



MARKSCHEME

May 2010

DESIGN TECHNOLOGY

Standard Level

Paper 2

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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 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
US\$ 40 000;
(no mark if units not stated but accept \$) [1]
- (ii) Award [2] for:
identifying 100 000;
and the answer US\$ 50;
(no marks if units not stated but accept \$) [2]
- (iii) Award [3] for:
calculating retailer profit of US\$ 60;
 $150 - 60 = 90$;
 $90 - 50 = \text{US\$ } 40$ profit;
(2 max if no units) [3]
- (b) (i) Award [2] for:
product development;
to create an improved/different version of the same product; [2]
- (ii) Award [1] for:
new equipment and tooling; [1]
- (iii) Award [3] for one strategy.
target market research;
into competitive products;
and the prices they sell at;
- user research;
with potential users;
and what they are prepared to pay/what they want;
- expert appraisal;
with experts who know the target market and/or product well;
and so can advise on an appropriate price/design;
- user trial;
observe users with the original product;
to inform design decisions for the revised version; [3 max]
2. (a) Award [1] for something along the lines of:
the permanent deformation of a solid/material due to an applied force/load; [1]
- (b) Award [3] for something along the lines of:
the chair requires tubes to be bent (formed);
the metal used for the tubes needs to plastically deform easily;
so it stays in the deformed shape when the stress (load) is released; [3]

3. (a) *Award [1] for:*
a (volume) production process involving machines controlled by computers; *[1]*
- (b) *Award [3] for something along the lines of:*
both give consumers the opportunity to modify a design;
mass customization uses automation;
craft production uses human manual skills; *[3]*

SECTION B

4. (a) (i) *Award [1] for:*
batch; *[1]*
- (ii) *Award [2] for one reason:*
unusual design;
unlikely to have mass appeal;
- range of colours;
so a set number produced of each;
- many other chairs on the market for consumers;
most chairs are batch produced to give choice;
- famous designer so high prices;
limited market at the high price; *[2 max]*
- (iii) *Award [2] for one reason:*
cost to manufacturer;
the more colours produced the greater the cost;
- reduce waste;
the more colours produced the greater the chance of unsold chairs; *[2 max]*
- (b) (i) *Award [1] for:*
50th; *[1]*
- (ii) *Award [1] for stating comfort as the factor and [2] for an explanation:*
seat is a hard surface;
so less comfortable than a cushioned seat;
- seat surface is smooth;
so reduced grip for a seated person;
- no adjustability;
so different sized users cannot adjust the seat to suit their body sizes;
- no armrests;
so nothing to grip on when getting out of the chair;
- shape/form of the chair;
does not suit all types of bodies; *[3 max]*

- (c) (i) *Award [2] for one test:*
strength;
to test it is strong enough for a range of users;
- durability;
to test the hardness of the surface so it does not scratch or splinter easily;
- safety;
to test the stability of the chair if someone stands on it; *[2 max]*
- (ii) *Award [3] for each issue.*
size of curves;
has to be carefully worked out;
so the seat is the correct height from the floor;
- geometry of the chair;
needs to be carefully calculated;
so it functions as a stable product;
- the angle of the backrest;
needs to fit in with the curved form of the chair;
but also allow for the comfort of the user;
- no armrests to push on;
so the form of the chair has to be designed to allow users to get up;
without straining their back or legs;
- the form of the curved shapes at the front of the chair;
needs to ensure that no pressure is applied to the back of users' legs;
but adequate support is given to the thighs;
- stackability;
two chairs complement each other in form;
to ensure they can be stacked on top of each other/save space;
- seat slopes backwards;
so the user's legs are supported behind the knees;
and the back is supported;
- smooth curves to the form;
provides a rhythmic shape;
with no sharp edges; *[9 max]*

5. (a) (i) *Award [1] for*
hardness; *[1]*
- (ii) *Award [2] for:*
the cap will be volume produced by injection moulding;
polypropylene is a suitable material for injection moulding; *[2]*
- (iii) *Award [2] for one reason:*
there may not have been a market for the pen;
when Biro first invented it;
- Biro may not have had the personal finance to undertake the production;
as manufacturing the pens in quantity would be expensive;
- Biro may not have had the business acumen;
to convert his invention into an innovation;
- Biro may not have been able to persuade individuals or organisations to
invest in his idea;
so he could not manufacture the pen in quantity;
- the manufacturing technology to produce the pen at a cost-effective price;
may not have been available in 1938; *[2 max]*
- (b) (i) *Award [1] for any of:*
the user can see how much ink has been used/is available;
aesthetics/style; *[1 max]*
- (ii) *Award [3] for one reason:*
the flat surfaces provide edges;
which assists the user in gripping the pen;
and allows the pen to be picked up easily/ used in any position; *[3]*

- (c) (i) *Award [1] per distinct point in a suitable outline [2 max]:*
it is designed to be disposable;
so has a limited product life;

it cannot be refilled/repaired/reused;
therefore it has a limited product life;

[2 max]

- (ii) *Award [3 max] for each reason.*

stood the test of time;
still a global product;
with high volume of sales;

a low-cost item;
which is affordable by a large cross-section of society;
and is often purchased by institutions *e.g.* offices;

cost-effective to produce;
uses available materials and technology;
so can be produced in many countries;

value-for-money for consumers;
who often purchase the same item many times;
if satisfied with it;

the design of the pen is not culturally specific;
so it fits into varied environments worldwide;
which makes it recognisable in global environments;

dominant design;
the design has changed very little over 150 years;
but is still perceived as a modern product;

[9 max]

6. (a) (i) *Award [1] for:*
casting; [1]
- (ii) *Award [2] for:*
metal is dense/heavy;
the dispenser needs to be heavy so it does not move around the desktop as
the tape is pulled off the roll; [2]
- (iii) *Award [1] for each feature:*
oval hole;
groove for the blade;
surface finish; [2 max]
- (b) (i) *Award [1] for:*
reduced amount of components; [1]
- (ii) *Award [3] for:*
it allows fingers to get under the tape to grip it;
so tape can be pulled off the roll;
but the shape of the hole also fits in with the overall geometry of
the dispenser; [3]
- (c) (i) *Award [2] for:*
cutting blade is exposed;
so there is a danger of accidentally cutting a finger; [2]
- (ii) *Award [3] per strategy.*
user trial;
to evaluate how easily the roll of tape turns in the holder;
so the tape can be cut to length using one hand;

user research;
for aesthetic considerations;
to gauge reactions of people to the style of the product;

expert appraisal;
a manufacturer;
evaluates the design in relation to ease-of-manufacture/cost-effectiveness;

performance test;
a repeatability test;
to assess the effectiveness of the blade/how long it remains sharp; [9 max]
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