



**Pearson
Edexcel**

Mark Scheme (Results)

Summer 2018

**Pearson Edexcel GCSE
In Design & Technology (5RM02) Paper 1**

**Unit 2: Knowledge and Understanding of Resistant
Materials Technology**

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Summer 2018

Publications Code 5RM02_01_1806_MS

All the material in this publication is copyright

© Pearson Education Ltd 2018

General Marking Guidance

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

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

Question Number	Answer	Mark															
11. (a)	<table border="1"> <thead> <tr> <th></th> <th>Name</th> <th>Use</th> </tr> </thead> <tbody> <tr> <td>ai</td> <td></td> <td>Contains / stores / holds plasters / bandages basic medical supplies Do not accept generic descriptors of first aid kit. (1)</td> </tr> <tr> <td>aia</td> <td>Ear defenders (1) (only answer)</td> <td></td> </tr> <tr> <td>aiii</td> <td></td> <td>Marking / scoring a line parallel to an edge (1)</td> </tr> <tr> <td>aiv</td> <td>Cope and/or drag / moulding flask (1)</td> <td></td> </tr> </tbody> </table> <p style="text-align: right;">4 x 1</p>		Name	Use	ai		Contains / stores / holds plasters / bandages basic medical supplies Do not accept generic descriptors of first aid kit. (1)	aia	Ear defenders (1) (only answer)		aiii		Marking / scoring a line parallel to an edge (1)	aiv	Cope and/or drag / moulding flask (1)		(4)
	Name	Use															
ai		Contains / stores / holds plasters / bandages basic medical supplies Do not accept generic descriptors of first aid kit. (1)															
aia	Ear defenders (1) (only answer)																
aiii		Marking / scoring a line parallel to an edge (1)															
aiv	Cope and/or drag / moulding flask (1)																

Question Number	Answer	Mark
11. (b) (i)	<p>Any two advantages given from:</p> <ul style="list-style-type: none"> • Dense / hard does not dent easily (1) • Flat even surface / excellent surface finish / smooth (1) • Good dimensional stability (1) • Has the same properties in all directions (1) • Easy to finish / paint (1) • Available in large / flat sheets (1) • Knot free / no grain (1) • Will not splinter / splinter free (1) • Tough / withstand impacts (1) <p style="text-align: right;">2 x 1</p>	(2)

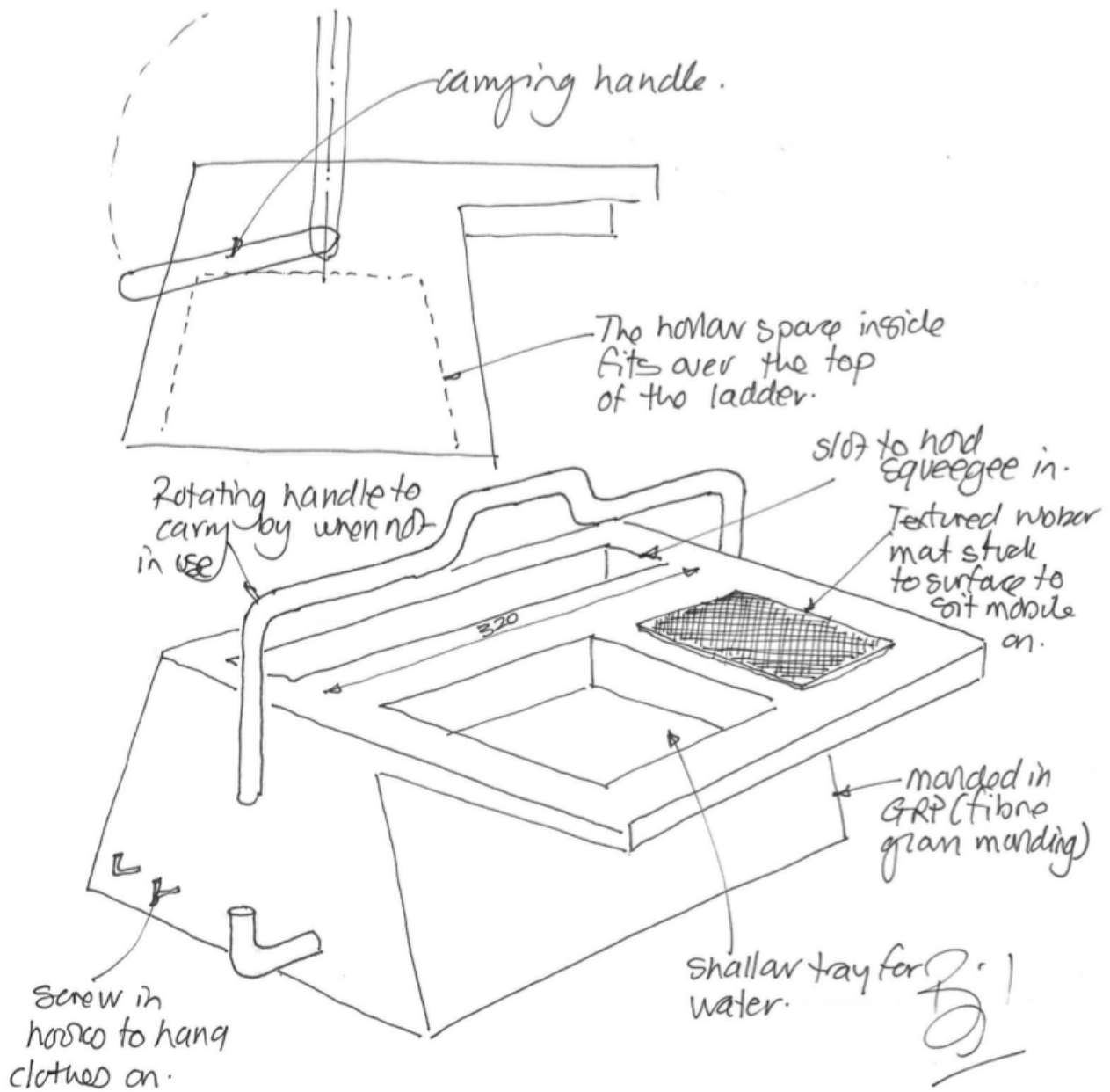
Question Number	Answer	Mark
11. (b) (ii)	<p>Any three health and safety risks given from:</p> <ul style="list-style-type: none"> • The dust can cause breathing / throat / lung problems (1) • Fine particles can cause sore eyes (1) • General dust / particles can cause problems for others in the workshop / slippery floors (1) • Fibres in extraction systems can potentially cause explosions / blow out (1) • You could cut yourself when using saws (1) • You might catch your skin on the glass paper / disc sander/ cause a scratch / remove skin (1) <p style="text-align: right;">3 x 1</p>	(3)

Question Number	Answer	Mark
11. (b) (iii)	<p>Any two advantages explained from:</p> <ul style="list-style-type: none"> • It does not matter which side of the MDF board you use since it is the same on each side / has two smooth sides (1) whereas hardboard has two different textures (1) • MDF is stiffer / more rigid than hardboard (1) which means it will bend / flex less (1) • MDF is better/ easier to finish (1) whereas hardboard has a shiny surface on one side which makes it more difficult to apply any finish (1) <p style="text-align: right;">2 x 1 2 x 1</p>	(4)

Question Number	Answer	Mark
11. (c) (i)	<p>Any two finishes given from:</p> <ul style="list-style-type: none"> • Plastic dip coating / dip coating / plastic coating (1) • Powder coating (1) • Electroplating (1) • Galvanising (1) • Lacquer (1) <p>Do not accept 'painting' of any form.</p> <p style="text-align: right;">2 x 1</p>	(2)

Question Number	Answer	Mark
11. (c) (ii)	<p>Any two reasons explained from:</p> <ul style="list-style-type: none"> • It will make it look nicer (1) which will potentially increase sales (1) • Mild steel will rust / develop a surface oxide (1) so any finish will protect it / make it last longer / more durable (1) • Colours can be applied (1) therefore making it more visually appealing to children / users / increase sales (1) <p style="text-align: right;">2 x 1 2 x 1</p>	(4)

Question Number	Answer	Mark
12.	<p>Design idea 1</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 graphical communication.</p> <ul style="list-style-type: none"> • attach to the ladder (1) e.g. gravity / counterbalance / clips / thumb screws / Velcro • provide a method of holding some water (1) e.g. bucket hooks / hole for bucket / void / well • provide a method of storing cloths (1) e.g. drawers / hooks / tray / net / pouch • include a non-slip surface for resting a mobile phone (1) e.g. moulded textures / matting / rubber dots • be easy to carry when detached from the ladder (1) e.g. cut out space / handle • hold a window squeegee safely (1) e.g. holes / recessed tray / dowel peg / appropriate use of dimensions • be made from waterproof materials (1) e.g. GRP, polystyrene, acrylic components (Do not accept wood/ mild steel unless appropriately finished) • be made using processes available in the school workshop (1) e.g. specific named process that relates to the named material above 	(8)

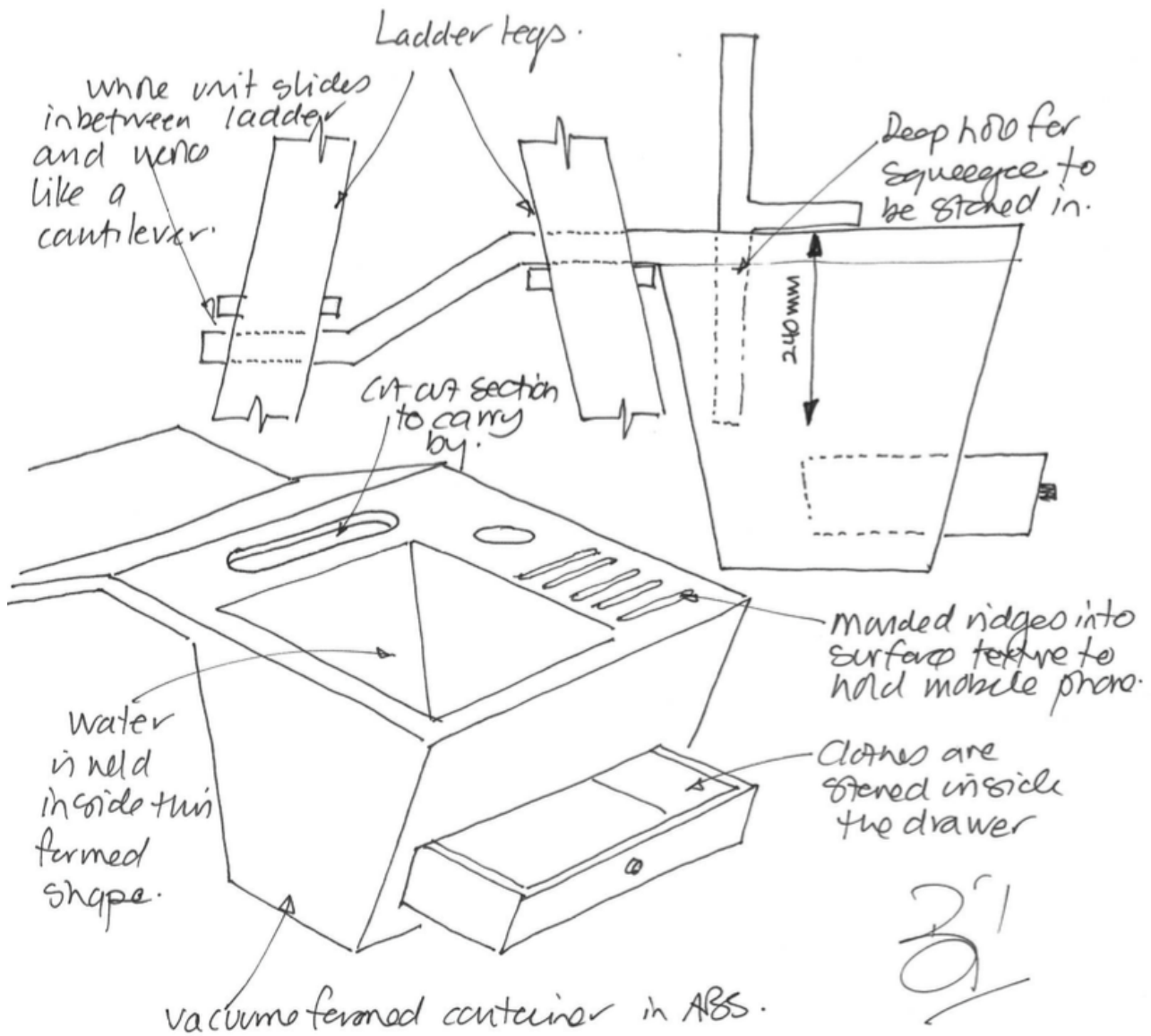


Design idea 2

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

Example of candidate response:

(8)



Question Number	Answer	Mark
13. (a) (i)	Any two properties given from: <ul style="list-style-type: none"> • Hard (1) • Ductile (1) • Malleable (1) • Toughness (1) <p style="text-align: right;">2 x 1</p>	(2)

Question Number	Answer	Mark
13. (a) (ii)	One reason described from: <ul style="list-style-type: none"> • Carbon steel is harder (1) which means it wears better / lasts longer (1) • Carbon steel can have an edge ground on it (1) which means it will be able to cut / shave / sharpen the pencil (1) • Carbon steel can be hardened (1) unlike aluminium which can only be work hardened / alloyed (1) <p style="text-align: right;">2 x 1</p>	(2)

Question Number	Answer	Mark
13. (b)	One reason explained from: <ul style="list-style-type: none"> • It will make it harder (1) and therefore last longer / more durable / retain a cutting edge / will not blunt easily / quickly (1) • It will be able to be ground / sharpened / honed better (1) and therefore will perform better over time (1) <p style="text-align: right;">2 x 1</p>	(2)

Question Number	Answer	Mark
13. (c) (i)	One reason explained from: <ul style="list-style-type: none"> • It has two different sized holes / sharpeners (1) therefore it can fit larger than the ordinary sized pencils (1) • The blades are different sizes (1) which means big / small / thicker / larger diameter sized pencils can be sharpened (1) <p>Do not accept a repeat of the stem</p> <p style="text-align: right;">2 x 1</p>	(2)

Question Number	Answer	Mark
13. (c) (ii)	One reason explained from: <ul style="list-style-type: none"> • There is a plastic cap / case / hollow lid that connects to the pencil sharpener (1) for the waste to fall into / stop it falling on the floor (1) • The small bucket / tube (1) will catch all of the waste / shavings as they come off the pencils (1) <p>Do not accept a repeat of the stem.</p>	(2)

Question Number	Answer	Mark								
13. (d) QWC	<p>Evaluation to address the following issues:</p> <p>Form Why is the product shaped/styled as it is?</p> <table border="1"> <thead> <tr> <th>Pencil sharpener A</th> <th>Pencil sharpener B</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> • Big to hold and collect waste • Able to be taken apart easily so as to be able to empty the ABS case • Textured ribs moulded into the case • Two different sized holes to enable different sized diameter pencils to be sharpened • Bigger and takes up more space </td> <td> <ul style="list-style-type: none"> • Textured grip on the side to make it easier to hold • Clear space around the top by the blade to allow shavings to be removed as they come off the pencil • Has finger and thumb recesses to enable a secure grip • Tapered shape follows the form of the conical pencil tip • Smaller than A but likely to get lost </td> </tr> </tbody> </table> <p>Material and components What materials and components are needed and how should they perform?</p> <table border="1"> <thead> <tr> <th>Pencil sharpener A</th> <th>Pencil sharpener B</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> • Could have a clear / transparent waste collection unit so as to see when it is full • Blades that can be replaced when they are blunt • Injection moulded components can be coloured at the manufacturing stage • Multiple materials • ABS case prone to cracking </td> <td> <ul style="list-style-type: none"> • Low melting alloy for die casting • Fine detail moulded into product as a result of material and process • Replaceable blade • Self-finishing as a result of the process used • Single material • Robust / unlikely to break </td> </tr> </tbody> </table>	Pencil sharpener A	Pencil sharpener B	<ul style="list-style-type: none"> • Big to hold and collect waste • Able to be taken apart easily so as to be able to empty the ABS case • Textured ribs moulded into the case • Two different sized holes to enable different sized diameter pencils to be sharpened • Bigger and takes up more space 	<ul style="list-style-type: none"> • Textured grip on the side to make it easier to hold • Clear space around the top by the blade to allow shavings to be removed as they come off the pencil • Has finger and thumb recesses to enable a secure grip • Tapered shape follows the form of the conical pencil tip • Smaller than A but likely to get lost 	Pencil sharpener A	Pencil sharpener B	<ul style="list-style-type: none"> • Could have a clear / transparent waste collection unit so as to see when it is full • Blades that can be replaced when they are blunt • Injection moulded components can be coloured at the manufacturing stage • Multiple materials • ABS case prone to cracking 	<ul style="list-style-type: none"> • Low melting alloy for die casting • Fine detail moulded into product as a result of material and process • Replaceable blade • Self-finishing as a result of the process used • Single material • Robust / unlikely to break 	(6)
Pencil sharpener A	Pencil sharpener B									
<ul style="list-style-type: none"> • Big to hold and collect waste • Able to be taken apart easily so as to be able to empty the ABS case • Textured ribs moulded into the case • Two different sized holes to enable different sized diameter pencils to be sharpened • Bigger and takes up more space 	<ul style="list-style-type: none"> • Textured grip on the side to make it easier to hold • Clear space around the top by the blade to allow shavings to be removed as they come off the pencil • Has finger and thumb recesses to enable a secure grip • Tapered shape follows the form of the conical pencil tip • Smaller than A but likely to get lost 									
Pencil sharpener A	Pencil sharpener B									
<ul style="list-style-type: none"> • Could have a clear / transparent waste collection unit so as to see when it is full • Blades that can be replaced when they are blunt • Injection moulded components can be coloured at the manufacturing stage • Multiple materials • ABS case prone to cracking 	<ul style="list-style-type: none"> • Low melting alloy for die casting • Fine detail moulded into product as a result of material and process • Replaceable blade • Self-finishing as a result of the process used • Single material • Robust / unlikely to break 									

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

Question Number	Answer	Mark
14. (a)	<p>Any three risks given from:</p> <ul style="list-style-type: none"> • The dust / fibres / particles created from cutting / sanding is harmful to breath in / irritating to the eyes (1) • The glass fibre matting can cause skin irritation (1) • The fumes given off when using the resin / gel coat are harmful and can cause sickness / dizziness / highly toxic (1) • The resin materials are highly flammable (1) • Sharp edges left / exposed when cut / cuts to skin (1) <p style="text-align: right;">3 x 1</p>	(3)

Question Number	Answer	Mark
14. (b)	<p>Any one explanation from:</p> <ul style="list-style-type: none"> • A material made from two or more different materials (1) with enhanced / improved properties (1) • A material such as glass / carbon fibre matting (1) which is held within a resin based material (1) <p style="text-align: right;">2 x 1</p>	(2)

Question Number	Answer	Mark
14. (c)	<p>Any two advantages described from:</p> <ul style="list-style-type: none"> • GRP is a light / lightweight material (1) which means it can be carried / moved around easier / faster by the player (1) • GRP can be moulded into various shapes (1) which means the complex form of the end is easily achieved (1) • Textures / colours can be added during the moulding process (1) which will save time / reduce additional manufacturing costs / time afterwards (1) • GRP has a good strength to weight ratio (1) which means it can withstand the pressure / hitting involved without being too heavy to run around with (1) • GRP is a durable material (1) which means it will withstand any abrasion on Astroturf as it is swept / rubbed across the surface (1) • GRP is a tough material (1) which means it can withstand impact of hitting ball / another stick (1) <p style="text-align: right;">2 x 1 2 x 1</p>	(4)

Question Number	Answer	Mark
14. (d)	<p>Any two reasons explained from:</p> <ul style="list-style-type: none"> • Products can be viewed / seen all round / 3D / see what it looks like / coloured / textures added (1) therefore a true and accurate representation can be gained from the computer model (1) • Designs can be edited / modified / viewed all round on screen without having to redraw / physically modelled (1) which saves time / materials / speeds up any development (1) • Files can be sent electronically via email (1) which saves time / reduces costs / speeds up the whole design and make process (1) • Files can be output to 3D printing / rapid prototyping machines (1) which enables real models to be produced to test / hold / evaluated (1) • Computer simulations such as stress / strain tests can be carried out (1) which will allow the designer to see if the hockey stick will be able to withstand the forces / impacts it will be subjected to when playing (1) <p style="text-align: right;">2 x 1 2 x 1</p>	(4)

Question Number	Answer	Mark
14. (e) QWC	<p>Indicative content</p> <p>Discussion to address the following issues:</p> <ul style="list-style-type: none"> • Lighter products have enabled athletes to travel faster / less fatigue – skis / motorbikes / bikes • More aerodynamic shapes have been made allowing F1 cars the travel faster • Golf clubs have thinner, lighter shafts • Tennis rackets are lighter / stronger allowing them players to hit the ball harder and faster • Prosthetic limbs have allowed disabled athletes to run and take part in numerous sporting events – Paralympics • Boats have been made lighter more streamlined and so can travel faster • F1 cars are now much safer due to the carbon fibre used / helmets / protective equipment • Fishing rods capable of holding bigger / heavier fish • Able to be moulded / manufactured into complex shapes improving ergonomics / wear ability • Can be used to create large / single piece items / boat hulls / car faring • Good weather resistance / improves durability / life expectancy 	(6)

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

