



Institute  
and Faculty  
of Actuaries

# EXAMINERS' REPORT

CP1 - Actuarial Practice

Core Practices

Paper Two

September 2022

## **Introduction**

The Examiners' Report is written by the Chief 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.

Sarah Hutchinson  
Chair of the Board of Examiners  
December 2022

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

The aim of the Actuarial Practice subject is to use the technical and business skills learnt in the Actuarial Statistics, Actuarial Mathematics, Actuarial Modelling and Business subjects, combining them with new material on how the skills are applied to solve real world problems.

The subject provides the essential knowledge of risk management techniques and processes required by all actuaries and is an essential introduction to Enterprise Risk Management, subject SP9 and the Chartered Enterprise Risk Actuary qualification. The subject also underpins the SP and SA subjects, covering essential background material that is common to a number of specialisms.

This subject examines applications in practical situations of the core actuarial techniques and concepts. To perform well in this subject requires good general business awareness and the ability to use common sense in the situations posed, as much as learning the content of the core reading. The candidates who perform best learn, understand, and apply the principles rather than memorising the core reading.

The examiners set questions that look for candidates to apply the principles specific to the situation set out in the questions, having read the question carefully. Many candidates gain few marks by writing around the subject matter of the question in a more general fashion. Detailed specialist knowledge is not required and nor is very detailed development of particular points.

Well prepared candidates demonstrate that they have used the planning time well to understand the breadth of the question and to structure their answer, this is a big advantage in making points clearly and without repetition. This also enables candidates to use the later parts of questions to generate ideas for answers to the earlier parts. Time management is important so that candidates give answers to all questions that are roughly proportionate to the number of marks available.

The comments that follow the questions concentrate on areas where candidates could have improved their performance. Candidates approaching the subject for the first time are advised to use these points to aid their revision.

Candidates who give well-reasoned points, not in the marking schedule, are awarded marks for doing so.

## **B. Comments on *candidate performance in this diet of the examination.***

Candidates scored higher marks for Paper 2 than Paper 1 with the average scores being circa 6% different between the papers. It is also worth noting that some candidates did not use of the information provided in the two case studies in Paper 2 sufficiently. This meant that these candidates missed out on relatively straight forward marks.

## **C. Pass Mark**

The Pass Mark for this exam was 54  
700 presented themselves and 277 passed.

## Solutions for Subject CP1-2 - September 2022

### Q1

(i)

Setting pricing/premiums at incorrect levels	[1/2]
Difficulty in Setting assumptions correctly	[1/2]
Inadequate Reserving	[1/2]
Unable to control expenses	[1/2]
Pace of paying out surplus or dividends is too fast and risks insolvency	[1/2]
Volumes of new business to allow is too great	[1/2]
Underwriting is inadequate or non-existent	[1/2]
Unable to follow the Treating Customers Fairly principles	[1/2]
Unprepared for any regulations that might get imposed	[1/2]
Investment in inappropriate assets to match the liabilities	[1/2]
Exercise of discretion/SVS/alterations/bonus/reviewable charges not done rigorously	[1/2]
Inaccurate Capital Modelling/cashflow projections	[1/2]
Unable to perform Statistical analysis	[1/2]
Unable to purchase suitable reinsurance	[1/2]
Lack of data and/or process to monitor experience	[1/2]
Unable or incorrectly identifying and managing risks	[1/2]

[Marks available 8, maximum 5]

(ii)

To improve customer service and customer choice	[1]
To correct monopoly situation of Company N	[1/2]
It may be setting premiums too high and/or making excessive profits	[1]
It is likely to be "cherry picking" the most profitable areas of business	[1/2]
The government may be concerned about poorer parts of its population not having access to life cover	[1/2]
Underwriting restrictions may be too restrictive or unfair	[1/2]
Encourage wider access to insurance	[1/2]
Over the space of the five years Country M's government may be in a better position	[1/2]
To allow a bigger market	[1/2]
It may have acquired actuarial knowledge and is ready to regulate the industry	[1/2]
Or it hopes a bigger industry will bring more ideas on regulation	[1/2]
To increase the revenue raised from taxes. Reduce dependency on Government to provide benefits to its citizens	[1]
To decrease unemployment and create/sustain jobs	[1/2]
To improve quality of life of citizens - avoid financial problems when family members die without life cover	[1]
Increase insurance awareness and education on financial planning	[1]
To improve diversification of the industry. Promote wider product range and innovation	[1]
Having more than one insurer gives options if either should encounter solvency difficulties. Similarly, access to reinsurance may improve	[1]
Other industries may be emerging/expanding which a life assurance industry is needed to support e.g. mortgage companies might want customers to obtain related life cover	[1]

To fulfil a political agenda/manifesto; win votes or popularity [1]  
 May be a vanity move - appear better in international community. Or may be part of a strategy to obtain finance e.g., from World Bank [1]  
 The existing company may have been unable to meet the high demand for the products on its own [1]

[Marks available 16, maximum 5]

(iii)

*(Do not give repeated marks for the same issue)*

Option X

Option X would allow for complete control of the government [1]  
 It could ensure that all sectors of the population get covered and at an affordable price [½]  
 Citizens may have more confidence in a state-backed insurer, as compared to other companies, and be better protected [1]  
 However, the creation of such a company could be a big distraction for the government of a developing company [½]  
 Should this really be a priority versus other issues it may want to deal with [½]  
 Does it have sufficient resources to set up the company? [½]  
 It would also come with a high price to set up and maintain and this would need to be funded somehow e.g. from taxes or increased national debt [1]  
 When citizens take out policies, they would then have to pay premiums. This opens up the government to the accusation of charging citizens twice for their cover [1]  
 The government would also be involved in obtaining suitably qualified and competent staff/directors. Given actuarial knowledge has been deficient, this does not give a strong starting point [1]  
 Control of the state insurer may be too short term e.g. driven by the aims of changing governments rather than affording the long term stability needed for long term life assurance business [1½]  
 It is likely to be managed by government officials who may lack understanding in running the business [1]  
 A state insurer will wield great power compared with Company N. This may actually distort the market unduly rather than solving the monopoly issue [1]

Option Y

Option Y may be a much quicker way to expand the market [½]  
 Privately funded so government is not responsible to set up the company [½]  
 Private companies have a profit motive and, in theory at least, should lead them to be more efficiently and expertly run than a state insurer, leading to lower premiums and improved service [2]  
 Government will be able to tax the profits but will need to regulate different aspects [1]  
 Private companies are free to withdraw or restrict their services, leaving the government exposed [1]  
 Option Y may motivate more companies, in other industries, to start up / expand. It Shows the Government is serious about jobs for its own citizens [1]

Option Z

Option Z may be a much quicker way to expand the market [½]  
 Option Z has the advantage of rapidly solving any remaining lack of actuarial understanding, although the culture of Company N will need to be allowed for [1]  
 The Government is exposed to overseas interference/values in what it wants to achieve, e.g. the Government of the overseas country may put pressure on the subsidiary to run

the company according to certain values which clash with Country M's [1]  
 It will bring lots of ideas from more developed markets e.g. on product ranges, customer service, distribution/marketing, technology/systems [1½]  
 It may be able to flex its scale more easily, partly through superior systems, partly through availability to capital [1½]  
 It may be able to increase awareness and market penetration more easily [1]  
 Company N may bring a greater commitment to reducing carbon emissions [½]  
 May be capital issues if the overseas insurers don't capitalise their branches properly [1]  
 Overseas companies could end up dominating the market, which could impact Company N [1]  
 Risk that the parent company will not support the branch in the event it gets into financial difficulties [1]

[Marks available 26½, maximum 6]

(iv)

Stress its advantages versus competitors: [½]  
 Focus on track record in home country e.g. solvency level, customer service, product ranges including riders and packaging of different benefits within a product, competitiveness of premiums, lack of customer complaints/adverse Ombudsman rulings [2½]  
 Clear, transparent business plan for the subsidiary in Country M, including capital backing [1]  
 What ideas it has for addressing the specific objectives it has of the government e.g. on market awareness/penetration, scope/ideas for simple products e.g. microinsurance Solutions [2]  
 Scope to rescue Company N if it faces difficulty [½]  
 Thorough research about Country M's marketplace [½]  
 Support the government in education the public [½]  
 Provide inducements [½]  
 Work hard to show how it could be a mutually beneficial arrangement rather than just siphoning off profits and showing no interest in how Company N could develop and eventually be self-sustaining [1½]  
 Offer to sponsor education of actuarial students in the home county [½]  
 Run local actuarial societies [½]  
 Guarantee to employ a certain proportion of Country M's population [½]  
 Be ready to share some ideas on technical operations e.g. on underwriting, claims control [½]  
 Offer ideas on how to introduce a suitable regulatory/supervision regime. [½]  
 Offer to contribute to infrastructure development e.g. invest in a new financial business district in Country M [1]  
 Work with the government on its other objectives to reduce climate change and increase pension provision awareness [1]  
 Ensure parent capitalises its branches. Could give guarantee to support the branch if it gets into financial difficulty [1]  
 Ensure main functions of branch will be carried out in Country M, under the scrutiny of Country M's regulator [1]

[Marks available 16, maximum 5]

(v)

Having all the required information in one central place will improve citizens'

awareness about pension products, how they work and whether further pension savings are required [1½]

The website will show the proportion of retirement benefits between state and private pensions [½]

Where the state provides benefits to its citizens these are often at a low level which may only be sufficient to keep individuals out of poverty [1]

Many individuals will require or expect a higher level of benefits [½]

The government will believe that once individuals see the expected incomes, they will be encouraged to save more for their retirement themselves, by joining an employer scheme or through additional saving [2]

The government may well offer incentives for pensions savings, e.g. tax relief, but it is not well publicised [1]

If the State requires individuals to save for their retirement or other benefits this will reduce the amount that individuals feel they can or need to invest in individual arrangements [1]

If the state system is a pay-as-you-go state pension system, it may come under increasing pressure, with a risk of becoming unsustainable [1]

Encouraging private pension provision would ensure that this risk does not grow further [½]

Otherwise, government will be faced with a choice between requiring higher levels of tax to be paid for the state pensions [1]

Many citizens are likely to be comfortable using websites for other financial planning, so this will be more convenient for them [1]

Citizens may have lost track of some of their benefits through moving jobs, so this is one way of reconnecting their lost funds [1]

This may be in line with what is being practiced in other countries [½]

Using a website may be a lower cost method of raising awareness [½]

Making the information available online will make it easier for citizens to keep track of their pension information, improving their awareness [1]

[Marks available 14, maximum 6]

(vi)

Government:

Building a website like this will require expert personnel [½]

Gathering data from so many sources will take a long time and be very costly [½]

Even linking the website to the state pension system will not be straightforward. [½]

The data will be in many different formats - the government will have to decide whether to impose a standard format for every pension provider to follow or alternatively find a solution to convert the provider's data into a format that can be used [1½]

It will need to inform citizens how it proposes to use their data under data protection laws e.g. security, length of time it is kept etc. [1]

The government will be aware that non-compliance with the relevant data protection laws when processing personal data can lead to significant legal penalties as well as reputational damage [1½]

Sensitive personal data is generally subject to much stricter regulation than ordinary personal data, so it will need to consider whether sensitive data is actually necessary for this initiative [1]

Depending on the data protection laws in place, citizens may need to give their consent for the transfer of their personal data. This may be hard to achieve in practice [1]

The servers put in place may not have enough capacity to store large volumes of data [½]

Government will be aware of potential cyber risks that hacking, or loss of data could cause to their reputation [½]  
 Will need to set up processes for dealing with data errors and keeping data up to date [1]

Citizens:

This will disadvantage those who are unable to access their details, either because they are unable to access the internet e.g. rural areas or are not knowledgeable. Likely this will be disadvantaged poorer, less financially sophisticated citizens, who might also benefit from this initiative [1½]

Data may be incorrect, incomplete or out of date, leading citizens to make sub-optimal decisions about their future savings [1½]

It could lead to a proliferation of scams and cybercrimes e.g. fake websites, which could have adverse consequences if sensitive details are passed on [1]

Citizens may lack trust in the Government, leading to fewer citizens giving consent for the data to appear on the website, thereby diminishing the benefits of the arrangement [1]

Concern from citizens of how their personal data will be used e.g., can it be shared with any institutions? [½]

[Marks available 15½, maximum 6]

(vii)

Offer a variety of pension products that will cater to as much as the population as Possible [1]

e.g. for low net worth citizens, ensure low-cost investment vehicles, whereas for high net worth citizens, the ability to control their investment choices may be more important [1]

Simplify/Standardise their Terms & Conditions so that they are easier to understand [1]

Improve the process by which citizens are able to transfer their pension savings from one arrangement to another [1]

Work together to improve reputation of the industry, thus increasing the level of trust that citizens have in the industry [1]

Lead an industry-wide marketing invitation to boost savings [½]

Educate citizens in the benefits of savings and the perils of not saving enough for retirement [1]

Work closely with the government to ensure a consistent approach is taken by both sides [½]

Assist the government with any data and expertise required e.g. setting up the website [1]

Have an industry code of conduct, to treat customers fairly [1]

[Marks available 9, maximum 5]

(viii)

An institution with fixed-income obligations e.g. pension provider, will find the bond a good match [1]

If the bond is short-term, then general insurance companies would use the bond to invest premiums [1]

If the bond is of a longer-term, then life insurance companies and pension schemes would use the bond to match fixed-rate annuity payments [1]

An institution may have a particular interest in Environmental, social and governance (ESG) considerations, e.g. pension scheme for charities, then it may be required to have a certain allocation of its assets in ESG assets such as this bond. [1]

Overseas institutional investors may also be interested, as a way of matching liabilities denominated in the currency of Country M and/or enhancing their investment returns [1]

[Marks available 5, maximum 3]

(ix)

Institutions need to be aware of the long-term investment strategy which will most closely match their liabilities by nature, currency and term [1]

The bond may help to create a well-diversified portfolio, as it is less correlated with equities or property markets [1]

Given its purpose, the bond may have a favourable tax treatment to encourage Investment [1]

To investors with a low risk appetite, this bond is secure compared to other bonds Offered in the country [1]

The bond is expected to have a significant risk-adjusted return, especially over the long-term, compared to other similar type of assets [1]

As the bond is in a developing country, it may have a higher expected return than bonds in more developed countries to reflect the additional default risk [1]

There is increasing integration of ESG considerations in investment practices, due to reasons of risk and return and the public interest, as well as the more traditional ethical reasons [1]

The investor may come under pressure from other stakeholders e.g. shareholders, policyholders etc, to increase their investment in such assets [1]

The bond may be more marketable and liquid than other investments [1/2]  
Low trading costs [1/2]

[Marks available 9, maximum 5]

(x)

Long term care costs - accommodation, medication [1]

Personal accident cover - a fixed benefit in case of accidents leading to loss of limbs or other serious injury [1]

Medical insurance - To cover the cost of hospitalization and treatment following any disease or injury listed in the policy, such as dialysis, cataract, etc. [1]

Sickness cover - To cover the loss of income during temporary illness [1]

Critical illness cover - a lump sum benefit on diagnosis of a serious medical conditions [1]

[Marks available 5, maximum 3]

(xi)

Not all risks relate to all products [1/2]

Longevity is longer than expected [1/2]

Higher than expected morbidity rates [1/2]

Inflation is higher than expected e.g. Medical costs, expenses [1/2]

Lack of demand for the product, in which case the fixed overheads will not be covered and leading to lower than expected profits [1/2]

On the flipside, there may be excessive demand, leading to new business strain [1/2]

Errors in pricing models, leading to incorrect premiums charged [1/2]

Operational risks e.g. fraud, administration processes with hospitals [1/2]

Unclear policy wording, leading to unexpected claims conflicts with policyholders and reputational damage [1/2]

Poor underwriting leading to anti-selection/incorrect risk classification [1/2]

Reputational damage if claims are denied due to strict policy wording [1/2]

Data is inadequate to price and reserve for the products, requiring margins to be added and making the product expensive [1]

One-off catastrophic events e.g., pandemic [½]  
[Marks available 7, maximum 3]

(xii)

Ensure sufficient marketing and publicity to maintain a steady demand	[½]
Using publicly available data to complement its analysis	[½]
Clear policy wording	[½]
Strict underwriting to ensure the expected cover is provided	[½]
Covering various classes of policyholders in different regions to reduce the risk of concentration	[½]
Maintaining a strict contract with the hospitals with penalties for fraudulent activities	[½]
Employing experts and maintaining sound systems to reduce operational failures	[½]
Use reinsurance	[½]
Control costs by entering into contracts with providers	[½]
Undertake claims underwriting	[½]
Write a wider range of business for diversification	[½]

[Marks available 5½, maximum 3]

(xiii)

Advantages:

Lower ruin probability will equate to increased capital	[1]
All other things being equal, this will lead to increased protection of policyholders and reduced failure rates for the Government to supervise/regulate	[1½]
A higher solvency standard is likely to improve citizens' confidence in the companies, leading to greater demand for the products	[1]

Disadvantages:

Setting ruin probabilities is a delicate balance between seeking to ensure solvency and not deterring market participants with overly burdensome capital requirements	[1½]
A 0.3% standard is likely to produce a capital requirement significantly in excess of what a company's economic capital requirement would be	[1]
Capital tends to be held in assets which return significantly less than the risk discount rate available on alternative ventures	[1]
So some new entrants will be deterred from entering the industry	[½]
In particular, Option Z companies will be likely to see their capital making better returns in other countries where the ruin probability is set at ½%	[1]
Existing entrants may leave altogether	[½]
Market participants may also react in the following counterproductive ways:	
stop providing products with guarantees/options, as these will be more capital intensive	
charge more for products	[1]
adopt safer investment strategies, reducing returns for policyholders	[½]
Moving from ½% to 0.3% does not appear to be a big step	[½]
However, the loss distributions are fat tailed and the capital effect will be highly geared	[½]
The types of events considered plausible at 0.3% compared to ½% will be much more serious and severe	[1]
The government and market participants are most likely to start with a standard formula rather than internal model approach to calculate the required capital	[1]
Whereas overseas regulators/participants may share their standard formula approach, Co would need to recalibrate it from ½% to 0.3%	[1]
This is not a trivial exercise and is unlikely to be justified either on cost or money	

grounds given it would be used in only 1, still-developing, country [1]

Overall, the move is likely to be less effective overall [½]

[Marks available 16, maximum 5]

**[Total 60]**

*Part (i) This was generally answered well by most candidates, however higher marks were awarded where a wide ranging list was given.*

*Part (ii) Again this was well answered with most candidates scoring well.*

*Part (iii) This was not answered as well as the first two parts, less prepared candidates did not consider each options specifically but answered with vague questions. Candidates also did not manage to pick up many points in respect of Option Y. The other 2 options generally were answered better with candidates making a wider range of points.*

*Part (iv) Generally well answered, with candidates picking up a wide range of marks*

*Part (v) Reasonably well answered*

*Part (vi) This was not as well answered as the early question parts. Candidates needed to have focused on both government and citizens ensuring both were addressed equally.*

*Part (vii) This question part was not answered well, with few candidates generating sufficient ideas to score well.*

*Part (viii) This part was also not well answered with few candidates being specific enough in their answers to score well.*

*Part (ix) Reasonably well answered with most candidates scoring half marks.*

*Part (x) This part was well answered.*

*Part (xi) This was very well answered with most candidates giving sufficient points to score well.*

*Part (xii) This question part was answered less well.*

*Part (xiii) Only a small number of candidates recognised that it would be a big change and hence did not score the marks for the issues and focused on narrow points (e.g. price increases)*

## Q2

(i)

As it is an aquarium, it may be desirable for the location near the sea, to make it easier to transport aquatic species to and from the sea [1]

- Whether the aquarium should be in an urban or rural location:
- An urban location will make it easier to attract tourists [1/2]
- However, there may be lack of available space to build the aquarium [1/2]
- There would be a lot more space in a rural location, however it will be harder for tourists to get there [1]
- Proximity to hotels and other tourist attractions would be helpful for attracting tourist trade [1/2]
- If it is going to be a tourist attraction, then transport links will be key [1/2]
- Ideally, should be close to main roads for car and coach access [1/2]
- Also, preference may be to have good links to public transport e.g., trains [1/2]
- Should not be too far away from an airport, in order to encourage international tourists to visit [1/2]
- To build the aquarium will require availability and transportation of building material and labour [1]
- If it's planning to breed species, it would need to attract suitably qualified staff to the aquarium to take care of the animals [1]
- Find out the unemployment rates in the area [1/2]
- Consider a tie-up with a well-renowned university [1/2]
- Different locations will have different costs in terms of rental or purchase. In particular, purchase of land will require significant initial outlay of funds [1]
- The lease structure of the location is important [1/2]
- Will need planning permission to build on the land from the local authorities. May benefit from government subsidies/grants if a certain location is chosen e.g. to boost development [1]
- Potential damage to buildings, animals etc. from external factors [1]
- The climate of the location may become an important factor for the animals to thrive [1/2]
- [Marks available 12½, maximum 6]

(ii)

- Insurance to cover its employee benefits e.g.:
- Life insurance, to provide benefits on death of employees [1/2]
- Medical/Health insurance, to provide medical benefits if employees become sick [1/2]
- Pensions, to provide retirement benefits to employees [1/2]
- Insurance for any veterinary costs in the treatment of fish [1/2]
- Buildings and contents insurance for the aquarium [1/2]
- Motor insurance to cover use of motor vehicles [1/2]
- Public liability - to cover any injury or death of visitors on the aquariums premises, [1/2]
- Employers' liability/Workers' compensation - to cover injury to employees in the Course of employment [1/2]
- Fidelity guarantee, to cover the risk of fraud by employees [1/2]
- Cyber insurance, to protect against loss of data or failure of computer systems [1/2]
- Business interruption, to cover against any forced closures [1/2]
- Product liability, to cover against failure of products sold in the gift shop [1/2]
- Marine craft, to cover use of marine vehicles [1/2]
- [Marks available 6½, maximum 3]

(iii)

- Displaying fish - tourists would pay an admission price to visit the attraction. Costs involved in maintenance and marketing [1½]

Gift shop - tourists pay for associated merchandise. Company needs to pay the suppliers to provide the goods, and the staff to run the shop.	[1½]
Trading species - buy and sell fish to other aquariums, zoos etc. Costs associated with breeding e.g. fish food	[1½]
Group tours by schools or other institutions - revenue from the group ticket sale	[1]
Food and drink - similar to gift shop. Company needs to pay the suppliers to provide the goods, and the staff to run the stalls	[1½]
Breed species and release into the wild - Government may offer financial incentive as part of its environmental policies. Cost associated with breeding	[1½]
Special events - Charge entry fee. Cost associated with staff	[1½]
[Marks available 10, maximum 6]	

(iv)

Building the aquarium:

Construction delays, with a potential increase in the costs involved and an overrun on budget	[1]
Poor quality workmanship by construction firm	[½]
Political risks - unable to obtain planning permission, local protests against building the aquarium	[1]
Environmental risks e.g. proximity to earthquakes	[1]
Lack of available staff at the construction stage	[1]

Ongoing activities:

Lack of available staff to operate the aquarium on an ongoing basis	[1]
Reputational risk e.g. if animals are harmed	[1]
Low demand, leading to not enough revenue raised through admissions and gift shop	[1]
Operational risks - fraud, mismanagement, overcrowding	[1]
Transportation issues - strikes, roadworks	[1]
Breeding programme is not successful	[1]
[Marks available 10½, maximum 5]	

(v)

Building the aquarium:

The insurance products mentioned in (ii) will cover a number of risks	[½]
Obtain a fixed fee contract for the construction from a reputable firm, with penalties applied for any delay	[1]
Hold initial discussions with politicians and focus groups to encourage support for the proposal. Build up a strong Public Relations department	[1]
If the environmental risks are too great, select a different location	[1]

Ongoing activities:

Background checks on staff to ensure they are of a sufficiently high standard to work at the aquarium, especially with animals	[1]
Competitive remuneration packages to attract staff	[½]
Devise marketing strategy to ensure sufficient publicity and demand at launch time and in the future	[1]
Sound audit and accounting processes to reduce risk of fraud or mismanagement	[1]
Limit ticket sales depending on the capacity to avoid overcrowding	[1]
Have disaster recovery plans should something happen to the aquarium	[1]
[Marks available 9, maximum 5]	

(vi)

The objective is to maximize the return on capital/profit provided the objectives are being met. The company can adopt a cashflow model with the return on capital/profit as the final observable variable to maximise it [1]

It can select the various parameters that would be variable such as the number of employees for each activity, the costs and revenues associated with each activity etc. and vary the mix [2]

This would result in multiple scenarios and a range of results for the final return on capital/profit [1]

Will need to decide whether to use an existing model, build one from scratch or buy from another company [1]

It will be necessary to decide between deterministic and stochastic modelling processes. [½]  
A deterministic model is more readily explicable to a non-technical audience, cheaper to and easier to design, and quicker to run. [1]

Data may be sourced from multiple areas - footfall at the other local aquariums, demand for other national level aquariums, maintenance costs from breeders and suppliers, etc.

The data should be verified and cleaned as much as possible [1½]

Multiple assumptions would be required, such as the tickets sold, maintenance expenses, inflation, interest rates, etc. [1]

Need to consider whether assumptions should be on a best-estimate basis or should contain margins for prudence [1]

Considerable actuarial judgment may be required in choosing and using the model and in setting the parameters and interactions between the different features [1]

The most important assumptions may be sensitivity tested to understand how the results would vary with such assumptions [1]

The model should also consider other stakeholders such as the rules imposed by the regulator, the strategy set by the Board of Directors, etc. [1]

Finally, the entire process should be well-documented to facilitate audit, ensuring model is checked, peer reviewed, and professional standards are met. [1]

The mix should be continuously monitored, and assumptions revised in light of changing conditions [1]

[Marks available 15, maximum 6]

(vii)

Building the aquarium

Grants or subsidies from Country Y's government. These could be repayable at a later Point [1]

Raise capital e.g., through issuing equity, debt [1]

Obtain funding from the private sector e.g., bank loans, a mortgage on the aquarium Building [1]

Donations/benefactors, from individuals and companies [1]

*Ongoing activities*

Could aim to be self-sufficient from the cashflows raised from its activities [1]

Use up cash reserve to meet cost of ongoing activities [1]

Selling some of its fish to other aquariums/institutions/individuals, although this is not likely to be a long-term solution [1]

[Marks available 7, maximum 6]

(viii)

There will be more certainty of costs for the company to pay the actuary a pre-defined fixed fee for the advice [1]

However, this may lead the actuary to charge a higher fee to cover any risks [½]

Alternatively, the company may agree to pay the actuary on a 'time and materials' basis based on the length of time spent e.g. £100 per hour [1]

To reduce the risks of excessive time and money being spent, the company could insist on a cap to the final fee [1]

To avoid an outlay of cash, the company could offer the actuary a stake in the aquarium e.g. shares, or a portion of any future profits [1]

Other non-monetary gifts could be made such as discount vouchers, free visits, naming rights etc [½]

[Marks available 5, maximum 3]

**[Total 40]**

*Part (i) This was answered reasonably well, but candidates that thought about wider issues – e.g., transport produced better answers.*

*Part (ii) This was answered very well with most candidates scoring full marks.*

*Part (iii) This was well answered with most candidates scoring well with lots of ideas being considered.*

*Part (iv) Most candidates made a good range of valid points but many candidates made a lot of minor or irrelevant points for most candidates that received little credit from the examiners.*

*Part (v) Candidates that focused on both building and then ongoing activities did well.*

*Part (vi) Most candidates scored reasonably but many candidates would have scored more if they had applied the scenario to their answers.*

*Part (vii) Most candidates did well and produced a good range of points, but some candidates made a lot of additional points that were not valid like talking about liquidity facilities.*

*Part (viii) This was well answered with many valid points (hourly rates, etc) being made but some candidates went beyond what was being asked for (i.e. talking about actually being employed full time by the aquarium).*

**[Paper Total 100]**

**END OF EXAMINERS' REPORT**



Institute  
and Faculty  
of Actuaries

### **Beijing**

14F China World Office 1 · 1 Jianwai Avenue · Beijing · China 100004  
Tel: +86 (10) 6535 0248

### **Edinburgh**

Level 2 · Exchange Crescent · 7 Conference Square · Edinburgh · EH3 8RA  
Tel: +44 (0) 131 240 1300

### **Hong Kong**

1803 Tower One · Lippo Centre · 89 Queensway · Hong Kong  
Tel: +852 2147 9418

### **London (registered office)**

7<sup>th</sup> Floor · Holborn Gate · 326-330 High Holborn · London · WC1V 7PP  
Tel: +44 (0) 20 7632 2100

### **Oxford**

1<sup>st</sup> Floor · Belsyre Court · 57 Woodstock Road · Oxford · OX2 6HJ  
Tel: +44 (0) 1865 268 200

### **Singapore**

5 Shenton Way · UIC Building · #10-01 · Singapore 068808  
Tel: +65 8778 1784

[www.actuaries.org.uk](http://www.actuaries.org.uk)

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