

# **INSTITUTE AND FACULTY OF ACTUARIES**

## **EXAMINERS' REPORT**

April 2018

### **Subject SA3 – General Insurance: Specialist Applications**

#### **Introduction**

The Examiners' Report is written by the Principal Examiner with the aim of helping candidates, both those who are sitting the examination for the first time and using past papers as a revision aid and also those who have previously failed the subject.

The Examiners are charged by Council with examining the published syllabus. The Examiners have access to the Core Reading, which is designed to interpret the syllabus, and will generally base questions around it but are not required to examine the content of Core Reading specifically or exclusively.

For numerical questions the Examiners' preferred approach to the solution is reproduced in this report; other valid approaches are given appropriate credit. For essay-style questions, particularly the open-ended questions in the later subjects, the report may contain more points than the Examiners will expect from a solution that scores full marks.

The report is written based on the legislative and regulatory context pertaining to the date that the examination was set. Candidates should take into account the possibility that circumstances may have changed if using these reports for revision.

Luke Hatter  
Chair of the Board of Examiners  
July 2018

**A. General comments on the *aims of this subject and how it is marked***

1. The aim of the General Insurance Specialist Applications subject is to instil in successful candidates the ability to apply knowledge of the United Kingdom general insurance environment and the principles of actuarial practice to providers of general insurance in the United Kingdom.
2. Our expectation of a passing candidate at this stage is that, broadly, they should appear capable of stepping up to a head of function (pricing / reserving / capital) role at a small-mid sized organisation or being a senior member of a function team at a larger organisation. They should demonstrate not only a grasp of the technical aspects of general insurance actuarial work, but should also a good sense for products, the competitive marketplace, regulatory environments and the operational aspects of an insurance company. They should be able to pull these areas of understanding together to provide well rounded advice to the users of their services.
3. Consistent with previous examiners' reports, we would offer candidates two key pieces of advice – (i) read the question properly and (ii) take the time to actually think about what is going on. Further to previous reports, we would stress that candidates do not need to get the majority of the points included in this report in order to pass (there are significantly more than 100 marks available for the points in this report). Time spent making sure that you are answering the question that is asked is therefore more valuable than a panicked rush to put down as many points as possible, regardless of whether they are relevant.
4. On the first issue, candidates should always work on the assumption that the question wording has been carefully chosen. It is therefore essential to read the question properly.
5. If something is not asked for then candidates will waste valuable time writing answers that will gain no marks. These broader answers may be a logical next step to the question and so may be appropriate for candidates to discuss in a professional context. This is an exam however with a finite number of marks available and so the scope must necessarily be limited and specifically defined.
6. If a question does specifically mention something, candidates should also assume that there are definitely marks available for this aspect of the question. During the exam setting process, any content that is superfluous will have been removed. A clear implication of that is that if there are numbers provided in the question paper then there are marks available for comment and consideration of those numbers.
7. Wording of question sections should also be considered in the context of the position within the overall question. Where new question information is provided between sections, candidates should recognise that this information is specifically relevant to the following section or sections. When answering preceding question sections, candidates should not consider any subsequent information in their answers (although it may cover similar ground).

8. Various examples from this paper of recurrent failure to read the question are noted below. On the second issue, candidates should note that SA3 is the key paper at which we test candidates' broader thinking. This is generally the final paper before qualifying as a professional, and we consider a capacity for broader thinking to be one of the best indicators of a candidate's suitability to act in a professional capacity once qualified.
9. As such we aim to design exam papers so that it is difficult to pass without displaying some capacity for independent and broad thinking, as well as to heavily reward instances where these skills are displayed. When reviewing past papers, candidates should assume that the marks available for generic points are substantially less than those awarded for the more challenging points that would be the mark of high quality professional insight in a practising actuary. Marks available for list items from bookwork are lower still.
10. We strongly recommend that candidates step back and take the time to thoroughly think about what is actually going on in question situations proposed rather than simply considering numbers to be analysed with standard techniques. For example, candidates might stop to think about what claims actually are for a particular class of business, considering factors such as what actually causes the claim, who brings the claim, how it is dealt with once brought, what makes one claim small while another is substantial etc.
11. This more grounded, real world perspective will help candidates to consider such things as practical issues, stakeholders involved and their potentially diverging objectives, wider impacts, regulatory or ethical issues, inappropriateness of certain actuarial techniques for the specific situation, current economic or cyclical effects etc. This is likely to lead to significantly broader point generation (and indeed reflects the thought processes of the examiners in drafting the questions and solutions) and a more rounded understanding of the underlying risks and dynamics which should also be of value to candidates when dealing with different stakeholders in their professional life.
12. Again, some examples of this failure to think more widely on the current paper are below. More generally, we would also advise candidates to employ basic exam techniques such as well structured answers and effective time management.
13. Candidates who give well-reasoned points, not in the marking schedule, are awarded marks for doing so.

**B. General comments on student performance in this diet of the examination**

Performance was relatively average. Many candidates couldn't demonstrate their understanding on the professional standards, and a number didn't fully understand coverage for core classes such as D&O and PI as well as they should, but otherwise generally made a reasonable effort. More detailed feedback is provided

by question.

**C. Pass mark**

The Pass Mark for this exam was 58.

**Solutions**

- Q1** (i) Standards required of members of the IFoA are detailed in the Actuaries’ Code (TAC), the Technical Actuarial Standards (TASs) and the Actuarial Profession Standards (APSs). [1]
- The Actuaries’ Code sets out five core principles which all members are expected to observe in their professional lives, in both the spirit and the letter. [1]
- Five principles of actuaries code - integrity, competence & care, impartiality, compliance, communication [2.5]
- Assuming the risks written include US Trust Fund related business ... [½]
- ... APS G2 applies to the preparation, by an actuary appointed by a Lloyd’s managing agent, of opinions required by the IID of the NAIC or by the NYID for Lloyd’s syndicates writing relevant USA insurance or reinsurance business. [1]
- APS X1 (“Applying standards to actuarial work”) – [1]
- sets out principles to be applied by members to determine which standards they must or should be applying to a piece of work. [½]
- It clarifies that all members, regardless of where they are located or whether the work is being carried out in the UK or elsewhere, must apply the Actuaries’ Code and relevant APSs. [½]
- It also sets out principles for members to follow in identifying and applying appropriate standards to their work. [½]
- APS X2 (“Review of Actuarial Work”) – [1]
- applies to all members [½]
- and relates to the need to consider the extent to which review (including independent peer review) is required for any “actuarial work”, [½]
- i.e. work undertaken by a member in their capacity as a person with actuarial skills on which the intended recipient of that work is entitled to rely [½]
- TAS 100: Principles for Technical Actuarial Work. [1]

This TAS promotes high quality technical actuarial work and supports the reliability objective that users for whom actuarial information is created should be able to place a high degree of reliance [½]

on that information's:

- Relevance [½]
- transparency of assumptions [½]
- completeness [½]
- and comprehensibility [½]
- including the communication of any uncertainty inherent in the information. [½]

TAS 200: Insurance. [1]

This TAS promotes high quality technical actuarial work in insurance on matters where there is a high degree of risk to the public interest and supports the same reliability objective as under TAS 100. [1]

...TAS 200 is applicable to the following technical actuarial work  
(*comprehensive text is given for completeness – no need for the full articulation of the point*)

- to support the preparation of an insurer's balance sheet for prudential regulatory purposes [½]
- to support the preparation of financial statements that are intended to give a true and fair view of an insurer's financial position and profit or loss (or income and expenditure) and the reporting of that financial position and profit and loss in a parent company's financial statements [½]
- to support an opinion on provisions as required by Lloyd's [½]
- to support the confirmation required under the General Insurers' Technical Provisions (Appropriate Amount) Regulations 2009  
Technical actuarial work to support the calculation of an insurer's prudential regulatory capital requirements and technical actuarial work undertaken as part of its Own Risk and Solvency Assessment [½]
- to support the provision of an audit opinion on an insurer's financial statements and the reporting of a parent company's interest in the insurer in its financial statements [½]
- to support the provision of an auditor's assurance opinion on an insurer's prudential regulatory reporting [½]
- To support pricing frameworks [½]
- To support insurance transformations [½]

*Note: accept answers from both pre-2018 and 2018 Core Reading given the change in the TASs and APSs. Should not give credit for mixture of both.*

TAS D Data. The purpose of TAS D is to ensure that data is subject to sufficient scrutiny and checking so that users can rely on the resulting actuarial

information, and that appropriate actions are taken where data is inaccurate or incomplete. [1]

TAS R Reporting Actuarial Information. The purpose of TAS R is to ensure that the reporting of actuarial work enables users to judge the relevance and implications of the report’s contents, and that the information is presented in a clear and comprehensible manner [1]

... Its emphasis on the information communicated in the lead-up to decisions rather than on formal reports. [½]

TAS M Modelling. The purpose of TAS M is to ensure that actuarial models sufficiently represent the issues on which decisions will be based, and are fit for purpose both as theoretical concepts and as practical tools. [1]

... TAS M requires that models be properly documented and that significant limitations and their implications be reported. [½]

Insurance TAS. The purpose of the Insurance TAS is to ensure that management and governing bodies of insurers can understand and rely on the information supplied by their actuaries, and understand its limitations. [1]

... It also requires that information provided to policy holders is relevant, comprehensible and sufficient for their needs. [½]

... The key principles include requirements to check data, to use appropriate assumptions derived from relevant information, and to explain uncertainty around any figures. [1]

[24, max 8]

- (ii) APS G1 sets out the requirements for actuaries carrying out the statutory role of Chief Actuary for UK authorised general insurance companies and Lloyd’s syndicates and the relationship between them and the Members who support those role holders. [1]

APS X3 (“The Actuary as an Expert in Legal Proceedings”) – applies to actuaries who are appointed to act as an expert witness in legal proceedings held before courts, tribunals or similar [1]

*Markers to give credit for professional standards highlighted in part (a) solution but described in response to (b) at their discretion (no duplication allowed).*

[2, max 2]

[Total 10]

*This was a bookwork question, with a wide ranging quality of answers depending on whether the candidates had familiarised themselves with this aspect of the course material.*

*A number of candidates could recall the names of the actuarial standards or the existence of an actuarial code, although without an understanding of what each standard covered.*

**Q2 (i) Advantages**

Not covering insurer's profit margin	[½]
Not covering insurer's margin for uncertainty	[½]
Save time/money not liaising with insurer	[½]
May be able to control costs by screening customers / not offering car sale discounts to customers likely to be high risk	[1]
Avoids underwriting cycle	[½]
Company is big so can absorb losses themselves	[½]

### Disadvantages

Unlikely to be allowed to cover this without setting up insurance vehicle as likely to be a compulsory element to motor insurance for third party liabilities	[1]
Significant cost investment in setting up some form of insurance vehicle	[1]
... and significant ongoing operational costs	[1]
May be claims that are large even by company's standards	[1]

### Examples of costs of setup [1]

Costs of capitalising new vehicle	[½]
Costs of getting regulatory approval	[½]

Company unlikely to have any relevant expertise	[½]
... which also increases the risk of catastrophic mispricing	[½]
May be concentrations of risk that the company is not large enough to be able to absorb	[½]

*Credit given for other valid generic answers*

[13.5, max 5]

(ii)	Age	[½]
	Gender	[½]
	Location	[½]
	Where car is kept (drive / garage)	[½]
	Type of car	[½]
	Age of car	[½]
	Driving history	[½]
	Type of use	[½]
	Extent of use	[½]
	Profession	[½]
	Marital status	[½]
	Credit score	[½]

*Credit given for other valid answers*

[8, max 4]

(iii)	Distribution of policyholder characteristics by key rating factors outlined in previous sections	[1]
	... in particular age and gender which are the most material	[1]
	... and most likely to have a particular skew based on the nature of the car	[1]

	Information on the brand and models of the cars themselves	[1]
	... for example repair costs or safety features	[1]
	Details on the product itself, in particular whether it is to be offered to all customers or whether it is optional / can be considered as part of overall negotiations on car purchase and other discounts	[1]
	Standard factors - expenses etc	[½]
	Volumes expected for fixed costs	[½]
	Standard cover / excess levels	[½]
	<i>Other valid suggestions</i>	[½]
	<i>Other valid suggestions</i>	[½]
		[8.5, max 4]
(iv)	Insurer is in this market so should have an existing pricing model that would give them target pricing with sufficient data inputs	[1]
	... so key is going to be estimation of mix	[½]
	... and clarity on product design	[½]
	Has large portfolio so will also have some existing policies with this car	[1]
	... which is presumably a common model given there are 100 dealerships	[1]
	<b>Mix assumptions</b>	
	Have address information	[½]
	... may provide some proxy for where car is kept as well	[½]
	Name gives good proxy for gender	[1]
	... no need to worry about use of gender if restricted as can consider in flat rate	[1]
	Name may also be some proxy for age but this could be difficult to implement to any credibility	[1]
	Type of car purchased may be better indicator of age	[1]
	... may be able to use existing portfolio to get indicative spread	[1]
	Type of car may also give some proxy for profession or type of use	[1]
	May be able to cross reference with public data sources e.g. census	[1]
	<i>Credit given for other sensible comments about car types</i>	[2]
	Driving history may even out over whole portfolio	[1]
	... or if cars have very specific market may be able to use that to determine average loadings by model	[1]
	... very dependent on policy being compulsory otherwise major selection risk	[1]
	... may still be some residual selection risk however if the costs of high risk insurance relative to costs of car make it a material factor in decision making	[1]



... may have some suitable proxies for these enhanced exposures from other similar schemes in existing portfolio

### Product design

Essential is knowledge of whether or not compulsory as commented above [½]  
If any flexibility e.g. to review rates after an initial period would impact pricing [1]

### Overall calculation

Apply existing rating model to estimated distributions to get base price [1]  
... likely in bandings for practicality [½]

Consider appropriate uplifts to office premium [1]  
... *generic examples* [1]  
... may not be brokered impacting commission requirements [1]  
... expense loadings may be different due to scale [1]  
... margin requirements may be different due to data quality and uncertainty [1]  
[19, max 8]

### (v) General mitigation

Break clauses to allow repricing if risks manifest [1]  
Margins to compensate for risks [1]  
... subject to competitive pressure [1]  
Include a profit share element or some risk retention [1]

### Anti-Selection [1]

*Appropriate example or description of specific risks* [1]  
... insist that product is compulsory if flat rated [1]

Wrong mix estimation [1]  
*Appropriate example or description of specific risks* [1]  
... invest in additional data to improve mix analysis [1]

*Generic risks of any product launch* [½]  
*Generic risks of any product launch* [½]  
*Generic risks of any product launch* [½]  
*Generic risks of any product launch* [½]  
*Generic risk mitigation* [½]  
*Generic risk mitigation* [½]  
*Generic risk mitigation* [½]  
*Generic risk mitigation* [½]

[14, max 6]

*Candidates generally scored well on (i), albeit mostly with generic answers rather than focusing on the pertinent issues. Almost every candidate got full marks for (ii).*

*Parts (iii) and (iv) were the weakest answered parts of this question. Many candidates did not work out the focus of this question – this is an established insurer with a large volume of pricing and loss information, the challenge is for them to understand the distribution of the policyholders well enough to get a blend of their existing rates which would work as a flat rated premium. The wording of the question was clear and should have given the candidates a steer (we reiterate the standard advice to always read the question and assume that content is there for a reason). Many candidates started outlining full pricing and loss analysis exercises from scratch, rather than considering what an insurer with a good level of existing expertise would be likely to do. These candidates missed the majority of available marks.*

*Part (v) was reasonably well answered, although there were a number of candidates who failed to mention anti-selection (always a risk with non-underwritten products) or errors in mix assumptions (always a risk with flat premiums). A number of candidates tried to use a capital model framework to generate ideas in underwriting, reserving, operational etc risk categories. While it never hurts to have some frames of reference to use to generate additional ideas, we would always recommend getting the pertinent points down first and only then trying to generate a few additional generic points.*

- Q3** (i) (a) D&O indemnifies against the legal liability to compensate third parties owing to any wrongful act of the insured in their capacity as a director or officer of the company. [½]
- The insurance is personal to the director or officer, but is usually bought by the company. [½]
- The perils include allowing the company to continue operating in circumstances when it should have been declared insolvent [½]  
...any act resulting in the insured being declared unfit for their role [½]  
...allowing false financial statements to be published. [½]
- The cover is written on a claims made basis. [½]
- (b) Professional Indemnity indemnifies the insured against legal liability for losses resulting from negligence in the provision of a service. [½]

- The insured will be a professional person or a professional firm. [½]
- The perils will depend on the profession the insured and might include negligence in the provision of a service such as [½]  
 ... giving poor or incorrect advice [½]  
 ... failure to provide adequate service [½]  
 ... errors in plans or designs [½]
- The cover is written on a claims made basis [½]
- (c) Property insurance indemnifies against loss or damage to the insured's material property [½]  
 Often includes business interruption [½]
- The perils typically covered include:  
 ... fire  
 ... explosion  
 ... weather events e.g. hail, storms, ice, flooding, lightening  
 ... theft  
 ... any reasonable alternatives [2]
- The cover is written on an occurrence basis [½]  
 [15, max 9]
- (ii) D&O policies will generally cover cyber risks if it can be shown that they were negligent in adequately protecting the company against cyber risk [½]  
 It is possible but rare that the risk would be excluded [½]  
 ... though limits or sub-limits may be in place. [½]
- Some elements of cover could be indirectly excluded through the bodily injury and (intangible) property exclusion of D&O policies [½]  
 ... though coverage may be more comprehensive if the policy has a specific cyber extension. [½]  
 D&O cover may give risk to a claim if the directors and officers can be shown to have committed a wrongful act, error or omission [½]  
 or breach of fiduciary duty by [½]  
 ... failing to ensure adequate cyber security measures in place [½]  
 ... failing to protect private customer data [½]  
 ... failing to protect Intellectual Property [½]  
 ... failing to respond effectively to a cyber risk event [½]  
 providing misleading statements through [½]  
 ... failing to adequately report any event [½]  
 ... making misleading or inadequate statements as to the seriousness of the event [½]  
 or acted negligently by failing to have adequate disaster recovery plans in place. [½]
- PI policies will generally exclude cyber coverage [½]  
 ... though it may be included for certain types of PI e.g. Tech E&O [½]

... or included as an extension in other policies [½]  
 ... perhaps with sub-limits [½]  
 May be included where professions or trade bodies do not allow any  
 exclusions in their PI policies e.g. UK solicitors. [½]

PI cover might give rise to a cyber related claim if the insured’s negligence  
 can be shown to cause or contribute to a client’s cyber risk loss such as  
 ... destroying or damaging client’s data [½]  
 ... causing a leak of its client or their customer’s data [½]  
 ... causing its client to suffer a system vulnerability which results in a cyber  
 risk event. [½]  
 ... failing to adhere to its client’s IT security / data protocols [½]

Commercial property policies which cover specific perils may omit cyber  
 coverage  
 ... though some coverage may be included in an all risk policy [½]  
 Cover may be restricted to loss or damage to a physical assets and therefore  
 exclude certain forms of cyber loss e.g. loss of electronic data [½]  
 ... but cyber events can lead to physical damage or loss of property e.g. server  
 room is hacked, fans turned off leading to fire. [½]

Coverage may be open to legal challenge in cases where the cyber event was  
 a contributory factor in the occurrence of a named peril. [½]  
 Cyber acts of terrorism will also be excluded in the UK as covered by Pool  
 Re. [½]  
 [15, max 9]

(iii) Relevant and sensible losses up to maximum of 2 for each product

Typical D&O cyber losses could include:  
 ... damage to digital assets [½]  
 ... reputational damage [½]  
 ... financial loss through loss of IP and trade secrets [½]  
 ... regulatory fines [½]  
 ... need to pay compensation to customers [½]  
 ... loss of sales due to system/website failure [½]  
 ... financial cost of notification [½]  
 ... additional repair and protection costs [½]

Typical P&I losses could include:  
 ... compensation to client [½]  
 ... cost of rectifying problem / damage [½]  
 ... legal fees [½]  
 ... regulatory fines [½]  
 ... expenses incurred in communication to its client’s customers [½]  
 Typical property losses could include cost of replacing or repairing physical  
 asset damaged as result of a cyber event including [½]  
 ... theft of property facilitated by hacking incident e.g. security systems shut  
 down. [½]

... third party property and liability losses resulting from damage to own property from cyber event e.g. [½]  
 ... hacking incident interrupting a manufacturing process leading to machinery damage, fire or explosion. [½]  
 [10, max 6]

- (iv) Catastrophe cyber models are at very early stages of development compared to other types of catastrophe models. [1]

Many models will be incomplete focusing on the main types of cyber Risks only. [½]

The choice of models available in the market will be limited. [1]

The event module databased will be relatively small due to the limited number of historic cyber events [1]

... and the challenges of extrapolating a reliable and comprehensive sets of theoretical events. [1]

... due to this being a relatively new and developing field of academic research. [1]

Risk itself constantly changes in an arms race [1]

Correlations between policies hard to assess [1]

Insurance companies will have very little own data to assist in parameterisation and validation of the model. [½]

It is difficult to obtain market level data as cyber events are often not publicised by the targets. [1]

Cyber threats are relatively new risk compared to natural catastrophes. [1]

[10, max 5]

[Total 29]

*A lot of candidates did well on (i) although some showed less understanding of D&O or PI. A number of candidates showed weak understanding e.g. missing some key aspects of negligence or assuming that criminal or intentional acts were covered. A number also seemed very confused between claims made and losses occurring cover, which is a basic product characteristic any prepared candidate should know. A few enterprising candidates tried putting both claims made and losses occurring down for the same product – we did not give marks for this.*

*Parts (ii) and (iii) were the least well answered parts of the paper. Candidates who had given bookwork quality answers in (i) seemed to have forgotten those answers. For D&O and PI, a number of candidates failed to articulate negligence which would be necessary for that particular policy to trigger. For property this showed as a failure*

*to consider how a cyber event might result in loss or damage to a physical asset. We would stress that this is not an uncommon question structure – the easier bookwork content is intended to help candidates refresh their memory on the course that they will then need to apply in a subsequent part of the question.*

*For D&O, candidates failed to think about ways in which a director could act negligently following a cyber event, for example by failing to disclose it or remediate it in a timely manner. We would always recommend that candidates take the time to read press coverage of insurable events (with a number of the high profile data breaches involving some issues of this nature) as this helps to provide a tangible perspective of a real world claim.*

*Candidates also did poorly at answering the questions posed, often talking (in both sections) about what an event might look like, which has been the subject of a previous, albeit differently worded, question on a similar underlying topic. Part (ii) asked “why each product might have exposure to cyber events”, i.e. not requesting a description of an event, not asking what sort of events a professional services firm might experience, but why these three particular products might respond to a cyber event. Part (iii) asked candidates to outline potential claims for each product. Again, many candidates described events without articulating what the policyholder might be claiming for. A policyholder would not for example claim for “being hacked”, they would claim for the financial losses that arose as a result of being hacked such as compensation to customers, fines or costs of remedial action.*

*Most candidates made a reasonable effort at (iv).*

- Q4** (i) Property damage to satellites [½]  
 ... predominantly at launch [½]  
 ... may also be element of in-orbit cover [1]  
 ... and possibly some pre-launch / testing coverage, although this may overlap with the cargo market [1]  
 Risks in manufacture [½]
- Potentially some liability coverage e.g. for impact to other satellites in orbit or for third parties with equipment aboard satellite [1]  
 Liability on the ground [½]  
 Launch delay [½]
- May be some business interruption cover for loss of service satellite was intended to provide (this is not a feature of the market but would be a reasonable suggestion for candidates to make) [1]
- May be some ancillary covers for satellite operators / owners [½]

Losses are likely to be large only with negligible attrition	[½]
Low frequency	[½]
Reporting delay unlikely – events will be newsworthy	[½]
Earning will be quick as most exposure is at launch which is a very concentrated period	[1]
... although may be some remaining in-orbit exposures	[½]
Quantum of loss is likely to be known as will tend to be total loss (i.e. value of satellite) or nothing	[½]
... so settlement delays can be quick	[½]
	[11.5, max 5]

(ii) **Opportunities**

Diversification	[1]
Exposure to an expanding market	[½]
Exposure to an international market	[½]
Elevating company standing	[½]
Access to potentially profitable business	[½]

**Risks**

Lack of knowledge of the market/requires specific expertise	[1]
Potentially unprofitable if market soft	[½]
Low number of high value policies – high variability of claims/profit	[1]
May be capital intensive even with diversification	[½]
Small market, so may be difficult to attract business.	[1]
Difficulty in finding reinsurance	[½]

**Mitigation**

Buy in expertise: either employ specialist underwriters or buy an existing company	[1]
Do not follow market rates, but underwrite for profit - but may not get much business	[½]
Buy reinsurance / coinsurance	[1]
Get data from reinsurers / brokers / subscription market	[½]
Likely to be subscription market / coinsurance so can manage line sizes	[½]
Use excesses / limits to manage accumulations	[½]
Use policy exclusions or restrictive policy language	[½]
Limit the income written and so limit the downside risk	[1]
	[13.5, max 7]

- (iii)  $\text{prob (0 losses)} = 0.98^{100} = 0.132620$   
 $\text{prob (1 loss)} = 100 \times 0.98^{99} \times 0.02 = 0.270652$   
 $\text{prob (2 losses)} = 100 \times 99 / 2 \times 0.98^{98} \times 0.02^2 = 0.273414$   
 $\text{prob (3 losses)} = 100 \times 99 \times 98 / 6 \times 0.98^{97} \times 0.02^3 = 0.182276$

Therefore prob of 4 or more losses is  $1 - 0.13620 - 0.270652 - 0.273414 - 0.182276 = 0.141038$

Therefore expected loss is = \$1.41m

*Right overall approach* [1]  
*Correct calculation of probabilities* [1]  
*Get overall cost correct* [1]  
 [3, max 3]

- (iv) Not all vehicles will have a value of exactly \$250 million. [1]  
 Hence, although the method may understate or overstate the expected loss cost ... [1]  
 ... it will certainly understate the variability of the result. [1]

Not all launch vehicles will have the same failure probability, so the method will understate the variability and the loss cost. [1]

The launch schedule may be disrupted following a failure, so there may be fewer than 100 launches, and the method may overstate the expected cost. [1]

Binomial may not be appropriate, if the success of launches is not independent, which may well be the case. Variation is likely to understate variability and loss cost. [1]

There may not be enough losses on our own account to collect the full amount, so the method overstates loss costs. [1]

Larger risks may have a higher or lower failure frequency than smaller ones. [1]

Project overspend may increase the value of launches and possible loss cost. [1]

Failure rate of 2% not valid in the future, if lower then overstates cost. [1]

*Other valid suggestions* [1]  
*Other valid suggestions* [1]  
*Other valid suggestions* [1]  
 [12, max 6]

- (v) Claims ratio = Claims incurred / Premium earned [½]  
 Gives a basic measure of the level of claims. [½]  
 Increasing over time implies decreasing adequacy of premium, falling underwriting standards or reducing control of claims. [½]

The claims ratio is affected by the strength of the valuation basis used. [½]  
 Claim frequency and average cost of claims unlikely to be available from PRA / SII returns and Co Act accounts. [½]



Expense Ratio = Total expenses (including commission) / Written Premium	[1/2]
Increasing over time suggests falling efficiency.	[1/2]
Outstanding claims / Paid claims	[1/2]
Outstanding claims / Premium earned	[1/2]
Will help give further insight into the claims experience	[1/2]
e.g. changes in the mix of business	[1/2]
e.g. changes in the valuation basis	[1/2]
e.g. changes in the settlement process.	[1/2]
Commission Rate = Commission / Premium written	[1/2]
Unlikely to be relevant as reinsurer will have its own underwriting team.	[1/2]
Proportion Retroceded = Outward retrocession premiums / Gross premiums written ½	
Changes may highlight a change in retrocession progress or changes in the mix of business.	[1/2]
Investment ratio = Total investment return / Avg assets during year	[1/2]
Profit margin = Insurance profit / Net premium earned	[1/2]
Affected by reserving basis	[1/2]
Return on Capital = Total profit / Capital employed	[1/2]
Measures the efficiency of use of capital	[1/2]
Solvency Ratio = Free reserves / Net written premium	[1/2]
Measures financial strength	[1/2]
Asset-liability Ratio = Total assets / Total liabilities	[1/2]
Another measure of financial strength	[1/2]
Comparisons of ratios above with other similar companies and over time will provide a useful insight into performance.	[1/2]
Ratios will help to make a reasonable assessment of business still outstanding	[1/2]
... and likely future business performance in the short to medium term.	[1/2]
	[12, max 8]

(vi) **Projections (including use of historical data)**

Should be performed over a variety of periods, say 5, 10, 20 years.	[1/2]
On a variety of bases, weak, best estimate and prudent	[1/2]
though best estimate is most important.	[1/2]
Need to do by class of business to assess exposure to catastrophes and latent claims. ½	

Need to look at relatively long period of past data due to reinsurance cycle. [½]  
Limit to how far back is worthwhile due to distant past being less relevant as a guide for future performance. [½]  
Data can be obtained through Published accounts and any Statutory returns. [½]  
Valuation Basis in the above returns and accounts are likely to contain margins. [½]  
It is desirable though to value the business on a best estimate basis. [½]  
Will therefore need to attempt to understand business through variety of ratios and trends to produce valuation on best estimate basis. [½]

### **Synergies**

The insurer should see a reduction in reinsurance fees as profit element now removed. [½]  
Consolidating office space and other fixed overheads may be possible. [½]  
Any non-essential or support departments can be merged with likely efficiency gains. [½]  
Cost of combining systems. [½]  
Greater diversification as more types of business underwritten. [½]  
Will obtain useful data in respect of business already written by the reinsurer, possibly in respect of competitors or new classes of business into which it could expand. [½]  
Unlikely to continue to underwrite types of reinsurance risks which it underwrites as a direct writer? [½]  
Also useful, where possible, to speak with staff and management at all levels to get a feel for how well the company is managed and what the atmosphere and ethos is like within the company. [½]

### **Market considerations**

Current share price [½]  
Will depend on whether the take-over is hostile or friendly. [½]  
Internal company information may be unavailable if hostile. [½]  
Are there any other bidders? [½]  
What other opportunities exist? [½]  
Market information including credit rating [½]  
The cost of setting up something similar from scratch? [½]  
Assess the brand image of the company. [½]

*Multiple marks available for other generic points appropriate for any acquisition*

[15, max 5]  
[Total 34]

*A lot of candidates made a good effort at (i), although there were quite a few who got quite side-tracked thinking about liability issues and didn't think about more obvious factors like whether igniting enough rocket fuel to literally blast something into space might occasionally result in things blowing up.*

*People also scored well on (ii) including generating some of the question specific points.*

*In part (iii), a number of candidates don't really understand how ILWs work and didn't show a good understanding of how probability works, with a lot of candidates taking a deterministic approach and deriving an expected loss cost of zero.*

*Most candidates picked up at least a few of the possible points in (iv) even if they hadn't got part (iii).*

*Candidates generally came up with some ratios in (v) but often didn't provide much in the way of supporting reasons*

*Most candidates scored reasonably on (vi) although often more from generic points.*

## **END OF EXAMINERS' REPORT**