



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **ICAPRG417A Apply mathematical techniques for software development**

**Release: 1**

## ICAPRG417A Apply mathematical techniques for software development

### Modification History

| Release   | Comments                                                                                                          |
|-----------|-------------------------------------------------------------------------------------------------------------------|
| Release 1 | This Unit first released with <i>ICA11 Information and Communications Technology Training Package version 1.0</i> |

### Unit Descriptor

This unit describes the performance outcomes, skills and knowledge required to use basic mathematical methods and operations with real numbers and their precedence, the evaluation and construction of formulas in standard and computer notation, and the use of Boolean algebra, data types and computer storage.

### Application of the Unit

This unit applies to individuals in software development roles who are required to use mathematical constructions in programming.

Mathematics and algebraic manipulation forms the underpinning structure of computer architecture and memory storage as well as programming languages.

### Licensing/Regulatory Information

No licensing, legislative, regulatory or certification requirements apply to this unit at the time of endorsement but users should confirm requirements with the relevant federal, state or territory authority.

### Pre-Requisites

Not applicable.

### Employability Skills Information

This unit contains employability skills.

## Elements and Performance Criteria Pre-Content

| Element                                                                  | Performance Criteria                                                                                                                                                                                                                                                                                                    |
|--------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Elements describe the essential outcomes of a unit of competency.</i> | <i>Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.</i> |

## Elements and Performance Criteria

|                                                                            |                                                                                                                                                                                                                              |
|----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Manipulate algebraic terms, leading to the solution of linear equations | 1.1 Position number types on the number line<br>1.2 Evaluate various numerical expressions involving integers, fractions and indices<br>1.3 Simplify various algebraic expressions involving integers, fractions and indices |
| 2. Construct mathematical formulas                                         | 2.1 Solve simple equations<br>2.2 Convert formulas between standard algebraic form and computer form<br>2.3 Create several formulas in standard algebraic form and in computer form                                          |
| 3. Simplify and evaluate Boolean expressions and formulas                  | 3.1 Simplify and evaluate several <b>Boolean expressions</b><br>3.2 Complete truth tables based on simple Boolean expressions and logic<br>3.3 Simplify and evaluate several formulas                                        |
| 4. Manipulate number and character representation systems                  | 4.1 Convert numbers between binary, decimal and hexadecimal number systems<br>4.2 Add, subtract and multiply numbers in binary<br>4.3 Determine binary memory storage of an integer and a character                          |

## **Required Skills and Knowledge**

*This section describes the skills and knowledge required for this unit.*

### **Required skills**

- analytical skills to evaluate various numerical expressions
- numeracy skills to solve simple equations
- planning and organisational skills to meet deadlines
- problem-solving skills to recognise and address issues and problems.

### **Required knowledge**

- overview knowledge of mathematical terms and operations and calculation tools.

## Evidence Guide

*The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.*

|                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Overview of assessment</b>                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Critical aspects for assessment and evidence required to demonstrate competency in this unit</b> | <p>Evidence of the ability to:</p> <ul style="list-style-type: none"> <li>• solve and evaluate various mathematical problems in various computational contexts</li> <li>• demonstrate a knowledge, use and manipulation of: <ul style="list-style-type: none"> <li>• Boolean algebra</li> <li>• number types</li> <li>• memory storage.</li> </ul> </li> </ul>                                                                                                                                                                                                                                          |
| <b>Context of and specific resources for assessment</b>                                             | <p>Assessment must ensure access to:</p> <ul style="list-style-type: none"> <li>• programming language</li> <li>• appropriate learning and assessment support when required</li> <li>• modified equipment for people with special needs.</li> </ul>                                                                                                                                                                                                                                                                                                                                                     |
| <b>Method of assessment</b>                                                                         | <p>A range of assessment methods should be used to assess practical skills and knowledge. The following examples are appropriate for this unit:</p> <ul style="list-style-type: none"> <li>• verbal or written questioning to assess candidate's knowledge of: <ul style="list-style-type: none"> <li>• Boolean algebra and how it applies to various computational contexts</li> <li>• different number bases</li> <li>• arithmetic involving different number bases</li> </ul> </li> <li>• review of candidate's program code containing mathematical equations.</li> </ul>                           |
| <b>Guidance information for assessment</b>                                                          | <p>Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended, where appropriate.</p> <p>Assessment processes and techniques must be culturally appropriate, and suitable to the communication skill level, language, literacy and numeracy capacity of the candidate and the work being performed.</p> <p>Indigenous people and other people from a non-English speaking background may need additional support.</p> <p>In cases where practical assessment is used it should be combined with targeted questioning to assess required knowledge.</p> |

## Range Statement

*The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.*

|                                                              |                                                                                   |
|--------------------------------------------------------------|-----------------------------------------------------------------------------------|
| <b><i>Boolean expressions</i></b><br>may include the use of: | <ul style="list-style-type: none"><li>• AND</li><li>• NOT</li><li>• OR.</li></ul> |
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## Unit Sector(s)

Programming and software development