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Mark Scheme (Results)

June 2014

Pearson Edexcel GCSE
Design & Technology (5EP02/01)

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question Number	Answer	Mark
1	B	**(1)**
Question Number	Answer	Mark
2	D	**(1)**
Question Number	Answer	Mark
3	D	**(1)**
Question Number	Answer	Mark
4	A	**(1)**
Question Number	Answer	Mark
5	D	**(1)**
Question Number	Answer	Mark
6	A	**(1)**
Question Number	Answer	Mark
7	B	**(1)**
Question Number	Answer	Mark
8	D	**(1)**
Question Number	Answer	Mark
9	A	**(1)**
Question Number	Answer	Mark
10	C	**(1)**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Mark</th></tr>
<tr><td>11 (a)</td><td>
<table>
<tr><td>Variable resistor</td><td>To conrol/ restrict current by varying amounts/volume control/speed control/in dimmer switches/to adjust sensitivity/set voltage levels/create potential divider (1)</td></tr>
<tr><td>Piezo-electric sensor</td><td>To make sound/to detect pressure/vibrate/impact/to sense strain (1)

(Not movement)</td></tr>
<tr><td>Light dependant resister (LDR) (1)</td><td>For sensing light levels

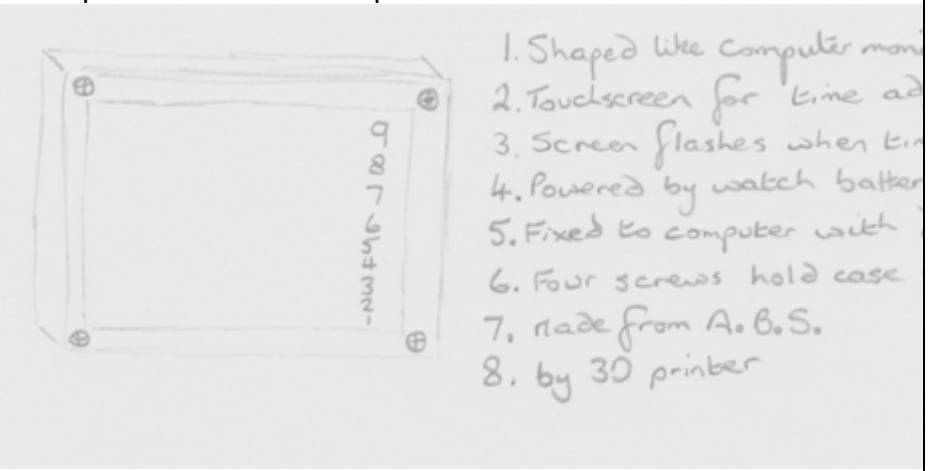
(Not a light sensor)</td></tr>
<tr><td>Ammeter (1)</td><td>To measure current</td></tr>
</table>
4 x 1</td><td>4</td></tr>
<tr><td>11(b)</td><td>A - Named switch;
Toggle/Key/Slide/SPST/Rocker/latching
[but not; push to make, push to break, rotary, tilt]
B – Thyristor
2 x 1</td><td>2</td></tr>
<tr><td>11(c)</td><td>Push to make/PTM (1)
1 x 1</td><td>1</td></tr>
<tr><td>11(d)</td><td>Turns on/sound/buzz/make a noise/ (1)
Stays on/latches/continues to sound/buzz/make a noise (1)
2 x 1</td><td>2</td></tr>
<tr><td>11(e)</td><td>• It shorts out/bypasses the thyristor (1) and resets the circuit/thyristor (1)
• It takes the voltage at the anode low/interrupts the flow of current to the anode (1) It turns off the buzzer (1)
[Accept mix & match as appropriate]
2 x 1</td><td>2</td></tr>
</table>

11(f)	Any **two** from: • Using fewer components (1) reduces costs (1) • Needs no driver/amplifier circuit (1) reducing size (1) • Smaller circuit (1) enables more compact product (1) • Less assembly required (1) enabling more rapid manufacture (1) • Can be PCB mounted (1) making circuit more robust (1) (Do not accept smaller or cheaper) **2 x 2**	**4**
11(g)	**Name:** Solar/rechargeable battery/geothermal/wind/biomass/mains (1) **Reason:** No pollution/no landfill/no CO2/no fossil fuels needed/don't need materials for new batteries/don't need to drive to get new batteries/no harmful waste from old batteries/ only needs light (1) *[power supply and reason must be linked]* **1 x 2**	**2**
11(h)	**One explanation from:** • Complex shapes can be easily produced (1) accurately (1) • Integral fixing components or holes (1) can be included in the moulding (1) • Highly automated process (1) reduces costs (1) • Fast process (1) suitable for high volume production (1) • Wall thickness can be varied easily (1) to optimise strength and weight (1) • High quality finish (1) so no finishing required (1) **2 x 1**	**2**

Question Number	Answer	Mark
12.	Candidates may answer any specification point in either graphical form or by annotation. **No marks are awarded for the quality of graphical communication.** • have a computer theme (1) : e.g. keyboard, monitor, mouse • be adjustable for different time periods (1) : e.g. rotary switch, slide switch, must be electronic • have a method of warning when time is up (1) : e.g. buzzer, flashing lights, audio/visual alarm • have a suitable power supply (1) : e.g. named battery, mains, nine v battery, USB to PC • be attachable to and removable from the computer (1) : e.g. clip, clamp, screws, Velcro, suction pad • have a method of accessing the circuit for maintenance (1) : e.g. screws, sliding panel, hinges • be made of a material suitable for a prototype (1) : e.g. acrylic, pine, brass • be made using process(es) suitable for prototype manufacture (1) : e.g. strip heating, PVA glue, soldering, not injection moulding *[Process must be appropriate to material]*	

Design idea 1

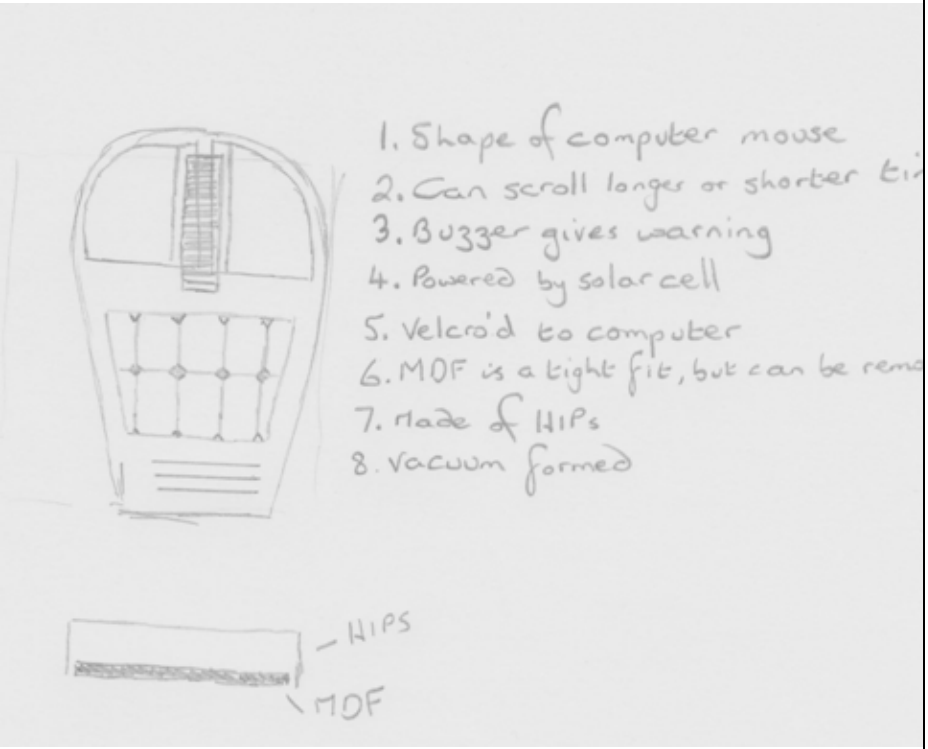
Example of candidate responses:



Design idea 2

Marks for design idea 2 can only be awarded where specification points are resolved differently than in design idea 1.

Example of candidate response:



16 x 1 **16**

Question Number	Answer	Mark
13(a)	Any **one** from: • It is rounded (1) so doesn't dig into the hand (1) • It's a suitable size/small (1) so is easy to hold (1) • The buttons are suitably positioned (1) so are easy to reach with fingers/thumb (1) **1 x 2**	**2**
Question Number	Answer	Mark
13(b)	Any **two** from: • Low power/current requirement (1) to extend battery life (1) • More energy efficient(1) so more environmentally friendly (1) • High resolution (1) so easy to read (1) • Thinner display (1) enables more compact product (1) • Colour display (1) is attractive/appealing (1) • Range of colours (1) can convey more information (1) Mix & match if appropriate **2 x 2**	**4**
Question Number	Answer	Mark
13(c)	Any **two** from: • Greater accuracy (1) means higher quality products (1) • Ease of repeatability (1) speeds up design modifications (1) • Ease of modification (1) enables changes to manufacture (1) • Electronic communication (1) allows workers across the world to work together (1) • Can manufacture directly (1) from CAD drawings (1) • Virtual testing (1) avoids destructive testing (1) • Constant quality (1) fewer rejects (1) • Less human error (1) So fewer mistakes (1) • Virtual 3D images (1) Enable better visualisaion (1) Mix and match if appropriate **2 x 2**	**4**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Mark</th></tr>
<tr><td>13. (d) QWC</td><td>Evaluation to address the following issues. Marks should be gained for reasoned & justified statements, not a simple check-list.
<table>
<tr><th>HIPS</th><th>Aluminium</th></tr>
<tr><td>Not as tough as aluminium, and may crack if dropped</td><td>More robust/durable than HIPS so less likely to crack</td></tr>
<tr><td>The handset will be lightweight and easier to hold</td><td>Aluminium is heavier than HIPS, so product is heavier to hold/feels like a better quality product.</td></tr>
<tr><td>Insulator so short-circuits are not possible.</td><td>Conductor, so short-circuits are possible.</td></tr>
<tr><td>Requires oil reserves for its production which are limited</td><td>Requires aluminium ore/bauxite for its production</td></tr>
<tr><td>Can be recycled</td><td>Can be recycled</td></tr>
<tr><td>Easily formed</td><td>Harder to form</td></tr>
<tr><td>Low cost</td><td>More expensive</td></tr>
<tr><td>Available in many colours</td><td>Required painting/anodising for colour</td></tr>
</table></td><td>(6)</td></tr>
</table>

Level	Mark	Descriptor
	0	No rewardable material
Level 1	1-2	Candidate identifies the area(s) of comparison with no development OR identifies and develops one area. Shows limited understanding of the comparison. Writing communicates ideas using everyday language but the response lacks clarity and organisation. The candidate spells, punctuates and uses the rules of grammar with limited accuracy.
Level 2	3-4	Candidate identifies some areas of comparison with associated developments showing some understanding of the comparison. Writing communicates ideas using D&T terms accurately and showing some direction and control in the organising of material. The candidate uses some of the rules of grammar appropriately and spells and punctuates with some accuracy, although some spelling errors may still be found.
Level 3	5-6	Candidate identifies a range of areas of comparison with associated developments showing a detailed understanding of the comparison. Writing communicates ideas effectively, using a range of appropriately selected D&T terms and organising information clearly and coherently. The candidate spells, punctuates and uses the rules of grammar with considerable accuracy.

Question Number	Answer	Mark
14(a)	Resistor/fixed resistor (1)	**1**
14(b)	• To change its resistance (1) by sensing a change in temperature (1) • It will change the current (1) when its gets hotter/colder (1) **2 x 1**	**2**
14(c)	• The voltage from the inverting/variable input (1) • Is compared to the non-inverting/fixed input (1) • And the difference is amplified (1) **3 x 1**	**3**
14(d)	The thermistor and fixed resistor/potential divider (1) are swapped over (1) To put an inverter (1) at the output of the op-amp (1) To swap (1) the inputs to the op-amp (1) **2 x 1**	**2**
14(e)	• The output/current of the op-amp is amplified/increased/made bigger (1) to give enough power to the lamp (1) • It acts as a switch (1) to turn on the bulb (1) • A small current at the base (1) enables a large current to flow from the collector to the emitter (1) **1 x 2**	**2**
14(f)	Answer of 36 (3) **OR** Rearranging formula to R=V/I (1) Identifying V as 9 **AND** I as 0.25 (1) Final answer of 36 (1) *[ecf maximum 2 marks]* **3 x 1**	**3**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Mark</th></tr>
<tr><td>14(g)

QWC</td><td>Discussion to address the following issues:

virtual modelling
<table>
<tr><th>Advantages</th><th>Disadvantages</th></tr>
<tr><td>• Details can be modified easily which means drawings can be completed quickly
• Work can be sent electronically which means it can be sent anywhere in the world
• Information can be uploaded to CAM machines so there is no delay from drawing to moulding
• Virtual models need no materials saving time/ costs/ materials
• Saving uses no space</td><td>• Workers may require retraining which is costly
• Hardware and software are expensive, reducing profits
• Programs can crash/ so data can be lost
• Power can be lost so hardware could be damaged
• Software is updated so new software needs to be purchased
• All users must have compatible software or data will not be read</td></tr>
</table></td><td></td></tr>
</table>

Level	Mark	Descriptor
	0	No rewardable material
Level 1	1-2	Candidate identifies the issues with no development OR identifies and develops one area. Shows limited understanding of the issues. Writing communicates ideas using everyday language but the response lacks clarity and organisation. The candidate spells, punctuates and uses the rules of grammar with limited accuracy.
Level 2	3-4	Candidate identifies some issues with associated developments showing some understanding of the issues. Writing communicates ideas using D&T terms accurately and showing some direction and control in the organising of material. The candidate uses some of the rules of grammar appropriately and spells and punctuates with some accuracy, although some spelling errors may still be found.

Level 3	5-6	Candidate identifies a range of issues with associated developments showing a detailed understanding of the issues. Writing communicates ideas effectively, using a range of appropriately selected D&T terms and organising information clearly and coherently. The candidate spells, punctuates and uses the rules of grammar with considerable accuracy.

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