

# LIFE INSURANCE AND RETIREMENT VALUATION

## MODULE 1: INTRODUCTION





## Module 1

# INTRODUCTION



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# 1. Introduction

## 1.1. Subject approach

In 2019, the Actuaries Institute (Institute) launched new subjects that lead to the Fellowship qualification. This first subject under the new pathway combines valuation approaches for life insurance and retirement (LI&R). It is recommended that the LI&R Valuation subject be undertaken before the complementary LI&R Product Development subject, as the latter presumes familiarity with the content of this subject.

The LI&R Valuation and Product Development subjects have been structured to focus on key principles and do not require knowledge of any country's regulatory or legal rules. The Life Insurance Application and the Superannuation and Retirement Application subjects then consider how those principles may be applied in practice in Australia. For example, differing legislative requirements and differing circumstances of clients will impact how principles may be applied in particular situations.

The concepts in this subject build on those taught in the Australian Foundation (formerly Part I) and Actuary (formerly Part II) programs with respect to actuarial techniques, valuations and the product development process. More generally, the Foundation and Actuary programs reflect the underlying knowledge of an actuary in the context of the International Actuarial Association's educational syllabus. A number of principles are explained in this subject with the help of mathematical formulae and concepts. While the mathematical emphasis in the subject is important, it should be borne in mind that mathematical techniques alone can have limited success. Failure can arise from inappropriate models, assumptions and data. It is important to keep in mind that mathematical models are merely a means to an end for actuaries.



Further, many with a mathematical background tend to expect theories to be either right or wrong. In actuarial practice, there are few instances of single results necessarily being right with all others being incorrect and there is scope for legitimate professional differences. Where there is scope for reasonable differences of opinion, any solution within this scope may be acceptable. However, there is a need for practitioners to be able to clearly demonstrate that opinions have been formed after proper consideration of the issues. This involves demonstrating not only an understanding of the strengths and weaknesses of proposed solutions, but also of the important main alternative solutions. It is also important to understand the level of uncertainty that may be present in proposed solutions and to ensure that this, and its impact, is properly explained to the users of actuarial services.

## 1.2. Subject overview

### 1.2.1. Overview and aim

This subject aims to provide students with an understanding of how actuarial judgement is required when considering the purpose of a valuation. Implications of different methods, models and assumptions are discussed through considering liability valuations (life insurance and retirement), risk-based capital requirements and appraisal values.



### 1.2.2. Student outcomes

After successfully completing this subject, students will be able to:

- assess cash flows arising from savings and risk products from the viewpoint of product providers;
- plan and produce appropriate methods, models and parameters to value uncertain future cash flows;
- apply their valuation knowledge to calculate policy liabilities, benefit liabilities, emerging profit, capital adequacy margins, the economic value of a life insurer and the net position (surplus/deficit) of a retirement fund;
- set out a process to analyse the change in profit, surplus or embedded value; and
- construct a risk management framework.

### 1.2.3. Prerequisites

While there are no formal prerequisites for this subject, students will be assumed to have studied (but not necessarily passed) all Foundation subjects and all Associate subjects. Core Actuarial Mathematics 1 (or CT5) and Core Actuarial Management (Part IIA) are directly relevant to this subject.

### 1.2.4. Assessment skill level

Assessment of this subject will test the following skill levels in the proportions shown in the brackets:

- knowledge (20%): demonstration of a detailed knowledge and understanding of the topic;
- application (50%): demonstration of an ability to apply the principles underlying the topic within a given context; and
- higher-order (30%): demonstration of an ability to perform deeper analysis and assessment of situations, including forming judgements, taking into account different points of view, comparing and contrasting situations, suggesting possible solutions and actions and making recommendations.



### 1.2.5. Assessment method

The subject is assessed via a three-hour (plus 15-minute reading time) open-book examination, worth 80% of the mark, and an assignment, worth 20% of the mark.

### 1.2.6. Modules

The subject material is contained in the fifteen modules shown in Table 1.1

**Table 1.1: Module titles**

Module	Title
1	Introduction
2	A framework for valuing cash flows
3	Product cash flows
4	Life insurance and retirement fund liabilities
5	Life insurance liability valuation methods
6	Life insurance profit
7	Liabilities on the balance sheet
8	Valuation assumptions
9	Valuation of retirement funds
10	Valuation process
11	Asset valuation and investment strategies
12	Analysis of surplus
13	Risk management frameworks
14	Capital management
15	Appraisal values



### 1.2.7. Learning objectives

The following is a list of the learning objectives for this subject. A mapping to the relevant subject module is indicated in brackets after each learning objective (e.g. M2 refers to Module 2 for this subject).

1. **Describe the overarching framework for valuing uncertain future cash flows (M2)**
  - 1.1 Describe the actuarial approach to valuing cash flows
  - 1.2 Outline the probabilistic nature of actuarial models
  - 1.3 Explain, in general, actuarial models, their inputs and outputs, and how they are affected by professionalism and the external environment
  - 1.4 Recognise the qualitative aspects of providing actuarial advice
- 2 **Analyse the cash flows arising under savings and protection products from the viewpoint of the life insurer or retirement fund (M3)**
  - 2.1 Determine the types and characteristics of cash flows that arise for each product type
  - 2.2 Identify the key features of the main product types offered by life insurers and retirement funds
  - 2.3 Discuss how investment risks may be shared
  - 2.4 Explain how mortality and morbidity affect cash flows
3. **Prepare a valuation of life insurance or retirement fund liabilities (M4–10)**
  - 3.1. **Consider the characteristics of policy and benefit liabilities (M4 & M7)**
    - 3.1.1. Explain the characteristics of the different types of life company or retirement fund liabilities (M4)
    - 3.1.2. Understand how liability values are reflected in accounts (M7)
  - 3.2. **Describe reasons for valuing policy and benefit liabilities (M4)**
    - 3.2.1. Discuss the reasons for valuing liabilities and how these might impact the approach





- 3.2.2. Describe key stakeholders and their interests in valuation results
- 3.3. Suggest and evaluate an appropriate valuation method, model and actuarial basis for major insurance product lines and for retirement products (M5, M8 & M9)**
  - 3.3.1. Critique the principles guiding the selection of valuation approaches (M5 & M9)
  - 3.3.2. Analyse various valuation methodologies, including cash flow projection versus formula, prospective versus retrospective, net premium versus gross premium, and stochastic versus deterministic (M5 & M9)
  - 3.3.3. Distinguish between different valuation methodologies and consider the circumstances where each might be applied (M5 & M9)
  - 3.3.4. Apply methodologies for calculating claims reserves for IBNR, RBNA and CICP/DLR (M5)
  - 3.3.5. Develop models for the application of methodologies for major product types (M5)
  - 3.3.6. Explain the need for valuation assumptions (M8)
  - 3.3.7. Consider the various purposes for which actuarial assumptions are used (M8)
  - 3.3.8. Assess sources of information in setting assumptions (M8)
  - 3.3.9. Distinguish between the different categories of assumptions (M8)
- 3.4. Distinguish between gross of reinsurance and net of reinsurance calculations, and understand the credit risk associated with transfer of insurance risk (M5)**
- 3.5. Examine the concept of planned profit margins and calculate profit arising under different valuation approaches (M6)**
  - 3.5.1. Differentiate between actual and estimated profit
  - 3.5.2. Explain the impact of the valuation basis on the timing of release of profit
  - 3.5.3. Demonstrate the use of planned margins as a mechanism for the smooth release of profit
  - 3.5.4. Determine distributable profit and understand the distinctions between accounting and distributable profit



- 3.5.5. Apply methodologies for the deferment of acquisition costs
- 3.5.6. Develop models for recognising the emergence of profit for various product types
- 3.6. Describe the different pace of funding associated with different valuation approaches and recognise that valuation methods do not affect actual experience (M9)**
- 3.7. Determine the impact of, and justification for, valuation assumptions changes (M8)**
  - 3.7.1. Assess the impact of assumption changes
  - 3.7.2. Apply and explain the use of alternative methodologies for incorporating assumption changes
- 3.8. Design a valuation process including data, systems and controls (M10)**
  - 3.8.1. Understand the steps and key interactions of a valuation process
  - 3.8.2. Evaluate and apply data grouping techniques for use in valuation
  - 3.8.3. Assess and apply techniques for the validation of valuation input data
  - 3.8.4. Critique the features of valuation systems
  - 3.8.5. Assess and select valuation modelling applications
- 3.9. Develop a plan for a year end valuation (M10)**
  - 3.9.1. Assess and adapt the key stages in the planning process for an annual valuation for a life company with a diverse portfolio
  - 3.9.2. Assess the business considerations and impacts of the external environment for each step of the valuation process
- 3.10. Analyse and explain the results of a valuation, internally and externally (M10)**
  - 3.10.1. Assess and select appropriate levels of aggregation for intermediate results and reporting
  - 3.10.2. Select appropriate validation techniques to apply to the results of a valuation
  - 3.10.3. Compare to previous valuation results to evaluate reasonableness and explain changes



- 3.10.4. Decide on appropriate presentation and reporting for the communication of results to internal and external stakeholders
- 4. **Evaluate asset valuation methods and asset liability management strategies (M11)**
  - 4.1. Differentiate between the different types of assets on the balance sheet of a life company or retirement fund
  - 4.2. Assess the nature of the relationship between assets and liabilities and the need for consistency in their valuation approaches
  - 4.3. Examine the key steps and actuarial analyses required in the setting of investment strategies
  - 4.4. Explain asset liability management strategies
  - 4.5. Evaluate and apply asset valuation methodologies for a range of asset types
- 5. **Design a process to determine the sources of surplus (M12)**
  - 5.1. Explain why an analysis of surplus may be undertaken
  - 5.2. Assess methodologies for the analysis of surplus
  - 5.3. Evaluate an analysis of surplus arising
  - 5.4. Communicate outputs of the process
- 6. **Analyse the components of risk management frameworks applicable to life insurers and retirement funds, covering risk assessment, risk management, risk reporting, governance and culture (M13)**
  - 6.1. Consider the relationship between objectives, risks and capital
  - 6.2. Identify, and assess, the different types of risks and their potential impact
  - 6.3. Design a new, or critique an existing, risk management framework
  - 6.4. Examine the impact of the internal and external environment on risk management, including the role of regulators
  - 6.5. Plan the implementation of risk management processes within a business function
- 7. **Analyse a risk-based capital model for a life insurer or retirement fund (M14)**



### **7.1. Explain the need for capital**

- 7.1.1. Examine the purpose of capital
- 7.1.2. Consider the impact of an entity's financial strength on its stakeholders
- 7.1.3. Explain the benefits of a risk-based approach to calculating capital
- 7.1.4. Contrast regulatory and economic capital

### **7.2. Evaluate an entity's capital requirements under a three-pillar approach**

- 7.2.1. Examine the three-pillar approach to quantifying, qualifying and reporting on risk-based capital
- 7.2.2. Explain the different types of capital that can be used by entities
- 7.2.3. Analyse the range of risks faced by an entity and their impact on the entity's capital requirement
- 7.2.4. Examine the adjustments to asset and liability values that may be required in determining a company's capital base
- 7.2.5. Calculate an entity's capital base and its prescribed capital amount, using a range of risk assessment and aggregation techniques

### **7.3. Consider the implications of capital adequacy standards for a life insurer or retirement fund**

- 7.3.1. Examine components of the internal capital adequacy assessment process
- 7.3.2. Explain the role of the regulator under a three-pillar capital approach
- 7.3.3. Explain the role of disclosure under a three-pillar capital approach

## **8. Evaluate economic valuations (appraisal values) (M15)**

### **8.1. Determine the reasons for obtaining an appraisal value**

### **8.2. Identify and determine the components of an appraisal value**

### **8.3. Discuss the key issues involved in determining an appraisal value**

### **8.4. Demonstrate the steps required to calculate an appraisal value**

### **8.5. Compare and contrast the different methods available for arriving at an appraisal value**



- 8.6. Prepare an analysis of the change in appraisal values and communicate the results
- 8.7. Explain why an analysis may be undertaken
- 8.8. Contrast the change in appraisal value with the reported profit
- 8.9. Identify and examine issues associated with the change in appraisal values

## 1.3. Advice for students

### 1.3.1. Studying at Fellowship level

A key purpose of this module is to help you consider how to answer the so-called critical thinking, or higher-order, questions that are set at Fellowship level. The Fellowship subjects represent a continuum of learning, from technical knowledge gained in the earlier Foundation and Actuary subjects, ultimately to the level of knowledge and behaviours required to practise as a Fellow. At each stage, candidates are tested at a deeper level of understanding. The LI&R Valuation subject adds a significant amount of depth to concepts that you have touched upon in your earlier studies. Having an appreciation of what the examiner is seeking should aid the way you approach learning the Fellowship material.

The Foundation subjects covered a wide range of mathematical techniques as well as an introduction to corporate finance, interpreting financial statements, and micro- and macro-economics. For example, the CB3 subject, launched in 2019, assists students to consider roles in wider management rather than purely actuarial roles. It isn't necessary to remember every detail from the Foundation subjects, but you should have a feel for the main concepts.

Assessment at Foundation level typically involves students being presented with a well-defined question and then having to choose and apply a technique to deduce a unique answer. A small part of Foundation level assessments may ask students to comment on their answers and this is almost universally ignored by candidates as being too difficult or a 'waste' of time. However, marks for these questions can be quite easy to get as the questions are often asking students to simply state what they see.



The concept of 'stating what you see' is a recurring theme throughout the Associateship and Fellowship subjects, as well as being important in your career. Students often bring in their personal observations and filter out ideas that do not conform to their prejudices. A potential consequence is that your views in an examination answer may appear too narrow and hence miss marks. Professional actuaries are obliged to think widely about a potential problem, provide advice on various options open to their 'client' and inform them of the likely consequences of their decisions.

Candidates entering the Actuary level subjects needed to adjust to assessments based on scenarios that were not exactly solvable by quantitative techniques. They were instead introduced to scenarios where a more qualitative, or holistic, approach was required. In addition to a new assessment style, the Core Actuarial Management subject (formerly the Part IIA subject) introduced a significant amount of new material. Many of the topics considered in that subject are considered more deeply in the Fellowship program LI&R Valuation and Product Development subjects. Further, the Applications subjects involve a deep dive into the current Australian environment.

The initial actuarial training of solving problems for unique answers often stops students making 'obvious' statements. Post-Foundation level, the solution to a question is the journey that you consider when answering the question. Student answers can sometimes lack depth or logical consistency as students seek the 'clever' or 'right' answer. However, a significant portion of the marks may be achieved by stating obvious points.

A typical examination question in the technical (i.e. Foundation) program of actuarial studies involves a precise situation and asks the student to solve a problem algebraically or use some other well-defined approach. Questions set up a scenario that is complete and, after much practise, candidates apply an appropriate mathematical technique that often leads to a unique answer.



For example, a straightforward question may be:

*"A life company issues a 20-year participating endowment insurance policy to a female life aged 45 exact. The sum assured of \$200,000 plus declared reversionary bonuses are payable at the date of death or on maturity. Premiums are payable monthly in advance for 20 years or until earlier death. Premiums increase by 3% compound at each policy anniversary.*

*A compound bonus of 3%, is added to the policy at the end of each year. The death benefit does not include the bonus relating to the policy year of death.*

*The following basis is used to price this policy:*

*Mortality: AM92 Select*

*Rate of interest: 5.5% per annum*

*Initial expenses: \$250 plus 100% commission of the first annual premium, incurred at the policy commencement date*

*Renewal commission: 2.5% of each premium from the start of the second policy year*

*Claim expense: \$425 at the point of claim payment*

*Determine an equation that may be used to calculate the initial monthly premium."*

The solution involves some algebra and knowledge of the actuarial symbols. This style of question is often answered well by candidates as it represents basic knowledge and there is a clear path to arrive at an answer. The key idea is to equate the present value of premiums with the present value of both benefits and expenses and be clear in your workings.



### Fellowship level question

Whilst the question above is straightforward, there are many questions that may be raised regarding the suitability of the pricing assumptions. Questions on the suitability of assumptions would be raised in a fellowship level question. Try to think about what questions you would raise before reading the text below.

Explicit assumptions are provided in the question, but we don't have information on why they are suitable. For example:

- the mortality table AM92 is used to price the contract but we do not understand how that decision was made, nor do we know why it is a relevant table for a female in the (unknown) jurisdiction;
- the discount factor is 5.5% but we do not know why, nor what, it represents;
- \$250 represents the hypothecated initial expense but we do not know the actual initial expenses incurred on sale;
- \$425 represents the expense at claim, which may occur at any time over the next 20 years, but we don't know how the figure was derived nor the logic for not allowing for future inflation of expenses.

There are also implicit assumptions, including:

- a life insurance company is willing to offer this contract and presumably the risks in the contract lie within the risk appetite of the company;
- A female, aged 45 exact, is willing to purchase the contract and we have no information on the competitive environment;
- there is no mention of profit loading but we don't know if the life insurance company is a mutual (non-profit) or a proprietary (for-profit) organisation;
- there is no mention of how to set reserves for the contract that may be imposed by a prudential regulator;
- there is a strain at outset as cash outflows exceed cash inflows and the seller must have access to capital to support this outgo;
- the insurer sells a sufficient volume of contracts to enable it to use some averaging process in its assumptions;
- the insurer has the administration capability to manage this contract:





- that is, it has the ability to collect premiums, manage the policy records, perform underwriting, invest the premiums and manage claims;
- note that the question implicitly assumes no renewal expenses, which does not make sense;
- the method of selling appears to be via a broker as the question states two types of commission;
- a key implicit assumption is that the policy owner continues to pay the premiums until death or the end of the contract;
  - in practice, actuaries would specify a rate of withdrawal and, depending on the contract, a rate at which policy owners kept the contract, potentially with reduced benefits, but paid no further premiums.

Hopefully, you can see that there are many questions that need considering when pricing and reserving.

Unlike those in the Foundation program, Fellowship examinations are focused on the application of knowledge to scenarios. As we progress through this subject, we will be questioning the validity of the assumptions, both explicit and implicit, as well as the reasonableness of the methods and models adopted.

### 1.3.2. Study tips

Students taking this subject are expected to demonstrate a sound knowledge across a broad range of areas addressed in the subject. This leads to a number of points to be taken into consideration in both study and assessment.

- **Breadth of Knowledge:** Successful completion of this subject requires you to demonstrate breadth of knowledge across the syllabus and show the ability to synthesise relevant information in a particular situation, separating and assessing the important issues from the less important. This implies that both the technical aspects and the broader professionalism issues are important. Throughout the subject these broader issues are expected to be considered and addressed.



- **Current Issues:** You are strongly encouraged to have an awareness of current issues in matters relevant to the subject. While knowledge of current issues will not be directly assessed in this subject, it will help to give you a better understanding of subject materials and better prepare you for the Applications subjects.
- **Judgement:** You are expected to develop the ability to apply judgement in solving problems in the areas covered in the subject. Aspects of problems where judgement may be required include complexity, varying degrees of clarity of scope or definition, new or unforeseen circumstances, conflicting interests of stakeholders, and application of appropriate professional guidance and behaviour. Your ability to apply judgement in these and other contexts will be further developed in the Applications subjects.

Judgement is not an easy term to define or an easy skill to teach. It requires ongoing experience to refine. Where possible, you should reflect on your readings and the opinions of others, both in the materials provided for your Fellowship subjects and more broadly, and assess the rationale behind judgements and opinions offered. For the purposes of actuarial examinations, the judgement criteria can be viewed as the ability to:

- identify key facts and other information relevant to the particular situation. This requires the ability to both synthesise information and to make assessments in a given scope and context;
- understand and interpret the facts and other information in the given context;
- relate those facts to the relevant legislative, economic and commercial principles and the environment (for Applications subjects);
- identify and apply the key actuarial principles which need to be considered in solving the problem in question; and
- combine all of the above to reach a relevant and practical solution which is actuarially sound, professional and legal. This may often require a balance to be struck between opposing forces.



Below are a number of other suggestions to help you successfully undertake this subject:

- **Learning objectives build on each other:** In practice, problems have multiple dimensions and their different aspects need to be addressed in a coherent manner. As you progress through the subject, you should therefore be integrating material from earlier learning objectives with the content of the learning objective you are currently studying. You should also be integrating knowledge attained from prior actuarial subjects.
- **Reflection:** You are expected to actively review and reflect on the materials and activities undertaken in the subject. The subject materials are not intended to contain large amounts of content-specific information to be rote learned. You are expected to develop and ultimately demonstrate the critical thinking required of a professional actuary.
- **Exercises:** Exercise questions are posed throughout each module of this subject. These require you to apply principles and key points from the text in various circumstances. These questions do not require specific answers to be provided as part of the assessment process, but are intended to provoke enquiry and exploration of concepts and issues, and encourage critical review and analysis. Your active synthesis and use of the materials and principles presented is a critical part of your learning process. The exercises provided not only help you to consolidate your understanding of the learning objectives but also facilitate synthesis of those concepts with prior learning.
- **Key learning points:** As a practicing actuary, you need to develop the ability to identify key issues and themes relating to a particular task and to separate these key issues from minor or supporting points. This is also a necessary component of successful exam technique. These skills require ongoing practice. You are therefore strongly encouraged to develop your own key learning points before comparing these to the ones provided at the end of each module.



- **Tutorials and study groups:** The materials in the subject do not necessarily lead to clear or definitive solutions for all the questions you may face. Professional actuarial practice requires the application of knowledge and principles to new situations. Outcomes may not be clear and different actuaries may come to different reasonable conclusions. You are strongly encouraged to discuss issues and the subject matter with others, including work colleagues, fellow students and mentors. This will help you to develop a deeper appreciation of the issues and alternative perspectives or interpretations. You are therefore encouraged to form your own study groups and utilise tutorials on a regular basis.
- **Wider reading:** The learning materials provided for this subject are intended to be self-contained. However, in a number of instances, including for deeper exploration of a particular topic or in answering an exercise or assignment questions, you are advised to use your research skills to further explore issues and questions raised in the text. This may include watching seminar presentations, reading research papers, talking to experts, reading the financial news or conducting other online research. You should consider using such tools to enhance your perspective and knowledge of the learning objectives. In particular, you are expected to actively keep abreast of current debates and developments that are relevant to the subject materials and syllabus. While such developments are not directly examinable, their consideration in the context of the principles and discussions of these subjects will provide you with a valuable opportunity to apply and reflect on the subject topics.

### 1.3.3. Learning levels

You are not required to demonstrate the same level of learning for each learning objective. Consequently, an indication of the required level of learning is required to ensure that you focus on the key areas. This also helps to ensure that examinations, assessment and any other support materials are appropriately focused.



To assist your understanding of the level of learning expected in this subject, the following six-level guide<sup>1</sup> is provided, starting from the lowest or easiest level and increasing in complexity.

- **Remember — Retrieve relevant knowledge from long-term memory**

This may involve recalling or recognising information, ideas and principles in the approximate form in which they were previously learned. While this may involve the recall of a wide range of material, from specific facts to complete theories, all that is required is the bringing to mind of the appropriate information. Examples of learning objectives at this level include: list common terms, state specific facts, recognise methods and procedures, and define basic concepts.

- **Understand — Construct meaning from instructional messages**

This relates to translating, comprehending or describing information based on prior learning. Comprehension is the ability to grasp the meaning of material. This may be shown by describing, discussing or summarising material. These learning outcomes go one step beyond the simple remembering of material, and represent the basic or core understanding. Examples of learning objectives at this level include: describing facts and principles, discussing material, comparing numerical data and translating verbal material to mathematical formulae.

- **Apply — Carry out or use a procedure in a given situation**

This involves calculating, estimating and relating the assumptions, hypotheses, evidence or structure of a statement or question. Application refers to the ability to use learned material in new and concrete situations. This may include the application of such things as rules, methods, concepts, principles, laws and theories. Learning outcomes in this area require a higher level of understanding than simply remembering or understanding. Examples of learning objectives at this level include: apply concepts and principles to new situations, apply laws and theories to practical situations, interpret mathematical problems and demonstrate the correct usage of a method or procedure.

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<sup>1</sup> See Anderson, L., Krathwohl D.A. (2001). Taxonomy for Learning, Teaching and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives. Addison Wesley Longman, Inc.



- **Analyse — Break material into its constituent parts and determine how the parts relate to one another and to an overall structure or purpose**

This may include identifying parts, analysing relationships between parts and recognising the organisational principles involved. Learning outcomes here represent a higher intellectual level than understanding and application because they require an understanding of both the content and the structural form of the material, and the ability to look behind the facts and assumptions. Examples of learning objectives at this level include: recognise unstated and implicit assumptions, recognise logical fallacies in reasoning, distinguish between facts and inferences, and question the relevancy of data.

- **Evaluate — Make judgements based on criteria and standards**

This involves appraising, assessing or critiquing on a basis of specific standards and criteria. Evaluation is to do with the ability to judge the value of material for a given purpose. Learning outcomes in this area are very high in the cognitive hierarchy because they contain elements of all the other categories, plus conscious value judgments based on clearly defined criteria.

- **Create — Put elements together to form a coherent or functional whole; reorganise elements into a new pattern or structure**

This includes originating, integrating and constructing ideas. Synthesis is the ability to put parts together to form a new whole. This may involve the production of a unique communication, plan or set of abstract relations (scheme for classifying information). Learning outcomes in this area stress creative behaviours, with major emphasis on the formulation of new patterns or structure. Examples of learning objectives at this level include: propose a plan for ... , integrate learning from different areas into a plan for solving a problem, formulate a new scheme for ... .

The expected level of learning for each learning objective is signalled by the use of the appropriate key word, as shown in Table 1.2.



Table 1.2: Learning level key words

1 Remember	2 Understand	3 Apply	4 Analyse	5 Evaluate	6 Create
Define	Clarify	Apply	Analyse	Appraise	Construct
List	Categorise	Calculate	Attribute	Argue	Deduce
Recognise	Classify	Conduct	Detect	Assess	Delineate
State	Compare	Demonstrate	Differentiate	Check	Design
	Conclude	Estimate	Discriminate	Choose	Develop
	Contrast	Generalise	Distinguish	Consider	Formulate
	Describe	Interpret	Determine	Critique	Modify
	Discuss	Relate	Examine	Decide	Plan
	Express	Use	Explain	Evaluate	Prepare
	Extrapolate	Value	Predict	Judge	Produce
	Identify		Question	Justify	Propose
	Illustrate		Select	Review	
	Map		Solve	Revise	
	Match		Test	Validate	
	Outline				



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## About the Actuaries Institute

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