N08/4/DESTE/HP2/ENG/TZ0/XX/M+

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MARKSCHEME

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DESIGN TECHNOLOGY

Higher Level

Paper 2

14 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 **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 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 the correct answer including units.*
5.5 m^2; ***[1]***

(ii) *475/6;*
79.1 %; (+/- 0.1 %) ***[2]***

(iii) *745;*
× 75% = 558.75;
× 2 = 1 117.5 MJ;
[2 max]** for a correct calculation but no units.* ***[3]

(b) (i) *Award **[1]** for the reason and **[1]** for a point relating to that reason.*

windows may be obscured by trees/buildings/blinds/curtains;
thereby eliminating some of the potential solar gain;

house in different location;
aspect toward the sun will change;

doors may have glass panels;
which would increase the solar gain;

in the calculation east-west windows are not taken into account;
so the heat gain calculated is lower than it would be; ***[2 max]***

(ii) *Award **[1]** for the reason and **[1]** for a point relating to that reason.*

the bathroom is usually the smallest room;
so using the smallest window would be in proportion;

bathroom windows are usually opaque for privacy;
so a smaller window would be less costly;

people spend less time in the bathroom than other rooms;
and do not use the bathroom window for its views;

less light is needed in a bathroom than other rooms;
so a smaller window is appropriate; ***[2 max]***

(c) (i) *Award **[1]** for the correct answer including units.*
12 000 MJ; ***[1]***

(ii) *Award **[1]** for the reason and **[1]** for a point relating to that reason.*

appliances vary in the amount of heat they release;
and the number of appliances may be different to the estimate;

people may use appliances in different ways;
e.g. boiling a kettle many times or boiling more water than required; ***[2 max]***

(iii) *Award **[1]** per distinct point in an explanation.*
cooking is a varied activity;
it includes using the hob / oven / grill;
which are not efficient in relation to energy conversion;

cooking usually happens often;
time spent cooking varies;
energy used in cooking is high; ***[3 max]***

(d) (i) *Award **[1]** for identifying windows and **[1]** for any from the list.*
windows;
light;
ventilation;
to see outside;
solar heat gain;
aesthetic reasons; ***[2 max]***

(ii) *Award **[1]** for the purpose and **[1]** for a point relating to that purpose.*

so access to outside is not directly from a room;
which aids comfort;

to give privacy to people in rooms;
as you do not need to go into a room to get to another room;

to aid circulation of people between rooms;
as rooms are arranged around the hall/corridor;

to provide extra space for storage;
e.g. a coat rack; ***[2 max]***

2. *Award **[1]** for the reason and **[1]** for a point relating to that reason.*

gives the surface a hard finish;
so scratch resistant;

heat resistant;
so will not be damaged by hot coffee cups *etc.*;

colourless;
so allows the grain/colour of the timber to show;

easy to apply;
so cost-effective for manufacturers; ***[2 max]***

3. (a) literature search; ***[1]***

(b) *Award **[1]** for the limitation and **[1]** for each point relating to that limitation.*

dynamic data relates to users carrying out tasks;
so obtaining accurate ergonomic data is difficult;
because much data gathering is by observation rather than measurement;

users do not always carry out tasks in the same way;
so data may not be reliable;
or users may not do tasks correctly; ***[3 max]***

4. (a) *Award **[1]** for the strategy and **[1]** for a point relating to that strategy.*

use technologies which enhance human skills;
so providing job satisfaction;

provide employment for local people;
so helping the economy;

production should not dehumanise people;
so respecting their dignity/way of life; ***[2 max]***

(b) *Award **[1]** per distinct point in an explanation.*

"green" consumer groups;
apply pressure on politicians;
to provide legislation relating to sustainability;

"green consumers" look for products that fit the criteria for sustainability;
so increasing pressure on manufacturers;
to include sustainability as part of the design brief;

sustainability issues;
are promoted by the media;
and increase consumer awareness; ***[3 max]***

5. (a) sandwich of two glass outer layers;
with a layer of plastic in between; ***[2]***

(b) *Award **[1]** for the reason and **[1]** for each point relating to that reason **[2 max]**.*
aesthetics;
curved shapes possible;
different surface veneers can be used for colour/grain pattern;

cost;
uses less timber;
suitable for volume production;

good strength to weight ration;
less dense than solid timber chairs;
appropriate where portability is important (*eg.* classrooms); ***[3 max]***

6. (a) high protein / low salt / low cholesterol;

good for a balanced diet / a healthy diet; ***[2]***

(b) reference to texture / smell / appearance;

must be acceptable (or comparable) with existing foods; ***[2]***

SECTION B

7. (a) (i) *Award **[1]** for the advantage and **[1]** for a point relating to that advantage.*

reliable;
wind is inconsistent in force;

predictable;
tidal patterns are known but wind is unpredictable; ***[2 max]***

(ii) *Award **[1]** per distinct point in one outline.*

turbines are under water;
so less visual pollution;

the tidal power scheme is at sea;
so less chance of being seen by people; ***[2 max]***

(b) stiffness is an important consideration for the rotors;
so they do not flex in the water;
knowledge of Young's modulus of different materials allows for the selection of an appropriately stiff material; ***[3]***

(c) (i) *Award **[1]** for the limitation and **[1]** for a point relating to that limitation.*

some countries are land locked;
so it is not an appropriate technology;

high capital costs;
so poor countries may not be able to afford it; ***[2 max]***

(ii) *Award **[1]** for the reason and **[1]** for a point relating to the reason.*
the design is cost-effective;
as the blades will rotate efficiently / they will not damage easily; ***[2]***

(d) *Award **[1]** for each consideration and **[1]** for each point in the discussion **[3 max]** per aspect.*

large R&D or design costs;
because it's new technology
which requires much testing *etc.*;

small scale of production;
so expensive to manufacture;
as no economies of scale;

large maintenance costs;
due to the effects of seawater;
and forces acting on the structure;

large installation costs;
due to the difficult location;
and the need to distribute the electricity generated to land; ***[9 max]***

8. (a) (i) *Award **[1]** for each correct answer from the list.*
broad leaf;
slow growing;
close grain;
deciduous; ***[2 max]***

(ii) *Award **[1]** for the advantage and **[1]** for a point relating to that advantage.*
aesthetics;
because of attractive grain pattern / colour;

useful properties;
of strength or toughness;
(accept durability);

image;
relating to status or perceived quality; ***[2 max]***

(b) (i) *Award **[1]** for the reason and **[1]** for a point relating to that reason.*
to reduce the moisture content;
so the timber is less likely to crack / warp / cup / twist / bow. ***[2]***

(ii) *Award **[1]** for each point.*

the unit needs to be designed to withstand a higher load than the anticipated external load;
because heavier items than expected may be placed on it;
or people might lean on it; ***[3]***

(c) *Award **[1]** for the way and **[1]** for a point relating to it.*
cutting;
members cut to size with a saw or by machining to cut to size;

abrading;
to sand the wood to a smooth finish; ***[2]***

(d) *Award **[1]** for each distinct point in an explanation, **[3]** relating to fashion and planned obsolescence.*

fashion:
use of natural timber;
so decoration from it's colour;
grain pattern;
minimalist style;
clean lines;
contemporary;
individual style;
appeals to discerning consumers;
who do not just follow mass trends;

obsolescence:
limited production run;
likely to become scarce and so valuable in the future;
self-assembly so consumers may not have the skill;
or tools to assemble it properly so reducing it's life;
good quality hardwood used;
so if it is assembled well;
and looked after it should last a long time;

[6 max]** if reference is made to only fashion or planned obsolescence.* ***[9 max]

9. (a) (i) *Award **[1]** for radical and **[1]** for incremental.*
radical in concept or features *e.g.* carbon tanks *etc.*;
incremental in shape or transmission; ***[2]***

(ii) *Award **[1]** for the advantage and **[1]** for a point relating to that advantage.*

feedback on the design;
from experts or consumers;

testing;
on the road and/or in the factory;

if successful;
can be used for tooling up for mass production;

can be shown at motor shows / in the press *etc.*;
so stimulate demand; ***[2 max]***

(b) *Award **[1]** for the advantage and **[1]** for a point relating to that advantage.*

non corrosive;
so will not rust;

high tensile strength;
so will resist the pressure;

very tough;
so will not crack easily;

low density;
so will not add much weight to the car;

mouldable;
so can be shaped easily; ***[2 max]***

(c) the car uses electricity;
which is likely to be produced in power stations;
using fossil fuels which produce emissions; ***[3]***

(d) large (highest) cost;
as much R&D required which is expensive; ***[2]***

(e) *Award **[1]** for each distinct point, **[3 max]** for each aspect.*
science:
understanding of physics;
to calculate correct pressure;
how the air works in the engine *etc.*;

technology:
use of carbon fibre;
manufacturing technology to produce the car;
to make sure it performs well;
especially against competitors' models;

philosophy:
values;
such as sustainability;
leading to "green design"; ***[9 max]***