

# ASSET LIABILITY MANAGEMENT

EXAM MARKING GUIDE SEMESTER 2 2020



### MARKING GUIDE

This exam represents 80% of the available marks for the Asset Liability Management subject.

Question	LO	Module	Marks	K	A	J
1	2.7, 5.1, 6.2	M4, M6	14	6	2+2	3+1
2	3.1, 3.2, 6.4	M7, M11	24	7+4	5+4	4
3	5.1, 5.2	M9	12	1	4+3	4
4	3.4, 4.1	M10, M8, M11	14	2+2	2+6	2
5	6.1, 6.2, 6.4, 6.7	M11	16	7	4+4	1
<b>Total</b>			<b>80</b>	<b>29 (36%)</b>	<b>36 (45%)</b>	<b>15 (19%)</b>

The sample answer is presented in black font.

Marking guide information is presented in blue font.

The sample answer is not the only possible answer.



### QUESTION 1: MARKING GUIDE

(14 Marks)

#### a) (6 marks)

Table of calculations

Market Cap		Price (buy 1 share)		Equal weight (invest \$1 in each stock initially)				
0 price * total shares	1 price * total shares	0 price	1 price	0 invest \$	0 price	# shares purchased	1 price	1 invest \$
10	120	1	12	1	1	1	12	12
40	40	2	2	1	2	0.5	2	1
90	180	3	6	1	3	0.33	6	2
160	280	4	7	1	4	0.25	7	1.75
250	400	5	8	1	5	0.2	8	1.6
Sum 550	Sum 1020	Sum 15	Sum 35	5	-	-	-	18.35
Divide 550	Divide 550	Divide 0.8	Divide 0.8	Divide 1				Divide 1
Index 1.00	Index 1.85	Index 18.75	Index 43.75	Index 5				Index 18.35

Results

- Market Cap Index Closes at 1.85 [0.5], return over year 85% [0.5]
- Price Index closes at 43.75 [0.5], return over year 133% [0.5]
- Equal weight Index closes at 18.35 [0.5], return over year 267% [0.5]

Students were asked to present their workings and must do so to get full marks

May present differently to sample answer

1.0 per index for laying out workings for each index with correct understanding of the weighting (even if calculations wrong) max 3.0

0.5 for each correct result (6 items) Max 3.0

**Overall max marks 6.0**

Module 4.7.1 p44 and Exercise 4.12 and Tutorial 3

#### b) (2 marks)

The equal weight index has outperformed (in this period) as one stock (A) has had exceptional growth in price (1100%) and the EW index has 20% exposure to this growth. [1.0]

As this is the smallest stock by opening market cap (only 2% of market cap), its growth has much lesser impact on the market cap index results. [0.5] Similarly it was only 7% of the opening price weighted index. [0.5]

State which was highest and give a reason why 1.0, comment on why other two lower 0.5 each

**Max 2.0**

Module 4.7.1 p44, and Tutorial 3



**c) (3 marks)**

The index selected needs to represent what the trustee is investing in (representative), be available to invest (investible), transparently calculated and publicly available (transparent). [1.0]

I recommend a market cap index to the trustee as this would meet all these criteria. [1.0]

It also means the trustee would not have to actively rebalance their portfolio over time to remain consistent with the index. [1.0]

If the very small stocks were not available for investment, the trustee may hold only the larger stocks and still stay close to the index for performance. [alternative 1.0]

The **price index** may not be available to invest (particularly the smaller (by cap value) stocks) except via derivatives. [alternative 1.0]

The **equal weight index** portfolio requires rebalancing (end each measurement period), and again the smaller stocks may not be sufficiently available. [alternative 1.0]

1.0 for explaining characteristics of a benchmark.

Must make a clear and appropriate recommendation for 1.0.

1.0 for any other supporting reasons that make sense.

**Max 3.0**

Module 4.7.2

**d)**

**i. (1 marks)**

Investment markets are not efficient [0.5] therefore it is possible to apply knowledge or information to exploit pricing inefficiencies and achieve a higher return than the market overall [0.5]

This is an example answer, not the only answer

Must propose a belief that indicates active investment can achieve higher returns than the market overall (or than the market cap index)

**Max 1.0**

Module 6.6

**ii. (2 marks)**

Do not hold all the stocks in the index and apply fundamental analysis in order to more heavily weight stocks believed to be underpriced [1.0] If these stocks are then repriced as expected the manager has more exposure than the index and should outperform. [1.0]

**Or**

Invest the index and then use derivatives to exploit perceived incorrect pricing [1.0] If the manager's decisions on derivatives are correct they will generate additional returns and therefore overall the manager will outperform the index. [1.0]



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These are example answers

1.0 for a coherent strategy and 1.0 for explaining why it would outperform the TOP200 index, which is the objective for the manager

**Max 2**

**END OF QUESTION 1: MARKING GUIDE**



### QUESTION 2: MARKING GUIDE

(24 Marks)

#### a) (4 marks)

The trustee should first consider their liabilities. In this case they must withdraw \$1m (1%) per annum (indexed) every year for 10 years so they require regular income [0.5], inflation protection [0.5] and some liquidity [0.5] and then in 10 years be able to liquidate the portfolio [0.5]. It is unstated but I would assume the goal is to preserve the real value of the capital so that the beneficiaries receive a payout equivalent in real terms to their current share of the portfolio [0.5]. I also assume that if one of the grandchildren dies before the 10 years, their estate will receive their share [0.5].

Therefore, suitable investment return objective would be a return of 1% plus CPI per annum over the ten year period [1].

Clear links to liabilities (we encourage the students to state the obvious starting point)

0.5 for each element of the liabilities max 2 marks

0.5 for each relevant assumption max 1 mark

1 for a coherent return objective that is consistent with liabilities and assumptions

(expecting a CPI + x% objective but others may be reasonable)

[0.5 for an objective that is reasonable but not supported with discussion]

Discussion of volatility objectives may be given marks even though not the question

**Max 4 marks**

Module 11 for objectives

#### b) (5 marks)

The Ferris tests

Ferris set out five questions that are useful when reviewing a set of objectives:

- Do they meet all legal agreements as well as the basic requirements of the investor?
- Are there any special characteristics that need to be considered such as promises made in promotional literature?
- Are they realistic?
- If there is more than one objective, then are they consistent?
- Are they clear and can they be explained and justified simply.

In reviewing the objective

- Yes, as objective selected meets the **basic requirements** of the trustee (and trust) as discussed. That is objectives aligned with **legal requirement** to pay an indexed income of 1% and release capital in 10 years.
- No promotional literature relevant, however **beneficiaries** will have read the trust terms and will be expecting the income and eventual capital.



- CPI+1% is fairly standard type objective for institutional investors and **is achievable** over this timeframe.
- This is only one objective, so **consistency** not an issue; OR

A consistent risk objective could be established, for example, a capital loss no more frequently than once in five years

- Yes, happy that it is clear, **simple** and **justifiable** in light of liabilities.

Students may split up as above sample answer or combine identifying each test with appropriate comments on the case

0.5 marks for identifying each Ferris test maximum 2.5 marks.

0.5 marks for commenting specifically on the case and return objectives for each test max 2.5 marks

**Max 5 marks**

Module 11.4 p 16 for Ferris

c)

**i. (7 marks)**

The key risk and return characteristics of property that are relevant to this trust fund are

**Security:** Land is relatively secure asset, but the buildings may be destroyed so need insurance. The bigger risk is the security of the rental income as tenants may default or premises may be unoccupied for long periods. It may not generate any income for the trust in some years. There is some sovereign risk that the property can no longer be used, which could mean capital loss when sold at or before 10 years

**Yield:** Rental income is usually indexed, providing a return with a real yield. Once tenants are in place the income is reasonably predictable. This will be beneficial to meet the regular income drawdowns. The risk is a loss of tenant.

**Spread:** The capital value of property can move up and down (significantly). Also, valuation is subjective and there may be a wide gap between the seller's valuation and the buyer's valuation, and a forced sale may see a significant sell spread adverse for the seller. So, valuation at the end of the 10 years may not be favourable.

**Term:** Whilst the land element of the investment may be very long term, the buildings will require refurbishment or replacement regularly. This may be required within the 10 years. This needs to be factored into future returns and adds an element of uncertainty. The remaining term of the tenant leases in place will be a major input to a valuation. Usually valued using a term of 10 years or more, however only 10 years for this trust

**Expenses:** Transactional expenses can be significant. Ongoing expenses are significant to maintain a property although some can be passed through to tenants. These costs should be taken into account when agreeing tenant rents and when valuing a property. Which may mean the net return is not sufficient for the trust fund to meet its objective.

**Marketability:** This is a key risk for individual property investments – they are not liquid investments and finding a seller/buyer and completing a transaction can take some time. This could be a problem at the end of the 10 years. Listed property trusts are one way to



access property with more liquidity.

**Tax:** Generally, there will be property related taxes (e.g. land tax), transactional taxes (e.g. stamp duty), as well as income and/or capital gains taxes. However, expenses may be tax deductible. Overall taxes can reduce the return to the investor and need to be taken into account when considering if the property net returns will support the investment objective

0.5 for each relevant risk and/or return point and 0.5 for each relevant link to the trust fund's requirements, with max 1 per SYSTEM T element

NO marks for directly copying SYSTEM T mnemonic from text (M7 page 14-15) unless ALSO provided additional commentary in own words relevant to question

**Max 7 marks**

Module 7.2 (risk and return) p 14-15

**ii. (4 marks)**

Property and economic cycles are related, however typically with a lag on property supply. [1] That is, as economic growth is strong/increasing, the available property is insufficient (demand more than supply) which increases property prices and encourages new property developments. [1] These new developments take time to build and become available for tenants. The first to complete will secure tenants. However, as the economic cycle plateaus or declines, there is less demand than supply, and the later developments that complete may secure lower rental yields or no tenants at all. [1] Property prices fall due to surplus supply and no new developments commence. [1] When economy picks up again, the remaining available space to taken up so initially no new developments are required. [1]

The best time to invest in (or develop) property is towards the end of a weak economic period when there is an oversupply of property and property prices are depressed. [1] And conversely the best time to sell is when economic growth is strong and there is a shortage of properties and prices are pushed higher by demand. [1] Recognising these points in the economic cycle can be difficult [1]  
Further, the overall timeframe for property investment should be several years as it may require one or more full economic cycles to see property valuations fully recover the initial purchase price or initial development costs.[1]

This is only one sample answer and more comprehensive than expecting from a student. Looking for a logical argument relating economic cycle to property markets that considers supply/demand for property and consequences for property prices. That discusses both the ups and downs of the cycle, identifies the lag as properties take time to build.

**Max 4 marks**

Module 7.2.1 page 9-10

**iii. (4 marks)**





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This portfolio has a 10 year timeframe with the objectives of a real return of 1% and no capital losses by the end of the 10<sup>th</sup> year. [0.5]

The pros and cons of a direct property investment are:

Pros	Cons
A known tenant and lease agreement means rental income is known, provides regular income to meet drawdowns	Sustaining tenants and rental income at required level for 10 years is uncertain
Trust has 10 year timeframe which is long enough for property to experience full economic cycle	Trust will be required to sell at end of 10 years and market conditions may be poor at that time, leading to fire sale and loss of capital. Might not meet capital protection objective for overall portfolio in that event.
A property that is already fully tenanted has known income and the purchase price can be offered to achieve the required CPI+1% return on the investment	Process of selecting and transacting on a direct property is time consuming and expensive. Also not earning any income until transaction completed. Net return may not meet objective of CPI+1%, may be negative in first year.
Trustee can place property up for sale at any time, to exploit market pricing if property is in demand,, i.e. does not have to wait until 10 <sup>th</sup> year.	Trustee requires expertise in direct property market, and in property management. This likely has to be outsourced, at further cost. Net return may not meet objective of CPI+1%.
\$25m may be sufficient to purchase a few smaller properties (residential, commercial, retail) or one mid-size commercial or industrial property – 100% ownership gives control	Placing the entire \$25m into one direct asset is overly concentrated/insufficient diversification for the portfolio as a whole

0.5 for stating the fund objectives or characteristics at commencement

1 for each unique point – any four valid unique points would gain full marks

**Max 4 (but max 3 if no reference to the actual portfolio)**

Module 7.3.1 page 19-29

### END OF QUESTION 2: MARKING GUIDE



### QUESTION 3: MARKING GUIDE

(12 Marks)

**a) 1 mark**

The semi-strong form of the Efficient Market Hypothesis states that the market price of an investment incorporates all publicly available information [0.5], but not information only privately available.[0.5]

or

Semi-strong efficient means no manager can exploit public information to gain investment performance advantage. [0.5] They may be able to exploit private information though. [0.5]

or

Semi-strong efficient means all public information has been taken into account by the market [0.5], so that technical and fundamental analysis based on public information cannot identify any mispricing.[0.5]

**1 mark max**

Module 9.3.3 p18

**b) (4 marks)**

The cost of research, analysis and transacting by investment managers (including their own fees) means the net return after all costs may be less than the market as a whole, or any particular market benchmark. [1.0] Even if the manager has access to private information meaning that they could outperform the market in semi-strong conditions the costs may still be the reason for underperformance [1.0]

and/or

The manager's strategy is forward looking and relies on assumptions about the future for individual stock selection decisions rather than history, public or private information [1.0]. The manager's assumptions may prove to be wrong, so that stock prices do not move as the investor predicted and performance is below peers as a result. [1.0]

and/or

A technical or fundamental analysis strategy that makes no allowance for market behaviour driving market prices up/down [1.0] For example if the 'herd' outlook is risk averse on technology at present many technology stocks may be over sold, depressing their prices below the price generated from analysis. As the manager would be holding these stocks regardless of current price, their overall performance will be relatively poor until the market view of those stocks changes. [1.0]



1.0 for an explanation that is logical

1.0 for any supporting comments

Expecting two examples

These are three examples only others may be possible

**Max 4 marks**

Module 9.3.3 p18 and 9.3.4

c) (7 marks)

Aside from Modern Portfolio Theory, there are three other theories of investment behaviour:

### **Technical analysis**

Technical analysis as a key assumption that patterns in price and volume of trades within an investment market can be perceived, analysed and used to forecast future prices in the market. [1]

Under this theory, any investor that takes the time to fully investigate the historical information on a stock will be better at forecasting future prices and therefore able to outperform managers who do not investigate the past or use that information for their decisions. [1]

This would support the hypothesis that active management could add value - but doesn't say that it WILL add value – as if all managers were doing technical analysis equally well then they would all make the same decisions and no-one would be able to add value. [1]

If markets are efficient then unlikely to be a source of added value. [0.5]

### **Fundamental analysis**

Fundamental analysis assumes that the intrinsic value of a security, the true value, can be calculated by the analysis of financial and accounting information, along with other public information. [1]

Under this theory, any investor that takes the time to fully investigate the financial information on a stock will be better at forecasting future prices and therefore able to outperform managers who do not investigate or use that information for their decisions. [1]

This would support the hypothesis that active management could add value - but doesn't say that it WILL add value – as if all managers were doing fundamental analysis equally well then they would all make the same decisions and no-one would be able to add value. [1]

Fundamental analysis makes assumptions about the future, and different managers may make different assumptions, some better than others at getting the assumptions right and



therefore adding value. [1]

If markets are efficient (MPT) then unlikely to be source of added value [0.5]

**Behavioural finance (or they may go for Prospect Theory)**

Challenges the key assumptions of MPT (that all market information is incorporated all the time) and allows for human behaviour to be irrational. Challenges MPT based on empirical evidence of anomalies. [1]

If the ideas relating to behavioural finance do apply, then an investor who is able to interpret market behaviours may be able to anticipate changes in market sentiment and exploit mispricing/future price changes to their advantage. [1]

The challenge is whether any investment manager has a tool to interpret the market behaviour that actually works in all conditions, or whether any outperformance is more due to chance. [1]

Expect each of the three theories to be named and defined [1] mark each

Then discussion of whether there is an opportunity for investment manager to add value [1] mark per sensible point with consistent logic. [0.5] marks for noting where the fourth theory(MPT/EMH) would rule it out.

This sample answer is more than sufficient.

**Max marks 7.**

Module 9.1.1 p 6, 9.3.1 p13, 9.3.2 p 14, 9.3.4 p 20 onwards

### END OF QUESTION 3: MARKING GUIDE



### QUESTION 4: MARKING GUIDE

(14 Marks)

**a) (2 marks)**

Diversification of a portfolio means it holds a variety of assets, and typically refers to holding a range of asset types (across equities, debt, property, infrastructure) and can also mean a diversity of countries, currencies, markets, managers and so forth. [1.0]

Modern Portfolio Theory (Markowitz) [0.5] proposes that diversification improves the risk return trade off. By holding a range of assets or asset types (rather than just one) it is possible to maximise expected returns for a given risk of loss (or variance in return). [1.0] Or minimise the risk of loss for a given required return.[0.5]

Holding a portfolio of assets or stocks where each has its own specific risk (that is unsystematic or independent of the market) means that if one asset suffers, the others may not. [0.5]

1.0 for defining diversification in detail. 0.5 for naming MPT or Markowitz. 1.0 for the main idea 0.5 any other explanatory points.

**Max 2 marks**

Module 11.5.4 p24 and 9.3.3 p16

**b) (2 marks)**

Arguments in support of international assets are primarily around increasing the diversification of the portfolio [0.5]

- By accessing industries not available in home country [0.5]
- Access to countries with different local expectations for market risk/return – there may be undervalued markets for example. [0.5]
- Exposure to other currencies and movement in exchange rates, which may be favourable [0.5]
- Added diversification by exposure to markets in different stages of economic cycle [0.5]
- Access markets with low correlation to local market for risk/return [0.5] although this is less likely now with global economic forces

0.5 for each distinct and plausible point **max 2**

Module 4.3.6 p 17

**c) (2 marks)**

Assuming this allocation goes ahead, the trustee may employ derivatives to manage the



portfolio in two ways:

- a. To partially or fully hedge all international currency exposure, amount of hedging depending on level of risk trustee wishes to accept arising from exchange rate movements. [1]
- b. Purchase derivatives (futures contracts?) that track international investment indices, rather than purchase actual international assets. This may be to minimise transactional costs[1]
- c. Purchase put options to protect against significant falls in global equity markets to mitigate the risk exposure [1]

1 mark for each sensible use, three shown here but there may be other reasonable suggestions {0.5 if says just 'hedge' or 'options'}

**Max 2 marks**

Module 4.3.5 p14 Module

d) (6 marks)

### SAMPLE ANSWER NOT ONLY ANSWER

Assumptions about long term returns are underpinned by economic assumptions. [0.5]  
I assume long term inflation will be 1.5% consistent with the government's monetary policy targets. [0.5]

Then, I assume the central bank will manage cash rates to achieve this goal. [0.5] The current cash rate is 1.0% but is likely to increase again over the long term as economic growth recovers. I will assume an average of 2.0% over the next 10 years and beyond. [0.5]

[another argument might be nominal risk free rate = will be expected real GDP growth 0.5% plus expected inflation 1.5% = 2.0%]

Then, 10 year conventional government bonds should have a return over cash to compensate for inflation and term premium (risk of change in inflation over next 20 years), I will assume 3.0%pa (arguably could be lower/higher)

Then, corporate floating rate notes have added credit risk, (noting ratings as low as BB), adding a reasonable margin over risk free short term (cash) plus inflation risk, I will assume 2% plus 0.5% plus 3% = 5.5% pa

Domestic listed property may be undervalued at present due to depressed conditions. However as listed, will recover quickly when economy turns up and over a long term should maintain a strong positive real return plus margin for property risk premium. I will assume 2% plus 0.5% plus 4% = 6.5%

Domestic ordinary shares assumed well priced at present and should deliver real returns



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over the long term plus an equity risk premium. I will assume 2% plus 0.5% plus 3.5% (i.e. similar to corporate debt plus a risk margin) 6.0%pa

I mark for inflation as underpin and setting at 2.5%

**Students may come up with any consistent set of assumptions. Looking for logical relationships between the economic assumptions and the asset classes, reasons for each assumption**

0.5 mark for each point in each sector discussion max 1 per sector

**Max 6**

Module 10.4.3 p 31

e) (2 marks)

This long term return is an estimate only and not guaranteed

The investment portfolio is exposed to variable returns on its investments and from year to year may have higher or lower returns

It is possible that the portfolio will have negative returns from time to time

The trustee estimates that the portfolio will have a negative return once every 7 years

Past performance of the portfolio is not a guide to the future performance as economic conditions change over time

This return is before taxation and all investment related fees and charges. The impact of taxation (income tax rate of 15%) and investment related fees and charges (of 0.5% pa) means the net return to you is estimated to be 4.0%pa.

1.0 marks per valid suggestion

**Max 2 marks**

Module 11.5.2 page 24

### END OF QUESTION 4 MARKING GUIDE



### QUESTION 5: MARKING GUIDE

(16 Marks)

a) (1 marks)

An appropriate primary objective for the life insurance company is to operate profitably, that is deliver a profit each and every year for its owners [1]

or

An appropriate objective for the life insurance company is to ensure it can meet all policyholder claims/benefits as they arise. [1]

**1 mark** for an objective that is set at a corporate level as asked for the primary objective (not the investment objective)

b) (4 marks)

Term/Duration of liabilities: Therefore, asset portfolio that backs the insurance liabilities should be of same term [1.0] As only selling yearly renewable term insurance, liabilities are very short term (12 months)so primarily cash and short term fixed interest (term deposits for example) for assets backing the liabilities [1.0]

Regulation/Reserves: The regulatory requirement for the investment of reserves will affect how to invest the balance of the assets. [1.0] There may be a requirement to hold a certain amount of reserves in cash, for example. [1.0] Or, there may be a requirement to increase the value of regulatory reserves if holding a riskier investment portfolio.

Free reserves: After the liabilities and regulatory reserves are invested appropriately, the company may decide how to invest any free reserves that remain. This could be into a growth strategy designed to achieve a real return over the longer term for the benefit of shareholders.

1.0 for the issue 1.0 for the explanation

**Max 4 marks**

There may be other identified issues that can gain marks.

c) (4 marks)

Life annuity liabilities consist of a reasonably predictable series of payments to the beneficiaries, ceasing only on their death [1]. The payments are guaranteed and usually indexed [1]. So, the liability uncertainty is the timing of the final payment (date of death) with the risk being the life lives longer than expected.

The closest asset to match this, with guaranteed indexed payments for a long period of time, is a portfolio of **long term indexed government bonds**. [1] This strategy removes the life insurer's risk of capital loss [0.5] and inflation impact [0.5]. It also provides required liquidity. [0.5] It cannot remove the longevity risk.[0.5]





Holding some **cash** assists with managing any timing mismatches between receipt of coupons and payment of annuities and expenses, i.e. liquidity. [1]

1 for defining annuity, and 0.5 for each relevant key feature guarantees, indexed  
1 for acknowledging indexed bonds are best available as align well for 0.5 for each feature, e.g. long term, indexation risk, capital risk, etc.

0.5 no other asset can provide this matching

0.5 if acknowledge bonds cannot remove mortality risk

0.5 for discussing liquidity

0.5 for role of cash

**Max 4 marks**

**d)** (7 marks)

The goal of an asset/liability model is to project cash flows on both the assets and the liabilities and ascertain if the assets will adequately fund the liabilities. [1]

Steps include

- Collecting data on liabilities (term policies and annuities) and assets (currently held)
- Set timeframe and frequency (e.g. 10 years and quarterly cashflows)
- Deciding what type of model (deterministic or stochastic or formula driven)
- Setting asset risk/return assumptions including inflation, expected asset returns and volatility of returns
- and if going to do stochastic model correlations between assets and inflation, distribution of returns
- Setting liability assumptions (same inflation) including probabilities for amount and timing of payments (mortality in this case)
- There may be a regulatory or accounting requirement for the discount rate to apply to liabilities
- Establish any one off adjustments (e.g. for current equity market position) [0.5]
- Deterministic – project all cashflows applying data and assumptions and determine net cash flow each year from time 0. Calculate present values ( $t=0$ ) if required.
- Repeat again at  $t=1, 2$  etc. to forecast assets and liabilities into the future.
- Stochastic – apply a randomiser to the assumed distributions to generate a set of assumptions for each year and then generate a set of cashflows and net cash flows for each year. Present value at time 0 if required.
- Repeat process at  $t=1, 2$  etc.
- Repeat say 1000 times and determine the median outcomes and the distribution of outcomes (or confidence intervals) for net cash flow each year, and the value of assets and liabilities each year.
- To test the sensitivity to assumptions two approaches
  - Test varying one assumption only for sensitivity e.g. move inflation by  $\pm 1\%$ pa
  - Test varying a set of assumptions as might occur under a given scenario. For example, pandemic means higher mortality experience, very low



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inflation, 0% cash rates and increased volatility in listed markets.

- Present results in a meaningful way to the CRO

**This is an example answer, would not have to match exactly.**

1 mark if they explain what it is trying to achieve (for example, the first sentence in example answer)

1 mark for each relevant step that is fully described

0.5 mark for any subsidiary or minor point

Expecting to mention deterministic and/or stochastic techniques, stronger answers will mention

Only get full marks if sensitivity testing and scenario testing mentioned

Some may have more than 8 relevant steps but

**7 marks max**

Module 11 Case Study

**END OF QUESTION 5 MARKING GUIDE**

**END OF MARKING GUIDE**