



Pearson

Mark Scheme (Results)

Summer 2017

Pearson Edexcel GCSE
In Design and Technology (5RM02)
Paper 1 Resistant Materials

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General Marking Guidance

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

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

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11. (a)	<table border="1"> <thead> <tr> <th></th> <th>Name</th> <th>Use</th> </tr> </thead> <tbody> <tr> <td>ai</td> <td>Bolt / Hexagonal Bolt (1) (only answers)</td> <td></td> </tr> <tr> <td>aia</td> <td>Adjustable hacksaw / hacksaw (1) (only answers Do not accept saw on its own)</td> <td></td> </tr> <tr> <td>aiii</td> <td></td> <td>Cutting / engraving materials Marking out / scoring (1)</td> </tr> <tr> <td>aiv</td> <td></td> <td>Turning/holding a taper/ second/bottom/ plug/ tap to cut / form a screw thread (1)</td> </tr> </tbody> </table> <p style="text-align: right;">4 x 1</p>		Name	Use	ai	Bolt / Hexagonal Bolt (1) (only answers)		aia	Adjustable hacksaw / hacksaw (1) (only answers Do not accept saw on its own)		aiii		Cutting / engraving materials Marking out / scoring (1)	aiv		Turning/holding a taper/ second/bottom/ plug/ tap to cut / form a screw thread (1)	(4)
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Question Number	Answer	Mark
11. (b) (i)	<p>Two properties given from:</p> <ul style="list-style-type: none"> ▪ Excellent resistance to corrosion/oxidises to protect/water resistant/does not rust (1) ▪ Light/lightweight (1) ▪ Durable (1) ▪ Maintains/keeps high shine/lustre (1) ▪ Free cutting/good machinability (1) ▪ Fluidity/Can be extruded (1) <p style="text-align: right;">2 x 1</p>	(2)

Question Number	Answer	Mark
11. (b) (ii)	<p>Two other non-ferrous materials given from:</p> <ul style="list-style-type: none"> ▪ Brass (1) ▪ Copper (1) ▪ Zinc (1) <p style="text-align: right;">2 x 1</p>	(2)

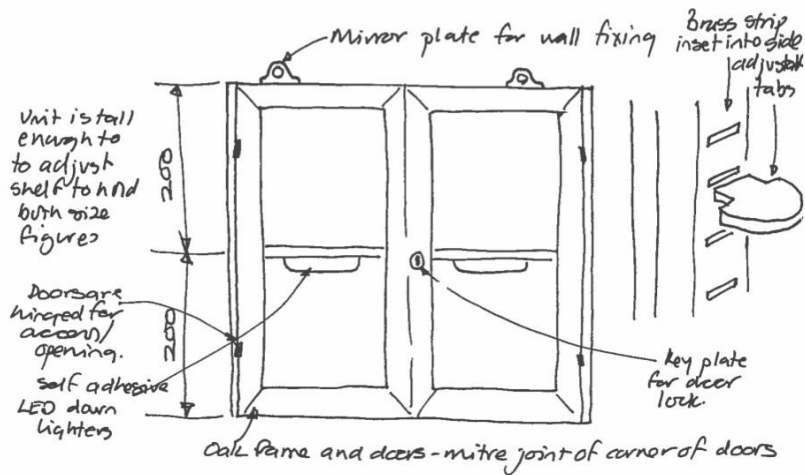
Question Number	Answer	Mark
11. (c)	<p>Any three tools listed from:</p> <ul style="list-style-type: none"> ▪ Pencil (1) ▪ Ruler / tape measure (1) ▪ Marking knife / knife (1) ▪ Try square/combination square (1) ▪ Gauge/marketing gauge (1) ▪ Tenon/Dovetail/Back/Coping saw/Gentleman's saw (only accept 1 type of saw but DO NOT ACCEPT saw on its own)(1) ▪ Chisel (1) ▪ Mallet (1) ▪ Bench hook / G clamp (1) ▪ Vice (1) ▪ G-Clamp/Cramp <p style="text-align: right;">3 x 1</p>	(3)

Question Number	Answer	Mark
11. (d) (i)	<p>Two advantages explained from:</p> <ul style="list-style-type: none"> ▪ More durable (1) therefore pine will last longer (1) ▪ Tougher (1) therefore will withstand any knocks and bumps better (1) ▪ Better resistance to water/moisture (1) whereas MDF will soak up / expand / become useless (1) ▪ Pine is more aesthetic / looks better (1) whereas MDF is plain and has no grain / structure (1) ▪ Easier to cut joints in (1) whereas MDF will crumble because it has no grain / made from fibres (1) ▪ MDF will be significantly weaker than pine (1) when cut into to make the joint (1) ▪ Pine is less dangerous / safer to use than MDF (1) because MDF contains harmful chemicals / gives off fine dust when cut (1) <p style="text-align: right;">2 x 1 2 x 1</p>	(4)

Question Number	Answer	Mark
11. (d) (ii)	<p>Two advantages explained from:</p> <ul style="list-style-type: none"> ▪ Fewer trees will need to be cut down / less deforestation (1) meaning resources will be sustained / last longer / environmental issues (1) ▪ It will stop timber / waste being sent to landfill (1) which means space will not be taken up with too much timber waste / bulk (1) ▪ Energy costs / pollution will be reduced (1) as no seasoning / processing will be required on recycled timber (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"> ▪ be capable of holding at least two small and two large figures (1) e.g. side by side in a row/on top of each other on shelves/use of dimensions ▪ be lockable (1) e.g. key lock/keypad/digital lock ▪ allow them to be easily accessed (1) e.g. Hinge doors, sliding panels / door, lids, ratchet lock ▪ have adjustable shelves (1) e.g. Pegs/brackets/housing slots ▪ include a light source (1) e.g. led/strip light/bulbs ▪ be capable of being fixed to a wall (1) e.g. screwed / hung / mirror plates ▪ be made from material available in the school workshop e.g. specific named material ▪ be manufactured using processes suitable for a one-off (1) e.g. specific named process that relates to the named material above 	

Example of candidate response:

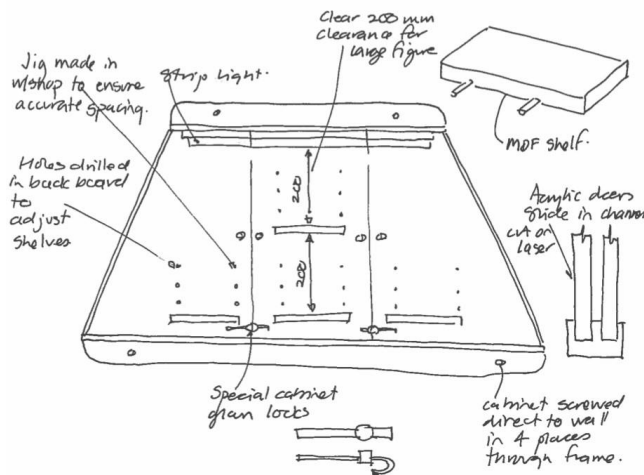


(8)

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)	<p>Two properties given from:</p> <ul style="list-style-type: none"> ▪ Excellent resistance to corrosion (1) ▪ Tough (1) ▪ Can be polished to achieve a high lustre (1) ▪ Turns well on a lathe/machinability (1) ▪ Casts well / good fluidity (1) ▪ High density / heavy (1) ▪ Durable (1) ▪ Good heat resistance (1) <p>(Do not accept good conductor of heat / electricity / strong)</p> <p style="text-align: right;">2 x 1</p>	(2)

Question Number	Answer	Mark
13. (a) (ii)	<p>One reason explained from:</p> <ul style="list-style-type: none"> ▪ Brass is heavier (1) therefore the base will be more stable / less likely to fall over (1) ▪ It is an attractive colour / aesthetic appeal / traditional style lamp (1) whereas acrylic is a more modern material / will not suit style of lamp (1) ▪ Brass is tougher (1) therefore will withstand knocks and bumps better (1) <p style="text-align: right;">2 x 1</p>	(2)

Question Number	Answer	Mark
13. (b)	<p>One reason explained from:</p> <ul style="list-style-type: none"> ▪ PVC is an electrical insulator (1) and so will protect the user against any electric shock / electrocution / safe to touch (1) ▪ There are 3 separate wires in the cable (1) so the PVC sleeve will hold all 3 separate wires together/insulate them from each other (1) ▪ PVC is quite flexible (1) and so it will not crack/break down/crumble as it is moved around (1) ▪ PVC can be coloured (1) and increase/match aesthetically / identify the wire inside (live, neutral/earth) (1) <p style="text-align: right;">2 x 1</p>	(2)

Question Number	Answer	Mark
13. (c) (i)	<p>One reason explained from:</p> <ul style="list-style-type: none"> ▪ It can be moved around (1) which means it can be placed in different areas on the desk (1) ▪ The lampshade is on a hinge / adjustable (1) which means it can be angled/adjusted (1) ▪ The ball and socket joint / hinge can rotate (1) which will allow the lampshade to be tilted/adjusted /moved in all directions (1) ▪ Light will reflect from the inside of the shade (1) spreading across a wide area / surface (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)	<p>One reason explained from:</p> <ul style="list-style-type: none"> ▪ Brass is a heavy material (1) which will provide good stability / be stable (1) ▪ It has a wide base (1) which means there is a lot of surface area in contact with the desk / good balance (1) ▪ The base is larger than the top (1) which provides a low centre of gravity (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. (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>Desk lamp A</th> <th>Desk lamp B</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> ▪ Large heavy base will not fall over ▪ Easily adjustable lampshade ▪ Traditional / old fashioned style ▪ Easy to clean / polish ▪ Takes up more space ▪ Targeted light area </td> <td> <ul style="list-style-type: none"> ▪ Simple / minimalist design ▪ Small and compact ▪ Easy to adjust lamp head / position ▪ Takes up less desk top space/ sits on the edge of the desk / worktop </td> </tr> </tbody> </table> <p>User requirements What makes the product attractive to potential users?</p> <table border="1"> <thead> <tr> <th>Desk lamp A</th> <th>Desk lamp B</th> </tr> </thead> <tbody> <tr> <td> <ul style="list-style-type: none"> ▪ Formal / traditional style ▪ Mains powered / will not run out of power ▪ Professional image banker / lawyer / wealth ▪ Needs to be near a plug socket </td> <td> <ul style="list-style-type: none"> ▪ Lightweight and easily moved ▪ Battery powered / no trailing leads / can be used anywhere ▪ Easily clipped onto a bookshelf / desk / work top edge ▪ Uses LED instead of a bulb / they last longer / cheaper to run ▪ Maintenance issues - batteries need replacing </td> </tr> </tbody> </table>	Desk lamp A	Desk lamp B	<ul style="list-style-type: none"> ▪ Large heavy base will not fall over ▪ Easily adjustable lampshade ▪ Traditional / old fashioned style ▪ Easy to clean / polish ▪ Takes up more space ▪ Targeted light area 	<ul style="list-style-type: none"> ▪ Simple / minimalist design ▪ Small and compact ▪ Easy to adjust lamp head / position ▪ Takes up less desk top space/ sits on the edge of the desk / worktop 	Desk lamp A	Desk lamp B	<ul style="list-style-type: none"> ▪ Formal / traditional style ▪ Mains powered / will not run out of power ▪ Professional image banker / lawyer / wealth ▪ Needs to be near a plug socket 	<ul style="list-style-type: none"> ▪ Lightweight and easily moved ▪ Battery powered / no trailing leads / can be used anywhere ▪ Easily clipped onto a bookshelf / desk / work top edge ▪ Uses LED instead of a bulb / they last longer / cheaper to run ▪ Maintenance issues - batteries need replacing 	(6)
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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) (i)	<p>One other method from:</p> <ul style="list-style-type: none"> ▪ Brazing (1) ▪ Hard/Silver soldering (1) ▪ Soldering (1) <p>(Do not accept any other form of welding – Arc / MIG)</p> <p style="text-align: right;">1 x 1</p>	(1)

Question Number	Answer	Mark
14. (a) (ii)	<p>Two reasons explained from:</p> <ul style="list-style-type: none"> ▪ Easily cut and shaped / bent (1) which means it can be manipulated / formed quite easily (1) ▪ Can have a variety of surface finishes applied (1) which means it can be finished to suite different markets / price points (1) ▪ It can be recycled (1) which means less virgin material needs to be produced / reduces demand on raw materials / less waste sent to landfill (1) ▪ It has good compressive strength (1) which means it can withstand heavy weights (1) ▪ Relatively lightweight / hollow tubes (1) which means it is easy to move around / carry (1) ▪ Good strength to weight ratio (1) therefore will hold the weight of the user <p>(Do not accept strong)</p> <p style="text-align: right;">2 x 1 2 x 1</p>	(4)

Question Number	Answer	Mark
14. (b)	<p>Two descriptions from:</p> <ul style="list-style-type: none"> ▪ Heat / welding mask / shield / goggles should be worn (1) to avoid arc eye / damage to eyes / sparks / burns(1) ▪ Tinted goggles / mask (1) to avoid arc eye / damage to eyes (1) ▪ Ensure welding screens / curtains are closed (2) therefore no risk to others of arc eye / damage to eyes (1) ▪ Gloves should be worn (1) to avoid any burns to hands / splatter from welding (1) ▪ Apron should be worn (1) to prevent clothing catching fire (1) ▪ Any gas bottles should be stored correctly / chained up (1) to prevent them falling over / run the risk of exploding (1) ▪ Any gas bottles should be fitted with non-return valve (1) to reduce the risk of any 'blowback' / explosions (1) ▪ Extraction / ventilation system should be provided (1) to remove harmful fumes / gases from work area (1) ▪ Fire extinguisher/blankets should be provided (1) to put out any fires (1) <p style="text-align: right;">2 x 1 2 x 1</p>	(4)

Question Number	Answer	Mark
14. (c)	<p>Two reasons explained from:</p> <ul style="list-style-type: none"> ▪ All parts will slot / be held in place/easily repeated (1) therefore reducing manufacturing time / increasing accuracy/efficiency / reduces movement (1) ▪ It will be held in the correct place/aligned (1) therefore no measuring out needs to happen (1) ▪ It will be square / correct angles (1) therefore will be correct shape / size (1) ▪ It will be held flat (1) therefore will not twist / change shape / move when it is being welded (1) ▪ Reduces the need to hold it manually (1) therefore reducing the risk of burns to hand / fingers (1) <p style="text-align: right;">2 x 1 2 x 1</p>	(4)

Question Number	Indicative Content	Mark
<p>14. (d) QWC</p>	<p>Indicative content Discussion to address the following issues:</p> <p>Advantages</p> <ul style="list-style-type: none"> ▪ Can test weights/destructive testing ▪ Can simulate production times ▪ Calculate material costs ▪ Files can be transferred electronically ▪ Ideas easily edited/amended ▪ Library of standard components/stock size materials ▪ Anthropometrics/Ergonomic data accessed via databases ▪ Can be output to 3D printing ▪ Can view design from all angles ▪ Colours and textures can be changed easily ▪ Easily dimensioned for cutting lists ▪ No need to purchase modelling materials ▪ Reduced demand on resistant / compliant materials for modelling <p>Disadvantages</p> <ul style="list-style-type: none"> ▪ High cost/expensive set up ▪ Highly skilled operative required / training issues ▪ Power-cuts can lose work/loss of files if not backed up ▪ Unable to physically test until prototype is produced ▪ Continual development/upgrade of software/hardware required ▪ Potential threat of hacking / cyber theft / ransom <p>(Cap marks at a maximum of 4 if candidates only present advantages or disadvantages and not both)</p>	<p style="text-align: center;">(6)</p>

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