

Markscheme

May 2015

Design technology

Standard level

Paper 2

11 pages

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1. Follow the markscheme provided, award only whole marks and mark only in **RED**.
2. Make sure that the question you are about to mark is highlighted in the mark panel on the right-hand side of the screen.
3. 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.**
4. Sometimes, careful consideration is required to decide whether or not to award a mark. In these cases use RM™ Assessor annotations to support your decision. You are encouraged to write comments where it helps clarity, especially for re-marking purposes. Use a text box for these additional comments. It should be remembered that the script may be returned to the candidate.
5. Personal codes/notations are unacceptable.
6. Where an answer to a part question is worth no marks but the candidate has attempted the part question, use the “ZERO” annotation to award zero marks. Where a candidate has not attempted the part question, use the “SEEN” annotation to show you have looked at the question. RM™ Assessor will apply “NR” once you click complete.
7. If a candidate has attempted more than the required number of questions within a paper or section of a paper, mark all the answers. RM™ Assessor will only award the highest mark or marks in line with the rubric.
8. Ensure that you have viewed **every** page including any additional sheets. Please ensure that you stamp “SEEN” on any additional pages that are blank or where the candidate has crossed out his/her work.
9. Mark positively. Give candidates credit for what they have achieved and for what they have got correct, rather than penalizing them for what they have got wrong. However, a mark should not be awarded where there is contradiction within an answer. Make a comment to this effect using a text box or the “CON” stamp.

Subject Details: Design Technology SL Paper 2 Markscheme

Mark Allocation

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

1. A markscheme often has more marking points than the total allows. This is intentional.
2. Each marking point has a separate line and the end is shown 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 **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. When marking indicate this by adding **ECF** (error carried forward) on the script.
10. Do **not** penalize candidates for errors in units or significant figures, **unless** it is specifically referred to in the markscheme.

Section A

1. (a) (i) *Award [1] for stating the annual amount of carbon emissions produced by Windsor Castle prior to the installation of the hydroelectric scheme.*
1580tonnes; [1]
- (ii) *Award [1] for stating one reason why fish may be injured by the scheme even though a fish run is installed.*
fish may not be able to navigate past the strong current so get sucked into the turbine;

the protective rubber for the blades of the turbine may rot/become damaged;

size of the fish run is too small/inadequate; [1 max]
- (iii) *Award [1] for listing two reasons why the hydroelectric scheme is unlikely to maintain maximum output throughout the year. [2 max].*
periods of drought/low river level;

essential maintenance required;

malfunction; [2 max]
- (b) (i) *Award [1] for one reason why the spin rate data for the screws may vary and [1] for a brief explanation.*
different water flow/currents;
varies with the amount of rainfall;

mechanism could become damaged;
or blocked by debris; [2]
- (ii) *Award [1] for one reason why the data relating to 95% of the power needs of Windsor Castle may reduce even if the hydroelectric scheme maintains maximum output and [1] for a brief explanation.*
power needs of the castle/consumption of energy increases
(dependent on the number of users/types or number of appliances used/seasonal conditions; summer cooling or winter heating);
but the power output of the scheme stays the same; [2]
- (c) (i) *Award [1] for stating the ideas generating technique which stimulated the idea for this type of hydroelectric scheme.*
adaptation; [1]
- (ii) *Award [1] for suggesting why the data relating to 400 homes may not be accurate.*
homes vary in size/amount of people housed;
so they will have different energy needs;
the data probably based on a typical home's average energy requirements
but no reference is made to this requirement; [3]

2. (a) *Award [1] for stating the manufacturing technique used to secure the handle to the satchel bag.*
fasteners/rivets/ring; [1]
- (b) *Award [1] for each distinct correct point in an explanation of the influence of fashion and planned obsolescence on the design of the satchel in Figure 4.*
it can be viewed as a retro design as it is very similar to the original design of the 1950s/60s and nostalgia for this period is part of the fashionable appeal but the use of bright colours is contemporary;
the satchel is produced from traditional, durable materials/leather and so little materials obsolescence in normal use; [3]
3. (a) *Award [1] for stating the percentile which would be used to decide an appropriate height for the tallest shelf in a supermarket.*
5th (adult);
50th percentile (adult); [1max]
- (b) *Award [1] for each distinct correct point in an explanation of why there is no specific anthropometric data available for the “average” person.*
designing for the average person is a misnomer/misleading/there is no such thing as designing for the average person;
someone may be average for one body dimension but not average for other dimensions;
if a designer wants to use a specific average dimension for a body part they need to use median/mode/choice of percentile is dependent on design context; [3]

Section B

4. (a) (i) *Award [1] for stating why the manufacturer emphasizes the packed size of the Biolite stove.*
the target market is hikers/expedition participants so knowing it will pack into a bag/backpack is important to them/for carrying purposes;
portable design/easily fits into a bag; **[1 max]**
- (ii) *Award [1] for one limitation of the Biolite stove for users who undertake expeditions to locations all over the world and [1] for a brief explanation.*
they need a supply of biomass material in the vicinity of the camp location;
so the stove is not suitable for expeditions to desert/arid areas/arctic regions/wet conditions/protected areas etc; **[2]**
- (iii) *Award [1] for one reason why users may decide to carry wood pellets for the stove even though they will be camping in wooded areas and [1] for a brief explanation. [2 max].*
convenience/flexibility;
faster/easier to set up/use;

they may make camp at night;
and do not want to hunt around in the dark for fuel;

they may need to make an emergency camp;
where suitable vegetation for the stove is limited/unavailable;

wet weather conditions;
wood needs to be dry to burn effectively; **[2 max]**
- (b) (i) *Award [1] for stating one disadvantage of the Biolite stove in relation to green design. [1 max].*
burning wood/vegetation causes chemical pollution;

users may damage plants/vegetation when collecting fuel;
mixed materials/not easy to disassemble/does not facilitate repair;
potentially unsafe product; **[1 max]**
- (ii) *Award [1] for each distinct correct point in an evaluation of the Biolite stove in relation to ease-of-maintenance.*
burning wood will produce ash;
and carbon deposits inside the stove unit;
the stove will need to be cleaned regularly to maintain efficiency/operation;

designed with components that can be disassembled;
as charging unit/burner needs to be detachable;
to facilitate maintenance/cleaning/repair; **[3 max]**

- (c) (i) *Award [1] for one potential safety issue when using the Biolite stove for cooking and charging an electronic device at the same time and [1] for a brief explanation. [2 max].*

plugging in a device while food/water is being heated could cause a spillage;
and the user get burnt/scalded;

when plugging in the device the user may be tempted to hold the stove with one hand while plugging in with the other;
and burn the hand on the stove;

Item being charged may become damaged if left too close to the stove;
or the charging lead could be damaged by heat/be a trip hazard;

accidental spillage due to unstable surface/tripping;
could burn/injure the user;

[2 max]

- (ii) *Award [1] for each distinct point in a discussion of how the strategies of user trial, performance test and field trial could have contributed to the development of the Biolite stove. Award [3 max] per strategy.*

user trial:

ease-of-use/method(s) of use/ergonomics;

identify any perceived safety issues for different users;

assess ease-of-maintenance;

assess the effect of the weight of the product when carried in a rucksack with other typical expedition gear;

feedback informs designers on improvements needed; [3 max]

performance testing:

test a prototype to evaluate the effectiveness of the stove with different types of biomass materials;

test for efficiency levels relating to heat/electricity;

test for reliability;

test for safety;

testing durability of materials/components used to manufacture the stove;

[3 max]

field trial:

evaluate performance in real environmental/climatic conditions;

combine with user trial/user research to evaluate performance during an actual expedition/over a typical expedition timescale;

evaluate data gathered from lab tests/performance tests in different expedition conditions;

[9 max]

5. (a) (i) *Award [1] for stating the most likely manufacturing technique used to assemble the Bagalight.*
adhesives; [1]
- (ii) *Award [1] for stating why the Bagalight is only produced in one colour and [1] for a brief explanation.*
brown paper bags are a traditional form of packaging and have been used for many years;
the novel use of brown paper bag reinforces the design concept along with green design/recycling;
- using a standard colour only makes it more cost effective to produce;
and potentially cheaper for consumers; [2 max]
- (iii) *Award [1] for stating how the designer will have considered stability in the design of the Bagalight and [1] for a brief explanation.*
as it is mainly made from paper it is a very light structure which could easily topple over/be blown over;
but the bulb holder in the base will add weight to increase stability of the lightweight structure/stop it from toppling over; [2]
- (b) (i) *Award [1] for stating one limitation of the Bagalight in relation to ease-of-maintenance.*
dust/insects will collect inside the bag;
- paper is difficult to keep clean/cannot be cleaned with water;
- if the paper bag/handle is squashed/torn it cannot be smoothed out/repaired again; [1 max]
- (ii) *Award [1] for each distinct correct point in a suggestion of one reason for using the shape of a traditional lamp as a surface pattern for the Bagalight.*
using a well-known lamp shape on one side of the bag reinforces the function of the bag;
especially when the lamp is not switched on and its function is not obvious;
and it enhances the aesthetic appeal when it is switched on providing a contrast of tones/the lamp shape is lit up; [3]
- (c) (i) *Award [1] for one limitation of using the Bagalight as a main source of light and [1] for a brief explanation.*
the maximum wattage of the bulb which can be used is 15W so the lamp will only produce a low level of light;
meaning that it is not useful as a main source of light/is only suitable for ambient lighting/most light is directed upwards; [2]

- (ii) *Award [1] for each distinct correct point in suggesting three ways in which the Bagalight may be viewed as a robust design. Award [3 max] for each issue.*
suitable for a wide variety of market conditions;
it is relatively inexpensive so affordable;
and suitable for different contexts;
- technically easily adaptable;
a variety of light fittings could be used;
for different CFL bulbs as long as they are low wattage;
- flexible as part of an interior design;
different coloured bulbs could be used to match colour schemes;
create different moods;
- portable;
suitable for putting on a variety of surfaces/structures;
as long as near enough to a power supply/electrical socket; **[9 max]**
6. (a) (i) *Award [1] for stating the type of evaluation test performed at Bondi beach in Australia.*
field trial; **[1]**
- (ii) *Award [1] for one physiological ergonomic consideration which contributed to the idea for the Water Craft and [1] for a brief explanation.*
fatigue/body tolerance/lifting strength;
difficult to rescue people from the water single-handed; **[2]**
- (iii) *Award [1] for each distinct correct point in a description of the structure and bonding of a thermoplastic.*
long/linear chain molecules;
with weak secondary bonds between the chains; **[2]**
- (b) (i) *Award [1] for stating the ideas generation technique which was the impetus for the design of the Water Craft and [1] for a brief explanation.*
constructive discontent;
Kemp was dissatisfied with the performance of existing rescue craft; **[1 max]**
- (ii) *Award [1] for each distinct correct point in an explanation of the reason for using scale models as part of the design development process for the Water Craft.*
a scale model explores the proposed design in relation to shape/form/proportions;
the model can easily be manipulated at the early stage of design development to refine ideas;
it also allows others to contribute to the process even if they do not have technical expertise/enhance communication;
- performance testing;
can be used to determine effective movement through water;
to develop optimal shape; **[3 max]**

- (c) (i) *Award [1] for stating why the Water Craft is primarily an example of market development and [1] for a brief explanation.*
there is an existing market for life-saving aids in open water/there are existing products which can be used;
the Water Craft is aimed at development of this market/the Water Craft is aimed at developing the market for life-savers working on their own; **[2]**
- (ii) *Award [1] for each distinct correct point in a discussion of Ross Kemp as an inventor, innovator and entrepreneur. Award [3 max] for each role.*
- inventor:
identified an original idea/concept;
but did not invent the jet ski or paddle board;
he combined both concepts into his prototypes;
worked as a lone inventor to prototype stage;
used design/creative ability to persevere/persist with production of models/prototypes;
[3 max]
- innovator:
wants to create an innovation by making it successful in the marketplace;
still at the prototype stage so no guarantee of success;
can no longer work alone but needs the support/involvement of other people/different expertise for marketing;
- entrepreneur:
does not have a business background;
does not have the finance to fund the innovation;
not an entrepreneur so requires a business partner/business deal;
identifies a marketing opportunity;
tries to raise funds/awareness by entering a competition/winning first prize;
which aids in developing a marketable product; **[3 max]** **[9 max]**
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