



MARKSCHEME

May 2012

DESIGN TECHNOLOGY

Standard Level

Paper 2

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If you do not have a copy of the current Design Technology Guide,
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General Marking Instructions

Assistant Examiners (AEs) will be contacted by their team leader (TL) by e-mail (or telephone) – if by e-mail, 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 e-mail at any time if they have any problems/queries during the marking process.

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 IB. 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. For Section A this should be 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 on both the additional sheet and in the right-hand margin of the corresponding question part in the body of the script to transfer these marks to that question part in the script.
9. 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 the 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.
10. 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. **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, **even if the candidate has indicated the question(s) to be marked on the cover sheet.**
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 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. 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 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 stating which category of materials the material used for the ball belongs.*
composites; *[1]*
- (ii) *Award [1] for stating a reason for using polyurethane with the metal piano wire for the hose [1 max].*
durability (extended product life)/toughness;
the plastic coating helps prevent the metal corroding;
aesthetics/can be manufactured in any chosen colour;
easier to handle;
provides a solid surface as the hose flexes; *[1]*
- (iii) *Award [1] for each of two distinct correct points in a description of the extrusion process used to manufacture the hose [2 max].*
the plastic/polyurethane is heated and with great force / pressure is squeezed through a die/mould;
as the wire is fed into the machine; *[2]*
- (b) (i) *Award [1] for one reason why the designer has chosen a transparent material for the casing for the dust container and [1] for a brief explanation [2 max].*
aesthetics;
use of transparent materials suggests a modern/contemporary image;

brand identity;
all Dyson cleaners use the same material;

to show the novel mechanism/technology;
so reinforces the uniqueness of the product;

ease-of-use;
you know when to empty it; *[2 max]*
- (ii) *Award [1] for the ideas generating technique used by the designer for the ball technology and [1] for a brief explanation [2 max].*
adaptation;
the idea was adapted from the ballbarrow; *[2]*

- (c) (i) *Award [1] for stating the strategy used for evaluating the durability of the cleaner.*
performance test; *[1]*
- (ii) *Award [1] for each distinct correct point in an explanation of why the number of tests for different components of the vacuum cleaner varies [3 max].*
trial and error / material testing;
for a range of (potentially) appropriate materials;
to find the most suitable material for the component;
- the tests relate to the anticipated life cycle of a component;
in order to ensure that the component performs effectively;
this enables the manufacturer to assure the quality of the product / offer a guarantee;
- some of the components will be used / abused in different ways by users;
this depends on the context of their home / lifestyle;
user trials/user research will establish types/range of usage/alternative usage patterns;
- testing to destruction;
to find how long each part will last;
product life can be determined / the product can be redesigned for the required life / planned obsolescence; *[3 max]*
2. (a) *Award [1] for stating an issue relating to the consideration of timber as a renewable resource.*
time to reach maturity;
soil erosion;
greenhouse effect;
extinction of species; *[1 max]*
- (b) *Award [1] for each distinct correct point in a discussion of the use of particle board (chipboard) for a student's desk in relation to planned obsolescence [3 max].*
particle board has a surface veneer;
the desk will endure much wear and tear in use / the veneer will become damaged/scratched exposing the particle board underneath;
prompting it to be replaced;
- particle board is difficult to use with traditional joints for wooden furniture;
fasteners / KD fittings are used;
this method of construction is not long-lasting resulting in the desk being replaced;
- particle board with a surface veneer is not easy to restore;
especially in comparison to the price of such products;
consumers tend to discard it rather than repair it/limited product lifecycle; *[3 max]*

3. (a) *Award [1] for stating the manufacturing technique used to create glass bottles.*
(blow) moulding; [1]
- (b) *Award [1] for each distinct correct point in an explanation of how the composition of Pyrex® glass has been determined in order to make it successful in the marketplace [3 max].*
the glass used is borosilicate / tempered soda-lime glass (US market);
the glass is treated so it has high thermal resistance and low thermal expansion/resists cracking;
this makes it suitable for oven-to-tableware / laboratory products; [3]

SECTION B

4. (a) (i) *Award [1] for stating the percentile range used to decide the range of shoe size.*
5th–95th; [1]
- (ii) *Award [1] for one issue relating to percentile ranges for the international marketplace and [1] for a brief explanation [2 max].*
percentile ranges vary in different regions of the world / human dimensions vary in different regions;
different sizes need to be produced for different market sectors; [2]
- (iii) *Award [1] for one reason why plastic bottles are suitable for recycling and [1] for a brief explanation [2 max].*
they are made from a thermoplastic material;
the molecular structure of thermoplastic materials means the polymer chains can be rearranged on heating; [2]
- (b) (i) *Award [1] for stating one way in which the design of the Terra Plana shoe is consistent with clean manufacturing.*
lack of toxic dyes / chemicals;
no pollution from the manufacturing process / reduces environmental impact; [1 max]
- (ii) *Award [1] for each point in a comparison of stitching with gluing for joining shoe parts in relation to product life cycle [3 max].*
stitching is usually stronger than gluing;
stitched parts are easier to replace when worn out;
the shoes will last longer / extending the product life cycle;
stitching is more environmentally friendly as gluing may use toxins;
stitching is a more complex process than gluing/takes longer/costs more; [3]
- (c) (i) *Award [1] for one way in which design for manufacture (DfM) has been a dominating constraint on the design brief for the Terra Plana shoe and [1] for a brief explanation [2 max].*
design for materials / design for process;
materials / manufacturing techniques have been chosen as a prime objective for a green design approach / the Terra Plana shoe; [2]

- (ii) *Award [1] for each of three distinct correct points in a discussion of the concepts of reuse, repair and recycling in relation to the Terra Plana shoes [3 max] per concept.*

Reuse:

the shoes are part of the fashion market;
people do not always wear out their shoes;
part worn shoes can be reused by others / given to charities;

Repair:

the shoes are designed to support repair;
by worn out parts being easily replaced;
due to the lack of glue / use of stitching;

Recycle:

the shoes are manufactured from recycled materials;
when obsolete, the shoes themselves can be recycled;
due to the materials chosen / manufacturing technique;

[9]

5. (a) (i) *Award [1] for a definition of market sector to the effect of:* *[1]*
broad categories of a market for a particular product/system;
- (ii) *Award [1] for identifying how the Yogo scooter satisfies a pioneering corporate strategy and [1] for a brief explanation [2 max].*
the Yogo was the first product of its type to market;
using the lithium battery as a power source for the scooter; *[2]*
- (iii) *Award [1] for identifying an advantage of the battery being easily detached from the scooter other than for re-charging and [1] for a brief explanation [2 max].*
security;
the scooter is far less attractive to thieves with the expensive lithium battery missing;

convenience / extended journey;
the battery can be easily replaced by a fully charged spare battery;

disposal;
batteries can be reconditioned; *[2 max]*
- (b) (i) *Award [1] for stating the scale of production for the Yogo scooter.*
batch; *[1]*
- (ii) *Award [1] for each of three distinct points in an explanation of why the designer decided to use retro-styling for the scooter [3 max].*
fashion;
retro-styling is popular trend for the market segment;
based on young people / used for other products; *[3]*
- (c) (i) *Award [1] for identifying one way in which assembly line production for the scooter contributes to cost-effectiveness and [1] for a brief explanation [2 max].*
each task in the assembly of the scooter is pre-planned;
optimum use of time / materials;

if workers are used on the assembly line they work on specialised tasks to ensure maximum efficiency;
reduced cost/time for training; *[2 max]*

- (ii) *Award [1] for each of three distinct correct points in a discussion of the rules of inventor, innovator and entrepreneur in relation to James South's contribution to the evolution of the Yogo scooter [3 max] per rule.*

Inventor:

the scooter is not an invention / it cannot be patented;
the design is a combination of existing components;
combined to create a novel product based on the use of the lithium battery for scooters though it has been used for electric cars;

Innovator:

the scooter is limited in innovation;
as it is in the early stage of diffusion;
due to the high cost/competition it may not succeed/diffuse fully;

Entrepreneur:

South is an entrepreneur;
as he was looking for a business opportunity / to make money;
focused on an idea which was good enough to raise funds to develop the Yogo scooter;
he has the right characteristics / business acumen to persuade others to invest / join him in the venture;

[9 max]

6. (a) (i) *Award [1] for stating the percentile used to decide the distance between the floor and the height of the shelf.*
50th; [1]
- (ii) *Award [1] for one anthropometric consideration in deciding the depth of the fold down shelf and [1] for a brief explanation [2 max].*
reach;
users can access what is stored inside the bureau when sitting in front of the fold-down shelf; [2]
- (iii) *Award [1] for one psychological ergonomic factor relating to the bureau and [1] for a brief explanation [2 max].*
texture;
the feel of the wooden surface/grain pattern/tactile quality; [2]
- (b) (i) *Award [1] for stating the most likely scale of production for the bureau.*
batch; [1]
- (ii) *Award [1] for each of three distinct points in a discussion of the contribution of craft production and mechanisation for the manufacture of the bureau [3 max].*
some wood working machines will be used in the production, suitable for cutting / abrading / joining;
the bureau also requires hand-craftsmanship in order for the decorative pattern of (inlaid) veneers to be created;
and the skilled assembly / surface finish; [3]

- (c) (i) *Award [1] for a reason for the high cost of the bureau and [1] for a brief explanation [2 max].*
amount of skill required from craftsmen;
resulting in high labour costs;
- small scale production of a unique design;
requiring the expertise and time of an innovative designer which is expensive; *[2 max]*
- (ii) *Award [1] for each of three distinct correct points in a discussion of each of three ways in which the designer has attempted to balance form with function in the design of the bureau [3 max] per way.*
when closed the bureau has strong visual appeal;
the decoration will stand out in a room;
though the function as a writing bureau is not obvious;
- the bureau is multi-functional;
it can be used for storage and as a stand alone piece of furniture for displaying other objects;
while the form provides stability;
- when open the function dictates the form;
the bureau loses its striking appearance;
the colour of the inside does not match the outside;
- the pattern of the decorative veneers;
is carefully designed so that the pattern for the ends balance with each other;
even when the bureau is open and the pattern on the outside of the central part is not visible;
- the straight lines used for the decorative veneers;
are compatible with the rectangular geometry of the rest of the form;
and enhance the function as a stand alone display bureau;
- the design of the surface decoration;
is like having an abstract painting in the room;
the shape of the rest of the bureau supports the contemporary style; *[9 max]*
-