GCE

Design and Technology

H406/02: Problem Solving in Product Design

Advanced GCE

Mark Scheme for June 2019

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

Annotations

Annotation	Meaning
BP	Blank Page – this annotation must be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.
✓	Tick (not used on level Qs)
BOD	Benefit of doubt
SEEN	Noted but no credit given
L1	Level 1 response
L2	Level 2 response
L3	Level 3 response
L4	Level 4 response
ECF	Error carried forward
RE	Rounding error
highlighter	A line is highlighted next to relevant part if only part is answering Q

Subject Specific Marking Instructions

INTRODUCTION

Your first task as an Examiner is to become thoroughly familiar with the material on which the examination depends. This material includes:

- the specification, especially the assessment objectives
- the question paper
- the mark scheme.

You should ensure that you have copies of these materials.
You should ensure also that you are familiar with the administrative procedures related to the marking process. These are set out in the OCR booklet Instructions for Examiners. If you are examining for the first time, please read carefully Appendix 5 Introduction to Script Marking: Notes for New Examiners.

Please ask for help or guidance whenever you need it. Your first point of contact is your Team Leader.

Question			Answer	Mark	Guidance	
					Content	**Levels of Response**
1			**Design Requirements** • Appearance/aesthetics – domestic owner considerations – colour scheme complementing intended environment e.g. child's bedroom. Or may not be an issue for garage/utility. • Size/dimensions – appropriate for 1 or 2 small rabbits or g-pigs, sleeping compartment, food bowl, litter tray and exercise space (ref. to healthy care of pets from RB). • Material/structural integrity – base tray withstand the load of two pets, e.g. guinea pigs at 1200 g each (from RB), bars to resist impact from pets. • Maintenance – ease of dismantling/cleaning by a single user. Wipe clean materials, resistant to anti-bacteria agent e.g. – PP trays = self-lubricated, galvanised bars. • Security/access – access panels should secure easily for pet owner (single handed so can add/remove items quickly), but resist the force of a pet/pets, pushing them. • Durability – resist chemical reaction of cleaning products, water-based liquid/food, urine/pet	8	Pet owners – identification of range of pet owners - rabbits and guinea pigs are owned by a large age range of owners, 4 years old upwards, non-gender specific. Candidates may extract information from the Resource Booklet. Any such lifted information can be used in support of the critical evaluation but no marks should be awarded simply for duplicating text. There is no analysis or evaluation in Level 1. Only 1 Des. Req. but detailed – top of Level 2. Indirect ref to stakeholder group – Max mark in level 2. Candidates can draw on practical experience of iterative designing to support their response to this question.	**Level 4 [7-8 marks]** *A **comprehensive** critical examination of design requirements in relation to stakeholder group.* Comprehensive understanding of a wide range (at least 3) of different design requirements that would have been taken into account when designing the SMSPC. Analysis of design requirements is consistently and appropriately aligned with needs of target group. Information in RB is used effectively to fully exemplify the points being made. Well-constructed narrative in relation to question with clear and supported evaluative comments. **Level 3 [5-6 marks]** *A **good** critical examination of design requirements in relation to stakeholder group.* Good understanding of a range (at least 2) of different design requirements that would have been taken into account when designing the SMSPC. Analysis of design requirements is appropriately aligned with needs of

			litter – PP trays = easy clean waterproof solutions, galvanised bars reduce corrosion. • Cost – value for money, quality of finish, perceived durability/reliability. • Access – pets – top hatch of appropriate dimensions for rabbit/g-pig to be placed through without damage to animal or owner. • Access – owner - pet in the cage to add feed/hay/medicine. (Front) access should allow the pet owner's hand can pass through and the rabbit /g-pig cannot escape at same time. • Marketing/publicity – details of the product and website. Packaging, instruction/information and accessories– enclosed info. or info. labels/packaging to enable disassembly/assembly of cage for maintenance and adding accessories/pets. Instructions on components and how they may be used. Link to manufacturer's website/url, to enable access graphic/video user instructions, and learn about accessories available to complement this cage. QR Code. • Transportation – carry handles to enable movement of cage for cleaning without any risk of having fingers bitten, or harming			target group but one or two opportunities are missed to make connections. Information in RB is used for the most part effectively to exemplify points being made although one or two opportunities are missed. Well-constructed narrative in relation to question although one or two opportunities missed to develop response. Evaluative comments are clear but not always supported. **Level 2 [3-4 marks]** *A **sufficient** critical examination of design requirements in relation to stakeholder group.* Sufficient understanding of design requirements (at least 1) that would have been taken into account when designing the SMSPC. Analysis of design requirements is reasonably aligned with needs of target group but there are significant opportunities missed to make connections. Information in RB is used to exemplify some points being made although much more could have been done to exploit the stimulus material available. Reasonable narrative in relation to the question although response at times lacks depth and cohesion.

			the pet. Secure fastening of base tray to top cage. • Anthropometrics/ergonomics – carry handles – opening for 95th%ile adult user hand width. Shape to provide sufficient comfort to users for movement over short distances e.g. within home, or from the home to a car. Consideration of 5th%ile older adult strength. • Online order transportation – suitable shape and structure when assembled/packaged for stacking to save space, protect cage for delivery. • Animal Welfare – identify safety aspects of the cage, certified safe for animals. • Pet safety – horizontal cage bar spacing should be narrow to prevent pet escape or damaging themselves chewing, but close enough to prevent access by predators (cat/dog/child) • User-centred approach keeps users at heart of designing - focuses on user interface, how user interacts with/relates to the product, which will create a product with a high level of usability. Thus product gives thought to the issues when caring for a pet, which through favourable reviews will increase numbers, business and			Evaluative comments lack clarity and are unsupported. **Level 1 [1-2 marks]** *A **limited** examination of design requirements in relation to stakeholder group.* Limited knowledge and next to no understanding of design requirements that would have been taken into account when designing the SMSPC. No analysis of design requirements resulting in only weak alignment with needs of target group. Use of information from the RB is used in a simplistic way and adds limited value to the points being made. Limited narrative in relation to question. Response is basic and unstructured with no evaluative comments. 0 marks = No response or no response worthy of credit.

			commercial returns.		

Question	Answer	Mark	Guidance

					Content	**Levels of Response**
2*			**Points made against Owners Requirements list RB.** Deliver a measured amount of dry food once per day: • Fig 4 **provides** portion control which is suitable for maintaining the diet of overweight pets. Fig 3 has **no** portion control. Fig 4 **can dispense** different foods at different times. • **Neither** product allows the pet owner to easily dispense appropriate quantities of food **for daily portions** to small pets, as Fig 4 compartments have 236ml **capacity which is too much food** for small pets such as guinea pigs**. Thus**, owners will need to measure out quantity of food before adding to the feeder. • Fig 3 and 4 **can also** be used to dispense medication with the food, however Fig 4 can dispense medication **separately to food.** Be suitable for 2, 3, 4 or 5 day holidays: • Fig 4 **offers 5 days** of food whereas Fig 5 provides **a greater scope for more days** feeding. Fig 4 is **programmable** and can distribute 1, 2, 3, 4 or 5 meals • With the weight of pet on top of	12	All responses should be in relation to the existing product information provided in Fig. 3 and Fig. 4. Candidates may extract information from the Resource Booklet. Any such lifted information can be used in support of the critical evaluation but no marks should be awarded simply for duplicating text. There is no analysis or evaluation in Level 1. Points raised must be linked to the owner's requirements.	**Level 4 [10-12 marks]** *A **comprehensive** examination of the suitability of the listed products for dispensing food against the list of owners' requirements.* Comprehensive understanding of the suitability of the existing products for stated purpose. Product analysis is consistently and appropriately aligned with list of owners' requirements. Information in RB is used effectively to fully exemplify the points being made. Well-constructed response in relation to question with a clear and developed narrative. *There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.* **Level 3 [7-9 marks]** *A **good** examination of the suitability of the listed products for dispensing food against the list of owners' requirements.* Good level of understanding of the suitability of the existing products for stated purpose. Product analysis is appropriately aligned with list of owners' requirements but one or two

			Fig 4 (1200g for a large g-pig) feed tray **may rub against the lid** and/or create too much friction for the motor to overcome. This could lead to overheating/more use of electrical energy thus = flat batteries. Fig 3 takes up **less floor room** on the cage but it is taller and does not allow for an animal to climb on to it. Fit inside a standard size guinea pig cage such as the Skyline Maxi Small Pet Cage in Fig. 2**:** • Fig 4 has a larger footprint than Fig 3 and will take up **roughly a third** of the available tray space in the Skyline Maxi Small Pet Cage, but it is **likely to be more stable** and less height needed in cage. **Other accessories** can be placed on top of Fig 4, so only lost floor area is that of a single compartment. • At 13cm high, Fig 4 **could possibly** be stacked with another unit (26cm) to dispense medication or other food and avoid cross contamination. Whereas more Fig 4 feeders would take up a greater floor area of the cage tray**. Multiple Fig 3 feeders** could lead to overfeeding or contamination of food. Pass through the front or top hatch of			opportunities are missed to make connections. Information in RB is used for the most part effectively to exemplify points being made although one or two opportunities are missed. Well-constructed response in relation to question although one or two opportunities missed to develop narrative. *There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence.* **Level 2 [4-6 marks]** *A **sufficient** examination of the suitability of the listed products for dispensing food against the list of owners' requirements.* Sufficient understanding of the suitability of the existing products for stated purpose. Product analysis is reasonably aligned with list of owners' requirements but there are significant opportunities missed to make connections. Information in RB is used to exemplify some points being made although much more could have been done to exploit the stimulus material available. Reasonable response in relation to the question although narrative at

a cage so that the cage does not have to be removed from the tray:

- Fig 6 is **too large** to pass through top cage hatch. Meaning **whole cage frame needs to be lifted** to remove **whereas** the feeder in Fig 5 is small enough to pass through the top hatch or even the front hatch. Fig 6 **uses** battery electrical energy stores. These will need to be changed periodically, by removing the whole product from the cage.

Be easy to dismantle for cleaning:

- Fig 5 simple construction/easy rinsed out. Food tray of Fig 6 can be easily removed for cleaning by lifting it out once the lid is open. The feeder will need to be removed from the cage to do this.
- Fig 5 in entirety can be washed. Care to be taken when cleaning the base and top of Fig 6 as electronics are contained - housings may not be waterproof.

Refillable from outside of the cage without having to remove the food dispenser.

- Fig 5 **can be permanently** attached to the cage and fill from outside of cage **if an aperture** is cut out of the side for the food tray to pass through. The feeder has clip fixings **for both front and**

times lacks depth and cohesion.
The information has some relevance and is presented with limited structure. The information is supported by limited evidence.

Level 1 [1-3 marks]
*A **limited** examination of the suitability of the listed products for dispensing food against the list of owners' requirements.*
Limited knowledge and next to no understanding of the suitability of the existing products for stated purpose.
Isolated statements made in relation to existing products resulting in only weak alignment with list of owners' requirements.
Use of information from the RB is used in a simplistic way and adds limited value to the points being made.
Limited response in relation to question. Narrative is basic and unstructured.
The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.

0 marks = No response or no response worthy of credit.

			rear fastening to enable this option. Fig 6 can only be located in its entirety inside the cage, needs removing from cage for refill. At 46cm long and 13cm high, the lid cannot be opened when inside the Skyline Maxi Small pet cage which is only 47cm in exterior height. However, if Fig 5 is attached in this permanent method, it **will be difficult to clean**, and if removed the aperture would need to be covered for security. • **Neither** product is easy to re-fill from the outside of the cage. Possibly through the use of two hands, the lid of Fig 5 could be held open while refilling from inside or outside the cage. This would work if the lid hinges at the front. At 21cm high there is possibly 25cm allowing for thickness of materials remaining height in the cage for filling. It could also be filled through a tube from outside of the cage. Keep each meal separate to prevent possible damage or contamination from water or guinea pig litter: • Fig 6 has separate compartments to **prevent c**ross-contamination. Fig 6 could be stacked with another unit to dispense medication or other food and			

			avoid cross contamination. Whereas more Fig 5 feeders would take up a greater floor area of the cage tray. Multiple Fig 5 feeders could lead to overfeeding or contamination of food. **Appropriate Requirements not given in the RB Owners Requirements list** The pet must have ease of access to the food: • The pet can climb on top of Fig 6 and eat from feed compartment, **whereas** pet will have to reach over the thin edge of the food tray of Fig 5. This could cause discomfort to small pets such as g-pigs. Small pets may struggle to climb on top, or reach to feed from Fig 6 at 13cm high. Fig 5 however has a food tray that is ¼ of the height of the feeder i.e. 21cm / 4 = 5 to 6cm high: much easier to reach for a guinea pig or small rabbit. Food must not get stuck in any areas that could interfere with operation of feeder: • There is more potential for Fig 6 to become faulty than Fig 5 due to no. moving parts and potential for food/liquid to get between compartments. However, the images show a very **close fit**			

			between the food tray and the top housing of the food tray. Sides of compartments are narrow and tops curved to **prevent food jamming** the food tray. The materials the product is made from should be non-toxic: • The feeding compartments of both products are made from BPA-free (bisphenol A), a chemical that is considered harmful when digested over time. The materials the product is made from need to be wipe/washable: • The feeding compartments **of both** products are made from plastics which can be washed. The tray of Fig 6 appears to be made from a smoother, self-lubricated plastic, such as PP, thus resists adhesion of food deposits and ease clean. Mechanical and electronic/electrical parts would need to remain free from trapped sawdust/hay/pet food/moisture to avoid damage/malfunction: • The simple construction of Fig 5 means that it should distribute food as long as it has been refilled. The base sifts fine dust and may clog/have an			

			impact.			

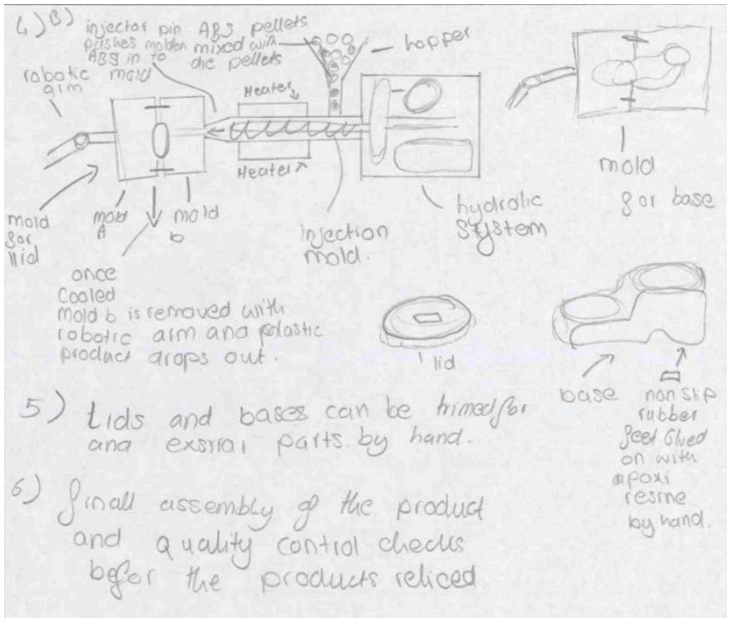
Question			Answer	Mark	Guidance	
					Content	**Levels of Response**
3			**Should logically follow – LID/TANK+LABEL/BASE It is possible to achieve L4 without sketches or limited notes dependent on fully comprehensive answer.** **Lid:** • Materials; ABS, PP, HDPE • Injection moulded to produce the complex 3D shape due to the curves. The lid is screwed onto the container/tank, a complex form of a thread will need to be moulded. 1.The polymer granules and colour granules are placed in the hopper. 2.The granules flow through the hopper onto the Archimedean screw. 3.Screw is rotated by a motor - forces granules towards the heaters, becomes softened. 4.The hydraulic ram forces the molten polymer through the feedhole into the mould. 5.Pressure from ram ensures all cavities are filled. 6.Polymer is allowed to cool / or cooled through cold water.	16	Candidates can draw on practical experience of iterative designing and product analysis to support response. The question assesses applied knowledge and technical principles to the existing design. Redesigning the existing solution will not be rewarded. Candidate expected to demonstrate understanding of the processes through annotated sketches and/or notes. There may be variations to the process as indicated but to get into L3 candidates must show a clear understanding of the end to end process. Detailed responses missing sticker = low L4 No assembly low L4	**Level 4 [13-16 marks]** *A **comprehensive** demonstration of the manufacturing and assembly process for the features of the concept design.* Comprehensive understanding of the manufacturing and assembly process for the concept design. At least 3 features (components/parts) covered in detail. Information in RB is used effectively to fully exemplify the points being made. Sketches if used will be clear and supported with relevant notes. The process will be end to end and clear in the way it is explained. **Level 3 [9-12 marks]** *A **good** demonstration of the manufacturing and assembly process for the features of the concept design.* Good understanding of the manufacturing and assembly process for the concept design. At least 3 features

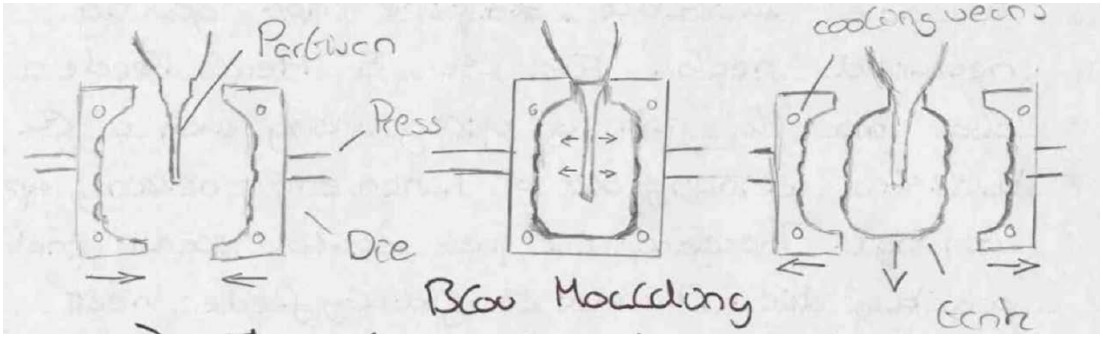
			7.Mould halves open - ejector pins release product from the mould. • Finishes: Self-finish polymers, colour pigments added to base material during the injection moulding process. **Any** standard components to be used **or/and** assembly methods. **Container:** • Materials; main container - food grade polyethylene terephthalate (PET); tasteless, odourless, non-toxic. **Note**: LDPE is not fully transparent. HDPE is usually opaque. • Blow moulding of PET. 1. Mixing, melting and extruding polymer to form into a tube - parison that will be used to make the container. 2. Mould in two halves that are closed around the parison. 3.Air is blown into the parison to expand the polymer against the mould. 4. Mould is water cooled to set plastic to shape of the mould. 5.Moulded polymer part is removed from mould, separated/flash trimmed from excess parison material top and bottom, finished. **Label:** **S**elf-adhesive waterproof label – face materials: polyester, PS,			(components/parts) covered in some detail OR 2 covered in detail. Information in RB is used for the most part effectively to exemplify points being made although one or two opportunities are missed. Sketches if used will for the most part be clear and supported with relevant notes although one or two opportunities for clarity may be missed. The process will be end to end and for the most part be clear in the way it is explained. **Level 2 [5-8 marks]** *A **sufficient** demonstration of the manufacturing and assembly process for the features of the concept design.* Sufficient understanding of the manufacturing and assembly process for the concept design. At least 2 features (components/parts) covered in some detail OR 1 covered in detail. Information in RB is used to exemplify some points being made although much more could have been done to exploit the stimulus material available. Sketches if used will be adequate and supported with notes, some of which may be relevant.

			polyethylene (PE), polyolefin (PO), (PVC), (PP). Adhesives: rubber based, acrylic based. Ink: alcohol based, water based, acetone based. **Label**: Applied by self-adhesive sticker labelling machine. Printing: screen printing, rotary letterpress/UV curing, rotary flexography, offset, hot foil, thermal transfer, direct thermal. • Finishes; self-finished transparent polymer. Any standard components to be used **or/and** assembly methods; **Base:** • Materials; main component: ABS, PP, HDPE - Non-slip rubber feet: natural rubber, polyurethane (PU) • Injection moulded to produce complex 3D shape. Underside shows sprue/ejector pin marks. **Method: As per manufacturing detail for lid above** • Accept vacuum forming and compression moulding as alternative but not most appropriate methods. **Non-slip feet:** Poss. self-adhesive backed feet - injection moulding, adhesive/bonded to base by hand/machine – **OR** moulded during manufacture directly onto pre-formed base.			The process may not necessarily be end to end with some knowledge gaps evident. **Level 1 [1-4 marks]** *A **limited** demonstration of the manufacturing and assembly process for the features of the concept design.* Limited knowledge and next to no understanding of the manufacturing and assembly process for the concept design. Use of information from the RB is used in a simplistic way and adds limited value to the points being made. Sketches if used will be unclear with only basic notes to accompany them The end to end process may not exist and if anything is basic in nature. 0 marks = No response or no response worthy of credit.

			• Finishes; **as per detail for lid above - Any** standard components to be used **or/and** assembly methods. Assembly, hand assembled, or packaged in component form to reduce packaging volume. To be assembled by the customer or retailer.			

Sketches:



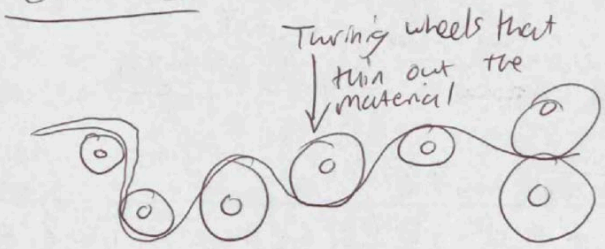


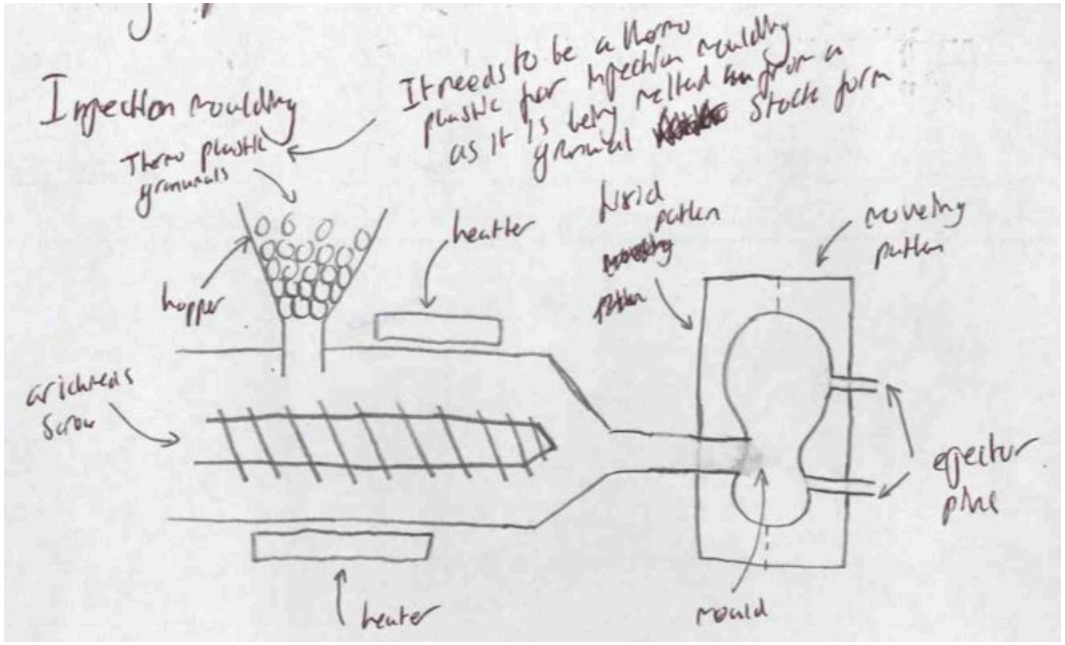
Label

Material:
~~Thermo polymer~~ LDPE (Low density poly ethelene)
that is suitible for calendering
- can be multiple coulours and can be printed on.
- would be glued to the tank using adhesive.

process
- calendering
- can produce thin label.

Calendering




Injection moulding
It needs to be a thermo plastic for injection moulding as it is being melted to form a granular stock form
Throw plastic granuals
hopper
heater
fixed pattern
moveing pattern
archimedes screw
ejector pins
heater
mould

Question			Answer	Mark	Guidance	
4				6		
	From RB, Guinea pig eats 30 grams of food per day. 31 days x 3 = 93 days. 30 g/day x 93 days = 2790 g (1). For working out the number of tanks required for each of the food products: Crispy Muesli – 7 tanks (7 x 400 g = 2800 g) GP Pet Science – 8 tanks (8 x 350 g = 2800 g) Farm Food Feast – 7 tanks (7 x 450 g = 3150 g) (1). Crispy Muesli: 7* tanks means 1 tank @ 60% reduction. Cost of tanks = (6 tanks x £2.49) + (1 tank x 0.4 x £2.49) = £15.94 to the nearest penny (1). GP Pet Science: 8* tanks means 2 tanks at half price. Cost of tanks = (6 tanks x £1.99) + (2 tanks x 0.5 x £1.99) = £13.93 to the nearest penny (1). OR ((2 X £1.99) + ((1 X 1.99) / 2) x 2) + (1 x £1.99) = £13.94 Farm Food Feast: 7* tanks means 6 tanks @ £1.49 each. Cost of tanks = (1 tank x £2.99) + (6 tanks x (£2.99 – £1.50) = £11.93 to the nearest penny (1). OR (7 tanks x £2.99) – (7 tanks x £1.50) = £10.43 Farm Food Feast* is the best value (1).			One mark for transposing the correct values from the RB to the equation. One mark for dividing the total volume by the required container volume. One mark for correct answer. **Max 4 marks**. Where an incorrect answer is given working out should be used to credit appropriate marks. *Allow error carried forward (ECF) where correct working out is shown Award marks for any other correct method.

Question			Answer	Mark	Guidance	
					Content	**Levels of Response**
5			**Should logically follow – Main Block/Carrots/Attachment to Cage** Should consider initial batch size - 4000 units. Manufacturing methods should be suited to **large batch.** **Main block:** • Materials; Appropriate hard wood not treated with chemicals/pesticides; tough, close grain resistant to gnawing/splintering or harm to pet e.g. rosewood, beech, ash, sycamore, walnut, oak, maple, elder, willow, mahogany (not most appropriate for a batch of 4000). **Note: Do not award softwoods that splinter easily such as pine.** • Methods of manufacture; CNC routing – the main block is roughly 30mm thick. Planks/blanks can be CNC routed - include the feed/treat dispenser hole and gnawing carrot holes. • Square blanks pre-cut to 120mm squares from 120mm planks using a 300mm diameter blade or larger cross-cut saw or chop saw. Blanks inserted into an alignment jig / bed of alignment pegs, on the vacuum bed of the CNC router. Multiple blanks could be aligned on the	16	Candidates can draw on practice experience of iterative designing and product analysis to support their response to this question. The question assesses applied knowledge and technical principles to the existing design so responses that focus on redesigning the existing solution should not be rewarded. The candidate is expected to demonstrate their understanding of the process involved through a series of annotated sketches and/or notes. There may be variations to the process as indicated but to get into L3 candidates must demonstrate a clear understanding of the end to end process.	**Level 4 [13-16 marks]** *A **comprehensive** demonstration of the manufacturing process for the trial batch.* Comprehensive understanding of the manufacturing process for the trial batch. All details required are included. Information in RB is used effectively to fully exemplify the points being made. Sketches if used will be clear and supported with relevant notes. The process will be end to end and clear in the way it is explained. **Level 3 [9-12 marks]** *A **good** demonstration of the manufacturing process for the trial batch.* Good understanding of the manufacturing process for the trial batch. All details covered but some evidence underdeveloped. Information in RB is used for the most part effectively to exemplify points being made although one or two opportunities are missed. Sketches if used will for the most part be clear and supported with relevant notes although one or

			bed. • Most commercial vertical/horizontal flat bed CNC routers have 1220mm x 2440mm machining capacity, therefore approximately 9 blocks wide x 18 blocks long = potentially 162 main blocks in each machining run. • If routed from a plank, without a vacuum bed, the main block may need to be routed with tabs in-between each one to prevent movement during machining. This would leave finishing processes - by hand with a disc sander or belt sander. This leaves potential for human error and variation in finished accuracy across the batch. • With vacuum bed, router would completely machine the main block, as long as a sacrificial bed is used e.g. 3mm up to 6mm MDF = vacuum strength of the vacuum bed. • Long series 6mm dia. slot cutter suitable for the outside profile cutting, 10mm diameter slot cutter (square end) for the carrot holes – hole slightly larger than 10mm to prevent interference fitting of the carrot (loose for pet to pull out). The treat/feed hole machined using larger diameter cutter. **The CNC router would have built-in tool selection.**			two opportunities for clarity may be missed. The process will be end to end and for the most part be clear in the way it is explained. **Level 2 [5-8 marks]** *A **sufficient** demonstration of the manufacturing process for the trial batch.* Sufficient understanding of the manufacturing process for the trial batch. All details may not be covered and the details that are covered may be underdeveloped. Information in RB is used to exemplify some points being made although much more could have been done to exploit the stimulus material available. Sketches if used will be adequate and supported with notes, some of which may be relevant. The process may not necessarily be end to end with some knowledge gaps evident. **Level 1 [1-4 marks]** *A **limited** demonstration of the manufacturing process for the trial batch.* Limited knowledge and next to no understanding of the manufacturing and assembly process for the trial batch.

			• Possible tool path sequence: **1.** Machine feeder hole – internal tool path **2.** Machine carrot holes – internal tool path **3**. Machine outside profile – external tool path. • Cutter speed/ feed rate / pass depth considerations appropriate routing hard wood would be acceptable. Surface finish – non-toxic, food-safe, natural finishes, followed by: Raw linseed oil, Mineral oil, Walnut oil, Beeswax, organic vegetable dye. **Carrots:** • Materials; Hardwood that hasn't been treated with chemicals such as pesticides; tough/resistant to gnawing, close grain, resistance to splintering and harm to pet e.g. rosewood, beech, ash, sycamore, walnut, oak, maple, elder, willow. **Note: Cedar and pine are both poisonous to small pets as they release phenols.** • Methods of manufacture; **CNC lathe** – profile turned from stock dowel of minimum 24mm diameter. 1. Load material into chuck 2. Turn 10mm diameter peg/stem 3. Turn around with 10mm peg/stem in chuck 4. Turn curved profile 5. Drill 10mm diameter hole 6. Finish 10mm			Use of information from the RB is used in a simplistic way and adds limited value to the points being made. Sketches if used will be unclear with only basic notes to accompany them. The end to end process may not exist and if anything is basic in nature. 0 marks = No response or no response worthy of credit.

diameter hole with slot cutter. CNC lathe needs auto-tool selection. 7. Remove 'carrot'

Surface finishing – organic vegetable dye.

Attachment to cage:
Standard components: M6 chrome/zinc plated steel threaded rod, M6 chrome/zinc plated steel wing nut. Large diameter / penny washer - white nylon, chrome/zinc plated steel.

Methods of retaining threaded rod in the main block:

Thread insert/ insert nut.

- e.g. M6 x 13mm thread insert / insert nut - drill hole with 7.5mm diameter drill, screw-in insert with hex attachment. This process will need to be undertaken before CNC routing of the curved profile of the main block (and thus the other routing processes). Main

			block located in drilling jig, side on, drilled, then turned to drill the next hole. • Thread inserts / insert nuts – driven in with hex drive bit – main block located in alignment jig. Insert screwed in, block turned and second insert screwed in. • M6 threaded rod bought as standard component at 50mm length or similar. Threaded rod attached after all surface finishing of the main block; likely to be by hand. Alternatively, the threaded rod, washer and wing nut can be supplied in a small polyethene bag within the product packaging to reduce volume for transportation/warehousing/packaging costs. Cross dowel (barrel nut) and threaded rod: • e.g. M6 x 16mm cross dowel • Drill hole on narrow edges with 6.5mm diameter drill for M6 threaded rod clearance. This process will need to be undertaken before CNC routing of the curved profile of the main block (and thus the other routing processes). Main block located in drilling jig, side on, drilled, then turned to drill the next hole. • Process as above for the base			

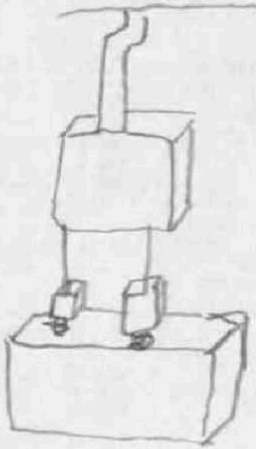
			holes, but drill on the large face of the main block (underside). Drill a 10.5mm diameter hole to a depth of 16mm to allow clearance for cross dowel to be placed inside the hole by hand. • The cross dowel, threaded rod, washer and wing nut can be supplied in a small polyethene bag within the product packaging to reduce volume for transportation/warehousing/packaging costs.			

Sketches:

(1) wooden block:

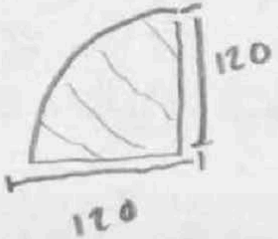
a wooden block made from pine would be bought in on a large scale so the edge piece can be cut out.

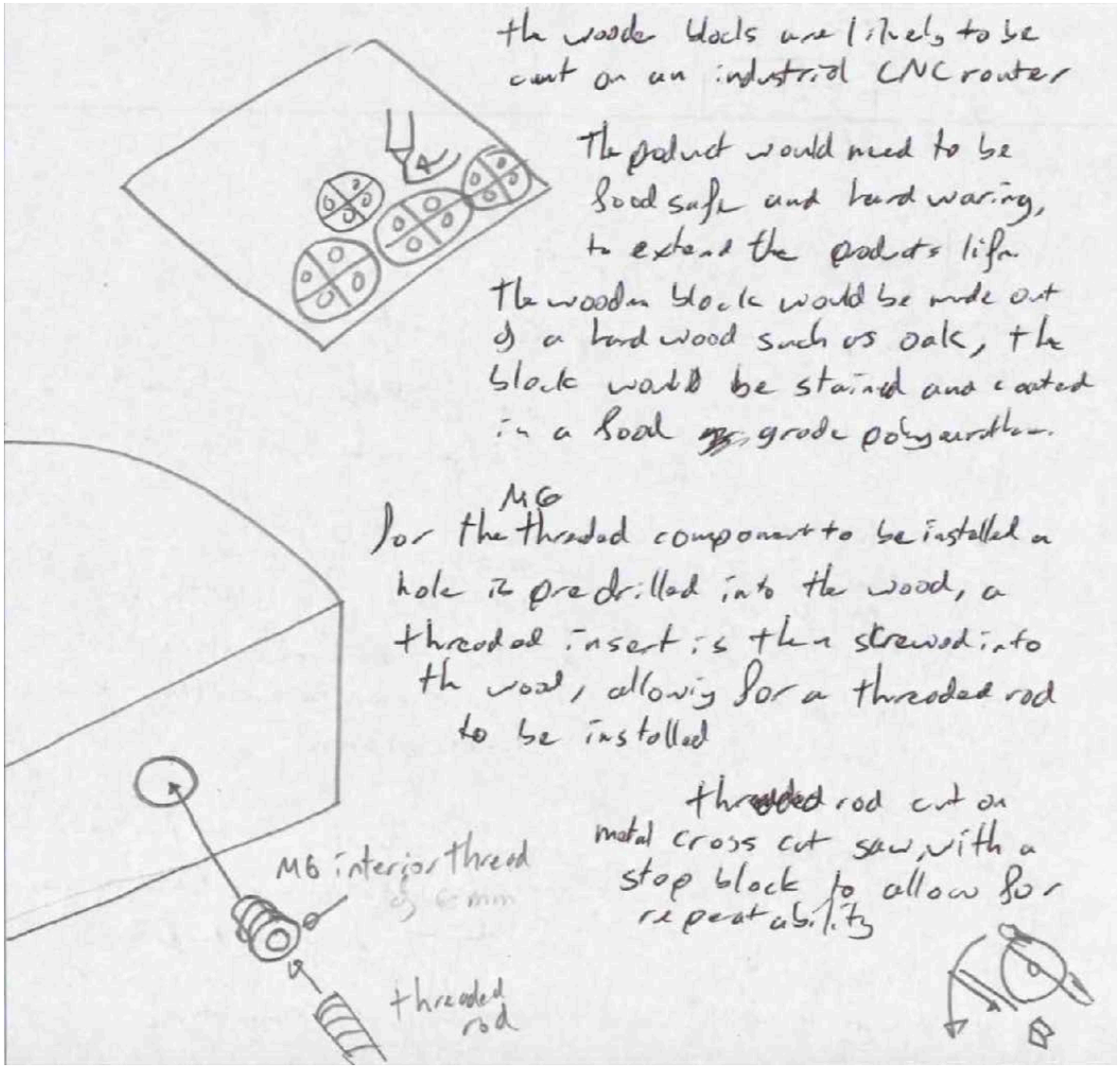
(2)



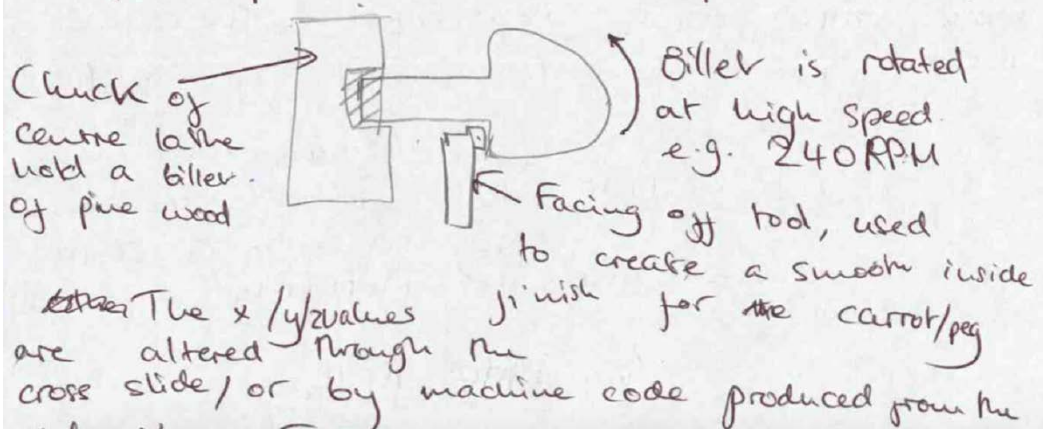
CNC router would then cut a ~~wood~~ section out around 180mm by 180mm.

and would be cut to shape leaving a 1/4 of a sphere



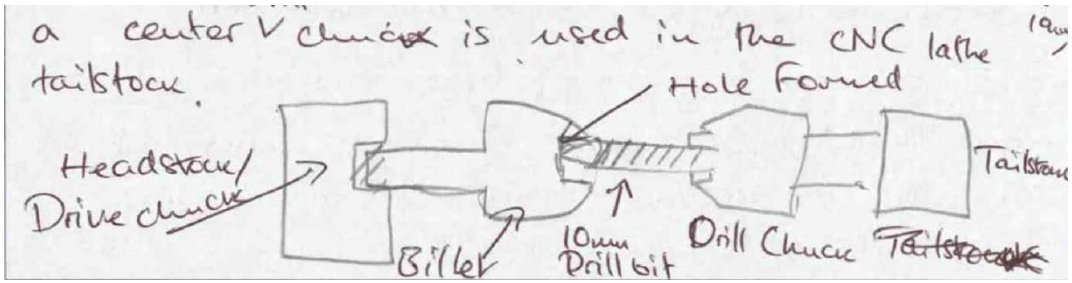

the wooden blocks are likely to be cut on an industrial CNC router
The product would need to be food safe and hard waring, to extend the products life
The wooden block would be made out of a hard wood such as oak, the block would be stained and coated in a food grade polyurethane.
M6
for the threaded component to be installed a hole is pre drilled into the wood, a threaded insert is then screwed into the wood, allowing for a threaded rod to be installed
threaded rod cut on metal cross cut saw, with a stop block to allow for repeatability
M6 interior thread
threaded rod

To create the 'chewy' wooden component, a CNC process would be used to produce the ~~pr~~ product on a batch production basis.



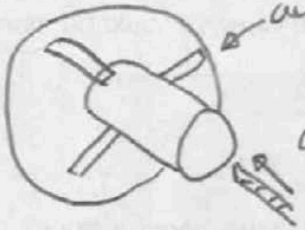
~~Either~~ The x/y/z values are altered through the cross slide/or by machine code produced from the

a center V ~~chuck~~ is used in the CNC lathe tailstock.

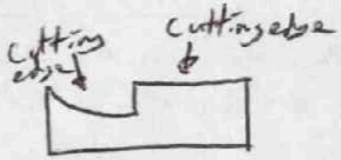


the wooden carrot: The carrot would be produced on a CNC lathe, through several processes.

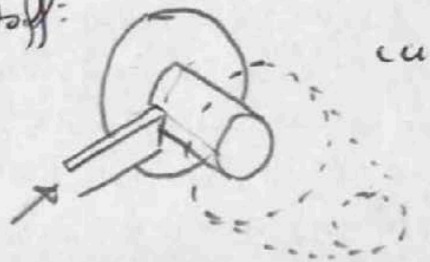
centre drill:



shaping: (one process with a specialised tool)



cutoff:



cut off tool separates piece from the lathe,

auto feed chuck feeds more 24mm down into machine.

Question			Answer	Mark	Guidance	
					Content	**Levels of Response**
6*			**Methods that could be used linking this into each of the listed stakeholders where relevant** **Methods that could be used to create more demand for product and maintain a longer product popularity:** **Customers:** • Awareness of the product. • USPs of the product – why should they be interested? Why is it better than alternatives? What are the benefits to the pet e.g. better health through activity. • Email marketing. Could be promoted through retailer's emails advising existing customers of offers and new products. • Social media marketing e.g. Facebook Twitter Instagram #Chewy • Search engine marketing. Web browser pop-ups from pet owner profiling e.g. Google. • Tailored web-browser search results. • Access to demonstration product in Petzone. Can one be seen in use, with a live pet, inside a pet cage in Petzone? • Attractive/informative packaging of the product on the Petzone store shelf e.g. photographs,	12	There is no analysis or evaluation in Level 1.	**Level 4 [10-12 marks]** *A **comprehensive** critical examination of methods that could be used to create more demand and maintain longer product popularity.* Comprehensive understanding of a wide range (i.e. at least 3) of methods that could be used to create product demand and maintain longer product popularity. Analysis of method is consistently and appropriately aligned with needs of target group (all 3). Well-constructed narrative in relation to question with clear and supported evaluative comments. *There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated.* **Level 3 [7-9 marks]** *A **good** critical examination of methods that could be used to create more demand and maintain longer product popularity.* Good understanding of a range (i.e. at least 2) of methods that could be used to create product demand and maintain longer product popularity.

			informative text, url to manufacturer's website, videos, QR code. • Manufacturers website to provide detailed information; specification including dimensions and weight, photographs of; the product empty, attached to the cage, and with treats/food in place. Videos of the product; in use with a guinea pig, demonstration of how to attach the Chewy to the cage. Maintenance and care instructions. Manufacturer's warranty and returns policy. • Many pet stores are located in retail parks. Retail parks also send out letterbox hand delivered leaflets to promote the retail park and associated businesses with their offers and new products. • Awareness of future accessories, such as interchangeable gnawing vegetables, and/or replacement carrots e.g. parsnips, beetroot etc. • Price. **Retailer:** • An initial stock of Chewy products on sale or return for store demonstration and shelf presence. • Demonstration units provided at no cost by Pets4You to all Petzone stores for customer demonstration and staff training or		Analysis of method is appropriately aligned with needs of target group (at least 2) but one or two opportunities are missed to make connections. Well-constructed narrative in relation to question although one or two opportunities missed to develop response. Evaluative comments are clear but not always supported. *There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence.* **Level 2 [4-6 marks]** *A **sufficient** critical examination of methods that could be used to create more demand and maintain longer product popularity.* Sufficient understanding of method (at least 1) that could be used to create product demand and maintain longer product popularity. Analysis of method is reasonably aligned with needs of target group (at least 1) but there are significant opportunities missed to make connections. Reasonable narrative in relation to the question although response at times lacks depth and cohesion. Evaluative comments lack clarity and are unsupported.

store use inside store owned cages inhabited by pets.

- Stock limited in the first week so that existing sales and products are not displaced.
- Promotional material for in-store use such as point-of-sale displays, posters/signage. The pet retailer will want minimal associated cost to promote the product.
- Sponsorship for adverts placed in the Petzone advertising media e.g. store leaflets, website, social media, advertising pop-ups.
- Attractive mark-up on the Chewy product e.g. 100% and an agreement for preferential buying terms in the future after the promotional batch run.
- Staff training from Pets4You specialists at no cost to ensure that staff are familiar with the Chewy product and answer customer questions, and be able to advise customers of the USPs, operation, method of attachment, care instructions, maintenance, cleaning, welfare of pet e.g. toxicity of materials, likely future developments and accessories to extend product life.
- Access to Pets4You's internet based digital marketing material for use on the Petzone website e.g. photographs and videos.
- No costs incurred in the event of

The information has some relevance and is presented with limited structure. The information is supported by limited evidence.

Level 1 [1-3 marks]
*A **limited** examination of methods that could be used to create more demand and maintain longer product popularity.*
Limited knowledge and next to no understanding of methods that could be used to create product demand and maintain longer product popularity.
No analysis of method resulting in only weak alignment with needs of target group.
Limited narrative in relation to question. Response is basic and unstructured with no evaluative comments.
The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear.

0 marks = No response or no response worthy of credit.

			the product selling poorly and being returned to the manufacturer for redistribution. • Ongoing manufacturer support. • Guarantee that future manufacturing will happen if sales are good and a level of exclusivity, or preferential buying power, is maintained for Petzone. **Manufacturer:** Need customers to be engaged withthe product, immediately after an initial launch, for it to be successful. This can be through: • Social media marketing • Email marketing • Search engine marketing • Video marketing – advertising on appropriate low-cost TV channels after associated TV shows such as 'Pet Rescue' – to send potential customers to website and awareness of products for sale in Petzone stores. • Petzone staff interaction with potential customers: staff need to be an extension of the manufacturer and be trained to be able to answer all conceivable questions. • Good placement within Petzone stores to ensure the product can be found easily by potential customers. Effective point-of-sale			

displays would help here. Placement within Petzone website, social media and email marketing.

Need to know which stores are selling the most Chewy products. Does this relate to demographic, staff training, poor management?

Monitoring of interest can include:

- TV advert viewing figures
- Web page hit count
- Feedback from Petzone

Feedback from Petzone:

- Recording within Petzone stores of interest in Chewy products and how customers found out about them.
- Sales assistants can survey customers, and potential customers (possible telephone enquiries) with just a few standard questions. How did you hear of Chewy? What do you think of it? How could it be improved?
- Notification from Petzone when additional stock is required in good time to ensure the product maintains presence on store shelves.
- Feedback from sales assistants own experience with the product in store.

			• What changes to packaging could help better promote the product? Other requirements to ensure an effective advertising campaign can be maintained: • Reliable, safe, dry, secure warehousing/storage until sold/delivered to Petzone stores. • Reliable transportation and delivery of stocks to Petzone stores so that products arrive damage free and ready for sale.			

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