



# **MARKSCHEME**

**November 2010**

**DESIGN TECHNOLOGY**

**Standard Level**

**Paper 2**

13 pages

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 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 to show that these marks have been transferred to the appropriate square bracket in the body of the script.
9. Section A: Add together the total for each question and write it in the Examiner column on the front cover.  
Section B: Insert the total for each question in the Examiner column on the front cover.  
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 front cover 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 front cover.**
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 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 stating the length of dimension *h* for a one litre carton.  
200 mm; [1]
- (ii) Award [1] for stating the purpose of the dashed lines on the net.  
fold lines / they indicate where the cardboard should be folded to make the carton; [1]
- (iii) Award [1] for identifying the minimum length and [1] for identifying the minimum breadth of cardboard from which the net for a one litre carton could be cut.  
length:  $10 + 50 + 200 + 50 + 10 = 320$  mm ;  
breadth:  $10 + 70 + 70 + 70 + 70 = 290$  mm ; [2]
- (b) (i) Award [1] for identifying why the modification of the design of the carton to add the plastic spout is an example of constructive discontent and [1] for a brief explanation.  
consumer feedback indicated discontent with the pouring action of the carton in Figure 1;  
this provided the impetus for re-design [2]
- (ii) Award [1] for identifying **one** market segment that might find the carton difficult to open and [1] for a brief explanation.  
young children;  
small hands and not firm enough grip;  
elderly people;  
arthritic hands/lack of dexterity; [2 max]
- (c) (i) Award [1] for stating why the cardboard is wax coated.  
to make it waterproof;  
to prevent the cardboard absorbing the juice/becoming soggy;  
to prevent the carton leaking;  
to make it more durable; [1 max]
- (ii) Award [1] for each distinct correct point in an explanation of one implication of the plastic spout of the carton for the ease of recycling of the carton.  
it means that the empty carton has to be treated as a mixed material;  
cardboard and plastic are recycled in different ways;  
the two materials need to be separated;  
this means that the process will be more complex/time consuming; [3 max]

2. (a) Award [1] for stating which cell relates to product development.  
B; [1]
- (b) Award [1] for naming a product and [1] for each of two points in an explanation of how a company might undertake product development.  
name of product – note the candidate may name any appropriate product, e.g. mobile phone, ice cream, snack product, car, washing machine;  
explanation required of how the product has developed over time;  
in order to make it appeal to new markets; [3]
3. (a) Award [1] for stating **one** limitation of a literature search for evaluating a product's performance.  
too much information;  
not enough information;  
may be difficult to match information to the specific design context;  
the circumstances in which the data were collected may be unclear;  
the source of the information may be unreliable/biased; [1 max]
- (b) Award [1] for each of three distinct correct points in a discussion of the contribution of the Internet to the evaluation of value for money by consumers.  
consumers can access detailed information on product specifications;  
they can compare prices from different suppliers;  
they can access product evaluations from experts and from virtual and actual consumer groups;  
they can take as much time as they want/need in order to gain information about a product before deciding whether to purchase it;  
they can research the product thoroughly on the internet before going to a shop to physically inspect a product/ask informed questions to sales staff; [3]

**SECTION B**

4. (a) (i) *Award [1] for identifying a market segment for which the mobile phone with a QWERTY keypad would be the preferred option and [1] for a brief explanation.*  
people who write a lot of emails/want to do complex searches on the Internet;  
*e.g. business people/socialites;* [2]
- (ii) *Award [1] for each of three distinct correct points in an explanation of one benefit of quality assurance to mobile phone customers.*  
quality assurance helps give the consumer confidence about a purchase;  
it helps the manufacturer to offer a guarantee so that the consumer has some redress should things go wrong;  
it covers all activities involved in the manufacture of the product from design through raw material procurement to production;  
it ensures that the product meets its specification;  
consumers feel confident that the phone will be reliable/function well; [3 max]
- (b) (i) *Award [1] for identifying one way in which planned obsolescence influences the design specification of mobile phones and [1] for a brief explanation.*  
materials/durability;  
material specification may identify a particular product life;  
this will make the product only last a particular length of time;  
  
construction/ease of maintenance;  
products may be made difficult to maintain/repair;  
*e.g. use of rivets or adhesives so product cannot be opened easily or at all;*  
  
new technology;  
the mobile phone market is highly competitive;  
much R & D takes place in order to improve the design/create technological obsolescence for existing products; [2 max]
- (ii) *Award [1] for identifying a design for disassembly strategy which would be appropriate for the mobile phone and [1] for a brief explanation.*  
design components made from one material;  
this will make it that the phone does not have to be disassembled to recycle the materials;  
  
use thermoplastic adhesives;  
these can be designed so that they lose their properties when reheated to a particular temperature;  
  
use of snap fittings rather than welding or gluing;  
temporary rather than permanent fittings; [2 max]

- (c) (i) Award [1] for identifying a reason why the product cycle for mobile phones has shortened and [1] for a brief explanation.

fashion;

consumers like to change their phone for a different style;

technology;

phones with new features tempt consumers to change their phone/upgrade;

phone contracts;

in a competitive market consumers can choose a different tariff/package;

[2 max]

- (ii) Award [1] for each of three distinct correct points in an explanation of how the terms “fixed costs”, “variable costs” and “break-even point” relate to mobile phone production.

Fixed costs:

fixed costs include all the costs that must be paid out before production starts;

e.g. design costs, set up/tooling costs, marketing;

initial set-up/tooling costs will be high for first model but may be able to use same tooling and thus reduce costs for subsequent models;

design for manufacture will reduce fixed costs;

R & D fixed costs will be very high in order to develop new products regularly;

Variable costs:

variable costs include all the costs that vary with the volume of production;

e.g. materials, energy;

lightweighting will reduce amount of material required and could reduce variable costs;

variable labour costs can be reduced by setting up manufacturing in countries with relatively cheap labour;

Break-even point:

the number of products that will be made to recoup the set-up costs;

a proportion of the fixed costs will be recouped on each product;

after the break-even point the profits of the manufacturer will increase;

alternatively the manufacturer can drop the price to enhance the competitiveness of the product once fixed costs are covered;

the manufacturer determines the break-even point according to predicted sales;

[9 max]

5. (a) (i) *Award [1] for way in which aesthetic considerations have contributed to the design of the OMK chair and [1] for a brief explanation.*  
fashion colours;  
provides consumer choice;
- surface finish;  
high gloss/polished finish is attractive to consumers;
- holes;  
add to the distinctiveness of the chair;
- tubular metal frame;  
high-tech look/contemporary design; [2 max]
- (ii) *Award [1] for each of three distinct points in an explanation of the conflict that Rodney Kinsman would have faced when attempting to balance form and function in the design of the OMK chair.*  
the rule of design is that form should follow function, *i.e.* function of a product takes priority over the way that the product looks;  
there is a conflict between being lightweight and being sturdy enough;  
there is a conflict between trying to make it cheap but making it attractive to a wide market;  
ensuring the chair is appealing but there is a conflict between being stackable, suitable for individual use and being able to be clipped into rows;  
the curved shape of the seat is attractive but also assists with comfort for the user;  
the rectangular hole is a contrast to the round holes but also acts a handhold for lifting the chair; [3 max]
- (b) (i) *Award [1] for identifying one advantage of using steel to produce the seats and backs of the OMK chair and [1] for a brief explanation.*  
steel is a high strength material;  
it will be able to hold a person sitting on the chair during use;
- stiffness;  
steel is stiff enough to hold its shape when it is being used;
- easy to manufacture;  
in sheet or tube form;
- easy to join parts;  
by use of fusing techniques;
- steel is a durable material;  
will withstand abrasions from being stacked regularly;
- steel is a relatively cheap material/readily available;  
so cost-effective for manufacture; [2 max]



- (ii) *Award [1] for identifying one benefit of the perforations in the seat and back of the OMK chair and [1] for a brief explanation.*  
less material;  
less weight;
- aesthetics;  
the holes are a distinctive feature; **[2 max]**
- (c) (i) *Award [1] for identifying how the tubular steel for the frame of the OMK chair would be produced and [1] for a brief explanation.*  
extrusion;  
would produce a consistent and hollow cross-section required for the tubular steel frame for the chair/ the die will dictate the size/shape of the tube; **[2]**
- (ii) *Award [1] for each of three distinct correct points in an explanation of how consumers would evaluate the OMK chair before purchase, during initial use and in long-term use [3 max] per stage.*  
Before purchase:  
through advertisements and manufacturers specification;  
value for money by comparing price with product image;  
use of the Internet;  
evaluations by experts;  
aesthetics;
- During initial use:  
aesthetics;  
comfort;  
safety;  
stackability;  
functions well;
- In long-term use:  
durability;  
ease of maintenance;  
reliability; **[9 max]**

6. (a) (i) *Award [1] for identifying how robust design contributes to the development of a product family and [1] for a brief explanation.*  
a robust design is successful in the marketplace;  
it provides potential for development into a variety of products expanding the market; [2]
- (ii) *Award [1] for each distinct correct point in an explanation of one benefit to a manufacturer of developing a product family.*  
cost effectiveness;  
use of standard parts, e.g. wheels for the trolleys;  
same tooling so set-up costs reduced;  
same skill set so reduction in cost of training of staff;  
economies of scale in procurement of materials;  
shorter lead times to market; [3 max]
- (b) (i) *Award [1] for listing each of two correct benefits of using stainless steel to make the baskets for the shopping trolleys.*  
does not corrode;  
easy to keep clean;  
attractive;  
needs no surface finishing;  
low maintenance;  
strong/durable; [2 max]
- (ii) *Award [1] for identifying one reason why ductility is an important property of the material for the manufacture of the basket for the shopping trolley and [1] for a brief explanation.*  
ductility allows the material to be drawn/shaped into a wire;  
the wire is then cut into lengths to produce the basket; [2]

- (c) (i) *Award [1] for identifying one reason why a wire basket is a better design solution than a solid sheet for the shopping trolley and [1] for a brief explanation.*

the baskets are often out in the weather;  
rain water can drain from the basket;

easier to keep clean;  
can see if rubbish accumulates in the basket;

less material;  
cheaper;

**[2 max]**

- (ii) *Award [1] for each of three distinct points in a discussion of each of three ways in which robust design meets the principles of green design [3 max] per stage.*

efficiency in the use of materials, energy and other resources;  
minimal use of material and energy;  
no waste as excess material can be recycled;

ensuring that the planned life of the product is most appropriate in environmental terms and that the product functions efficiently for its full life;

the trolleys are simple designs;  
little can go wrong/repairs are straightforward;

analysing and minimizing potential safety hazards;  
the shopping trolleys are designed to be very safe;  
instructions are provided for users about the safe use, *e.g.* not allowing children to stand in the baskets;

in use the product causes no environmental damage (unless taken away from the store);

it is adaptable *e.g.* addition of the child seat;  
and stacks efficiently outside the store;

**[9 max]**