

APPLY BASIC SCIENCE PRINCIPLES

UNIT CODE: ENG/OS/AUT/CC/3/4/A

UNIT DESCRIPTION

This unit describes the competencies required in order to apply basic science principles. It involves interpreting units and measurements, resolving forces, work, energy and power, determining effect of friction in automotive, solving problems related to light and sound, general chemistry, element and compounds and distinguishing metals and alloys.

ELEMENTS AND PERFORMANCE CRITERIA

ELEMENT	PERFORMANCE CRITERIA
These describe the key outcomes which make up workplace function.	These are assessable statements which specify the required level of performance for each of the elements. <i>Bold and italicized terms are elaborated in the Range.</i>
1. Interpret units and measurements	1.1 Appropriate units of measurements are identified as per the BSI 1.2 Calculations on converting units from one form to another are performed as per the concept
2. Resolve forces, work, energy and power	2.1 <i>Types of forces</i> are identified as per concept 1.3 Types of work, energy and power are identified as per concept 1.4 <i>Forms of energy</i> are described as per theorems 1.5 Determining conversion of energy from one form to another as per theorem 1.6 Resolving simple calculations on work, energy and power as per concept
3. Determine effect of friction in automotive	3.1 Friction is defined as per concept 3.2 Laws of friction are stated as per reference 3.3 Advantages and disadvantages of friction are identified as per concept 3.4 Effects of friction are identified as per concept 3.5 Calculations resolving simple problems on friction are carried out as per concept.
4. Solve problems related to light and sound	4.1 Source of light and sound is identified as per concept 4.2 Laws of reflection and refraction are identified as per concept 4.3 Characteristics of light images formed on plane and curved mirrors are determined as per concept 4.4 Primary and secondary colours in light are identified as per concept

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	4.5 Calculations solving simple problems involving location of light images formed by plane and curved mirrors are carried out as per concept 4.6 Velocity of sound in air is determined as per concept 4.7 <i>Propagation of sound</i> in a given medium is described as per concept 4.8 <i>Properties of sound</i> are identified as per concept
5. Solve problems related to general chemistry, elements and compounds	5.1 Matter is defined as per concept 5.2 Classification of matter is stated as per concept 5.3 Structure of atoms is recognized as per concept 5.4 Strength of chemical bonds are described and identified 5.5 Properties of elements and compounds are identified as per concept 5.6 Carbon cycle is described as per concept 5.7 Properties of acids and bases are identified as per concept 5.8 Salt is prepared from acids and bases as per concept
6. Distinguish metals and alloys	6.1 Methods of extracting metals are identified as per concept 6.2 <i>Composition of alloys</i> is identified as per concept 6.3 Uses of alloys are identified as per concept

RANGE

This section provides work environments and conditions to which the performance criteria apply. It allows for different work environments and situations that will affect performance.

Variable	Range
1. Types of forces may include but not limited to:	<ul style="list-style-type: none"> • Friction • Centrifugal • Centripetal • Gravitational • Inertia • Shear
2. Forms of energy may include but not limited to:	<ul style="list-style-type: none"> • Kinetic energy • Potential energy
3. Composition of alloys may include but not limited to:	<ul style="list-style-type: none"> • Brass, steel and chrome

4. Propagation of sound may include but not limited to:	<ul style="list-style-type: none"> • Air • Liquid • Solids
5. Properties of sound may include but not limited to:	<ul style="list-style-type: none"> • Reflection • Absorption • Diffraction • Interference

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit of competency.

Required Skills

The individual needs to demonstrate the following skills:

- Apply basic automotive engineering formulas
- Use of basic mechanical machines
- Perform various unit conversions of engineering quantities
- Basic mechanical systems design
- simple machine operations
- Logical thinking
- Problem solving
- Drawing graphs
- Using different measuring tools

Required knowledge

The individual needs to demonstrate knowledge of:

- Newton's laws of motion
- Levers and pulleys
- Gear trains
- Laws of conservation of energy
- Laws of friction
- Types of forces
- Calculation of pressure and density
- Mechanical advantage and efficiency calculations
- Properties of materials
- Gas laws
- SI units of mechanical energy.
- Power transmission systems
- Operation of mechanical machines
- Mechanical calculation of power, energy, work done, torque and safety factor
- Units of measurement, conversions and abbreviations

EVIDENCE GUIDE

This provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge and range.

1 Critical aspects of Competency	Assessment requires evidence that the candidate: 1.1 Identified units of measurements correctly 1.2 Converted units from one form to another appropriately 1.3 Identified types of forces, energy and work correctly 1.4 Identified effect of friction appropriately 1.5 Determined the light images on plane and curved mirrors correctly 1.6 Identified properties of element and components correctly 1.7 Identified composition of alloys correctly
2. Resource Implications	The following resources should be provided: 2.1 Access to relevant workplace or appropriately simulated environment where assessment can take place 2.2 Measuring tools and equipment 2.3 Sample materials to be tested
3. Methods of Assessment	Competency in this unit may be assessed through: 3.1 Direct Observation 3.2 Demonstration with Oral Questioning 3.3 Case studies 3.4 Written tests
Context of Assessment	Competency may be assessed individually in the actual workplace or through accredited institution or during Industrial Attachment.
Guidance information for assessment	Holistic assessment with other units relevant to the industry sector, workplace and job role is recommended.