

Mark Scheme (Results)

Summer 2007

GCSE

GCSE Design and Technology: Resistant Materials Technology Higher Tier (1973/3973)

Marking Guidance

Give / State / Name

Normally a one or two word answer, at the very most a short sentence.

Describe

Normally, one or two sentences which form a description, making reference to more than one point. All points must be linked for a complete answer.

Explain

Normally, one or two sentences which form an explanation. This requires a clear or detailed account of something and includes a relevant justification, reason or example.

Evaluate

Normally one or two sentences where the quality, suitability or value of something is judged. This can include both positive and negative points, with each point normally requiring a relevant justification.

The mark scheme contains a range of possible answers for all questions. For some questions it is possible to provide a finite number of acceptable answers. However, in some instances it is not possible to provide every conceivable answer. In these instances objective guidance is provided.

For all answers candidates are not expected to give the exact wording contained in this mark scheme. However, to gain credit their answer must demonstrate the same meaning as detailed in the mark scheme.

It is the examiner's responsibility to apply their professional judgement in determining if what the candidate has written has the same meaning as the answer detailed in the mark scheme. For all answers the '*Key words*' have been written in bold text.

For describe and explain questions, candidates may give a different combination of the marking points listed in the mark scheme. In such instances candidates can be rewarded for the marking points provided that they are suitably linked. However, candidates cannot be rewarded for the same point repeated in two different combinations.

Examiners must mark in red pen using ticks and crosses in the body of the script.

Design & Technology: Resistant Materials Technology(1973/2H)
Full Course Higher Tier Mark Scheme

Question Number	Question		
1973_2H_Q01a	<p>The drawings show a ballpoint pen.</p> <p>Two specifications points for the ballpoint pen are that it must:</p> <ul style="list-style-type: none"> • clip onto a shirt pocket when not in use • provide a steady flow of ink when being used <p>Under each of the following heading, give <u>one</u> more point that should be included in the specification of this ballpoint pen.</p> <p>For each point, give <u>one</u> reason why it should be included.</p>		
	<p>Answer</p> <p>Three each of the following: Specification points Reasons <i>(Do not accept repetition of the specification points given)</i></p> <p><u>Quality</u> Point: smooth edges Reason: so no injury is caused to the user / comfortable to use /easy to hold</p> <p>Point: accurate fitting of the ball bearing Reason: so that it does not fall out/leak/waste ink</p> <p>Point: tight fitting of cap onto the barrel Reason: so it does not fall off/get lost/get swallowed</p> <p>Point: smooth hard ball Reason: to give smooth writing action / so it does not rip/tear the paper</p> <p>Point: any part made from a quality material Reason: longer life span/improved use/greater reliability</p>	<p>Part Mark</p> <p>3x1 3x1</p>	<p>Total Mark</p> <p>(6)</p>

Point: full ink tube
Reason: will last longer

Point: non-toxic materials
Reason: people chew pens and must not be harmed/poisoned
(Do not accept anything relating to quality control checks/generic manufacturing)

Environment

(must relate to materials and processes not the environment in which it is to be used)

Point: parts should be recycled once they are finished with/run out
Reason: so it reduces the need for new parts to be made / less landfill / less waste produced / damage to the environment

Point: parts could be made from recycled/recyclable materials
Reason: so that natural resources can be saved

Market

Point: cheap to make/ purchase
Reason: made in high volume/low material/unit costs

Point: used as promotional gifts
Reason: cheap way to advertise company name/logo

Point: suitable for everyone to use
Reason: need to write

Point: sold in multiple packs
Reason: better value for money

Some flexibility should be given as some points may cross over descriptions.

Question Number	Question	Part Mark	Total Mark
1973_2H_Q01b	<p>The ball bearing is made from silver steel. One reason why the ball bearing is made from silver steel is that it will not rust. Give <u>two</u> other reasons why silver steel is a suitable material from which to make the ball bearing.</p>		
	<p>Answer</p> <p>Two reasons given from:</p> <ul style="list-style-type: none"> • hard / withstands abrasive wear/indentation • can be ground accurately to form a ball shape • tough / durable • smooth finish can be achieved • good compressive strength • will retain its shape • recyclable <p><i>(Do not accept 'strong')</i></p>	2x1	(2)
Question Number	Question	Part Mark	Total Mark
1973_2H_Q01c	<p>The cap is manufactured by injection moulding. Give <u>two</u> reasons why injection moulding is a suitable process to manufacture the cap.</p>		
	<p>Answer</p> <p>Two reasons given from:</p> <ul style="list-style-type: none"> • good surface finish / self finishing • no additional surface finishing required • suitable for high volume/mass/batch production / repeatability • many can be made in one mould • high tolerance/very accurate • colours can be easily changed • unit costs are low once the mould has been paid for • can produce different internal and external form / complex form <p><i>(Do not accept 'easy'/'quick'/'cheap' unless qualified)</i></p>	2x1	(2)

Question Number	Question		
1973_2H_Q01d	<p>The barrel is made from acrylic.</p> <p>Give <u>two</u> properties of acrylic that make it suitable for the barrel.</p> <p>For each property give <u>one</u> reason why it makes acrylic suitable for the barrel.</p>		
	<p>Answer</p> <p>Property: lightweight Reason: does not make the pen too heavy</p> <p>Property: available in a range of colours Reason: so that the body of the pen can be made in the same colour as the ink inside</p> <p>Property: toughness Reason: will withstand little knocks and bumps</p> <p>Property: plasticity / easily moulded Reason: so it can be easily injected into the mould</p> <p>Property: transparency / see through Reason: can see how much ink is left/colour of ink</p> <p>Property: durable Reason: will withstand weathering/deterioration</p> <p>Property: non-toxic Reason: no harm caused to user</p> <p>Property: waterproof Reason: does not absorb water <i>(Do not accept 'strong')</i></p>	<p>Part Mark</p> <p>2x1</p>	<p>Total Mark</p> <p>(2)</p>

Question Number	Question		
1973_2H_Q01e	The end cap is made from a blue material. Explain <u>one</u> reason why the end cap is made from a blue material.		
	Answer	Part Mark	Total Mark
	One reason explained from: <ul style="list-style-type: none"> it means that the pen contains blue ink and therefore allows thousands of clear bodies to be made / enables the user to choose the correct coloured pen / know what colour it will write clear bodies can be made in higher volumes rather than changing the colour of the plastic granules which means that the pens will be cheaper to make and sell indicates the colour of the ink and therefore saves having to scribble on bits of paper to find out 	2x1	(2)
Question Number	Question		
1973_2H_Q01f	The ink tube is manufactured by extrusion. Extrusion is a self-finishing process. Explain why a self-finishing process is used to manufacture the ink tube.		
	Answer	Part Mark	Total Mark
	One reason explained from: <ul style="list-style-type: none"> the smooth finish achieved by extruding reduces processing costs /time processing time is faster because no secondary finishing is required / final shape is produced <i>(Do not accept 'quick'/'easy' unless qualified)</i>	2x1	(2)

Question Number	Question		
1973_2H_Q01g	<p>Two purposes of the ballpoint pen are to:</p> <ul style="list-style-type: none"> • clip onto a shirt pocket when not in use • provide a steady flow of ink <p>Explain, under the following headings, how the ballpoint pen achieves these purposes.</p>		
	Answer	Part Mark	Total Mark
	<p>(i) Clip onto a shirt pocket when not in use One explanation given from:</p> <ul style="list-style-type: none"> • the cap/barrel is shaped/designed to trap/grip/hold the pocket/cloth/material • the small/narrow gap between the clip and the body allows it to trap/grip/hold the pocket edge 	2x1	(2)
	<p>(ii) Provide a steady flow of ink One explanation given from:</p> <ul style="list-style-type: none"> • the ball bearing rotates when in contact with the paper surface and therefore transfers ink from the ink tube onto the paper • the viscosity of the ink allows a constant flow and therefore the ball does not get clogged up disrupting the flow of ink • the ball bearing is held within the nib unit in such a way as to allow it to rotate 	2x1	(2)
		(Total 22 marks)	

Question Number	Question		
1973_2H_Q02a	<p>The drawing shows a screwdriver which has been made by a student in a school workshop. The blade of the screwdriver has been heat treated. Give <u>three</u> health and safety risks associated with heat treatment.</p>		<p>Answer</p> <p>Three risks given from:</p> <ul style="list-style-type: none"> • burning of yourself/others • fire risk in the workshop • spitting oil/water when quenching • explosion of gases • damage to eyes • inhalation of fumes/gases <p style="text-align: right;">Part Mark Total Mark</p> <p style="text-align: right;">3x1 (3)</p>
1973_2H_Q02b	<p>Several turning processes have been used to manufacture the handle of the screwdriver. The table shows <u>four</u> of the turning processes used to manufacture the handle of the screwdriver. Complete the table by naming the correct process given by <u>each</u> description.</p>		<p>Answer</p> <p>Processes named:</p> <p>(i) Facing (ii) Parallel turning (iii) Taper turning / tapering (iv) Parting off/parting</p> <p style="text-align: right;">Part Mark Total Mark</p> <p style="text-align: right;">4x1 (4)</p>

Question Number	Question		
1973_2H_Q02c	The blade of the screwdriver must be securely joined into the handle. Name <u>two</u> different methods of securely joining the blade into the handle.		
	Answer	Part Mark	Total Mark
	Two different processes named from: <ul style="list-style-type: none"> • interference fit / burning into handle • gluing / chemical welding • welding • brazing/soldering • screw thread • bolts/rivets/screw through handle/blade 	2x1	(2)
Question Number	Question		
1973_2H_Q02d	The handle of the screwdriver is plastic dip coated. Explain <u>one</u> reason for the plastic dip coating of the handle of the screwdriver.		
	Answer	Part Mark	Total Mark
	One reason explained from: <ul style="list-style-type: none"> • the plastic will act as an insulator which means that the user will be protected against electric shocks • the plastic surface will improve the grip and will therefore make it easier undo tight screws • the main body can be coloured and therefore makes it more aesthetically pleasing / easy to identify the screwdriver type 	2x1	(2)

Question Number	Question		
1973_2H_Q02ei	A company manufactures the handles of the screwdriver in high volume using CNC machinery. Explain <u>two</u> reasons for using CNC machinery for the manufacture of the handles.		
	Answer	Part Mark	Total Mark
	Two reasons explained from: <ul style="list-style-type: none"> the main body will be more accurate/consistent and therefore there will be fewer rejects / less human error they can be machined 24-7 automatically without stopping unlike shift patterns which are worked by humans / greater through-put they will be made faster/more efficient on CNC because the machines do not need to stop for breaks much less labour intensive and therefore reduces wages/labour cost <i>(Do not accept 'quicker'/'cheaper'/'easier' or anything related to high volume production)</i>	2x1 2x1	(4)
Question Number	Question		
1973_2H_Q02eii	The manufacturer used a CAD system to model a new 'virtual' shape for the handle. Give <u>three</u> reasons for creating 'virtual' shapes on screen.		
	Answer	Part Mark	Total Mark
	Three reasons given from: <ul style="list-style-type: none"> computer files can be sent/emailed/shared with others see what it looks like without having to make it can be linked to CAM machines changes/amendments are easily modified/saved can be tested virtually viewed from any angle/3D/wireframe rendering can be applied <i>(Do not accept anything related to measurements)</i>	3x1	(3)

Question Number	Question	Part Mark	Total Mark
1973_2H_Q02f	<p>Electronic links and ICT are used by manufacturers for easy and fast communication.</p> <p>Describe <u>two</u> ways in which electronic links and ICT can be used by manufacturers for communication.</p>		
	<p>Answer</p> <p>Two ways described from:</p> <ul style="list-style-type: none"> • internet can be used for surveys/client feedback information gathering/keeping in contact • e-mail used for communication with suppliers/ customers • fax machines for sending and receiving data • mobile phones for discussion from anywhere, at anytime • EPOS for collecting product sales information • webcams/video conferencing provide opportunities for meetings without travelling • pagers can be used to send messages/information • PDA/Blackberry used for sending/receiving data <p><i>(Must be related to communication therefore do not accept 'database'/'spreadsheet'/'word' etc)</i> <i>(Do not credit mention of communication or manufacturers)</i></p>	<p>2x1</p> <p>2x1</p>	<p>(4)</p>
			(Total 22 marks)

Question Number	Question	
1973_2H_Q03a	<p>A company is designing a new bird seed feeder for sale in garden centre shops.</p> <p>The specification for the bird seed feeder is that it must:</p> <ul style="list-style-type: none"> • hold bird seed securely and be easy to refill • be clear of the ground and securely fixed • allow birds access to the bird seed and keep the bird seed dry • be made using materials and processes suitable for batch production <p>In the spaces, sketch and, where necessary, brief notes to show <u>two different</u> design ideas for the bird seed feeder which meet this specification.</p>	
	<p>Answer</p> <p>Design Idea 1</p> <p>Each point of the specification has two marking points.</p> <p>1 mark should be awarded for evidence of each point of the specification resolved in the design.</p> <p>Where an answer does not viably answer a specification point 0 marks</p> <p>For each specification point with only one element viably satisfied 1 mark</p> <p>For each specification point with both elements viably satisfied 2 marks</p> <p>Candidates may answer any specification point in either graphical form or by annotation.</p> <p>No marks are awarded for the quality of communication.</p> <p>Each specification resolved in design</p> <p>The bird seed feeder must hold bird seed securely and be easy to refill</p> <ul style="list-style-type: none"> • Evidence given/shown that seed is held securely eg Hold in a container/tray 	<p>Part Mark</p> <p>Total Mark</p> <p>1</p>

- Evidence given/shown that it can be refilled
eg Lid comes off/lifts up/ hinged / access to tray

1

The bird seed feeder must be clear of the ground and securely fixed.

- Evidence given/shown that it is clear of the ground
eg Post/wall fixing/hanging/tree
- Evidence given/shown that it is fixed securely
eg Will not fall down/rawl plugs/screws/mirror plates/nail/hook/set into ground / wide base area

1

1

The bird seed feeder must allow birds access to the bird seed and keep the bird seed dry.

- Evidence given/shown that access is provided
eg Wire mesh/holes in container
- Evidence given/shown that the bird seed is covered
eg Lid/roof/shelter

1

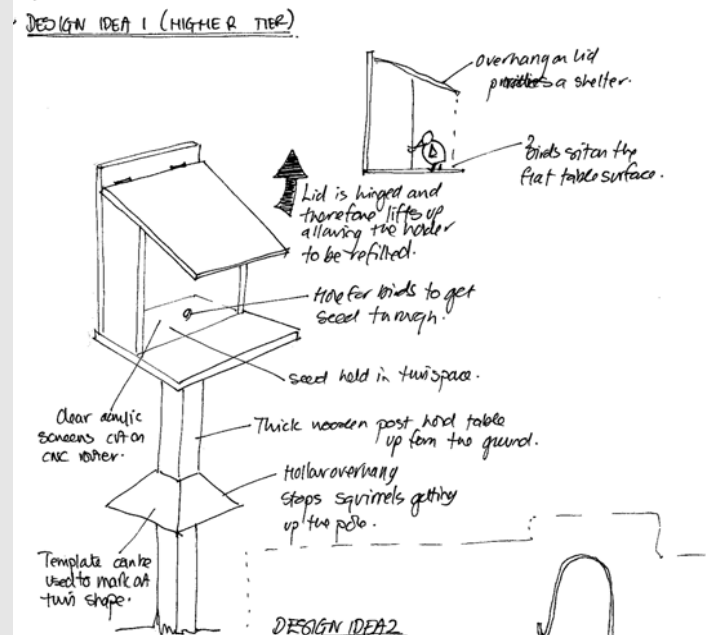
1

The bird seed feeder must be made using materials and processes suitable for batch production

- Specific material named
- Evidence given/shown that jigs/templates are used /tools/processes/machinery

1

1



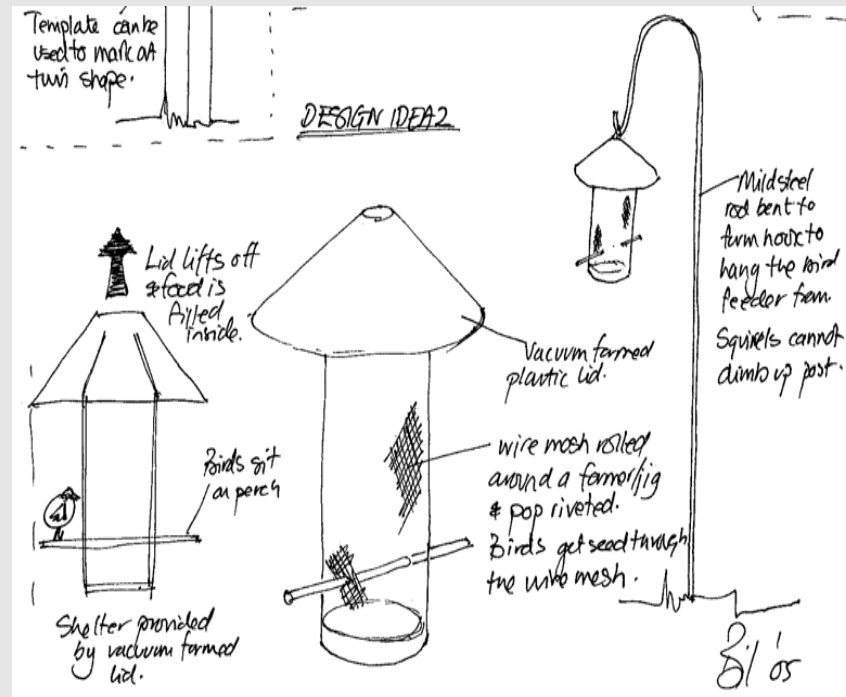
(8)

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 holding the bird seed securely	1
A different method of being easy to refill	1
A different method of being clear of the ground	1
A different method of being securely fixed	1
A different method of allowing birds access to the bird seed	1
A different method of keeping the bird seed dry	1
A different material suitable for batch production	1
A different processes suitable for batch production	1

(8)



Question Number	Question		
1973_2H_Q03b	<p>Three of the original specification points are repeated below.</p> <p>Evaluate how <u>one</u> of your chosen design ideas succeeds or fails to meet each of the specification points.</p> <ul style="list-style-type: none"> (i) The bird seed feeder must hold bird seed securely and be easy to refill (ii) The bird seed feeder must be clear of the ground and securely fixed (iii) The bird seed feeder must allow birds access to the bird seed and keep the bird seed dry 		
	<p>Answer</p> <p>Each point clearly evaluated.</p> <p>If a candidate has indicated design idea 1 and then evaluates design idea 2 for all or part of (i), (ii) or (iii) then the idea in greater evidence should be marked.</p> <p>The evaluation of the design must contain reference to either positive or negative aspects not simply just a description of the design.</p> <p>Award 1 mark for a correct evaluation/justification relating to each design feature and how it succeeds or fails. Repetition of original spec scores 0.</p> <ul style="list-style-type: none"> (i) Evaluation of: hold bird seed securely and easy to refill <ul style="list-style-type: none"> • Holding bird seed securely • Ease of refilling (ii) Evaluation of: being clear of the ground and securely fixed <ul style="list-style-type: none"> • Being held clear of the ground • Securely fixed (iii) Evaluation of: allowing access to the bird seed and keeping the bird seed dry <ul style="list-style-type: none"> • Access to bird seed • Keeping it dry 	<p>Part Mark</p> <p style="text-align: right;">(2)</p> <p style="text-align: right;">(2)</p> <p style="text-align: right;">(2)</p>	<p>Total Mark</p> <p style="text-align: right;">(2)</p> <p style="text-align: right;">(2)</p> <p style="text-align: right;">(2)</p>
(Total 22 marks)			

Question Number	Question	Part Mark	Total Mark
1973_2H_Q04ai	<p>The window frame shown below is made from aluminium, a non-ferrous metal. Give <u>three</u> properties of aluminium, a non-ferrous metal.</p>		
	<p>Answer</p> <p>Three properties given from:</p> <ul style="list-style-type: none"> • lightweight • soft • ductile / can be drawn into thin wires • resistant to corrosion in air/atmosphere / waterproof • good surface finish • good conductor of heat/electricity • good strength to weight ratio <p><i>(Do not accept 'strong')</i></p>	3x1	(3)

Question Number	Question		
1973_2H_Q04aii	Give <u>four</u> differences between ferrous and non-ferrous metals.		
	Answer	Part Mark	Total Mark
	<p>Four differences given from:</p> <ul style="list-style-type: none"> • non ferrous metals do not contain iron/carbon • non ferrous metals will not rust • non ferrous metals are not magnetic • non ferrous metals are more ductile • non ferrous metals are generally softer • non ferrous metals generally have a lower melting point • non ferrous metals are generally better electrical conductors <p><i>(Do not accept converse responses eg do not accept 'Ferrous metals are magnetic', if you have already given a mark for 'non ferrous metals are not magnetic')</i></p>	4x1	(4)
Question Number	Question		
1973_2H_Q04b	<p>The hardwood sill is made from mahogany.</p> <p>Explain <u>two</u> advantages of using mahogany rather than pine, as a softwood, for the sill.</p>		
	Answer	Part Mark	Total Mark
	<p>Two advantages explained from:</p> <ul style="list-style-type: none"> • slower growing / more dense therefore they will last longer • less prone to warping which means it will look better/provide a tighter seal • pine contains knots/resin which will spoil the aesthetics/paintwork which means it will need to be re-painted more often • a harder/tougher material therefore higher resistance to wear / more durable • does not rot as fast as pine therefore does not need replacing as often 	2x1 2x1	(4)

Question Number	Question		
1973_2H_Q04c	The window frame is sold with a British Standards label attached. Describe <u>two</u> benefits to the consumer of being able to buy products with a British Standards label attached.		
	Answer	Part Mark	Total Mark
	Two benefits described from: <ul style="list-style-type: none"> • greater reliability/quality and therefore less likely to break • has been subjected to rigorous tests and has passed which makes it safe to use / less likely to break / quality assurance / enhanced product value • gives consumers confidence in the product because it carries a guarantee 	2x1 2x1	(4)
Question Number	Question		
1973_2H_Q04d	During transportation the window frame has to be carefully wrapped and packaged. Give <u>three</u> advantages to the environment of reducing product wrapping and packaging.		
	Answer	Part Mark	Total Mark
	Three advantages given from: <ul style="list-style-type: none"> • less raw materials are required / resources are conserved • less waste packaging is disposed of / landfill sites will decrease/last longer • incineration / processing pollution is reduced • less manufacturing/transportation pollution • less waste packaging for recycling 	3x1	(3)

Question Number	Question		
1973_2H_Q04e	<p>As a result of increased draught proofing and insulation with sealed double glazed windows, less energy is required in the heating of homes.</p> <p>Explain <u>two</u> benefits for the environment of using less energy in the heating of homes.</p>		
	<p>Answer</p> <p>Two benefits explained from:</p> <ul style="list-style-type: none"> • less fuel/gas/oil/wood/coal burned to create energy for heating therefore fewer green house gases emitted / reduces global warming • less heat will escape from houses therefore homes will be warmed more efficiently / reduces global warming • less coal/oil/gas needs to be mined/extracted therefore less environmental damage done to landscapes/coastlines 	<p>Part Mark</p> <p>2x1 2x1</p>	<p>Total Mark</p> <p>(4)</p>
		<p>(Total 22 marks)</p> <p>(TOTAL FOR PAPER: 88 MARKS)</p>	

Design & Technology: Resistant Materials Technology (3973/2H)
Short Course Higher Tier Mark Scheme

Question Number	Question		
3973_2H_Q01a	<p>The drawings show a ballpoint pen.</p> <p>Two specifications points for the ballpoint pen are that it must:</p> <ul style="list-style-type: none"> • clip onto a shirt pocket when not in use • provide a steady flow of ink when being used <p>Under each of the following heading, give <u>one</u> more point that should be included in the specification of this ballpoint pen.</p> <p>For each point, give <u>one</u> reason why it should be included.</p>		
	<p>Answer</p> <p>Three each of the following: Specification points Reasons <i>(Do not accept repetition of the specification points given)</i></p> <p><u>Quality</u> Point: smooth edges Reason: so no injury is caused to the user / comfortable to use /easy to hold</p> <p>Point: accurate fitting of the ball bearing Reason: so that it does not fall out/leak/waste ink</p> <p>Point: tight fitting of cap onto the barrel Reason: so it does not fall off/get lost/get swallowed</p> <p>Point: smooth hard ball Reason: to give smooth writing action / so it does not rip/tear the paper</p> <p>Point: any part made from a quality material Reason: longer life span/improved use/greater reliability</p>	<p>Part Mark</p> <p>3x1 3x1</p>	<p>Total Mark</p> <p>(6)</p>

Point: full ink tube
Reason: will last longer

Point: non-toxic materials
Reason: people chew pens and must not be harmed/poisoned
(Do not accept anything relating to quality control checks/generic manufacturing)

Environment

(must relate to materials and processes not the environment in which it is to be used)

Point: parts should be recycled once they are finished with/run out
Reason: so it reduces the need for new parts to be made / less landfill / less waste produced / damage to the environment

Point: parts could be made from recycled/recyclable materials
Reason: so that natural resources can be saved

Market

Point: cheap to make/ purchase
Reason: made in high volume/low material/unit costs

Point: used as promotional gifts
Reason: cheap way to advertise company name/logo

Point: suitable for everyone to use
Reason: need to write

Point: sold in multiple packs
Reason: better value for money

Some flexibility should be given as some points may cross over descriptions.

Question Number	Question		Answer	Part Mark	Total Mark
3973_2H_Q01b	<p>The ball bearing is made from silver steel.</p> <p>One reason why the ball bearing is made from silver steel is that it will not rust.</p> <p>Give <u>two</u> other reasons why silver steel is a suitable material from which to make the ball bearing.</p>		<p>Two reasons given from:</p> <ul style="list-style-type: none"> • hard / withstands abrasive wear/indentation • can be ground accurately to form a ball shape • tough / durable • smooth finish can be achieved • good compressive strength • will retain its shape • recyclable <p><i>(Do not accept 'strong')</i></p>	2x1	(2)

Question Number	Question		
3973_2H_Q01c	<p>The cap is manufactured by injection moulding.</p> <p>Give <u>two</u> reasons why injection moulding is a suitable process to manufacture the cap.</p>		
	<p>Answer</p> <p>Two reasons given from:</p> <ul style="list-style-type: none"> • good surface finish/self finishing • no additional surface finishing required • suitable for high volume/mass/batch production / repeatability • many can be made in one mould • high tolerance/very accurate • colours can be easily changed • unit costs are low once the mould has been paid for • can produce different internal and external form / complex form <p><i>(Do not accept 'easy'/'quick'/'cheap' unless qualified)</i></p>	Part Mark	Total Mark
		2x1	(2)
Question Number	Question		
3973_2H_Q01d	<p>The barrel is made from acrylic.</p> <p>Give <u>two</u> properties of acrylic that make it suitable for the barrel.</p> <p>For each property give <u>one</u> reason why it makes acrylic suitable for the barrel.</p>		
	<p>Answer</p> <p>Property: lightweight Reason: does not make the pen too heavy</p> <p>Property: available in a range of colours Reason: so that the body of the pen can be made in the same colour as the ink inside</p> <p>Property: toughness Reason: will withstand little knocks and bumps</p>	Part Mark	Total Mark

Property: plasticity / easily moulded
Reason: so it can be easily injected into the mould

Property: transparency / see through
Reason: can see how much ink is left/colour of ink

Property: durable
Reason: will withstand weathering/deterioration

Property: non-toxic
Reason: no harm caused to user

Property: waterproof
Reason: does not absorb water
(Do not accept 'strong')

2x1

(2)

Question Number	Question	
3973_2H_Q01e	The end cap is made from a blue material. Explain <u>one</u> reason why the end cap is made from a blue material.	
	Answer	Part Mark Total Mark
	One reason explained from: <ul style="list-style-type: none">• it means that the pen contains blue ink and therefore allows thousands of clear bodies to be made / enables the user to choose the correct coloured pen / know what colour it will write• clear bodies can be made in higher volumes rather than changing the colour of the plastic granules which means that the pens will be cheaper to make and sell• indicates the colour of the ink and therefore saves having to scribble on bits of paper to find out	2x1 (2)

Question Number	Question		
3973_2H_Q01f	<p>The ink tube is manufactured by extrusion. Extrusion is a self-finishing process. Explain why a self-finishing process is used to manufacture the ink tube.</p>		
	<p>Answer</p> <p>One reason explained from:</p> <ul style="list-style-type: none"> the smooth finish achieved by extruding reduces processing costs /time processing time is faster because no secondary finishing is required / final shape is produced <p><i>(Do not accept 'quick'/'easy' unless qualified)</i></p>	<p>Part Mark</p> <p>2x1</p>	<p>Total Mark</p> <p>(2)</p>

Question Number	Question		
3973_2H_Q01g	<p>Two purposes of the ballpoint pen are to:</p> <ul style="list-style-type: none"> • clip onto a shirt pocket when not in use • provide a steady flow of ink <p>Explain, under the following headings, how the ballpoint pen achieves these purposes.</p>		
	Answer	Part Mark	Total Mark
	<p>(i) Clip onto a shirt pocket when not in use One explanation given from:</p> <ul style="list-style-type: none"> • the cap/barrel is shaped/designed to trap/grip/hold the pocket/cloth/material • the small/narrow gap between the clip and the body allows it to trap/grip/hold the pocket edge 	2x1	(2)
	<p>(ii) Provide a steady flow of ink One explanation given from:</p> <ul style="list-style-type: none"> • the ball bearing rotates when in contact with the paper surface and therefore transfers ink from the ink tube onto the paper • the viscosity of the ink allows a constant flow and therefore the ball does not get clogged up disrupting the flow of ink • the ball bearing is held within the nib unit in such a way as to allow it to rotate 	2x1	(2)
		(Total 22 marks)	

Question Number	Question		
3973_2H_Q02a	The drawing shows a screwdriver which has been made by a student in a school workshop. The blade of the screwdriver has been heat treated. Give <u>three</u> health and safety risks associated with heat treatment.		
	Answer	Part Mark	Total Mark
	<p>Three risks given from:</p> <ul style="list-style-type: none"> • burning of yourself/others • fire risk in the workshop • spitting oil/water when quenching • explosion of gases • damage to eyes • inhalation of fumes/gases 	3x1	(3)
Question Number	Question		
3973_2H_Q02b	Several turning processes have been used to manufacture the handle of the screwdriver. The table shows four of the turning processes used to manufacture the handle of the screwdriver. Complete the table by naming the correct process given by each description.		
	Answer	Part Mark	Total Mark
	<p>Processes named:</p> <ul style="list-style-type: none"> (i) Facing (ii) Parallel turning (iii) Taper turning / tapering (iv) Parting off / parting 	4x1	(4)

Question Number	Question		
3973_2H_Q02c	The blade of the screwdriver must be securely joined into the handle. Name <u>two</u> different methods of securely joining the blade into the handle.		
	Answer	Part Mark	Total Mark
	Two different processes named from: <ul style="list-style-type: none"> • interference fit / burning into handle • gluing / chemical welding • welding • brazing/soldering • screw thread • bolts/rivets/screw through handle/blade 	2x1	(2)
Question Number	Question		
3973_2H_Q02d	The handle of the screwdriver is plastic dip coated. Explain <u>one</u> reason for the plastic dip coating of the handle of the screwdriver.		
	Answer	Part Mark	Total Mark
	One reason explained from: <ul style="list-style-type: none"> • the plastic will act as an insulator which means that the user will be protected against electric shocks • the plastic surface will improve the grip and will therefore make it easier undo tight screws • the main body can be coloured and therefore makes it more aesthetically pleasing/easy to identify the screwdriver type 	2x1	(2)
		(Total 11 marks)	

Question Number	Question		
3973_2H_Q03ai	The window frame shown below is made from aluminium, a non-ferrous metal. Give <u>three</u> properties of aluminium, a non-ferrous metal.		
	Answer	Part Mark	Total Mark
	<p>Three properties given from:</p> <ul style="list-style-type: none"> • lightweight • soft • ductile / can be drawn into thin wires • resistant to corrosion in air/atmosphere / waterproof • good surface finish • good conductor of heat/electricity • good strength to weight ratio <p><i>(Do not accept 'strong')</i></p>	3x1	(3)
Question Number	Question		
3973_2H_Q03aii	Give <u>four</u> differences between ferrous and non-ferrous metals.		
	Answer	Part Mark	Total Mark
	<p>Four differences given from:</p> <ul style="list-style-type: none"> • non ferrous metals do not contain iron/carbon • non ferrous metals will not rust • non ferrous metals are not magnetic • non ferrous metals are more ductile • non ferrous metals are generally softer • non ferrous metals generally have a lower melting point • non ferrous metals are generally better electrical conductors <p><i>(Do not accept converse responses eg do not accept 'Ferrous metals are magnetic' if you have already given a mark for 'non ferrous metals are not magnetic')</i></p>	4x1	(4)

Question Number	Question		
3973_2H_Q03b	<p>The hardwood sill is made from mahogany. Explain <u>two</u> advantages of using mahogany rather than pine, as a softwood, for the sill.</p>		
	<p>Answer</p> <p>Two advantages explained from:</p> <ul style="list-style-type: none"> • slower growing / more dense therefore they will last longer • less prone to warping which means it will look better/provide a tighter seal • pine contains knots/resin which will spoil the aesthetics/paintwork which means it will need to be re-painted more often • a harder/tougher material therefore higher resistance to wear / more durable • does not rot as fast as pine therefore does not need replacing as often 	<p>Part Mark</p> <p>2x1 2x1</p>	<p>Total Mark</p> <p>(4)</p>
		(Total 11 marks)	
TOTAL FOR PAPER: 44 MARKS			

