edexcel
advancing learning, changing lives

Mark Scheme (Results)
Summer 2010

GCSE

GCSE Design and Technology: Systems and Control (1974)
Paper 2H
Higher Written Paper.

Edexcel Limited. Registered in England and Wales No. 4496750
Registered Office: One90 High Holborn, London WC1V 7BH

A PEARSON COMPANY

If you have any subject specific questions about the content of this Mark Scheme that require the help of a subject specialist, you may find our Ask The Expert email service helpful.

Ask The Expert can be accessed online at the following link:

http://www.edexcel.com/Aboutus/contact-us/

Summer 2010

Publications Code.

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.

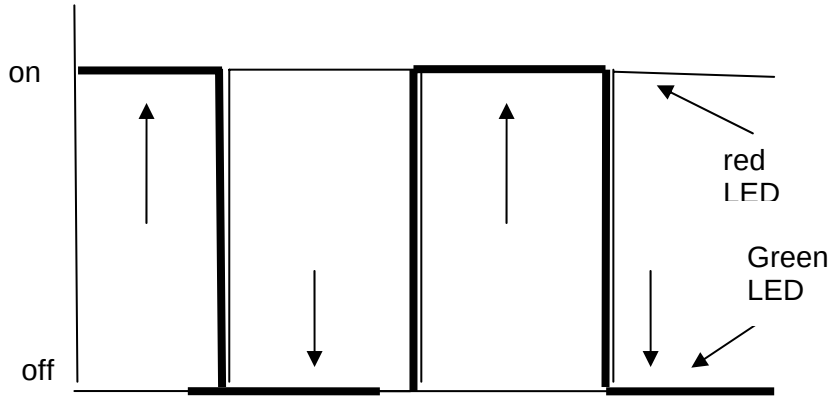
Higher tier

Question Number	Answer	Mark
1(a)	For each point, give **one** reason why it should be included.	
1(a)(i)	**Quality** **Point:** It must be reliable/accurate/durable/robust/look good/feel good (1) **Reason:** So customers will purchase/tell friends/won't complain/don't break (1) (2x1)	**(2)**
1(a)(ii)	**Environment** **Point:** There must be low energy requirements/minimal wrapping/no harmful chemicals in the batteries/recyclable/solar cells/rechargeable batteries/'environmental' materials/minimal manufacturing waste (1) **Reason:** Will create less environmental/waste damage/less landfill tax/green credentials lead to increased sales(1) (2x1)	**(2)**
1(a)(iii)	**Safety** **Point:** No sharp edges/toxic paints/removable or swallowable parts(1) **Reason:** Will avoid injury to users/children/other household members(1) (2x1)	**(2)**
Question Number	Answer	Mark
1(b)	Any **two** from: • Can be read in the dark • easily viewed • digits are clear • universally understood • easy to integrate with circuit • can switch between different functions • Low power consumption (2X1)	**(2)**

Question Number	Answer	Mark
1(c)	Any **two** from: • rapid process • suitable for volume (mass) production, • little finishing required • products are identical/accurate • small workforce required • complex shapes possible • low-cost process once setup costs are recouped • low/recyclable waste (2X1)	**(2)**
Question Number	Answer	Mark
1(d)	Any **one** from: • easy to apply (1) so manufacturing is easier (1) • strong/permanent fixing method(1) so timer won't come apart(1) • dries quickly(1) making manufacturing faster(1) • doesn't need to be clamped(1) so manufacture is easier(1) • appropriate adhesive (1) for this material (1) • no screws (1) so fewer parts (1) mix and match if linked (2X1)	**(2)**
Question Number	Answer	Mark
1(e)	Any **two** from: • easily formed(1) so makes manufacturing easier(1) • **good** conductivity/low resistance(1) so electricity flows easily(1) • hardwearing(1) so won't wear quickly(1) • doesn't rust/oxidise(1) so will last for a long time(1) mix and match if linked (2X1) (2X1)	**(4)**

Question Number	Answer	Mark
1(f)	Any **one** of; • so they don't sell faulty batteries(1) which would lose customers(1) • to make sure production line is working effectively(1) so all batteries produced work properly(1) • if there are any problems(1) they will be fixed rapidly(1) • so they know what the batteries performance is(1) so they can tell their customers(1) • not enough time/manpower to check every one (1) so they are checked at intervals (1). (2x1)	**(2)**
Question Number	Answer	Mark
1(g) (i)	Any two from: • There are control buttons/switches(1) which are easy to read/operate/clearly labelled (1) • Well spaced (1) to avoid pressing wrong ones (1) (2X1)	**(2)**
1(g) (ii)	• the display is large(1) so it will be easy to read(1) • the display is digital (1) which is very clear (1) mix and match if linked (2X1)	**(2)**
	Total for Question 1	**22 marks**

Question Number	Answer	Mark
2(a)	• Limit current/voltage • Protect LED (2X1)	**(2)**

Question Number	Answer	Mark
2(b)	 Give **one** mark for the trace being **high** in the correct places, and a second for being **low** in the correct places. (2x1)	**(2)**

Question Number	Answer	Mark
2(c) (i)	*Any two from:* • R_1 • R_2 • C_1/capacitor (2X1)	**(2)**
(ii)	*Any one from:* Replace R2 (1) with a variable resistor (1) Replace C1 (1) with a variable capacitor (1) (2X1)	**(2)**

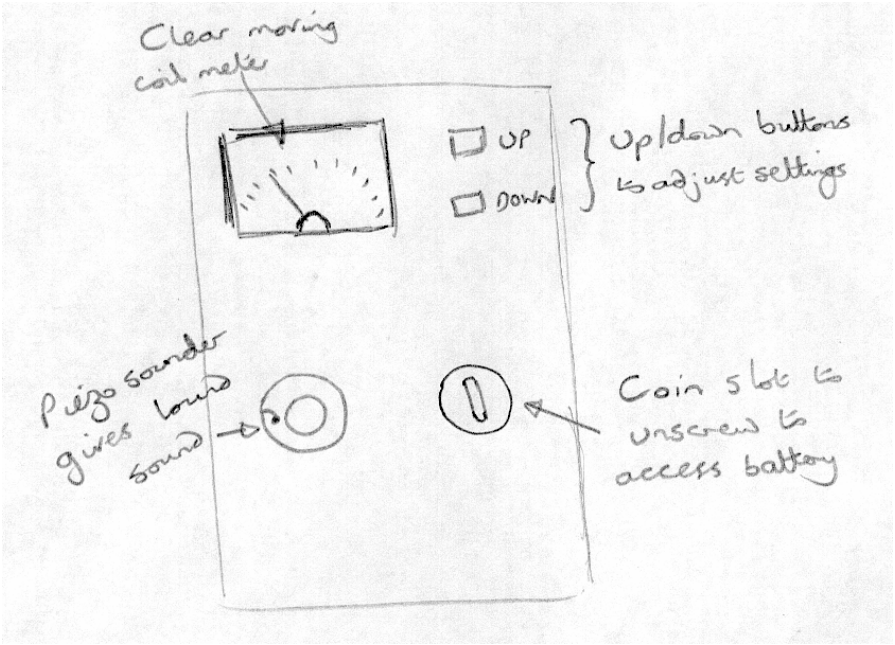
Question Number	Answer	Mark
2(d) (i)	• Pick and Place • Populating the circuit board (1X1)	**(1)**

Question Number	Answer	Mark
(ii)	The components are placed (1) by robots/automatically/by machine (1) (2X1)	**(2)**

Question Number	Answer	Mark
(iii)	*Any two from:* • Predictable outcomes • Consistency • No adjustments required • Parts will always fit • Less QC required • Better QA. • Cheaper to buy in bulk • Interchangability • Readily available (2x1)	**(2)**
Question Number	Answer	Mark
2(e)	Computer Integrated Manufacture (only acceptable answer) (1X1)	**(1)**
Question Number	Answer	Mark
2(f)	Award up to **four** marks for pairs of points from the following list: Greater accuracy/fewer mistakes(1) so fewer faulty products(1) Faster assembly(1) so greater profits(1) No need for breaks(1) so more products made(1) Reduced wage costs(1) so higher profits(1) Can work in hot/cold/polluted environments(1) which are unhealthy for workers(1) Don't go on strike/breaks/holidays(1) so production never stops(1) Mix and match if linked (4X1)	**(4)**
Question Number	Answer	Mark
2(g) **(i)**	Any **one** from: The circuit could be simulated on a computer **(1)** to test if it will work properly **(1)** The circuit could be connected to a computer **(1)** which would test which outputs are generated for given inputs **(1)** (2X1)	**(2)**

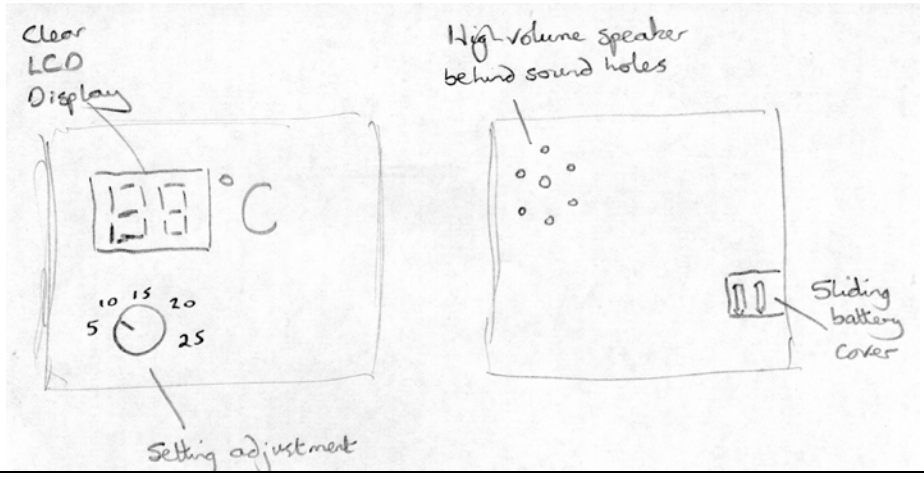
Question Number	Answer	Mark
(ii)	*Any two from:* • Payroll • stock control • word processing • DTP • accounting • e-mail • product testing • Internet Do not accept CAD/CAM (2x1)	**(2)**
	Total for Question 2	**22 marks**

Question Number	Answer	Mark
3(a)	A company is designing an electronic greenhouse thermometer. The specification for the thermometer is that is must: • Have an electronic display that can be easily read • Allow a sound output to attract attention • Have easy access to change the battery • Have a means of adjusting the temperature setting In the space below use notes and sketches to show **two** different ideas for the design of a calculator which meets this specification. Design Idea 1 Each point of the specification has two marking points. 1 mark should be awarded for evidence of each point of specification resolved in the design. For each specification point with both elements visually satisfied **2** marks For each specification point with only one element visually satisfied **1** mark Where an answer does not viably answer a specification point **0** marks Candidates may answer any specification point in either graphical form or by annotation. **No marks are awarded for quality of communication.** **Have an electronic display (1)** The drawing /annotation clearly refers to an appropriate electronic display. **That can be easily read (1)** Candidate has indicated how display can be read. *Allow a sound output (1)* Candidate makes reference to a speaker/sounder/buzzer *To attract attention* **(1)** there is clear reference to how the sounds escapes from the enclosure, or the volume of the sound. *Have easy access (1*) The drawing or annotation make clear reference to how the casing opens. *To change the battery* **(1)** Clear reference is made to changing the battery/ies. *Have a means of adjusting(1)* One mark for clear adjustment device *The temperature setting(1)* Some form of indicating the desired temperature. (8X1)	**(8)**



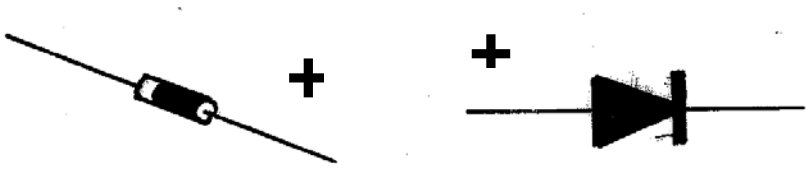
Design Idea 2.
To score a mark for Design Idea 2, each specification point must be resolved**, but the second design idea must be technically /conceptually different in design and construction from the first** and not a simple variation on a theme to be awarded the mark.
Use exactly the same criteria as Design Idea 1 to mark Design Idea 2.

(8X1)



(8)

3(b)	*THREE of the specification points are given again below.* *Use these points to explain how one of your designs meets the initial specification.* • **Have an electronic display that can be easily read** • **Have easy access to change the battery** • **Have a means of adjusting the temperature setting.**	
(i)	**Have an electronic display that can be easily read.** Give one mark for reference to an electronic display that relates to their drawing/annotation, and a second mark for reference to being easy to read that relates to their drawing/annotation. (2x1)	**(2)**
(ii)	**Have easy access to change the battery.** Give one mark for reference to accessing the battery, and a second mark for reference to changing the battery. (2X1)	**(2)**
(iii)	**Have a means of adjusting the temperature setting.** Give one mark for reference to the temperature setting, and a second mark for reference to adjusting the range. (2X1)	**(2)**
	Total for Question 3	**22 marks**

Question Number	Answer	Mark
4(a)	Push-to-make/PTM (1X1)	**(1)**
(b) (i)	It will make the counter **count** up. (It will NOT turn the circuit or the display on & off). (1X1)	**(1)**
(b) (ii)	It will **reset** the counter/circuit/display (1X1)	**(1)**
(c) (i)	5 (1X1)	**(1)**
(c) (ii)	0 (1X1)	**(1)**
(d)	0.5mA, 1/2mA, 5 X 10-4A. Award one mark for the correct value, a second mark for stating the units as A or mA. (2x1)	**(2)**
(e)	 (2X1)	**(2)**
(f)	*Any two from:* • Low power requirements • Easy to read • Economical • Can be driven by a driver IC • Compact • Readily available (2X1)	**(2)**
(g)	*Any two from:* Customer confidence (1) will lead to greater sales(1) Showing certification(1) will enable sales across Europe(1) The testing(1) will prove the product is of high quality(1) Meeting standards (1) should minimise legal action (1) (2X1) (2X1)	**(4)**

(h)	*Any two from:* New packaging (1) will make the product look new/modern (1) Shops will buy more (1) to maximise their sales (1) Customers will want(1) the latest model(1) The manufacturer can reduce costs(1) by using cheaper materials/production methods(1) Manufacturers can increase sales (1) by adding new features (1) Products can be developed (1) to keep ahead of the competition (1) (2X1) (2X1)	**(4)**
(i)	*Any one from:* Increased production (1) will require more raw materials (1) Greater sales (1) will require more resources/transport (1) Customers will throw away their old one (1) creating waste problems (1) (2X1)	**(2)**
(j)	Any **one** from: • Have the writing in different languages • Have colours/logos/graphics that appeal to different nationalities *NB Award marks whether the candidate refers to the product or to its packaging.* (1X1)	**(1)**
	Total Marks	**22**
	Total for paper	**88**

Further copies of this publication are available from
Edexcel Publications, Adamsway, Mansfield, Notts, NG18 4FN

Telephone 01623 467467
Fax 01623 450481

Email publications@linneydirect.com

Order Code Summer 2010

For more information on Edexcel qualifications, please visit www.edexcel.com/quals

Edexcel Limited. Registered in England and Wales no.4496750
Registered Office: One90 High Holborn, London, WC1V 7BH