Mark Scheme (Results)

Summer 2018

Pearson Edexcel GCSE
In Design & Technology (5GR02) Paper 01

Unit 2: Knowledge and Understanding of Graphic Products

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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 - the only correct answer is A B is not correct because the Brussels Agreement is a relationship signed by Serbia and Kosovo C is not correct because the Maastricht Treaty is related to the forming of the EU D is not correct because the Geneva Convention sets out conditions for humanitarian treatment in wartime	**(1)**
Question Number	**Answer**	**Mark**
2	B - the only correct answer is B A is not correct because polypropylene is a sheet material C is not correct because thermochromic liquid crystals are a liquid D is not correct because solid white board is a sheet material	**(1)**
Question Number	**Answer**	**Mark**
3	C - the only correct answer is C A is not correct because a french curve is a solid curved object B is not correct because a protractor is semi circular D is not correct because a stencil is used to produce lettering or shapes	**(1)**
Question Number	**Answer**	**Mark**
4	C - the only correct answer is C A is not correct because biopol is a type of polymer B is not correct because biodiversity relates to the range of animals/plants living in an area/habitat D is not correct because the biosphere is the worldwide sum of ecosystems	**(1)**
Question Number	**Answer**	**Mark**
5	A - the only correct answer is A B is not correct because continuous production would be too large a scale of production C is not correct because mass production would be too large a scale of production D is not correct because more than one ticket is needed therefore one-off is inappropriate	**(1)**
Question Number	**Answer**	**Mark**

6	C - the only correct answer is C A is not correct because cartridge paper is opaque B is not correct because copier paper is opaque D is not correct because sugar paper is opaque	**(1)**
Question Number	**Answer**	**Mark**
7	B - the only correct answer is B A is not correct because high density polystyrene is a block material used for model making C is not correct because foil lined board is used for food packaging D is not correct because corrugated cardboard is difficult to print on to and lacks durability	**(1)**
Question Number	**Answer**	**Mark**
8	A - only correct answer is A B is not correct because letterpress cannot print images C is not correct because pad printing would be too slow for mass production D is not correct because photocopying would be uneconomic for a long print run	**(1)**
Question Number	**Answer**	**Mark**
9	D - the only correct answer is D A is not correct because vacuum forming cannot produce different features inside/outside of a mould B is not correct because 3D printing would be too slow for the scale of production C is not correct because an extrusion would not be able to have a hollow section	**(1)**
Question Number	**Answer**	**Mark**
10	C - the only correct answer is C (note questions asks which is **NOT** a characteristic) A is not correct because the width to height ratio **is** 16:9 B is not correct because the frame rate **does** vary between 720p and 1080p D is not correct because audio and video **are** both compressed.	**(1)**

<table>
<tr><th>Question Number</th><th>Answer</th><th>Mark</th></tr>
<tr><td>11. (a)</td><td>
<table>
<tr><td></td><td>Name</td><td>Use</td></tr>
<tr><td>ai</td><td></td><td>• To draw circles / arcs / sectors of circles (1)
• to bisect lines / angles (1)
• to transfer lengths(1)</td></tr>
<tr><td>aii</td><td>• Craft knife (1)
• Crafting knife (1)
• Trimming knife (1)
• Stanley knife (1)

Do not accept marking knife or scalpel</td><td></td></tr>
<tr><td>aiii</td><td>• Hot wire cutter (1)</td><td></td></tr>
<tr><td>aiv</td><td></td><td>• Producing solid / hollow models / components/parts /objects from CAD designs. (1)
• Rapid prototyping (1)
Do Not Accept – 3D printing</td></tr>
</table>
4 x 1
</td><td>(4)</td></tr>
</table>

Question Number	Answer	Mark
11. (b) (i)	**Three** reasons given from: 1. Check the ergonomics of designs (1) 2. Reduces risk of the final design being unsuitable if suggested improvements are made(1) 3. Inexpensive process to make a one-off / batch compared to working models (1) 4. Prototypes can be made/adapted quickly (1) 5. Models can be presented to clients/customers/potential end users for opinions (1) 6. To check the aesthetics/look of the product (1) 7. Check the position of buttons for ease of use (1) Do not accept 'attractive' unless referenced to the appearance of the controller. **3 x 1**	**(3)**

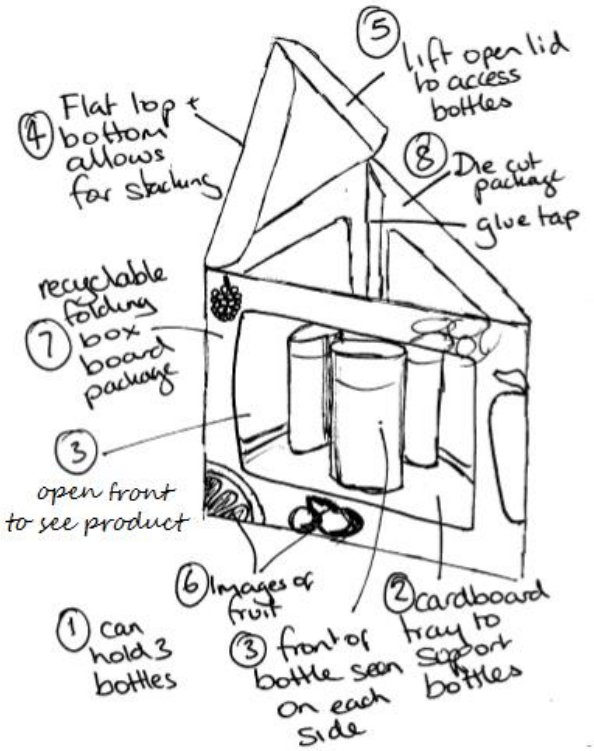
Question Number	Answer	Mark
11. (b) (ii)	**Two** safety precautions given from: 1. Use PPE / wear goggles/eye protection/apron (1) 2. Personal safety/tie long hair back/secure loose clothing (1) 3. Use guards (1) 4. Use extractor (1) 5. Follow instructions/training/supervision/keeping fingers away from the blade (1) 6. Only one person to use the machine / maintain working space /one person within the taped area (1) 7. Follow mandatory safety signage instructions (1) 8. Check machine for faults/report faults (1) 2 x 1	**(2)**

Question Number	Answer	Mark
11. (b) (iii)	**Two** advantages explained from: 1. Can be softened/made flexible (1) using hot water/heat (1) 2. Easy to shape/mould (1) using hand pressure/simple tools (1) 3. Becomes impact resistant (1) when it cools down (1) 4. Durable once set (1) allows the model to last a long time (1) 5. Is hard/tough once cooled (1) meaning holes can be drilled/sanded smooth/finish applied(1) 6. There is minimal waste (1) because once completed polymorph can be reused (1) 2 x 1 2 x 1	**(4)**

Question Number	Answer	Mark
11. (c) (i)	**One** reason explained from: 1. Impact resistant / tough (1) therefore can withstand being dropped (1) 2. Dimensional stability (1) so does not change shape when it gets warm (1) 3. Cost effective material(1) that does not add significantly to the cost of the product (1) 4. Durable /robust (1) so does not get damaged from frequent use (1) 5. Lightweight (1) so can be held for long periods of time (1) 6. Range of colours available (1) so it can match corporate identity/colour scheme of the product (1) 7. Good fluidity / plasticity (1) which allows it to be forced under pressure into the mould (1) Do **not** accept answers relating to electrical insulation 2 x 1	**(2)**

Question Number	Answer	Mark
11. (c) (ii)	**Two** advantages explained from: 1. Complex / intricate / precise shapes can be included in designs (1) which are too complicated and expensive to manufacture using other techniques (1) 2. Plastic injection moulding is a fast process (1) allowing large numbers of parts to be manufactured / meeting levels of demand / reduce lead times(1) 3. The moulding can be made with webs/different thicknesses (1) to increase strength where the product needs to be strong (1). 4. The process is automated (1) reducing manufacturing/labour costs/making it suitable for large scale manufacture (1) 5. Moulds can be manufactured direct from CAD design (1) allowing for intricate details/high levels of accuracy (1) 6. Inserts and fixing can be internally moulded into the body (1) in order to aid assembly (1) 7. No additional surface finishing / surface texture is required/self finishing (1) therefore reduced manufacturing time/ additional costs/need for secondary processes (1) 8. Produces little waste (1) as only the amount of material required for the moulding is used / reduces units costs (1) 9. Using a mould allows accuracy / repeatability (1) allowing products to be consistently shaped (1) 10. Requires a smaller draft angle (1) as the mould separates to release the casing (1) 2 x 1 2 x 1	**(4)**

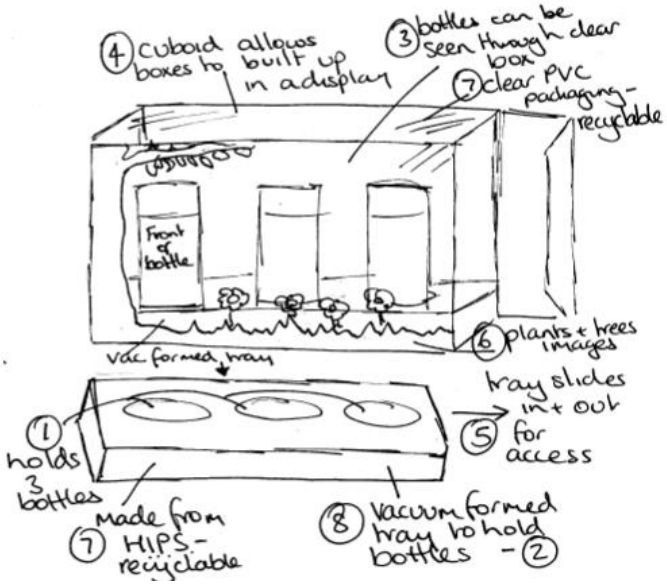
Question Number	Answer	Mark
12.	Candidates may answer any specification point in either graphical form or by annotation. **No marks are awarded for the quality of graphical communication.** • have a nature theme (1) e.g. plants / fruit / water • hold three bottles (1) e.g. side by side in a row / tube / triangle / use of dimensions • keep the bottles upright (1) e.g. formed insert / holes / support structure • allow the fronts of the three bottles to be seen (1) e.g. large surface area / visible from different faces / windows / cut outs • be able to be displayed in a shop (1) e.g. stackable / hung on a cord / euro slots • allow the bottles to be removed easily from the packaging (1) e.g. opening flap / holes / slide out tray / lift off lid • be produced from materials that are recyclable (1) e.g. folding box board / HIPS / pine / aluminium / acrylic • be manufactured using processes suitable for batch production (1) e.g. die cutting / vacuum forming / gluing / pressing / named printing process Example of candidate response: **Design idea 1**	**(8)**



Design idea 2

Marks for design idea 2 can only be awarded where specification points are resolved differently than in design idea 1.

Example of candidate response:



(8)

Question Number	Answer	Mark
13. (a) (i)	**Two** properties given, with a linked justification from: 1. property: Inert / non-reactive (1) justification: so does not flavour/contaminate the contents (1) 2. property: Lightweight (1) justification: so does not add additional unnecessary weight to the product (1) 3. property: waterproof (1) justification: prevents liquid escaping from the sides/base of the carton / prevent contaminants entering the liquid(1) 4. property: Air tight (1) justification: to keep the contents fresh (1) 5. property: Impact Resistant (1) justification: so does not smash/break if dropped (1) 6. property: Tough / durable (1) justification: will not tear easily as it is a laminate / will last a long time(1) 7. property: Sterile (1) justification: so prevents bacteria/germs from damaging the contents (1) 8. property: stiff/rigid once formed (1) justification: so it keeps its shape/easier to store/easier to hold (1) 2 x 1 2 x 1	**(4)**

Question Number	Answer	Mark
13. (a) (ii)	**One** advantage explained from: 1. It is a high speed process (1) which means packaging can be continuously produced / suitable for mass/batch/continuous production (1) 2. It is suitable for water-based inks (1) which are nontoxic for use with food/drink (1) 3. It uses fast drying inks (1) which allows for quicker production (1) 4. Ideal for solid block colour printing (1) which suits the graphics on the carton (1) 5. Produces a well-defined/high quality image (1) increasing the visual appeal of the carton (1) 2 x 1	**(2)**

Question Number	Answer	Mark
13. (b) (i)	**One** reason explained from: 1. The package has flat sides (1) which allows it to be held easily in the hand (1) 2. A spout (opening) can be formed when (1) which allows the flow to be controlled / flow directed / removes the need for additional closure components (1) 3. Has been ergonomically designed (1) so that it is not too wide to hold comfortably (1) Do not accept a repeat of the stem 2 x 1	**(2)**

Question Number	Answer	Mark
13. (b) (ii)	**One** reason explained from: 1. The package is produced from a web feed (1) which allows continuous production methods to be used (1) 2. Printed using a high speed process (1) using ink which dries quickly (1) 3. Standardised nets are used for a range of products (1) that means the same dies can be used multiple times (1) 4. The net could be produced using rotary die cutting (1) which is a high speed process (1) Do not accept a repeat of the stem 2 x 1	**(2)**

<table>
<tr><th>Question Number</th><th>Indicative content</th><th>Mark</th></tr>
<tr><td>13. (c)
QWC</td><td>
Evaluation to address the following issues:

Sustainability considerations
sustainability — how will the design allow for environmental considerations?
<table>
<tr><th>Package A TetraPak™ Carton</th><th>Package B – Glass Bottle</th></tr>
<tr><td>• Most paper board is from renewable sources therefore does not contribute to deforestation/FSC sourced/trees replanted
• Aluminium can be sourced from recycled supplies so further ore does not need to be mined
• It is possible to break down the packaging for recycling reducing material going to landfill
• The energy used in manufacture is relatively low compared to producing glass</td><td>• Glass bottles can be washed and reused reducing the need to produce more bottles
• The same bottle can be used for milk/ juice/ milkshake allowing more efficient production methods
• Glass can be easily recycled time and time again therefore does not need to go to landfill/incineration</td></tr>
</table>

performance requirements — What are the technical considerations that must be achieved within the product?
e.g. keeping milk fresh, easy to pour, ease of storage etc.
<table>
<tr><th>Package A TetraPak™</th><th>Package B – Glass Bottle</th></tr>
<tr><td>• Layers of plastic and aluminium keep the flavoured milk fresh
• The packaging is inert so does not change the taste of the drink
• Standardised size of container so it can be stored easily in a fridge door
• Provides safer storage as it does not smash if dropped
• Allows full graphic coverage of the packaging</td><td>• Glass does not contaminate the flavour of the drink
• The customer can easily see how much drink is remaining
• Glass prevents the drink from leaking as it is not porous
• Bottles fit easily into fridges for storage</td></tr>
</table>
</td><td>(6)</td></tr>
</table>

Level	Mark	Descriptor
	0	No rewardable material
Level 1	1-2	Candidate identifies the area(s) of comparison with no development OR identifies and develops one area. Shows limited understanding of the comparison. Writing communicates ideas using everyday language but the response lacks clarity and organisation. The candidate spells, punctuates and uses the rules of grammar with limited accuracy.
Level 2	3-4	Candidate identifies some areas of comparison with associated developments showing some understanding of the comparison. Writing communicates ideas using D&T terms accurately and showing some direction and control in the organising of material. The candidate uses some of the rules of grammar appropriately and spells and punctuates with some accuracy, although some spelling errors may still be found.
Level 3	5-6	Candidate identifies a range of areas of comparison with associated developments showing a detailed understanding of the comparison. Writing communicates ideas effectively, using a range of appropriately selected D&T terms and organising information clearly and coherently. The candidate spells, punctuates and uses the rules of grammar with considerable accuracy.

Question Number	Answer	Mark
14. (a) (i)	**One** reason given from: • Use low amounts of energy (1) • Thin / compact (1) • Flat screen (1) • Very sharp image (1) • Suitable for showing simple images (1) 1 x 1	**(1)**

Question Number	Answer	Mark
14. (a) (ii)	**Two** explanations from: 1. Can be used to bond differing types of material (1) allowing the LCD to be joined to the casing (1) 2. Has good strength once set (1) meaning the step counter will last a long time (1) 3. Waterproof/weatherproof (1) allows the step counter to be used outside/in all weathers (1) 4. Wide range of working temperatures (1) so the step counter will not be damaged by high/low temperatures(1) 5. Does not shrink when cured (1) which will prevent gaps appearing between the parts (1) 6. Has some flexibility (1) allowing movement to be accommodated (1) 7. Non-corrosive adhesive (1) so will not affect the display/PVC (1) 8. Sets quickly (1) so there is quicker production/no need for clamping (1) 2 x 1 2 x 1	**(4)**
Question Number	**Answer**	**Mark**
14(b)	Explain two advantages of using an electronic point of sale (EPOS) system when selling the step counters. Explanation to address the following issues: 1. Can provide an account of the transactions involving the step counter (1) because sales are recorded on a computer/sales trends can be predicted/links to loyalty schemes (1) 2. The retailer can monitor the performance of the product compared to similar devices (1) because all data is stored centrally (1) 3. Allows the retailer to react more quickly to changes in consumer demand / makes sure that the step counter is always available (1) because stock can be automatically ordered at certain threshold levels (1) 4. Manual 'stock takes' are no longer needed to see if the step counter is in stock / Retailers get 'real time' updates of stock levels (1) because sales are recorded in a central database (1) 5. Reduces time / human error at checkout (1) because data is linked to specific bar codes (1) 6. Allows prices to be changed easily / centrally by the store (1) so stock does not need to be relabelled / reducing pricing sales (1) 2 x 1 2 x 1	**(4)**

Question Number	Answer	Mark
14. (c)	**Two** reasons explained from: 1. Screen printing gives deep /saturate / glossy/ vivid colour (1) making the packing attractive to customers / improve product perception(1) 2. The overall quality of printing can be very high (1) increasing the value of the product (1) 3. The process is relatively low cost (1) compared to flexography/gravure (1) 4. stencils can be reused (1) allowing further batches to be produced (1) 5. Low set-up cost (1) so does not add significantly to the cost of the packaging (1) 6. Suitable for printing solid blocks of colour (1) making it suitable for simple designs (1) 7. Automated process (1) so suitable for batch /mass production (1) 8. Relatively simple to create screen (1) lead times are shortened/ suitable for smaller batches (1) 9. Versatile process (1) that can be used on a range of different materials / shapes (1) Do not accept 'fast', 'quick', 'cheap', 'easy' etc 2 x 1 2 x 1	**(4)**

Question Number	Answer	Mark
14. (d) **QWC**	**Indicative content** **Discussion to address the follow issues:** • Susceptible to moisture / not waterproof • Limited printing processes can be used • Corrugated cardboard will protect the contents as it has good impact resistance / will provide protection if dropped • Corrugated cardboard is light weight due to its internal structure making the easier/cheaper to transport/handle • Low cost materials that is widely available • Corrugated cardboard can be die cut which allows any size/shape of box to be produced • Can be produced flat pack for self-assembly • Can be printed on for branding purposes • Corrugated cardboard boxes are recyclable which makes the packaging sustainable/eco-friendly • Different wall thicknesses (single/double/triple) can be used depending on the strength needed • Made from largely recycled materials.	**(6)**

Level	Mark	Descriptor
	0	No rewardable material
Level 1	1-2	Candidate identifies an area(s) of discussion with no development OR identifies and develops one area. Shows limited understanding of the subject. Writing communicates ideas using everyday language but the response lacks clarity and organisation. The candidate spells, punctuates and uses the rules of grammar with limited accuracy.
Level 2	3-4	Candidate identifies some areas of discussion with associated developments showing some understanding of the subject. Writing communicates ideas using D&T terms accurately and showing some direction and control in the organising of material. The candidate uses some of the rules of grammar appropriately and spells and punctuates with some accuracy, although some spelling errors may still be found.
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