



# **MARKSCHEME**

**November 2008**

**DESIGN TECHNOLOGY**

**Standard Level**

**Paper 3**

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## Subject Details: Design Technology SL Paper 3 Markscheme

### Mark Allocation

Candidates are required to answer questions from **TWO** of the Options [**2 × 20 marks**].

Maximum total = [**40 marks**]

1. A markscheme often has more marking points than the total allows. This is intentional. Do **not** award more than the maximum marks allowed for part of a question.
2. Each marking point has a separate line and the end is signified by means of a semicolon (;).
3. An alternative answer or wording is indicated in the markscheme by a slash (/) - either wording can be accepted.
4. Words in brackets ( ) in the markscheme are not necessary to gain the mark.
5. Words that are underlined are essential for the mark.
6. The order of marking points does not have to be as in the markscheme, unless stated otherwise.
7. If the candidate's answer has the same "meaning" or can be clearly interpreted as being of equivalent significance, detail and validity as that in the markscheme then award the mark. Where this point is considered to be particularly relevant in a question it is emphasized by writing **OWTTE** (or words to that effect).
8. Remember that many candidates are writing in a second language. Effective communication is more important than grammatical accuracy.
9. Occasionally, a part of a question may require an answer that is required for subsequent marking points. If an error is made in the first marking point then it should be penalized. However, if the incorrect answer is used correctly in subsequent marking points then **follow through** marks should be awarded. Indicate this with **ECF** (error carried forward).
10. Only consider units at the end of a calculation. Omission of units should only be penalized once in the paper. Indicate this by writing **-1(U)** at the first point it occurs and **U** on the cover page.
11. Do not penalize candidates for errors in significant figures unless it is specifically referred to in the markscheme.

**Option A — Raw material to final product**

- A1.** (a) *Award [1] for a characteristic.*  
transparency;  
able to be wiped clean;  
protect from outside world;  
tough and will not shatter; *[1 max]*
- (b) *Award [1] for stating the reason and [1] for a distinct point.*  
absorbency;  
can be easily cleaned;  
dries quickly after being wet from cleaning; *[2 max]*
- (c) *Award [2] for the structure and [1] for an additional point relating to its use.*  
  
structure:  
laminated glass is sheets of glass;  
with a thin layer of plastic in the middle;  
  
use:  
prevents propagation of cracks;  
can be made shatter proof; *[3 max]*
- A2.** (a) *Award [1] for a reason.*  
less brittle and higher tensile strength than pig iron; *[1]*
- (b) *Award [1] for why and [1] for each point relating to that.*  
to prevent corrosion;  
iron alloys corrode in the presence of oxygen;  
to protect the metal from corrosion;  
  
(to enhance) aesthetics;  
paint it pretty colours;  
company logos/train name;  
  
to improve durability;  
protect from scratching;  
protect from pitting; *[2 max]*

**A3.** Award [1] for stating the benefit and [1] for each point in a brief explanation [2 max] for each of two benefits.

performance;

- smooth ride;
- reduced noise;
- reliability;

financial;

- energy savings;
- low maintenance costs;
- lower raw material costs;

maintenance;

- low maintenance cost as no parts need to be replaced;
- ease of maintenance due to low part numbers;

[6 max]

**Option B — Microstructures and macrostructures**

- B1.** (a) *Award [1] for a characteristic.*  
toughness;  
resistant to moisture;  
stiffness;  
aesthetics; *[1 max]*
- (b) *Award [1] for a reason and [1] for each related point.*  
thermal conductivity;  
is low so it won't burn the lap of the user;  
  
stiffness;  
high, retains shape when hot food is placed on;  
high so retains shape when a lot of food is placed on; *[2 max]*
- (c) *Award [1] for per distinct point.*  
structure – has cross linking of chain molecules;  
cannot be broken down easily for recycling;  
high temperatures needed to break the cross linking; *[3 max]*
- B2.** (a) *Award [1] for a definition.*  
a mixture that contains at least one metal; *[1]*
- (b) *Award [1] for each point up to [2 max].*  
ductility is reduced;  
metal becomes brittle due to the presence of “foreign” atoms; *[2 max]*

**B3.** Award [1] for per distinct point mentioned in a brief explanation [3 max] for the plastic region and the elastic region.

elastic:

- until elastic limit the material will return to its original shape;
- enough force mass is applied;
- material is malleable;
- straight line of proportionality;

plastic:

- permanently deformed;
- curved region;
- material is malleable;
- variable strength;

[6 max]

**Option C — Appropriate technologies**

- C1.** (a) *Award [1] for definition*  
resources that take too long for natural processes to replenish them; **[1]**
- (b) *Award [1] for reason and [1] for a point relating to that reason.*  
materials;  
    availability;  
    cheap;
- production;  
    more power;  
    existing technology in place; **[2 max]**
- (c) *Award [1] for a difficulty and [1] for each related point in a brief explanation [2 max].*
- resources;  
    expensive to change to renewable resources;  
    coal is still relatively cheap;
- global;  
    demand, *i.e.* industries that still require coal;  
    large reserves of coal still exist;
- timescales for implementing changes;  
    long lead time to implement system level change;  
    end of pipe solutions can be implemented relatively quickly;
- cost of policing legislation;  
    environmental agencies would have to monitor compliance;  
    government would need to enforce legislation; **[3 max]**
- C2.** (a) *Award [1] for definition.*  
development that meets the needs of the present without compromising the ability of future generations to meet their own needs; **[1]**
- (b) *Award [1] for an aspect and [1] for a point for a point relating to that aspect.*  
market demand;  
    a growing market of “green” consumers;  
    consumers wanting products produced by environmentally responsible manufacturers;
- consumer pressure;  
    consumers want a cleaner environment;  
    growing number of pressure groups;  
    forcing manufacturers to reconsider their environmental policies; **[2 max]**

**C3.** Award [1] for a characteristic and [1] for each point in a brief discussion [2 max] for each of two characteristics.

resources;

coal availability;

cheap;

technology;

cheap and cost effectiveness;

technology available;

workforce;

labour intensive;

no need for specialized training;

time and place;

developing economy;

available infrastructure;

[6 max]

**Option D — Food technology**

- D1.** (a) *Award [1] for property.*  
texture;  
smell;  
taste; *[1 max]*
- (b) *Award [1] for reason and [1] for a point related to that reason.*  
taste;  
too salty or sour a flavour;  
  
health issue;  
high salt consumption unhealthy for consumers; *[2 max]*
- (c) *Award [1] for definition of dehydration and [1] for each point in a brief explanation [2 max].*  
dehydration is the reduction of water;  
the low water content inhibits growth of micro-organisms;  
micro-organisms cant survive without water;  
added salt or sugar absorbs any water that micro-organisms need; *[3 max]*
- D2.** (a) *Award [1] for definition.*  
food becoming unfit for consumption; *[1]*
- (b) *Award [1] for lifestyle factor and [1] for each related point.*  
leisure activities;  
reduce space;  
easy to pack;  
lightweight;  
  
living arrangements;  
nomadic;  
guarantee supply of food;  
prevent spoilage;  
  
busy lifestyle;  
no time to prepare food;  
eat on the run; *[2 max]*

**D3.** Award **[1]** for area of benefit and **[1]** for each related point in a brief explanation  
**[2 max]** for each of two benefits.

spoilage;

limit interaction with the environment;

re-sealable so all the food doesn't need to be consumed at once;

convenient;

transportation of product due to light weight of packaging material:

easily recognize brand;

read nutritional content/product information;

transportation;

plastic is light weight;

easily packed;

cheap to transport due to lightweight material;

**[6 max]**

**Option E — Computer-aided design, manufacture and production**

- E1.** (a) *Award [1] for an advantage.*  
flexibility;  
storage;  
interface with other CAD/CAM systems;  
complex drawings done quickly; *[1 max]*
- (b) *Award [1] per point.*  
CAD design using input devices and software;  
CAD software is compatible with CAM translates into  $x y z$  co-ordinates;  
artefact/scarf is produced through CAM; *[2 max]*
- (c) *Award [1] for impact and [1] for each related point in a brief explanation [2 max].*  
choice;  
wider range of designs and colours;  
consumer input, monograms or logos;  
  
cost;  
is kept low;  
takes advantage of economies of scale;  
  
quality;  
high due to reduction of human error;  
consistency of quality; *[3 max]*
- E2.** (a) *Award [1] for definition.*  
a sophisticated CIM system that manufactures products to individual customer orders; *[1]*
- (b) *Award [1] for advantage and [1] for each related point.*  
higher profits;  
increased customer satisfaction;  
increased access to mass markets;  
gains from benefits of economy of scale;  
  
market access;  
increased access to mass market flexibility of economy of scale;  
increased customer satisfaction therefore returning customers; *[2 max]*

**E3.** Award **[1]** per issue and **[1]** for discussion relating to that issue **[2 max]** for each of two issues.

financial;

- high initial cost of capital;
- reduction in labour and waste costs;
- high cost for training;

labour;

- skills required;
- improved working conditions;
- employment satisfaction;
- loss of jobs as less employees;

production;

- more quality control;
- better machine utilisation;
- ability to replicate artefacts exactly;

**[6 max]**

**Option F — Invention, innovation and design**

- F1.** (a) *Award [1] for definition.*  
the process of discovering a principle;  
a technical advance in a particular field often resulting in a novel product; *[1 max]*
- (b) *Award [1] per reason.*  
safety;  
efficiency;  
availability;  
reliability; *[2 max]*
- (c) *Award [1] for a reason and [1] for each related point in a brief explanation [2 max].*  
businessman;  
understood markets;  
able to get formal backing;  
had a business;  
was a business man;

**OR**

- creativity;  
invented artefacts;  
made technological advances; *[3 max]*
- F2.** (a) *Award [1] for definition.*  
the initial impetus for the development of a new product is generated by a demand from the market; *[1]*
- (b) *Award [1] for area of change and [1] for each related point.*  
product life cycle;  
last longer;  
therefore less waste is generated;
- performance;  
brighter light-use less bulbs;  
less heat is generated;  
more efficient;
- environment;  
designed for disassembly;  
recycling incentives/systems;  
use recycled materials; *[2 max]*

**F3.** *Award [1] per characteristic and [1] for each related point in a brief explanation [2 max].*

technophile will adopt;

someone who immediately welcomes a technological change;

will accept “bad with the good” of the technology;

sees “Tech as cool” and so will get the latest advance;

sees it as a way to increase wealth;

technophobe will not adopt technology;

may fear change and disturbance;

not willing to spend money on technology no matter what the price;

may fear change and disturbance;

value systems towards technology;

someone who resists all technological change;

*[6 max]*

**Option G — Health by design**

- G1.** (a) *Award [1] per pollutant*  
Sulphur Dioxide (SO<sub>2</sub>);  
Nitrogen Oxides (NO<sub>x</sub>);  
Carbon Monoxide (CO);  
Benzene (Ozone (O<sub>3</sub>); *[1 max]*
- (b) *Award [1] per point.*  
provides an environment for a chemical reaction to occur;  
the toxic combustion products are transformed to less toxic by-products; *[2]*
- (c) *Award [1] per role and [1] for each related point in a brief explanation [2 max].*  
improve standards;  
tighter emission controls;  
higher safety standards;
- force multinational companies to invest in R&D;  
R&D is expensive so companies may be reluctant to invest in R&D;  
R&D cuts into the company's profits so companies may be reluctant to invest; *[3 max]*
- G2.** (a) *Award [1] for definition.*  
a design methodology in which designers use the users as a resource to increase their understanding; *[1]*
- (b) *Award [1] for implant and [1] per relative advantage.*  
arteries;  
soft;  
won't dissolve;  
extensible;
- ear;  
won't melt;  
extensible;  
won't dissolve;  
soft;
- nose;  
won't melt;  
extensible;  
won't dissolve;  
soft; *[2 max]*

**G3.** *Award for each related point in a discussion [3 max] for reuse and for repair*  
reuse:

- changing to custom made shells;
- changing the batteries;
- changing the internal circuitry;
- rechargeable batteries;

repair:

- use standard parts;
- easily disassembled;
- ease of repair by user;
- changing the internal circuitry;

**[6 max]**

**Option H — Electronic products**

- H1.** (a) *Award [1] for voltage including units.*  
9 V / 9 volts; *[1]*
- (b) *Award [1] for function and [1] for description.*  
protection for transistor;  
steps down the output from ICI;  
controls input to base of the transistor; *[2 max]*
- (c) *Award [1] per point.*  
open circuit system;  
the circuit is open, no current;  
when it becomes closed current flows;  
sounding the alarm; *[3 max]*
- H2.** (a) *Award [1] for stating component.*  
thermistor; *[1]*
- (b) *Award [1] for difference and [1] for description.*  
closed loop provides feedback, open loop does not;  
control measures can be taken on basis of feedback signal in closed loop circuits; *[2]*
- H3.** *Award [1] for impact and [1] for each related point in a brief explanation [2 max] for each of two impacts.*
- portability;  
smaller computers/PDA's;  
less weight;  
fit into bags/pockets;
- ease of use;  
screens too small to see all details;  
small keyboards for input;  
learn using scribe "graffiti" for input;
- more functions;  
able to include more circuits;  
any reference to a multifunction, e.g. cameras, speakers; *[6 max]*
-