

Mark Scheme (Results)

Summer 2012

GCE Design and Technology
Product Design (6RM02)

Paper 01: Design and Technology in
Practice (RMT)

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications come from Pearson, the world's leading learning company. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information, please visit our website at www.edexcel.com.

Our website subject pages hold useful resources, support material and live feeds from our subject advisors giving you access to a portal of information. If you have any subject specific questions about this specification that require the help of a subject specialist, you may find our Ask The Expert email service helpful.

www.edexcel.com/contactus

Pearson: helping people progress, everywhere

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 2012

Publications Code US032005*

All the material in this publication is copyright


© Pearson Education Ltd 2012

Question Number	Answer	Mark
1(ai)	<p>Only acceptable answer: -</p> <ul style="list-style-type: none"> • A reference to warning personnel about flammable substances / fire.(1) <p style="text-align: right;">(1 x 1)</p>	(1)
1(aii)	<p>Only acceptable answer: -</p> <ul style="list-style-type: none"> • A reference to warning personnel about high voltage / electricity / risk of electric shock.(1) <p style="text-align: right;">(1 x 1)</p>	(1)
1(aiii)	<p>Only acceptable answer: -</p> <ul style="list-style-type: none"> • A reference to warning personnel about lasers.(1) <p><i>Do not accept 'Bright light' responses.</i></p> <p style="text-align: right;">(1 x 1)</p>	(1)
1(b)	<p>Only acceptable answer: -</p> <ul style="list-style-type: none"> • Circular signs are a command /mandatory / prohibition signs. (1) (Triangular are warning). <p style="text-align: right;">(1 x 1)</p>	(1)
1(c)	<p>Any two of the following :-</p> <ul style="list-style-type: none"> • Maximum safe exposure / controlling exposure e.g. extraction.(1) • Maintenance of protective equipment. (1) • Training in safe working / handling of hazardous materials. (1) • Frequency of monitoring / surveillance exercises. (1) • Safe methods of storing the materials. (1) • First aid measures in the event of accident / exposure.(1) • Safe methods of disposing of waste. (1) • Essential signage required. (1) <p style="text-align: right;">(2 x 1)</p>	(2)
Total for question		6

Question Number	Answer	Mark
2(ai)	<p>Any one of the following (Abbreviated or full name): -</p> <ul style="list-style-type: none"> • HDPE – High density polyethylene • LDPE - Low density polyethylene • PP - Polypropylene • PVC – Polyvinyl chloride • ABS – Acrylonitrile butadiene styrene • PS – polystyrene • Nylon • Rubber <p><i>Note - Do not accept acrylic.</i></p> <p style="text-align: right;">(1 x 1)</p>	(1)
2(aii)	<p>Only acceptable answer: -</p> <ul style="list-style-type: none"> • Injection moulding <p style="text-align: right;">(1 x 1)</p>	(1)
2(b)	<p>Any two linked points from three of the following :-</p> <ul style="list-style-type: none"> • Strength, (1) resist large forces (1) from peoples bodies / weights. (1) • Toughness (1) resist the knocks / impacts (1) from weights being repeatedly banged against the frame. (1) • Plasticity / malleable (1) can be easily bent/formed (1) into the shapes required. (1) • Fusibility (1) can be welded / brazed (1) so that it can be easily/strongly joined. (1) • Hardness (1) resists abrasion / scratching / does not wear away easily (1) so that pivots / moving parts will last a long time. (1) <p style="text-align: right;">(2 x 3)</p>	(6)

2(c)	<p>Any four of the following points either in diagram or in text: -</p> <p style="text-align: center;"> Welding gun / head / nozzle Argon / gas shield </p> <p style="text-align: center;"> Filler wire / electrode Electric spark </p> <p style="text-align: center;"> Molten metal Earth connection / Electrical clip </p>	
------	---	--

	<ul style="list-style-type: none"> • Recognisable welding gun/ torch / nozzle. (1) • The work is electrically connected to the earthing cable. (1) • An electrical spark. (1) • A filler wire / electrode is fed through the gun. (1) • The materials are melted / molten / fused together. (1) • Argon gas / gas shield is fed over the weld pool. (1) <p>If wrong welding process shown e.g. oxycet / arc / TIG then maximum 2 marks.</p> <p style="text-align: right;">(1 x 4)</p>	(4)
2(d)	<p>Any two of the following with a linked relevant explanation: -</p> <ul style="list-style-type: none"> • Enable repetitive accuracy / reduction in errors (1) leading to less faulty / wasted components and materials. (1) • Components are easily /quickly aligned / no marking out (1) which speeds up production / saves time. (1) • Enable less skilled personnel to carry out the tasks (1) reduced labour costs. (1) <p style="text-align: right;">(2 x 2)</p>	(4)
Total for question		16

Question Number	Answer	Mark
3(a)	<p>A sketch showing the following clear or labelled features: -</p>  <ul style="list-style-type: none"> • Surface laminates / veneer. (1) • Thick layer of internal strips. (1) • Grain opposing / rotated on laminates / strips. (1) • Adhesive to bond blocks / laminates together. (1) • Blocks of approximately 25mm used. (1) <p style="text-align: right;">(1 x 3)</p> <p><i>[NB. If plywood, chip board, MDF then no marks]</i></p>	(3)
3(b)	<p>Any three of the following with a linked relevant explanation: -</p> <ul style="list-style-type: none"> • Cheaper (1) as it is manufactured from low grade timber / off-cuts / for making low cost furniture /increasing profits. (1) • Available in wide boards (1) so easy to cut to sizes needed for furniture panels / so no edge jointing needed / not limited to tree width. (1) • Has no grain (1) so is stable / will not warp / twist / split / move as much as solid timber. (1) • Smooth finish (1) so less surface preparation is needed before a finish is applied. (1) • No natural faults / knots (1) so it is easily worked /that cause problems during manufacturing. (1) • Uniform strength in all directions (1) so no consideration has to be given to the grain direction. (1) <p style="text-align: right;">(2 x 3)</p>	(6)
Total for question		9

Question Number	Answer	Mark
4(a)	Any 4 of the following: - <ul style="list-style-type: none"> • Fast method of production. (1) • Can cut complex profiles.(1) • The machine works very accurately. (1) • High level of repetitive accuracy achieved / no human error / less waste. (1) • Minimal labour needed / minimal labour costs. (1) • Safe method of production. (1) • Shape is easily programmed (1) • Data is easily saved / retrieved for future batches. (1) <i>[Do not accept an unqualified 'cheaper']</i> (1 x 4)	(4)
4(bi)	Only acceptable answer: - <ul style="list-style-type: none"> • The two parts are mixed / adhesive mixed with catalyst before being applied. (1) (1 x 1)	(1)
4(bii)	Any 3 of the following :- <ul style="list-style-type: none"> • Sufficient strength for this purpose. (1) • Good gap filling properties / expands in hole / high viscosity (1) • Will bond both materials / bonds wide range materials. (1) • Fast setting versions to allow rapid joining (1). • Slow setting versions allow for accurate positioning / adjustment. (1) • There are no significant H&S issues / non toxic / will not burn. (1) (1 x 3)	(3)
Total for question		8

Question Number	Answer	Mark
5(ai)	Only acceptable answer :- <ul style="list-style-type: none"> • Worm gear / worm wheel / worm and wheel. (1) (1 x 1) <i>[Do not accept 'wheel' on its own.]</i>	(1)
5(aii)	Any 2 of the following with a linked relevant explanation: - <ul style="list-style-type: none"> • It gives a large gear ratio / velocity ratio / increases small input force (1) exerting a large output of force / high torque / strong pull.(1) • The system will not overhaul / run back when released / is self locking (1) so it is safe / will not drop the load. (1) • It is a compact / simple system compared to other systems that do a similar task (1) therefore the unit can be made smaller / cheaper. (1) (2 x 2)	(4)
5(b)	Any 4 points or relevant explanations from the following: - <ul style="list-style-type: none"> • They are cheaper (1) • They have less complex parts / simpler to make. (1) • They can take greater loads / stronger (1) • They spread the load over a greater surface / don't focus the force on points of contact.(1) • They work effectively at slow speeds. (1) [Do not accept 'longer lasting']. [Do not accept 'maintenance / replacement' issues.] (4 x 1)	(4)
Total for question		9

Question Number	Answer	Mark
6(a)	<p>Any 2 of the following: -</p> <ul style="list-style-type: none"> • Complex shapes can be produced. (1) • Effective / fast /cheap method of production (1). • Produces a strong component. (1) • Repeatable process (1). • Casting generates little waste / economic on materials. (1) • Low priority on dimensional accuracy / surface finish. (1) • Metals can be alloyed to give a range of properties (1) <p style="text-align: right;">(1 x 2)</p>	(2)

6(b)	<p>Any 5 of the following features sketched clearly or labelled: -</p> <div style="text-align: center;"> </div> <ul style="list-style-type: none"> • Two part box /cope and drag. (1) • Pattern / mould cavity. (1) • Riser / runner. (1) • Horizontal gate. (1) • Pouring basin/ ring. (1) • Parting powder / French chalk. (1) • Steam vents (1) • Location pins. (1) <p>[Do not accept 'sand' as this is given in the question]</p> <p>Any response that does not have a two part (split) moulding box should be given no marks.</p> <p style="text-align: right;">(1 x 5)</p>	(5)
------	---	-----

<p>6(c)</p>	<p>Any of the following points with a linked relevant explanation: -</p> <ul style="list-style-type: none"> • It is faster (1) as die is reusable / you do not loose /break mould each time.(1) • It requires minimal labour (1) due to automation / not re-making moulds.(1) • It produces finer detail / smoother/ higher quality mouldings (1) as casting reflects a machined surface rather than sand texture (1) as pressure is used to force the metal into the die. (1) • It is more accurate (1) so will require less machining. (1) • High level of repetitive accuracy / less prone to error (1) due to collapsing sand mould (1) impurities .(1) • It is a safer process (1) due to molten metal being enclosed within the machine / not manually poured. (1) <p>[Do not accept 'cheaper'.] [Do not accept an unqualified 'higher quality'.]</p> <p style="text-align: right;">(3 x 2) or (6 x 1)</p>	<p style="text-align: right;">(6)</p>
Total for question		13

Question Number	Answer	Mark
7(ai)	<p>Any one of the following points :-</p> <ul style="list-style-type: none"> • Product must meet / be tested against the relevant European directives. (1) <p><i>[Do not accept unqualified 'testing'.]</i></p> <p style="text-align: right;">(1 x 1)</p>	(1)
7(aii)	<p>Any one of the following with a linked relevant explanation:-</p> <ul style="list-style-type: none"> • To establish / maintain a common standard of goods being traded across Europe (1) which prevents poor quality / dangerous goods being imported / exported.(1) • To ease trade restrictions / encourage trade between European countries (1) by eliminating the need for a product to comply with each individual countries own quality standards. (1) <p style="text-align: right;">(2 x 1)</p>	(2)
7(b)	<p>Any six of the following points but must include at least one positive and one negative to gain maximum marks:-</p> <p><u>Positives</u></p> <ul style="list-style-type: none"> • Staff feel more valued / listened too / staff feedback accepted. (1) • Better working conditions / culture. (1) • Staff more highly motivated. (1) • Team mentality will be developed. (1) • Less staff absentees. (1) • Staff has increased job satisfaction / morale. (1) • Staff fully trained / has frequent training opportunities. (1) • Fair rates of pay. (1) • Improving health and safety. (1) • Each department treated as a client. (1) • Improved product quality / less failure products and components. (1) • Improved company reputation. (1) • Develop an ethos of continuous improvement. (1) • Increased sales / market share. (1) • Improved productivity /profits. (1) • Gain BSI/ISO 9000 mark / trade with ISO.9000 companies. (1) 	

	<p><u>Negatives</u></p> <ul style="list-style-type: none"> • Additional costs of developing new ways of working. (1) • Additional costs of training staff. (1) • On-going costs of responding to workforce proposals. (1) • Benefits will take time to filter through. (1) • Some staff may be reluctant to embrace change.(1) <p style="text-align: right;">(6 x 1)</p> <p><i>[Max 5 marks from one section]</i></p>	(6)
	Total for question	9

Further copies of this publication are available from
Edexcel Publications, Adamsway, Mansfield, Notts, NG18 4FN

Telephone 01623 467467

Fax 01623 450481

Email publication.orders@edexcel.com

Order Code US032005 Summer 2012

For more information on Edexcel qualifications, please visit our website
www.edexcel.com

Pearson Education Limited. Registered company number 872828
with its registered office at Edinburgh Gate, Harlow, Essex CM20 2JE

Ofqual




Llywodraeth Cynulliad Cymru
Welsh Assembly Government

