Mark Scheme (Results)

Summer 2025

Pearson Edexcel GCSE
Design Technology
Paper 1A: Metals

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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.

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Component 1 mark scheme

Section A – Core content

Question number	Answer	Additional guidance	Mark
1 (a) (i)	Any **one** property from: • Soft (1) • Insulator of heat (1) • Flexible/flexibility (1) • Warm (1)	Do not accept 'Insulator' on its own	(1)

Question number	Answer	Additional guidance	Mark
1 (a) (ii)	Any **one** property from: • Stiff / rigid / hard (1) • Waterproof / water resistant / stain resistant / non-absorbent (1) • Food safe / non-toxic (1) • Good heat resistance (1) • Good UV resistance (1) • Lightweight (1)	Do not accept the following on their own: 'Can be recycled' 'Durable' 'Light' 'Strong'	(1)

Question number	Answer	Additional guidance	Mark
1 (a) (iii)	Any **one** property from: • Good insulator of heat (1) • Good impact resistance (1) • Printability / takes colour well (1) • Food safe / non-toxic (1)	Do not accept the following on their own: 'Insulator' 'Recyclable'	(1)

Question number	Answer	Additional guidance	Mark
1 (a) (iv)	Any **one** property from: • Corrosion resistance / will not rust (1) • Good fluidity / casts well (1) • Malleability (1)	Do not accept: 'Durable	(1)

Question number	Answer	Mark
1 (b) (i)	Any **one** other property of oak that makes it a suitable choice of material for the floorboards (1) and a linked justification of that property (1) • Oak is hard (1) therefore it will withstand abrasive wear from being walked over / on / furniture placed / moved on it (1) • Oak is durable / hardwearing (1) therefore it will be able to withstand abrasive wear / damage from being walked on (1)	(2)

Question number	Answer	Additional guidance	Mark
1 (b) (ii)	A calculation that includes: • correct working out of cost 57.6 / 1.44 (1) • correct answer £40 or £40.00 (1) ECF Award 1 mark if candidates show 1.44 / 57.6 = 0.025 or Award 1 mark if candidates show $57.6 / 1.44^2$ = 27.70 to 27.80	Award full marks for correct numerical answer without working. Allow ECF if candidate gets part of calculation wrong.	(2)

Question number	Answer	Additional guidance	Mark
2 (a)	Any **one** property of copier paper that makes it an appropriate choice of material for the origami rabbit from: • Flexibility (1) • Bendability / easy to bend (1) • Easily creased / holds shape when folded (1) • Biodegradability (1) • Foldability / easy to fold / easily folded / easily foldable (1)	Do not accept 'Foldable' or 'Folded' on their own	(1)

Question number	Answer	Additional guidance	Mark
2 (b)	Any **one** advantage explained of using recycled copier paper to manufacture the origami rabbit (1) and a linked justification of that advantage (1) • Using recycled paper will reduce the need to make new paper / reduce environmental damage / is more sustainable / lowers carbon footprint (1) which reduces the need for cutting down trees to make the pulp required for paper production / reduces deforestation / reduces energy consumption / emissions (1) • Recycling paper stops it going to landfill / being thrown away / reduces waste (1) which keeps the space in landfill available for materials that cannot be recycled (1)	Do not accept 'Recycled' on its own	(2)

Question number	Answer	Additional guidance	Mark
2 (c)	Any **one** feature explained of how SMAs can be used to animate the origami rabbit (1) and a linked justification for that feature (1) • SMAs can be added / connected to the ears / nose / head / tail (1) which can be made to twitch / spring / straighten / fold when activated / heated / cooled / deformed (1) • SMAs can be added / connected to the legs / front paws / arms (1) which can create the impression of the rabbit hopping when activated / heated / cooled / deformed (1) Marking points can be accepted in reverse	Do not accept any reference to 'Move' on its own	(2)

Question number	Answer	Additional guidance	Mark
2 (d)	A calculation that includes: • correct calculation for the area of the standard sheet of A4 paper (Step 1) 29.7 x 21.0 = 623.7 cm^2 (1) • correct calculation for area of the square sheet (Step 2) 21.0 x 21.0 = 441 cm^2 (1) • correct calculation of waste percentage (Step 3) ((623.7 – 441) / 623.7) x 100 = 29.29(2929)% (1) • Correct answer rounded to 29% (Step 4) (1) Alternative method for Steps 2 and 3: • correct calculation for waste area cut off (Step 2) (29.7 - 21.0) x 21 = 182.7 cm^2 (1) • correct calculation of waste percentage (Step 3) (182.7 / 623.7) x 100 = 29.29% (1)	Award full marks for correct numerical answer without working. Allow ECF if candidate gets part of calculation wrong. Award one mark for the correct rounding of an ECF calculation.	(4)

Question number	Answer	Mark
3 (a)	Award **one** mark from: • Resistor (1) • Fixed resistor (1) Do not accept: • Variable resistor • Preset resistor • Surface mount resistor	(1)

Question number	Answer	Mark
3 (b)	Any **one** advantage for the manufacturer of making the electronic circuit in batches of 1,000 (1) and a linked justification for the advantage (1) • A batch of circuit boards will take a set amount of time to manufacture (1) therefore the manufacturer can plan how to make best / efficient use of their time / machines / staffing (1) • Any changes in component / material prices can be reflected when a new batch is ordered / manufactured (1) therefore the manufacturer does not have to bear / stand any price increases (1) • If faults are found in a batch of completed / assembled circuit boards modifications can be made / products do not sell (1) therefore material / components wastage / financial loss is kept to a minimum (1) • The manufacturer does not need to buy lots of stock (1) therefore they do not have to invest / tie up money in stock / storage space (1) • The manufacturer can bulk buy components / get discounts (1) therefore being able to take advantage of economies of scale / pass on savings to the customer (1)	(2)

Question number	Answer	Additional guidance	Mark
3 (c)	A calculation that includes: • Correct calculation of number of circuit boards that can be cut from the larger sheet (32 / 4) x (16 / 4) = 8 x 4 = 32 (1) • Correct calculation of cost of one circuit board £3.20 / 32 = £0.10 or 0.1 (1)	Award full marks for correct numerical answer without working. Allow ECF if candidate gets part of calculation wrong.	(2)

Question number	Answer	Mark
3 (d)	Any **one** advantage of using batteries (1) and a linked justification of the advantage (1) • They do not need to be plugged into a mains power source / require a cable (1) which means the device is free to be used anywhere / fully mobile / portable (1) • The batteries are a small / discrete component (1) which means they do not take up too much space within the circuit / product (1) • You can use rechargeable batteries (1) which means one set can be used again and again (1) • You can use the voice recorder in remote areas / campsites / beach / power cuts (1) because it does not need to be plugged into the mains power supply (1) • The batteries can simply be replaced with new ones (1) which means no time is wasted having to wait to charge it / can be used straightaway (1)	(2)

Question number	Answer	Mark
3 (e)	Any **two** benefits of using HIPS for the case of the Sing Along Box (1) and a linked justification of that benefit (1) • HIPS is lightweight / has a low density (1) therefore it will be easier for young children to carry / move it around / it is portable (1) • HIPS has good / excellent impact resistance / tough (1) therefore if the box is dropped the contents inside will be protected from damage / the box is unlikely to break (1) • HIPS does not absorb water / is waterproof (1) therefore it can be easily cleaned / wiped down without any risk of damaging the materials / moving / working parts / electronic circuit (1) • As a thermoplastic / thermoforming polymer HIPS can be formed / moulded (1) therefore it is capable of being used to form complex shapes / forms / intricate details (1)	(4)

Question number	Answer	Mark
4 (a)	Any **two** explanations of a working characteristic of stainless steel (1) and a linked justification of that characteristic (1) • Stainless steel is corrosion resistant / rust proof / non-toxic (1) therefore it will not be affected by the corrosive salt / react with / contaminate the contents / surface will not become blemished / food safe (1) • Stainless steel has good torsional resistance (1) therefore it will not distort / twist when the grinder is rotated (1) • Stainless steel is hard (1) which means it will withstand the abrasive wear / scratching from grinding the salt / will not wear / will extend life span of product (1)	(4)

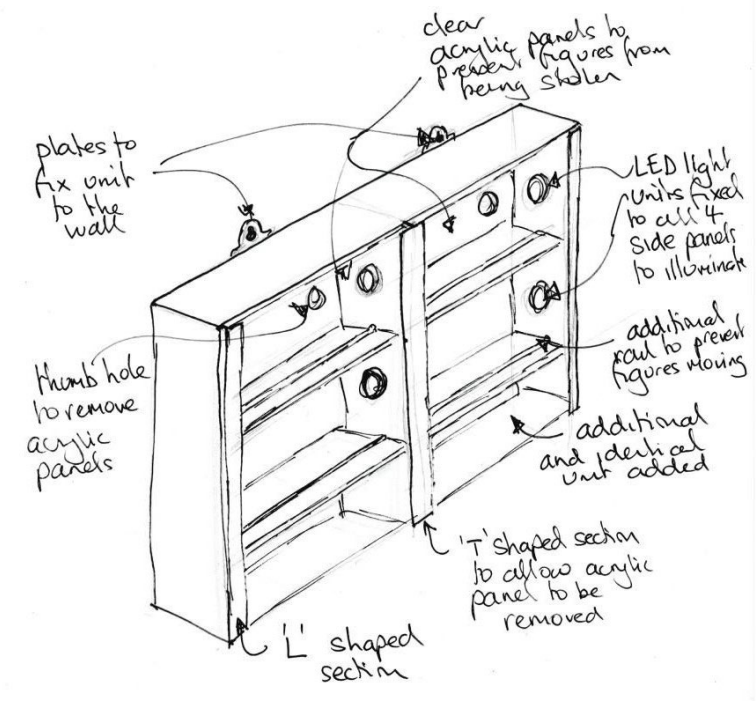
Question number	Answer	Additional guidance	Mark
4 (b)	A calculation that includes: • Correct calculation of the percentage of material that CANNOT be recycled 100 – 80 = 20 % (1) • Correct calculation of the weight of material that CANNOT be recycled (20 / 100) x 270 = 54 grams (1) ECF Award 1 mark for an answer of 216 grams which is what 80% represents	Award full marks for correct numerical answer without working. Allow ECF if candidate gets part of calculation wrong. 216 alone with no working out is zero marks.	(2)

Question number	Indicative content	Mark
4 (c)	• Designers can see / get a better idea of how products work when they are taken apart • Designers can see / draw each individual part that they may be able to improve / refine / combine / design them out / combine them into one individual part • Designers may be able to introduce standardised components into their new designs • Designers can look at ways of trying to reduce material usage / wastage when designing a new product • Designers can take measurements of existing products • Designers can look at how they might improve the assembly / manufacture of a new product to reduce time • Designers take inspiration that they can use in their own work • Designers can analyse / evaluate the materials that have been used • Designers can get to see the intricate workings of the product • Designers are able to evaluate products in terms of working out / discovering what is wrong with them / identify flaws • Designers can work out how they can be improved / made more reliable / energy efficient	(6)

Level	Mark	Descriptor
	0	
Level 1	1 - 2	• Attempts to interrogate and deconstruct information but connections and logical chains of reasoning are flawed. • An unbalanced appraisal of the information/issues, containing judgements that show a limited awareness of the interrelationships between factors or competing arguments.
Level 2	3 – 4	• Interrogates and deconstructs information and provides some connections and logical chains of reasoning. • A balanced appraisal of the information/issues, containing judgements that show an awareness of the interrelationships between factors or competing arguments.
Level 3	5 - 6	• Interrogates and deconstructs information and provides sustained connections and logical chains of reasoning. • A well-balanced appraisal of the information/issues, containing judgements that show a thorough awareness of the interrelationships between factors or competing arguments.

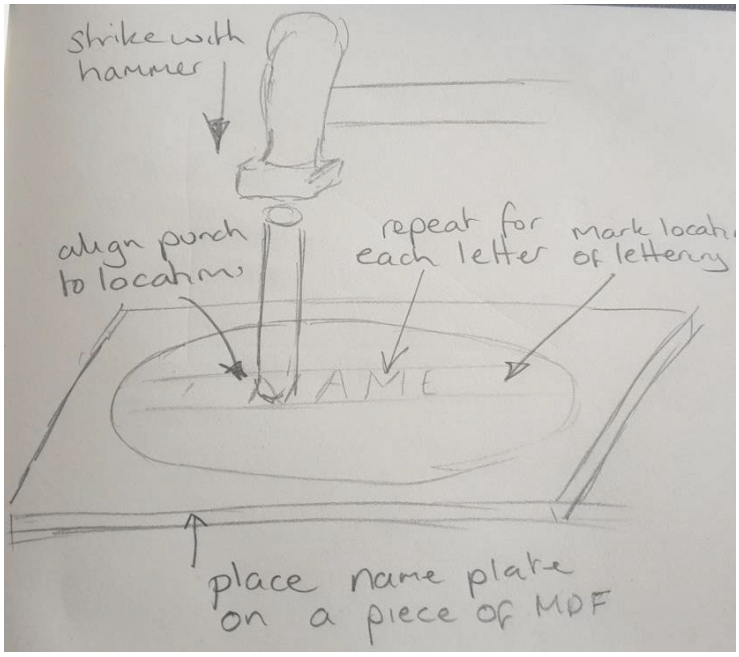
Section B – Metals

Question number	Answer	Mark
5 (a)	Marks will be awarded for understanding of design and technology, not graphical skills. Notes and sketches that include: • be able to display an additional four collectable figures (1) and include a method to stop them falling off the shelves (1) e.g. unit is made taller / wider to show extra four spaces and double sided tape / glue dots / slots / recessed grooves / lipped front edge ('door' will also attract credit for stopping the figures falling off the shelf) • include a method to stop the collectable figures from being stolen (1) that still allows them to be seen (1) e.g. hinged / sliding doors & lock / lockable / padlock / hasp and staple and clear acrylic / glass screen • be capable of being fixed to a wall (1) and include a lighting system (1) e.g. screws / bolts / wall / flat plates / hooks and LEDs / neo pixels / bulbs / strip lights (reference to 'lights' generically without any subsequent graphical indication or reference to wiring does not attract a mark)	(6)

	Example of candidate response:  Notes: • Additional rail to prevent figures moving / falling off shelves • L shaped sections and T shaped section to allow acrylic panel to be removed • Clear acrylic panel to prevent figures being stolen • Thumb hole to remove acrylic panels • Additional and identical unit added • LED lights fixed to all four side panels to illuminate • Plates to fix unit to the wall	

Question number	Answer	Mark
5(b)	Any **two** explanations that include a way the number play set meets or fails to meet the requirement (1) and a linked justification of that way (1) • There is a full set / lots of numbers and maths symbols (1) therefore the child will be able to make up lots of different sums / equations (1) • The numbers are all very clear / easy to read (1) therefore there can be no confusion as to what the number is / 6 and 9 cannot be confused (1) • Helps teach them about how the numbers look / differentiate numbers / symbols (1) without the need of having to be able to write (1) • The numbers are easily moved around / rearranged (1) therefore they can learn that some problems / calculations have the same answer (e.g. 6 x 4 = 24 and 4 x 6 = 24) (1) • There might not be enough numbers / symbols to make up some questions / answers [e.g. 11 x 11 = 121 (1) so the set will not be very useful as you will not be able to make the correct answer since you need 6 1s and there are only 3 in the set] (1) / therefore some extended types of calculations will not be able to be completed (1) • Some of the numbers / symbols might get lost (1) therefore you will not be able to carry out a full range of sums / equations (1) • The plus / multiply symbols are quite similar (1) therefore the child might get confused as to what the sum / equation actually is (1) • There is one disc that is the greater / less than symbol which the child might not be able to identify (1) therefore they may not understand what the purpose of the question / task is (1)	(4)

Question number	Answer	Additional guidance	Mark
6 (a)	Any **two** explanations for using mild steel for the desk tidy (1) and a linked justification (1) • Mild steel has good structural stability / rigidity when folded (1) therefore it will retain its shape (1) • Mild steel is available in large sheets (1) therefore pieces of metal do not need to be joined together to make a panel / piece big enough for the various panels (1) • Mild steel is a plain grey colour / can be finished in a number of ways (1) therefore it can be customised / colours to increase potential sales / appeal to a wider audience / increase aesthetic appeal (1) • Mild steel is relatively cheap / cost effective (1) therefore it keeps the overall cost of the product down (1) • Mild steel is easily machined / formed / malleable (1) therefore the dividers can be cut with accuracy / bends made to the correct angle (1) • Mild steel is readily available (1) can be purchased in large volumes for mass production (1) • Mild steel parts can joined using a range of permanent methods (1) therefore the sides / dividers can be attached and will not come apart when in use (1)	Do not credit 'Cheap' or 'Lightweight' on their own Do not credit 'Durable'	(4)

Question number	Answer	Additional Guidance	Mark
6 (b)	Marks will be awarded for understanding of design and technology, not graphical skills. Notes and sketches that include: • Place copper name plate on a piece of MDF / scrap wood / stamping block (1) • Apply engineers' blue to the copper (1) • Mark out locations for each letter (1) • Align punches with locations of each letter (1) • Strike / punch with a hammer (1) Example of candidate response:  Notes: • Place name plate on a piece of MDF • Mark location of lettering • Align punch to locations • Strike with a hammer	Cap at 3 marks if no sketches or all sketches and no notes	(4)

Question number	Answer	Mark
6 (c)	Any **one** explanation of a physical characteristic of copper (1) and a linked justification of the characteristic (1) • Copper is an orange / gold / pale colour (1) which means that it will compliment most desk areas / offices (1) • Copper can be highly polished (1) which creates a very pleasant / nice aesthetic appearance (1)	(2)

Question number	Answer	Mark
6 (d)	Any **two** explanations that include a method of assembly (1), plus two linked justifications of that method (1) + (1) Rivets / riveting (1) • Rivets would secure the name plate in place using compression (1) as the rivet is passed through holes in both parts and compressed to form a second rivet head on the inside face (1) Pop rivets / pop riveting (1) • Pop rivets would only need to be accessible from the front side of the desk tidy (1) which is effective for joining thin sheets of material together (1) Adhesives / adhering / glue / gluing (1) • Adhesive / glue forms a bond between the two different types of metal (1) as layers of adhesive / glue are applied and pressure applied until the nameplate is secure (1) Tape / taping (1) • Tape can be applied quickly / with no drying time (1) as it can be attached to each piece / pushed together / doesn't need clamping (1) Mechanical fixings / machine screws (1) • Using nuts / washers would compress the two parts together (1) as the nut / washer is tightened onto the bolt / machine screw to secure / provide a firm connection between the parts (1)	(6)

Question number	Answer	Additional Guidance	Mark
7 (a)	Award **one** mark from: • Hacksaw (1) • Adjustable hacksaw (1) • Full-size hacksaw (1) • 300mm hacksaw (1) Award different / phonetic spellings of hacksaw, including (there are other variations): • Hack saw • Hac saw • Haksar • Hacsar	Do not accept 'Junior hacksaw'	(1)

Question number	Answer	Mark
7 (b)	Any **two** benefits for the manufacturer of using stock materials (1) plus a linked justification of the benefit (1) • It means the materials will be widely / readily available / can be bulk purchased / do not have to be machined to a specific non-standard size (1) therefore the materials will be cheaper / reducing overall costs / improve profit margin (1) • The manufacturer does not need to have / hold lots of different sized materials (1) which reduces the need for cutting / machining / reducing waste / machining time / processes (1) • Machines do not have to be reset each time a different sized material is used (1) therefore it helps to reduce the manufacturing time / speed up manufacturing / reduce potential errors that might be introduced (1)	(4)

Question number	Answer	Additional guidance	Mark
7 (c)	A calculation that includes: • Conversion of units at any stage (1) • Calculation of the cost of Part number 1 and 2 (1) 2 at 100 mm = 200 mm or 0.2 m x 2.80 = £0.56 • Calculation of the cost of Part number 3 (1) 1 at 75 mm = 75 mm or 0.075 m x 2.80 = £0.21 • Calculation of the cost of Part number 4 (1) 3 at 100 mm = 300 mm or 0.3 m x 3.30 = £0.99 • Total cost of the material (1) 0.56 + 0.21 + 0.99 = £1.76 Any response of £1760 or £17.60 or equivalent without any working out shown must be awarded 0 marks	Award full marks for correct numerical answer without working. Allow ECF if candidate gets part of calculation wrong. £1760 or £17.60 are partially correct answers given some incorrect conversion of units has taken place but can be awarded 4 marks	(5)

Question number	Answer	Additional guidance	Mark
7 (d)	Any **two** explanations that include a benefit of using powder coating (1), plus two linked justifications of that benefit (1) + (1) • The powder coating will provide a waterproof finish (1) which means that any water / rain will be repelled from the surface (1) therefore it will not contact the steel / prevent corrosion (1) • The powder coating will provide a tough surface finish (1) which will protect the steel when it is hung up (1) therefore prolonging the life of the product (1) • The powder coating can be applied in a solid colour (1) which results in a more aesthetic / nicer looking product (1) therefore resulting in greater sales (1)	Do not accept anything related to a smoother surface	(6)

Question number	Answer	Additional guidance	Mark
8 (a)	Any **one** explanation of a physical characteristic of aluminium (1) and a linked justification of that characteristic (1) • Aluminium is a low density material (1) therefore it will not make the tool box excessively heavy (1) • Aluminium is a non-magnetic material (1) therefore tools that contain magnets will not become attached to the sides / base of the toolbox (1) • Aluminium is corrosion resistant / will not rust (1) therefore it will not deteriorate / fall apart / collapse if used outside (1)	Do not credit 'Lightweight' or 'Light'	(2)

Question number	Answer	Mark
8 (b)	Any **one** explanation of an issue associated with the ecological footprint of using titanium (1) plus two linked justifications of that explanation (1) + (1) • Titanium ore is extracted using mining / open cast mining (1) which destroys local landscapes / countryside / deforestation (1) meaning that animal habitats are destroyed (1) • The extraction of titanium from ore uses chlorine gas (1) which results in the emission of greenhouse gases (1) therefore contributing to climate change (1) • The production of titanium uses large amounts of water (1) which results in impurities / contamination entering the water (1) therefore affecting locals / wildlife (1) • The production of titanium involves high-temperature reactions (1) therefore a large amount of energy is required (1) which contributes to greenhouse gas emissions (1)	(3)

Question number	Answer	Mark
8 (c)	Any **two** reasons for manufacturing the parts of the tool box to a tolerance (1) and a linked justification (1) • The length of the linkages need to be of a certain dimension (1) otherwise they will not be long enough to allow the aluminium compartments to hinge open / closed correctly (1) • The shape and size of the aluminium compartments must be formed / cut / finished to a certain size (1) otherwise they will not move in and out freely (1) • The handle must be positioned within a certain set of dimensions (1) otherwise the tool box might not be balanced when it is picked up (1) • The holes for the fixings must be manufactured to the correct size (1) so that the separate pieces can fit in correctly / neatly (1) • Identical parts / lid / linkages / compartments (1) therefore they will be interchangeable / will fit into / onto any toolbox when assembled (1)	(4)

Question number	Indicative content	Mark
8 (d)	Impact on **cost factors** in relation to: • Aluminium is available in a range of grades and alloys which allows the quality of the material to be specified to meet the requirements of the toolbox • Aluminium may contain impurities which will affect how it performs against its intended function • Aluminium has a smooth surface finish that is free from defects such as pits, scratches or cracks which leads to a high quality finish • Aluminium has consistent properties which means that there will be no weak points in the toolboxes • Aluminium is malleable which allows for the compartments to be manufactured with sharp corners without the metal fracturing / cracking • Aluminium is supplied in sheets which are of consistent thickness which reduces the need to alter manufacturing processes / tool settings • There will be lots of processing of the aluminium to manufacture the tool box into the shapes of the various parts from the original supply in the form of sheets, it will need to be cut, formed and finished with smooth edges • Products of this nature tend to be produced in large batches using automated machinery due to the standardised nature of the various parts that make up the tool box • The tool compartments need to be formed accurately so that the whole of the tool box can fit together when closed • The holes for fixings for the linkages will need to be either drilled or punched meaning that some secondary machining processes will be needed • Fixings will need to be used to hold the linkages in place and to allow for movement of the tool compartments • Due to batch production stages / steps should be planned so as to maximise machine processes / times / set up • The choice of surface finish needs to be considered so that it is hardwearing and does not become damaged by the repeated putting in and removal of tools • The cost of the tool box will be affected by the price of the various materials at the London Metal Exchange as fluctuations in the cost of raw materials will need to be passed on to customers	(9)

Level	Mark	Descriptor
	0	
Level 1	1 - 3	• Attempts to interrogate and deconstruct information but connections and logical chains of reasoning are flawed. • An unbalanced appraisal of the information/issues, containing judgements that show a limited awareness of the interrelationships between factors or competing arguments. • A conclusion may be presented but it is likely to be generic assertions rather than supported by relevant judgements.
Level 2	4 – 6	• Interrogates and deconstructs information and provides some connections and logical chains of reasoning. • A balanced appraisal of the information/issues, containing judgements that show an awareness of the interrelationships between factors or competing arguments. • A conclusion is presented that is partially supported by relevant judgements.
Level 3	7 - 9	• Interrogates and deconstructs information and provides sustained connections and logical chains of reasoning. • A well-balanced appraisal of the information/issues, containing judgements that show a thorough awareness of the interrelationships between factors or competing arguments. • A conclusion is presented that is fully supported by relevant judgements.