Mark Scheme (Results)

Summer 2017

Pearson Edexcel GCE
In Design & Technology (6GR03)
Paper 1

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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(a)	Any **two** of the following examples from: 1. Use of alternative fuels/liquefied petroleum gas (LPG)/bio ethanol/compressed natural gas/hydrogen (1) 2. Use of electric/hybrid vehicles (1) 3. Deliver in larger quantities/fewer journeys/full vehicles/larger vehicles (1) 4. Use of modern more fuel efficient vehicles (1) 5. Use of the rail network (1) 6. Use of waterways (1) 7. Optimum geographic location of the distribution centre / factory (1) 8. Reducing packaging size / weight so more can be carried (1) 9. Optimisation of route planning / shorter routes / avoiding congestion / use of route planning software (1) 10. Night time deliveries (1) **2 x 1**	**(2)**
1(b)	An discussion covering any **four** of the following examples from: 1. Plastic bottles and containers (1) 2. Food packaging/packaging (1) 3. Carrier bags (1) 4. Bin liners (1) 5. Composting bags (1) 6. Dog 'poop and scoop' disposal bags (1) 7. Disposable nappies (1) 8. Coatings for paper and board (1) 9. Agricultural uses e.g. slow-release pesticides and fertilizers, mulches that degrade over time (1) 10. Medical uses e.g. gauzes, sutures and implants (1) 11. Pharmaceutical uses e.g. coatings for pills (1) 12. New natural fibres for the textiles industry (1) 13. Replacement for expanded polystyrene (1) 14. Disposable cutlery (1) 15. Credit cards (1) 16. Take away coffee cups (1) 17. Disposable gloves (1) 18. BB pellets (1) **4 x 1**	**(4)**

Question Number	Answer	Mark
1(c)	Discussion incorporating any **four** of the following points: 1. Still contributes to global warming as carbon dioxide is released during decomposition (1) 2. Reduces the quality when mixed with recycled plastics / can contaminate other plastics during recycling (1) 3. Fully biodegradable plastics are more expensive (1) 4. Causes price inflation of plastic products and packaging (1) 5. Difficult to source as they are not widely produced (1) 6. May not be as energy efficient to produce as synthetic polymers (1) 7. Semi-biodegradable polymers remain in the environment for years (1) 8. Impacts on the price of food (1) 9. More expensive / less economically viable than synthetic polymers (1) 10. Cannot be recycled other than composting / recycling plants don't take biodegradable polymers (1) 11. Difficult to sort/separate from PET/HDPE plastics (1) 12. Uses land/crops that would otherwise be used for food production/moral issues relating to feeding the third world (1) 13. Poor surface characteristics / high haze (1) 14. Requires treatments for printing (1) 15. Narrow choice for gauge / finish (1) **4 x 1**	**(4)**
	Total for question	**10**

Question Number	Answer	Mark
2(a)	An outline covering any **four** of the following examples from: 1. Saves money by eliminating the need to process paper documents (1) 2. No limit on the size of document/file (1) 3. Assists in the production of the paperless office (1) 4. Saves time as information is transferred digitally (1) 5. Business documents are transferred quickly with fewer errors (1) 6. Expands a businesses customer base (1) 7. Improved customer service through efficient EDI processes (1) 8. More computerised automation therefore less human input than is required for email (1) 9. EDI documents flow directly into the appropriate application on the receivers computer 10. Common document type or conversion software is used (1) 11. Can be used on a global scale (1) 12. A secure method of document transfer / encryption is used (1) 13. Tracks data and keeps records of sent and received documents (1) **4 x 1**	**(4)**

2(b)	Any **three** of the following explanations from: 1. Loss of economies of scale (1) because large orders cannot be taken into stock/storage is not available (1) 2. Less short term flexibility in the rate of production / difficult to respond to changes in demand (1) companies cannot immediately respond as parts may not be available (1) 3. Interruptions to the supply chain / faulty supplies (1) will have an immediate effect on production / could result in workforce being 'laid-off' (1) 4. Transportation delays (1) could result in deliveries not arriving on time (1) 5. Dependent on good industrial relations within the supply chain (1) to ensure supplies are not interrupted (1) 6. Increased reliance on supplier performance (1) increases the risk of production delays (1) 7. No storage of materials/components (1) means the company cannot cope with periods of non-supply (1) 8. Requires high levels of planning / efficient systems / automated ordering / pull tools (kanban)(1) to accurately schedule and organise deliveries (1) 9. Early deliveries cannot be accepted (1) because there is no storage (1) **3 x 2**	**(6)**
2(c)	Any **one** of the following explanations from: 1. A machine / robot / computer system that exhibits human-like intelligence and behaviour (1) and has the ability to learn / adapt through experience (1) 2. A machine that can respond to changing situations (1) adapting its approach / making decisions to ensure its objectives are achieved / without human control(1) 3. Can think for itself (1) therefore can make decisions (1) 4. A branch of computer science (1) concerned with making machines behave like humans/simulating human behaviour (1) **1 x 2**	**(2)**

Question Number	Answer	Mark
2(d)	An outline of any **four** of the following examples from: 1. Processes large amounts of information (1) 2. Makes decisions / resolves problems similar to humans/acts like a human expert (1) 3. Based upon logic systems (1) 4. Has a knowledge base / processes expert knowledge (1) 5. Uses inference engine to draw conclusions (1) 6. Can make choices independently (1) 7. Computer processes the options before making a decision (1) 8. Links with voice recognition and voice simulation (1) 9. Allows robots to operate as co-workers (1) 10. Used in systems that provide advice e.g. medical diagnosis (1) 11. User interface (1) 12. Closed loop system (1) **4 x 1**	**(4)**
	Total for question	**16**

Question Number	Answer	Mark
3(a)	Any **six** of the following characteristics from either movement: Art Nouveau 1. Embraced function follows form or form over function (1) 2. Unity and harmony across the various fine arts and crafts (1) 3. Designers appreciated the benefits of mass production (1) 4. Embraced technological advances of the time (1) 5. Embraced the aesthetic properties of new materials (1) 6. High standards of craftsmanship and design to everyday objects (1) 7. Influenced by natural forms (1) 8. Elongated curvy 'whiplash' lines/undulating asymmetrical lines (1) 9. Stylised flowers/leaves/roots/buds/seedpods (1) 10. Exotic insects and peacock feathers (1) 11. Use of the female form/languid female figures/long flowing hair (1) 12. Influenced by the arts and artefacts of Japan (1) 13. Vertical lines and height (1) 14. Celtic/Arabian/Ancient Greek patterns provided inspiration for intertwined ribbon patterns (1) 15. Use of stained glass (1) 16. White colour schemes (1)	

	Bauhaus 1. Form follows function or function over form (1) 2. Designs worked well but also looked good (1) 3. Simple geometrically pure forms / cubic shapes / right angles (1) 4. Minimalist design / less is more (1) 5. High-end functional products with artistic pretensions (1) 6. Products that worked well but also looked good (1) 7. Products for a machine age/products look machine made 'machine aesthetic' (1) 8. Use of modern materials such as tubular steel (1) 9. Everyday objects for everyday people (1) 10. Functional, cheap and easily mass produced (1) 11. Rejects decorative details (1) 12. Flat roofs / smooth facades (1) 13. White / grey / black / beige / dull colours (1) Note candidates must have discussed only one design movement – marks can only be awarded for the design named by the candidate. **6 x 1**	**(6)**

Question Number	Answer	Mark
3(b)	An evaluation covering six of the following points from: Positive impacts Other designers have been influenced by the following characteristics and values: 1. Influential designer in the 'New Design Style' (Post-modernism) (1) 2. Influenced both product design and interior design (1) 3. Working with international companies / Alessi spread his design influence (1) 4. His designs for a wide range of consumer products influenced all areas of design (1) 5. Stylised and streamlined designs (1) 6. Values new technologies and has a taste for innovation (1) 7. Better to make a creative mistake than stagnant work in good taste (1) 8. Iconic designs for Alessi (1) 9. Designs have humour and personality (1) 10. Designs bright and colourful (1) 11. Retro designs that take inspiration from past movements (1) 12. Deconstruction and controlled chaos (1) 13. Less is a bore (1) 14. Abstract / individualistic / modern / distorted childlike (1) 15. Gave products names (1) 16. Form over function or function follows form (1) 17. Designs didn't always work well but looked good (1) 18. Vibrant, eccentric and ornamental (1) 19. Promotes the use of plastic (1) 20. Avoidance of the use of 'natural' materials (wood, leather etc) (1) 21. Uses interesting combinations of materials eg glass with stone (1) 22. Designs to be mass produced and relatively affordable (1) 23. Uses anthropomorphic, horn, sperm and teardrop shapes within designs (1)	

	Negative impacts 1. Designs may not function effectively (1) 2. Designs may not be as safe as functional designs (1) 3. Ergonomics may be compromised by the visual form of the product (1) 4. The designs may not be suitable for traditional interiors (1) To score the maximum six marks, the candidate's response must include a minimum of **one** negative or **one** positive impact. **6 x 1**	**(6)**
	Total for question	**12**

Question Number	Answer	Mark
4(a)	Any **three** of the following explanation points from: 1. Some parts/products are designed with a limited lifespan (1) Resulting in consumers replacing the product earlier than intended (1) 2. Manufacturers often postpone the release of a new technologies (1) to create future demand for subsequent releases (1) 3. It is often cheaper to replace a product than repair it (1) resulting in consumers discarding old products (1) 4. New and improved models/products are released by companies to entice sales (1) puts pressure on consumers who want the latest version (1) 5. Newer models may be cheaper than the old model (1) creating a reluctance to repair the product (1) 6. Replacement parts are only provided for a limited period/while stocks last (1) products are no longer repairable and need to be replaced (1) 7. New products and developing technologies (1) entice consumers who always want to be seen with the newest/latest/updated version of a product (1) 8. Has become accepted by a large section of todays consumer society (1) who have a lack of knowledge/skill/desire to repair a product (1) 9. The very design of a product may determine its lifespan (1) as consumers move towards disposable/consumable products (1) 10. Changes in fashion/style/trends may make a product aesthetically obsolete (1) creating demand for newer more trendy products (1)	

	11. Consumers have to dispose of obsolete products (1) may need specialist disposal / may go to landfill (1) 12. The technology is no longer supported so becomes obsolete (1) forcing the customer to upgrade even when they were happy with the performance of the old product (1) 13. Consumers will always have up to date technology (1) as products are continually being improved for their benefit (1) If a justification is repeated the mark can only be awarded once **3 x 2**	**(6)**
4(b)	Any **six** of the following examples from: 1. Software technology has allowed multiple functions to be assigned to a single control panel (1) 2. Advanced/miniaturised/improved integrated circuits allow more components on a single chip (1) 3. Advanced battery technology results in smaller and lighter batteries (1) 4. Advanced liquid crystal displays are thinner (1) 5. Advanced liquid crystal displays require less current therefore reduces battery size (1) 6. Modern materials including alloys and carbon fibre can be of thinner wall construction than polymers (1) 7. Modern materials reduce the need for an internal structure allowing for a more compact packaging of components (1) 8. Smaller charging/USB connectors have been developed which contribute to the overall space saving (1) 9. Use of solid state memory/storage (1) 10. No moving parts reduces battery/space requirements (1) 11. Wireless technology reduces the need for ports for earphones/headphones (1) 12. Downloading of music eliminates the need to use CDs, DVDs or cassettes (1) 13. Touch screen technology means that keyboards / number pads are not required (1) 14. Modern circuits consume less power allowing smaller batteries to be used (1) 15. Inbuilt aerials / the introduction of stronger networks have reduced the overall size of electronic devices (1) **6 x 1**	**(6)**
	Total for question	**12**

Question Number	Answer	Mark
5(a)	Any **two** of the following points from: 1. As a safety feature to indicate when something is hot (1) 2. Aesthetic/novelty appeal e.g. images that appear on a mug/clothing (1) 3. Forehead thermometer/room thermometer (1) 4. Battery level indicator on the side of a battery casing (1) 5. Kettles that change colour when the water is hot (1) 6. Children's bath toys that indicate when the water is at the correct temperature (1) 7. Childrens' cutlery to indicate temperature (1) 8. Radiator temperature indicators (1) 9. Thermochromic cookware that provides an indication of heat (1) 10. Hair straighteners / heat mats (1) 11. Fish tank temperature indicator (1) 12. Stickers on food packaging to indicate the correct storage temperature (1) 13. Indicators inside refrigerators to indicate the correct storage temperature (1) 14. Fire safety signs / fire extinguishers (1) **2 x 1**	**(2)**

Question Number	Answer	Mark
5(b)	An evaluation covering **six** of the following points from: Advantages: 1. Superelasticity/SMAs are extremely flexible (1) 2. If bent or kinked they can return to original shape (1) 3. Use of heat / hot water facilitates the shape return (1) 4. Resistant to typical spectacle damage e.g. being sat on (1) 5. Will immediately return to the original shape (1) 6. Lightweight so comfortable to wear (1) 7. Durable therefore long lasting (1) 8. Thin sections can be used to provide discreet spectacles (1) 9. Good mechanical properties (1)	

	Disadvantages: 1. More expensive than traditional frames/materials (1) 2. Can be subject to fatigue (1) 3. Limited aesthetic choice in terms of designs (1) 4. Can be deliberately/intentionally bent/creased / snapped / broken (1) 5. Thin sections do not discreetly mask the lens thickness (1) 6. Storage can be more problematic with unhinged side arms (1) 7. Less rigid than normal spectacle frames (1) 8. Light weight combined with heavy lenses may make the frames feel unbalanced (1) 9. Cannot be/are difficult to repair (1) Do not accept responses relating to sustainability/ environmental factors as these would apply to all types of spectacle frame. To score the maximum six marks the candidate's response must include a minimum of one advantage or one disadvantage. **6 x 1**	**(6)**
	Total for question	**8**

Question Number	Answer	Mark
6(a)	Any **three** of the following explanations from: 1. Hydroelectric power is a sustainable power source (1) because there is an abundant supply of water / precipitation / rainfall available for HEP generation (1) 2. Fossil fuels are not required (1) so eliminates fuel costs / the production of carbon dioxide / environmental issues associated with mining / extraction / there are no emissions / uses renewable energy (1) 3. Hydroelectric plants are highly efficient due to their automated operation (1) therefore providing cheap and abundant power/ a short payback period (1) 4. Hydroelectric plants have longer economic lives than fuel fired power stations (1) reducing the long term capital costs of electricity production (1) 5. Surplus power in the national grid/hydroelectric supply can be used during of peak times to pump water back up to the higher reservoir level for reuse (1) further contributing to the renewable credentials of hydroelectric power (1) 6. Large reservoirs (1) which can provide improved leisure and tourism (1) 7. Hydroelectric power is a reliable source of renewable energy (1) unlike photovoltaic cells and wind turbines that are dependant upon favourable weather conditions (1) 8. Zero fuel costs (1) means that capital expenditure / initial investment is paid off quickly (1) 9. Quick start up time and shut down by controlling the water flow (1) enables HEP to be used at times of peak demand / as a top up supply (1) 10. Dams are created (1) which protect downstream towns from flooding (1) **3 x 2**	**(6)**

Question Number	Answer	Mark
6(b)	An evaluation covering **six** of the following points from: Advantages 1. Uses uranium which is an abundant and widely distributed fuel and is able to meet future energy needs for many years (1) 2. Controlled chain-reaction creates heat that can be used to heat the power station (1) 3. Produces less airborne pollution leading to cleaner air / eco-friendly (1) 4. Mitigates the greenhouse effect if used to replace fossil-fuel derived electricity (1) 5. Passively-safe nuclear reactors use new technology leading to increased levels of safety to avoid leaks and overheating leading to meltdown (1) 6. Fission reactors are being developed that are both cleaner and more efficient (1) 7. Very high energy yield / efficiency / creates vast amounts of power (1) 8. Only small quantities of uranium are needed (1) 9. Reliable continuous form of energy production (1) 10. Surplus heat can be used for district heating schemes (1) 11. Does not use fossil fuels (1) Disadvantages 1. Unpopular with the public/public mistrust due to overseas accidents e.g. Chernobyl (1) 2. Problem of storing/disposing of radioactive waste (1) 3. Nuclear waste remains highly dangerous for many years / takes thousands of years to degrade (1) 4. Potential for severe radioactive contamination by accident (1) 5. Could help lead to the proliferation of nuclear weapons (1) 6. Mining of uranium causes damage to the environment and pollution (1) 7. The UK has a high population density therefore the generation will be close to population centres (1) 8. Public concerns relating to potential use of radioactive material by terrorists (1) 9. Needs to located near large bodies of water eg sea or lakes for cooling water requirements (1) 10. Very high initial set up costs (1) 11. Nuclear power plants have a limited life span (1) To score the maximum **six** marks the candidate's response must include a minimum of **one** disadvantage. **6 x 1**	**(6)**
	Total for question	**12**

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