

QUALIFICATION SPECIFICATION

 gateway
qualifications



Applied Science and Technology (Level 2)

Access to HE

Apprenticeships

Digital

Employability &
Enterprise

English & Maths

ESOL

Personal & Social
Development

Professional
Development

Vocational

This qualification specification covers the following qualifications:

| Qualification Number | Qualification Title |
|----------------------|---|
| 601/1428/9 | Gateway Qualifications Level 2 Award In Applied Science and Technology |
| 601/1402/2 | Gateway Qualifications Level 2 Certificate In Applied Science and Technology |
| 601/1403/4 | Gateway Qualifications Level 2 Extended Certificate In Applied Science and Technology |
| 601/1404/6 | Gateway Qualifications Level 2 Diploma In Applied Science and Technology |

| Version and date | Change detail | Section/Page Reference |
|--------------------|---|------------------------|
| 1.0 November 2019 | Addition of grading change statement | 16 |
| 1.1 (April 2021) | Qualification approval from Qualifications Wales removed. | Pg5 and 6 |
| 1.2 (October 2021) | Guidance for Pre 16 age range. | Page8 |
| 1.3 (Feb 2023) | Removed address and changed back cover | Page 20 |

About this qualification specification

This qualification specification is intended for tutors, assessors, internal quality assurers, centre quality managers and other staff within Gateway Qualifications recognised centres and/or prospective centres.

It sets out what is required of the learner in order to achieve the qualification. It also contains information specific to managing and delivering the qualification(s) including specific quality assurance requirements.

The specification should be read in conjunction with the Gateway Qualifications Centre Handbook and other publications available on the website which contain more detailed guidance on assessment and verification practice.

In order to offer this qualification you must be a Gateway Qualifications recognised centre.

If your centre is not yet recognised, please contact our Development Team to discuss becoming a Gateway Qualifications Recognised Centre:

Telephone: 01206 911211

Email: enquiries@gatewayqualifications.org.uk

Website: www.gatewayqualifications.org.uk/advice-guidance/delivering-our-qualifications/become-recognised-centre/

Contents

| | |
|---|-----------|
| About this qualification specification | 3 |
| 1. Qualification Information | 6 |
| 1.1. About the qualifications | 6 |
| 1.2. Objective..... | 6 |
| 1.3. Funding..... | 6 |
| 1.4. Geographical coverage | 6 |
| 1.5. Progression opportunities..... | 7 |
| 1.6. Relationship with other frameworks..... | 7 |
| 1.7. Equality, diversity and inclusion..... | 7 |
| 2. Learner Entry Requirements | 8 |
| 2.1 Key information..... | 8 |
| 2.2 Access to qualifications for learners with disabilities or specific needs | 8 |
| 2.3 Recruiting learners with integrity | 8 |
| 3. Achieving the Qualification | 9 |
| 3.1 Achievement methodology | 9 |
| 3.2 Qualification Size..... | 9 |
| 3.3 Qualification structure..... | 10 |
| Gateway Qualifications Level 2 Award In Applied Science and Technology | 10 |
| Gateway Qualifications Level 2 Certificate In Applied Science and Technology | 10 |
| Gateway Qualifications Level 2 Extended Certificate In Applied Science and Technology | 12 |
| Gateway Qualifications Level 2 Diploma In Applied Science and Technology | 13 |
| 3.4 Grading..... | 15 |
| 3.5 Recognition of prior learning..... | 17 |
| 3.6 Links to other qualifications | 18 |
| 4. Assessment..... | 19 |
| 4.1 Method of assessment | 19 |
| 4.2 Assessment language | 19 |
| 4.3 Assessment materials | 19 |
| 4.4 Access Arrangements, Reasonable Adjustments and Special Considerations..... | 19 |
| 5. Centre Recognition and Qualification Approval..... | 21 |
| 5.1 Centre Recognition..... | 21 |
| 5.2 Qualification-specific centre requirements..... | 21 |
| 5.3 Qualification-specific tutor/assessor requirements | 21 |
| 6. Quality Assurance | 22 |
| 6.1 Qualification-specific quality assurance requirements..... | 22 |
| 6.2 Malpractice | 22 |
| 6.3 . Additional requirements/guidance | 22 |

| | |
|--|-----------|
| 7. Learner Registration and Results | 23 |
| 7.1 Registration | 23 |
| 7.2 Issuing results..... | 23 |
| 7.3 Enquiries..... | 23 |
| 8. What to do next..... | 24 |
| 9. Gateway Qualifications | 24 |
| 10. Appendices | 25 |
| 10.1 Appendix 1 – Unit Details | 25 |
| Chemistry and Our Earth..... | 25 |
| Energy and Our Universe | 29 |
| Biology and Our Environment | 35 |
| Electronics in Action | 40 |
| Working in Science and Technology | 45 |
| Science in the World | 50 |
| Environmental Science..... | 55 |
| The Living Body..... | 60 |
| Science in Medicine | 65 |
| Using Mathematical Tools in Science and Technology | 68 |
| Carrying Out a Science or Technology Project | 72 |
| Healthy Living..... | 78 |
| Effective Communication in the Workplace | 82 |
| Using ICT in the Workplace..... | 88 |
| Applications of Chemical Substances | 93 |
| Applications of Physical Science..... | 97 |
| Chemical Analysis and Detection | 101 |
| Investigating Human Behaviour | 105 |
| Electronic Devices and Communications Applications..... | 110 |
| Investigating a Crime Scene | 114 |
| Improving own Employability Skills in Science and Technology | 119 |

1. Qualification Information

1.1. About the qualifications

The qualifications have been approved by the Office of Qualifications and Examinations Regulation (Ofqual) that regulates qualifications, examinations and assessments in England.

The qualifications have been developed in conjunction with further education colleges, adult and community learning and private training providers. They are intended primarily for learners post 16 who are interested in Science and Technology but have not studied Science or Technology at Key Stage 4 or who have not achieved higher grade GCSEs in these subjects. They can also be used with learners pre-16 who require an alternative more applied approach to GCSE science qualifications. They include core units in Biology, Chemistry, Physics and Electronics and a range of optional units.

The qualifications are intended to give learners the knowledge, understanding and skills that will enable them to progress to qualifications in a science or technology related area at a higher level and that could be used within the 16-19 Programmes of Study.

The Level 2 Diploma in Applied Science and Technology has an additional optional unit 'Improving own Employability Skills in Science and Technology' which is intended for those on an extended programme that encompasses a work placement.

1.2. Objective

The Qualifications in Applied Science and Technology are intended to give learners the knowledge, understanding and skills that will enable them to progress to qualifications in a science or technology related area at a higher level or to employment in a science or technology related area.

1.3. Funding

For information on potential sources of funding in England please visit the Education and Skills Funding Agency:

<https://www.gov.uk/government/organisations/education-and-skills-funding-agency>

<https://www.gov.uk/government/collections/qualifications-approved-for-public-funding>

<https://hub.fasst.org.uk/Pages/default.aspx>

1.4. Geographical coverage

The qualifications have been approved by Ofqual.

If a centre based overseas (including Scotland) would like to offer this qualification, they should make an enquiry to Gateway Qualifications.

1.5. Progression opportunities

These qualifications allow learners to progress to qualifications in applied science or technology at a higher level or to study of particular aspects of science and technology in greater depth. They also provide learners with the opportunity to acquire knowledge and skills that would support progression to employment in Science or Technology or a related field.

1.6. Relationship with other frameworks

The Gateway Qualifications Applied Science and Technology qualifications cover some of the material in the Science National Curriculum.

1.7. Equality, diversity and inclusion

It is Gateway Qualifications' aim that there shall be equal opportunities within this organisation and in all the services it provides and within its recognised centres and via the services they provide and so meet the organisation's legal responsibilities to prevent discrimination.

In particular it is the organisation's intention that there should be no discrimination on the grounds of a protected characteristic including age, disability, gender assignment, marriage and civil partnership, pregnancy and maternity, race, religion and belief, sex, sexual orientation. It is acknowledged that this is not an exhaustive list.

2. Learner Entry Requirements

2.1 Key information

| Qualification Titles | |
|---|---|
| Age | The qualifications have been approved for learners aged pre-16, 16-18 and 19+. Whilst some of our qualifications are regulated for pre 16 learners our minimum age is 14. |
| Prior qualifications or units | There is no requirement for learners to have achieved prior qualifications. |
| Prior skills/knowledge/understanding | There is no requirement for learners to have prior skills, knowledge or understanding. However, to access the qualifications learners should ideally have achieved mathematics at level 1 and be working towards level 2. |
| Restrictions | There are no restrictions to entry. However, learners should have undertaken relevant initial assessments to ensure that they are following an appropriate learning programme leading to the summative assessment. |
| Additional requirements/guidance | There are no additional rules or guidance regarding learner entry requirements. |

2.2 Access to qualifications for learners with disabilities or specific needs

Gateway Qualifications and recognised centres have a responsibility to ensure that the process of assessment is robust and fair and allows the learner to show what they know and can do without compromising the assessment criteria.

Gateway Qualification has a duty to permit a reasonable adjustment where an assessment arrangement would put a disabled person at a substantial disadvantage in comparison to someone who is not disabled. Please refer to [Section 4.11 Access Arrangement, Reasonable Adjustments and Special Considerations](#) for further details.

2.3 Recruiting learners with integrity

It is vital that centres recruit with integrity with regard to qualifications. Centres must ensure that learners have the correct information and advice on their selected qualification(s) and that the qualification(s) will meet their needs.

The recruitment process must include the centre assessing each potential learner and making justifiable and professional judgements about the learner's potential to successfully complete the assessment and achieve the qualification. Such an assessment must identify, where appropriate, the support that will be made available to the learner to facilitate access to the qualification(s).

3. Achieving the Qualification

3.1 Achievement methodology

The qualification will be awarded to learners who successfully achieve an approved combination of units through a Portfolio of Evidence that has been successfully verified and monitored through Gateway Qualifications' Quality Assurance process. Achievement is therefore determined by successful completion of unit assessment with no further requirement for additional/summative assessment.

This qualification is graded at unit and qualification level.

3.2 Qualification Size

| Qualification Title | Total Qualification Time | Guided Learning | Credit Value |
|---|--------------------------|-----------------|--------------|
| Gateway Qualifications Level 2 Award In Applied Science and Technology | 60 | 48 | 6 |
| Gateway Qualifications Level 2 Certificate In Applied Science and Technology | 150 | 114 | 15 |
| Gateway Qualifications Level 2 Extended Certificate In Applied Science and Technology | 270 | 210 | 27 |
| Gateway Qualifications Level 2 Diploma In Applied Science and Technology | 390 | 302 | 39 |

Total Qualification Time is the number of notional hours which represents an estimate of the total amount of time that could be reasonably expected to be required for a Learner to achieve and demonstrate the achievement of the level of attainment necessary for the award of the qualification.

Total Qualification Time is comprised of the following two elements:

- the number of hours which an awarding organisation has assigned to a qualification for Guided Learning, and
- an estimate of the number of hours a Learner will reasonably be likely to spend in preparation, study or any other form of participation in education or training, including assessment, which takes place by – but, unlike Guided Learning, not under the Immediate Guidance or Supervision of – a lecturer, supervisor, tutor or other appropriate provider of education or training.

3.3 Qualification structure

The knowledge, skills and understanding that will be assessed as part of the qualification are set out within the unit specifications. These include the learning outcomes and associated assessment criteria.

For information on Recognition of Prior Learning/Exempt and Equivalent units please see section **3.5 Recognition of Prior Learning (RPL)/Exemptions/Equivalencies**.

Gateway Qualifications Level 2 Award In Applied Science and Technology

To achieve the Gateway Qualifications Level 2 Award In Applied Science and Technology, learners must complete at least 1 unit totalling 6 credits from Mandatory Group (M).

| Unit Number | Title | Level | Credit Value | GLH | Subject Sector code | Group Name |
|-------------|-----------------------------|-------|--------------|-----|---------------------|---------------|
| D/505/5350 | Chemistry and Our Earth | 2 | 6 | 48 | 2.1 | M (Mandatory) |
| H/505/5351 | Energy and Our Universe | 2 | 6 | 48 | 2.1 | M (Mandatory) |
| K/505/5352 | Biology and Our Environment | 2 | 6 | 48 | 2.1 | M (Mandatory) |
| M/505/5353 | Electronics in Action | 2 | 6 | 48 | 2.1 | M (Mandatory) |

Gateway Qualifications Level 2 Certificate In Applied Science and Technology

To achieve the Gateway Qualifications Level 2 Certificate In Applied Science and Technology, learners must complete a total of 15 credits. Learners must achieve at least 6 credits from Mandatory Group (M) and 3 credits from group O1 Science and Technology. The remaining 6 credits can be achieved from Group M or Group O1.

| Unit Number | Title | Level | Credit Value | GLH | Subject Sector code | Group Name |
|-------------|-----------------------------------|-------|--------------|-----|---------------------|-----------------------------|
| D/505/5350 | Chemistry and Our Earth | 2 | 6 | 48 | 2.1 | M (Mandatory) |
| H/505/5351 | Energy and Our Universe | 2 | 6 | 48 | 2.1 | M (Mandatory) |
| K/505/5352 | Biology and Our Environment | 2 | 6 | 48 | 2.1 | M (Mandatory) |
| M/505/5353 | Electronics in Action | 2 | 6 | 48 | 2.1 | M (Mandatory) |
| T/505/5354 | Working in Science and Technology | 2 | 3 | 24 | 2.1 | O1 (Science and Technology) |

| Unit Number | Title | Level | Credit Value | GLH | Subject Sector code | Group Name |
|-------------|--|-------|--------------|-----|---------------------|-----------------------------|
| A/505/5355 | Science in the World | 2 | 5 | 40 | 2.1 | O1 (Science and Technology) |
| F/505/5356 | Environmental Science | 2 | 6 | 48 | 2.1 | O1 (Science and Technology) |
| J/505/5357 | The Living Body | 2 | 6 | 48 | 2.1 | O1 (Science and Technology) |
| R/505/5359 | Science in Medicine | 2 | 4 | 36 | 2.1 | O1 (Science and Technology) |
| J/505/5360 | Using Mathematical Tools in Science and Technology | 2 | 3 | 24 | 2.1 | O1 (Science and Technology) |
| L/505/5361 | Carrying Out a Science or Technology Project | 2 | 6 | 48 | 2.1 | O1 (Science and Technology) |
| R/505/5362 | Healthy Living | 2 | 3 | 24 | 2.1 | O1 (Science and Technology) |
| H/504/6312 | Effective Communication in the Workplace | 2 | 3 | 30 | 14.2 | O1 (Science and Technology) |
| J/504/6318 | Using ICT in the Workplace | 2 | 3 | 25 | 14.2 | O1 (Science and Technology) |
| Y/505/5363 | Applications of Chemical Substances | 2 | 5 | 30 | 2.1 | O1 (Science and Technology) |
| D/505/5364 | Applications of Physical Science | 2 | 5 | 40 | 2.1 | O1 (Science and Technology) |
| F/505/5387 | Chemical Analysis and Detection | 2 | 5 | 40 | 2.1 | O1 (Science and Technology) |
| J/505/5388 | Investigating Human Behaviour | 2 | 5 | 40 | 2.1 | O1 (Science and Technology) |
| H/505/5365 | Electronic Devices and Communications Applications | 2 | 6 | 48 | 2.1 | O1 (Science and Technology) |
| R/505/5409 | Investigating a Crime Scene | 2 | 6 | 48 | 2.1 | O1 (Science and Technology) |

Gateway Qualifications Level 2 Extended Certificate In Applied Science and Technology

To achieve the Gateway Qualifications Level 2 Extended Certificate In Applied Science and Technology, learners must achieve a total of 27 credits. At least 12 credits must be achieved from Mandatory Group (M) and 3 credits from group O1 Science and Technology. The remaining 12 credits can be achieved from Group M or Group O1.

| Unit Number | Title | Level | Credit Value | GLH | Subject Sector code | Group Name |
|-------------|--|-------|--------------|-----|---------------------|-----------------------------|
| D/505/5350 | Chemistry and Our Earth | 2 | 6 | 48 | 2.1 | M (Mandatory) |
| H/505/5351 | Energy and Our Universe | 2 | 6 | 48 | 2.1 | M (Mandatory) |
| K/505/5352 | Biology and Our Environment | 2 | 6 | 48 | 2.1 | M (Mandatory) |
| M/505/5353 | Electronics in Action | 2 | 6 | 48 | 2.1 | M (Mandatory) |
| T/505/5354 | Working in Science and Technology | 2 | 3 | 24 | 2.1 | O1 (Science and Technology) |
| A/505/5355 | Science in the World | 2 | 5 | 40 | 2.1 | O1 (Science and Technology) |
| F/505/5356 | Environmental Science | 2 | 6 | 48 | 2.1 | O1 (Science and Technology) |
| J/505/5357 | The Living Body | 2 | 6 | 48 | 2.1 | O1 (Science and Technology) |
| R/505/5359 | Science in Medicine | 2 | 4 | 36 | 2.1 | O1 (Science and Technology) |
| J/505/5360 | Using Mathematical Tools in Science and Technology | 2 | 3 | 24 | 2.1 | O1 (Science and Technology) |
| L/505/5361 | Carrying Out a Science or Technology Project | 2 | 6 | 48 | 2.1 | O1 (Science and Technology) |
| R/505/5362 | Healthy Living | 2 | 3 | 24 | 2.1 | O1 (Science and Technology) |
| H/504/6312 | Effective Communication in the Workplace | 2 | 3 | 30 | 14.2 | O1 (Science and Technology) |
| J/504/6318 | Using ICT in the Workplace | 2 | 3 | 25 | 14.2 | O1 (Science and Technology) |

| Unit Number | Title | Level | Credit Value | GLH | Subject Sector code | Group Name |
|-------------|--|-------|--------------|-----|---------------------|-----------------------------|
| Y/505/5363 | Applications of Chemical Substances | 2 | 5 | 30 | 2.1 | O1 (Science and Technology) |
| D/505/5364 | Applications of Physical Science | 2 | 5 | 40 | 2.1 | O1 (Science and Technology) |
| F/505/5387 | Chemical Analysis and Detection | 2 | 5 | 40 | 2.1 | O1 (Science and Technology) |
| J/505/5388 | Investigating Human Behaviour | 2 | 5 | 40 | 2.1 | O1 (Science and Technology) |
| H/505/5365 | Electronic Devices and Communications Applications | 2 | 6 | 48 | 2.1 | O1 (Science and Technology) |
| R/505/5409 | Investigating a Crime Scene | 2 | 6 | 48 | 2.1 | O1 (Science and Technology) |

Gateway Qualifications Level 2 Diploma In Applied Science and Technology

To achieve the Gateway Qualifications Level 2 Diploma In Applied Science and Technology, learners must achieve a total of 39 credits. At least 18 credits must be achieved from Mandatory Group (M) and 15 credits from Group O1 Science and Technology. The remaining 6 credits can be achieved from Group M or Group O1.

| Unit Number | Title | Level | Credit Value | GLH | Subject Sector code | Group Name |
|-------------|-----------------------------------|-------|--------------|-----|---------------------|-----------------------------|
| D/505/5350 | Chemistry and Our Earth | 2 | 6 | 48 | 2.1 | M (Mandatory) |
| H/505/5351 | Energy and Our Universe | 2 | 6 | 48 | 2.1 | M (Mandatory) |
| K/505/5352 | Biology and Our Environment | 2 | 6 | 48 | 2.1 | M (Mandatory) |
| M/505/5353 | Electronics in Action | 2 | 6 | 48 | 2.1 | M (Mandatory) |
| T/505/5354 | Working in Science and Technology | 2 | 3 | 24 | 2.1 | O1 (Science and Technology) |
| A/505/5355 | Science in the World | 2 | 5 | 40 | 2.1 | O1 (Science and Technology) |
| F/505/5356 | Environmental Science | 2 | 6 | 48 | 2.1 | O1 (Science and Technology) |

| Unit Number | Title | Level | Credit Value | GLH | Subject Sector code | Group Name |
|-------------|--|-------|--------------|-----|---------------------|-----------------------------|
| J/505/5357 | The Living Body | 2 | 6 | 48 | 2.1 | O1 (Science and Technology) |
| R/505/5359 | Science in Medicine | 2 | 4 | 36 | 2.1 | O1 (Science and Technology) |
| J/505/5360 | Using Mathematical Tools in Science and Technology | 2 | 3 | 24 | 2.1 | O1 (Science and Technology) |
| L/505/5361 | Carrying Out a Science or Technology Project | 2 | 6 | 48 | 2.1 | O1 (Science and Technology) |
| R/505/5362 | Healthy Living | 2 | 3 | 24 | 2.1 | O1 (Science and Technology) |
| H/504/6312 | Effective Communication in the Workplace | 2 | 3 | 30 | 14.2 | O1 (Science and Technology) |
| J/504/6318 | Using ICT in the Workplace | 2 | 3 | 25 | 14.2 | O1 (Science and Technology) |
| Y/505/5363 | Applications of Chemical Substances | 2 | 5 | 30 | 2.1 | O1 (Science and Technology) |
| D/505/5364 | Applications of Physical Science | 2 | 5 | 40 | 2.1 | O1 (Science and Technology) |
| F/505/5387 | Chemical Analysis and Detection | 2 | 5 | 40 | 2.1 | O1 (Science and Technology) |
| J/505/5388 | Investigating Human Behaviour | 2 | 5 | 40 | 2.1 | O1 (Science and Technology) |
| H/505/5365 | Electronic Devices and Communications Applications | 2 | 6 | 48 | 2.1 | O1 (Science and Technology) |
| R/505/5409 | Investigating a Crime Scene | 2 | 6 | 48 | 2.1 | O1 (Science and Technology) |
| F/507/4960 | Improving own Employability Skills in Science and Technology | 2 | 3 | 24 | 14.2 | O1 (Science and Technology) |

3.4 Grading

The assignments submitted by learners must achieve the learning outcomes and meet the standards specified by the assessment criteria for the unit as outlined below. To achieve a merit or distinction grade, the learners must demonstrate that they have achieved all the criteria set for these grades. Where work for the pass standard is marginal, assessors can take account of any extension work completed by the learners.

| | |
|---------------------------------|---|
| To achieve a Pass | <ul style="list-style-type: none"> • learners must evidence all Pass criteria from the assessment and grading grid |
| To achieve a Merit | <ul style="list-style-type: none"> • learners must evidence all Pass and Merit criteria from the assessment and grading grid • should a learner achieve some of the Merit criteria but not all, this would provide the opportunity for additional guidance to enable the learner to progress all work to the required standard to achieve all the Merit criteria • partial achievement of the Merit criteria cannot attract the Merit grade. |
| To achieve a Distinction | <ul style="list-style-type: none"> • learners must evidence all Pass, Merit and Distinction criteria from the assessment and grading grid • Distinction criteria are qualitative extensions of the Merit criteria • should a learner achieve some of the Distinction criteria but not all, this would provide the opportunity for additional guidance to enable the learner to progress all work to the required standard to achieve all the Distinction criteria • partial achievement of the Distinction criteria cannot attract the Distinction grade. |

The qualification grade will be automatically calculated for learners when the learner unit grades are submitted by a centre. The overall grade is calculated based on the rules of combination for the qualification, in the following way:

1. The grade is converted to a number of points per credit (see table below).
2. The units required to meet the rules of combination are selected and the points allocated per credit are applied.
3. If the amount of credit needed for the qualification is less than the amount of credit achieved by the learner, i.e. the learner has overachieved, the total number of points will be adjusted. This will be calculated as a proportion of the total number of credits achieved by the required number of credits to complete the overall grade:

$$\frac{\text{No. of credits required}}{\text{No. of credits achieved}} \times \text{Total No. of Points} = \text{Adjusted Points Total}$$

No. of credits achieved

4. Any surplus credits will be listed on the credit transcript.
5. Number of points are totalled and the overall grade applied according to the 'qualification grade' table.

The table below shows the **number of points scored per credit** at the unit level and grade:

| Points per credit | | | |
|-------------------|------|-------|-------------|
| | Pass | Merit | Distinction |
| Level 2 | 5 | 6 | 7 |

Learners who achieve the correct number of points within the ranges show in the 'qualification grade' table below will achieve the qualification merit or distinction grade:

| Points range above pass grade | | | |
|-------------------------------|---------|---------|-------------|
| | Pass | Merit | Distinction |
| Level 2 Award | 30 | 36 | 42 |
| Level 2 Certificate | 75-83 | 84-92 | 93-105 |
| Level 2 Extended Certificate | 135-149 | 150-164 | 165-189 |
| Level 2 Diploma | 195-215 | 216-236 | 237-273 |

Gateway Qualifications monitors the maintenance of qualification standards through its quality assurance activity. In order to maintain standards there may be occasions where it is necessary to change the overall grade threshold. In the event of a change notification will be communicated to centres.

Example 1

A learner completing the Gateway Qualifications Level 2 Certificate In Applied Science and Technology completes a total of 15 credits to gain a pass qualification grade and does not achieve the points to gain a merit grade.

Achievement of pass qualification grade

| | Level | Credit | Grade | Grade Points | Points per unit = credit x grade |
|------------------------------------|---------|-----------|-------|--------------|----------------------------------|
| Chemistry and Our Earth | Level 2 | 6 | Pass | 5 | 6 x 5 = 30 |
| Energy and Our Universe | Level 2 | 6 | Pass | 5 | 6 x 5 = 30 |
| Healthy Living | Level 2 | 3 | Merit | 6 | 3 x 6 = 18 |
| Qualification Points totals | | 15 | | | 78 |

Points Total = 78 = Pass

Example 2

A learner completing the Gateway Qualifications Level 2 Extended Certificate In Applied Science and Technology completes a total of 30 credits, 3 credits more than the required number of credits for the qualification.

| | Level | Credit | Grade | Grade Points | Points per unit = credit x grade |
|--|---------|-----------|-------|--------------|----------------------------------|
| Chemistry and Our Earth | Level 2 | 6 | Merit | 6 | 6 x 6 = 36 |
| Energy and Our Universe | Level 2 | 6 | Pass | 5 | 6 x 5 = 30 |
| Biology and Our Environment | Level 2 | 6 | Merit | 6 | 6 x 6 = 36 |
| Environmental Science | Level 2 | 6 | Merit | 6 | 6 x 6 = 36 |
| Healthy Living | Level 2 | 3 | Pass | 5 | 3 x 5 = 15 |
| Using Mathematical Tools in Science and Technology | Level 2 | 3 | Merit | 6 | 3 x 6 = 18 |
| Qualification Points totals | | 30 | | | 171 |

Adjustment (rounded to 1 whole number):

27 credits required x 171 Points Total Points= **154 Adjusted Points Total** = Merit

30 credits achieved

3.5 Recognition of prior learning

Recognition of Prior Learning (RPL) provides learners and Centres with an alternative assessment method by which a learner's previous achievements can meet the assessment requirements for a unit/qualification through the knowledge, understanding or skills that they already possess and so, do not need to develop these through a course of learning.

It enables the recognition of achievement from a range of activities using any valid assessment methodology. Provided that the assessment requirements of a given unit or qualification have been met, the use of RPL is acceptable to contribute to a unit, units or a whole qualification according to the RPL criteria for a given qualification.

*The recognition of prior learning is permitted for this qualification and includes the prior attainment of units on a qualification offered by Gateway Qualifications, e.g. where a learner progresses from a smaller qualification to a larger qualification and where the qualifications have shared content such as an Award, Certificate and/or Diploma.

Centres should refer to the Gateway Qualifications' Recognition of Prior Learning policy and follow the process available on the website.

| Qualification Number | Qualification Title | RPL Permitted |
|----------------------|--|---------------|
| 601/1428/9 | Gateway Qualifications Level 2 Award In Applied Science and Technology | No |
| 601/1402/2 | Gateway Qualifications Level 2 Certificate In Applied Science and Technology* | Yes |
| 601/1403/4 | Gateway Qualifications Level 2 Extended Certificate In Applied Science and Technology* | Yes |

| Qualification Number | Qualification Title | RPL Permitted |
|----------------------|---|---------------|
| 601/1404/6 | Gateway Qualifications Level 2 Diploma In Applied Science and Technology* | Yes |

3.6 Links to other qualifications

The qualifications are for learners interested in Science and Technology but who have not studied or achieved GCSEs in these subjects. It is part of a coherent suite of qualifications that Gateway Qualifications has developed in Science, Technology and Engineering. It is intended to give learners the knowledge, understanding and skills that will enable them to progress to further learning or training qualifications in a Science and Technology related area including Engineering at a higher level and supports the Government's Industrial Strategy in the following sector subject areas: aerospace; automotive; life sciences; agricultural technologies; nuclear.

It is unique to other qualifications available as the qualification includes both subject specific learning and the opportunity to develop and gain recognition for generic employability skills through the achievement of units from other Gateway Qualifications' qualifications including Personal Learning and Thinking skills, as well as opportunities to develop and apply English and Maths skills, therefore providing a firm employability basis which will be of use in any workplace.

4. Assessment

The following are in addition to the standard assessment and quality assurance requirements set out in the Gateway Qualifications Centre Handbook.

4.1 Method of assessment

The method of assessment for the qualifications is through a portfolio of evidence.

4.2 Assessment language

This qualification is assessed in English only.

4.3 Assessment materials

There are no specific assessment materials provided for this qualification.

4.4 Access Arrangements, Reasonable Adjustments and Special Considerations

Gateway Qualifications and recognised centres have a responsibility to ensure that the process of assessment is robust and fair and allows the learner to show what they know and can do without compromising the assessment criteria.

Gateway Qualification has a duty to permit a reasonable adjustment where an assessment arrangement would put a disabled person at a substantial disadvantage in comparison to someone who is not disabled.

The following adaptations are examples of what may be considered for the purposes of facilitating access, as long as they do not impact on any competence standards being tested:

- adapting assessment materials;
- adaptation of the physical environment for access purposes;
- adaptation to equipment;
- assessment material in an enlarged format or Braille;
- assessment material on coloured paper or in audio format;
- British Sign Language (BSL);
- changing or adapting the assessment method;
- changing usual assessment arrangements;
- extra time, e.g. assignment extensions;
- language modified assessment material;
- practical assistant;
- prompter;
- providing assistance during assessment;
- reader;
- scribe;
- transcript;
- use of assistive software;
- using assistive technology;
- use of CCTV, coloured overlays, low vision aids;

- use of a different assessment location;
- use of ICT/responses using electronic devices.

It is important to note that not all of the adjustments (as above) will be reasonable, permissible or practical in particular situations. The learner may not need, nor be allowed the same adjustment for all assessments.

Learners should be fully involved in any decisions about adjustments/adaptations. This will ensure that individual needs can be met, whilst still bearing in mind the specified assessment criteria for a particular qualification.

A reasonable adjustment for a particular learner may be unique to that individual and may not be included in the list of available access arrangements specified above.

Special Considerations

Requests for special consideration should be submitted as soon as possible. Please refer to the [Reasonable Adjustments and Special Consideration Policy](#)

5. Centre Recognition and Qualification Approval

5.1 Centre Recognition

Both centre recognition and qualification approval must be gained before centres are permitted to deliver these qualifications. Guidance on the centre recognition and qualification approval processes is available on the website:

<https://www.gatewayqualifications.org.uk/advice-guidance/help-admin-tasks/centre-recognition/>

5.2 Qualification-specific centre requirements

Centres must ensure that they have the appropriate resources in place when delivering performance units from vocational areas.

In the delivery of qualification and units to pre-16 learners centres are required to exercise due diligence in respect of the following:

- the learner's needs and access to information and advice about the units offered and how the course of learning will meet their needs;
- the learner's present capacity to undertake the tasks set by tutors, and tutors understanding of how particular tasks accord with the assessment criteria for the unit;
- tutors should be fully conversant with the qualification and unit specification/s offered to learners, where clarification is required the centre should consult with the assigned Quality Reviewer for further advice and guidance in the delivery of units and refer to the Centre Handbook and Reasonable Adjustment and Special Consideration policy and guidance.
- centres will be required to have appropriate and up to date risk assessments and ensure that appropriate support and supervision is provided; appropriate subject specialist knowledge should be consulted where the possibility of harm to learners is identified; this will be monitored through Gateway Qualifications' quality assurance process.
- the centre contact for the unit/qualification being delivered must ensure that all procedures relating to the delivery of the unit/qualification operate effectively in the centre.

5.3 Qualification-specific tutor/assessor requirements

There are no additional internal/external quality assurance requirements for this/these qualification/s.

Tutor/Assessors must be fully qualified and experienced in the subject area in which they are delivering, details of which must be provided to Gateway Qualifications as part of the Qualification Approval application.

6. Quality Assurance

6.1 Qualification-specific quality assurance requirements

There are no additional internal/external quality assurance requirements for this/these qualification/s.

6.2 Malpractice

Malpractice is any deliberate activity, neglect, default or other practice that compromises the integrity of the internal and external assessment process, and/or the validity of certificates. It covers any deliberate actions, neglect, default or other practice that compromises, or could compromise:

- the assessment process
- the integrity of a regulated qualification
- the validity of a result or certificate
- the reputation and credibility of Gateway Qualifications
- the qualification to the public at large.

Centre staff should be familiar with the contents of Gateway Qualifications Malpractice and Maladministration Policy, <https://www.gatewayqualifications.org.uk/wp-content/uploads/2017/10/Malpractice-and-Maladministration-Policy.pdf>

6.3 . Additional requirements/guidance

There are no additional requirements that Learners must satisfy in order for assessment to be undertaken and the unit/qualification to be awarded.

7. Learner Registration and Results

7.1 Registration

Centres will register learners via the Gateway Qualifications' online registration portal. Learner registration guidance is available on our website, <https://www.gatewayqualifications.org.uk/advice-guidance/help-admin-tasks/registering-learners/>.

7.2 Issuing results

Results for learners who do not reach the minimum standard for a pass will be recorded as fail.

7.3 Enquiries

Enquiries about assessment decisions should be made once the centre has followed its internal enquiries and appeal procedures.

Contact details are available on our website:
<https://www.gatewayqualifications.org.uk/contact-us/>

8. What to do next

For existing centres please contact your named Development Manager or Development Officer.

Tel: 01206 911211

Email: enquiries@gatewayqualifications.org.uk

9. Gateway Qualifications

Gateway Qualifications, a not for profit registered charity, is an Awarding Organisation based in Colchester.

We work with learning providers and industry experts to design and develop qualifications that benefit the learner and the employer.

We support flexible, responsive and quality assured learning opportunities whether it's in the classroom, at work, in the community or through distance learning.

We are recognised by Ofqual, to design, develop and submit qualifications to the Regulated Qualifications Framework (RQF).

10. Appendices

10.1 Appendix 1 – Unit Details

Chemistry and Our Earth

| | |
|-------------------------------|------------|
| Level: | Level 2 |
| Credit Value: | 6 |
| GLH: | 48 |
| Unit Reference Number: | D/505/5350 |

This unit has 4 learning outcomes.

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|---|---|---|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 1. Know how uses of chemical substances depend upon their chemical and physical properties. | 1.1 Describe physical and chemical properties of chemical substances. 1.2 Describe how chemical substances are used based on their physical properties. 1.3 Describe how chemical substances are used based on their chemical properties. | M(i) Explain how physical and chemical properties of chemical substances make them suitable for their uses. | D(i) Explain why a range of chemical substances have particular physical properties. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|---|---|--|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 2. Know about chemical reactivity and bonding. | 2.1 Describe the physical and chemical properties of group 1 and 7 elements. 2.2 Describe the formation of ionic compounds in terms of electron transfer. 2.3 Describe the formation of covalent compounds in terms of electron sharing. 2.4 Relate properties of typical ionic and covalent compounds to their bonding. | | D(ii) Explain how the properties of given elements and compounds relate to their atomic and molecular structure respectively. |
| 3. Be able to investigate the factors that affect the rate of chemical reactions. | 3.1 Describe the factors that can affect the rates of chemical reactions. 3.2 Carry out an investigation to establish how factors affect the rates of chemical reactions. | M(ii) Explain how given factors affect the rate of chemical reactions. | |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|---|--|--|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 4. Know the factors that are affecting the Earth and its environment. | 4.1 Describe human activities that are affecting the Earth and its environment. 4.2 Describe natural factors that have changed the surface and atmosphere of the Earth over time. | M(iii) Explain how a range of human activities are affecting the Earth and its environment. M(iv) Explain how natural factors have changed the surface and atmosphere of the Earth over time. | D(iii) Make predictions as to how human activities and/or natural factors might affect the Earth and its environment in the future. |

Indicative Content: Chemistry and Our Earth**Learning Outcome 1:**

Learners might start by locating and naming chemicals found in their own environment, such as the workplace and finding out the properties of such chemicals. They could then move on to relating the properties of these chemicals to their uses.

Learning Outcome 2:

Learners might research common chemicals found in the workplace to discover their structure and how they interact with other chemicals. Examples of these might include water, its polarity and uses in dissolving, nitrogen and its use in food preservation, e.g. crisps, dry ice and its use in lowering temperatures.

Learning Outcome 3:

Learners should carry out investigations into the factors that affect the rate of reaction such as temperature, concentration of reagents and products. Examples of reactions learners might investigate include calcium carbonate and acid (linking to acid rain [L/O4]), iron to an iron oxide (linking to rusting [L/O4]), carbonates and acids (linking to indigestion remedies).

Learning Outcome 4:

Learners could research how the Earth evolved over time in terms of its structure and chemical composition today and develop a video clip or storyboard demonstrating their knowledge and understanding. They could investigate, through further research, how specific factors and human activities affect the Earth leading to either acid rain or global warming or depletion in the ozone layer. These should be related to the workplace where possible and include any risk mitigation taken by the industry.

Energy and Our Universe

| | |
|-------------------------------|------------|
| Level: | Level 2 |
| Credit Value: | 6 |
| GLH: | 48 |
| Unit Reference Number: | H/505/5351 |

This unit has 6 learning outcomes.

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|---|---|---|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 1. Be able to investigate energy transformations. | 1.1 Carry out practical investigations that demonstrate how various types of energy can be transformed. | <p>M(i) Describe the energy transformations and identify useful and non-useful energy changes in these investigations.</p> <p>M(ii) Draw Sankey diagrams to represent various energy transformations.</p> | <p>D(i) Explain how non-useful energy transformations in the home or workplace can be minimised.</p> <p>D(ii) Explain how minimising non-useful energy transformations can reduce the impact on the environment.</p> |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|---|--|--|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 2. Know properties and applications of waves and radiation. | 2.1 Describe the trends and patterns in the electromagnetic spectrum. 2.2 Give examples of radio and light radio waves being used in communication. | M(iii) Explain the trends and patterns in the electromagnetic spectrum. M(iv) Explain the advantages of wireless communication. | D(iii) Compare and contrast two different communication systems, e.g. those that use light waves with radio waves or wired with wireless. |
| 3. Know properties and applications of ionising radiations. | 3.1 Describe different types of ionising radiations. 3.2 Identify one application of each of the ionising radiations in the modern world. 3.3 Describe the benefits that using ionising radiations brings to the modern world. | M(v) Compare the benefits and drawbacks of using ionising radiations. | D(iv) Explain how the safety mechanisms needed when using ionising radiations work. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|---|---|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 4. Know how electrical energy that is generated from different sources can be transferred to electric circuits in the home and industry. | <p>4.1 Describe methods of generating electricity from different energy sources.</p> <p>4.2 Describe the stages involved in transferring electrical energy from a power station to homes or industry.</p> | <p>M(vi) Compare the efficiency and environmental impact of electricity generated by different sources.</p> <p>M(vii) Assess, in qualitative terms, ways to minimise 'energy losses' when generating electricity.</p> | <p>D(v) Assess in quantitative terms, ways to minimise 'energy losses' when generating electrical energy.</p> |
| 5. Know the components of the solar system and the way the universe is changing. | <p>5.1 Explain the structure of the universe and our solar system.</p> <p>5.2 Identify trends and patterns in given quantitative data about the components in the solar system.</p> <p>5.3 Identify evidence that shows the dynamic nature of the universe.</p> | <p>M(viii) Describe and compare scientific evidence that exists to show how the universe is changing.</p> | <p>D(vi) Analyse trends and patterns in given quantitative data about the components in the solar system to make predictions.</p> |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|--|---|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 6. Know the methods used to explore space. | 6.1 Describe different methods used to observe the universe. | M(ix) Describe the suitability of different methods for observing the universe. | |

Indicative Content: Energy and Our Universe**Learning Outcome 1:**

Learners might start by locating energy transformations found in their own environment, such as the workplace. They could then move on to considering the useful and non-useful energy transformations within these and think about how non-useful transformations might be minimised.

Learning Outcome 2:

Learners might research trends and patterns in the electromagnetic spectrum and try to explain these. They might go on to develop comparisons between communication systems used in the workplace such as radio waves and light waves or wired and wireless communications.

Learning Outcome 3:

Learners could think about any ionising radiations they have come across in their everyday lives including the workplace and research others to develop an understanding of the different types and their uses. Further work should consider the benefits and drawbacks of using ionising radiations.

Learning Outcome 4:

Learners could research energy resources used in the UK and investigate the resources used to generate electricity in their home, college and workplace. They should research how a resource is used for electricity generation and compare this to how another resource is used, e.g. nuclear and wind power, in terms of efficiency and environmental impact.

Learning Outcome 5:

Indicative Content: Energy and Our Universe

Learners could research to improve their understanding of the components and structure of the solar system. They should investigate any patterns and trends in this information and data and develop their own ideas as to the dynamic nature of the solar system, possibly making predictions as to the future of the solar system.

Learning Outcome 6:

Learners might express their knowledge of the methods used to explore space and research to find further examples. They could focus on one element of space explorations, e.g. space shuttles, radio telescopes, and weigh up the pros and cons of such a space exploration method.

Biology and Our Environment

| | |
|-------------------------------|------------|
| Level: | Level 2 |
| Credit Value: | 6 |
| GLH: | 48 |
| Unit Reference Number: | K/505/5352 |

This unit has 5 learning outcomes.

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|---|--|--|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 1. Know about the functioning of organisms. | 1.1 Describe the functions of the main organs and systems in plants and animals and relate this to their structure. 1.2 Describe how the structure and function of an organ relates to the genes of the organism. | M(i) Describe how the structure and function of an organ relates to the genes of the organism particularly when there is a genetic disorder in humans. | D(i) Compare and contrast the 'normal' structure and functions of organs and systems with those of a human with a particular genetic disorder. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|---|--|---|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 2. Be able to classify organisms. | 2.1 Use simple identification keys to classify organisms. 2.2 Identify the features of organisms from the different kingdoms. 2.3 Classify organisms using these features. | M(ii) Describe how classification systems have been modified over time. | D(ii) Explain why given organisms could fit into more than one kingdom. |
| 3. Know about the relationship of organisms with their environment. | 3.1 Describe the interdependence of organisms in terms of food webs. 3.2 Describe how given organisms are adapted to a particular environment. | M(iii) Describe the interdependence of organisms in terms of pyramids of numbers and biomass. M(iv) Explain why adaptations of organisms are essential for survival in a particular environment. | D(iii) Describe the interdependence of organisms in terms of pyramids of energy, including relative efficiency of energy transfers between trophic levels. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|---|---|---|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 4. Understand the effects of human activity on the environment and how these effects can be measured. | 4.1 Describe the impact that different human activities have on ecosystems. 4.2 Describe how living and non-living indicators can be used to measure levels of pollutants. 4.3 Describe the different methods used to help reduce the impact of human activities on ecosystems. | M(v) Discuss the advantages and disadvantages of methods used to reduce the impact of human activity on ecosystems. | D(iv) Evaluate the success of methods to reduce the impact of human activity on an ecosystem for a given environment. |
| 5. Know the factors which can affect and control human health. | 5.1 Describe the different internal and external factors that affect human health. 5.2 Identify the control mechanisms which enable the human body to maintain optimal health. | M(vi) Explain how selected medical, social and inherited factors disrupt body systems to cause ill health. | D(v) Evaluate the social issues which arise from ill health caused by the selected medical, social and inherited factors. |

Indicative Content: Biology and Our Environment**Learning Outcome 1:**

Learners might start by researching to find additional information about the organs of the human body and their functions. They might investigate how genes dictate the structure and functions of organs. Further research on a particular genetic disorder, such as muscular dystrophy, cystic fibrosis, Down's syndrome, haemophilia etc. should lead learners to compare and contrast the relevant organs of people with these disorders to those without the disorder.

Learning Outcome 2:

Learners should be given opportunities to investigate the way organisms are classified today and historically how this classification system has been developed. They might practise classifying organisms on their observable characteristics from specimens or images. Eventually, learners might be able to recognise the problems with such classification systems by studying organisms that fit into more than one classification category, examples here might include Euglena and slime moulds.

Learning Outcome 3:

Learners should study food chains and food webs to gain an understanding of the transfer of food (biomass) and therefore energy. If possible, fieldwork could cement this understanding and include studies of pyramids of energy and biomass. Eventually, learners might be able to describe and explain energy efficiencies in food chains and food webs in terms of the underlying science.

Learners could research adaptations of organisms to best suit their environment. They could utilise their creative thinking skills when inventing a new organism that would survive in a fictitious alien environment.

Indicative Content: Biology and Our Environment**Learning Outcome 4:**

A fieldwork study of a local environment would be an ideal starting point. Reviewing human influences on this environment would allow learners to weigh-up the positive and negative impacts. Examples of such local environments might be a park, river, stream, waste land, farmland, seashore, pond etc. Within this fieldwork, learners could measure/assess abiotic and biotic factors and possibly use indicator surveys, such as lichen distribution. If fieldwork is not possible, there are many online interactive resources that can be used instead.

Learning Outcome 5:

Learners could research to improve their understanding of the factors that affect human health. To demonstrate their understanding, they could produce factsheets or posters. Learners should be given opportunities to investigate control mechanisms in the body that reduce the possibilities of ill-health. Simple examples might include the reflex response to prevent burning, passive immune response such as the skin as a barrier, sneezing to dispel particles in the nose etc. and active immune response in terms of antibodies produced against a pathogen. Detail of these control mechanisms is not necessary but an understanding of what they are and how they work is essential. Learners could research the causes of ill-health in terms of medical, social and inherited factors with a focus on one of each type of factor, e.g. medical – insulin production and diabetes, body dysmorphia – anorexia nervosa; social – malnutrition, poor hygiene; inherited – haemophilia, type 1 diabetes, cystic fibrosis. Eventually, learners might be able to evaluate the social issues that arise from these factors.

Electronics in Action

| | |
|-------------------------------|------------|
| Level: | Level 2 |
| Credit Value: | 6 |
| GLH: | 48 |
| Unit Reference Number: | M/505/5353 |

This unit has 4 learning outcomes.

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|--|---|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 1. Know the components used in electronic systems. | 1.1 Use circuit symbols to identify components of an electronic circuit. 1.2 Identify the specific requirements of some electronic components e.g. need to be connected the correct way round. 1.3 Identify the components that are used as input transducers, processors and output transducers in simple electronic systems. | M(i) Describe the action of a sensing component as part of an input transducer in an electronic system. M(ii) Describe the action of an output transducer as part of an electronic system. M(iii) Describe the action of a processor in a simple electronic system. | D(i) Explain the action of a sensing component as part of an input transducer in an electronic system. D(ii) Explain the action of an output transducer as part of an electronic system. D(iii) Explain the action of a processor in a simple electronic system. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|--|--|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 2. Be able to carry out electrical measurements on electronic circuits safely. | 2.1 Identify the appropriate range required on a multi-meter to make a measurement. 2.2 Measure the resistance of a given resistor using the ohms range. | M(iv) Measure the resistance of a number of resistors using the ohms range. M(v) Measure the voltage across a resistor, input transducer and output transducer in an electronic circuit safely. | |
| 3. Be able to safely construct an electronic system to help solve an identified problem. | 3.1 Identify the input, processor and output of an electronic system. 3.2 Produce and use a drawing (systems or circuit) which will support the construction of the electronic solution to an identified problem. 3.3 Assemble an electronic system, which contains an active device that could be used to help solve an identified problem. | M(vi) Identify the input, processor and output of an electronic system to help solve an identified problem. M(vii) Explain how the electronic system will help solve the identified problem. | D(iv) Describe the limitations of the working electronic system. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|---|--|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 4. Be able to assess the constructed electronic system safely. | 4.1 Perform an electrical test on the constructed electronic system safely. | M(viii) Explain the outcomes of the electrical test. | D(v) Explain how the working electronic system can be further improved. |

Indicative Content: Electronics in Action**Learning Outcome 1:**

Learners might research to find the types of electronic components that can be used and divide them into two groups; discrete electronic components (e.g. resistors, capacitors, diodes, transistors) and integrated circuits (ICs) (e.g. with the functions as - timers, counters, logic gates, operational amplifiers (op-amps)).

Learning Outcome 2:

Learners should develop an understanding of the use of a multimeter to measure current, voltage and resistance. They should use this knowledge practically to safely measure, recognising the correct range to use. Learners could then measure the voltage across a resistor, input transducer and output transducer in an electronic circuit safely.

Learning Outcome 3:

Learners should be able to identify the input, processor and output of an electronic system. They should be given a problem to solve and draw systems or circuit drawings/diagrams to build an electronic system with an active device to try and solve the problem. Once built, learners might explain how their solution works and consider its limitations.

Examples of problems might include:

Problem1 – It can be dangerous if a passenger in a car opened a car door without the knowledge of the driver. Design an electronic system to automatically switch on an alarm when a door of a car is opened.

Problem 2 – Some local authorities have decided to reduce the amount of street lighting at night. A local home owner wants to fit an automatic electronic system which will switch on a lamp outside his house as soon as it gets dark.

Indicative Content: Electronics in Action**Learning Outcome 4:**

Learners should understand the function, features and characteristics of electronic test equipment. They should be given practical opportunities to carry out electronic testing on the electronic system they have built to solve the given problem. Learners might be able to assess the electronic system safely and explain how it will solve the problem, eventually going on to identify possible limitations and further improvements.

Working in Science and Technology

| | |
|-------------------------------|------------|
| Level: | Level 2 |
| Credit Value: | 3 |
| GLH: | 24 |
| Unit Reference Number: | T/505/5354 |

This unit has 5 learning outcomes.

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|---|--|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 1. Know how a science or technology based organisation operates. | 1.1 Describe the structure of a selected organisation. 1.2 Outline the functions of different departments of a selected organisation and how they work with each other to meet the aims of the organisation. | M(i) Explain how the different departments of a selected organisation work with each other to meet the aims of the organisation. | D(i) Evaluate the impact of the selected organisation on the science or technology and local community. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|---|--|--|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 2. Know about the product development process in science or technology. | 2.1 Outline the key features of the product development process in science or technology. | M(ii) Explain the key features of the product development process in science or technology. | |
| 3. Know the duties and responsibilities of a junior technician or assistant practitioner in a science or technology based organisation. | 3.1 Describe the typical duties and responsibilities of a junior science technician or assistant practitioner. | M(iii) Compare the duties and responsibilities of junior technicians/assistant practitioners in different science or technology based organisations. | |
| 4. Know the personal, communication and ICT skills needed to work in a science or technology based organisation. | 4.1 Outline the personal, communication and ICT skills required by junior technicians/assistant practitioners within a science or technology based organisation. 4.2 Explain why these skills are needed. | M(iv) Describe how the personal communication and ICT skills of a junior technician/assistant practitioner contribute to the work of a science or technology based organisation. | D(ii) Evaluate how well own personal communication and ICT skills could contribute to a science or technology based organisation and any required future personal training |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|---|--|--|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 5. Know about health and safety working practices and procedures within a science or technology based organisation. | <p>5.1 Outline key health and safety working practices and procedures within a science or technology organisation and why they are important.</p> <p>5.2 Identify the health and safety legislation which relates to working within a science or technology based organisation.</p> <p>5.3 Outline the responsibilities of an individual worker for health and safety within a science or technology based organisation.</p> | <p>M(v) Explain key health and safety working practices and procedures within a science or technology based organisation and why each is important.</p> <p>M(vi) Review a given science or technology based organisation's health and safety policy to suggest improvements.</p> | D(iii) Explain some of the potential consequences of not following health and safety working practices and procedures within a science or technology based organisation. |

Indicative Content: Working in Science and Technology**Learning Outcome 1:**

Learners might focus on the workplace or be given a choice of local science or technology organisations to research. They should find out the structure of the chosen organisation and the functions of the departments within the organisation. Once the structure is established, learners might develop flow charts or concept maps to demonstrate their understanding of how the different departments work together to meet the aims of the organisation. Eventually, learners might survey the local community or do further research to evaluate how the organisation impacts on the local community.

Learning Outcome 2:

Learners might research the product development process and represent their understanding in an annotated flow chart. They could then be given a selected product, choose a product from a given list or within the workplace, and apply their understanding to that selected product. Learners could then be given opportunities to explain each step of the process and its importance to product development.

Learning Outcome 3:

Learners might focus on their own workplace role (as a junior technician or assistant practitioner) or be given a suggested role in a local science or technology organisation to study. It would be wise for the organisation chosen to be the same as that used for LO1. Learners should be able to describe the role including its typical duties and responsibilities. Eventually, learners could compare this role with that in other science and technology organisations.

Learning Outcome 4:

Indicative Content: Working in Science and Technology

Using the junior technicians /assistant practitioners role explored in LO3, learners should outline the personal, communication and ICT skills required and explain why these skills are needed. Learners could then go on to explain how these skills contribute to the work of the science or technology organisation through research or surveying others within this role in the organisation. Eventually, learners could evaluate their own personal, communication and ICT skills to review how these skills fit with those needed for the role of a junior technicians /assistant practitioners and suggest further training they would require to meet these skills requirements. For example, learners might note that skills in using Excel are required for the role and that their own skills in this area need improvement.

Learning Outcome 5:

Learners should be able to investigate their chosen science or technology organisation further and outline the key health and safety working practices and procedures and relevant legislation stating why these are important. They should research to outline the responsibilities of an individual worker for health and safety. For example, learners might have chosen, for LO3, a junior technician in a laboratory-based organisation which utilises poisonous or corrosive chemicals, therefore risk assessments and mitigations would be in place. Learners could go on to explain the key health and safety working practices and procedures within the organisation and why each is important, from personal or online research. They might review the organisation's health and safety policy and suggest improvements. This would be especially pertinent if learners were in the workplace. Eventually, learners might develop flow charts or concept maps to show the consequences of not following health and safety working practices. For example, in a laboratory-based organisation, learners might look at the risk assessments of using corrosive chemicals and suggest the consequences of not following guidelines.

Science in the World

| | |
|-------------------------------|------------|
| Level: | Level 2 |
| Credit Value: | 5 |
| GLH: | 40 |
| Unit Reference Number: | A/505/5355 |

This unit has 3 learning outcomes.

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|---|---|---|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 1. Know the factors that can influence scientific progress. | 1.1 Identify the factors that have influenced the progress of different scientific discoveries identified. 1.2 Identify one scientific discovery or advancement which has not made the expected progress and give a brief description of its progress. | M(i) Describe how external factors can influence scientific progress. M(ii) Explain why one identified scientific discovery or advancement has not made the expected progress. | D(i) Evaluate how external factors can influence scientific progress. D(ii) Evaluate why an identified scientific progress or advancement has been very successful and why another has been less successful. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|--|---|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 2. Understand how science is represented in the media. | 2.1 Describe how different media publications have reported a selected controversial scientific topic. 2.2 Outline the scientific based evidence in each of the media articles on the selected topic which supports the views expressed. 2.3 Explain why one media publication might explain a science story differently from another. | M(iii) Compare and contrast how a recent controversial scientific topic was reported by a variety of media publications. M(iv) Explain why the various media sources regarded this topic as controversial. | D(iii) Evaluate the strengths and weaknesses in the scientific evidence presented in a range of media coverage on a recent controversial scientific topic. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|--|--|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 3 Know how scientific discoveries or advances have been used in society. | 3.1 Outline the impact that different scientific discoveries or advances have had on our lives today. 3.2 Outline the factors contributing to the successful application of different scientific discoveries or advances. 3.3 Outline some of the unintentional consequences of a scientific discovery or advancement. | M(v) Describe some of the evidence which points to the success of identified scientific discoveries or advances. M(vi) Describe how the unintentional consequences of a scientific discovery have had a beneficial or a detrimental effect. | D(iv) Explain why some scientific discoveries or advances have had successful applications in society and some have not. D(v) Evaluate how some detrimental, unintentional consequences of a scientific discovery were overcome. |

Indicative Content: Science in the World**Learning Outcome 1:**

Learners might focus on given scientific discoveries that are relevant to their current preferences or workplace placements. For example, learners working in food technology might review how pasteurisation was first discovered and the factors that influenced its widespread use in wine making and eventually milk pasteurisation. They might also research gene technology, in terms of genetically modified crops and/or biotechnology to produce beer/wine/vinegar. By researching how these methods were first invented, and following their integration into society, learners should be able to identify and describe factors that influence this progress and explain their success. In addition, learners should research unsuccessful inventions, possibly ones like the Sinclair C5 or inventions that had both positive and negative impacts, e.g. nuclear fission/fusion.

Learning Outcome 2:

Learners should review a range of articles from media sources, hard copy or digital. They should describe how different media sources have reported a selected controversial scientific topic, for example genetically modified (GM) crops, stem cell research, fracking etc. When reviewing the articles, learners should be able to extract and review any scientific based evidence to identify the views expressed. When reviewing different articles learners should explain why one media publication might explain a science story differently from another. Eventually, learners should be able to compare and contrast such articles and explain why the media sources decided the selected subject is controversial. In addition, learners could evaluate the strengths and weaknesses in the scientific evidence presented in a range of media coverage on a recent controversial scientific topic.

Learning Outcome 3:

Learners should outline the impact that different scientific discoveries or advances have had on our lives today. For example, they could research electronic devices, such as the mobile phone, tablets etc. They should outline the factors contributing to the successful application of different scientific discoveries or advances possibly by focusing on three or four such applications maybe of radiation, electro-magnetic waves, stem cells etc. Learners could describe some of the evidence which points to

Indicative Content: Science in the World

the success of identified scientific discoveries or advances and explain why some scientific discoveries or advances have had successful applications in society and some have not. Looking at one of their selected scientific discoveries or advancements they should outline some of its unintentional consequences. They could describe how the unintentional consequences of a scientific discovery have had a beneficial or a detrimental effect and evaluate how some detrimental, unintentional consequences of a scientific discovery were overcome.

Environmental Science

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|-------------------------------|------------|
| Level: | Level 2 |
| Credit Value: | 6 |
| GLH: | 48 |
| Unit Reference Number: | F/505/5356 |

This unit has 5 learning outcomes.

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|---|--|--|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 1. Know the importance and functions of the carbon cycle. | 1.1. Outline the importance of the carbon cycle. 1.2. Describe the effects of human intervention on the carbon cycle. | M(i) Describe the carbon cycle and the scientific processes involved. M(ii) Explain the importance of the carbon cycle and how humans can utilise it for their own benefit. | D(i) Analyse the effects of human intervention on the natural carbon cycle that cause local and global changes. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|---|---|--|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 2. Know the importance and functions of the nitrogen cycle. | 2.1. Outline the importance of the nitrogen cycle. 2.2. Outline some of the processes in the nitrogen cycle. | M(iii) Describe the nitrogen cycle. M(iv) Describe the effects of human intervention on the nitrogen cycle. | D(ii) Explain the importance of the nitrogen cycle. D(iii) Explain how human intervention can disrupt the natural nitrogen cycle to benefit humans and to cause global issues. |
| 3. Know the processes that produce undesirable atmospheric changes. | 3.1. Outline different factors that adversely change the atmosphere. 3.2. Describe how both natural processes and human activities produce atmospheric changes. 3.3. Describe how these processes may lead to global warming and/or destruction of the ozone layer. | M(v) Explain current evidence that suggests humans contribute to global warming and/or destruction of the ozone layer. M(vi) Describe the scientific processes involved in this current evidence. | D(iv) Analyse evidential data that quantifies the atmospheric changes caused by humans. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|---|---|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 4. Know the economic and social consequences of pollution caused by humans. | 4.1. Give examples of how humans pollute local environments. 4.2. Outline changes that can be attributed to human pollution locally and globally. | M(vii) Explain how the effects of pollution by humans can be minimised. M(viii) Describe the global effects of human pollution in terms of their economic and social consequences. | D(v) Predict possible social and economic outcomes of continued human pollution over time. |
| 5. Understand the arguments for the continued expansion of recycling programmes. | 5.1. Describe why it is important to recycle aluminium, glass, steel and plastic. 5.2. Described ways that these materials are recycled. 5.3. Outline the reasons for expanding recycling programmes. | M(ix) Assess the relative merits of recycling, reusing and reducing waste. | D(vi) Analyse data related to recycling, reusing and reducing waste to suggest future expansions within the industry. |

Indicative Content: Environmental Science**Learning Outcome 1:**

Learners should be introduced to the carbon cycle in terms of its importance and be able to outline each stage. They should research how humans can intervene in the carbon cycle, for example using combustion/burning trees or bracken to increase carbon dioxide levels and therefore the rate of photosynthesis. Learners could go on to describe how humans can utilise the carbon cycle, in e.g. greenhouses and polytunnels, for their own benefit to increase the rate of plant growth commercially. They could also review researched data to analyse the effects of human intervention on the natural carbon cycle that cause local and global changes.

Learning Outcome 2:

Learners should be introduced to the nitrogen cycle in terms of its importance and be able to outline each stage describing some of the processes involved, such as denitrification (names of bacteria are not required). They could go on to describe the nitrogen cycle and describe how humans can affect it, e.g. use of fertilisers containing nitrates to improve soil quality and so plant growth. In addition, learners could explain the importance of the nitrogen cycle and research in order to explain how human intervention can disrupt the natural nitrogen cycle to benefit humans and to cause global issues. An example of this could be leaching of nitrate fertilisers into water ways causing increased algal growth or exhaust emissions releasing nitrous oxides into the atmosphere.

Learning Outcome 3:

Learners should outline different factors that adversely change the atmosphere, such as combustion, factory and car emissions. They should describe how both natural processes, such as volcanoes and human activities, such as car exhaust emissions and the use of CFCs, produce atmospheric changes. They could research to find current evidence that suggests humans contribute to global warming and/or destruction of the ozone layer. They could also describe the scientific processes involved in this current evidence and analyse evidential data that quantifies the atmospheric changes caused by humans.

Indicative Content: Environmental Science**Learning Outcome 4:**

Learners should be able to give examples of how humans pollute local environments, for example, litter, noise, factory and car emissions and recognise the processes that pollute the air. They should outline changes that can be attributed to human pollution both locally, e.g. trampling of grass on sports fields, and globally e.g. acid rain and global warming. They could go on to explain how the effects of pollution by humans can be minimised in terms of reducing harmful emissions by a reduction in polluting transport and/or by using greener fuels and/or chimney filtration or neutralisation systems. Those working at higher levels might recognise and describe the global effects of human pollution in terms of their economic and social consequences and predict possible social and economic outcomes of continued human pollution over time. An example might be a study of global warming and its consequences over time.

Learning Outcome 5:

Learners should recognise and describe why it is important to recycle aluminium, glass, steel and plastic, and describe ways that they can be recycled, possibly by looking at local recycling schemes

Maintaining the focus on a local recycling scheme, they should outline the reasons for expanding this recycling programmes. Learners could research in order to assess the relative merits of recycling, reusing and reducing waste. They could analyse given data related to recycling, reusing and reducing waste to suggest future expansions within the industry.

The Living Body

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| Level: | Level 2 |
| Credit Value: | 6 |
| GLH: | 48 |
| Unit Reference Number: | J/505/5357 |

This unit has 4 learning outcomes.

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|---|--|---|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 1. Know the role of enzymes as catalysts. | 1.1. Describe the key features of enzymes. 1.2. Outline the role of enzymes as catalysts. | M(i) Describe the involvement of different types of enzymes in metabolic processes. M(ii) Explain the factors affecting the function of enzymes. | D(i) Explain how enzymes fulfil their function. D(ii) Explain how enzymes lower the activation energy required for a reaction. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|--|---|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 2. Understand body systems. | 2.1 Describe the structure of the digestive, respiratory, circulatory and renal systems. 2.2 Outline the function of each system in maintaining health. | M(iii) Explain how the respiratory and circulatory systems interact to maintain body functions. | D(iii) Explain consequences for the body when one of these systems fail. |
| 3 Know how the nervous and endocrine systems work. | 3.1 Describe the components of a simple reflex arc. 3.2 Identify the functions of the main endocrine glands. 3.3 Describe how the nervous and endocrine systems work to coordinate the body systems. | M(iv) Explain how the structure of each of the components in a reflex arc assists in its function. M(v) Describe the functions of given hormones released by each of the endocrine glands. | D(iv) Describe the importance of negative feedback in endocrine control. D(v) Explain how the endocrine and nervous systems work together to maintain homeostasis. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|---|---|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 4 Know the structure and functions of the human reproductive system. | 4.1 Outline the structure and functions of the male and female human reproductive system. | <p>M(vi) Describe the structure and functions of the male and female human reproductive system.</p> <p>M(vii) Describe how gametes are produced.</p> <p>M(viii) Describe fertilization.</p> | <p>D(vi) Explain how the structure of given organs in the male and female human reproductive system are related to their functions.</p> <p>D(vii) Explain why gametes need half the number of chromosomes of somatic cells.</p> <p>D(viii) Describe fertilisation in terms of cellular and intracellular changes.</p> |

Indicative Content: The Living Body**Learning Outcome 1:**

Learners should be able to describe the key features of enzymes, in terms of their size, abundance, chemical nature and size. They should be able to outline the role of enzymes as catalysts, speeding up the rate of reaction yet unaffected by the reaction and therefore can be recycled. Learners should describe the involvement of different types of enzymes in metabolic processes, for example hydrogen peroxide and catalase, amylase and starch digestion. They could explain the factors affecting the function of enzymes and consolidate this by experimental work. Using the lock and key theory they could explain how enzymes fulfil their function and how enzymes lower the activation energy required for a reaction.

Learning Outcome 2:

Learners should be able to describe the structure of the digestive, respiratory, circulatory and renal systems by being able to label given diagrams and outline the function of each system in maintaining health. They could investigate the respiratory and circulatory systems further to explain how they interact to maintain a healthy body in terms of maintenance of respiration in cells and explain the consequences for the body when one of these systems fail, e.g. in a cardiac arrest.

Learning Outcome 3:

Learners should describe the components of a simple reflex arc. They could go on to explain how the structure of each of the components in a reflex arc assists in its function. They should be able to identify the functions of the main endocrine glands, e.g. adrenal, thyroid, pituitary, pancreas, ovaries, testes. Those working at higher levels might go on to describe the functions of given hormones released by each of the endocrine glands, examples of such hormones might include insulin, adrenalin, oestrogen, progesterone and testosterone.

Learners should be able to describe how the nervous and endocrine systems work to coordinate the body systems and maintain a healthy, stable body. They could go on to describe the importance of negative feedback in endocrine control and explain how the endocrine and nervous systems work together to maintain homeostasis.

Indicative Content: The Living Body**Learning Outcome 4:**

Learners should outline the structure, by labelling diagrams, and state the functions of the ovaries, uterus, oviducts, vagina and the testes, epididymis, prostate gland and seminal vesicles, urethra, penis. They could go on to describe the structure and functions of the parts of the male and female human reproductive system and how gametes are produced leading to fertilization (references to copulation are not required). Learners working at higher levels could explain how the structure of given organs, e.g. penis and testes, in the male and, e.g. ovaries and uterus, in the female human reproductive system are related to their functions. They could explain why gametes need half the number of chromosomes of somatic cells referring to meiosis but without detail of the stages of meiosis and describe fertilisation in terms of cellular and intracellular changes.

Science in Medicine

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|-------------------------------|------------|
| Level: | Level 2 |
| Credit Value: | 4 |
| GLH: | 36 |
| Unit Reference Number: | R/505/5359 |

This unit has 3 learning outcomes.

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|---|--|---|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 1. Know about the scientific procedures used in diagnosing illness. | 1.1. Describe different biological and physical procedures used to diagnose illness. | M(i) Describe the step-by-step procedures used to diagnose given illnesses. | D(i) Explain the scientific principles underlying the biological and physical procedures used to diagnose illness. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|---|--|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 2. Know about the scientific principles of treating illnesses and health conditions. | 2.1. Describe the scientific principles underpinning the use of therapeutic drugs to treat given illnesses. 2.2. Describe the scientific principles underpinning the use of physical therapies to treat given health conditions. | M(ii) Explain how therapeutic drugs work when used to treat given illnesses. M(iii) Explain how physical therapies work when used to treat given illnesses. | D(ii) Use analysis of data and other evidence to evaluate the effectiveness of physical therapies and therapeutic drugs in the treatment of given illnesses and health conditions |
| 3. Know the factors affecting treatments. | 3.1. Describe the general risks associated with specified treatments. 3.2. Describe factors, other than risk, affecting the choice and availability of treatments to patients. | M(iv) Explain why it is important to present all factors to patients in order for them to make informed choices. | D(iii) Explain how patients are supported to understand risk and make choices about treatment. |

Indicative Content: Science in Medicine**Learning Outcome 1:**

Learners should be able to describe different biological and physical procedures used to diagnose illness, e.g. observation, palpation, body temperature, blood pressure, pulse rate, blood tests, x-rays, MRI and CAT scans. They could then go on to describe the step-by-step procedures used to diagnose given illnesses, for example a simple childhood illness such as measles, chicken pox and a more complex illness, such as diabetes, coeliac disease etc. Those working at higher levels could go on to explain the scientific principles underlying the biological and physical procedures used to diagnose illness for a few common illnesses, such as diabetes, asthma etc.

Learning Outcome 2:

Learners should be able to describe the scientific principles underpinning the use of therapeutic drugs to treat given illnesses, for example diabetes, asthma and heart disease. They should be able to describe the scientific principles underpinning the use of physical therapies to treat the same given health conditions. Learners could go on to explain how therapeutic drugs work when used to treat given illnesses, e.g. insulin in diabetes and bronchodilators in asthma. They could also explain how physical therapies work when used to treat given illnesses, e.g. in cystic fibrosis. Those working at higher levels could research to find data to analyse and other evidence that they could use to evaluate the effectiveness of physical therapies and therapeutic drugs in the treatment of given illnesses and health conditions, such as diabetes, asthma and cystic fibrosis.

Learning Outcome 3:

Learners should be able to describe the general risks associated with specified treatments, e.g. chemotherapy and radiotherapy in cancer treatment. They should describe factors, other than risk, affecting the choice and availability of treatments to patients, e.g. quality of life. Learners could go on to explain why it is important to present all factors to patients in order for them to make informed choices and explain how patients are supported to understand risk and make choices about treatment.

Using Mathematical Tools in Science and Technology

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|-------------------------------|------------|
| Level: | Level 2 |
| Credit Value: | 3 |
| GLH: | 24 |
| Unit Reference Number: | J/505/5360 |

This unit has 3 learning outcomes.

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|--|--|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 1. Be able to use mathematical tools in a science or technology context. | 1.1 Identify when it is necessary to use estimation and checking in scientific or technological contexts. 1.2 Carry out mathematical calculations to solve problems in science or technology. | M(i) Use estimation and checking strategies in a scientific or technology context. M(ii) Carry out mathematical calculations to solve problems in science or technology with the aid of given algebraic formulae. | D(i) Carry out mathematical calculations to solve problems in science or technology with the aid of own selection of algebraic formulae. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|---|---|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 2. Be able to collect and record data in a science or technology context. | 2.1 Collect and record data in a science or technology context. 2.2 Process the data collected. 2.3 Identify possible errors associated with data collected. 2.4 Use suitable mathematical tools to carry out mathematical calculations to process primary and secondary data. | M(iii) Explain possible errors associated with collecting data. | D(ii) Describe how modifications to the method used could have eliminated errors associated with collecting data. |
| 3. Be able to display and interpret data in a science or technology context. | 3.1 Use appropriate formats to display data that has been collected in a science or technology context. 3.2 Interpret collected data and draw conclusions. | M(iv) Justify methods used to interpret data. M(v) Extract data from different graphical forms used in science and technology. | D(iii) Use the most appropriate formats for displaying and comparing data that has been collected in a science or technology context. D(iv) Analyse data from different graphical forms used in science and technology. |

Indicative Content: Using Mathematical Tools in Science and Technology**Learning Outcome 1:**

Learners should identify when it is necessary to use estimation and checking in scientific or technological contexts, for example when there is a risk to mathematical accuracy, e.g. when the numbers used are very large or very small. They should carry out mathematical calculations to solve problems. Learners could use estimation and checking strategies routinely in a scientific or technology context. They could also carry out mathematical calculations to solve problems in science or technology with the aid of given algebraic formulae, such as those for the volume of cylinders, spheres or for quantities such as speed or acceleration. Those working at higher levels might carry out mathematical calculations to solve problems in science or technology with the aid of own selection of algebraic formulae.

Learning Outcome 2:

Learners should collect and record data in a science or technology context using tables. They should be able to process the data collected, identifying any possible errors. They could go on to explain possible errors associated with collecting data and describe how modifications to the method used could have eliminated errors associated with collecting data. They should use suitable mathematical tools to carry out calculations to process primary and secondary data. For example, working out temperature differences, percentages to compare like values, and calculating the mean of a data set.

Learning Outcome 3:

Learners should be able to use appropriate formats to display data that has been collected in a science or technology context, e.g. tables, bar charts, line graphs, pie charts, scatter graphs. They should interpret collected data and draw conclusions. They could go on to justifying the methods used to interpret data. They could also extract data from different graphical forms such as bar charts, line graphs, scatter graphs and pie charts. Those working at higher levels could select and use the most appropriate formats for displaying and comparing data, for example recognising that a line graph or scatter graph should be plotted to describe the relationship between two continuous variables.

Indicative Content: Using Mathematical Tools in Science and Technology

They could also analyse data from different graphical forms used in science and technology.

Carrying Out a Science or Technology Project

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|-------------------------------|------------|
| Level: | Level 2 |
| Credit Value: | 6 |
| GLH: | 48 |
| Unit Reference Number: | L/505/5361 |

This unit has 5 learning outcomes.

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|---|--|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 1. Be able to identify and select a science or technology project. | 1.1 Agree a suitable topic and scope for a science or technology project. 1.2 Explain why they have chosen the particular topic or focus for the project. 1.3 Identify intended project outcomes and actions they need to take to achieve these (e.g. specific experiments or data collection). 1.4 Outline skills for example scientific, project-management, needed to complete project. 1.5 Plan how to meet agreed deadlines. | M(i) Explain what they hope to achieve through the project. M(ii) Give reasons why each action is required. M(iii) Describe how these skills will be deployed. M(iv) Produce a plan for the project which includes timelines, order of activities, resources and facilities needed. | D(i) Explain how this will contribute to their understanding of a particular area of science or technology. D(ii) Produce a well-organised and clear plan for the project which includes timelines, order of activities, resources and facilities needed and contingencies. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|---|---|--|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 2. Be able to carry out research for a science or technology project. | 2.1 Identify different sources of information relevant to the project. 2.2 Select data that is relevant and reliable. 2.3 Reference evidence and information appropriately. | M(v) Recognise the relative reliability and bias in different sources M(vi) Select and combine data from different sources. | D(iii) Analyse data systematically to determine its relevance and reliability |
| 3. Be able to undertake activity to complete a science or technology project. | 3.1 Carry out the necessary actions to complete the science or technology project. 3.2 Apply appropriate skills and knowledge to complete the project. | M(vi) Make on-going adjustments where needed. M(vii) Apply a range of relevant scientific skills and knowledge to complete the project. | D(iv) Follow contingency plan where necessary. D(v) Apply and extend own scientific skills and knowledge to complete the project. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|--|--|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 4. Be able to present a science or technology project. | 4.1 Select appropriate information to include in a presentation, including method and findings or conclusions. 4.2 Use appropriate format and language, including scientific terms, to present project outcomes to a specific audience. | M(viii) Sequence information to ensure a logical flow. | D(vi) Include a summary of key points and highlight the most important outcomes. |
| 5. Be able to evaluate science or technology project outcomes and own performance. | 5.1 Review own performance in planning, carrying out and presenting outcomes from a science or technology project, identifying what went well and what could be improved. | M(ix) Determine the success criteria of a good presentation and use these to make suggestions for improving performance. | D(vii) Evaluate how well each success criterion was met 5.2 Summarise scientific or technological knowledge and skills gained. |

Indicative Content: Carrying Out a Science or Technology Project**Learning Outcome 1:**

Learners should agree a suitable topic and scope for a science or technology project and be able to explain why they have chosen the particular topic or focus for the project. Learners could develop ideas that explain what they hope to achieve through the project. Examples of projects could be those from the workplace or those in which learners are interested. For example, projects could be based on electronic sensors and circuits, chemical reactions such as food spoilage, environmental indicators etc.

They should identify their intended project outcomes and the actions they need to take to achieve these, e.g. specific experiments and/or data collection, and could give reasons why each action is required. Learners should be able to outline the skills they will use for example scientific, project-management, needed to complete project and could describe how these skills will be deployed. They should plan how to meet agreed deadlines and could include timelines, order of activities, resources and facilities needed in their plan.

Those working at higher levels could explain how the project will contribute to their understanding of a particular area of science or technology. They could also produce a well-organised and clear plan for the project which includes timelines, order of activities, resources and facilities needed and contingencies.

Learning Outcome 2:

Learners should identify different sources of information, making sure that the information is relevant to the project. They should select data that is both relevant and reliable and could take this further by recognising the relative reliability and bias in different sources. All source materials should be referenced appropriately. Learners working at higher levels could also select and combine data from different sources and analyse data systematically to determine its relevance and reliability.

Learning Outcome 3:

Indicative Content: Carrying Out a Science or Technology Project

Learners should carry out the necessary actions and apply appropriate skills, e.g. scientific and project management, to complete the project. Learners could apply a wide range of relevant scientific skills and knowledge, and those working at higher levels could extend their own scientific skills by, for example, measuring with greater precision. They could make on-going adjustments where needed, for example if they note errors or anomalies in data collected, and those working at higher levels could change their plan to one of contingency.

Learning Outcome 4:

Learners should be given the opportunity to present their project to their peers or another given audience. They should select appropriate information to include in the presentation, including their method and findings or conclusions. Learners should use an appropriate format and language, including scientific terms, for their audience. They could sequence information to ensure a logical flow, and those working at higher levels could include a summary of the key points and highlight the most important outcomes.

Learning Outcome 5:

Learners should review their own performance in planning, carrying out and presenting outcomes from their project, identifying what went well and what could be improved. They could determine the success criteria of a good presentation and use these to make suggestions for improving their own performance. Those working at higher levels could evaluate how well they met each success criterion. They could also summarise the scientific or technological knowledge and skills gained in the form of self-assessment.

Healthy Living

Level: Level 2
Credit Value: 3
GLH: 24
Unit Reference Number: R/505/5362

This unit has 3 learning outcomes.

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|---|--|--|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 1. Be able to investigate factors which contribute to healthy living. | 1.1 Describe the possible effects of diet and exercise on the functioning of the human body. 1.2 Design a diet and exercise plan to promote healthy living for an individual. | M(i) Explain how the diet and exercise plan will affect the functioning of the human body. | D(i) Evaluate the diet and exercise plan and justify choices of menu and activities. |
| 2. Know about measures taken to improve the health of the population. | 2.1 Describe different measures taken to improve the health of the population. | M(ii) Explain different measures taken to improve the health of the population. | D(ii) Evaluate different methods taken to improve the health of the population. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|--|---|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 3. Know how preventative measures can be used to support healthy living. | 3.1 Outline the role of health screening and vaccination programmes to support healthy living. | M(iii) Explain how given health screening and vaccination programmes have supported healthy living. | D(iii) Evaluate the effectiveness of given vaccination and screening programmes. |

Indicative Content: Healthy Living**Learning Outcome 1:**

Learners should be able to describe the possible effects of diet and exercise on the functioning of the human body. This could be a research and presentation task. They should then design a diet and exercise plan to promote healthy living for an individual, possibly themselves. However, they could be given a fictitious person and details of their current diet and exercise. Learners could then be asked to design a more beneficial plan. Learners could go on to explain how the diet and exercise plan will affect the functioning of the human body. Learners working at higher levels could then evaluate the diet and exercise plan and justify their choices of menu and activities.

Learning Outcome 2:

Learners should be able to describe the different measures taken to improve the health of the population, in terms of media and advertising, public health promotions, governmental pressure on food manufacturers, and also advice from health professionals. This could be done as a research project or by speaking to a health professional. They could explain how the different measures taken to improve the health of the population impact on health and those working at higher levels could evaluate the different methods taken to improve the health of the population.

Learning Outcome 3:

Learners should be able to outline the role of health screening and vaccination programmes to support healthy living. Starting with those they have personal knowledge of, learners could research other available screening and vaccination programmes available in the UK. They could go on to explain how given health screening and vaccination programmes have supported healthy living.

Examples that could be used include breast cancer screening, cervical smear testing etc. and childhood vaccinations including MMR, polio and others such as tetanus, BCG etc. Learners could explain at least three of these programmes and those working at higher

Indicative Content: Healthy Living

levels could evaluate the effectiveness of one given vaccination and one screening programme.

Effective Communication in the Workplace

| | |
|-------------------------------|------------|
| Level: | Level 2 |
| Credit Value: | 3 |
| GLH: | 30 |
| Unit Reference Number: | H/504/6312 |

This unit has 4 learning outcomes.

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|--|---|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 1. Understand the importance of effective communication in the workplace. | 1.1. Explain how effective communication creates a positive impression of the organisation on the customer. 1.2. Explain how effective communication between colleagues enables work to be completed to a high standard. 1.3. Describe the possible impact of poor communication on an organisation. | M(i) Evaluate the key features of effective communication in a specific workplace. | |
| 2. Know how different types of communication are appropriate for different situations. | 2.1. Describe the main types of communication, oral and written, used in organisations. 2.2. Explain why different types of communication are required for different circumstances and when communicating with different people. | M(ii) Compare and contrast the different approaches taken by an organisation when presenting similar information to two different audiences | D(i) Evaluate the effectiveness of a specific document or other form of communication in presenting information to its intended audience. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|--|---|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 3. Use appropriate forms of written communication. | 3.1. Select appropriate formats of written communication for different purposes. 3.2. Produce documents that are clearly and accurately presented and appropriate for the audience. | M(iii) Produce documents that combine visual and text-based information | D(ii) Produce a document that presents complex information in a way that is accessible to the intended audience |
| 4. Use appropriate forms of oral communication. | 4.1. Communicate clearly in speech in different workplace situations, adjusting register and tone to match the audience and purpose of the communication. | M(iv) Evaluate the advantages and disadvantages of two possible approaches to the oral presentation of a specific piece of information or issue, in order to select the most appropriate. | D(iii) Use oral communication to present complex information or issues, in a manner appropriate to the audience and purpose of the communication |

Indicative Content: Effective Communication in the Workplace**Learning Outcome 1:**

Ways effective communication promotes a good first impression:

- gives the customer confidence in the business
- reduces misunderstandings
- customer gains good understanding of products/services available
- customer understands benefits of organisations products/services

Ways effective communication promotes high standards:

- everyone understands the goals that they are working towards
- reduces the likelihood of mixed messages
- reduces the potential for errors
- business understands who their customer is and their needs

Possible impact of poor communication may include:

- loss of existing customers and/or failure to gain new customers
- legal action
- financial penalties
- loss of business

Learning Outcome 2:

Examples of main types of communication may include:

- oral - team meetings, telephone conversations, one-to-one meetings, conference calls, web-based media e.g. Skype, FaceTime
- written - email, social media, e.g. Twitter or Facebook, notes, minutes of meetings, reports, letters, charts, diagrams, illustrations

Reasons for using different types of communication may include:

Indicative Content: Effective Communication in the Workplace

- the complexity/amount of the information
- different audience/purpose
- cost
- speed – the need to respond quickly to a customer
- the need to meet people e.g. to gather people together who are working in different parts of the country or internationally
- to meet specific needs such as visual and auditory impairment, reading difficulties, English is not the first language

Learning Outcome 3:

To achieve this learning outcome learners must provide appropriate evidence of using different forms of communication.

The learner could be set a selection of scenarios for which they need to select an appropriate format (for Pass) and then produce them (for Merit/Distinction).

Examples of purposes should be varied and may include may include:

- to record a conversation
- to launch a new product
- to respond to a complain
- to present evidence of a problem to a team
- to provide sales figures to a manager

Learning Outcome 4:

To achieve this outcome learners must provide sufficient evidence to demonstrate their ability to use appropriate forms of oral communication.

Audiences should be varied and may include:

Indicative Content: Effective Communication in the Workplace

- colleagues
- customers
- senior managers

Situations should be varied and may include:

- 1:1 meetings with manager
- group meetings with colleagues
- presentations
- informal conversation

Using ICT in the Workplace

| | |
|-------------------------------|------------|
| Level: | Level 2 |
| Credit Value: | 3 |
| GLH: | 25 |
| Unit Reference Number: | J/504/6318 |

This unit has 5 learning outcomes.

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | Merit | Distinction |
|---|---|--|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 1. Know the importance of making effective use of ICT in the workplace. | 1.1. Explain how effective use of ICT can contribute to the overall effectiveness of an organisation. 1.2. Describe the possible impact of poor use of ICT on an organisation. | M(i) Evaluate the key features of effective ICT use in a specific workplace. | |
| 2. Be able to identify the ICT requirements of workplace tasks. | 2.1. Describe the ICT requirements for different complex workplace tasks. | M(ii) Compare and contrast two given software applications capable of meeting the requirements of a specific task. | D(i) Evaluate different software applications to recommend the most effective for a given complex task. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | Merit | Distinction |
|--|--|--|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 3. Be able to make safe use of an ICT system to undertake workplace tasks. | 3.1. Use ICT to complete different complex workplace tasks efficiently. 3.2. Develop and use storage systems to enable efficient retrieval of information. 3.3. Follow workplace guidelines for safe and secure use of ICT. | M(iii) Use a combination of different ICT methods to complete a single complex task. | D(ii) Recommend improvements to a given set of guidelines for safe and secure use of ICT, based on own experience of their use |
| 4. Be able to use ICT to find and select information in the workplace. | 4.1. Use ICT to locate and select relevant and reliable information from different sources to meet the requirements of a complex workplace task. | M(iv) Use ICT to locate, select and combine relevant, reliable and unbiased information from different sources to meet the requirements of a complex workplace task. | |
| 5. Be able to use ICT to present and share information in the workplace. | 5.1. Be able to use ICT to present and share information in the workplace. 5.2. Use appropriate software to present conclusions including a) text b) images c) graphs/charts in a format suitable for the purpose and for the audience. | M(v) Use ICT to present and share information on a complex topic | D(iii) Use appropriate software to present information including edited audio and video clips. |

Indicative Content: Using ICT in the Workplace**Learning Outcome 1:**

Examples of how ICT can contribute to the effectiveness of an organisation may include:

- information is easily accessible
- information can be stored and retrieved efficiently
- data can be used for a range of purposes including marketing and developing new products and services
- widen the market place e.g. international, other parts of the country

Inefficient use of ICT can result in:

- financial losses
- time wasting
- errors

Learning Outcome 2:

To achieve this learning outcome, learners must provide sufficient and valid evidence that meets the assessment criteria.

Complex tasks:

- targeting customers
- analysing data
- selecting customers from data bases
- using CRM system effectively

Learning Outcome 3:

Indicative Content: Using ICT in the Workplace

To achieve this learning outcome, learners must provide sufficient and valid evidence that meets the assessment criteria.

Storage systems, for example:

- databases
- archives

Workplace guidelines may include:

- regularity of eye checks
- posture/ergonomics
- breaks
- safe storage of power leads
- close own procedure
- use of screen saver

Learning Outcome 4:

Sources may include:

- databases
- spreadsheets
- CRM systems

Use of ICT to research information from different sources to meet the requirements of complex work could include:

- reading and retrieving information from files stored on ICT
- receiving, reading, sending and recording information received by email with attachments
- safe and effective online web search for information – e.g. search engines

Indicative Content: Using ICT in the Workplace

- recognising currency, relevance and bias when selecting and using information

Learning Outcome 5:

Use of ICT to present and share information using appropriate software could include:

- text
- tables
- graphics
- records
- numbers
- charts and graphs
- audio and video clips

These must be presented in a format suitable for the audience so may be printed or for viewing on screen.

Applications of Chemical Substances

| | |
|-------------------------------|------------|
| Level: | Level 2 |
| Credit Value: | 5 |
| GLH: | 30 |
| Unit Reference Number: | Y/505/5363 |

This unit has 4 learning outcomes.

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|--|--|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 1. Be able to investigate chemical substances with different types of bonding. | 1.1 Carry out appropriate tests to identify compounds with different bonding types. 1.2 Use the tests to identify the bonding types of a number of unknown chemicals. | | |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|---|---|---|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 2. Be able to investigate exothermic and endothermic reactions. | 2.1 Carry out experiments to investigate given exothermic and endothermic reactions using primary data. | M(i) Carry out experiments to investigate the similarities and differences between given exothermic and endothermic reactions. | D(i) Explain why some reactions are exothermic and others endothermic. |
| 3. Be able to investigate organic compounds. | 3.1 Describe the uses of organic compounds in society. 3.2 Carry out appropriate tests to identify organic compounds. 3.3 Use primary observation to identify an alkene, an alkane and a carboxylic acid. | M(ii) Review the applications of organic compounds in society. M(iii) Use appropriate tests to identify organic compounds from a range of different given chemicals. | D(ii) Evaluate the benefits and drawbacks of using organic compounds. |
| 4. Know the uses of nanochemicals. | 4.1 Define nanochemicals. 4.2 Describe uses of nanochemicals. | M(iv) Explain why given nanochemicals are used. | |

Indicative Content: Applications of Chemical Substances**Learning Outcome 1:**

Learners should carry out appropriate tests to identify compounds with different bonding types, such as ionic and covalent. Simple tests such as appearance, properties, solubility, melting points and electrical conductivity would be sufficient. Then, to use these tests to identify the bonding types of a number of unknown chemicals, such as sugar, salt, a metal, water etc.

Learning Outcome 2:

Learners should carry out experiments to investigate given exothermic and endothermic reactions using primary data. Simple reactions between everyday chemicals can be used such as those between water or white vinegar or hydrogen peroxide with baking soda, Epsom salts, steel wool etc. In the workplace, such as a hairdresser's, reactions to make up hair dye or bleach colourants can be studied to see which are endo- and which are exothermic. In a cleaning company, learners could discuss with colleagues why it is important not to leave oil-soaked rags after finishing cleaning. Learners could then investigate the similarities and differences between these exothermic and endothermic reactions. To take their ideas further, learners could research in order to explain why some reactions are exothermic and others endothermic.

Learning Outcome 3:

Learners should research in order to describe the uses of organic compounds in society, and in their particular workplace. They could also review the applications of organic compounds in society and in their workplace. They should carry out appropriate tests to identify organic compounds in the workplace, such as Tollen's reagent for aldehydes or the Lucas test for alcohols. They should use primary observation to identify an alkene, an alkane and a carboxylic acid. Learners could be given unknown organic chemicals and asked to identify them through tests.

Eventually, learners could research to evaluate the benefits and drawbacks of using organic compounds.

Indicative Content: Applications of Chemical Substances**Learning Outcome 4:**

Learners should research to define 'nanochemicals' and describe their uses, linking this to any nanochemicals used in their workplace. For example, a MRI scanner using iron oxide (rust) to detect cancers, silica (glass) used to bend or stop light in its tracks, carbon as a better choice for electronic materials. They could go on to research to explain why given nanochemicals are used, such as those previously mentioned.

Applications of Physical Science

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|-------------------------------|------------|
| Level: | Level 2 |
| Credit Value: | 5 |
| GLH: | 40 |
| Unit Reference Number: | D/505/5364 |

This unit has 4 learning outcomes.

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|-----------------------------------|---|---|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 1. Be able to investigate motion. | 1.1 Carry out an investigation into the various types of motion, namely uniform and non-uniform motion. | M(i) Analyse the various types of motion using graphs, namely distance-time and velocity – time graphs. | D(i) Evaluate the findings of an investigation into uses of motion in the real world, in order to suggest improvements to real-life application. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|---|--|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 2. Be able to investigate forces. | 2.1 Carry out an investigation into the effects of balanced and unbalanced forces. | M(ii) Analyse the results of the investigation into effects of balanced and unbalanced forces. M(iii) Explain how friction and normal reaction forces are produced in response to an applied force. | D(ii) Evaluate the findings of an investigation into uses of forces in the real world, in order to suggest improvements to real-life application. |
| 3. Know about light and sound waves. | 3.1 Describe, using diagrams, reflection and refraction of light for simple applications. 3.2 Explain how sound is produced. 3.3 Use a diagram to show the motion of sound waves. | M(iv) Describe how lenses and mirrors affect rays of light. M(v) Describe how sound is reflected for simple applications. | D(iii) Explain how reflection and refraction of light can be used in real-life applications. D(iv) Explain real-life applications of sound waves and suggest future improvements. |
| 4. Be able to investigate electricity. | 4.1 Measure currents and voltages in series and parallel electric circuits. 4.2 Use primary data to investigate an application of thermistors or LDRs. | M(vi) Analyse voltage – current relationships. M(vii) Compare and contrast series and parallel circuits. | D(v) Evaluate the findings of an investigation into the uses of electricity in the real world, in order to suggest improvements. |

Indicative Content: Applications of Physical Science**Learning Outcome 1:**

Learners should carry out an investigation into the various types of motion, namely uniform and non-uniform motion to recognise the difference between them. They could analyse the various types of motion using graphs, namely distance-time and velocity-time graphs and go on to evaluate the findings of an investigation into uses of motion in the real world, in order to suggest improvements to real-life application. For example, making a bungee jump smoother for the participant, accelerating steadily in a car, ensuring a conveyor belt moves smoothly in the workplace.

Learning Outcome 2:

Learners should carry out an investigation into the effects of balanced and unbalanced forces, for example floating and sinking, see-saws etc. They could analyse the results of the investigation and explain how friction and normal reaction forces are produced in response to an applied force. For example, how a braking system works in a car or how a parachute drops or how a conveyor belt can be made to run more smoothly. They could go on to evaluate the findings of an investigation into uses of forces in the real world, in order to suggest improvements to real-life application, such as the applications mentioned previously.

Learning Outcome 3:

Learners should be able to describe, using diagrams, reflection and refraction of light for simple applications, such as to view images in a mirror or at the bottom of a bowl of water. They could describe how lenses and mirrors affect rays of light to see the actual image or one that is changed and explain how reflection and refraction of light can be used in real-life applications. e.g. when using spectacles or a telescope or a microscope.

Learners should be able to explain how sound is produced, possibly from research and use a diagram to show the motion of sound waves. They could describe how sound is reflected for simple applications, such as to produce an echo. They could go on to explain real-life

Indicative Content: Applications of Physical Science

applications of sound waves, such as sonar or ultrasound or measures taken to reduce sound in the workplace and suggest ideas for future improvements.

Learning Outcome 4:

Learners should be able to measure currents and voltages in series and parallel electric circuits and could compare and contrast series and parallel circuits. They could analyse voltage–current relationships from graphs and think about resistance. Learners should use primary data to investigate an application of thermistors as a temperature sensor or LDRs in, for example, one of alarm locks, street lights, light intensity meters, burglar alarm circuits. They could go on to evaluate the findings of their investigation in order to suggest improvements.

Chemical Analysis and Detection

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|-------------------------------|------------|
| Level: | Level 2 |
| Credit Value: | 5 |
| GLH: | 40 |
| Unit Reference Number: | F/505/5387 |

This unit has 4 learning outcomes.

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|---|--|---|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 1. Know the reagents and techniques used to analyse different inorganic chemical compounds. | 1.1 Identify the reagents needed to analyse different inorganic chemical compounds. 1.2 Describe the techniques needed to analyse inorganic chemicals. 1.3 Identify unknown inorganic chemicals using appropriate analysis techniques. | M(i) Explain how one of the analysis techniques works in terms of chemical reactions. | D(i) Assess how one of the techniques can be used quantitatively. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|---|---|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 2. Be able to classify substances according to their pH. | 2.1 State the meaning of 'pH'. 2.2 Outline the differences between acids and bases in terms of pH. 2.3 Carry out tests on solutions of household and laboratory substances to determine their pH. | M(ii) Compare the pH of a weak acid and a strong acid of identical concentration and draw a conclusion about the concentration of hydrogen ions. | D(ii) Evaluate the procedures to determine the pH. |
| 3. Be able to use chromatography to analyse materials. | 3.1 State how chromatography can be used to analyse materials. 3.2 Use chromatography to analyse materials in a given experiment. | M(iii) Explain how chromatography can be used to analyse materials. M(iv) Analyse materials using chromatography, describing the findings in terms of R _f values. | D(iii) Analyse materials using chromatography, describing the findings in terms of the relative quantities of their constituents. |
| 4. Be able to detect different chemicals in unknown compounds. | 4.1 Carry out experiments to identify chemicals in unknown compounds. | M(v) Explain the scientific principles behind the tests used to identify the chemicals in unknown compounds. | D(iv) Analyse the findings of the chemical tests to work out the relative proportions and/or actual quantities of constituents. |

Indicative Content: Chemical Analysis and Detection**Learning Outcome 1:**

Learners should research in order to identify the reagents needed to analyse different inorganic chemical compounds and describe the techniques used. They should use these techniques to identify unknown inorganic chemicals using appropriate analysis techniques. Techniques might include flame tests, gas tests and precipitation tests. They could explain how one of the analysis techniques works in terms of chemical reactions, by researching the reaction, and could go on to assess how one of the techniques can be used quantitatively.

Learning Outcome 2:

Learners should be able to state the meaning of 'pH' and outline the differences between acids and bases in terms of pH. They should carry out tests, such as using litmus or universal indicator or pH strips or a pH meter, on solutions of household and laboratory substances to determine their pH. In the workplace, these tests could be on ponds, swimming pools, hot tubs etc. or in a manufacturing or baking setting. They could compare the pH of a weak acid and a strong acid of identical concentration and draw a conclusion about the concentration of hydrogen ions present in each. Learners could go on to evaluate the procedures, such as using litmus or universal indicator or pH strips or a pH meter, to determine the pH in the workplace.

Learning Outcome 3:

Learners should research to be able to state how chromatography can be used to analyse materials. They should use chromatography to analyse materials in a given experiment, such as the constituent inks in a black fibre tip pen or photosynthetic pigments in chlorophyll. Learners could explain how chromatography can be used to analyse materials in the workplace such as to separate drugs of abuse in blood samples, determine pesticides and other contaminants in water or soil, to determine dyes and additive in foods etc. They could also analyse materials using chromatography, describing the findings in terms of R_f values and go on to describe the findings in terms of the relative quantities of their constituents.

Indicative Content: Chemical Analysis and Detection**Learning Outcome 4:**

Learners should carry out experiments to identify chemicals in unknown compounds, using the analyses mentioned previously. They could explain the scientific principles behind the tests used and go on to analyse the findings of the chemical tests to work out the relative proportions and/or actual quantities of constituents.

Investigating Human Behaviour

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|-------------------------------|------------|
| Level: | Level 2 |
| Credit Value: | 5 |
| GLH: | 40 |
| Unit Reference Number: | J/505/5388 |

This unit has 4 learning outcomes.

| LEARNING OUTCOMES | ASSESSMENT CRITERIA – PASS | MERIT | DISTINCTION |
|---|---|--|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 1. Know about the central and peripheral nervous systems. | 1.1 Outline the structure and the function of the central nervous system. 1.2 Outline the structure and function of the peripheral nervous system. | M(i) Describe how the central nervous system works to process information. M(ii) Describe how the peripheral nervous system is involved at times of stress. | D(i) Explain how the nervous system co-ordinates responses to danger, stress and anxiety. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA – PASS | MERIT | DISTINCTION |
|---|--|--|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 2. Know theories about human behaviour. | 2.1 Outline the biological explanations of how various factors affect human behaviour. 2.2 Outline the social explanations of how various factors affect human behaviour. | M(iii) Describe research that has been associated with biological and social explanations. | D(ii) Explain how psychologists involved in the research reached their conclusions. |
| 3. Know methodologies which are used in psychological research. | 3.1 Outline the main features of methodologies used in psychological research. | M(iv) Discuss the strengths and weaknesses of each of the different research methods used in psychological research. | D(iii) Explain the reasons for choosing a particular research methodology for a given study. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA – PASS | MERIT | DISTINCTION |
|--|--|--|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 4. Be able to design a psychological research study. | 4.1. Identify the main ethical guidelines related to psychological research. 4.2. Design a psychological research study to investigate human behaviour. | M(v) Describe the consequences of not carrying out a psychological investigation ethically. M(vi) Explain why this methodology was used to carry out the study. | D(iv) Evaluate the methodology used to carry out the study. |

Indicative Content: Investigating Human Behaviour**Learning Outcome 1:**

Learners should research in order to outline the structure and the function of the central nervous system and the peripheral nervous system. They could describe how the central nervous system works to process information through further research. They could also find out how the peripheral nervous system is involved at times of stress. Learners could go on to explain how the nervous system co-ordinates responses to danger, stress and anxiety.

Learning Outcome 2:

Learners should be able to outline the biological explanations of how various factors affect human behaviour, such as hunger, thirst, temperature etc. They should also be able to outline the social explanations of how various factors affect human behaviour, for example, three or more of: age, genetics, attitudes, values, perception, culture, social norms and ethics, religious inclination, coercion and influence by authority. Learners could describe research that has been associated with biological and social explanations and go on to explain how psychologists involved in the research reached their conclusions.

Learning Outcome 3:

Learners should outline the main features of methodologies used in psychological research, for example, in correlational, descriptive and experimental research. They could discuss the strengths and weaknesses of each of the different research methods used in psychological research. Learners could go on to explain the reasons for choosing a particular research methodology for a given study, such as where products are placed in supermarkets/shops or advertising techniques for a particular product.

Indicative Content: Investigating Human Behaviour**Learning Outcome 4:**

Learners should identify the main ethical guidelines related to psychological research. They could describe the consequences of not carrying out a psychological investigation ethically. They should design a psychological research study to investigate human behaviour, such as why people smoke cigarettes, why people continue to shop at the same places, why people choose designer brands etc. Learners could explain why they have chosen a particular methodology to carry out the study. They could go on to evaluate the methodology used to carry out the study.

Electronic Devices and Communications Applications

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|-------------------------------|------------|
| Level: | Level 2 |
| Credit Value: | 6 |
| GLH: | 48 |
| Unit Reference Number: | H/505/5365 |

This unit has 4 learning outcomes.

| LEARNING OUTCOMES | ASSESSMENT CRITERIA – PASS | MERIT | DISTINCTION |
|--|--|--|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 1. Know the types of signals and units of measurements used in electronic systems. | 1.1. Describe the type of signals produced by electronic devices including the correct units of measurement. | | |
| 2. Know the functions of electronic components and devices. | 2.1. Describe the functions of electronic components and devices. 2.2. Identify BS symbols and the physical forms of given electronic components and devices. | M(i) Explain the operation of an analogue electronic circuit and a digital electronic circuit. | D(i) Justify the choice of components and devices to ensure the correct functionality of an electronic circuit. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA – PASS | MERIT | DISTINCTION |
|--|---|---|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 3. Be able to construct and test analogue and digital electronic circuits. | 3.1. Construct a passive circuit using at least two different methods of construction. 3.2. Construct and test the operation of an analogue circuit. 3.3. Construct and test the operation of a digital electronic circuit. | | |
| 4. Understand electronic communication systems and data transmission. | 4.1. Explain how electronic communication is achieved. 4.2. Explain how electronic communication systems can be used to successfully transfer data. | M(ii) Explain the function of repeaters and regenerators for communication over longer distances and how they are used. | D(ii) Explain the advantages of two given electronic communication systems. |

Indicative Content: Electronic Devices and Communications Applications**Learning Outcome 1:**

Learners should research to describe the type of signals, i.e. digital and analogue, produced by electronic devices including the correct units of measurement.

Learning Outcome 2:

Learners should be able to describe the functions of electronic components and devices, such as resistors, capacitors, LEDs, transistors etc. They should be able to identify BS symbols and the physical forms of these given electronic components and devices. Learners could go on to justify the choice of components and devices to ensure the correct functionality of an electronic circuit in the workplace.

Learning Outcome 3:

Learners should construct a passive circuit, such as a simple solar cell or infra-red alarm using at least two different methods of construction. They should construct and test the operation of an analogue circuit and a digital electronic circuit. Learners could go on to explain the operation of an analogue electronic circuit and a digital electronic circuit.

Learning Outcome 4:

Learners should explain how electronic communication is achieved, possibly through research. They should find out, and be able to explain, how electronic communication systems can be used to successfully transfer data both in and out of the workplace. Learners could explain the function of repeaters and regenerators for communication over longer distances. They could go on to

Indicative Content: Electronic Devices and Communications Applications

explain the advantages of two given electronic communication systems, for example radio and wireless.

Investigating a Crime Scene

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| Level: | Level 2 |
| Credit Value: | 6 |
| GLH: | 48 |
| Unit Reference Number: | R/505/5409 |

This unit has 3 learning outcomes.

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|--|---|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 1. Understand how forensic science is used in the criminal justice system. | 1.1. State the role of the Forensic Science Service in the criminal justice system. 1.2. Describe how different types of evidence are used in forensic investigation. | M(i) Explain the different types of evidence used in obtaining convictions. | D(i) Evaluate the usefulness of different types of evidence in obtaining convictions. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|---|--|---|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 2. Be able to process information at a crime scene. | 2.1. Plan the processing of a simulated crime scene, including an assessment of the potential health and safety risks. 2.2. Describe the most appropriate methods to ensure reliable evidence is collected, recorded and preserved from a crime scene. 2.3. Collect and identify different types of evidence from the simulated crime scene. | M(ii) Describe how errors can occur when processing a crime scene. M(iii) Describe how errors can occur when transporting evidence to the laboratory for further analysis. | D(ii) Describe ways to avoid potential errors in collecting evidence at a crime scene. D(iii) Explain the procedures used to minimize errors as the evidence is transported to the laboratory for further analysis. |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|--|---|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 3. Be able to use appropriate scientific techniques to analyse evidence which has been collected from a crime scene. | 3.1 Identify simple scientific techniques which can be used to analyse evidence. 3.2 Analyse different types of evidence from a crime scene. 3.3 Record the results of the analyses of evidence. 3.4 Present the results of the analyses of evidence. | M(iv) Explain how the evidence collected is processed and analysed in a laboratory. M(v) Link conclusions from analyses of different types of evidence. M(vi) Describe the conclusions drawn from the investigation as a court statement. | D(iv) Draw evidence-based conclusions, from the results of the various tests carried out. D(v) Justify conclusions drawn from the investigation as a court statement. |

Indicative Content: Investigating a Crime Scene**Learning Outcome 1:**

Learners should be able to state the role of the Forensic Science Service in the criminal justice system, possibly through research. They should describe how different types of evidence are used in forensic investigation, for example, blood, fingerprints, fibres etc. Learners could explain the different types of evidence used in obtaining convictions and go on to evaluate the usefulness of different types of evidence in obtaining convictions.

Learning Outcome 2:

Learners should plan the processing of a simulated crime scene, including an assessment of the potential health and safety risks. The crime scene could be straightforward, such as a forged cheque or more complex in the analyses needed, such as a theft including clothing fibres, fingerprints etc. They should describe the most appropriate methods to ensure reliable evidence is collected, recorded and preserved from a crime scene. Then, learners should collect and identify different types of evidence from the simulated crime scene. Learners could describe how errors can occur when processing a crime scene, such as mislabelling or moving evidence, and describe how errors can occur when transporting evidence to the laboratory for further analysis, for example if containers are open etc. They could go on to describe ways to avoid potential errors in collecting evidence at a crime scene and explain the procedures used to minimize errors as the evidence is transported to the laboratory for further analysis.

Learning Outcome 3:

Learners should be able to identify simple scientific techniques which can be used to analyse evidence and use these to analyse different types of evidence from the simulated crime scene. They should record the results of the analyses of evidence and present the results. Learners could explain how the evidence collected is processed and analysed in a laboratory. They could also link their conclusions from analyses of different types of evidence and describe the conclusions drawn from the investigation as a court statement. Learners could go on to draw

Indicative Content: Investigating a Crime Scene

evidence-based conclusions, from the results of the various tests carried out and justify their conclusions as a court statement.

Improving own Employability Skills in Science and Technology

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| Level: | Level 2 |
| Credit Value: | 3 |
| GLH: | 24 |
| Unit Reference Number: | F/507/4960 |

This unit has 4 learning outcomes.

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|---|--|--|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 1. Understand the responsibilities and working patterns associated with a specific role in a science or technology work environment. | 1.1. Explain the responsibilities and tasks associated with a specific job role in a science or technology work environment. 1.2. Explain the working patterns (e.g. typical hours, shift-work) associated with a specific job role. | M(i) Explain how a specific job role fits within the staff structure in a chosen work environment. | D(i) Explain the inter-relationship between different roles in a specific work environment |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|--|---|---|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| 2. Be able to work with due regard for health and safety in the work environment. | 2.1. Follow relevant legislation and workplace guidelines for health and safety in the work environment. | M(ii) Contribute to the minimising of risks and hazards through own conduct in the work environment | D(ii) Explain the legal responsibilities of employers and employees for health and safety in the work environment |
| 3. Be able to meet the professional standards expected in a chosen science or technology work environment. | 3.1. Follow instructions in a specific work environment to complete tasks to a set standard, seeking help if needed. 3.2. Observe relevant codes of conduct and guidelines in a work environment (e.g. for personal presentation, punctuality, ringing in sick). | M(iii) Apply understanding gained from completing one task to other related tasks. | D(iii) Demonstrate use of initiative in completing tasks. |
| 4. Be able to review own learning gained in a | 4.1. Describe skills and knowledge gained in a | M(iv) Describe the relevance of the skills and knowledge gained | D(iv) Explain how their experience in a work environment has |

| LEARNING OUTCOMES | ASSESSMENT CRITERIA - PASS | MERIT | DISTINCTION |
|---|--|--|---|
| The learner will: | The learner can: | In addition to the pass criteria, the learner can: | In addition to the pass and merit criteria, the learner can: |
| science or technology work environment. | work environment. 4.2. Outline areas where further development is still needed. | to their future career plans. M(v) Outline key actions to be taken to increase own work-related knowledge and skills. | enabled them to assess their own employability skills and behaviours. |



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