

Mark Scheme Summer 2009

GCSE

GCSE Design & Technology (1974/3974)

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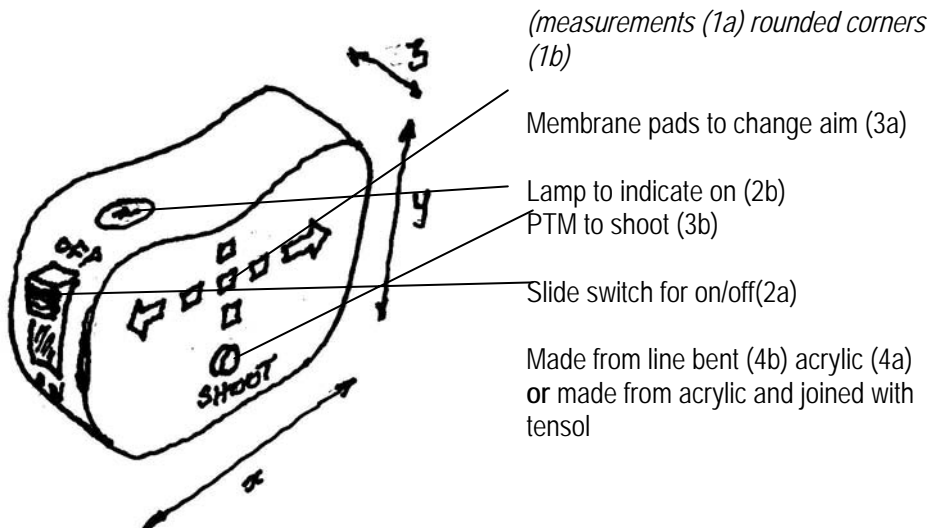
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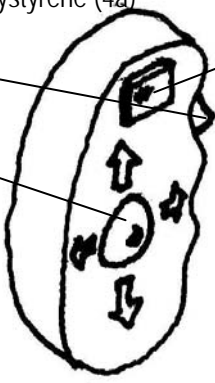
Question Number	Answer	Mark
Q01(a)(i)	<p>Name: LED / Light emitting diode Use: Illuminator/illumination / indicator/indication / shows signal / lights up / shows something is on/off</p> <p>Name: Side cutters / nippers / wire cutters / snips Use: cuts/trims/snips/crop wire/component legs</p> <p>Name: Relay / magnetic switch / interface Use: Electronic process / interface component / separates circuits/power sources /switches / electro-mechanical switch</p> <p>Name: Soldering iron Use: To solder / soldering / joining / tinning / melting solder</p> <p>Name: Light/UV/Ultra Violet/exposure box Use: To make PCB / PCB manufacture / expose PCB/board / print track pattern on PCB / transfer track on PCB</p> <p style="text-align: right;">(10 x 1)</p>	(10)
Q01(b)	<p>Two reasons given:</p> <ul style="list-style-type: none"> • Easy to use/form (1) • Inexpensive/Cheap (1) • Low danger (1) • Quick (1) • Easy to adapt (1) • Make hollow products/cases (1) • Suitable for volume production (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q01(c)(i)	<p>One way given</p> <ul style="list-style-type: none"> • Circuits may be designed (1) • Circuit can be tested/prototyped/modelled (1) • Moulds may be designed (1) • Cases may be designed (1) • CAD could be linked to CAM (1) <p style="text-align: right;">(1 x 1)</p>	(1)
Q01(c)(ii)	<p>One way described</p> <ul style="list-style-type: none"> • Tracks (1) can be milled (1) • Moulds (1) can be made (1) • Case parts/holes (1) can be shaped / cut out(1) <p><i>Do not accept 'pick and place.'</i></p> <p style="text-align: right;">(2 x 1)</p>	(2)
Q01(d) (i)	<ul style="list-style-type: none"> • One-off (1) <p><i>(only acceptable answer)</i></p> <p style="text-align: right;">(1 x 1)</p>	(1)
Q01(d)(ii)	<ul style="list-style-type: none"> • Batch (1) <p><i>(only acceptable answer)</i></p> <p style="text-align: right;">(1 x 1)</p>	(1)

Q01(d) (iii)	<ul style="list-style-type: none"> High volume (1) <p><i>(only acceptable answer)</i></p> <p style="text-align: right;">(1 x 1)</p>	(1)
Q01(e)	<p>Two reasons given:</p> <ul style="list-style-type: none"> Fast (1) Accurate (1) Repeatable (1) saves on manpower/wages (1) works 24/7 (1) works in hostile environment (1) easily reprogrammed / edited (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q01(f)	<p>One task described:</p> <ul style="list-style-type: none"> It identifies/reads the item quantity (1) and deducts it from stock(1). It reads the item price code(1) and displays this on screen(1). It receives money(1) and calculates change(1). Prints receipt (1) as proof of sale /guarantee (1) Collects data (1) for market research(1) Records sales (1) for automatic reordering (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Total for question		22

Question Number	Answer	Mark
Q02(a)(i)	<p>Four terms named:</p> <ul style="list-style-type: none"> • D1 - LED / Light Emitting Diode • C1 - Capacitor • VR1 - Variable resistor / potentiometer • R3 - LDR / Light Dependent Resistor <p><i>(only acceptable answers)</i></p>	(4)
Q02(a)(ii)	<p>The action stated: It lights / comes on / activates.</p>	(1)
Q02(a)(iii)	<p>One reason given</p> <ul style="list-style-type: none"> • Protects it/the circuit/the transistor (1) • Limits/controls the current (1) 	(1)
Q02(a)(iv)	<p>One reason given</p> <ul style="list-style-type: none"> • Change voltage on transistor base (1) • Change switch-on voltage/potential (1) • Changes the sensitivity of the circuit (1) • Adjusts the "turn on" light level (1) 	(1)
Q02(a)(v)	<p>One reason given</p> <ul style="list-style-type: none"> • To switch it/the circuit on/off (1) • To save battery power (1) • Disconnect/interrupt power supply (1) 	(1)
Q02(a)(vi)	<ul style="list-style-type: none"> • SPST <p><i>(Only acceptable answer)</i></p>	(1)
Q02(b)	<p>The voltage calculated</p> <p>3 (1) / Volts (1) 3000 (1) / mVolts (1)</p> <p>Accept V or Volts as interchangeable</p> <p>NB 3mVolts - 1 mark, 3000 Volts - 1 mark</p>	(2)

Q02(c)(i)	<p>Three ways given:</p> <ul style="list-style-type: none"> • Saves money on wages/fewer workers (1) • There is less waste (1) • Products sold cheaper/savings passed onto customer (1) • Products readily available (1) • Factories do not need lighting/heating (1) <p><i>(Answers must relate to being made in quantity cheaply.) Do not accept faster/quicker.</i></p> <p style="text-align: right;">(3 x 1)</p>	(3)
Q02(c)(ii)	<p>Two disadvantages given:</p> <ul style="list-style-type: none"> • There are fewer jobs (1) • Higher/more unemployment (1) • Loss of skills (1) • Retraining needed (1) • Workers may need to move to find work (1) • Areas become poorer (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q02(d)	<p>Two advantages given:</p> <ul style="list-style-type: none"> • Safe to use / little risk of injury (1) • Hazards/risks have been overcome (1) • Product can be bought/used with confidence / give consumers confidence (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q02(e)	<p>One way described:</p> <ul style="list-style-type: none"> • Expensive electronic components can be removed/unsoldered (1) and used in other circuits (1) . • Rechargeable batteries / SIM cards(1) can be used in other phones (1). • Plastic cases can be ground/re-melted down (1) and re-used for another plastic product (1). • Metals (1) can be recycled (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q02(f)	<p>One way described:</p> <ul style="list-style-type: none"> • A solar panel / fan / wind-up mechanism (1) could drive a rechargeable battery (1) • They should avoid (1) batteries which contain hazardous materials/chemicals (1) • A rechargeable battery (1) is recharged rather than thrown away / doesn't have to be replaced / fewer made (1) • Long-lasting battery (1) requires less frequent charging (1) • Recycled batteries (1) which will reduce landfill/ land contamination (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Total for question		22

Question Number	Answer	Mark
Q03 (a)	<p>DESIGN IDEA 1</p> <p>No marks are awarded for quality of communication.</p> <p>Specification point 1 Be comfortable in the hand</p> <ul style="list-style-type: none"> evidence to indicate that it will fit into the hand E.g. measurements / scale / finger holds (1) evidence to show it is comfortable E.g. rounded edges / pistol grip / general shape (1) <p>Specification point 2 Switch on and have a visual indication that it is on</p> <ul style="list-style-type: none"> evidence to indicate that it will switch on E.g. any type of latching switch / rocker / lever / toggle / slide (1) evidence to show that it has a visual indication that it is on E.g. Bulb / lamp / LED / 7 segment display (1) <p>Specification point 3 Have a way of changing the aim for the kick and kicking the ball</p> <ul style="list-style-type: none"> evidence to indicate that the aim can be changed E.g. Rotary switch / slide switch / joystick / roller ball / touch pad (1) evidence to indicate that it can kick the ball E.g. Trigger switch / push switch / PTM / toggle switch / button (1) <p>Specification point 4 Be made from materials and processes suitable for one-off production</p> <ul style="list-style-type: none"> evidence to indicate that the material is suitable for one-off production (1) E.g. specific material named evidence to indicate that the process is suitable for one-off production (1) E.g. specific process named <p>Possible graphical solutions:</p>  <p>(8)</p>	

<p>Q03 (a)</p>	<p>DESIGN IDEA 2</p> <p>Made from vacuum formed (4b) polystyrene (4a)</p>  <p>A trigger to shoot pad (3b)</p> <p>Roller ball to aim(3a)</p> <p>Finger grips (1a) and shape (1b)</p> <p>Toggle switch with LED backlight (2a & b)</p> <p>To score a mark for Design Idea 2, each specification point must be resolved again in the second design idea 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 score the mark.</p> <p>Use exactly the same criteria as design idea 1 to mark design idea 2.</p> <p>A different method to indicate it will fit in the hand (1) A different method to show how it is comfortable (1) A different method to indicate that it can be switched on (1) A different method to show that it has a visual indication that it is on (1) A different method to indicate that the aim can be changed (1) A different method to indicate a means of kicking the ball (1) A different material (1) A different process (1)</p>	<p>(8)</p>
<p>Q03(b)(i)</p>	<p>Positive or negative reasons relating to:</p> <ul style="list-style-type: none"> switching on (1) visual indication(1) <p><i>E.g. The slide switch is difficult to get to and the ultra bright LED may be too bright and put the player off.</i></p> <p>(2 x 1)</p>	<p>(2)</p>
<p>Q03(b)(ii)</p>	<p>Positive or negative reasons relating to:</p> <ul style="list-style-type: none"> Method of changing the aim(1) Method of taking the kick(1) <p><i>E.g. The joystick is a common way of moving things in games and the trigger is in easy reach of fingers.</i></p> <p>(2 x 1)</p>	<p>(2)</p>
<p>Q03(b)(iii)</p>	<p>Positive or negative reasons relating to:</p> <ul style="list-style-type: none"> Materials(1) Processes(1) <p><i>E.g. Acrylic is rigid and will not bend in the hand but is difficult to bend very accurately.</i></p> <p>(2 x 1)</p>	<p>(2)</p>
<p>Total for question</p>		<p>22</p>

Question Number	Answer	Mark
Q04 (a)	<p>Three each of the following, one under each heading: Specification points Reasons (i) The needs of the user</p> <ul style="list-style-type: none"> • Point: It must have a light sensing unit • Reason: to save electricity/switch off during the day • Point: It must have a motion detector • Reason: To switch on the light for people • Point: It must have some form of mounting device • Reason: So it is easily fixed/will stay fixed to a wall. • Point: Easy to install • Reason: No mains electricity <p style="text-align: right;">(2 x 1)</p>	(2)
	<p>(ii) Environmental considerations</p> <ul style="list-style-type: none"> • Point: It must be made from recyclable materials • Reason: To conserve the earth's resources • Point: It must have solar panels • Reason: To charge the batteries • Point: It must have a timer • Reason: To switch the light off after people/animals have gone / to save energy • Point: Minimum materials used • Reason: Resource conservation • Point: Made from recycled materials / Possible to be recycled • Reason: Resource conservation / waste minimisation • Point: The manufacture / disposal of the model should not cause pollution • Reason: Protection of the environment <p style="text-align: right;">(2 x 1)</p>	(2)

	<p>(iii) Quality</p> <ul style="list-style-type: none"> • Point: The battery must stay charged for a long time • Reason: So the light can be used all night • Point: The battery must be rechargeable • Reason: Save money on replacements • Point: It must be robust • Reason: does not break with normal use • Point: detection covers must not become opaque • Reason: reduction in efficiency • Point: Waterproof seals • Reason: so there is no water ingress • Point: Durable materials / finish • Reason: so it lasts a long time <p style="text-align: right;">(2 x 1)</p> <p><i>Some flexibility should be given as some points may cross over descriptions but the same answer can not be given more than once.</i></p>	(2)
Q04(b)	<p>Two reasons given:</p> <ul style="list-style-type: none"> • Relatively cheap (1) • Readily available (1) • Resistant to wear (1) • Able to be coloured/painted/dip-coated (1) • Joined/machined easily (1) • Tough / hard (1) • Can be recycled (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q04(c)	<p>Two reasons given:</p> <ul style="list-style-type: none"> • Complex shape (1) • Inexpensive when made in bulk (1) • Speed of production (1) • Repeatability/ identical (1) • little waste (1) • can be computer controlled (1) • good surface finish / self finishing(1) • no additional surface finishing required(1) • many can be made in one mould(1) • colours can be changed(1) • unit costs are low once mould has been paid for(1) • high tolerance / very accurate(1) • suitable for mass / high volume production (1) <p><i>(Do not accept 'cheap' or 'quick' without qualification)</i></p> <p style="text-align: right;">(2 x 1)</p>	(2)

Q04(d)	<p>Two properties given with two reasons:</p> <p>Property: Good conductor of electricity Reason: small power loss / current can flow</p> <p>Property: is malleable Reason: shape is easy to produce/ can bend without breaking/ flexible</p> <p>Property: non-magnetic Reason: will not affect magnetically sensitive devices</p> <p>Property: good resistance to corrosion Reason: long life</p> <p>Property: ductile Reason: drawn into thin wires</p> <p>Property: easily soldered Reason: connection can be easily made</p> <p style="text-align: right;">(2 x 1) (2 x 1)</p>	(4)
Q04(e)	<p>Two <i>electronic</i> quality control checks named:</p> <ul style="list-style-type: none"> • Solar panels charge batteries correctly • Motion detector works within a specified range • Timing circuit switches light off / testing complete circuit • Ultra-bright LED cluster is sufficiently bright • Batteries stay charged for specified time • Light sensor switches at correct level • Continuity/connections between components/systems • Water testing • Temperature testing <p style="text-align: right;">(2 x 1)</p>	(2)
Q04(f)	<p>One way described:</p> <ul style="list-style-type: none"> • The simple shape (1) of cover can be formed in a single/simple mould(1) • The slope of the sides / no undercuts/indents(1) means that the mould can slip out(1) • Shallow depth / low profile (1) means that there will be no thinning of material/webs(1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q04(g)(i)	<p>One way explained:</p> <ul style="list-style-type: none"> • Ultra bright LEDs are powerful (1) and as they are clustered they are even brighter (1). • The shape of the light lens (1) makes the light spread out(1). • Could be mounted high up (1) so lighting a wide area (1). <p style="text-align: right;">(2 x 1)</p>	(2)

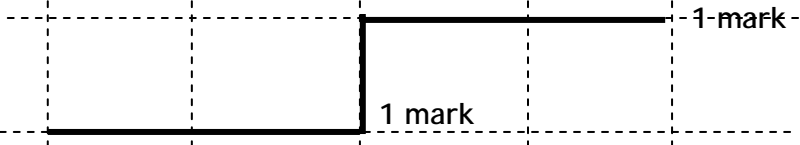
Q04(g)(ii)	<p>One way explained:</p> <ul style="list-style-type: none"> • The solar panels collect energy from the sun (1) which is used to charge the batteries(1). • The batteries are recharged during the day (1) which allows the light to shine at night(1). • Light given by the LED cluster (1) which is a low volt/current device/component(1). <p style="text-align: right;">(2 x 1)</p>	(2)
	Total for question	22
	Total for paper	88

Question Number	Answer	Mark
Q01a(i)	<p>Three each of the following, one under each heading: Specification points Reasons (i) The needs of the user</p> <ul style="list-style-type: none"> • Point: It must have a light sensing unit • Reason: to save electricity/switch off during the day • Point: It must have a motion detector • Reason: To switch on the light for people • Point: It must have some form of mounting device • Reason: So it is easily fixed/will stay fixed to a wall. • Point: Easy to install • Reason: No mains electricity <p style="text-align: right;">(2 x 1) (2 x 1)</p>	(2)
Q01a(ii)	<p>(ii) Environmental considerations</p> <ul style="list-style-type: none"> • Point: It must be made from recyclable materials • Reason: To conserve the earth's resources • Point: It must have solar panels • Reason: To charge the batteries • Point: It must have a timer • Reason: To switch the light off after people/animals have gone / to save energy • Point: Minimum materials used • Reason: Resource conservation • Point: Made from recycled materials / Possible to be recycled • Reason: Resource conservation / waste minimisation • Point: The manufacture / disposal of the model should not cause pollution • Reason: Protection of the environment <p style="text-align: right;">(2 x 1)</p>	(2)

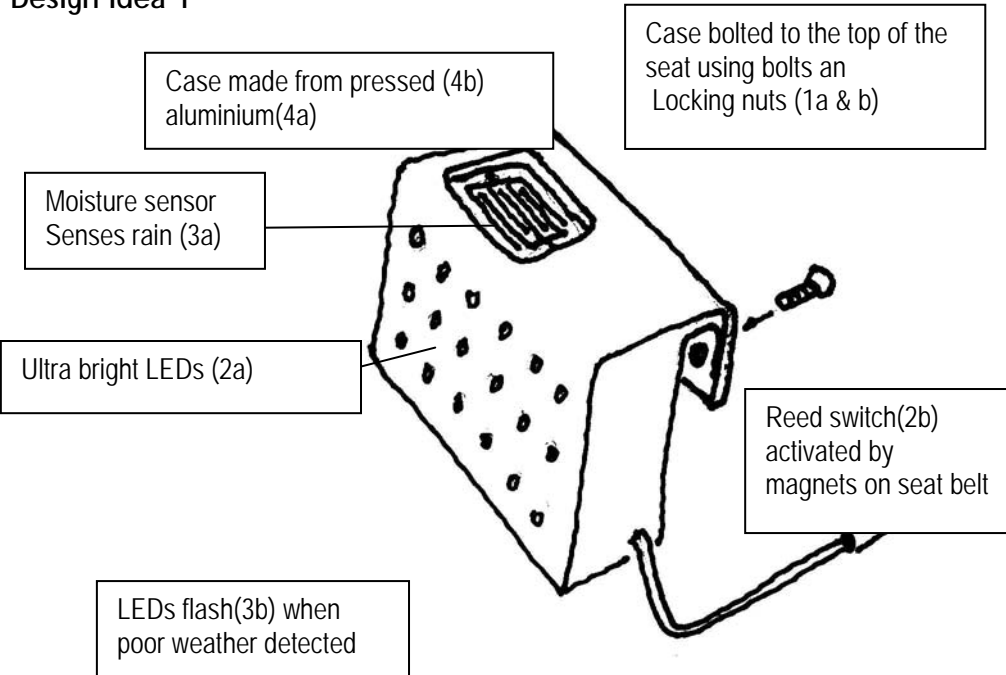
Q01a(iii)	<p>(iii) Quality</p> <ul style="list-style-type: none"> • Point: The battery must stay charged for a long time • Reason: So the light can be used all night • Point: The battery must be rechargeable • Reason: Save money on replacements • Point: It must be robust • Reason: does not break with normal use • Point: detection covers must not become opaque • Reason: reduction in efficiency • Point: Waterproof seals • Reason: so there is no water ingress • Point: Durable materials / finish • Reason: so it lasts a long time <p><i>Some flexibility should be given as some points may cross over descriptions.</i></p> <p style="text-align: right;">(2 x 1)</p>	(2)
Q01(b)	<p>Two reasons given:</p> <ul style="list-style-type: none"> • Relatively cheap (1) • Readily available (1) • Resistant to wear (1) • Able to be coloured/painted/dip-coated (1) • Joined/machined easily (1) • Tough / hard (1) • Can be recycled (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q01(c)	<p>Two reasons given:</p> <ul style="list-style-type: none"> • Complex shape (1) • Inexpensive when made in bulk (1) • Speed of production (1) • Repeatability/ identical (1) • little waste (1) • can be computer controlled (1) • good surface finish / self finishing(1) • no additional surface finishing required(1) • many can be made in one mould(1) • colours can be changed(1) • unit costs are low once mould has been paid for(1) • high tolerance / very accurate(1) • suitable for mass / high volume production (1) <p><i>(Do not accept 'cheap' or 'quick' without qualification)</i></p> <p style="text-align: right;">(2 x 1)</p>	(2)

Q01(d)	<p>Two properties given with two reasons:</p> <p>Property: Good conductor of electricity Reason: small power loss / current can flow</p> <p>Property: is malleable Reason: shape is easy to produce/ can bend without breaking/ flexible</p> <p>Property: non-magnetic Reason: will not affect magnetically sensitive devices</p> <p>Property: good resistance to corrosion Reason: long life</p> <p>Property: ductile Reason: drawn into thin wires</p> <p>Property: easily soldered Reason: connection can be easily made</p> <p style="text-align: right;">(2 x 1) (2 x 1)</p>	(4)
Q01(e)	<p>Two <i>electronic</i> quality control checks named:</p> <ul style="list-style-type: none"> • Solar panels charge batteries correctly • Motion detector works within a specified range • Timing circuit switches light off / testing complete circuit • Ultra-bright LED cluster is sufficiently bright • Batteries stay charged for specified time • Light sensor switches at correct level • Continuity/connections between components/systems • Water testing • Temperature testing <p style="text-align: right;">(2 x 1)</p>	(2)
Q01(f)	<p>One way described:</p> <ul style="list-style-type: none"> • The simple shape (1) of cover can be formed in a single/simple mould(1) • The slope of the sides / no undercuts/indents(1) means that the mould can slip out(1) • Shallow depth / low profile (1) means that there will be no thinning of material/webs(1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q01(g)(i)	<p>One way explained:</p> <ul style="list-style-type: none"> • Ultra bright LEDs are powerful (1) and as they are clustered they are even brighter (1). • The shape of the light lens (1) makes the light spread out(1). • Could be mounted high up (1) so lighting a wide area (1). <p style="text-align: right;">(2 x 1)</p>	(2)

Q01(g)(ii)	<p>One way explained:</p> <ul style="list-style-type: none"> • The solar panels collect energy from the sun (1) which is used to charge the batteries(1). • The batteries are recharged during the day (1) which allows the light to shine at night(1). • Light given by the LED cluster (1) which is a low volt/current device/component(1). <p style="text-align: right;">(2 x 1)</p>	(2)
Total for question		22

Question Number	Answer	Mark															
Q02(a)(i)	<p>The two lines completed 1 mark for each line.</p> <table border="1"> <thead> <tr> <th>Input A</th> <th>Input B</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> </tr> </tbody> </table> <p><i>(Only acceptable answer)</i></p>	Input A	Input B	Output	0	0	1	0	1	0	1	0	0	1	1	0	(2)
Input A	Input B	Output															
0	0	1															
0	1	0															
1	0	0															
1	1	0															
Q02(a)(ii)		(2)															
Q02(b)(i)	<ul style="list-style-type: none"> • Resistor • Variable resistor /pre-set potentiometer / potentiometer • Capacitor <p><i>Only acceptable answers</i> <i>Allow in any order</i></p>	(3)															
Q02(b)(ii)	<p>One adjustment described:</p> <ul style="list-style-type: none"> • By changing (1)the resistance of VR1(1). • Vary/change (1)the resistor[R1]/capacitor [C1]. (1) 	(2)															
Q02(c)	<p>One way described:</p> <ul style="list-style-type: none"> • Stored computer components may be retrieved (1)to build model circuits(1) • A built model circuit can be tested (1)for correct current flow/voltage drop/conditions / simulations(1) • Track layout can be designed(1) using auto-routing (1) • Work can be stored (1) and retrieved/easily communicated (1) • Existing circuits (1) can be easily adapted(1) • Silk screens/component masks (1) are easily generated (1) • Component lists generated (1) for costing(1) • 3D circuit models generated (1) for export to other design packages(1) <p><i>Some well known PCB Design Programs: PCB Wizard; Pro PCB; Crocodile Clips; Pulsonix; PCB 123; Express PCB; WinCAD PCB; Circuit creator.</i></p>	(2)															

Q02(d)	<p>Three reasons given:</p> <ul style="list-style-type: none"> • See that it works / is reliable / meets specification(1) • Saves money/components if circuit incorrect (1) • Saves time if circuit incorrect (1) • Check to see if circuit fits case (1) • Check to see it will join on to external peripherals (1) • Market testing (1) <p style="text-align: right;">(3 x 1)</p>	(3)
Q02(e)	<p>One way described:</p> <ul style="list-style-type: none"> • The circuit layout can be produced using CAD (1)and used every time(1). • A CAM machine/pick and place can be programmed(1) to make/assemble identical circuits(1). • Computer controlled machines (1) to test continuity / components(1) • Wave/float soldering (1) ensures consistent manufacture (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q02(f)	<p>Two reasons given:</p> <ul style="list-style-type: none"> • Quicker than manual testing • Reliable • Cuts down on wages/workforce • Repeatable • Works without breaks / 24/7 • More than one component can be tested at the same time • Works without lights/heating • Ability to store and run different test programmes <p style="text-align: right;">(2 x 1)</p>	(2)
Q02(g)	<p>One way described:</p> <ul style="list-style-type: none"> • An attachment (1) may be sent with an email(1). • A file may be posted on the internet (1) and downloaded by the manufacturer(1). • A company intranet system (1) with their own links(1) may be used. <p style="text-align: right;">(2 x 1)</p>	(2)
Q02(h)	<p>One way explained:</p> <ul style="list-style-type: none"> • Planned making can be estimated (1) on the number sold in a set period / the market demand(1). • Sales information (1) will enable the manufacturer to plan the manufacture / product distribution(1). • Raw materials can be ordered(1) because likely sales can be estimated(1). <p style="text-align: right;">(2 x 1)</p>	(2)
Total for question		22

Question Number	Answer	Mark
Q03 (a)	<p>DESIGN IDEA 1</p> <p>Specification point 1 Must have a method of fixing the device securely to the top rear of the seat</p> <ul style="list-style-type: none"> evidence to indicate that the package is fixed eg. Clips / screws / bolts/ Velcro / bent fitting evidence to indicate that it is fitted securely eg. Locking nuts / locking washers / industrial strength Velcro / clamps / screws <p>Specification point 2 Have a visual warning signal that switches on when the seat is occupied</p> <ul style="list-style-type: none"> evidence to indicate that it has a visual warning signal eg. LEDES / 7 segment displays / bulbs / lamps (<i>do not accept just 'light'</i>) evidence to indicate that it switches on when the seat is occupied eg. Reed switch / micro switch / infra red / LDR / pressure pad / piezo transducer <p>Specification point 3 Must have a method of sensing poor weather and making the warning signal more noticeable</p> <ul style="list-style-type: none"> evidence to indicate that it senses poor weather. eg. Moisture sensor / LDR / photo diode / photo transistor / pressure sensor / thermistor / anemometer evidence to indicate that it makes the warning signal more noticeable. eg. Flashing / brighter / sequencing / change of colour / motor motion / audible signal <p>Specification point 4 Its case must be made from materials and processes suitable for batch production</p> <ul style="list-style-type: none"> evidence to indicate that the material is suitable for batch production e.g. specific material named evidence to indicate that the process is suitable for batch production e.g specific process named <p style="text-align: right;">(8 x 1)</p> <p>Possible graphical solutions: Design Idea 1</p> 	(8)

DESIGN IDEA 2

To score a mark for Design Idea 2, each specification point must be resolved again in the second design idea 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 score the mark.

Use exactly the same criteria as design idea 1 to mark design idea 2.

A different method of fixing to the seat (1)

A different method of secure fixing (1)

A different method of visual warning signal (1)

A different method of switching on when the seat is occupied (1)

A different method of sensing poor weather (1)

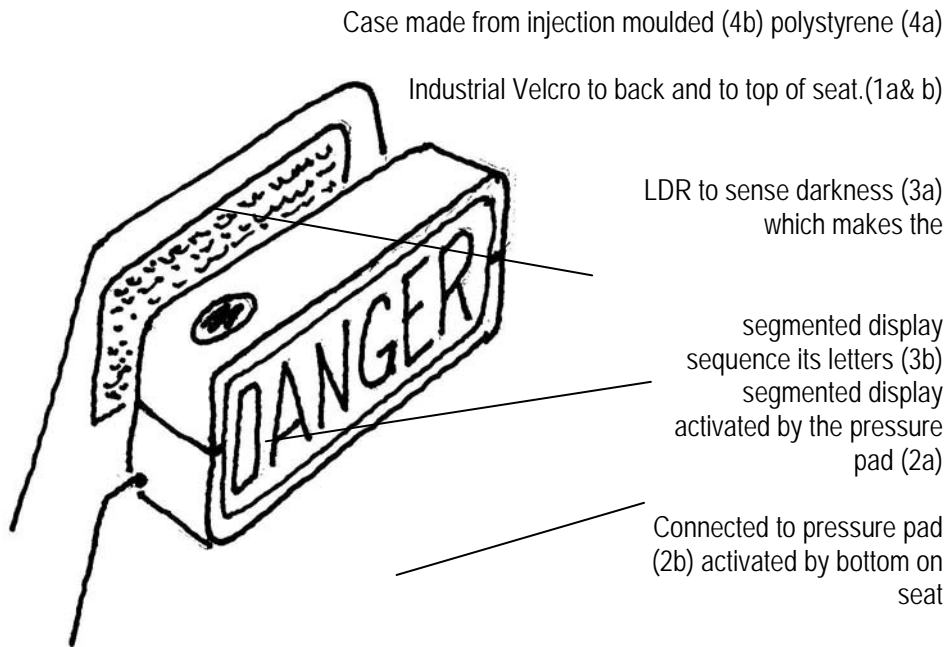
A different method of making the warning signal more noticeable (1)

A different material suitable for batch production (1)

A different process suitable for batch production (1)

(8 x 1)

(8)



Q03(b)(i)	<p>Evaluation of: The safety device must have a visual warning signal that switches on when the seat is occupied. Positive or negative reasons relating to:</p> <ul style="list-style-type: none"> • The method of warning signal • The method of switching on <p><i>Eg. The LEDs may not be visible from a distance and the reed switch would go on if the rider wore the seat belt</i></p> <p style="text-align: right;">(2 x 1)</p>	(2)
Q03(b)(ii)	<p>Evaluation of: The safety device must have a method of sensing poor weather which then increases the visibility of the warning signal. Positive or negative reasons relating to:</p> <ul style="list-style-type: none"> • Sensing poor weather • Increase of visibility <p><i>Eg. The moisture sensor only works when it is raining which is no good in the dark but the blue ultra bright LEDS may be seen from a long distance.</i></p> <p style="text-align: right;">(2 x 1)</p>	(2)
Q03(b)(iii)	<p>Evaluation of: The safety device case must be made using materials and processes suitable for batch production. Positive or negative reasons relating to:</p> <ul style="list-style-type: none"> • The material • The process <p><i>Eg. Aluminium is tough enough to withstand outside conditions but pressing is expensive and time consuming.</i></p> <p style="text-align: right;">(2 x 1)</p>	(2)
Total for question		22

Question Number	Answer	Mark										
Q04a(i)	<p>The action described:</p> <ul style="list-style-type: none"> • It will conduct (1) and latch on(1). • It switches on (1) and stays on(1) <p style="text-align: right;">(2 x 1)</p>	(2)										
Q04a(ii)	<p>One reason explained:</p> <ul style="list-style-type: none"> • Resets the circuit (1)so it can be operated again(1) • The switch shorts the thyristor(1) to earth thereby switching it off (1) • The thyristor is latched (1)on so it needs to be switched off. (1) • Breaks the latch (1)so it switches off the thyristor. (1) <p style="text-align: right;">(2 x 1)</p>	(2)										
Q04a(iii)	<ul style="list-style-type: none"> • For correctly showing: $V1 = 6$ (1 mark) • For correct value of: 1K1 / 1.1K / 1100 Ω/Ohms (1 mark) <p style="text-align: right;">(2 x 1)</p> <p><i>If correct value is given 2 marks can be awarded</i></p>	(2)										
Q04a(iv)	<p>One resistance calculated:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">750R</td> <td style="width: 50%;">2 marks</td> </tr> <tr> <td>750ohms / Ω</td> <td>2 marks</td> </tr> <tr> <td>0.75K</td> <td>2 marks</td> </tr> <tr> <td>750</td> <td>1 mark</td> </tr> <tr> <td>0.75</td> <td>1 mark</td> </tr> </table> <p><i>1 mark for number</i> <i>1 mark for unit (ohm, Ω, R, K)</i></p> <p style="text-align: right;">(2 x 1)</p>	750R	2 marks	750ohms / Ω	2 marks	0.75K	2 marks	750	1 mark	0.75	1 mark	(2)
750R	2 marks											
750ohms / Ω	2 marks											
0.75K	2 marks											
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0.75	1 mark											
Q04b(i)	<p>The box indicated</p> <p>Red <input checked="" type="checkbox"/></p> <p><i>(only acceptable answer)</i></p> <p style="text-align: right;">(2 x 1)</p>	(1)										
Q04b(ii)	<p>One action explained:</p> <ul style="list-style-type: none"> • The OpAmp will saturate (1) therefore the output will be +5V(1) • The output will go to +5V (1) therefore the green LED will glow/LEDs will switch(1) <p style="text-align: right;">(2 x 1)</p>	(2)										
Q04(c)	<p>Three advantages given:</p> <ul style="list-style-type: none"> • Cheaper to buy • Less waste of materials • More reliable • Ready availability of product • Miniaturisation of goods • Products brought to market quickly / quick response to market demands <p style="text-align: right;">(3 x 1)</p>	(3)										

Q04d(i)	<p>One way described:</p> <ul style="list-style-type: none"> • Reduction in landfill (1) if waste is reused / recycled / reclaimed. (1) • Reduction in need of raw materials (1) if less waste is produced / preserves environmental landscape (1). • Reduced energy/fuel cost / pollution(1) to remove waste materials(1). • Less deforestation(1) meaning habitats are preserved / preventing soil erosion (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q04d(ii)	<p>One way described:</p> <ul style="list-style-type: none"> • Reduced pollution (1) by reducing the need for generating electricity(1) for the phone. • Eliminate the need to dispose of dangerous chemicals (1) by using rechargeable batteries (1) • Rechargeable batteries(1) could be recharged by solar panels/cells/wind-up mechanism (1) • Increase battery life (1) by lower current devices(1). <p style="text-align: right;">(2 x 1)</p>	(2)
Q04(e)	<p>Two benefits explained:</p> <ul style="list-style-type: none"> • Greater value for money (1) as the phone will last / will not need to be replaced(1). • Increased confidence (1) in the use of the phone as they know that it will work every time(1). • The phone can be relied upon(1) in the case of an emergency(1). • Saved functions (1) will act the same every time(1) • Continue to buy / support brands (1) that you know will work(1) <p style="text-align: right;">(2 x 1) (2 x 1)</p>	(4)
Total for question		22
Total for paper		88

Question Number	Answer	Mark
Q01(a)(i)	<p>Name: LED / Light emitting diode Use: Illuminator/illumination / indicator/indication / shows signal / lights up / shows something is on/off</p> <p>Name: Side cutters / nippers / wire cutters / snips Use: cuts/trims/snips/crop wire/component legs</p> <p>Name: Relay / magnetic switch / interface Use: Electronic process / interface component / separates circuits/power sources /switches / electro-mechanical switch</p> <p style="text-align: right;">(6 x 1)</p>	(6)
Q01(b)	<p>Two reasons given:</p> <ul style="list-style-type: none"> • Easy to use/form (1) • Inexpensive/Cheap (1) • Low danger (1) • Quick (1) • Easy to adapt (1) • Make hollow products/cases (1) • Suitable for volume production (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q01(c)(i)	<p>One way given</p> <ul style="list-style-type: none"> • Circuits may be designed (1) • Circuit can be tested/prototyped/modelled (1) • Moulds may be designed (1) • Cases may be designed (1) • CAD could be linked to CAM (1) <p style="text-align: right;">(1 x 1)</p>	(1)
Q01(c)(ii)	<p>One way described</p> <ul style="list-style-type: none"> • Tracks (1) can be milled (1) • Moulds (1) can be made (1) • Case parts/holes (1) can be shaped / cut out(1) <p><i>Do not accept 'pick and place.'</i></p> <p style="text-align: right;">(2 x 1)</p>	(2)
Total for question		11

Question Number	Answer	Mark
Q02(a)(i)	<p>Four terms named:</p> <ul style="list-style-type: none"> • D1 - LED / Light Emitting Diode • C1 - Capacitor • VR1 - Variable resistor / potentiometer • R3 - LDR / Light Dependent Resistor <p><i>(only acceptable answers)</i></p>	(4)
Q02(a)(ii)	<p>The action stated: It lights / comes on / activates.</p>	(1)
Q02(a)(iii)	<p>One reason given</p> <ul style="list-style-type: none"> • Protects it/the circuit/the transistor (1) • Limits/controls the current (1) 	(1)
Q02(a)(iv)	<p>One reason given</p> <ul style="list-style-type: none"> • Change voltage on transistor base (1) • Change switch-on voltage/potential (1) • Changes the sensitivity of the circuit (1) • Adjusts the "turn on" light level (1) 	(1)
Q02(a)(v)	<p>One reason given</p> <ul style="list-style-type: none"> • To switch it/the circuit on/off (1) • To save battery power (1) • Disconnect/interrupt power supply (1) 	(1)
Q02(a)(vi)	<ul style="list-style-type: none"> • SPST <p><i>(Only acceptable answer)</i></p>	(1)
Q02(b)	<p>The voltage calculated</p> <p>3 (1) / Volts (1) 3000 (1) / mVolts (1)</p> <p>Accept V or Volts as interchangeable</p> <p>NB 3mVolts - 1 mark, 3000 Volts - 1 mark</p>	(2)
Total for question		11

Question Number	Answer	Mark
Q03(a)	<p>Three each of the following, one under each heading: Specification points Reasons (i) The needs of the user</p> <ul style="list-style-type: none"> • Point: It must have a light sensing unit • Reason: to save electricity/switch off during the day • Point: It must have a motion detector • Reason: To switch on the light for people • Point: It must have some form of mounting device • Reason: So it is easily fixed/will stay fixed to a wall. • Point: Easy to install • Reason: No mains electricity <p style="text-align: right;">(2 x 1)</p>	(2)
	<p>(ii) Environmental considerations</p> <ul style="list-style-type: none"> • Point: It must be made from recyclable materials • Reason: To conserve the earth's resources • Point: It must have solar panels • Reason: To charge the batteries • Point: It must have a timer • Reason: To switch the light off after people/animals have gone / to save energy • Point: Minimum materials used • Reason: Resource conservation • Point: Made from recycled materials / Possible to be recycled • Reason: Resource conservation / waste minimisation • Point: The manufacture / disposal of the model should not cause pollution • Reason: Protection of the environment <p style="text-align: right;">(2 x 1)</p>	(2)

	<p>(iii) Quality</p> <ul style="list-style-type: none"> • Point: The battery must stay charged for a long time • Reason: So the light can be used all night • Point: The battery must be rechargeable • Reason: Save money on replacements • Point: It must be robust • Reason: does not break with normal use • Point: detection covers must not become opaque • Reason: reduction in efficiency • Point: Waterproof seals • Reason: so there is no water ingress • Point: Durable materials / finish • Reason: so it lasts a long time <p style="text-align: right;">(2 x 1)</p> <p><i>Some flexibility should be given as some points may cross over descriptions but the same answer can not be given more than once.</i></p>	(2)
Q03(b)	<p>Two reasons given:</p> <ul style="list-style-type: none"> • Relatively cheap (1) • Readily available (1) • Resistant to wear (1) • Able to be coloured/painted/dip-coated (1) • Joined/machined easily (1) • Tough / hard (1) • Can be recycled (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q03(c)	<p>Two reasons given:</p> <ul style="list-style-type: none"> • Complex shape (1) • Inexpensive when made in bulk (1) • Speed of production (1) • Repeatability/ identical (1) • little waste (1) • can be computer controlled (1) • good surface finish / self finishing(1) • no additional surface finishing required(1) • many can be made in one mould(1) • colours can be changed(1) • unit costs are low once mould has been paid for(1) • high tolerance / very accurate(1) • suitable for mass / high volume production (1) <p><i>(Do not accept 'cheap' or 'quick' without qualification)</i></p> <p style="text-align: right;">(2 x 1)</p>	(2)

Q03(d)	<p>Two properties given with two reasons:</p> <p>Property: Good conductor of electricity Reason: small power loss / current can flow</p> <p>Property: is malleable Reason: shape is easy to produce/ can bend without breaking/ flexible</p> <p>Property: non-magnetic Reason: will not affect magnetically sensitive devices</p> <p>Property: good resistance to corrosion Reason: long life</p> <p>Property: ductile Reason: drawn into thin wires</p> <p>Property: easily soldered Reason: connection can be easily made</p> <p style="text-align: right;">(2 x 1) (2 x 1)</p>	(4)
Q03(e)	<p>Two <i>electronic</i> quality control checks named:</p> <ul style="list-style-type: none"> • Solar panels charge batteries correctly • Motion detector works within a specified range • Timing circuit switches light off / testing complete circuit • Ultra-bright LED cluster is sufficiently bright • Batteries stay charged for specified time • Light sensor switches at correct level • Continuity/connections between components/systems • Water testing • Temperature testing <p style="text-align: right;">(2 x 1)</p>	(2)
Q03(f)	<p>One way described:</p> <ul style="list-style-type: none"> • The simple shape (1) of cover can be formed in a single/simple mould(1) • The slope of the sides / no undercuts/indents(1) means that the mould can slip out(1) • Shallow depth / low profile (1) means that there will be no thinning of material/webs(1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q03(g)(i)	<p>One way explained:</p> <ul style="list-style-type: none"> • Ultra bright LEDs are powerful (1) and as they are clustered they are even brighter (1). • The shape of the light lens (1) makes the light spread out(1). • Could be mounted high up (1) so lighting a wide area (1). <p style="text-align: right;">(2 x 1)</p>	(2)

Q03(g)(ii)	<p>One way explained:</p> <ul style="list-style-type: none"> • The solar panels collect energy from the sun (1) which is used to charge the batteries(1). • The batteries are recharged during the day (1) which allows the light to shine at night(1). • Light given by the LED cluster (1) which is a low volt/current device/component(1). <p style="text-align: right;">(2 x 1)</p>	(2)
	Total for question	22
	Total for paper	44

Question Number	Answer	Mark
Q01a(i)	<p>Three each of the following, one under each heading: Specification points Reasons</p> <p>(i) The needs of the user</p> <ul style="list-style-type: none"> • Point: It must have a light sensing unit • Reason: to save electricity/switch off during the day • Point: It must have a motion detector • Reason: To switch on the light for people • Point: It must have some form of mounting device • Reason: So it is easily fixed/will stay fixed to a wall. • Point: Easy to install • Reason: No mains electricity <p style="text-align: right;">(2 x 1) (2 x 1)</p>	(2)
Q01a(ii)	<p>(ii) Environmental considerations</p> <ul style="list-style-type: none"> • Point: It must be made from recyclable materials • Reason: To conserve the earth's resources • Point: It must have solar panels • Reason: To charge the batteries • Point: It must have a timer • Reason: To switch the light off after people/animals have gone / to save energy • Point: Minimum materials used • Reason: Resource conservation • Point: Made from recycled materials / Possible to be recycled • Reason: Resource conservation / waste minimisation • Point: The manufacture / disposal of the model should not cause pollution • Reason: Protection of the environment <p style="text-align: right;">(2 x 1)</p>	(2)

Q01a(iii)	<p>(iii) Quality</p> <ul style="list-style-type: none"> • Point: The battery must stay charged for a long time • Reason: So the light can be used all night • Point: The battery must be rechargeable • Reason: Save money on replacements • Point: It must be robust • Reason: does not break with normal use • Point: detection covers must not become opaque • Reason: reduction in efficiency • Point: Waterproof seals • Reason: so there is no water ingress • Point: Durable materials / finish • Reason: so it lasts a long time <p><i>Some flexibility should be given as some points may cross over descriptions.</i></p> <p style="text-align: right;">(2 x 1)</p>	(2)
Q01(b)	<p>Two reasons given:</p> <ul style="list-style-type: none"> • Relatively cheap (1) • Readily available (1) • Resistant to wear (1) • Able to be coloured/painted/dip-coated (1) • Joined/machined easily (1) • Tough / hard (1) • Can be recycled (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q01(c)	<p>Two reasons given:</p> <ul style="list-style-type: none"> • Complex shape (1) • Inexpensive when made in bulk (1) • Speed of production (1) • Repeatability/ identical (1) • little waste (1) • can be computer controlled (1) • good surface finish / self finishing(1) • no additional surface finishing required(1) • many can be made in one mould(1) • colours can be changed(1) • unit costs are low once mould has been paid for(1) • high tolerance / very accurate(1) • suitable for mass / high volume production (1) <p><i>(Do not accept 'cheap' or 'quick' without qualification)</i></p> <p style="text-align: right;">(2 x 1)</p>	(2)

Q01(d)	<p>Two properties given with two reasons:</p> <p>Property: Good conductor of electricity Reason: small power loss / current can flow</p> <p>Property: is malleable Reason: shape is easy to produce/ can bend without breaking/ flexible</p> <p>Property: non-magnetic Reason: will not affect magnetically sensitive devices</p> <p>Property: good resistance to corrosion Reason: long life</p> <p>Property: ductile Reason: drawn into thin wires</p> <p>Property: easily soldered Reason: connection can be easily made</p> <p style="text-align: right;">(2 x 1) (2 x 1)</p>	(4)
Q01(e)	<p>Two <i>electronic</i> quality control checks named:</p> <ul style="list-style-type: none"> • Solar panels charge batteries correctly • Motion detector works within a specified range • Timing circuit switches light off / testing complete circuit • Ultra-bright LED cluster is sufficiently bright • Batteries stay charged for specified time • Light sensor switches at correct level • Continuity/connections between components/systems • Water testing • Temperature testing <p style="text-align: right;">(2 x 1)</p>	(2)
Q01(f)	<p>One way described:</p> <ul style="list-style-type: none"> • The simple shape (1) of cover can be formed in a single/simple mould(1) • The slope of the sides / no undercuts/indents(1) means that the mould can slip out(1) • Shallow depth / low profile (1) means that there will be no thinning of material/webs(1) <p style="text-align: right;">(2 x 1)</p>	(2)
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Q01(g)(ii)	<p>One way explained:</p> <ul style="list-style-type: none"> • The solar panels collect energy from the sun (1) which is used to charge the batteries(1). • The batteries are recharged during the day (1) which allows the light to shine at night(1). • Light given by the LED cluster (1) which is a low volt/current device/component(1). <p style="text-align: right;">(2 x 1)</p>	(2)
Total for question		22

Question Number	Answer	Mark															
Q02(a)(i)	<p>The two lines completed 1 mark for each line.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Input A</th> <th>Input B</th> <th>Output</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td>1</td> </tr> <tr> <td>0</td> <td>1</td> <td>0</td> </tr> <tr> <td>1</td> <td>0</td> <td>0</td> </tr> <tr> <td>1</td> <td>1</td> <td>0</td> </tr> </tbody> </table> <p><i>(Only acceptable answer)</i></p> <p style="text-align: right;">(2 x 1)</p>	Input A	Input B	Output	0	0	1	0	1	0	1	0	0	1	1	0	(2)
Input A	Input B	Output															
0	0	1															
0	1	0															
1	0	0															
1	1	0															
Q02(a)(ii)	<p style="text-align: right;">(2 x 1)</p>	(2)															
Q02(b)(i)	<ul style="list-style-type: none"> • Resistor • Variable resistor /pre-set potentiometer / potentiometer • Capacitor <p><i>Only acceptable answers</i> <i>Allow in any order</i></p> <p style="text-align: right;">(3 x 1)</p>	(3)															
Q02(b)(ii)	<p>One adjustment described:</p> <ul style="list-style-type: none"> • By changing (1)the resistance of VR1(1). • Vary/change (1)the resistor[R1]/capacitor [C1]. (1) <p style="text-align: right;">(2 x 1)</p>	(2)															
Q02(c)	<p>One way described:</p> <ul style="list-style-type: none"> • Stored computer components may be retrieved (1)to build model circuits(1) • A built model circuit can be tested (1)for correct current flow/voltage drop/conditions / simulations(1) • Track layout can be designed(1) using auto-routing (1) • Work can be stored (1) and retrieved/easily communicated (1) • Existing circuits (1) can be easily adapted(1) • Silk screens/component masks (1) are easily generated (1) • Component lists generated (1) for costing(1) • 3D circuit models generated (1) for export to other design packages(1) <p style="text-align: right;">(2 x 1)</p> <p><i>Some well known PCB Design Programs: PCB Wizard; Pro PCB; Crocodile Clips; Pulsonix; PCB 123; Express PCB; WinCAD PCB; Circuit creator.</i></p>	(2)															
Total for question		11															

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Q03a(i)	<p>The action described:</p> <ul style="list-style-type: none"> It will conduct (1) and latch on(1). It switches on (1) and stays on(1) <p style="text-align: right;">(2 x 1)</p>	(2)										
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750R	2 marks											
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Q03b(ii)	<p>One action explained:</p> <ul style="list-style-type: none"> The OpAmp will saturate (1) therefore the output will be +5V(1) The output will go to +5V (1) therefore the green LED will glow/LEDs will switch(1) <p style="text-align: right;">(2 x 1)</p>	(2)										
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Total for paper		44										

Question Number	Answer	Mark
Q01(a)(i)	<p>The needs of the user</p> <ul style="list-style-type: none"> • Point: It should have no sharp edges (1) • Reason: so that people do not injure themselves (1) • Point: Gripped jaws(1) • Reason: To hold firm / tightly (1) • Point: can be clamped / fixed to a bench (1) • Reason: so it does not move around / safer (1) • Point: Wide jaw movement (1) • Reason: hold a range of sized pieces (1) • Point: Long handle (1) • Reason: To reduce the effort required (1) • Point: It should not be too heavy/it should be light weight (1) • Reason: so that it is not too difficult to move/it is fairly easy to move (1) • Point: should have a high MA (1) • Reason: so that a small effort will produce a high clamping force (1) • Point: be easy to hold still (1) • Reason: for safety/accuracy (1) • Point: robust (1) • Reason: So it lasts a long time (1) • Point: low maintenance (1) • Reason: no specialist skills to maintain (1) • Point: easily cleaned (1) • Reason: maintain accuracy/safety (1) <p style="text-align: right;">(2 x 1)</p>	(2)

Q01a(ii)	<p>Environmental considerations</p> <ul style="list-style-type: none"> • Point: It should be made from the minimum amount of material (1) • Reason: so that the earth's resources can be preserved (1) • Point: The materials should be recycled at the end of its life (1) • Reason: so that there will be less land fill (1) • Point: Minimum amounts of energy should be used during manufacture (1) • Reason: to minimise pollution (1) • Point: Parts made from recycled materials (1) • Reason: Less demand on new virgin materials (1) <p><i>(Accept cross over of point and reason in all sections above - e.g. The materials should be recycled at the end of its life/ to minimise pollution)</i></p> <p style="text-align: right;">(2 x 1)</p>	(2)
Q01a(iii)	<p>Quality</p> <ul style="list-style-type: none"> • Point: It should be made from good quality materials (1) • Reason: so that it will withstand workshop use (1) • Point: A good surface finish (1) • Reason: So it does not rust / last longer (1) • Point: Well finished (1) • Reason: No rough edges so avoiding cuts / injuries / improve aesthetic appeal / prevents rusting (1) • Point: It should be reliable (1) • Reason: so that people will recommend it/get years of service (1) • Point: It should be made to close tolerances (1) • Reason: so that the parts move smoothly/reliably/accurately (1) <p><i>Answers from 4a(i)-(ii)-(iii) can over lap but should only score once.</i></p> <p style="text-align: right;">(2 x 1)</p>	(2)

Q01(b)	<p>Two reasons given:</p> <ul style="list-style-type: none"> • It can be machined easily / cut easily / shaped (1) • It is tough (1) • Good torsional / compressive strength (1) • Relatively cheap (1) • It is cheaper than other metals (1) • It is readily available (1) • It can be accurately finished (1) • It is hard/resists wear (1) <i>(Do not accept durable)</i> <p style="text-align: right;">(2 x 1)</p>	(2)
Q01(c)	<p>Two reasons given:</p> <ul style="list-style-type: none"> • Cast iron has a rough finish • The sides need to be smooth/to reduce friction/wear • It provides a flat bearing surface • For accuracy <p style="text-align: right;">(2 x 1)</p>	(2)
Q01(d)	<p>Two properties given with associated reason</p> <ul style="list-style-type: none"> • Property: It has good fluidity • Reason: Can be cast into intricate shapes • Property: It is self lubricating / has good frictional wear • Reason: Parts need to slide / will not require oil • Property: It is easy to machine • Reason: Slides / slots have to be machined in casting • Property: It is hard • Reason: To withstand wear/increase life span • Property: Good compressive strength • Reason: Will withstand the clamping / force / pressures <p style="text-align: right;">(2 x 1) (2 x 1)</p>	(4)
Q01(e)	<p>Two quality control checks named;</p> <ul style="list-style-type: none"> • Ensure that the bar is the correct diameter / length before cutting/making the thread (1) • Check for rough edges/burrs after screw cutting (1) • Check that it fits correctly into the internal/female thread (1) • Check profile of screw thread (1) • Integrity of the material (1) • Make sure not is not a 'drunken' thread (1) <p style="text-align: right;">(2 x 1)</p>	(2)

Q01(f)	<p>One reason described;</p> <ul style="list-style-type: none"> • After the initial cost (1) they can be made cheaply (1) • Many could be made at once (1) and this will reduce costs (1) • The finished shaped (1) can be obtained without the need for further machining (1) • The exact shape (1) is easily made (1) • Each jaw (1) will be the same shape/identical (1) • Repeatability of process (1) is ideal for high volume production (1) • Complex form achieved (1) due to the nature of the material / mould (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q01(g)(i)	<p>One reason explained;</p> <ul style="list-style-type: none"> • The screw thread / handle when turned (1) will slide the moving jaw forwards or backwards (1) • The screw thread will convert rotary motion (1) into linear/reciprocating motion (1) • The handle end of the screw thread is held (1) therefore the jaw slides when the handle is turned (1) • A smooth machined slide / bed (1) gives little friction (1) <p style="text-align: right;">(2 x 1)</p>	(2)
1 (g) (ii)	<p>One reason explained;</p> <ul style="list-style-type: none"> • The handle acts as a lever (arm) and will increase the effort applied. <p style="text-align: right;">(2 x 1)</p>	(2)
Total for question		22

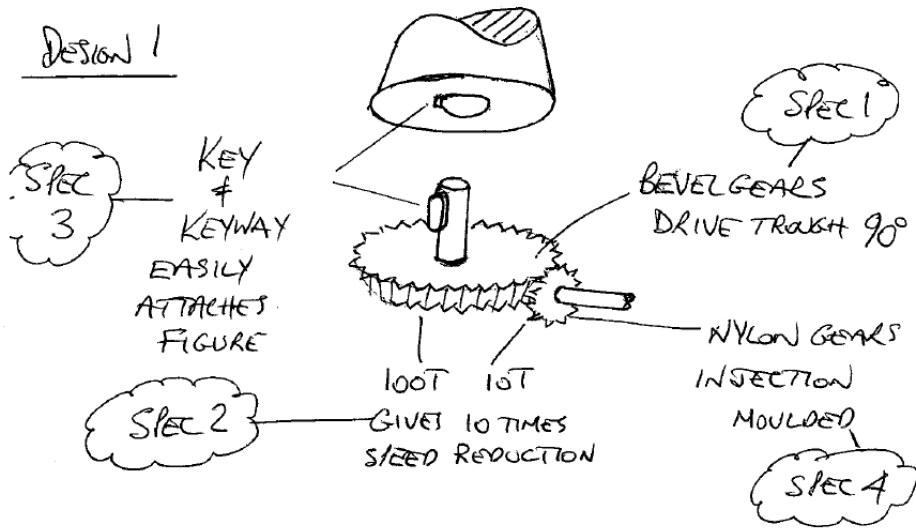
Question Number	Answer	Mark
Q02(a)(i)	<p>Two reasons given:</p> <ul style="list-style-type: none"> • Its stronger / less likely to break / grain follows the handle shape (1) • It is flexible / springy / tougher / durable (1) • Less waste / more economic use of timber (1) • Lighter weight for similar strength (1) • Dimensionally stable (1) • Will not warp / twist (1) • Easier to achieve the desired / required shape (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q02(a)(ii)	<p>Two finishing processes named:</p> <ul style="list-style-type: none"> • Painting (1) • Staining (1) • Varnishing (1) • Shellac (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q02(b)	<p>One effect stated:</p> <ul style="list-style-type: none"> • Less effort will be required / easier to lift (1) • A greater load can be lifted (1) • The handles will have to be lifted higher (to give the same ground clearance (1) • Increases MA / leverage / moments (1) <p style="text-align: right;">(1 x 1)</p>	(1)
Q02(c)	<p>Two materials given:</p> <ul style="list-style-type: none"> • Brass (1) • Bronze (1) • Nylon (1) • White metal (1) • Cast iron (1) • Sintered metal (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q02(d)(i)	<p>One advantage given:</p> <ul style="list-style-type: none"> • It could be made in one piece (1) • It would be lighter (in weight) (1) • Thinner sections could be used (1) • It could be stronger (1) • It could be tougher (1) • Can be recycled at the end of life cycle (1) <p>One disadvantage given:</p> <ul style="list-style-type: none"> • It could rust (1) • Edges could be dangerous (1) • Heavier to lift (1) <p style="text-align: right;">(2 x 1)</p>	(2)

Q02(d)(ii)	<p>One advantage given;</p> <ul style="list-style-type: none"> • It would be lighter (in weight) (1) • Different colours would be available (1) • Different shapes could be produced (1) • More easily cleaned (1) • Good strength to weight ratio (1) • Durable (1) • Waterproof / will not rust (1) <p>One disadvantage given;</p> <ul style="list-style-type: none"> • It would be more expensive/labour intensive to produce • The manufacturer would have to install new safety equipment • Secondary finishing of top edge • Not environmentally friendly / cannot be recycled <p style="text-align: right;">(2 x 1)</p>	(2)
Q02(e)	<p>Two ways given:</p> <ul style="list-style-type: none"> • E-mails / internet (1) • EPOS tills (1) • Internet (1) • Blackberry/mobile phone/i-phone (1) • Fax (1) • Websites (1) • Blogs / chat rooms (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q02(f)	<p>Two advantages described:</p> <ul style="list-style-type: none"> • Design changes are easily made/stored (1) thus saving time/money/space (1) • 2D designs (1) can be created as 3D images (1) • Images (1) can be viewed from all angles (1) • The working conditions/loads can be simulated (1) to see if it meets requirements / effects of changes (1) <p style="text-align: right;">(2 x 2)</p>	(4)
Q02(g)	<p>Three advantages given:</p> <ul style="list-style-type: none"> • They can work 24/7 / noon stop (1) • There is no human error (1) • The assembly is quicker (1) • After initial cost it would be cheaper (1) • There would be no injuries to workers (1) • Saves labour costs / wages (1) • More reliable / accurate (1) • Can be re-programmed / retrieve earlier files (1) • Fewer worker (1) • Can work in hazardous conditions (1) <p style="text-align: right;">(3 x 1)</p>	(3)

Q02(h)	<p>One way explained:</p> <ul style="list-style-type: none"> • By having stock delivered just in time (JIT) (1) the company can save on storage space (1) • It streamlines stock control/not so much stock on shelf (1) which saves the company money (1) <p style="text-align: right;">(2 x 1)</p>	(2)
	Total for question	22

Question Number	Answer	Mark
Q03(a)	<p>DESIGN IDEA 1</p> <p>No marks are awarded for the quality of communication.</p> <p>Have a mechanism that drives the output at 90° to the input shaft</p> <ul style="list-style-type: none"> • Evidence that it drives the output with rotary motion. <i>e.g. any type of gear, pulley and belt, sprocket and chain (1)</i> • Evidence that the drive is at 90° to input <i>e.g. Accept bevel/mitre gears, worm and wheel, crossed helical gears, contrate gears (1)</i> <p>Rotate the output shaft 10 times slower than the input shaft</p> <ul style="list-style-type: none"> • Evidence that the output rotates slower than the input <i>e.g. Different size of pulley, size of gear (1)</i> • Evidence supported by figures that the output will rotate 10 times slower <i>e.g. correct sizes/ratio (1)</i> (Allow 1 mark if evidence is given showing the output rotating 10 times faster) <p>Have a method of fixing the display table to the output shaft and also allow it to be easily removed</p> <ul style="list-style-type: none"> • Evidence that table can be fixed to the output shaft <i>e.g. Glue, weld, braze, solder, grub screw, keyway, spline, taper, screwthread (1)</i> • Evidence that it can be easily removed <i>e.g. Grub screw, keyway, spline, taper, screwthread (1)</i> <p>Be made from materials and processes that are suitable for high volume production</p> <ul style="list-style-type: none"> • Named suitable material <i>e.g. suitable named specific material (1)</i> • Named suitable process <i>e.g. named industrial process (1)</i> <p style="text-align: right;">(8 x 1)</p>	(8)

DESIGN 1



DESIGN IDEA 2

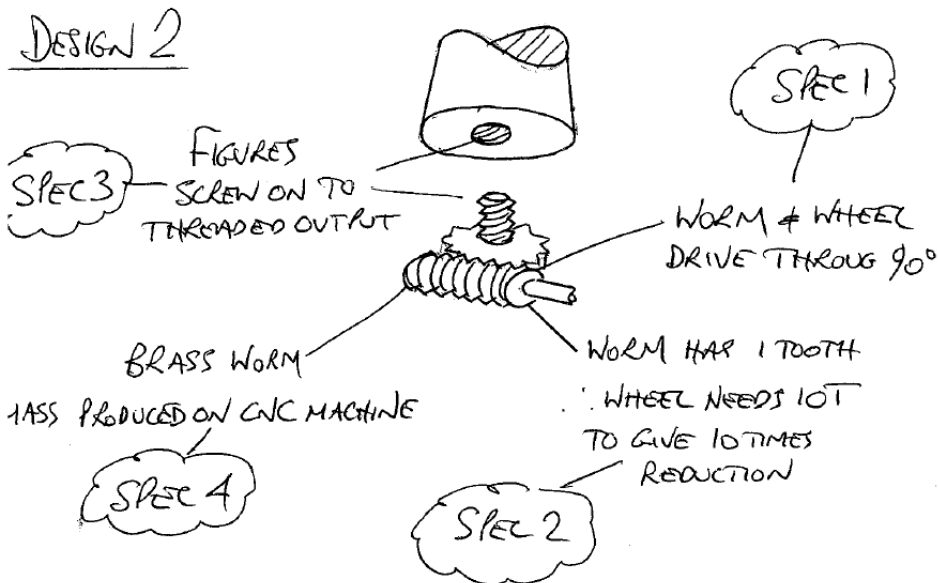
To score a mark for Design idea 2, each specification point must be resolved again in the second idea but the second design must be technically/conceptually different from the first to score a mark.

Use exactly the same criteria as design idea 1 to mark design idea 2.

- A different method of giving drive (1)
- A different method of obtaining drive at 90° (1)
- A different method of slowing output (1)
- A different method of moving output 10 times slower (1)
- A different method of fixing the table (1)
- A different method of easily removing (1)
- A different material suitable for high volume production (1)
- A different process suitable for high volume production (1)

(8)

DESIGN 2



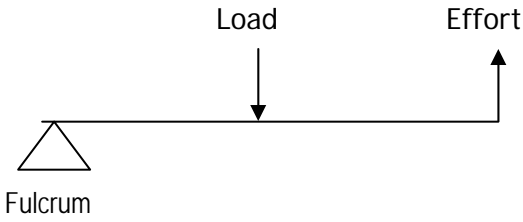
Q03(b)(i)	Positive or negative evaluation comments relating to <ul style="list-style-type: none"> • Rotating output slower • Output 10 times slower than input 	(2 x 1)	(2)
Q03(b)(ii)	Positive or negative evaluation comments relating to: <ul style="list-style-type: none"> • Attaching the table to the output • Ease of removal of the table 	(2 x 1)	(2)
Q03(b)(iii)	Positive or negative evaluation comments relating to: <ul style="list-style-type: none"> • Suitability of material for high volume production • Suitability of process for high volume production 	(2 x 1)	(2)
	Total for question		22

Question Number	Answer	Mark
Q04(a)	<p>Two reasons given:</p> <ul style="list-style-type: none"> • It reduces friction/wear/heat/increase efficiency (1) • It withstands radial (rotational) forces(1) • It withstands axial (sideways) forces (1) • Allows the wheel to turn freely (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q04(b)	<p>One reason explained:</p> <ul style="list-style-type: none"> • They produce large clamping forces (1) using standard tools (1) • They are a quick and simple method (1) and this will save on production costs (1) • They are a temporary method of fixing (1) and therefore the wheels can be removed when required (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q04(c)(i)	<p>Two reasons explained:</p> <ul style="list-style-type: none"> • The sprocket and chain will give a positive drive / transfer larger forces (1) because the sprocket teeth engage with the chain / unlike a pulley and belt that may slip (1) • A larger range of speeds is available using sprocket and chain (1) as chains can function when placed diagonally across sprockets (1) • A chain can have its length adjusted (1) unlike the belt that is fixed (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q04(c)(ii)	<p>One reason given:</p> <ul style="list-style-type: none"> • It can withstand high forces • It gives a positive drive with no slipping • It can be disassembled if required <p style="text-align: right;">(1 x 1)</p>	(1)
Q04(d)	$VR = \frac{54}{18}$ $= 3:1 \text{ or } 3$ <p>(ecf: if VR is given as 18/54 then Give 1 mark for answer of 1:3)</p> <p style="text-align: right;">(2 x 1)</p>	(2)
Q04(e)	<p>One advantage explained:</p> <ul style="list-style-type: none"> • They know that after their initial outlay (1) they should not incur repair costs (1) • They are not inconvenienced (1) when the product is being repaired (1) • They can go on journeys (1) knowing that the scooter is unlikely to break down (1) <p style="text-align: right;">(2 x 1)</p>	(2)

Q04(f)	<p>Three moral issues given:</p> <ul style="list-style-type: none"> • It may encourage children to be greedy/spoilt (1) • It may pressurise parents to buy what they cannot afford (1) • It may lead to some children feeling superior as they have the latest model (1) (accept opposite i.e. children feeling inferior) • It encourages creates / waste as older models are scrapped early (1) • It is wrong to replace an existing model when there is nothing wrong with it (1) <p style="text-align: right;">(3 x 1)</p>	(3)
Q04(g)	<p>One effect explained:</p> <ul style="list-style-type: none"> • They could lose their jobs (1) and this could result in financial hardship (1) • Fewer manual workers will be needed (1) so people could lose their jobs (1) • CAM systems can work 24/7 (1) therefore workers may have to work shifts (1) • CAM requires different skills (1) therefore there is a need to retrain workforce (1) • The number of skilled workers will be reduced (1) as CAM machines work automatically (1) <p style="text-align: right;">(3 x 1)</p>	(3)
Q04(h)	<p>Two advantages described:</p> <ul style="list-style-type: none"> • Bicycles are quiet (1) and will not emit noise pollution like cars (1) • Bicycles do not pollute the air (1) as they do not emit exhaust gases like cars (1) • Bicycles are smaller than cars (1) and could reduce congestion (1) • Bicycles are lighter (1) than cars and will not damage road surfaces (1) • Bicycles are human powered (1) and require no other fuel (1) <p style="text-align: right;">(2 x 1) (2 x 1)</p>	(4)
Total for question		22
Total for paper		88

Question Number	Answer	Mark
Q01(a)	<p>Name and use that can be carried out by using the following:</p> <p>Name: Scissors (1) Use: Cutting (1)</p> <p>Name: Dot/Centre punch (1) Use: To mark/indent (1)</p> <p>Name: Tap (1) Use: Cutting a screw thread (1)</p> <p>Name: Lathe (1) Use: Turning/taper turning/facing/drilling/screw cutting/knurling/boring (1)</p> <p>Name: Keyboard (1) Use: Inputting information (to computer)/typing/data entry (1)</p> <p style="text-align: right;">(10 x 1)</p>	(10)
Q01(b)(i)	Electro-plating	(1 x 1)
Q01(b)(ii)	<p>Two reasons given from:</p> <ul style="list-style-type: none"> • so that they are made to the correct sizes (1) • so that they to fit together easily (1) • so that they are not a sloppy/loose fit (1) • so that the bit does not fall out (1) • so that they can be easily changed (1) • so that the bit can be made to turn a screw (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q01(b)(iii)	<p>Two ways given:</p> <ul style="list-style-type: none"> • Clip-art libraries (1) • CD ROMS / Data bases (1) • CAD software (1) • Internet research (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q01(c)(i)	Injection moulding (1)	(1 x 1)
Q01(c)(ii)	High volume production (1)	(1 x 1)

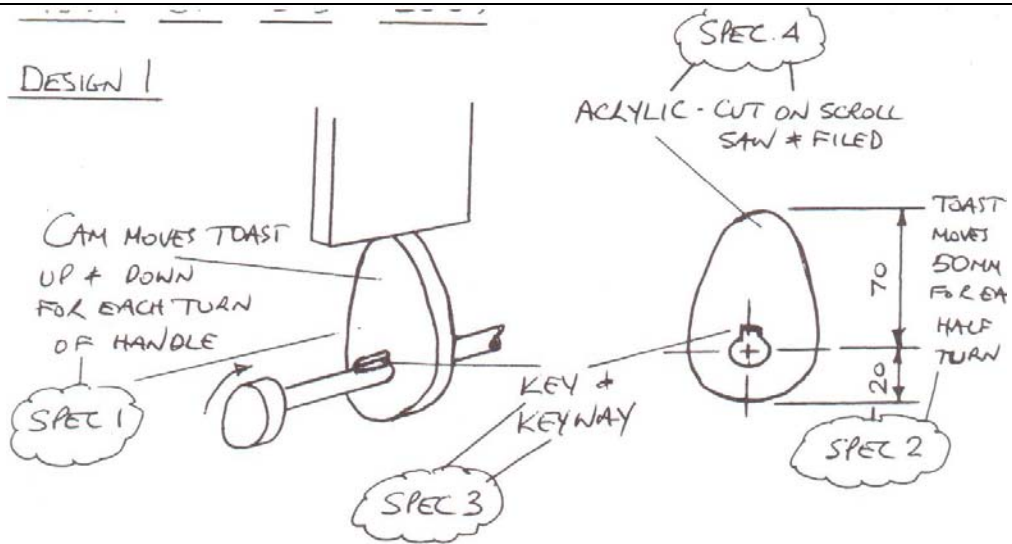
Q01(d)	<p>Two ways given:</p> <ul style="list-style-type: none"> • E-mails / internet / blogs / chat room (1) • Video conference (1) • EPOS tills (1) • Blackberry/mobile phone/i-phone (1) • Fax (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q01(e)	<p>Three ways stated:</p> <ul style="list-style-type: none"> • Computer Integrated Manufacture (CIM) (1) • Managing product/design data (1) • Managing stock control (1) • Quality control (1) • Controlling CNC (1) • Automatic production (1) • Pick and place (1) • 2D modelling (1) • 3D 'virtual' modelling (1) • Just in time (JIT) (1) <p style="text-align: right;">(3 x 1)</p>	(3)
Total for question		22

Question Number	Answer	Mark
Q02(a)(i)	 <p style="text-align: right;">(3 x 1)</p>	(3)
Q02(a)(ii)	<ul style="list-style-type: none"> • 10Nm/10 (1) • the same as clockwise (1) • equal to clockwise (1) <p><i>(D not accept -10NM)</i></p> <p style="text-align: right;">(1 x 1)</p>	(1)
Q02(b)	<p>Two advantages given:</p> <ul style="list-style-type: none"> • there will be less friction / smoother rotation (1) • the wheelbarrow will be easier to push/less force/effort will be needed/move a heavier load (1) • it will last longer / less wear (1) • it will be quicker to move (1) • easier for the wheel to rotate (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q02(c)	<p>Two reasons given:</p> <ul style="list-style-type: none"> • Can be unscrewed (1) • Can be flat packed (1) • Can be self assembled (1) • Secure (1) • Quick/simple method (1) • No special tools are required (1) • Easy to fix / replace broken parts (1) • Pulls the pieces together (1) • Easy to install / use (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q02(d)	Tough (1)	(1)
Q02(e)	<p>One reason explained:</p> <ul style="list-style-type: none"> • Aluminium is lighter than steel so the wheelbarrow will be easier to move. • The wheelbarrow will be used outdoors and aluminium will not rust/does not need protection. • Aluminium is more ductile and therefore easier to form. • Easier to machine/work therefore tools last longer. <p style="text-align: right;">(2 x 1)</p>	(2)

Q02 (f)	<p>Two benefits given:</p> <ul style="list-style-type: none"> • It should give many years of service/will last a long time (1) • It won't break down (1) • There will not be regular repair costs / need to buy replacements (1) • It will do the job it was bought for (1) • Customer satisfaction / trust brand (1) <p><i>(Do not accept reliable)</i></p> <p style="text-align: right;">(2 x 1)</p>	(2)
Q02 (g)	<p>Two effects given:</p> <ul style="list-style-type: none"> • less manual workers will be needed / the number of skilled workers will be reduced (1) • people could lose their jobs (1) • workers may have to work shifts (1) • CAD/CAM requires different skills / need to retrain workforce (1) • some jobs will be more highly paid / skilled (1) • less demanding / more menial tasks/ jobs (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q02 (h)	<p>Three advantages given</p> <ul style="list-style-type: none"> • There will be less land fill / less waste dumped (1) • Less trees will need to be chopped down (1) • Other types of fuel would not be needed (1) • Less of the earths resources will be used (1) • There will be less pollution (1) • Burning dry wood is carbon neutral (1) • Animal habitants preserved (1) <p style="text-align: right;">(3 x 1)</p>	(3)
Q02 (i)	<p>One advantage explained:</p> <ul style="list-style-type: none"> • They will be able to use them / know (1) that they should not suffer injury / safe to use (1) • Use (1) them with confidence (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q02 (j)	<p>Two moral issues given:</p> <ul style="list-style-type: none"> • consumers have to replace products more/too often (1) • it will cost them more than is necessary (1) • resources are used unnecessarily (1) • more waste is produced (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Total for question		22

Question Number	Answer	Mark
Q03 (a)	<p>DESIGN IDEA 1</p> <p>No marks are awarded for the quality of communication.</p> <p>Move the toast up and down.</p> <ul style="list-style-type: none"> • Evidence given that it moves the toast up. <i>e.g. Cam, crank, rack and pinion. (1)</i> • Evidence that it moves the toast down. <i>e.g. Cam, crank, rack and pinion with reverse rotation of the handle. (1)</i> <p>Move the toast 50mm for one-half turn of the handle.</p> <ul style="list-style-type: none"> • Evidence that the toast moves 50mm. <i>e.g. Cam rise of 50mm/crank offset of 25mm/correct pinion and pitch of rack. (1)</i> • Evidence that it moves 50mm for one-half turn of the handle. <i>e.g. Correct profile related to one-half turn of the handle/crank offset of 25mm/correct pinion and pitch of rack. (1)</i> <p>Be fixed securely to the axle</p> <ul style="list-style-type: none"> • Evidence that it is fixed Accept permanent or non-permanent fixings <i>e.g. Glue, friction push fit, braze, weld, solder, screw thread, grub screw, key / keyway, taper, spline. (1)</i> • Evidence that the mechanism is secured to the axle Detail required for second mark such as key and keyway/collar and grub screw. (Again this will depend upon material but the key is to look for detail in the response) <i>e.g. Named glue appropriate to material, friction push fit, braze, weld, solder screw thread, grub screw, key and keyway, taper. (1)</i> <p>Be made from materials and processes suitable for a one-off product</p> <ul style="list-style-type: none"> • Suitable material named e.g. suitable named specific material. (1) • Suitable one-off process named e.g. can be made in a school workshop. (1) 	(8)

DESIGN 1



DESIGN IDEA 2

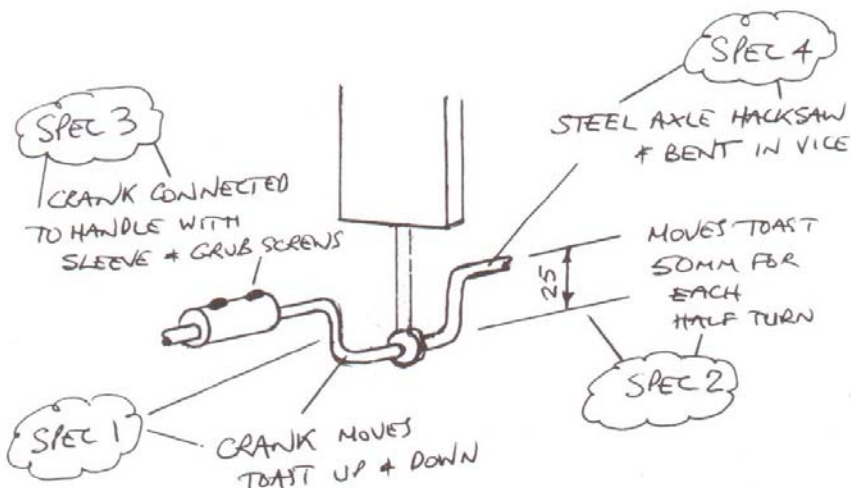
To score a mark for Design idea 2, each specification point must be resolved again in the second idea but the second design must be technically/conceptually different from the first to score a mark.

Use exactly the same criteria as design idea 1 to mark design idea 2.

- A different method of moving the toast up (1)
- A different method of moving the toast down (1)
- A different method of moving the toast 50mm (1)
- A different method of moving 50mm for one-half turn of the handle (1)
- A different method of fixing the mechanism (1)
- A different method of securing to the axle (1)
- A different material named (1)
- A different process named (1)

(8)

DESIGN 2



Q03 (b) (i)	Positive or negative Evaluation comments relating to <ul style="list-style-type: none"> • Moving the toast 50mm (1) • 50mm for one-half turn of the handle (1) 	(2 x 1)	(2)
Q03 (b) (ii)	Positive or negative Evaluation comments relating to <ul style="list-style-type: none"> • fixing method (1) • securely to the axle (1) 	(2 x 1)	(2)
Q03(b) (iii)	Positive or negative Evaluation comments relating to <ul style="list-style-type: none"> • suitable material (1) • suitable one-off process (1) 	(2 x 1)	(2)
Total for question			22

Question Number	Answer	Mark
Q04 (a)(i)	<p>The needs of the user</p> <ul style="list-style-type: none"> • Point: It should have no sharp edges (1) • Reason: so that people do not injure themselves (1) • Point: Gripped jaws(1) • Reason: To hold firm / tightly (1) • Point: can be clamped / fixed to a bench (1) • Reason: so it does not move around / safer (1) • Point: Wide jaw movement (1) • Reason: hold a range of sized pieces (1) • Point: Long handle (1) • Reason: To reduce the effort required (1) • Point: It should not be too heavy/it should be light weight (1) • Reason: so that it is not too difficult to move/it is fairly easy to move (1) • Point: should have a high MA (1) • Reason so that a small effort will produce a high clamping force (1) • Point: be easy to hold still (1) • Reason: for safety/accuracy (1) • Point: robust (1) • Reason: So it lasts a long time (1) • Point: low maintenance (1) • Reason: no specialist skills to maintain (1) • Point: easily cleaned (1) • Reason: maintain accuracy/safety (1) <p style="text-align: right;">(2 x 1)</p>	(2)

Q0 4a(ii)	<p>Environmental considerations</p> <ul style="list-style-type: none"> • Point: It should be made from the minimum amount of material (1) • Reason: so that the earth's resources can be preserved (1) • Point: The materials should be recycled at the end of its life (1) • Reason: so that there will be less land fill (1) • Point: Minimum amounts of energy should be used during manufacture (1) • Reason: to minimise pollution (1) • Point: Parts made from recycled materials (1) • Reason: Less demand on new virgin materials (1) <p><i>(Accept cross over of point and reason in all sections above - e.g. The materials should be recycled at the end of its life/ to minimise pollution)</i></p> <p style="text-align: right;">(2 x 1)</p>	(2)
Q04a(iii)	<p>Quality</p> <ul style="list-style-type: none"> • Point: It should be made from good quality materials (1) • Reason: so that it will withstand workshop use (1) • Point: A good surface finish (1) • Reason: So it does not rust / last longer (1) • Point: Well finished (1) • Reason: No rough edges so avoiding cuts / injuries / improve aesthetic appeal / prevents rusting (1) • Point: It should be reliable (1) • Reason: so that people will recommend it/get years of service (1) • Point: It should be made to close tolerances (1) • Reason: so that the parts move smoothly/reliably/accurately (1) <p><i>Answers from 4a(i)-(ii)-(iii) can over lap but should only score once.</i></p> <p style="text-align: right;">(2 x 1)</p>	(2)

Q04(b)	<p>Two reasons given:</p> <ul style="list-style-type: none"> • It can be machined easily / cut easily / shaped (1) • It is tough (1) • Good torsional / compressive strength (1) • Relatively cheap (1) • It is cheaper than other metals (1) • It is readily available (1) • It can be accurately finished (1) • It is hard/resists wear (1) <p><i>(Do not accept durable)</i></p> <p style="text-align: right;">(2 x 1)</p>	(2)
Q04 (c)	<p>Two reasons given;</p> <ul style="list-style-type: none"> • Cast iron has a rough finish (1) • The sides need to be smooth/to reduce friction/wear (1) • It provides a flat bearing surface (1) • For accuracy (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q04 (d)	<p>Two properties given with associated reason;</p> <ul style="list-style-type: none"> • Property: It has good fluidity • Reason: Can be cast into intricate shapes • Property: It is self lubricating / has good frictional wear • Reason: Parts need to slide / will not require oil • Property: It is easy to machine • Reason: Slides / slots have to be machined in casting • Property: It is hard • Reason: To withstand wear/increase life span • Property: Good compressive strength • Reason: Will withstand the clamping / force / pressures <p style="text-align: right;">(2 x 1) (2 x 1)</p>	(4)
Q04 (e)	<p>Two quality control checks named;</p> <ul style="list-style-type: none"> • Ensure that the bar is the correct diameter / length before cutting/making the thread (1) • Check for rough edges/burrs after screw cutting (1) • Check that it fits correctly into the internal/female thread (1) • Check profile of screw thread (1) • Integrity of the material (1) • Make sure not is not a 'drunken' thread (1) <p style="text-align: right;">(2 x 1)</p>	(2)

Q04 (f)	<p>One reason described;</p> <ul style="list-style-type: none"> • After the initial cost (1) they can be made cheaply (1) • Many could be made at once (1) and this will reduce costs (1) • The finished shaped (1) can be obtained without the need for further machining (1) • The exact shape (1) is easily made (1) • Each jaw (1) will be the same shape/identical (1) • Repeatability of process (1) is ideal for high volume production (1) • Complex form achieved (1) due to the nature of the material / mould (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q04(g)(i)	<p>One reason explained;</p> <ul style="list-style-type: none"> • The screw thread / handle when turned (1) will slide the moving jaw forwards or backwards (1) • The screw thread will convert rotary motion (1) into linear/reciprocating motion (1) • The handle end of the screw thread is held (1) therefore the jaw slides when the handle is turned (1) • A smooth machined slide / bed (1) gives little friction (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Q04(g)(ii)	<p>One reason explained;</p> <ul style="list-style-type: none"> • The handle acts as a lever (arm) and will increase the effort applied. <p style="text-align: right;">(2 x 1)</p>	(2)
Total for question		22
Total for paper		88

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