**Sample Assessment Tasks**

Engineering Studies

General Year 12

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Sample assessment task

Engineering Studies – General Year 12

## Task 1 – Unit 3

**Assessment type:** Design

**Conditions**

Period allowed for completion of the task: two weeks

**Task weighting**

3% of the school mark for this pair of units

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**Design project one (20 marks)**

Investigate design needs, different sources of inspiration and products with specific performance criteria, and then use a design process to design and make a product based on their design research.

**What you need to do**

Develop the first part of a design folio; include the following:

* investigate and develop ideas by an engineering design process using:
* performance criteria related to needs (8 marks)
	+ combine different sources of inspiration
* existing ideas and products (6 marks)
	+ include supporting images
* limitations
	+ list available materials and equipment
* prepare a design brief (6 marks)
* outline: function, aesthetics, safety, cost considerations and limitations
* include references and sources of information

|  |  |
| --- | --- |
| **What needs to be submitted for assessment** | **Due date** |
| * Research on design needs, different sources of inspiration, and products with specific performance criteria
 |  |
| * Design brief
 |  |

Marking key for sample assessment Task 1 – Unit 3

|  |  |  |
| --- | --- | --- |
| **Design folio – Investigation, design brief and concept development**  | **Maximum possible mark** | **Allocated mark** |
| Provides information on performance criteria and sources of inspiration * detailed comparisons, using design considerations, between a selected number of performance criteria and sources of inspiration, supported by suitable images
* a number of different examples with notes describing the differences
* a selection of ideas from a single performance criterion/inspiration with some notation about likes/dislikes
* collection of ideas, dissimilar images and few notes
 | 7–85–63–41–2 | **/8** |
| Provides information about existing products* appropriate number of existing similar products, with source referencing, using the design considerations to make detailed comparisons
* comparisons between an appropriate number of images against the design considerations
* a selection of ideas of a single product with limited annotation about likes and dislikes
 | 5–63–41–2 | **/6** |
| Provides information about the situation, defining a need or purpose for the project in the design brief* includes clear statements about function, aesthetics, safety, cost considerations and limitations
* includes general statements about the likes and dislikes
* covers broad areas of the design problem in limited general terms only
 | 5–63–41–2 | **/6** |
| **Total** | **/20** |

Sample assessment task

Engineering Studies – General Year 12

## Task 2 – Unit 3

## Core content – Engineering in society

**Assessment type:** Response

**Conditions**

Period allowed for completion of the task: one week

**Task weighting**

2% of the school mark for this pair of units

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**Investigate forms of energy (22 marks)**

Research the definitions of energy, power and work. Define and compare forms of energy by providing common examples. Compare suitable forms of energy supply for the proposed project.

**Core content – Engineering in society**

**Energy**

|  |  |
| --- | --- |
| * define and describe relationships between
 | * define and compare forms of energy
 |
| * + energy
 | * + kinetic
 |
| * + power
 | * + potential
 |
| * + work
 | * + thermal
 |
|  | * + chemical
 |
|  | * + electrical
 |
|  | * + electro-chemical
 |
|  | * + electromagnetic (light)
 |
|  | * + sound
	+ nuclear
 |

**Task description**

Research and report on the definitions of energy, power and work

* produce a detailed paragraph for each definition and a final paragraph on the relationships between the three (6 marks)
* research sources of information to define and compare the different forms of energy (8 marks)
* for each form of energy, identify and compare **two (2)** common examples or uses; the two examples should be described in approximately 100 words
* images may be included and referred to when comparing the forms of energy
* compare and select suitable forms of energy supply for the proposed project (6 marks)
* support the selection with a description and explanation of methods/sources of energy supply and estimated rate of consumption

Include all references by in-text referencing or in an appropriately set out reference list (2 marks)

|  |  |
| --- | --- |
| **What needs to be submitted for assessment** | **Due date** |
| * Definitions of energy, power and work
 |  |
| * Comparison of the different forms of energy
 |  |
| * Selected suitable forms of energy supply for the proposed project
 |  |

**Some suggested references:**

Copeland, P.L. (2000). *Engineering studies: The definitive guide* (Vol. 1. Preliminary course).
Allawah, NSW: Anno Domini 2000. (ISBN 0646394592)

Copeland, P.L. (2005). *Engineering studies: The definitive guide* (Vol. 2. The HSC course) (2nd ed.). Helensburgh, NSW: Anno Domini 2000. (ISBN 0975733478)

Ivanoff, V. (2010).*Engineering mechanics: An introduction to statics, dynamics and strength of materials*. Sydney: McGraw-Hill. (ISBN 9780071010030)

Moaveni, S. (2015). *Engineering fundamentals: An introduction to engineering* (5th ed.).Boston, MA: Cengage Learning. (ISBN 9781305084766)

Rochford, J. (2012). *Stage 6 Engineering Studies Communication: A student's workbook*.Tumbi Umbi, NSW: KJS Publications. (ISBN 9780957963016)

(Please note: Latest editions have been cited, but earlier editions will be just as useful as references.)

Marking key for sample assessment Task 2 – Unit 3

|  |  |  |
| --- | --- | --- |
| **Research the definitions of energy, power and work. Define and compare forms of energy by providing common examples. Compare suitable forms of energy supply for the proposed project.** | **Maximum possible mark** | **Allocated mark** |
| Document definitions and relationships of energy, power and work* accurate, detailed definitions and correct use of terminology
* minor/small errors or some details missing in each definition, uses terminology correctly to define each term
* terminology incorrect and/or critical information missing
 | 5–63–41–2 | **/6** |
| Comparison of the different forms of energy with two examples or uses of each form of energy* accurate identification of each energy type and correct descriptions of two common examples, using appropriate terminology
* correct terminology in identifying each energy type but has minor/small errors in some descriptions of the examples
* some energy types defined in general terms, with minor errors in some descriptions of the examples
* incorrect use of terminology to identify and describe examples of the energy types
 | 7–85–63–41–2 |  **/8** |
| Selected suitable forms of energy supply for the proposed project* appropriate forms of energy selected, supported by a clear explanation of each source of supply and estimated consumption
* energy selected; minor/small errors or some details missing in the description or explanation of energy supply and consumption
* description or explanation of energy supply and consumption uses incorrect terminology and/or has critical information missing
 | 5–63–41–2 | **/6** |
| * appropriate reference list
* limited or no reference list provided
 | 21 | **/2** |
| **Total** | **/22** |

Sample assessment task

Engineering Studies – General Year 12

## Task 3 – Unit 3

Specialist fields: Part A – Mechanical materials

 OR Part B – Mechatronics components

**Assessment type:** Design

**Conditions**

Period allowed for completion of the task: two weeks

**Task weighting**

Part A or Part B: 3% of the school mark for this pair of units

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**Task 3 Part A: Mechanical materials (25 marks)**

Investigate materials from the Core and within the specialty field, and report on materials suitable for the development of a solution.

**Task description**

1. Prepare reports and present in an appropriate form; list, charts or tables, on the following:

Core content: Materials – classify types of materials (5 marks)

* metals (pure)
* alloys (ferrous)
* alloys (non-ferrous)
* polymers
* composites
1. Investigate and develop an understanding of the following engineering processes in relation to steel (10 marks)

Mechanical – materials

* hardening
* tempering
* normalising
* case hardening
* annealing
1. Investigate, name the different steels, and express an understanding of: (8 marks)
* the effect of carbon content (C%) in steel
* steels’ ability to be worked and hardened, and its properties after processing
1. Acknowledge all sources of information, using either in-text referencing or an appropriate reference list at the end of the report (2 marks)

|  |  |
| --- | --- |
| **What needs to be submitted for assessment** | **Due date** |
| * List of classified core materials
 |  |
| * Processes in relation to steel
 |  |
| * Different steels
 |  |

Marking key for sample assessment Task 3 Part A – Unit 3

| **Report on classification of Core materials and understanding of the processes for steels and types of steel** | **Maximum possible mark** | **Allocated mark** |
| --- | --- | --- |
| List, charts or tables of classified Core materials * accurate detailed list, showing correct classified materials relating to composition
* small errors in terminology and/or minor details missing in the arrangement of materials
* some details missing and errors in arrangement or use of terminology
* some core information missing and arrangement has errors
* mix up of terminology used or incorrect and/or critical information missing
 | 54321 | **/5** |
| Processes in relation to steel * accurate detailed expressions of all five processes
* minor/small errors or minor details missing in one of the processes
* minor/small errors or some details missing in two of the processes
* minor/small errors or some details missing in more than two of the processes
* terminology used is incorrect and/or critical information missing
 | 9–107–85–63–41–2 | **/10** |
| Naming of steels and reports on the effect of carbon content (C%) in steel and steels’ ability to be worked and hardened and its properties after processing* correctly names the different steels, and accurately describes the varying effects of different carbon percentages on steel and the steels’ characteristics after processing
* correctly names the different steels, but has minor/small errors in some descriptions of the effects of different carbon percentages on steel and the steels’ characteristics after processing
* names the different steels, but has minor/small errors in some descriptions and/or incorrect terminology
* names the different steels, but has significant errors in descriptions of the effects of different carbon percentages on steel
 | 7–85–63–41–2 | **/8** |
| * appropriate in-text referencing or end of report reference list
* limited or no referencing provided
 | 21 | **/2** |
| **Total** | **/25** |

**Task 3 Part B: Mechatronics materials and electronic/electrical components (27 marks)**

Investigate materials from the Core and components within the specialty field, and report on suitable choices for the development of a solution.

**Task description**

1. Prepare reports and present in an appropriate form; list, charts or tables, on the following:

Core content: Materials – classify types of materials (5 marks)

* metals (pure)
* alloys (ferrous)
* alloys (non-ferrous)
* polymers
* composites
1. Investigate and develop an understanding to recognise circuit symbols and the function of each component listed in Unit 3 of the syllabus:Mechatronics – components (10 marks)
2. Explain and give examples of component markings: (10 marks)
* fixed value resistors – 4 band E12 series
* capacitors: pF, nF and μF
* serial numbers – data sheets
* pin outs: voltage regulator, transistor and integrated circuits
* include sketched, simple circuit diagrams that contain listed component
1. Acknowledge all sources of information, using either in-text referencing or an appropriate end of report reference list (2 marks)

|  |  |
| --- | --- |
| **What needs to be submitted for assessment** | **Due date** |
| * List of classified core materials
 |  |
| * Circuit components, their symbols and their function
 |  |
| * Explanations and examples of markings on components
 |  |
| * Simple circuit diagrams
 |  |

Marking key for sample assessment Task 3 Part B – Unit 3

|  |  |  |
| --- | --- | --- |
| **Report on classification of Core materials and understanding circuit symbols, characteristics and markings for electronic/electrical components** | **Maximum possible mark** | **Allocated mark** |
| List, charts or tables of classified Core materials * accurate detailed list, showing correct classified materials relating to composition
* small errors in terminology and/or minor details missing in the arrangement of materials
* some details missing and errors in arrangement or use of terminology
* some core information missing and arrangement has errors
* mix up of terminology used or incorrect and/or critical information missing
 | 54321 | **/5** |
| Circuit symbols, function and summary of characteristics * accurate recognition of all circuit symbols and detailed explanations of the function of each listed component
* correct recognition of all circuit symbols, but minor/small errors in the explanations of some functions
* correct recognition of all circuit symbols, but some details missing and/or errors in the explanations of some functions
* some circuit symbols not correctly named and some details missing
* terminology not correct and/or critical information missing
 | 9–107–85–63–41–2 | **/10** |
| Report on the general characteristics of components, with an explanation of markings on components, including sketching of simple circuit diagrams * accurate detailed explanation with the correct terminology to explain each value, with clear, well-labelled components in sketches of circuit diagrams
* minor errors in one or two explanations, but good, well-labelled sketches of circuit diagrams
* minor details missing some explanations, with satisfactory of components in sketches of circuit diagrams
* some circuit symbols not correctly labelled and/or components in sketches have some details missing
* some terminology used is incorrect and/or critical information missing
 | 9–107–85–63–41–2 | **/10** |
| * appropriate in-text referencing or end of report reference list
* limited or no referencing provided
 | 21 | **/2** |
| **Total** | **/27** |

Sample assessment task

Engineering Studies – General Year 12

## Task 4 – Unit 3

**Assessment type:** Design

**Conditions**

Period allowed for completion of the task: two weeks

**Task weighting**

8% of the school mark for this pair of units

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**Devise a solution for project one (15 marks)**

Use a design process to design a product based on their design research.

**What you need to do**

* Develop ideas and concepts through collected and annotated images, incorporating comments about design fundamentals and factors affecting design and materials, with references back to the design brief (12 marks)
* Include references and sources of information (3 marks)

|  |  |
| --- | --- |
| **What needs to be submitted for assessment** | **Due date** |
| * Annotated design concept images showing concept development
 |  |

Marking key for sample assessment Task 4 — Unit 3

|  |  |  |
| --- | --- | --- |
| **Design folio – Investigation, design brief and concept development**  | **Maximum possible mark** | **Allocated mark** |
| Provides ideas and concepts through collected and annotated images, including list of materials * clear development of ideas and concepts showing a flow of concept development with specific detailed annotations on a diverse range of images, but referring to design fundamentals, materials list and design brief
* development of ideas and concepts showing concept development with annotations on images referring to design brief and design fundamentals
* development of ideas expressed as annotated images, with reference back to design factors, materials and design brief
* concept development is limited by few images and simple annotations, little or some reference to ideas in the design brief
* single concept development expressed through a few simple images, little annotation of ideas in the design brief
* development of a concept is unclear through the random images having simple annotations, showing little reference to the design brief
 | 11–129–107–85–63–41–2 | **/12** |
| * appropriate in-text referencing or end of report reference list
* limited or infrequent referencing or no provided list
 | 31–2 | **/3** |
| **Total** | **/15** |

# Sample assessment task

# Engineering Studies – General Year 12

## Task 5 – Unit 3

**Assessment type:** Production

**Conditions**

Period allowed for completion of the task: two weeks

**Task weighting**

5% of the school mark for this pair of units

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**Production plan for project one (15 marks)**

Use a design process to produce working drawings, lists for materials, components and parts, and a timeline.

**What you need to do**

* Produce working drawings of the chosen design (8 marks)
* Create lists of materials, parts and components with costing (4 marks)
* Develop and use a timeline for producing the solution (3 marks)

|  |  |
| --- | --- |
| **What needs to be submitted for assessment** | **Due date** |
| * Working drawings; orthographic and other types, as required
 |  |
| * Lists for materials, parts and components with costing
 |  |
| * Timeline
 |  |

# Marking key for sample assessment Task 5 – Unit 3

|  |  |  |
| --- | --- | --- |
| **Production plan for project one** | **Maximum possible mark** | **Allocated mark** |
| Working drawings* accurate drawings that contain all required details to manufacture the product
* accurate drawings that contain most required details to manufacture the product
* rudimentary drawings that lack enough detail to manufacture the product
 | 6–83–51–2 | **/8** |
| Lists for materials, parts and components with costing* lists that contain all required details to supply materials, parts and components to manufacture the product and cost it
* lists that contain most of the required details to supply materials, parts and components to manufacture the product and cost it
* rudimentary lists that contain significant omissions that would make it unlikely for a third party to supply the required materials, parts and components and nor would they be able to cost the product
 | 3–421 | **/4** |
| Timeline* all key milestones are identified and listed with a completion date
* most key milestones are identified and listed with a completion date
* some key milestones are identified and listed with a completion date
 | 321 | **/3** |
| **Total** | **/15** |

# Sample assessment task

# Engineering Studies – General Year 12

## Task 6 – Unit 3

**Assessment type:** Production

**Conditions**

Period allowed for completion of the task: five weeks

**Task weighting**

20% of the school mark for this pair of units

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**Production of project one (30 marks)**

Using your production plan, construct the project. Document a work log/time sheet, including sequence of production, accompanied by production photographs.

**What you need to do**

1. Prepare a work log/time sheet to show a sequence of production, including spaces for photos of the main stages of production (4 marks)
2. Use ongoing evaluation techniques: diary, journal or folio notes and use of photography to record ongoing progress/decision changes made to the project (6 marks)
3. Complete the production stages by: (10 marks)
* following the proposed production plan
* constructing a solution by selecting and using appropriate tools and machines,
following safe work practices
* using a timeline to construct and test the solution
* maintaining safety requirements
* recording changes to materials lists or costing
* marking out of material/s as required from plan and cut parts to required sizes using appropriate tools
* carefully putting the parts together
* take photographs of completed working project
1. Present the completed working project (10 marks)

|  |  |
| --- | --- |
| **What needs to be submitted for assessment** | **Due date** |
| * Production stage photos/daily work log for making process
 |  |
| * Stages of production (teacher observation)
 |  |
| * Completed project
 |  |

# Marking key for sample assessment Task 6 – Unit 3

|  |  |  |
| --- | --- | --- |
| **Production and recording of project one** | **Maximum possible mark** | **Allocated mark** |
| Work log or diary preparation* prepares for records of photographs, ongoing decisions and evaluations
* inconsistent preparation for decisions and evaluations
 | 3–41–2 | **/4** |
| Ongoing record of production * detailed record of production clearly showing each stage of the process
* stages of the process are recorded with brief annotations
* limited record of production
 | 5–63–41–2 | **/6** |
| Completed assembly/fitting of project parts* all parts shaped, assembled and fitted to a very high degree of accuracy
* all parts shaped, assembled and fitted to a high degree of accuracy with some minor errors or corrections
* most parts shaped, fitted and assembled to a high degree of accuracy
* most parts shaped, fitted and assembled to an acceptable degree of accuracy but there is evidence of lack of attention to detail
* some parts shaped, fitted and assembled to an acceptable degree of accuracy but there is evidence of missing pieces or poor quality workmanship
 | 9–107–85–63–41–2 | **/10** |
| Completed functioning project* completed functioning project; all components tested and function correctly
* completed functioning project; all components tested, some components require adjustment
* completed functioning project, but with inconsistent functioning components requiring adjustments
* completed functioning project, but with interrupted functioning requiring adjustments to, or replacement of, components
* completed, but non-functioning project; faulty components and/or assembly caused a non-functioning project
 | 9–107–85–63–41–2 | **/10** |
| **Total** | **/30** |

# Sample assessment task

# Engineering Studies – General Year 12

## Task 7 – Unit 3

**Assessment type:** Design

**Conditions**

Period allowed for completion of the task: one week, completed during the final week of the term

**Task weighting**

2% of the school mark for this pair of units

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**Evaluation of completed project one (20 marks)**

Test and evaluate your finished project by responding to evaluation questions.

**What you need to do**

Write clear statements to evaluate the project

Comment on the following key points, using some relevant or all minor dot points

Test the solution for correct function and document using checklists and test data

1. Did the project meet the design requirements? (10 marks)
* compare project against design ideas and final drawings
* comment on appearance, function and safety
* shape and size
* finish
* operating efficiency
* safe usage
1. Did the manufacturing processes achieve a quality project? (5 marks)
* comment on success of manufacturing skills
* correct shape and size as per design
* proportion and fit
* accurate joins, no gaps
* manufacturing influences on appearance
* comment on the production procedure
1. Could the shape, size and design features of the project be improved? (5 marks)
* comment on variations and changes to the design – aesthetics, materials and function

|  |  |
| --- | --- |
| **What needs to be submitted for assessment** | **Due date** |
| * Completed, tested project and evaluation report
 |  |

# Marking key for sample assessment Task 7 – Unit 3

|  |  |  |
| --- | --- | --- |
| **Evaluation of completed project** | **Maximum possible mark** | **Allocated mark** |
| Evaluation comments with regards to the specifications and design considerations of aesthetics, function and safety* clear comments referring to specific design considerations combined with justification of design, fulfilling design brief requirements
* comments outlining major uses and function, and referring to points within design brief
* comments linked to design brief expressing personal likes and dislikes about finished project
* comments outlining use of project, but little reference to statement of intent
* comments reflect superficial evaluation
 | 9–107–85–63–41–2 | **/10** |
| Comments on the manufacturing processes* clear flow of evaluation of all procedures with reference to specific procedures, improvements with little or no variation of process
* appropriate reporting and/or comment on procedures with some logical evaluation of operations, with little or minor variation of process
* comments on procedures with limited evaluation of operations, and some major correction of process
* brief comments with few references to major changes to process
* comments reflect superficial evaluation
 | 54321 | **/5** |
| Evaluation comments with regards to the shape and size – improvements* clear comments referring to aesthetics, function and safety influenced by shape and size and suggested improvements
* comments suggesting improvements, referring to major design considerations
* comments expressing personal likes and dislikes about improvements
* brief reference to design changes to improve function or aesthetics
* few comments/superficial notes on improvements
 | 54321 | **/5** |
|  | **Total** | **/20** |

# Sample assessment task

# Engineering Studies – General Year 12

## Task 10 – Unit 4

**Assessment type:** Response

**Conditions**

Period allowed for completion of the task: two weeks

**Task weighting**

2% of the school mark for this pair of units

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**Core content – Engineering in society (33 marks)**

**Research forms of obsolescence**

Define the terms; obsolete and obsolescence. Compare forms of obsolescence: technical, functional, postponement and planned.

Describe advantages and disadvantages of the different forms of obsolescence for society, business and the environment.

**Task description**

* Research the definitions of the terms obsolete and obsolescence, then produce a detailed paragraph for each definition (5 marks)
* Investigate and identify the four different forms of obsolescence, and then compare the differences, using examples when necessary (12 marks)
* For each form of obsolescence, identify and describe an example of an advantage and disadvantage for society, business and the environment (14 marks)
* each example should be limited to approximately 20–30 words
* images should be included and referred to in the description of each form of obsolescence
* Include all references by using in-text referencing, or an appropriately set out reference list
 (2 marks)

|  |  |
| --- | --- |
| **What needs to be submitted for assessment** | **Due date** |
| * Definitions and examples of obsolescence
 |  |
| * Advantages and disadvantages of obsolescence
 |  |

**Some suggested website references:**

[www.merriam-webster.com/dictionary/obsolescence](http://www.merriam-webster.com/dictionary/obsolescence)

[www.websters-online-dictionary.org/definitions/obsolescence](http://www.websters-online-dictionary.org/definitions/obsolescence)

[en.wikipedia.org/wiki/Obsolescence](http://en.wikipedia.org/wiki/Obsolescence)

[www.investopedia.com/terms/p/planned\_obsolescence.asp](http://www.investopedia.com/terms/p/planned_obsolescence.asp)

[whatis.techtarget.com/definition/planned-obsolescence-built-in-obsolescence](http://whatis.techtarget.com/definition/planned-obsolescence-built-in-obsolescence)

[business.yourdictionary.com/technical-obsolescence](http://business.yourdictionary.com/technical-obsolescence)

[www.investopedia.com/terms/f/functional-obsolescence.asp#axzz26hyhPdnu](http://www.investopedia.com/terms/f/functional-obsolescence.asp#axzz26hyhPdnu)

[ecopolproject.blogspot.com.au/2010/04/what-are-types-of-obsolescence.html](http://ecopolproject.blogspot.com.au/2010/04/what-are-types-of-obsolescence.html)

# Marking key for sample assessment Task 10 – Unit 4

|  |  |  |
| --- | --- | --- |
| **Presentation of the definitions and examples of the terms obsolete and obsolescence. Advantages and disadvantages of obsolescence.** | **Maximum possible mark** | **Allocated mark** |
| Presented definitions of the terms obsolete and obsolescence* accurate definitions and descriptive use of each term
* uses terminology correctly to define each term, but has minor/small errors or some details missing
* definitions incorrect and/or information missing
 | 4–52–30–1 | **/5** |
| Identifies the different forms of obsolescence and compares the differences:technical, functional, postponement and planned* accurate identification of each form of obsolescence (4 marks); with explanation of differences (4 marks); using appropriate examples (4 marks)
* correctly identifies each form of obsolescence, but has minor/small errors in phrases or terminology when comparing the examples
* compares the types of obsolescence in general terms, with minor errors in some phrases and confused terminology; limited use of examples
* limited use of terminology to identify and compare each form of obsolescence
 | 10–127–94–61–3 |  **/12** |
| Identifies and describes examples of the advantages and disadvantages of each form of obsolescence for society, business and the environment * accurate use of detailed examples (4 marks); with appropriate inclusion of relevant images (2 marks); using appropriate terminology to highlight advantages and disadvantages of each form of obsolescence for society, business and the environment (8 marks)
* correct examples to describe the advantages and disadvantages of each form of obsolescence for society, business and the environment
* some examples described, with limited or irrelevant images, included in general terms the advantages and disadvantages of each form of obsolescence for society, business and the environment
* incorrect explanation or errors, no images within the description of the advantages and disadvantages of each form of obsolescence for society, business and the environment
 | 12–149–116–81–5 |  **/14** |
| * appropriate reference list
* incomplete or no reference list provided
 | 21 | **/2** |
| **Total** | **/33** |