

# LANLEO7 - SQA Unit Code F9GN 04

## Core land-based engineering principles – Calculations



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### Overview

This standard covers units of measurement with conversion factors (which could include area/volume, length/thickness, measurement used in a variety of systems) and the related laws and calculations surrounding them, e.g. Ohm's law, Pascal's law, Newton's law of motion, Boyles law, speed, power, torque, velocity, pressure, volume, flow, temperature, area.

This standard relates to the following context or application or context:  
The expression of units of measurements, the conversion factors, laws and formulas relating to establishing and obtaining measurements of:

1. Area and volume
2. Length, thickness, height, distance, speed – velocity, density
3. Units of measurement used in connection with electrical, hydraulic, pneumatic, transmission circuits and systems
4. Units of measurement used to indicate engine performance

The application of engineering and electrical principles:

5. Balance and leverage
6. Pressure and expansion
7. Centrifugal force
8. Ohm's Law

**Anyone undertaking mains electrical work must comply with current regulations.**

### Performance criteria

*You must be able to:*

- P1 use ratios and units of measurement to express values in transmissions, engine, hydraulic, pneumatic, electrical and machine performance, e.g. power, energy, torque, force, specific gravity, pressure, velocity, acceleration, deceleration, reduction ratios, friction, density, flow, resistance, load, current and noise
- P2 use conversion factors to convert measurement values from one unit of measurement to another
- P3 calculate/measure, e.g. areas, weights, volumes, angles, flow rates and speeds
- P4 use physical and/or theoretical methods to establish measurements of, e.g. fuel consumption, oil consumption, torque reserve, lifting force
- P5 verify by calculation the calibration of machinery and equipment
- P6 calculate measurements from a scale drawing

### Knowledge and understanding

*You need to know and understand:*

- K1 linear, area, volume, weight and temperature units of measurement and values
- K2 units of measurement used to express values in engine, transmission hydraulic, pneumatic, electrical and machine performance, e.g. power-energy, torque – force, specific gravity, pressure, velocity, acceleration, friction, flow, resistance, load, current and noise
- K3 how to use conversion tables and the conversion factors for calculations
- K4 the mathematical formulas for area, volume, circumference
- K5 a basic knowledge of Ohm's law, Newton's law of motion, Boyle's law and Pascal's law
- K6 the relationship between speed and torque
- K7 centrifugal force and its applications and effects
- K8 how to calculate power, torque, force, consumption and application rates
- K9 the methods and equipment required to carry out a given measuring task
- K10 the factors that can distort measurements
- K11 the methods used to check calibration/application rates
- K12 the power ratings (BHP or KW) and what they represent, e.g. ECE, DIN, SAE
- K13 the measurement of speed, velocity, acceleration, deceleration and coefficient of friction
- K14 how to calculate speed from given ratios and input or output speed
- K15 the interpretation of scales used in an engineering drawing

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**Suite** Land-based Engineering Operations

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