

Numeracy In Practice

Building Workplace Numeracy Proficiency
and Training Skills of VET Practitioners



This Snapshot relates to Question 4a from the Numeracy Proficiency Assessment Tool – Process Manufacturing. It is designed to be read in conjunction with explanatory information provided in the Guide.

Measuring Length

Many jobs require workers to measure length, for example:

- Retailers measuring the drop of a curtain
- Landscape gardeners measuring a garden bed
- Removalists checking to see if an item will fit through an opening
- Jewellers valuing a precious stone

This example is the measurement of length using a ruler. Examples of length measurements in the workplace include:

- Very small measurements (for example, a glass fibre)
- Very large measurements (for example, a steel beam)
- Different shaped objects (for example, the diameter of a gasket)

- Different materials (for example, hard objects and soft objects)

Examples of instruments used to measure length include different types of rulers, measuring tapes, callipers and micrometers.

Workers responsible for measuring length require other complementary skills, such as the skills to:

- Work safely
- Follow workplace instructions
- Meet quality requirements
- Work cooperatively
- Meet deadlines
- Identify and report problems
- Explain length measurements to other workers, supervisors or customers

THE QUESTION

An operator checks the length of tubing made on the production line every hour.



Select and measure the length of three pieces of tubing using the ruler.

In the table below, record the number of the piece and the length of each piece in millimetres.

Piece number	Length (mm)

Note:

The following resources are needed to answer the question:

- Three pieces of tubing or hose of between 30 mm and 70 mm in length, labelled 1, 2 and 3
- A 150 mm or 300 mm steel trade ruler annotated in millimetres, not centimetres, as per the diagram



ACSF NUMERACY LEVEL

This question requires skills associated with measuring length using a simple instrument in millimetres. Millimetres are a familiar workplace unit of measurement.

The content area of measurement using simple instruments is described as part of indicator .10 at level 2 in the focus area *Mathematics knowledge and skills: measurement and geometry*.

The question requires level 2 indicator .09 skills to read and interpret the question.

The question also requires level 2 indicator .10 skills to communicate the answer.

This question maps to ACSF numeracy level 2.

Note that at level 2 of the ACSF, a learner may work with an expert/mentor where support is available if requested.

WHAT THE QUESTION IS ASKING

The mathematical information embedded in the question must be identified and interpreted before the problem can be solved.

The photograph gives context. It does not contain mathematical information. It is not needed to solve the problem.

The first sentence contains mathematical information about measuring length. It explains that length is the property being measured and that it is measured every hour. Knowledge of the term 'length' and how length is measured is required to interpret this information.

An example of a correct answer

Piece number	Length (mm)
12	71mm
48	54mm
45	46mm

The second sentence contains mathematical information about the procedure for measurement. It specifies the property (length), the instrument (ruler) and the sample size (three). Knowledge of length measurement and instruments is required to interpret this information.

The third sentence and the table contain mathematical information about representing the results. It asks for the piece number and the measurement in millimetres. Knowledge of representations of length measurement and units of measurement are required to interpret this information.

HOW TO SOLVE THE PROBLEM

Select a piece of tube and the ruler.

Position the zero end of the ruler at one end of the piece.

Identify where the ruler meets the end of the piece.

Read the number of millimetres in tens.

Read the number of additional millimetre graduations.

Add the two readings to find the length.

Repeat with remaining two pieces.

HOW TO CHECK THE ANSWER

Estimate the measurement and compare the estimate to the measurement. For example, if the length of the piece is close to the length of a thumb and the measurement is 5 mm, a mistake has been made.

Remeasure each piece.

HOW TO COMMUNICATE THE ANSWER

Record the answer providing the result.

For example:

Piece number	Length (mm)
12	71
48	54
45	46

ACSF ASSESSMENT DECISIONS

A Credit is applied to the following responses using the example in the table above as the technically correct response:

1. As per table above
2. As per table below. Answer out by 1 mm or 2 mm (benefit of the doubt given for a 2 mm margin of error)

Piece number	Length (mm)
12	73
48	55
45	44

3. As per the table below. Only 2 pieces measured (benefit of the doubt given because the answer is more right than wrong)

Piece number	Length (mm)
12	71
45	46

4. As per the table below. Only 2 out of 3 of the measurements correct (benefit of the doubt given because the answer is more right than wrong)

Piece number	Length (mm)
12	71
48	43
45	46

5. As per the table below. Wrong piece number (benefit of the doubt given because the answer is more right than wrong)

Piece number	Length (mm)
12	71
48	54
15	46

MEETING WORKPLACE EXPECTATIONS

In most workplaces the worker is expected to record the correct answer in accordance with workplace requirements. This is consistent with the first response above.

Working through this PD resource will support you to confirm and strengthen your own numeracy skills.

Response 2 may or may not be acceptable in the workplace depending on the level of accuracy required. Where a high level of accuracy is required an incorrect measurement can cause problems. A poor quality product could be accepted and lead to a customer complaint. A good quality product could be rejected and lead to increased costs to production.

Responses 3, 4 and 5 contain missing information and errors. This is unacceptable in the workplace.

Incorrect answers may cause problems that impact productivity, quality and safety. This is unacceptable in the workplace.

ANALYSING RESPONSES TO IDENTIFY SKILL GAPS

Incorrect Response	Analysis	Skill Gaps
5.4 instead of 54	Answer out by multiple of $\frac{1}{10}$ Possibly measured in centimetres not millimetres or read the ruler incorrectly	Level 2 indicator .11 in relation to communicating the answer Support may also be needed for indicators .09 and .10 at this level in relation to understanding the instructions and using a trade ruler
540 instead of 54	Ruler was read incorrectly	Level 2 indicator .10 in relation to measuring length using a trade ruler
35 instead of 54	Incorrect measurement	Level 2 indicator .10 in relation to measuring length using a trade ruler

IMPLICATIONS FOR TRAINING DELIVERY

Encourage the learner to talk about measuring length at home and at work.

Talk about:

- Objects they must measure
- What the measurements are used for
- Why they are important
- How they are used
- How and where the measurements are reported
- How and where they are recorded

Working through this PD resource will support you to confirm and strengthen your numeracy teaching skills.

Check learner performance against workplace requirements and identify learner needs. The learner may:

- Need support in one or more of the numeracy indicators
- Be suffering from maths anxiety
- Lack the complementary skills needed to perform the task, such as a correct understanding of the workplace requirements for measuring length

Use a range of teaching strategies, such as:

- Ask the learner to show how they measure
- Draw on what the learner already knows and challenge them
- Sequence the material according to the learners' individual needs. For example, they may be skilled in reading a ruler at home but need support with a trade ruler
- Incorporate a range of length measurements and workplace conditions
- Include examples of different objects to measure using different instruments for measuring length found in the workplace
- Ask questions to extend the learner, such as:
 - How would you explain to someone else how to take a measurement?
 - What if accuracy was not important?
 - How do you recognise a correct answer?
 - How do you recognise an incorrect answer?
- Mix up questions that measure length of different objects for additional challenge
- Provide opportunities for practice without fear of failure and with time for reflection
- During training, measure the length of objects gathered from the workplace and discuss the results
- Develop the skills to estimate length by guessing the length of object before taking a measurement
- Outside training, encourage the learner to remove avoidance strategies, such as relying on another team member to take the measurements
- Assign a workplace buddy or mentor
- Ask the learners to reflect on what they have learnt, the challenges encountered and how they were overcome

PROFESSIONAL DEVELOPMENT LEARNING STRATEGIES

Build your own skills:

- Identify examples of typical length measurements and instruments found in the workplace
- Take a tour of the workplace and talk to people about length measurements, including:
 - How they measure
 - What they are used for
 - Why they are important
 - Who uses them
 - How they are used
 - How and where they are reported
 - How and where they are recorded
- Find examples of typical measurements found in the home, such as someone's height or the length and width of a window
- Practise taking length measurements with different measuring instruments found in the workplace or home
- Check your answers with a trusted peer or mentor
- Ask a trusted peer or mentor to challenge you to extend your skills

Working through this PD resource places you in the role of the learner.

ABOUT THIS RESOURCE

Numeracy in Practice is a professional development resource to support the development of VET practitioner numeracy proficiency skills and numeracy training skills.

It has been developed in response to a National Centre for Vocational Education and Research (NCVER) report titled [Seeking the N in LLN](#). This report found that there may be a need to increase the capacity of the VET workforce to meet the numeracy skills needs of existing workers. A copy of the full report is available for download at www.ncver.edu.au.

[Numeracy in Practice: Building Workplace Numeracy Proficiency and Training Skills of VET Practitioners](#) includes:

- A Guide with professional development activities
- A Numeracy Professional Assessment Tool – Process Manufacturing Industry
- Six Snapshots exploring different workplace numeracy skills

Topics covered in the Snapshots include:

- Reading instruments
- Using ratios and metric conversions
- Using rates and performing time calculations
- Measuring lengths
- Calculating quantities
- Reading specifications

VET practitioners interested in increasing their awareness of numeracy skills in the workplace may also like to access the companion resource [*Numeracy in Focus: Building VET Practitioner Awareness of Numeracy in the Workplace*](#).

Numeracy in Practice and *Numeracy in Focus* are available for download from the WELL practitioners' website at www.wellpractitioners.com.au.

Funded under the Workplace English Language and Literacy (WELL) Program by the Australian Government Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education.

ISBN 978-0-9874157-3-8

This resource was developed by Oggi Consulting Pty Ltd.
www.oggiconsulting.com.au

