N09/4/DESTE/HP2/ENG/TZ0/XX/M

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MARKSCHEME

November 2009

DESIGN TECHNOLOGY

Higher Level

Paper 2

13 pages

If you do not have a copy of the current Design Technology Guide, please request one from IB Cardiff.

General Marking Instructions

Assistant Examiners (AEs) will be contacted by their team leader (TL) by email (or telephone) – if by email, please reply to confirm that you have downloaded the markscheme from IBIS. The purpose of this initial contact is to allow AEs to raise any queries they have regarding the markscheme and its interpretation. AEs should contact their team leader by email at any time if they have any problems/queries during the marking process.

Note:

The DHL courier service must be used to send assessment material to your team leader/senior moderator and to IB Cardiff. (However, this service is not available in every country.) The cost is met directly by the IBO. It is vitally important that the correct DHL account number is used.

If you have any queries on **administration** please contact:

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1. Follow the markscheme provided, award only whole marks and mark only in **RED**.

2. Where a mark is awarded, a tick/check (✓) **must** be placed in the text at the **precise point** where it becomes clear that the candidate deserves the mark. **One tick to be shown for each mark awarded.**

3. Sometimes, careful consideration is required to decide whether or not to award a mark. In these cases write a brief annotation to explain your decision. You are encouraged to write comments where it helps clarity, especially for moderation and re-marking. It should be remembered that the script may be returned to the candidate.

4. Unexplained symbols or personal codes/notations are unacceptable.

5. Record marks in the right-hand margin against each mark allocation shown in square brackets *e.g.* ***[2]***. The total mark for a question must equal the number of ticks for the question.

6. Do **not** circle sub-totals. **Circle the total mark** for the question in the right-hand margin **at the end of the question.**

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

8. Where work is submitted on additional sheets the marks awarded should be shown as ticks and a note made to show that these marks have been transferred to the appropriate square bracket in the body of the script.

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

10. After entering the marks on the front cover 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. **All scripts are checked and a note of all clerical errors will be given in feedback to examiners.**

11. If an answer extends over more than one page and no marks have been awarded on a section draw a diagonal line through that section to indicate that it has been marked.

12. If a candidate has attempted more than the required number of questions within a paper or section of a paper, mark all the answers and use the marks of those answers that have the highest mark, **unless the candidate has indicated the question(s) to be marked on the front cover**.

13. A mark should not be awarded where there is contradiction 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.

1. A markscheme often has more marking points than the total allows. This is intentional. Do **no**t 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. Unless directed otherwise in the markscheme, unit errors 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 penalise candidates for errors in significant figures, unless it is specifically referred to in the markscheme.

SECTION A

1. (a) (i) *Award **[1]** for:*
metals; ***[1]***

(ii) *Award **[1]** for:*
metals; ***[1]***

(iii) *Award **[1]** each for any two of:*
energy / water / raw materials / petroleum; ***[2 max]***

(b) (i) *Award **[1]** per distinct point along the lines of:*
use;
as it happens often; ***[2]***

(ii) *Award **[1]** per distinct point along the lines of:*
disassembly;
used parts are repaired; ***[2]***

(c) (i) *Award **[1]** for:*
manufacture; ***[1]***

(ii) *Award **[1]** per distinct point in an evaluation along the lines of:*
service and repair;
parts are reconditioned and fed back into the system to be re-used;
as spare parts for repair of old cars or for new cars; ***[3]***

(d) (i) *Award **[1]** for identifying the correct data and **[1]** for the correct calculation:*
yr $2005 = 163$ and yr $2012 = 130$;
$163 - 130 = 33$ $\frac{33}{163} = 20.3\%$; ***[2]***

(ii) *Award **[1]** per distinct point in an explanation along the lines of:*
design changes to cars;
to focus on emissions;
via the use of new technology/new materials; ***[3 max]***

(e) (i) *Award **[1]** for:*
349 (350) %; ***[1]***

(ii) *Award **[1]** per distinct point in an outline along the lines of:*
the more expensive cars are likely to have less sales than inexpensive cars;
so although they have greater emissions per car they contribute less to the total emissions; ***[2]***

2. (a) *Award **[1]** for any of:*
gas / oil / timber; ***[1 max]***

(b) *Award **[1]** per distinct point in an explanation along the lines of:*
coal was used to create steam power, the basis of mechanisation;
and coal is used to create electricity the basis of automation;
coal was an abundant global resource during the industrial revolution and 20th century; ***[3]***

3. (a) *Award **[1]** for any two of:*
preparation of surfaces;
clamping;
bonding time;
type of materials;
health and safety;
cost;
indoor/outdoor use; ***[2 max]***

(b) *Award **[1]** per distinct point in an outline along the lines of:*
fast drying time;
to eliminate spring back; ***[2]***

4. (a) *Award **[1]** for a definition along the lines of:*
development that meets the needs of the present without compromising the needs of future generations; ***[1]***

(b) *Award **[1]** per distinct point in an explanation of one key dimension:*
economic;
*with reference to **two** of:*
growth;
development;
productivity;
trickle-down;

environmental;
*with reference to **two** of:*
ecosystem;
integrity;
carrying capacity;
biodiversity;

social;
*with reference to **two** of:*
cultural identity;
empowerment;
accessibility;
equity; ***[3 max]***

5. (a) *Award **[1]** per distinct point in a description along the lines of:*
introduction of a different metal to the base metal;
with increased tensile strength properties; ***[2]***

(b) *Award **[1]** per distinct point in an outline along the lines of:*
they can be used at high temperatures;
and rocket engines get extremely hot in use; ***[2]***

6. (a) *Award **[1]** for any of:*
too risky;
poor economic outlook;
no market for the product; ***[1 max]***

(b) *Award **[1]** per distinct point in a comparison along the lines of:*
lone inventor unlikely to have business acumen;
product champion influential in a company;
and knows the market; ***[3]***

SECTION B

7. (a) (i) *Award **[1]** per distinct point in one outline:*
convenience;
the user can see how much wood is being used without having to open the door;

aesthetics;
the glow of the flames creates a cosy atmosphere; ***[2 max]***

(ii) *Award **[1]** per distinct point in one outline:*
heat resistant finish required to the surfaces;
so people do not get burnt touching it;

stable;
so it will not topple over;

efficient fume extraction;
so no pollution in the room;

locking door mechanism;
so cannot be opened by young children;

fully enclosed fire;
so no sparks or hot coals fly into the room; ***[2 max]***

(b) (i) *Award **[1]** per distinct point in an outline of **one** advantage:*
it can be turned to face any chair in the room;
adding to the comfort of the user;

it gives the user more choice;
with room layout;

it can be used to give direct heat;
to one part of the room; ***[2 max]***

(ii) *Award **[1]** per distinct point in an evaluation:*
not instant heat;
as the wood takes a while to burn;
and build up heat;

ash will be created;
which needs to be cleaned from the stove;
in order for it to work efficiently;

the heat cannot be turned off immediately;
so will continue to burn fuel when users have left the room;
which may be a waste of energy;

more convenient than an open fire;
as no smoke damage to room décor;
and less cleaning; ***[3 max]***

(c) (i) *Award **[1]** per distinct point in an outline of one reason:*
tradition;
nostalgia of sitting round an open fire;

cost-effectiveness;
users may have access to cheap or free logs;

style;
it may be used as a feature of the room; ***[2 max]***

(ii) *Award **[1]** per distinct point **[3 max]** for each of the three considerations.*
deforestation is an environmental issue;
meaning there is a problem chopping down trees for fuel;
so the logs need to be from a sustainable resource;

using waste timber from a manufacturing process;
cuts down pollution;
as the waste timber would be incinerated;

the stove is designed to burn the fuel twice;
so it is more efficient than a conventional stove;
and saves on the use of timber;

the enclosed fire;
is more efficient than an open fire;
as there is less heat loss;

timber varies in CO_2 emissions given off when burnt;
so may contribute towards the build up of CO_2 in the atmosphere;
and global warming effect; ***[9 max]***

8. (a) (i) *Award **[1]** per distinct point in an outline along the lines of:*
bracing component;
to stop the legs splaying outwards due to the effect of the external load; ***[2]***

(ii) *Award **[1]** for:*
tensile;
as pulling forces are acting on the screws; ***[2]***

(b) (i) *Award **[1]** for an outline along the lines of:*
over many years different variations of the Thonet chair have been produced;
which constitute a *family* of products; ***[2]***

(ii) *Award **[1]** per distinct point in an evaluation along the lines of:*
standardised parts;
which make it suitable for mass production;
but also variations of the design are produced which is a batch production feature; ***[3]***

(c) (i) *Award **[1]** for:*
comfort/fatigue;
relating to shape /size / texture of chair; ***[2 max]***

(ii) *Award **[1]** per distinct point **[3 max]** in each of the three explanations.*
tradition;
the chair is a well known design;
and is acceptable in different cultures;

design classic;
as the Thonet chair is recognised as an optimum design;
and has achieved status;

cost-effective;
to produce in large numbers;
and suitable for modern production methods;

able to be produced flat pack;
so consumers can transport it home;
and assemble it as a DIY item;

style;
it represents café culture;
which many people want to replicate in their home;

it is still used in many cafes;
and is therefore part of a group of furniture;
some of which will need replacing from time to time as they wear out;

nostalgia;
the chair represents the past;
and romanticism; ***[9 max]***

9. (a) (i) *Award **[1]** per distinct point in one outline:*
to suit a wide range of users;
with different heights;

comfort;
so users can set it to a height which suits them; ***[2 max]***

(ii) *Award **[1]** per distinct point in one outline:*
rust resistant;
so the bicycle can be left out in the rain;

light;
so less effort to ride it;

light;
so more portable;

hard;
so scratch resistant;

strong;
so will not break easily;

tough;
so will not crack easily; ***[2 max]***

(b) (i) *Award **[1]** per distinct point in a description along the lines of:*
gears are connected to the chain drive by a cable;
so when the user changes gear the chain is moved up or down different sized sprockets; ***[2]***

(ii) *Award **[1]** for each aspect:*
efficiency $= \frac{\text{MA}}{\text{VR}}$;
where MA (mechanical advantage) is $\frac{\text{load}}{\text{effort}}$;
and VR (velocity ratio) is $\frac{\text{distance moved by effort}}{\text{distance moved by load}}$; ***[3]***

(c) (i) *Award **[2]** for:*
chemical/potential;
changed to kinetic; ***[2]***

(ii) *Award **[1]** per distinct point **[3 max]** in each of the three explanations.*
the folding bicycle can be put in a car boot;
so it can be transported to remote locations;
where it would be too far to cycle to;

the bicycle can be used to travel to a train station;
and carried up or down stairs *etc*;
and loaded onto and off the train;

the bicycle can be stored more easily than a conventional bicycle;
so is suitable for storing in the workplace;
or where storage space is limited;

increased security;
as bicycles can be more easily stored inside buildings;
meaning less chance of theft compared to leaving them outside buildings; ***[9 max]***