M10/4/DESTE/HP2/ENG/TZ0/XX/M

International Baccalaureate®
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MARKSCHEME

May 2010

DESIGN TECHNOLOGY

Higher Level

Paper 2

15 pages

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

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 **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. Unless directed otherwise in the mark scheme, 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:*
4736.9 kg;
(no mark if units not stated) ***[1]***

(ii) *Award **[1]** for:*
246 873.6 g (246.873 kg); ***[1]***
(no mark if units not stated)

(iii) *Award **[1]** for using the correct figures*

and ***[1]*** for the correct answer (99.1 %);
(allow 99 %) ***[2]***

(b) (i) *Award **[2]** for:*
kettles use large amounts of electricity to boil water;
and most of the electricity is generated from burning coal which results in large amount of solid waste; ***[2]***

(ii) *Award **[1]** for:*
carbon dioxide; ***[1]***

(iii) *Award **[2]** for:*
landfill;
as there are no emissions but a large amount of solid waste/the kettles are not incinerated; ***[2]***

(c) (i) *Award **[3]** for:*
changes to the traditional kettle design is a complex operation;
requiring much research and development as well as design;
so a team of experts with knowledge from different disciplines was required; ***[3]***

(ii) *Award **[1]** for:*
less electricity (25 %); ***[1]***

(iii) *Award **[2]** for outlining one benefit:*
the easier it is to disassemble;
the more economical recycling will be;

disassembly makes repair easier;
and re-use of parts after disposal; ***[2 max]***

(d) (i) *Award **[1]** per distinct point in a suitable suggestion **[3 max]** along the lines of:*
the codes represent different materials used;
as the kettle will be sold globally;
the international code system will aid recycling of the kettle in different parts of the world;

the codes may represent different components used in the kettle;
which makes it easier to repair/recondition parts;
as the components can be sourced anywhere in the world;

[3 max]

(ii) *Award **[1]** per distinct point in a suitable outline **[2 max]** along the lines of:*
less variety of materials makes recycling easier and more cost-effective;
as there are less materials to sort into different groups;

less materials helps to conserve resources;
as fewer raw materials need to be processed;

less materials makes the kettle more cost-effective to manufacture;
as it reduces the amount of processes involved; ***[2 max]***

2. (a) *Award **[1]** for:*
visual or noise; ***[1]***

(b) *Award **[1]** per distinct point in a suitable comparison **[3 max]**.*
off-shore costs higher;
sea winds are stronger so more force is exerted on the turbines;
the off-shore winds contain salt from sea water which is corrosive;

off-shore costs higher;
more difficult to get to the turbines;
requiring expensive transportation; ***[3 max]***

3. (a) *Award **[2]** for:*
kinetic energy is energy associated with a moving object;
potential energy is the energy in an object due to its position or the arrangement of its parts; ***[2]***

(b) *Award **[2]** for:*
potential energy;
produced as the rubber band resists being stretched out of shape/being deformed; ***[2]***

4. (a) *Award **[1]** for:*
the exterior surface of a building's construction (building shell); ***[1]***

(b) *Award **[1]** per distinct point in a suitable explanation **[3 max]** along the lines of:*
the building envelope balances requirements for ventilation;
daylight;
while allowing for thermal and moisture protection appropriate to the prevailing climate;

the u-value of materials used for the building shell;
affect the thermal conductivity of the envelope;
and hence the energy requirements of the building; ***[3 max]***

5. (a) *Award **[2]** for:*
cost effective;
low melting point/easily moulded; ***[2]***

(b) *Award **[1]** for each limitation*
no undercutting can be produced;
suitable for limited types of materials; ***[2]***

6. (a) *Award **[1]** for:*
Newton metres (Nm); ***[1]***

(b) *Award **[3]** for:*
the rider uses the pedals to create rotational motion;
which turns the drive wheel;
and moves the bicycle along the ground – linear motion; ***[3]***

SECTION B

7. (a) (i) *Award **[1]** for any two characteristics:*
hardness;
unreactivity;
windproof;
rigid (stiff);
easy to use;
easy to recycle; ***[2 max]***

(ii) *Award **[2 max]** for:*
each lantern is unique in its decoration (one-off);
the lanterns are manufactured by batch production; ***[2]***

(b) (i) *Award **[2]** for:*
brazing/soldering/fusing;
the technique suits craft production/low cost; ***[2]***

(ii) *Award **[1]** per distinct point in an explanation.*
plastic deformation is the permanent change in shape/size of a material due to an applied force/load;
the metal used to make the lanterns has been formed/shaped from sheet/flat metal;
by hammering/moulding; ***[3 max]***

(c) (i) *Award **[2]** for a suitable description which relates to the design process:*
the availability of the waste metal from another process;
has been the impetus/inspiration for the design of the lantern; ***[2]***

(ii) *Award **[3 max]** for each reason.*
use of available local raw materials;
which are recycled from another industry;
making manufacturing cost-effective;

use of appropriate manufacturing technology;
suitable for the local labour force;
creating employment;

flexible design;
which can be adapted to produce a range of products;
with different sizes/shapes/decoration;

low in capital cost;
the metal is from waste;
it is craft production so no expensive machinery;

minimal detrimental effect on the environment;
the raw materials do not have to be processed;
there is little waste or pollution from manufacturing;

not detrimental to the way of life of local people;
uses local skills;
creates wealth;

social sustainability;
the lanterns can be used within the community;
to improve the way of life; ***[9 max]***

8. (a) (i) *Award **[1]** for identifying each force that*
the bed is in tension;
the beam is in compression; ***[2]***

(ii) *Award **[3]** for:*
the external load (person) will cause the material used for the hammock cords to stretch elastically;
once the stress (load) is released the extension (strain) is released and the material returns to its original length;
unless the stress (load) causes the material to go beyond its yield point and so does not return to its original length/breaks; ***[3 max]***

(b) (i) *Award **[2]** for one advantage.*
cheaper;
less distribution/storage costs;

user satisfaction;
in constructing a product;

can be disassembled;
for ease of storage during winter months;

parts can be replaced;
so extending the product life; ***[2 max]***

(b) (ii) *Award **[2]** for:*
technique of weaving means the fibres interlock which creates a tough/strong material;
resists cracks (tears) and so extends the product life; ***[2]***

(c) (i) *Award **[2]** for one reason:*
hardwood is a dense wood/has a close grain;
it will hold fittings more securely;

hardwood is a durable timber;
so promotes a longer product life;

aesthetics;
attractive grain pattern/texture; ***[2 max]***

(ii) *Award **[3 max]** for three advantages.*
lamination does not require a solid piece of flawless timber;
it is constructed of thin strips of timber;
which can come from different trees;

laminated timber is strong;
due to the use of the adhesive;
between each layer;

lamination is cost-effective;
for various scales of production;
involving humans and/or machines;

lamination is suitable for curved shapes;
the strength of the glue helps to keep the shape;
by preventing springback;

laminated timber is durable outdoors;
as long as the adhesive is moisture resistant;
and a moisture resistant finish is regularly applied;

laminated timber has good strength to weight ratio;
which means it can be used for slender structures;
and so increases aesthetic appeal; ***[9 max]***

9. (a) (i) *Award **[2 max]** for one reason.*
gives consumers a choice;
so increases sales;

contemporary colours chosen;
to give the product a modern image;

bright colours;
easily seen when in water if it becomes detached;

many other products *e.g.* swimwear use a similar colour range;
aimed at the young consumer; ***[2 max]***

(ii) *Award **[2 max]** for something along the lines of*
incremental as it is a development of an existing product;
but radical in concept as it is adapted for a new context; ***[2]***

(b) (i) *Award **[2]** for:*
the Player weighs differently in and out of water;
but the mass is constant; ***[2]***

(ii) *Award **[3]** per distinct point.*
forces will vary depending on the type of swimming undertaken;
depth undertaken;
the effect of water current in open water; ***[3]***

(c) (i) *Award **[2]** for:*
if it is dropped in water/disengages from the wearer while in water;
it will float to the service rather than sink/makes it easier to retrieve; ***[2]***

(ii) *Award **[3 max]** for one criteria from each aspect of before purchase, initial use and long-term use.*

before purchase

effect of advertising:
consumers may be made aware of the product;
and so the potential benefit of the product for them;

price:
relative affordability;
depending on user's circumstances/compared to other products;

image:
it may fit in with their lifestyle;
and style of other products they use;

expert appraisal:
data from consumer groups;
or information from experts in the field via website *etc.*

initial use

performance:
especially when used under water;
and compared to a standard Player;

safety:
whether the cords tangle up around the head;
and whether it is waterproof;

ease-of-use:
whether the controls are easy to locate when swimming;
and it does not interrupt the activity;

long-term use

reliability:
whether the Player performs as well over a long period of time;
in different conditions;

ease-of-maintenance:
whether it is easy to keep clean;
and hygienic;

durability:
whether it is robust;
in and out of water;

running costs:
length of life of the battery;
and cost of recharging; ***[9 max]***