that his revised objective is to maximise the stability of future profits while still retaining exposure to potential good claims experience. Propose with reasons a reinsurance arrangement (not limited to the two options above) that should meet this objective. (2 marks)

e) The CEO indicates that he now wants a retention level that gives the company a 1-year 1-in-2000 chance of going bankrupt due to insurance risk (a new concept he learnt in a risk management seminar). List the theoretical steps you would take to find this level. (2 marks)

QUESTION 4 **(15 marks)**

Your company does daily unit pricing (UP) for all retail superannuation unit-linked product options. The job sits with a newly formed UP team. As the product actuary, you only review past unit pricing, and help solve pricing issues as they arise.

This morning, in a random review of unit prices published yesterday, you found that the unit price for the 'Aussie Share' option was wrong. The issue arose from a newly graduated staff member accidentally adding a $3 million amount into the 'Manual Asset Adjustment Field' to make asset movements reconcile.

You immediately notified the UP manager and re-calculated the correct unit price for the Aussie Share option - as shown below:

Aussie Share	Incorrect UP	Corrected UP
Net Asset Value	$750,350,123	$747,350,123
Number of units	238,770,247	238,770,247
Unit price	3.1426	3.1300

You also found out that the customer transactions were already processed last night using the incorrect unit price. The list of transactions is shown below:

Transaction	Type	Amount
Customer A	Contribution	$10,000
Customer B	Withdrawal	$80,000
Customer C	Switch in	$15,000
Customer D	Switch out	$12,000
Customer E	Premium deduction	$1,500

a) Calculate the dollar amount each customer above gained or lost from this UP error, and propose and briefly justify a remedial solution for each of these customers. (4 marks)

b) Having seen your remedial solutions, your UP manager proposes not to implement these adjustments. She thinks 'the amounts should average out'. Discuss with reasons whether you agree with her. (3 marks)

c) What regulatory requirements are there on the company to govern UP and UP incidents? What steps would you advise the business to take in order to prevent this from happening again? (3 marks)

d) Your company has some legacy business on historical UP. The UP manager wants your opinion on the arrangement. Draft a memo to your UP manager, explaining the potential problems with historical UP, and the transitional impacts on the company of such a movement from historical to forward UP. (5 marks)

QUESTION 5 **(17 marks)**

Your company offers “Mortgage Protection” in conjunction with home loans provided by a banking partner. “Mortgage Protection” is a decreasing Sum Insured, stepped premium, yearly renewable term life insurance with an optional trauma rider. Sales for “Mortgage Protection” have been slow lately.

The product manager wants to re-price the existing “Mortgage Protection”, and launch an extra version, “Protection Plus”, with the aim of boosting sales. Among other things, she wants “Protection Plus” to have the following characteristics:

- Single premium 10-year level term cover so that the premium can be incorporated into the loan amount.
- Single premium trauma rider with matching duration of cover, with definitions of trauma conditions regularly improved to reflect market developments (same as existing practice for “Mortgage Protection”).
- No refund / surrender value to keep product administration simple.

a) Describe how “Protection Plus” differs from “Mortgage Protection”, in terms of the investment and insurance risks the product poses to the company. (3 marks)

b) Describe how you would arrive at an appropriate interest rate assumption for “Protection Plus”, stating any differences from the earnings rate assumption you would use for “Mortgage Protection”. (3 marks)

c) Describe how you would arrive at mortality and morbidity assumptions for “Protection Plus”, stating any differences from the mortality and morbidity assumptions for “Mortgage Protection”. (4 marks)

d) Describe the issues the company may have with not offering a refund / surrender value on “Protection Plus”. (3 marks)

e) Discuss the advantages and disadvantages of each product design for mortgage purchasers in the Australian market. (4 marks)

QUESTION 6 **(17 marks)**

There have been few new products introduced to the Australian retirement product market in recent years. Some offices provide lifetime annuities, but the most common product offering is an “account-based” pension.

Your Head of Strategy has recently arrived in Australia and believes the future of the industry is going to be retirement services, and plans to ‘lead the charge’ in product innovation in this field.

a) He wonders why Lifetime Annuities, a seemingly perfect answer for retirement, have not been more successful in the Australian market. Discuss the possible reasons for this. (3 marks)

b) Staying awake late at night surfing the internet for inspiration, he came across the product “Lifetime for Nothing” – “*a product that allows retirees to unlock part of the equity in their own house, to fund a lifetime guaranteed income. The retirees still retain ownership over their property. The insurer only gets their money from the estate after the retirees pass away, with any surplus going to the estate*”. Your Head of Strategy thinks this is a wonderful idea. Discuss the risks and risk mitigation options the company needs to address in order to develop this product. (7 marks)

c) Another late night internet session gave your Head of Strategy the product “Forever Rising” – “*a product that gives retirees a lifetime income that is expected to rise over time in line with the selected asset basket index. The retiree can even lock in the income, guaranteeing that it will never go down below the current level*”. Again he thinks it is a wonderful concept. Discuss the risks and risk mitigation options the company needs to address in order to develop this product. (7 marks)

END OF EXAM

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