

# **MARKSCHEME**

**November 2000**

**DESIGN TECHNOLOGY**

**Standard Level**

**Paper 2**

**SECTION A**

1. (a) (i) Award [**1 mark**] for 7.94 mm (**[0 marks]** if units are missing)
- (ii) Award [**1 mark**] for 79.38 mm (**[0 marks]** if units are missing)
- (iii) Award [**1 mark**] for 33.27 mm (Dimension B Spring 3)  
[**1 mark**] for  $33.27 \text{ mm}^* - 12.7 \text{ mm}$   
[**1 mark**] for  $20.57 \text{ mm}^*$

*(\*Allow the mark if another value for B is used but the arithmetic is correct, reduce by [**1 mark**] if units are omitted.)*

- (b) Award [**1 mark**] for 1118 mm (length of Spring 2)  
Award [**1 mark**] for  $1118 \text{ mm}^* - 76.2 \text{ mm} = 1041.8 \text{ mm}^*$

*(\*Allow marks if another value for maximum length is used. [**0 marks**] if units are omitted)*

- (c) Award up to [**2 marks**] for each aspect correctly identified in the candidates response identified from the list below, to a maximum of [**4 marks**].
- Material must be inelastic and remain so
  - Material must be resistant to abrasion
  - Material must be resistant to a damp environment
  - Unit must 'fail-safe'
  - Material must be flexible and acceptable to the wearer
  - Material must have high tensile strength

2. (a) Award [**1 mark**] for either 'casting' or 'moulding'. No other answer acceptable.

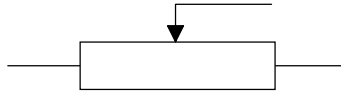
- (b) Traditional materials are combined, managed, processed to create new materials [**1 mark**] with novel properties and enhanced performance [**1 mark**].

3. Award [**1 mark**] for stating that an injection-moulder requires a mould which could be an example of one-off manufacture.

Award [**1 mark**] for a statement that identifies the fact that a prototype is required for development purposes

*(total [**2 marks**])*

4. (a) Award [**1 mark**] for a drawing that is a recognisable reproduction of the drawing on page 45, item 5.1.14 in the syllabus.



- (b) Award [**1 mark**] for the definition of a closed loop system identifying the need for some form of feedback. The word 'feedback' must be used or clearly implied.

Reference / input signal — drivers eyes, ears, balance *etc.*

Feedback / actual output — direction, speed,

Comparing stage — driver notes relative position of car, hazards, and other road users.

Driving stage — change direction and / or speed.

Award [**1 mark**] for input = from senses *e.g.* highest sound.

Award [**1 mark**] for output = action *e.g.* slow down.

Award [**1 mark**] for feedback = change of direction and/or speed.

## SECTION B

*Please note that for this section each question has an additional [3 marks] available for the construction of the answer.*

5. (a) (i) (Award [1 mark] for a statement in their own words.)
- ‘(Product life cycle) refers to the introduction, growth, maturity and decline and refers to the general pattern of the production and profitability of a product.’
- (ii) (Award [1 mark] for each correct statement up to a maximum of [3 marks])
- Designing is part of the product cycle not the whole.
  - The designer must be aware of the life cycle of the product designed.
  - The designer is not in control of the product cycle.
  - The designer is responsible for producing a suitable solution not for the commercial exploitation of the product.
  - The designer should build into the specification, elements that effect the product life, *e.g.* durability, planned obsolescence *etc.*
- (b) (Award [2 marks] for each clear, justified statement up to a maximum of [4 marks])
- Range of facilities (machine *etc.*) on which the car will be built will influence.
  - Type of facilities available *i.e.* press tools, jigs, robots.
  - Number of facilities, *i.e.* how many parts concurrently *etc.*
  - Maximum/minimum size of component that can be made on any particular machine.
  - Capital expenditure can be influenced by the design but not controlled by the design.
  - The corporate image of the company will influence, *i.e.* large, volume, or high quality.
- (c) (Award [2 marks] for each explanation to a maximum of four explanations, [1 mark] for a statement rather than an explanation.)
- Designing the car to be more environmentally responsible.
  - Designing cars to be recyclable
    - in part
    - whole.
  - Designing car engines to be more fuel efficient.
  - The environment is effected by vehicles that pollute during their lifetime and are difficult to dispose of at the end of their useful life, designers must mitigate this.
  - Designers must choose materials and processes that have a responsible environmental impact.
  - Designers should resist having short timescales for planned obsolescence. (Cars and their parts must be more durable, long lasting *etc.*)
  - Designers should influence legislators to ensure that environmental issues are included in any regulations affecting the manufacture of motor cars.
  - Award [1 mark] for a balanced discussion covering a good range of factors.

6. (a) (Award [**1 mark**] for each element identified in the candidates answer from those below. Maximum [**2 marks**])
- Must be possible to lift it when full. (Weight or Mass)
  - Must be able to be handled and opened without special tools
  - Size
  - Size distribution (aspect ratio)
  - Size of children (range)
  - Texture
- (b) (Award [**2 marks**] for each correctly identified element from those below. Maximum [**4 marks**])
- Devise, distribute, collect and analyse a questionnaire. (Obtaining user responses)
  - Hold selected user trials of prototypes
  - Refer to commercially available data from reliable sources
  - Observing user behaviour
  - Research existing products
- (c) (Award [**1 mark**] for each element correctly identified from the list below. Maximum [**3 marks**])
- By producing pictorial drawings
  - By producing models and samples (food)
  - By making a presentation using computer generated images
  - By using prototypes of ideas in whole or in part
- (d) (Award up to [**4 marks**] for a comprehensive response in each of the following areas. Maximum [**8 marks**])
- Designers have to balance the needs of the user with those of the manufacturer
  - Designers need to be aware of the quality ethos of the manufacturer and the proposed market and the relationship of the two
  - The designer must have a clear understanding of the manufacturer's processes and use them as much as possible, *e.g.* a cardboard box maker would not expect the designer to specify a plastic box
  - Designers have to be able to see all points of view and balance the needs and expectations of the user with the resources and business requirements of the manufacturer
  - Designers cannot be biased
  - Safety issues
  - manufacture looking for the largest profit available

7. (a) (Award [1 mark] for each correctly identified symbol. Maximum [3 marks])
- (i) Start / Stop
  - (ii) Decision
  - (iii) Input / Output
- (b) (Award [1 mark] for each component identified with a logical use. Maximum [2 marks])
- A. Nand Gate — Used in the logic circuitry of the solution.
  - B. Microphone — To detect sound inputs, e.g. response from the user.
  - C. Loudspeaker — To produce sound outputs as appropriate.
  - D. Light Dependent Resistor — Detects changes in light levels, used to detect when night falls.
  - E. Ammeter — measures current used ([0 marks] if chosen, this is a test instrument and not necessary for the function of the device.)
  - F. LED (Light Emitting diode) — Can be used to produce light output effects in concert with others.
  - G. Thermistor — Can detect changes in temperature by changing resistance. Can detect if the system is overheating and initiate a shut down procedure.
  - H. Switch - to switch the whole or part of the system on or off or act as a response element activated by the user directly or by the insertion of a coin.
- (c) (Award [2 marks] for each logical suggestion to a maximum [4 marks])
- Make it colourful
  - Make it child sized
  - Design it with a child orientated theme, e.g. Walt Disney characters
  - Sound outputs can have child's voices or characters that children identify with e.g. Yogi Bear or R2D2
  - Make it react well to children's approaches
- (There could be other ways, allow the marks if the candidate has put him/herself in the role of the designer generating ideas to answer the question.)
- (d) (Award [2 marks] for the inputs to the first AND gate, [2 marks] for the inputs to the second AND gate and [2 marks] for the inputs to the third AND gate. Award [1 mark] each for the output of the second and third AND gates.)

