# 2015 HSC Design and Technology Marking Guidelines

## Section I

**Multiple-choice Answer Key**

| Question | Answer |
| --- | --- |
| 1 | A |
| 2 | B |
| 3 | C |
| 4 | B |
| 5 | A |
| 6 | B |
| 7 | B |
| 8 | D |
| 9 | A |
| 10 | B |

# Section II

## Question 11

| Criteria | Marks |
|---|---|
| • Outlines safe work practices that should be implemented by the designer with a direct link to the desk lamp | 4 |
| • Identifies safe work practices that should be implemented by the designer and outlines at least one of them | 3 |
| • Identifies safe work practices<br>OR<br>• Outlines one safe work practice | 2 |
| • Identifies a safe work practice | 1 |

*Sample answer:*

A risk assessment should be conducted before constructing the prototype. Personal protective equipment (PPE) should be used to minimise risk of injury. For example, face mask and eye protection (eg goggles, safety glasses) should be worn to protect the designer against dust and flying particles (eg when cutting wood for the stand of the desk lamp). Hearing protection (eg ear plugs, ear muffs) should be worn to protect against hearing loss due to the noise generated from sawing.

Electrical work of the desk lamp should be carried out by a licensed technician. Electrical parts should also be clearly tagged.

Regular maintenance, service and safety inspections of machinery, tools and equipment must be carried out.

Likewise suitable training in the safe use of equipment and machines needs to be undertaken.

*Answers could include:*

- Electrical tagging and testing is carried out according to legislation
- Research and testing of materials to ensure that no toxic fumes are emitted during the use of the prototype
- Utilisation of appropriate SOP/SLMS and MSDS information sheets.

**Question 12**

| Criteria | Marks |
|---|:---:|
| • Clearly describes how teamwork and collaboration of the designers is supported by information storage devices | 5 |
| • Outlines different ways that teamwork and collaboration of the designers is supported by information storage devices | 4 |
| • Outlines how teamwork and collaboration could be supported by information storage devices | 3 |
| • Identifies features of teamwork and collaboration and/or information storage devices | 2 |
| • Identifies a feature of teamwork and collaboration or an information storage device | 1 |

*Sample answer:*

There are many storage devices available for designers to save and share information. Designers may need to save drawings so they can use them at home or at another location. In the past they would have needed to take pages of paper. Now, designers can save on external hard drives or a cloud, which has meant larger files and a greater quantity of files can be saved and transported with an ever-mobile designer.

Unlike paper-based storage, documents and drawings stored in digital form on devices such as computer hard drives, USB memory sticks and CDs can be emailed to team members easily and quickly for sharing ideas and collecting feedback.

If the documents and drawings are stored on computer network, access can also be restricted to team members only using password protection. Team members may be assigned different permissions such as the right to modify or the right to read only.

In addition, documents may be uploaded to a 'cloud' for web-based storage. Cloud collaboration technologies can allow users from diverse geographical locations to upload, comment, collaborate and make changes on documents within the cloud. Some providers even offer virtually unlimited storage space and collaborative content authoring in real time.

*Answers could include:*

• Unlike paper-based storage, documents and drawings stored in digital form on devices such as computer hard drives, USB memory sticks and CDs can be emailed to team members easily and quickly for sharing ideas and collecting feedback

• Teamwork and collaboration can be assisted by the use of cloud-based storage of data so that designers can access work files in any context and work in a local and/or global context

• Teamwork and collaboration can be further fostered in contemporary design fields through the use of external drives so that collaboration/teamwork can be effectively achieved even without access to web based technology

**Question 13**

| Criteria | Marks |
|---|---|
| • Indicates how and/or why legal issues should be considered when developing a new technology<br><br>• Supports answer with examples | 6 |
| • Indicates how and/or why legal issues should be considered when developing a new technology<br><br>• Includes one example | 5 |
| • Outlines legal issues that should be considered when developing a new technology<br><br>• Indicates how and/or why for at least one of these issues<br>OR<br>• Describes legal issues that should be considered when developing a new technology | 4 |
| • Outlines legal issues that should be considered when developing a new technology | 3 |
| • Identifies legal issues associated with developing a new technology<br>OR<br>• Outlines a legal issue associated with developing a new technology | 2 |
| • Identifies a legal issue associated with developing a new technology | 1 |

*Sample answer:*

New technologies are always being developed for a changing society. People are always demanding better and more innovative designs that allow them to do more or keep up with societal trends. For designers this means that they are always designing new technologies that need to be protected from copying by other designers or manufacturers. This means that they have to continually protect their designs by getting patents. This costs a lot of money, effort, time and legal fees, which many designers will need to budget for so that their ideas remain new and unique.

The designer should have the new invention patented to prevent others from making, using or selling it without permission. As intellectual property rights do not continue indefinitely, the designer must also pay renewal fees for patents and designs promptly and keep their trademark registration current. The periods during which the IP rights exist are specified in statutes. At expiry, people are generally free to use the IP rights without infringement. The designer should also update the patent or copyright when changes are made to the invention to ensure that all aspects are protected. On the other hand, if the designer is to incorporate other's design, the designer should identify the copyright/patent owner and seek permission before use. It is also important for the designer to identify the scope of the copyright/patent and any permission granted. The design and packaging of a product may be patented in addition to the technology. For example, the Apple-Samsung lawsuits included infringement in areas such as the shape of the iPhone and the colour design of the graphical user interfaces. Lawsuits regarding patent infringement can be lengthy and costly, and may have international implications. The Apple-Samsung lawsuits took place in many countries such as the US, Australia, Japan, Germany, South Korea and the UK. IP infringement could even result in the product being banned from sale.

*Answers could include:*

• Pantent

• Registered Trademarks

- Copyright
- Violation of individuals privacy
- Meeting existing safety standards
- Meeting building codes and standards
- Environment factors and standards
- Complying with government regulations

## Section III

### Question 14

| Criteria | Marks |
|---|---|
| • Shows a comprehensive understanding of the opportunities and challenges faced by designers when attempting to design and produce sustainable products<br>• Draws out and relates implications of these opportunities and challenges<br>• Communicates using relevant examples<br>• Responds in a sustained, logical and cohesive manner | 13–15 |
| • Shows a detailed understanding of the opportunities and challenges faced by designers when attempting to design and/or produce sustainable products<br>• Explains opportunities and challenges<br>• Includes relevant examples<br>• Responds in a logical manner | 10–12 |
| • Describes opportunities and challenges faced by designers when attempting to design and produce sustainable products<br>• May include a relevant example | 7–9 |
| • Outlines opportunity(ies) and/or challenge(s) faced by designers | 4–6 |
| • Identifies opportunity(ies) and/or challenge(s) faced by designers | 1–3 |

*Sample answer:*

Designers need to consider sustainable products due to the decreasing supply of traditional resources that can be used in the manufacturing of a product (eg fuels and plastics).

Sustainable products are now being developed that allow designers to consider a wider range of materials and processes in the production of design solutions. In order for this to occur, designers must consider the opportunities and challenges.

The use of plastic in product design has evolved with a range of alternative biodegradable options such as 'Biopak'. 'Biopak' is a sustainable form of packaging. By using this new and emerging technology, the amount of waste is reduced, particularly at the final stage of the product, when it is in the hands of the user.

This is important for the designer because a product will generally be successful if it appeals to the consumer. So if a designer were to use 'Biopak' in the packaging of their products, then more users would be prepared to purchase these products. With a greater consumer base, more income through sales is achieved by the designer. This in turn increases the profits of the designer or the company employing the designer. This increase in consumerism would also develop a change in consumer demands, with society now expecting other products to include 'Biopak' or similar.
However, there is the challenge of cost that designers and companies need to address. In order to develop sustainable products, designers must devote time and money. The development of technologies may take months or years to refine and companies must remain financially viable during that time. This is often out of reach for many designers and so they remain using the traditional practices, which maintain the extraction of raw materials such as oil for the creation of petrochemicals used in the manufacturing of plastic packaging. In the initial stages of introduction to a marketplace, sustainable technologies are generally more expensive

in comparison with traditional methods and materials, which again inhibits designers from choosing to develop sustainable products.

An example of this involved *Nike*, a transnational corporation that discovered the massive amounts of waste leather created in SE Asia through the production process of their footwear. They attempted to develop a sustainable product by using an emerging product. This involved the re-stitching of waste leather to create a 'second' raw material. This was then remanufactured to create the '*Nike Trash Talk*' shoe. In order for *Nike* to accomplish this they needed to create new manufacturing sites and retrain workers. While this solved the problem of reducing waste, it increased the cost of the shoe. Given this, *Nike* only market the '*Trash Talk*' in Europe and the US because of the size of these markets meaning that there is no change in consumer demand globally. In developing communities and economies such as China, there is a growing demand for traditionally produced footwear, which in turn creates more waste leather.

Sustainable products are essential in the attempt to reduce the extraction of raw materials and reduce the creation of waste. Designers need to consider the improvements in materials and the financial profitability in the long term. This will allow them to change global demands and designer trends that overcome the challenges of the short-term costs of developing sustainable products.

***Answers could include:***

Implications
- Ethical –
    - Labour costs, conditions, investment in developing better trade links, better quality of life
    - Better reputation
    - Production techniques
- Environmental
    - Use of resources, energy methods
    - Costs, incentives from governments
    - Innovation
    - Recycling, renewable (water/biofuel)

# 2015 HSC Design and Technology Mapping Grid

**Section I**

| Question | Marks | Content | Syllabus outcomes |
|:---:|:---:|---|---|
| 1 | 1 | Design factors | H1.1 |
| 2 | 1 | Research methods | H5.2 |
| 3 | 1 | Communication | H5.2 |
| 4 | 1 | Designing products | H1.1 |
| 5 | 1 | Impact of new technologies | H1.1, H2.1, H6.2 |
| 6 | 1 | Product development | H5.1 |
| 7 | 1 | Success of an innovation | H3.1 |
| 8 | 1 | Research methods & communication | H4.1, H5.2 |
| 9 | 1 | Work of designers | H1.2, H5.2 |
| 10 | 1 | Research methods/Process of design | H1.2, H4.1, H5.2 |

**Section II**

| Question | Marks | Content | Syllabus outcomes |
|:---:|:---:|---|---|
| 11 | 4 | Safe work practices | H6.1 |
| 12 | 5 | Work of designers | H1.2 |
| 13 | 6 | Legal implications and new technologies | H6.2 |

**Section III**

| Question | Marks | Content | Syllabus outcomes |
|:---:|:---:|---|---|
| 14 | 15 | Designing and producing sustainable products | H1.2, H2.2, H3.1 |