



Australian Government

MEA148 Apply mathematics and physics in aviation maintenance

Release: 1

MEA148 Apply mathematics and physics in aviation maintenance

Modification History

Release 1 - New unit of competency

Application

This unit of competency requires application of mathematics and physics principles required to support the development and application of aircraft, aircraft system and component maintenance competencies.

It also complies with the requirements of the licensing syllabus in the Civil Aviation Safety Regulation (CASR) Part 66 Manual of Standards.

Pre-requisite Unit

Competency Field

Aviation maintenance

Unit Sector

Elements and Performance Criteria

Elements describe the essential outcomes

Performance criteria describe the performance needed to demonstrate achievement of the element

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|--|---|
| 1. Apply mathematical techniques in aviation maintenance | 1.1 Arithmetic is used in calculations relating to aviation maintenance |
| | 1.2 Basic algebra is used to solve problems relating to aviation maintenance |
| | 1.3 Binary and other applicable numbering systems are used in aviation maintenance applications |
| | 1.4 Simple geometric constructions are used in aviation maintenance settings |
| | 1.5 Graphical representations are used in aviation maintenance settings |
| | 1.6 Simple trigonometric principles and methods are applied in aviation maintenance settings |

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| 2. | Apply physics laws and principles in aviation maintenance | 2.1 | Statics principles and techniques are applied in aviation maintenance settings |
| | | 2.2 | Kinetics principles and techniques are applied in aviation maintenance settings |
| | | 2.3 | Dynamics principles and techniques are applied in aviation maintenance settings |
| | | 2.4 | Fluid dynamics principles and techniques are applied in aviation maintenance settings |
| | | 2.5 | Thermodynamics principles, laws and techniques are applied in aviation maintenance settings |
| | | 2.6 | Typical applications of light characteristics and laws in aviation maintenance settings are explained |
| | | 2.7 | The application of the principles of wave motion and sound in aviation maintenance settings are explained |

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Unit Mapping Information

New unit of competency

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=ce216c9c-04d5-4b3b-9bcf-4e81d0950371>

Assessment Requirements for MEA148 Apply mathematics and physics in aviation maintenance

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Performance Evidence

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria under the specified conditions of assessment on at least one occasion, and must include:

- performing arithmetical calculations typically required in aviation maintenance that apply the methods listed in knowledge evidence
- applying physics principles, laws and techniques listed in knowledge evidence that are applicable to aircraft and aircraft systems.

Knowledge Evidence

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- arithmetic:
 - terms and signs
 - methods of multiplication and division
 - fractions and decimals
 - factors and multiples
 - weights, measures and conversion factors
 - ratio and proportion
 - averages
 - percentages
 - areas and volumes
 - squares, cubes, square and cube roots
- algebra:
 - how to evaluate simple algebraic expressions (add, subtract, multiply, divide, brackets, and simple fractions)
 - linear equations and their solution
 - indices and powers, negative and fractional indices
 - simultaneous equations and second degree equations with one unknown
- binary and other applicable numbering systems
- logarithms
- geometry:
 - simple geometrical constructions

- graphical representation (nature and use, graphs of equations and functions)
- trigonometry:
 - simple trigonometry
 - trigonometrical relationships
 - use of tables
 - rectangular and polar coordinates
- matter:
 - nature of matter (chemical elements, atoms and molecules)
 - chemical compounds
 - states and change between states
- mechanics:
 - forces, moments and couples – representation as vectors
 - centre of gravity
 - elements of theory of stress, strain and elasticity (tension, compression, shear and torsion)
 - nature and properties of solid, fluid and gas
 - pressure and buoyancy in liquids (barometers)
 - linear movement – uniform motion in a straight line, motion under constant acceleration including motion under gravity – Newton's Laws of Motion
 - rotational motion – uniform circular motion – centrifugal and centripetal forces
 - periodic motion – pendular movement
 - simple theory of vibration, harmonics and resonance
 - velocity ratio, mechanical advantage and efficiency
 - mass
 - force, inertia, work, power, energy (potential, kinetic and total), heat and efficiency
 - momentum and conservation of momentum
 - impulse
 - gyroscopic principles
 - friction – nature and effects and coefficient of friction
 - specific gravity and density
 - viscosity, fluid resistance and effects of streamlining
 - effects of compressibility of fluids
 - static, dynamic and total pressure, Bernoulli's Theorem and venturi
- thermodynamics:
 - temperature – thermometers and temperature scales (Celsius, Fahrenheit and Kelvin), heat definition
 - heat capacity and specific heat
 - heat transfer – convection, radiation and conduction
 - volumetric expansion
 - first and second laws of thermodynamics

- gases – ideal gas laws, specific heat at constant volume and constant pressure, work done by expanding gas
- isothermal, adiabatic expansion and compression, engine cycles, constant volume and constant pressure, refrigerators and heat pumps
- latent heat of fusion and evaporation, thermal energy and heat of combustion
- optics:
 - nature of light and speed of light
 - laws of reflection and refraction – reflection at plane surfaces, reflection by spherical mirrors, refraction and lenses
 - fibre optics
- wave motion and sound:
 - wave motion – mechanical waves, sinusoidal wave motion, interference phenomena and standing waves
 - sound – speed of sound, production of sound, intensity, pitch and quality, and Doppler effect.

Assessment Conditions

- The unit may be assessed off the job in a training classroom environment using problems and application of knowledge relevant to aviation maintenance competencies and relevant knowledge requirements.
- The unit must be linked in its assessment and application to those units that apply to actual maintenance of aircraft.
- Evidence of knowledge about aviation maintenance settings in which mathematical techniques and physics principles, laws and techniques are applied is essential.
- A person cannot be assessed as competent until it can be demonstrated to the satisfaction of the workplace assessor that the relevant elements and the performance criteria of the unit of competency are being achieved off the job in simulated settings.

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