

Mark Scheme Summer 2009

GCE

GCE D&T (6RM02/01)

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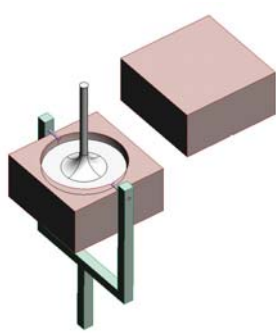
1.	6RM02 Mark Scheme	5
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6RM02 Mark Scheme

Question Number	Answer	Mark
1(a)	<ul style="list-style-type: none">• Rotational moulding ensures an even spread of plastic throughout the shape (1)• The chair can be moulded as a hollow shape (1)• The round shape lends itself to particularly well to rotational moulding (1)• Allows for seamless parts (1)• Eliminates sharp corners (1)• Allows moulding to have some degree of undercut (1)• Ideal process for forming larger plastic items (1) (2 x 1)	(2)

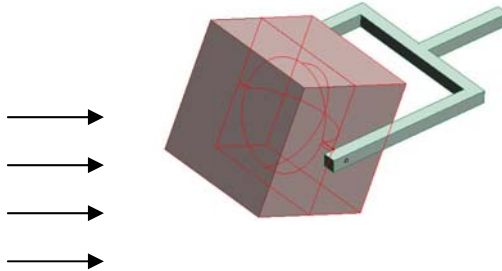
1(b)

Any 6 points from notes and/or diagrams



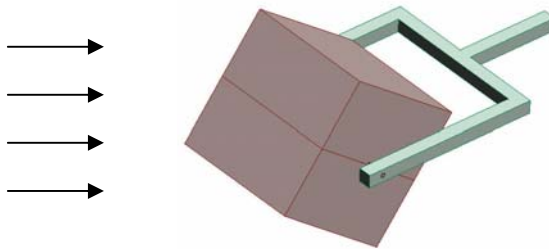
Stage 2

Heat

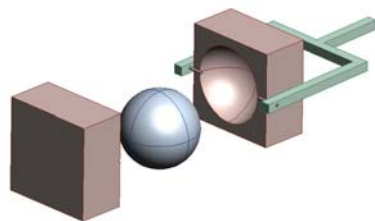


Stage 3

Cold



Stage 4



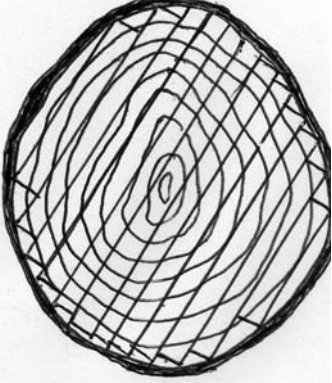
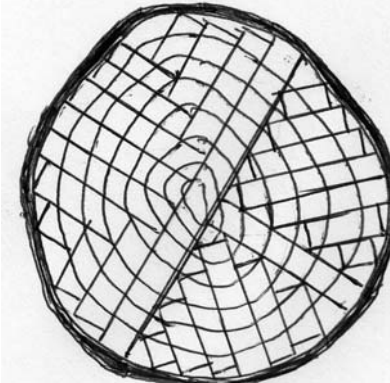
- Mould is opened and filled with plastic powder (1)
- Mould is rotated around a central point(1) in three planes (360 degrees) (1)
- Heated to melt the plastic powder (1)
- Plastic is evenly distributed throughout the mould (1)
- Mould continues to rotate (1) and is cooled to solidify the plastic (1)
- Mould is opened and product removed (1)

(6)

1(c)	<ul style="list-style-type: none"> • Once the mould has been made, batches or continuous production can take place (1) at minimal cost per item (1) • Little waste material is produced (1) therefore minimal cost per item (1) • A range of colours can be produced (1) from the same mould therefore minimum down time (1) • After the initial high cost of setting up (1) numerous different moulds can be used (1) making the process very flexible (1) • The accuracy of the mould (1) results in the consistency of the product produced remaining high (1) • Due to relatively slow speed(1) less suitable for high volume production (1) <p style="text-align: right;">(4 x 1)</p>	(4)
	Total for question	(12)

Question Number	Answer	Mark
2(a)	<ul style="list-style-type: none"> • Check that the drill bit is tight in the chuck (1) • Check that the speed is correct (1) • Check the work table is secure (1) • Check that the work is held securely (1) • Check the emergency stop mechanism works (1) • Check guards are in position (1) • Check correct safety clothing is worn (1) • Check for loose items/hair tied back (1) • Check chuck key is removed (1) • Check operator has had correct training (1) • Check regular maintenance has been carried out (1) • The area is clear of obstructions (1) • The use of dust extraction (1) (3 x 1) 	(3)
2(b)	<ul style="list-style-type: none"> • The CNC machines are generally fully enclosed (1) unmanned (1) therefore there is generally less direct manual contact with the machine (1) • CNC machines run simulations before machining commences (1) therefore the operator can tell whether the process is viable and safe to run (1) • Safety cut-out switches are fitted to the CNC machine doors (1) which means the operator cannot open the doors during production (1) • CNC machines often have built-in extraction (1) reducing the hazards associated with dust (1) • Human tiredness/error (1) can lead to injuries/accidents (1) (4 x 1) 	(4)

2(c)	<ul style="list-style-type: none"> • Products can be manufactured at speed (1) • They provide operational flexibility (1) • They allow quick response manufacturing (1) • Production of complex shapes is possible (1) • Saved data can be downloaded whenever a new batch is required (1) • Orders and material requirements can be linked (1) • CAM allows automated materials handling (1) • CNC machines can run continuously 24/7 (1) • One person can supervise numerous machines (1) • Accuracy of production (1) • Reduced waste (1) • Reduced human error (1) <p style="text-align: right;">(5 x 1)</p>	(5)
	Total for question	(12)

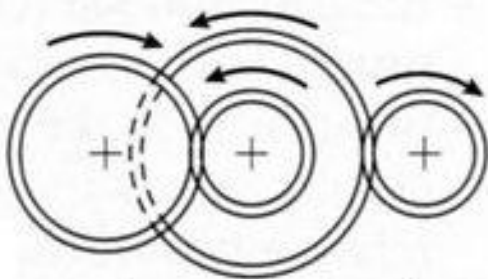
Question Number	Answer	Mark
3(a)i	<p data-bbox="260 286 695 320">Through and through (slab) sawn</p> 	(1)
3(a)ii	<p data-bbox="260 797 440 831">Quarter sawn</p>  <p data-bbox="260 1238 536 1272">Accept either option</p>	(1)

3(b)	<p>6 individual points. Maximum of 5 marks for advantages or disadvantages only</p> <p>Advantages</p> <ul style="list-style-type: none"> • More stable timber (1) due to the direction of cutting (1) • Better grain pattern (aesthetics e.g. figuring in oak) (1) due to the grain structure (1) • Better quality of timber (1) therefore increased value of timber (1) <p>Disadvantages</p> <ul style="list-style-type: none"> • More waste time/timber(1) • More complex sawing process (1) requires greater skill (1) and requires more time (1) • Timber costs more (1) • Board width is reduced (1) due to the direction of cutting (1) <p style="text-align: right;">(6 x 1)</p>	(6)
	Total for question	(8)

Question Number	Answer	Mark
4(a)	<ul style="list-style-type: none">• It will not corrode (1) which makes it ideal for outdoor use (1)• It does not require any surface treatment (1) therefore will not require regular maintenance (1)• Aesthetic qualities of stainless steel (1) plus it can be either polished or brushed (1) therefore giving a choice of finishes (1)• It is relatively strong/ durable (1) therefore withstand damage/ force (1) <p style="text-align: right;">(4 x 1)</p>	(4)

4(b)	<p>6 individual points. Maximum of 5 marks for advantages or disadvantages only</p> <p>Advantages</p> <ul style="list-style-type: none"> • Can be self finished (1) • Mechanical properties fit for purpose (1) • colour/texture/garden aesthetics an be manufactured into the material(1) • Can be moulded / extruded relatively easily (1) • Once the mould is made, cost per item to produce reduces with volume (1) • Relatively low cost compared to stainless steel (1) • Doesn't corrode/weather resistance (1) therefore giving it a long life outdoors (1) • The plastic can be given a 'wood effect' look to fit in with the garden (1) • Can be recycled (1) • Lighter in weight (1) therefore reducing transport costs/carrying home (1) <p>Disadvantages</p> <ul style="list-style-type: none"> • Lighter weight giving impression of being 'cheaper' quality (1)/ possibility of being blown over/away (1) • More brittle and prone to breaking (1) • Plastic possibly not in keeping with garden aesthetics (1) • PVC can become discoloured by UV rays (1) (6 x 1) 	(6)
	Total for question	(10)

Question Number	Answer	Mark
5(a)	<ul style="list-style-type: none"> • Quality control is the practical means of achieving quality assurance (1) by testing and inspection (1) • It is the monitoring of accuracy in relation to the specification (1) at critical control points during manufacture (1) • It ensures the manufacture of identical parts within tolerance (1) and provides feedback to the quality assurance system (1) • It guarantees a set standard to all products (1) therefore ensuring reliability (1) and continued customer confidence (1) <p style="text-align: right;">(4 x 1)</p>	(4)
5(b)	<ul style="list-style-type: none"> • The Kitemark signifies that the product is safe (1) and reliable (1) • The Kitemark shows that the design has been independently tested by BSI (1) and is a recognised mark of quality (1) <p style="text-align: right;">(2 x 1)</p>	(2)
5(c)	<ul style="list-style-type: none"> • TQM is the system used to ensure continuing improvement (1) for the complete life cycle of a product (1) • Computer aided systems are used at all levels (1) therefore improving all aspects of manufacturing quality (1) • In manufacturing, 'thinking tools' are equally as important as the physical tools (1) and they are 'purpose driven' long-term processes (1) • Applying quality assurance procedures and testing (1) at every stage of the design/development/manufacturing process (1) achieving (BSI/CE) standards (1) • An approach to quality assurance that emphasises a thorough understanding / contribution of all members of a production unit (1) of the needs and desires of the ultimate service recipients (1) • TQM emphasises constant measures and statistical techniques (1) to help and then maintain the output quality of production (1) • Have in place a customer services department (1) which responds to customer feedback. (1) <p style="text-align: right;">(4 x 1)</p>	(4)
	Total for question	(10)

Question Number	Answer	Mark
6(a)	<p>For the eccentric and pear cams - do NOT accept 'can rotate in either direction'</p> <ul style="list-style-type: none"> • Eccentric cam - rise and fall which are of equal length (1) Smooth motion (1) Simple Harmonic Motion S.H.M. (1) • Pear shaped cam - rise and fall are rapid (1) with a dwell (1) • Snail cam - a smooth continuous rise (for almost 360 degrees) (1) rapid fall (1) can only rotate in one direction (1) <p style="text-align: right;">(3 x 2)</p>	(6)
6(b)i	<ul style="list-style-type: none"> • The idler gear links the two main gears (1) and enables the main gears to rotate in the same direction as each other (1) and at same speed. (1) <p style="text-align: right;">(2 x 1)</p>	(2)
6(b)ii	<p>Compound gear train must show minimum of 4 gears with two meshing pairs.</p> <ul style="list-style-type: none"> • diagram of correctly meshing gears (1) • direction of rotation (1) <div style="text-align: center;">  <p>schematic drawing</p> </div> <p style="text-align: right;">(2 x 1)</p>	(2)
	Total for question	(10)

Question Number	Answer	Mark
7(a)	<p>Maximum of 4 marks if advantages or disadvantage only</p> <p>Advantages</p> <ul style="list-style-type: none"> • Relatively low running costs (1) • Relatively low maintenance (1) • Low/zero emissions (1) • Surplus energy can be sold back to the national grid/stored in batteries (1) • Use in remote areas (1) • Infinite/ renewable/ sustainable resource (1) <p>Disadvantages</p> <ul style="list-style-type: none"> • High initial cost (1) • Function efficiency is dependent on climate/ orientation (1) • Aesthetic impact (1) • The low output of each panel means a large number of panels are needed to get the equivalent (to fossils fuel) amount of energy (1) 	(5)
7(b)	<p>Three Advantages</p> <ul style="list-style-type: none"> • The high speed of reaction in the composite (1) • The small size of the composite required (1) • Low cost (1) • Simple to integrate (1) • High reliability (1) • Proportional response (1) • Range of sensitivities (1) • Easy to manufacture (1) 	(3)
	Total for question	(8)
	Total Marks for Paper	70

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