INTERNATIONAL BACCALAURÉAT BACHILLERATO
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BACCALAUREATE INTERNATIONAL INTERNACIONAL
N03/470/H(2)M+

MARKSCHEME

November 2003

DESIGN TECHNOLOGY

Higher Level

Paper 2

11 pages

1. Follow the markscheme provided, do **not** use decimals or fractions and mark only in **RED**.

2. Where a mark is awarded, a tick (✓) should be placed in the text at the **precise point** where it becomes clear that the candidate deserves the mark.

3. Sometimes, careful consideration is required to decide whether or not to award a mark. In these cases write a brief annotation in the **left hand margin** to explain your decision. You are encouraged to write comments where it helps clarity, especially for moderation and re-marking.

4. Unexplained symbols or personal codes/notations on their own are unacceptable.

5. Record subtotals (where applicable) in the right-hand margin against the part of the answer to which they refer (next to the mark allocation for Section A). Do **not** circle sub-totals. **Circle the total mark for the question in the right-hand margin opposite the last line of the answer.**

6. For Section B, show a mark for each part question (a), (b), *etc*.

7. Where an answer to a part question is worth no marks, put a zero in the right-hand margin.

8. Section A: Add together the total for each question and write it in the Examiner Column on the cover sheet.
Section B: Insert the total for each question in Examiner Column on the cover sheet.
Total: Add up the marks awarded and enter this in the box marked TOTAL in the Examiner Column on the cover sheet.

9. After entering the marks on the cover sheet check your addition to ensure that you have not made an error. Check also that you have transferred the marks correctly to the cover sheet. **We have script checking and a note of all clerical errors may be given in feedback to examiners.**

10. Every page and every question must have an indication that you have marked it. Do this by **writing your initials** on each page where you have made no other mark.

11. If a candidate has attempted more than the required number of questions, mark only the required number of questions in the order in which they are presented in the paper, unless the candidate has indicated the question(s) s/he wants to be marked on the cover sheet.

12. A candidate can be penalized if he/she clearly contradicts him/herself within an answer. Make a comment to this effect in the left hand margin.

Subject Details: Design Technology HL Paper 2 Markscheme

Mark Allocation

Candidates are required to answer **ALL** questions in Section A (total 40 marks) **ONE** question in Section B [20 marks]. Maximum total = 60 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 A

1. (a) (i) 1.4 m; ***[1]***

(ii) *Award **[2]** for calculation i.e.*
area: 5 $(1.4 \times (3.3 - 0.7))$;
$+ (0.5 \times 3.142 \times 0.7 \times 0.7)$;
*Award **[1]** for right answer,* = 22.04895 m^2 / *accept* 22.05 m^2 ***[3 max]***

(b) (i) light; ***[1]***

(ii) B; ***[1]***

(iii) Award ***[1]*** for identifying limitation and ***[1]*** for a brief explanation
fluctuations in natural light; ***[1]***
due to time of day / weather conditions; ***[1]***
differing needs of users *e.g.* waiters / diners; ***[1]***
require different levels of light; ***[1]*** ***[2 max]***

(c) (i) Figure 3 : 3D view ***[1]***

(ii) its easier to understand what is proposed;
because a 3D view is a more realistic representation;
and users may not be able to interpret technical drawings; ***[3 max]***

(d) (i) 61.0 cm (no marks without units and no marks for just stating F); ***[1]***

(ii) 35.6 cm (no marks without units); ***[1]***

(iii) minimum depth can be used where maximum seating capacity is the objective;
e.g in a fast food restaurant, ***[1]***
maximum depth can be used where maximum comfort is the objective; *e.g* in a high class restaurant, ***[1]*** ***[2]***

(e) (i) B is the range representing depth of seated people which is incorporated into the three overall table measurements; ***[1]***

(ii) B is a range representing the percentile range of people;
A, G and K also ranges (percentiles);
table depths are absolute values (no percentile); ***[3]***

2. (a) *Award **[1]** for* (Primary) Covalent bond. ***[0]*** *for just* Primary Bond. ***[1 max]***

(b) *Award up to **[3 max]** for an explanation on the lines of:*
during polymerization (moulding) the heat generated creates more cross links;
on cooling the material goes through a chemical change;
which is irreversible; ***[3 max]***

3. (a) *Award **[1]** for each correct point.*
no finishing or treatment required;
complex shapes possible;
high volume production technique; ***[2 max]***

(b) *Award **[1]** for appropriate suggestion with **[1]** for explanation.*
massive energy savings would be possible;
as superconductors have to be cooled to extremely low operating temperatures at present; ***[2 max]***

4. (a) *Award **[1]** for definition to the effect of:*
analysing a situation which would benefit from re-design and working out a strategy for improving it; ***[1]***

(b) ***[1]*** *per distinct point.*
constructive discontent can contribute to the greening of products by analyzing the product and identifying a way in which a product could be made greener and then working out a strategy for making it greener;
this may relate to the efficiency of use of materials, energy or other resources in the manufacture of the product;
minimizing damage or pollution from the chosen materials;
reducing any long term harm caused by the product;
ensuring that the product functions efficiently throughout its planned life;
consumer pressure forces changes by designers / manufacturers; ***[3 max]***

5. (a) *Award **[1]** for each correct response,*
high protein;
high fibre content;
low in salt;
low in cholesterol; ***[2 max]***

(b) *Award **[1]** for identifying a reason; **[1]** for a brief explanation.*
dissatisfaction with the meat industry causing people to look at alternatives;
rise in vegetarianism so more people buying non-meat products;
good source of protein and cheap;
can be made to look like meat so popular with vegetarians / cheaper than meat products;
Wider variety of mycoprotein products are available;
Appeal to a wider range of consumers ***[2 max]***

6. (a) *Award **[1]** for each correct response.*
raw materials;
components;
labour;
energy;
distribution;
sales; ***[2 max]***

(b) *Award any three points **[1]** each.*
raw materials that are recyclable may be more expensive;
the raw materials may need to be produced by a more expensive method to minimize damage or pollution;
the company may decide on a take-back policy to ensure the appropriate disposal or recycling of a product at the end of its useful life;
the packaging may need to be reviewed to minimize environmental damage;
more labelling of products necessary; ***[3 max]***

SECTION B

7. (a) (i) removal of carbon (by creating carbon dioxide);
the use of blown oxygen; ***[2]***

(ii) "plastic deformation" allows the metal to be permanently shaped by machines; ***[1]***

Metal stressed beyond yield point into plastic region; ***[1]*** ***[2]***

(b) (i) *Award **[1]** for definition to the effect of that in the Guide, i.e.:*
the mass production of a product via a flow line based on the interchangeability of parts, preprocessing of materials, standardization and work division; ***[1]***

(ii) *Award **[1]** for reason and **[1]** for brief explanation.*
accurate repeatable operation;
so more precise parts produced;
and less wastage;
reduce overheads;
non-stop operation;
can perform more than one task;
do not require special environments;
high work rate;
high capital low running costs;
reliable (no sick leave, no tea breaks *etc.*);
reduce labour costs; ***[2 max]***

(iii) radical in style / technology (***[1]*** for either)
incremental in use of steel body / other components (***[1]*** for either) ***[2 max]***

(c) *Award **[1]** for each correct issue linked to appropriateness.*
solar cars use renewable resources;
not detrimental to the quality of life;
energy efficient;
current technology used for the construction;
creates jobs in appropriate situations in construction;
does not use radically new construction techniques;
some parts are easily repaired;
non-polluting in use;
cut down on oil refinery needs;
correct climate required;
production facility appropriate for a developed country only;
sustainable design; ***[11 max]***

8. (a) (i) *Award **[1]** for each correct response.*
readily available;
aesthetic properties;
durable;
easily shaped by craft methods;
easily shaped by batch production methods;
some parts can be mass produced;
physical properties of wood make it suitable *e.g.* tough; ***[2 max]***

(ii) *Award **[1]** for each correct response.*
surface finish must be non-toxic;
wood used must be non-toxic;
wood chosen must be non-friable (*i.e.* no splinters, no chips *etc.*);
close grain timber required – does not soak up moisture;
wheels must not detach easily leaving sharp axles;
no small pieces which could be swallowed by a child; ***[2 max]***

(b) (i) Wheels which can be volume produced on a CNC lathe or mechanical lathe; ***[1]***

(ii) it is easier to cut out the shape by cutting along the grain;
and to abrade the shape smooth;
less chance of "tearing the grain"; ***[2 max]***

(iii) *Award **[1]** for identifying one criteria and **[1]** for outlining why its suitable.*
easily applied by brush or spray;
to reduce cost;
aesthetically appealing;
water resistant;
clear;
so the colour and texture of the grain is visible;
non-toxic;
so safe to handle;
durable finish;
so will resist rough treatment; ***[2 max]***

(c) *Award **[1]** for a definition of intermediate technology (as* in *Guide p.178.*)
*Award **[2]** for each correct issue related to intermediate technology.*
toy can be made by any scale of production;
parts can be volume produced whilst others are batch or craft produced;
use of varying degrees of technology clearly show a transition or intermediate technology situation;
design is traditional but the finishing could be very modern, *e.g.* spray finish with water based varnish and oven drying after craft finishing with edge tools and abrasives;
uses intermediate skilled labour for some aspects of production;
low investment to set-up;
traditional global market for old-fashioned toys;
robust design;
can be manufactured in a developing country; ***[11 max]***

9. (a) (i) *Award **[1]** for each correct response.*
glass can be moulded to the required shape;
glass transmits light energy;
glass is clear, contents can be seen;
glass is non-toxic;
glass is not corroded by hot / acidic / alkaline contents;
easy to clean / sterilise;
high melting point so can withstand high temperatures ***[2 max]***

(ii) borosilicate glass (Pyrex) is tougher than soda-glass;
borosilicate glass can take thermal shock better than soda glass; ***[2]***

(b) (i) Award ***[1]*** for each correct point.
size of handle suitable for a wide percentile range;
water and kettle must not weigh more than can be comfortably held by a frail person;
handle shape / texture;
heat must not be transferred to the handle;
pouring action must be comfortable (and safe); ***[1]***

(ii) the heating of the sea by the sun is; analogous with the light and the kettle;
the use of the halogen light;
is adapted from the halogen hob in a kitchen; ***[4 max]***

(c) Since the kettle uses electricity, as the prime energy source;
to heat the water then it is no more green than any other;. ***[2]***
Only if it can be proved that this kettle heats the same amount of water with less electricity; ***[2]***
than any other kettle then the innovation will be green; ***[1]***
there is no evidence to support this;
the element (halogen heater) is not in contact with the water;
meaning that there is no contamination one with the other;
this means that calcium carbonate deposits (lime scale) will not shorten the life of the element or reduce its efficiency;
may be greener because
– glass is an environmentally friendly material;
– pyrex borosilicate glass;
– therefore will last longer;
– easy to recycle;
– easy to clean, so uses less detergents, *etc.*; ***[11 max]***

*For **[11 max]** must have included at least one reason why the way it works will not make it greener.*