



Australian Government

Department of Education, Employment and Workplace Relations

PMLDATA400A Process and interpret data

Release: 1

PMLDATA400A Process and interpret data

Modification History

Unit Descriptor

This unit of competency covers the ability to retrieve data, evaluate formulae and perform scientific calculations, present and interpret information in tables and graphs and keep accurate records. The unit requires personnel to solve problems of limited complexity where the information may be less obvious, but not contradictory, and can be determined by direct reasoning.

This unit of competency is based on, and equivalent to, the unit **PMLDATA300A Process and record data** in PML99.

This unit of competency has no prerequisites.

This unit of competency is applicable to laboratory assistants, field/laboratory technicians and instrument operators in all industry sectors covered by this Training Package.

Industry representatives have provided case studies to illustrate the practical application of this unit of competency and to show its relevance in a workplace setting. These are found at the end of this unit of competency under the section This competency in practice.

Application of the Unit

Licensing/Regulatory Information

Pre-Requisites

Employability Skills Information

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance Criteria describe the level of performance required to demonstrate achievement of the element.

Elements and Performance Criteria

Elements and Performance Criteria

Element	Performance Criteria
1 Retrieve and check data	1.1 Store and retrieve data using appropriate files and/or application software 1.2 Verify the quality of data using enterprise procedures 1.3 Rectify errors in data using enterprise procedures
2 Calculate scientific quantities	2.1 Calculate statistical values for given data 2.2 Calculate scientific quantities and associated uncertainties using given formulae and data 2.3 Ensure calculated quantities are consistent with estimations and expectations 2.4 Report all calculated quantities using the appropriate units and correct number of significant figures
3 Present data in tables, charts and graphs	3.1 Present data in clearly labelled tables and charts 3.2 Graph data using appropriate scales to span the range of data or display trends 3.3 Report all data using the appropriate units and number of significant figures
4 Interpret data in tables, charts and graphs	4.1 Interpret significant features of graphs, such as gradients, intercepts, maximum and minimum values, and limit lines 4.2 Recognise and report trends in data
5 Keep accurate records and maintain their confidentiality	5.1 Transcribe information accurately 5.2 Verify the accuracy of records following enterprise procedures 5.3 File and store workplace records in accordance with enterprise procedures 5.4 File all reference documents logically and keep them up-to-date and secured

5.5 Observe enterprise confidentiality standards.

Required Skills and Knowledge

Evidence Guide

The Evidence Guide describes the underpinning knowledge and skills that must be demonstrated to prove competence.

Critical aspects of competency

Competency must be demonstrated in the ability to perform consistently at the required standard. In particular, assessors should look to see that the candidate:

- can code, record and check the documentation of data
- calculates statistical quantities relevant to his/her work and presents accurate results in the required format
- calculates scientific quantities relevant to his/her work and presents accurate results in the required format
- recognises anomalies and trends in data
- maintains the confidentiality of data in accordance with workplace and regulatory requirements
- keeps records up-to-date and secure.

Underpinning knowledge

Competency includes the ability to apply and explain:

- procedures for coding, entering, storing, retrieving and communicating data
- procedures for verifying data and rectifying mistakes
- procedures for maintaining and filing records, security of data
- relevant scientific and technical terminology, such as precision, accuracy, 'out of control' traceability.

Competency also includes the ability to:

- perform calculations involving fractions, decimals, ratios, proportions and percent
- perform calculations of mean, median, mode, range and standard deviation
- perform calculations of perimeters, areas, volumes, angles
- perform calculations of scientific quantities (for example, concentration)
- use scientific notation, convert units involving multiples and submultiples
- use significant figures, round off, estimate, approximate
- calculate and interpret absolute and percentage uncertainties
- transpose and evaluate formulae
- prepare graphs, tables and charts (pie, bar, histogram) and interpret trends
- prepare and interpret process control charts.

Assessment context and methods

This unit of competency is to be assessed in the workplace or simulated workplace environment.

The following assessment methods are suggested:

- review of data work sheets, calculations, computer files (such as spreadsheets, databases, statistical analysis), graphs, tables and/or charts prepared by the candidate
- review of records transcribed, maintained or stored by the candidate
- feedback from supervisors and peers
- questions to assess understanding of relevant procedures and trends in data
- observation of the candidate as they process data, file and store records.

In all cases, practical assessment should be supported by questions to assess underpinning knowledge and those aspects of competency which are difficult to assess directly. Questioning techniques should suit the language and literacy levels of the candidate.

Interdependent assessment of unit

This unit of competency may be assessed with:

technical units, such as the PMLTEST300 series and PMLTEST400 series of units
PMLDATA501B Use laboratory application software.

Resource implications

Resources may include:

data sets and records
computer and relevant software or laboratory information system
relevant workplace procedures.

This competency in practice**Manufacturing**

A laboratory assistant in a materials testing laboratory was performing routine tensile tests on samples of vinyl sheet. The assistant converted the readings from the machine to appropriate units using a simple calculation and recorded them in the logbook for that test method. After comparing these test results with previous results for the same type of vinyl material, the assistant found that the tensile strength was within the required range. However, it was at the lower rather than the upper end of the range as in previous testing. The assistant discussed the results with the laboratory supervisor. The calibration file for that machine showed that it had been calibrated four months previously and had not needed adjustment. Test results for the same period showed that the machine was giving lower than normal tensile strength readings for the few higher strength materials tested over the last two months. The assistant did some more checks and confirmed this trend. The machine was re-calibrated by the instrument company and the frequency of internal calibration checks by the laboratory assistant was increased. This problem would not have been detected or corrected as quickly without the assistant's initiative and competent recording and retrieval of test results and calibration information.

Biomedical

A technical assistant works in a team with laboratory scientists and technical officers. Analyses of electrolytes are routine and occur in large volume throughput even in this small diagnostic laboratory. The assistant is assigned tasks that contribute to the overall production of results, their reporting and the quality control evaluation of the results. One task is the daily collection of the electrolyte analyses from the internal quality control area. In this case, the technical assistant plots the results on a Levy-Jennings graph and computes the mean value. The assistant reports immediately to the supervisor if the plots show deviations which indicate out-of-control results.

Food processing

Cooking and holding temperatures greatly affect the nutrient composition of processed foods. The CSIRO provides documentation of nutrient losses with temperature variations. For cooked foods, there is the added problem of microbial growth in the so called 'danger zone'. In one laboratory, the technical assistant conducts simple testing of foods using a temperature probe and also measures the temperature of the storage areas, holding trays or bainmaries and individual tray units. Careful documentation of the temperatures of the foods and times of measurement must be kept. The technical assistant supplies the data as tables and a plot of temperature versus time. For quality control purposes, the assistant is directed to use a cross reference of mercury thermometer readings versus probe measurements for ambient temperature. The assistant plots the thermometer readings against the probe readings and reports to the supervisor if the plot shows a slope other than the defined value, for example, 450.

Key Competencies

The seven key competencies represent generic skills considered for effective work participation. The bracketed numbering against each of the key competencies indicates the performance level required in this unit. These are stand-alone levels and do not correspond to levels in the Australian Qualifications Framework (AQF).

Level (1) represents the competence to undertake tasks effectively

Level (2) represents the competence to manage tasks

Level (3) represents the competence to use concepts for evaluating and reshaping tasks.

Collecting, analysing and organising information	Communicating ideas and information	Planning and organising activities	Working with others and in teams	Using mathematical ideas and techniques	Solving problems	Using technology
Level 2	Level 1	Level 1	Level 1	Level 2	Level 2	Level 1

Range Statement

The range of variables relates to the unit of competency as a whole. It allows for different work environments and situations that will affect performance.

Where reference is made to industry Codes of Practice, and/or Australian/international standards, it is expected the latest version will be used.

Data may be recorded on worksheets or entered into spreadsheets or databases linked to information management systems. Data includes the results of: observations, tests and measurements, analyses, surveys, quality assurance and control assessments.

Data may be presented in the form of graphs, tables, histograms, pie charts, bar charts and control charts.

Data could also take the form of semi-quantitative observations and be expressed on a scale, for example, 1 to 4 or + to ++++.

Calculations may be performed with or without a calculator or using computer software, spreadsheets, databases and statistical packages. Examples of calculated scientific quantities could include:

percentage and absolute uncertainties in measurements and test results

areas (m²) and volumes (mL, L, m³) of regular shapes, such as packaging

dose (mg), average mass, mass percentage, density, specific gravity, moisture, relative and absolute humidity, viscosity, permeability

ratios, such as mass to mass, mass to volume and volume to volume percentages

concentration, such as molarity, g/100mL, mg/L, mg/(L, ppm, ppb, dilution mL/L

average count, colonies per swab surface, cell counts, such as live and dead/total

process variables, such as pressure, gauge pressure, velocity, flow rates

biological oxygen demand (BOD), chemical oxygen demand (COD), total organic carbons (TOC)

% content of moisture, ash, fat, protein, alcohol, sulphur dioxide, trace metals, such as calcium or zinc

food properties, such as % concentration (dry), friability, bitterness, brix, free amino nitrogen, diastatic power, calorific content and yeast viability

stress, strain, moduli, force.

Records could include information associated with:

purchase of equipment and materials, service records

safety procedures

history of calibration and test results.

Reference materials could include:

material safety data sheets (MSDSs)

equipment manuals and warranty, supplier catalogues, handbooks

sampling and test procedures, standard operating procedures (SOPs)

enterprise quality manual, customer quality plan

validation of the equipment and associated software where applicable

validation of spreadsheets developed in house for assay and process calculations

OHS regulations, guidelines and procedures

Australian and International Standards, NATA technical notes, National Measurement Act.

Health, safety and environment

All operations to which this unit applies are subject to stringent health, safety and environmental (HSE) requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and HSE requirements, the HSE requirements take precedence.

All operations assume the potential hazardous nature of samples and require standard precautions to be applied. Users should access and apply current industry understanding of infection control issued by the National Health and Medical Research Council and State and Territory Departments of Health. All operations are performed in accordance with standard operating procedures.

Unit Sector(s)