

# **MARKSCHEME**

**November 2002**

## **DESIGN TECHNOLOGY**

**Standard Level**

**Paper 2**

## Subject Details:      Design Technology SL Paper 2 Markscheme

### Mark Allocation

Candidates are required to answer **ALL** questions in Section A (total 20 marks) **and any ONE** question in Section B (20 marks each). Maximum total = 40 marks.

### General

A markscheme often has more specific points worthy of a mark than the total allows (especially for essay questions). This is intentional. Do not award more than the maximum marks allowed for part of a question.

When deciding upon alternative answers by candidates to those given in the markscheme, consider the following points:

- Each marking point has a separate line and the end is signified by means of a semicolon (;).
- An alternative answer or wording is indicated in the markscheme by a '/'; either wording can be accepted.
- Words in ( ... ) in the markscheme are not necessary to gain the mark.
- The order of points does not have to be as written (unless stated otherwise).
- If the candidate's answer has the same 'meaning' or can be clearly interpreted as being the same as that in the mark scheme then award the mark.
- Mark positively. Give candidates credit for what they have achieved, and for what they have got correct, rather than penalising them for what they have not achieved or what they have got wrong.
- Remember that many candidates are writing in a second language; be forgiving of minor linguistic slips. Effective communication is more important than grammatical niceties.
- Occasionally, a part of a question may require a calculation whose answer is required for subsequent parts. If an error is made in the first part then it should be penalised. However, if the incorrect answer is used correctly in subsequent parts then **follow through** marks should be awarded. Indicate this with 'ECF', error carried forward.
- Units should always be given where appropriate. Omission of units should only be penalised once. Indicate this by 'U-1' at the first point it occurs. Ignore this, if marks for units are already specified in the markscheme.
- Do not penalise candidates for errors in significant figures, unless it is specifically referred to in the markscheme.

## Section B

### Extended response questions - quality of construction

- ♦ Extended response questions for SL P2 carry a mark total of 20. Of these marks, 17 are awarded for content and 3 for the quality of construction of the answer.
- ♦ Three aspects are considered:
  - expression of relevant ideas with clarity
  - linking of ideas (relevant or irrelevant) in a logical sequence
  - for design using appropriate communication methods.
- ♦ The 3 quality marks are to be awarded according to the following criteria:

Clarity of argument:

**1 mark** Consistently expresses relevant ideas with clarity.

‘Designers’ logic:

**1 mark** Demonstrates ‘designer’s logic: planning; design contexts and relevant examples; prioritises issues.

Communication:

**1 mark** Employs techniques; (graphs, flowcharts, algorithms, appropriate communication, diagrams, annotations of graphs, tables and charts, 2D / 3D sketches *etc.*)

- ♦ It is important to judge this on the overall answer, taking into account the answers to all parts of the question. Although, the part with the largest number of marks is likely to provide the most evidence.
- ♦ Candidates that score very highly on the content marks need not necessarily automatically gain the three points for the quality of construction (and vice versa).
- ♦ The important point is to be consistent in the awarding of the quality points. For **sample scripts for moderation** the reason why quality marks have been awarded should be stated.
- ♦ Indicate the award of quality marks by writing **Q3, Q2, Q1** or **Q0** in **red** at the end of the answer.

SECTION A

1. (a) 120 mm; [1]

(b) (i) [1] for correct calculation [1] for correct answer including units.  
If no units [1] only.

(20 + 100 + 170 + 50);  
(340 × 2) = 680 mm;

[2 max]

[1] for how to do calculation [2] for right answer (no additional decimal places) including units.

(ii)  $\frac{200}{0.68}$ ;  
= 294 pairs;  
= 588 cartons;

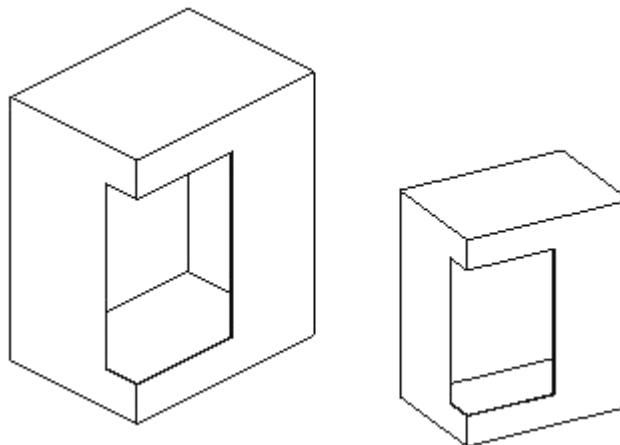
OR

$\frac{200}{0.34}$ ;  
= 588 cartons;

[3]

(c) (i) 7 creases; [1]

(ii)



window correctly positioned;  
3D;  
window shown;

[3]

2. (a) stiffness (accept how much the wood would bend); [1]

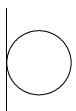
(b) wasting; [1]

3. new materials generally produced by combination of traditional materials-composite material  
properties of the new material can be managed by the composition of the composite;  
novel properties are different to those of original material;  
novel properties are designed for particular applications; [3]

4. *[1] for each aspect listed.*

- amount of energy needed to create the raw materials;
- amount of energy used to manufacture the product;
- amount of energy required for the product in use;
- efficient use of energy;
- use of thermostat e.g. in a kettle to ensure energy not wasted;
- amount of energy required to dispose of the product
- consideration of appropriate energy sources;
- use of less environmentally friendly fuels;

*[2 max]*

5. (a)  ;

*[1]*

(b) amplifier;

*[1]*

(c)  ; 

*[1]*

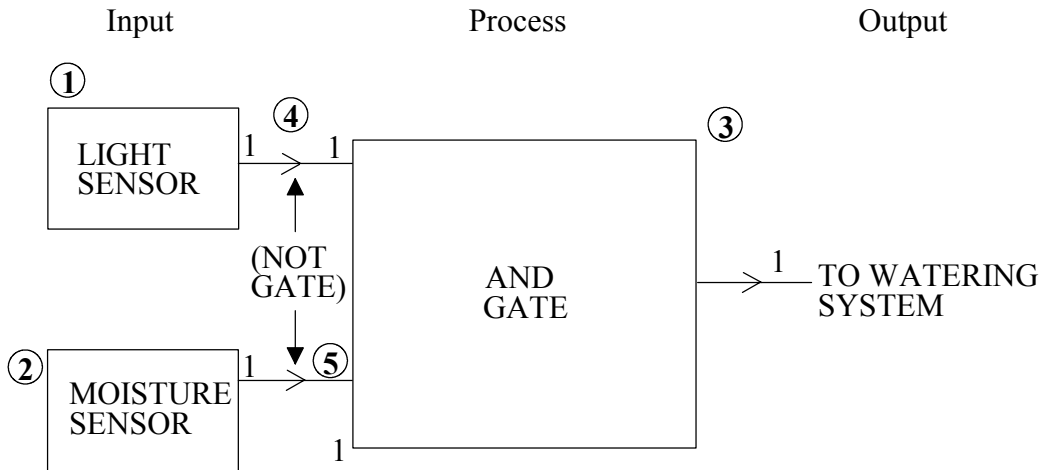
**SECTION B**

6. (a) *Any two factors outlined [2] each. [1] for factor and [1] for brief explanation.*  
signs are international;  
can be used in public spaces without worrying about translations;  
also space considerations, one international sign;  
they relate to different cultures;  
they communicate across different literacy abilities;  
therefore if people cannot read there is no problem;  
they have immediate visual impact;  
they are simple visual images and can be recognised at a distance; **[4 max]**
- (b) *Any four of the following advantages.*  
easy to clean;  
easy to manufacture in quantity;  
resistant to moisture does not deteriorate in damp environments;  
available in a wide range of colours;  
easy to fix to other materials;  
widely available in a variety of different plastics;  
available in different sizes (thicknesses);  
cheap;  
can be recycled;  
light in weight;  
translucent so can put light behind it so that it shows up at night; **[4 max]**
- (c) *[1] for identifying a design consideration. [1] for explaining the significance to wheelchair users. [4 max] considerations [1] for a balanced answer taking into account access to the building and the use of banking services by the user.*  
ease of access to the building e.g. sliding door operated by a sensor would be appropriate;  
no steps into the building – access by a ramp;  
size of door opening to be wide enough for wheelchair access;  
space to turn around a wheelchair without knocking into other customers or staff;  
height of tables or counter so customer can communicate with bank staff;  
height of banking machines so customer can operate from a seated position; **[9 max]**

*Expression of ideas max [3 marks]*

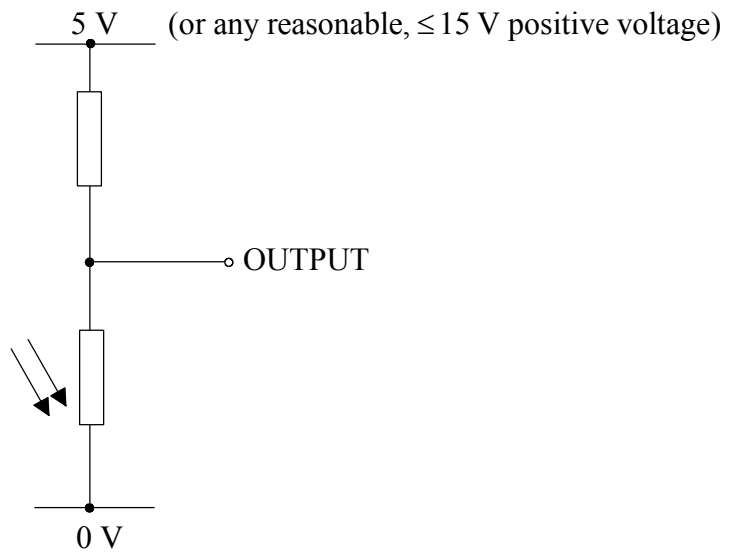
**Total [20 marks]**

7. (a)

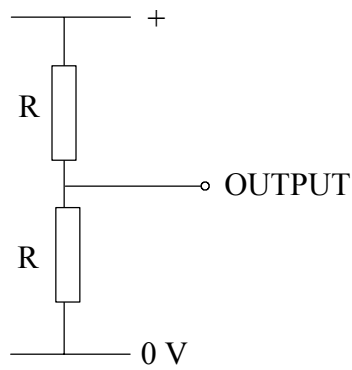


- ① for means of detecting light;
- ② for means of detecting moisture;
- ③ for an AND gate with output suitably labelled;
- ④ *[1]* for either:  
explanation that the light sensor gives out a logical 1 in the DARK;  
**OR**  
the insertion of a NOT gate to give out a logic 1 when it is NOT LIGHT;
- ⑤ *[1]* for either:  
explanation that the moisture sensor gives out a logic 1 when DRY;  
**OR**  
the insertion of a NOT gate to give out a logic 1 when it is NOT MOIST; *[5 max]*

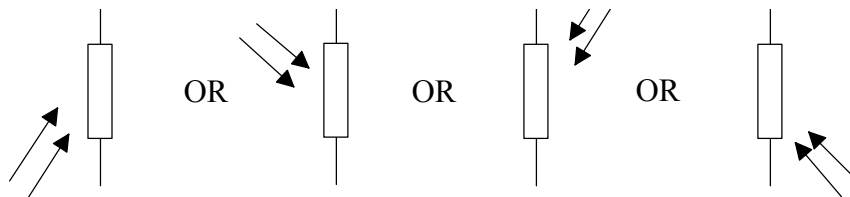
(b)



[1] for pair of resistive components in the form of a potential divider with output in the centre;



[1] for correct symbol for LDR (Light Dependant Resistor):



[1] for consistency with block diagram *i.e.* showing it working at night not during the day;

[3]



- (c) *Any four factors suitably explained [2] each. [1] for a balanced answer covering more than one resource.*

the system is set to use a measured amount of water, reducing waste;  
the system operates at night – so using cheaper electricity;  
the system can be adapted to use rainwater stored in a container;  
the positioning of the sensors is critical to ensure no over-watering *i.e.* to measure the moisture content after the water has been absorbed by the soil;  
the components must be made from non corrosive materials to avoid obsolescence;  
the design of the sensors is important so they are not too sensitive causing over-watering but are sensitive enough to detect the needs of the plants as they grow and require more water;

**[9 max]**

*Expression of ideas max [3 marks]*

**Total [20 marks]**

8. (a) (i) mechanisation relies on human control;  
automation relies on computer control; **[2]**
- (ii) CAD can used to produce drawings;  
which can be used to communicate the design details to the manufacturer; **[2]**
- (b) *Any two descriptions [2] each; [1] for not relating fully to the nature of the workforce.*  
less manual work required – therefore reduction in number of jobs;  
different range of skills required – need for retraining;  
reduction in hazardous jobs for workers – therefore safer working conditions; **[4 max]**
- (c) **[2] for each cost explaining how they will be affected up to [8 max]. [1] for a balanced answer.**  
capital costs: higher costs for automation due to the more expensive technically advanced equipment;  
labour costs: reduced labour costs as less manual labour required;  
design costs: the design costs may not vary as much as models, tests and prototypes will still have to be produced but will go up if redesign is needed to fit automated manufacture;  
overheads: a reduction in overheads as employing less people required less facilities for them; **[9 max]**

*Expression of ideas max [3 marks]*

**Total [20 marks]**

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