



**Australian Government**

# **CPPSIS5053A Perform advanced surveying computations**

**Release 1**

## **CPPSIS5053A Perform advanced surveying computations**

### **Modification History**

Unit revised and not equivalent to CPPSIS5023A Manage advanced surveying computations

New unit title

Element structure, performance criteria, and critical aspects reviewed to reflect workplace requirements

Skills and knowledge requirements and the range statement updated

### **Unit Descriptor**

This unit of competency specifies the outcomes required to solve a range of surveying and basic engineering-related problems. It requires the ability to identify, analyse and evaluate data to perform surveying computations. Functions would be carried out within organisational guidelines.

### **Application of the Unit**

This unit of competency supports the application of accuracy, communication, organisational and problem-solving skills; interpreting technical documentation; the ability to demonstrate initiative and enterprise; and a sound understanding of technology. The skills and knowledge acquired upon completion of this unit would support the needs of employees in surveying.

### **Licensing/Regulatory Information**

Licensing, legislative, regulatory and certification requirements may impact on this unit. Incorporate these requirements according to state, territory and federal legislation.

### **Pre-Requisites**

Nil

### **Employability Skills Information**

This unit contains employability skills.

## Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the required performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.

## Elements and Performance Criteria

- |   |  |     |  |
|---|--|-----|--|
| 1 | Prepare to perform advanced traverse computations. | 1.1 | Task <b><i>objectives</i></b> are defined.   |
|   |  | 1.2 | <b><i>Pertinent standards</i></b> are identified, considered and adhered to according to <b><i>project specifications</i></b> .  |
|   |  | 1.3 | <b><i>Principal work activities</i></b> and <b><i>constraints</i></b> in relation to advanced <b><i>traverse</i></b> computations are defined and documented according to <b><i>client</i></b> requirements. |
|   |  | 1.4 | Requirements of the job and the computations are clarified with <b><i>relevant personnel</i></b> according to <b><i>organisational guidelines</i></b> .  |
| 2 | Execute tasks.                                     | 2.1 | Computations are performed on angles and bearings.   |
|   |  | 2.2 | Perform conversions between polar and rectangular coordinates.   |
|   |  | 2.3 | Computations are performed on the coordinates of a closed traverse, and the missing elements and coordinates are computed.   |
|   |  | 2.4 | Traverse information is reduced from field notes.  |
|   |  | 2.5 | Traverse adjustment is performed.  |
|   |  | 2.6 | <b><i>Computation problems</i></b> involving linear figures of constant width are solved.  |
|   |  | 2.7 | <b><i>Organisational documented and undocumented practices</i></b> are adhered to.   |

- |   |   |     |   |
|---|---|-----|---|
| 3 | Perform computations involving circular curves. | 3.1 | Computations are performed on all elements of circular curves.                            |
|   |   | 3.2 | Problems involving circular curve missing elements are solved.                            |
|   |   |     |   |
| 4 | Complete the task.                              | 4.1 | <b><i>Required documentation</i></b> is completed according to organisational guidelines. |
|   |   | 4.2 | <b><i>Spatial data</i></b> is archived according to project specifications.               |

## Required Skills and Knowledge

This section describes the essential skills and knowledge and their level, required for this unit.

### Required skills

- communication skills to:
  - consult effectively with clients and colleagues
  - impart knowledge and ideas through oral, written and visual means
- computer skills to:
  - complete business documentation
  - apply surveying software
- initiative and enterprise skills to:
  - create, extract and output information from engineering plans
  - pass information and practical work skills onto others
- literacy skills to:
  - assess and use workplace information
  - research and evaluate
- numeracy skills to:
  - perform mental calculations
  - record with accuracy and precision
  - undertake high level computations
- organisational skills to prioritise activities to meet contractual requirements
- spatial skills to:
  - exercise precision and accuracy in surveying computations
  - archive and retrieve spatial data
  - manage and manipulate spatial data
  - manage files
  - solve problems relating to height, depth, breadth, dimension, direction and position in actual operational activity and virtual representation

### Required knowledge

- apply the basic principles of algebra, geometry and trigonometry
- computing traverse data from field information
- data formats
- data management
- industry requirements and standards
- planning and control processes

- spatial reference systems
- understanding and application of significance in calculations
- vocational issues involving survey computations

## Evidence Guide

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

### Overview of assessment

This unit of competency could be assessed on its own or in combination with other units relevant to the job function, for example CPPSIS5054A Perform geodetic surveying computations.

### Critical aspects for assessment and evidence required to demonstrate competency in this unit

A person who demonstrates competency in this unit must be able to provide evidence of:

- performing calculations following a logical progression and presenting clearly visible results
- assessing and recording computations from varied sources
- demonstrating operational knowledge in a broad range of areas relating to surveying computations
- applying mathematical principles and skills to a range of advanced surveying-related problems
- understanding the purpose of numerically solving advanced surveying problems
- understanding the requirement for accuracy in surveying calculations.

### Specific resources for assessment

Resource implications for assessment include access to:

- assessment instruments, including personal planner and assessment record book
- assignment instructions, work plans and schedules, policy documents and duty statements
- registered training provider of assessment services
- relevant guidelines, regulations and codes of practice
- suitable venue and equipment.

Access must be provided to appropriate learning and assessment support when required.

Where applicable, physical resources should include equipment modified for people with disabilities.

<b>Context of assessment</b>	<p>Holistic: based on the performance criteria, evidence guide, range statement, and required skills and knowledge.</p>
<b>Method of assessment</b>	<p>Demonstrated over a period of time and observed by the assessor (or assessment team working together to conduct the assessment).</p> <p>Demonstrated competency in a range of situations, that may include customer/workplace interruptions and involvement in related activities normally experienced in the workplace.</p> <p>Obtained by observing activities in the field and reviewing induction information. If this is not practicable, observation in realistic simulated environments may be substituted.</p>
<b>Guidance information for assessment</b>	<p>Assessment requires that the clients' objectives and industry expectations are met. If the clients' objectives are narrowly defined or not representative of industry needs, it may be necessary to refer to portfolio case studies of a variety of surveying and spatial information services requirements to assess competency.</p> <p>Oral questioning or written assessment and hypothetical situations (scenarios) may be used to assess underpinning knowledge (in assessment situations where the candidate is offered a preference between oral questioning or written assessment, questions are to be identical).</p> <p>Supplementary evidence may be obtained from relevant authenticated correspondence from existing supervisors, team leaders or specialist training staff.</p> <p>All practical demonstration must adhere to the safety and environmental regulations relevant to each State or Territory.</p> <p>Where assessment is for the purpose of recognition (recognition of current competencies [RCC] or recognition of prior learning [RPL]), the evidence provided will need to be authenticated and show that it represents competency demonstrated over a period of time.</p> <p>In all cases where practical assessment is used it will be combined with targeted questioning to assess the underpinning knowledge.</p> <p>Assessment processes will be appropriate to the language and literacy levels of the candidate and any cultural issues that may affect responses to the questions, and will reflect the requirements of the competency and the work being performed.</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 in the performance criteria is detailed below. Add any 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.

- Objectives*** may include:
- agreed client requirements
  - written survey data specifications.
- Pertinent standards*** are standards essential to the accuracy of:
- calculation of horizontal and vertical information
  - measurement
  - recording.
- Project specifications*** refer to:
- detailed technical descriptions of the survey data and its requirements.
- Principal work activities*** may include:
- activity and sequence of activity determined to be appropriate in order to meet project objectives.
- Constraints*** may include:
- coverage
  - datum
  - industry requirements
  - resource availability
  - time.
- Traverse*** refers to:
- a method of surveying in which lengths and directions of lines between points on the earth are obtained by or from field measurements and are used in determining positions of the points.
- Client*** may include:
- customers with routine or special requests
  - external to organisation
  - internal to organisation
  - regular and new customers, including:
    - business enterprises
    - government agencies
    - members of the public
    - suppliers.
- Relevant personnel*** may include:
- managers
  - site personnel such as field hands
  - supervisors
  - surveyors.



***Organisational guidelines***  
may include:

- code of ethics
- company policy
- personnel practices and guidelines outlining work roles and responsibilities.

***Computation problems***  
may include problems involving:

- adjustment of angular and linear observations in a network
- adjustment of height observations in a network
- linear figures of constant width
- maintaining areas of closed figures.

***Organisational documented and undocumented practices***  
may include:

- appropriate timelines
- data processing requirements
- final product formats
- formal design parameters.

***Required documentation***  
may include:

- field records
- final product reports.

***Spatial data*** may:

- include data from:
  - echo sounder
  - global navigation satellite system (GNSS)
  - level
  - photogrammetry
  - total station
- relate to:
  - depth
  - dimension
  - direction
  - height
  - position.

## **Unit Sector(s)**

Surveying and spatial information services

## **Custom Content Section**

Not applicable.