

# Mark Scheme (Results)

# Summer 2015

Pearson Edexcel GCE in Graphic Products 6GR03

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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
<b>1(a)</b>	<ul> <li>Description of any one of the following strategies, up to a maximum of two marks:</li> <li>'Kids are growing older younger' allows companies to exploit children's natural yearning to play at being grown-ups (1) by manufacturing/advertising toy versions of 'grown-up' products eg toy tool kit(1)</li> <li>'Gotta catch 'em all' exploits children's natural urge to collect things (1) new/additional items are constantly introduced so the urge to complete the set / get the latest version is maintained eg Pokemon trading cards (1)</li> <li>'The culture of cool' exploits children's needs to be seen wearing the right brands (1) to appear 'cool' and fashionable and fit in with their chosen peer group / to get what they want rather than need (1)</li> <li>Intensive advertising during prime time children's TV (1) convinces children that they must have the product (1)</li> <li>The use of attractive bright graphics/special effects/bright colours/superheroes (1) are exciting and attract children (1)</li> <li>In game/app advertising (1) because children spend a lot of time on electronic devices (1)</li> <li>The use of celebrities/sports stars to advertise (1) children will listen to the advertising message because they are 'star struck' (1)</li> <li>Products tie in with films/TV/computer games (1) children will then want to buy the product because they associate with the image/theme (1)</li> </ul>	(2)

Total for question 6

Question	Answer	Mark
Number 2(a)	<ul> <li>Any one of the following sources (maximum 1 mark)</li> <li>British Standards Institute (BSI) (1)</li> <li>Department of Business Innovation and Skills (BIS) also accept former name Department for Trade and Industry (DTI) (1)</li> <li>Compendium of essential design and technology standards for schools and colleges (1)</li> <li>European anthropometric database (1)</li> <li>European sizing survey (1)</li> <li>Named UK internet sites (1)</li> </ul>	(1)
2(b)	<ul> <li>Any three of the following responses (maximum 3 marks)</li> <li>Designers use the mean/average sizes for the age range of their target market (1)</li> <li>Anthropometric data is used to cover 90% of the population/between the 5<sup>th</sup> and 95<sup>th</sup> percentile (1)</li> <li>Below the 5<sup>th</sup> percentile/the smallest 5% are excluded / Above the 95<sup>th</sup> percentile/largest 5% are excluded (1)</li> <li>Anthropometric data is specific to the region of the world where the product is to be used (1)</li> <li>Both male and female data is used (1)</li> <li>Data is available for children of all ages (1)</li> </ul>	
	NB accept correctly annotated normal curve of distribution graph for up to 3 marks	(3)
2(c)	<ul> <li>Explanation including any two of the following statements up to a maximum of 4 marks: <ul> <li>Seat adjustable backwards and forwards to take into account different leg and arm lengths (1) to enable correct positioning to safely use the steering wheel, foot pedals and other controls/to operate the vehicle (1)</li> <li>Seat adjustable vertically to take into account different heights (1) to enable the driver to see over the dashboard / provide the driver with adequate headroom (1)</li> <li>Shape/size of seat base/back to take into account different body sizes (1) for comfort and to prevent fatigue on long journeys (1)</li> <li>Adjustable head restraints (1) to protect the occupant from whiplash injuries (1)</li> <li>Seat adjustable for correct support/comfort (1) via an adjustable lumber support (1)</li> </ul> </li> </ul>	
	<ul> <li>cornering (1)</li> <li>Seat back can be reclined (1) to achieve a comfortable driving position (1)</li> </ul>	(4)

NB statements must relate to the seat	
Total for question	8

Question Number	Answer	Mark
3(a)	<ul> <li>Discussion containing any four of the following statements up to a maximum of 4 marks: <ul> <li>Actors can be imposed on separate filmed or computer generated backgrounds (1)</li> <li>Can create scenes / angles that would be impossible using traditional filming techniques (1)</li> <li>Provides integration of traditional filmed images with computer generated graphics including both locations and characters (1)</li> <li>Scale models can be imposed into traditionally filmed scenes (1)</li> <li>Improves safety and reduces the need for 'stunt doubles' as actors can be digitally imposed into dangerous situations (1)</li> <li>Reduces the need for 'on location' filming thus reducing costs /reducing the carbon footprint of the production (1)</li> <li>Can be used in news studios where newsreaders sit in front of blue screens and headlines and graphics are imposed behind them (1)</li> <li>Allows weather reporters to interact with large scale weather charts and computer graphics (1)</li> <li>Backgrounds from any location can be used (1)</li> <li>Weather doesn't affect filming as done indoors (1)</li> <li>Background special effects do not limit the number of 'takes' eg explosions might only be done once (1)</li> <li>Reduces the need for the construction of expensive film sets (1)</li> </ul> </li> </ul>	(4)
3(b)	<ul> <li>An explanation covering either of the following statements up to a maximum of 2 marks:</li> <li>Green emits more light than blue (1) making it easier to work with/edit (1)</li> <li>Green doesn't feature in human skin tones (1) which makes it easier to use with scenes that involve people (1)</li> <li>Green clothing is less common / not used (1) so there is less chance of the clothing being replaced by background (1)</li> </ul>	(2)
	Total for question	6

Question Number	Answer	Mark
4(a)	<ul> <li>Discussion covering any four of the following statements up to a maximum of 4 marks.</li> <li>Advantages: <ul> <li>Documents eg CAD files can be uploaded and attached to the e-mail (1)</li> <li>Quick/instant, easy and convenient means of communicating around the world allowing design departments and manufacturing facilities to be legated</li> </ul> </li> </ul>	
	<ul> <li>departments and manufacturing facilities to be located in different areas/time zones (1)</li> <li>Widespread usage all designers and manufacturers will use e-mail/has become the primary means of communication between businesses and internally within a business (1)</li> <li>(1)</li> <li>E-mail exchanges can be saved as a dated record of design decisions (1)</li> <li>Faster design decisions (1)</li> </ul>	
	<ul> <li>Disadvantages:</li> <li>Limits on file/mailbox size may prevent some large design files being transmitted (1)</li> <li>Security of design/commercial information as e-mails can be intercepted and read (1)</li> <li>Computer viruses can be spread via e-mail placing systems at risk of failure and delays to the design process (1)</li> <li>Impersonal and some design requests may be misinterpreted (1)</li> <li>Incompatibility of design software / designs may have to be transferred to another format eg PDF</li> </ul>	
	If discussion not linked to communications between designers and manufacturers – max 2 marks	(4)

4(b)	<ul> <li>Evaluation covering any four of the following statements up to a maximum of 4 marks.</li> <li>Both advantages and disadvantages must be included in the evaluation (a minimum of one advantage or one disadvantage) for full marks</li> <li>Advantages: <ul> <li>Eliminates the need for travel / delegates can be anywhere in the world (1)</li> <li>Saves both time and money (1)</li> <li>Allows designs to be viewed and discussed (1)</li> <li>Speeds up design decisions (1)</li> <li>Presentations can be made to several people simultaneously (1)</li> <li>Lowers the company's CO<sub>2</sub> footprint (1)</li> <li>Can be recorded and viewed by delegates who could not attend the scheduled meeting (1)</li> </ul> </li> <li>Disadvantages: <ul> <li>Technical faults may result in failing connection / low speed connection / poor image quality / freezing / poor audio visual synchronisation (1)</li> <li>Lack of eye contact can hinder purpose or intent (1)</li> <li>'Camera shyness' can hinder presentation (1)</li> <li>Participants may be wary of making statements and decisions that are recorded (1)</li> </ul> </li> </ul>	
	<ul> <li>Participants may be wary of making statements and decisions that are recorded (1)</li> </ul>	
	If the response does not focus on communications between designers and manufacturers maximum 2 marks.	(4)
	Total for question	8

Question Number	Answer	Mark
5(a)	<ul> <li>Outline of the system including any four of the following statements, up to a maximum of 4 marks.</li> <li>Movement of materials/components to required position is controlled by computer (1)</li> <li>AGVs follow lines/buried wires/tape on/in the floor (1)</li> <li>AGVs can enter / work in dangerous areas where humans would be excluded (1)</li> <li>Materials / components are stored in a racking system (1)</li> <li>Automated use of bar code reader to identify components (1)</li> <li>Transportation via conveyor or automatic guided vehicle (AGV) (1)</li> <li>Automated transfer of component to/from transportation system via robotics/AGV forklift/crane (1)</li> <li>Faster/improves efficiency/runs 24/7 by reducing the labour required for distributing materials and components (1)</li> <li>Note – the response must relate to the use of ASRS within CIM and not within retail / distribution warehousing. Maximum 2 marks if not referenced to CIM.</li> </ul>	(4)

5(b)	A justification containing two of the following justified points:
	<ul> <li>Interactive screen can be modelled within CAD (1) allowing accurate manufacturing tolerances to ensure a good fit (1)</li> </ul>
	<ul> <li>Development cells often have small scale CNC equipment widely available (1) allowing testing of manufacturing methodologies for the product (1)</li> </ul>
	<ul> <li>CAD is widely used for designing products (1) allowing easy output to CNC equipment/produced directly from a CAD design (1)</li> </ul>
	<ul> <li>Multiple prototypes can easily be produced (1) allowing a range of product testing and evaluation to be carried out simultaneously (1)</li> </ul>
	<ul> <li>High levels of dimensional accuracy (1) produces an accurate product/quality product for assessment and evaluation (1)</li> </ul>
	<ul> <li>Complex shapes can be manufactured easily (1) allowing a wider range of designs (1)</li> </ul>
	<ul> <li>Repetitive accuracy (1) allows for high levels of consistency (1)</li> </ul>

<ul> <li>Faster than traditional prototyping reduces development time/time to market / as complex models can be produced in one piece (1)</li> <li>Appropriate for a one-off product/prototype (1) as there is no need to buy new equipment/tooling (1)</li> </ul>	
Note response must relate to prototype production otherwise a maximum of 2 marks.	(4)

		1
5(c)	Evaluation covering any six of the following statements up to a maximum of 6 marks.	
	Both advantages and disadvantages must be included in the evaluation (a minimum of one advantage or one	
	disadvantage) for full marks.	
	Advantages:	
	• Ideal for repetitive, monotonous, mundane tasks (1)	
	<ul> <li>Produces products with extreme precision (1)</li> <li>Can be used in hazardous environments not suitable</li> </ul>	
	for human operators (1)	
	Able to carry extremely heavy loads (1)	
	<ul> <li>Highly flexible when responding to change as they are</li> </ul>	
	re-programmable (1)	
	<ul> <li>Can be programmed once and then repeat the same task for years/24/7 (1)</li> </ul>	
	<ul> <li>Do not suffer from lack of concentration and stress</li> </ul>	
	during repetitive tasks over long periods (1)	
	Cost effective as robots can operate continuously	
	<ul> <li>resulting in increased productivity (1)</li> <li>High quality products produced using highly accurate</li> </ul>	
	<ul> <li>High quality products produced using highly accurate inspection and measurement sensors that are built in</li> </ul>	
	to the robot (1)	
	Speed of production (1)	
	Disadvantages:	
	<ul> <li>Robots do not have an impressive array of sensors as</li> </ul>	
	humans (touch, vision, hearing, smell, pattern	
	recognition) (1)	
	<ul> <li>Robots do not have the ability to learn and make decisions when the required data does not exist eg</li> </ul>	
	may continue to operate when errors occur (1)	
	<ul> <li>Robots are not as flexible as humans and are harder to</li> </ul>	
	program to perform specific tasks making them less	
	suitable for bespoke 'one-off' production or changes to	
	<ul> <li>the production task/line (1)</li> <li>Robotics technology is extremely expensive to</li> </ul>	
	purchase and install in automated manufacturing (1)	
	Human operators have to be excluded from robot	
	working areas due to safety issues (1)	
	<ul> <li>High cost of making robot cells safe, including collision</li> <li>sensors (1)</li> </ul>	
	<ul><li>sensors (1)</li><li>Repairs and maintenance (downtime) of the robots can</li></ul>	
	disrupt production (1)	
	Incompatibility between different robotic systems	
	(programming language and control systems) so	(6)
	maintenance teams need additional specialist training (1)	(6)
	<ul> <li>Specialised robots can only perform one task (1)</li> </ul>	
	Cost of training operators/maintenance staff (1)	

Total for question 14	for question 14	

Question	Answer	Mark
Question Number 6	<ul> <li>Evaluation containing any eight of the following statements up to a maximum of 8 marks:</li> <li>Considerations: <ul> <li>Designers consider the 4 Rs (reduce, recycle, re-use and recover)/design for re-use/recovery (1)</li> <li>Designers use 'Life Cycle Assessment' (LCA) (1)</li> </ul> </li> <li>Marking of materials/polymers in order to aid recycling (1)</li> <li>Avoid materials with surface treatments in order to keep the materials 'clean' for future recycling (1)</li> <li>Use as few different materials as possible (1)</li> <li>Increase use of mechanical fixings in order to minimise gluing (1)</li> <li>Use fully recyclable materials (1)</li> <li>Use less materials - to assist lean manufacturing (1)</li> <li>Specify locally sourced materials (1)</li> <li>Use materials with less environmental impact/low embodied energy (1)</li> <li>Specify recycled materials (1)</li> <li>Adhere to relevant environmental legislation (1)</li> <li>Minimise specification of materials from finite sources / use materials from renewable sources eg timber and plant based products (1)</li> <li>Is the material biodegradable (1)</li> <li>Impact on animal habitats (1)</li> <li>Does the manufacture/transport of the product contribute to excessive CO<sub>2</sub> production (1)</li> </ul> <li>Advantages: <ul> <li>Ease of recycling (1)</li> <li>Minimise sourdamination during recycling process (1)</li> <li>Improves/maintains air quality (1)</li> <li>Reduced waste disposal to landfill (1)</li> <li>Green image may increase sales (1)</li> <li>Reduced carbon footprint (1)</li> </ul> </li> <li>Disadvantages: <ul> <li>Additional tooling/pattern costs (1)</li> <li>Choice of surface finish may be limited (1)</li> <li>Choice form local sources may be limited (1)</li> </ul> </li>	Mark
	<ul> <li>Choice of surface finish may be limited (1)</li> <li>Mechanical fixings may add bulk to the packaging (1)</li> <li>Choice from local sources may be limited (1)</li> <li>Product may be perceived as lower quality (1)</li> <li>Recycled materials may be of inferior quality (1)</li> <li>Limits material choice for components (1)</li> <li>Product may not be as robust (1)</li> </ul>	
	<ul> <li>Materials may not be efficient for manufacturing process (1)</li> <li>Note: advantages and disadvantages must be linked to appropriate design considerations (maximum 7 marks if only</li> </ul>	(8)

advantages or only disadvantages are covered.	
Total for question	8

Question Number	Answer	Mark
7(a)	<ul> <li>An explanation covering any of the following statements up to a maximum of 4 marks:</li> <li>May be more difficult to integrate the design with a 'brand image'(1) which may make it more difficult to gain client approval of the design (1)</li> <li>Designer has limited opportunities to experiment with materials/aesthetics/appearance of the point of sale (1) because method of displaying/holding/supporting the product is the prime driver of the design process (1)</li> <li>Point of sale design may not have the 'wow' factor (1) which may attract fewer customers to buy the product as they are drawn towards branding and appearance (1)</li> </ul>	(4)

7(b)	Evaluation covering any six of the following statements up to a maximum of 6 marks. If only one design evaluated max of 3 marks	
	<ul> <li>marks</li> <li>Reference to form over function for figure 1 and/or form follows function for figure 2 (1)</li> <li>Figure 1: <ul> <li>Futuristic/unique/modern aesthetically pleasing design/is a design statement/centrepiece (1)</li> <li>Three ovals/geometric shapes form a table surface on three levels (1)</li> <li>Designer style will only fit into contemporary setting (1)</li> <li>Easier to clean (1)</li> <li>Appears upmarket/expensive/high quality (1)</li> <li>Ovals (might) rotate to increase the surface area (1)</li> <li>Differing levels/gap limits the use of the surface/things could fall through (1)</li> <li>Heavy not easy to move (1)</li> </ul> </li> <li>Figure 2: <ul> <li>Level square table surface maximises useable area and functionality (1)</li> <li>Stable and robust (1)</li> <li>Inoffensive neutral style will fit in with most domestic settings (1)</li> <li>Three separate tables provide versatility (1)</li> <li>Design allows tables to 'nest' for storage (1)</li> </ul> </li> </ul>	

	(6)
Total for question	10

Question Number	Answer	Mark
8(a)	<ul> <li>Evaluation covering any four of the following statements up to a maximum of 4 marks.</li> <li>Both advantages and disadvantages must be included in the evaluation (a minimum of one advantage or one disadvantage) for full marks.</li> <li>Advantages: <ul> <li>Cost effective method of energy production as it is a by-product of waste incineration/zero or low fuel cost (1)</li> <li>Energy produced offsets the pollution caused during incineration (1)</li> <li>Heat is used to generate electricity via a steam turbine (1)</li> <li>Can provide heat and hot water via district heating schemes (1)</li> <li>Reduces fossil fuel usage (1)</li> </ul> </li> <li>Disadvantages: <ul> <li>To use for district heating the incinerator plant needs to be near/within the area benefitting from the system (1)</li> <li>Limits potential locations this increases the potential for localised pollution (1)</li> </ul> </li> </ul>	
		(4)

8(b)	<ul> <li>Evaluation covering any six of the following statements up to a maximum of 6 marks.</li> <li>Both advantages and disadvantages must be included in the evaluation (a minimum of one advantage or one disadvantage) for full marks</li> <li>Advantages: <ul> <li>Minimises the effect of deforestation upon climate change as planned replanting takes place (1)</li> <li>Maintains the Earth's carbon cycle (1)</li> <li>Reduces the environmental degradation of forest areas (1)</li> <li>Limits soil erosion (1)</li> <li>Maintains the stability of the watershed (1)</li> <li>Provides a renewable resource/replanting follows felling (1)</li> <li>Re-establishes animal habitats/eco systems (1)</li> <li>Maintains biodiversity in developing countries (1)</li> <li>Reduces the loss of animal species (1)</li> <li>Minimises CO2 emissions resulting from timber transportation as managed forests can be located closer to the major consumers of timber products (1)</li> <li>Sustainable softwoods grow at a much quicker rate than equatorial hardwoods replenishing timber stocks at a faster rate (1)</li> <li>Maintains a supply of softwood to meet the demand from industry/maintains a stable price (1)</li> </ul> </li> </ul>	
	<ul> <li>Disadvantages:</li> <li>Loss of national income for developing countries reliant upon deforestation and sale of hardwoods (1)</li> <li>Unemployment in developing countries where deforestation and exportation of hardwoods is the main source of employment (1)</li> <li>Loss of livelihood for forest dependant people results in a migration to cities and creates economic and social problems in other areas (1)</li> <li>Potential lack of diversity of trees within managed forests (1)</li> <li>May only be available in developed countries (1)</li> <li>The focus is on softwoods meaning that sustainably sourced hardwood is still a problem (1)</li> </ul>	(6)
	Total for question	10

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