



MARKSCHEME

November 2007

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 **ALL** questions in each of **TWO** Options (total *[15 marks]*). Maximum total = *[30 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.
- Words that are underlined are essential for 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 penalized. 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 penalized 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 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 each reason [2 max].*

privacy – from both inside and outside;
no need for curtains – detract from the décor of the room;
prevent the glare of sunlight;
aesthetics;

[2 max]

(b) *Award [1] for each distinct point in an appropriate evaluation [3 max].*

multi dimension stability;
can be moulded to shape;
easy to work because no grain;
laminated for timber look finish;
less expensive than solid timber;

[3 max]

A2. *Award [1] for each distinct point in an appropriate description [2 max].*

so they can be washed/wiped to keep clean;
enhance the aesthetics of the kitchen;
enhance water resistance;
more durable;

[2 max]

A3. *Award [1] for stating a reason and [1] for an outline of the reason [2 max].*

strength;
stainless steel is very strong to withstand heavy utensils;

corrosion;
in a wet environment ss will not corrode;

tough;
ss does not need a coating for protection;

aesthetics;
ss kitchen appliances are a popular fashion;

[2 max]

A4. Award [1] for the identification of each factor [2 max] and [1] for each distinct point in a discussion of the two factors [4 max]. [6 max] in total.

appearance;

food needs to look real;
needs to look like its marketing – healthy, fast, easy to prepare;
recognizable ingredients;

smell;

must smell as people would expect;
attractive smell;

flavour;

taste must be similar to the food it is representing;
pleasant flavour;

people need to be able to relate to the new food;

a point of comparison with existing foods must be obvious;
method of use must be clear;

safety;

tested as a recipe component;
conforms to regulations;
sample recipes given;
tested against community standards – salt / sugar / fat / heart;

value;

consumers must perceive value for money;
new food will therefore be more acceptable;

[6 max]

Option B — Microstructures and macrostructures

- B1.** (a) (i) *Award [1] for the type of bonding [1 max].*
metallic; *[1 max]*
- (ii) *Award [1] for a mechanical property [1 max].*
high tensile strength; stiffness; toughness; *[1 max]*
- (b) *Award [1] for each distinct characteristic [3 max].*
easily moulded to shape;
tough;
waterproof;
low friction when in contact with the axle; *[3 max]*
- B2.** *Award [1] for each distinct point in an appropriate outline [2 max].*
- slow cooling;
allows larger grains to form;
- rapid cooling;
produces smaller grains;
- selectively cooling;
one area can produce differential grain size; *[2 max]*
- B3.** *Award [1] for each appropriate point in a description [2 max].*
High Young's modulus indicates the material is stiff;
stiffness means it is good for high compressive loads; *[2 max]*

B4. Award [1] for the identification of each aspect on a diagram [6 max] in total.

elastic region

cast iron – almost straight line, so brittle, not elastic;

mild steel – distinct elastic regions to yield stress;

plastic region

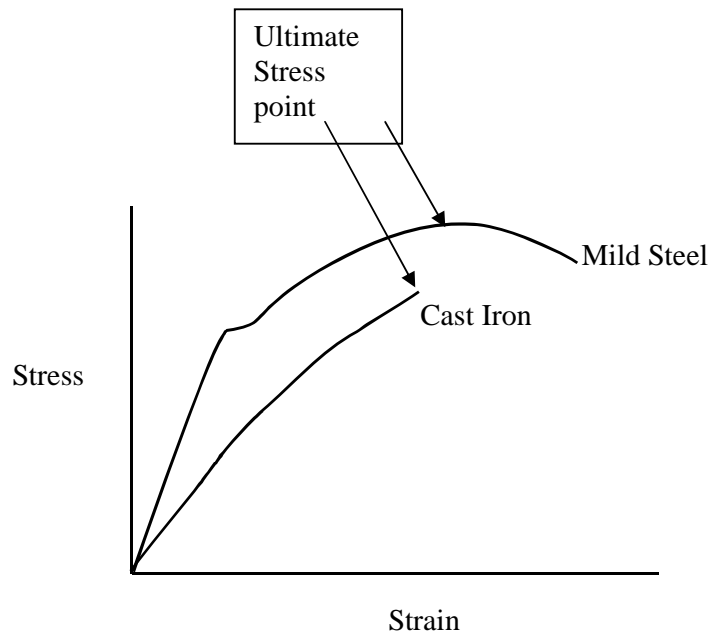
cast iron – no plastic region;

mild steel – distinct plastic region between yield stress and USP;

USP

identify USP on cast iron;

identify USP on mild steel;



[6 max]

Option C — Appropriate technologies

C1. (a) *Award [1] for each distinct characteristic [2 max].*

- locally available materials;
- low capital cost;
- simple understandable technology;
- not detrimental to the environment;
- employs local skills;

[2 max]

(b) *Award [1] for the statement of a way the house helps conserve resources and [1] for each point in a discussion [2 max].
[3 max] in total.*

insulation;

- straw is a good insulator;
- less resources used for heating and cooling;
- conserves energy;

renewable;

- the basic raw material is renewable;
- can be repaired or added to easily;

production;

- traditional techniques;
- minimal environmentally damaging processing;
- uses simple techniques;

[3 max]

C2. *Award [1] for the identification of a disadvantage and [1] for a description [2 max].*

pests;

- insects and rodents may live in the material;

deterioration;

- as it is an organic material it will deteriorate;

flammability;

- straw is flammable so in danger of ignition;

absorbency;

- could absorb moisture and so make the house damp;

[2 max]

C3. *Award [1] for each point of distinction between renewable and non-renewable [2 max].*

- naturally replenished;
- short time compared with long (life) time;

[2 max]

C4. Award [1] for the identification of each point - [3 max] for market pull and [3 max] for technology push. [6 max] in total.

market pull

- sustainable heating systems;
- sustainable cooling systems;
- minimize maintenance expenses;
- use of natural materials to blend in with the environment;
- desire to be independent of unreliable technologies;
- recycle grey water;
- increasing cost of energy;
- increasing public conscience about using resources;

technology push

- electronic sensors;
- low cost automatic control of housing systems;
- high insulating materials;
- cost effective renewable energy generation systems;

[6 max]

Option D — Food technology

- D1.** (a) *Award [1] for each point in a list of foods [2 max].*
meat;
poultry;
fish;
milk;
dairy products; *[2 max]*
- (b) *Award [1] for each distinct point in an explanation [3 max].*
pyramid shape represents food intake;
less of the foods at the top should be eaten;
more of the foods at the base should be eaten; *[3 max]*
- D2.** *Award [1] for the selection of a food and [1] for the reason it is essential [2 max].*
vegetables / bread / cereal / fruit;
essential because it helps prevent bowel and intestinal diseases; *[2 max]*
- D3.** *Award [1] for the identification of any two points [2 max] total.*
cut surface damages cells;
enzymes oxidize the phenolic substances;
iron containing chemicals react with oxygen; *[2 max]*
- D4.** *Award [1] for the identification of each principle [2 max] and [1] for each point in the explanation of each principle [4 max]. [6 max] in total.*

minimize contamination;
 packaging;
 good hygiene standards;

killing or removing micro-organisms;
 using heat through pasteurization; cooking; canning;
 physical removal through filtration;

preventing microbial growth;
 temperature reduction;
 dehydration;
 chemical preservation;
 control of food atmosphere; *[6 max]*

Option E — Computer-aided design, manufacture and production

E1. (a) *Award [1] for the identification of each reason [3 max].*

- reproduction is exact/accurate;
- shape is complex;
- many similar shapes involved in the design (repetition);
- easy to change the design;
- allows for 3D visualization;

[3 max]

(b) *Award [1] for each point in an outline [2 max].*

- they are complex;
- they are CAD designed;
- shapes are repeatable;
- faster production;

[2 max]

E2. *Award [1] for an understanding of CIM and [1] for a reason [2 max].*
CIM;

- not a CIM system because it is not at the manufacturing stage;
- it is not yet a product;
- does not involve the total integration of all production aspects;

reason;

- the CNC router is used as part of the design process;
- materials for final product not decided;

[2 max]

E3. *Award [1] for identifying each reason [2 max].*

- people want individualized products;
- people are willing to pay the higher cost for one-off products;
- some consumers are becoming more discriminating;
- higher status is linked with craft products;
- craft production may result in higher quality goods.

[2 max]

E4. Award [1] for the identification of each advantage [2 max] and [1] for each distinct point in a discussion of the two advantages [4 max]. [6 max] in total.

economies of scale;

same economies of scale whether small or large order;
enables the cost to be kept lower;

individual orders;

ability to customize product for individual customers;
larger group of customers happy with their customization;

profit;

customised product can command prestige price;
greater share of profit to manufacturer than when dealing with third party;

market;

lends itself to use of the Internet – global market place;
potential for greater marketability;

[6 max]

Option F — Invention, innovation and design

F1. (a) *Award [1] for each distinct point [2 max].*

hardwearing;

 durable and long lasting;

multi-purpose;

 could be worn for many purposes;

value for money;

 originally they were good value;

[2 max]

(b) *Award [1] for each point in an explanation [3 max].*

market pull

 miners wore out their pants quickly;

 pockets ripped easily;

 demand for a solution to these problems;

[3 max]

F2. *Award [1] for each point in a list [2 max].*

range of types of denim (faded, stone washed, coloured);

other denim clothes (skirts, jackets);

range of jeans styles (straight, flared);

[2 max]

F3. *Award [1] for each point in a description [2 max].*

the material was imitated in other types of clothing;

cheaper versions of the original were manufactured and sold;

other companies capitalized on Levi's initial R&D;

other companies capitalized on the strong original market for jeans;

[2 max]

F4. *Award [1] for the identification of each criteria and [1] for each point in an explanation of the criteria [4 max]. [6 max] in total.*

recyclable;

 material can be recycled;

 clothing items can be recycled;

durable;

 clothing items last a long time;

 no built in obsolescence;

fashionable;

 for some denim clothes, the older they look the more fashionable they are;

 people are more likely to retain their jeans even if they are old;

[6 max]

Option G — Health by design

G1. (a) *Award [1] for each point in an advantage [2 max].*

cleanliness;

so less likely to cause irritation or illness;

no need for messy cleaning fluids;

upgrade lens;

new supply can be an upgraded prescription;

no extra cost for upgrading;

convenience;

no storage requirements;

easy to care for;

availability;

widely available;

readily available;

[2 max]

(b) *Award [1] for each distinct point [3 max].*

fashion

eye colour can match clothing;

possible to change lens colour;

can combine prescription with fashion;

range of colours available;

choose as a fashion accessory;

[3 max]

G2. *Award [1] for a distinct point about soft and [1] for a distinct point about hard in a comparison [2 max].*

soft are more fragile;

hard last longer;

soft need replacing more often;

hard are more durable;

[2 max]

G3. *Award [1] for the identification of each specific reason [2 max].*

any one material is not necessarily biocompatible with all applications;

a material in one application may not be safe for another;

[2 max]

G4. Award [1] for the identification of each design context [2 max] and [1] for each distinct point in a discussion of the two contexts [4 max]. [6 max] in total.

disadvantage

limited scale;

small number in the sample;
results may not be conclusive;

more R&D needed;

user centred design not enough by itself;
have to include other methods of research;

timeconsuming;

have to take the research to the users;
time to train and observe the users;
have to access a number of groups;

advantage

reliable data;

trialed in a real context;
use of a product will enable consideration of all variables;
deal with a range of real-life situations;

variety of sources of data;

range of different contexts covered;
range of different people covered;

[6 max]

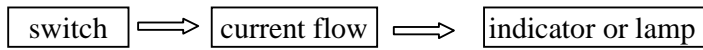
Option H — Electronic products

H1. (a) Award [1] for each correct symbol [2 max].



[2 max]

(b) Award [1] for identifying each of the three components – input or power, process or indicator and output or light [3 max].



[3 max]

H2. Award [1] for each point in a description [2 max].

- sensory input mechanism senses temperature;
- feedback to control the heating;
- temperature parameters often set manually;

[2 max]

H3. Award [1] for each distinct point in a description [2 max].

- two terminal device;
- lets current pass in one direction only;

[2 max]

H4. Award [1] each for the identification of two benefits [2 max] and [1] for each distinct point in an explanation of the two benefits [4 max].
[6 max] in total.

- improved performance;
 - machine works at its optimum;
 - considers all the variables;
- simplicity;
 - simpler and so less can go wrong with the system;
 - easier to produce;
- ease of use;
 - simple for operator to use;
 - machine determines detergent required;
 - machine decides on type / length of wash;
- no damage to contents;
 - machine senses type of fabric;
 - treatment is optimal;

[6 max]