

Design & Technology Edexcel A-Level

Strategies, techniques and approaches to explore, create and evaluate design ideas

Materials required for questions

- Pencil
- Rubber
- Calculator

Instructions

- Use black ink or ball-point pen
- Try answer all questions
- Use the space provided to answer questions
- Calculators can be used if necessary
- For the multiple choice questions, circle your answer

Advice

- Marks for each question are in brackets
- Read each question fully
- Try to answer every question
- Don't spend too much time on one question

Good luck!

Q1. What is iterative design

- A** A product is never change throughout the design process
- B** A product is continually analysed, tested and revisited throughout the design process
- C** A product is developed once throughout the design process

Q2. What is an advantage of user-centred design?

- A** The user is put at the centre of design
- B** The user is consulted at the end of the Design
- C** The user is not consulted during the Design process

Q3. Which of these is not an advantage of collaboration when designing

- A** it is an excellent way of gaining feedback
- B** it is a way to take ideas from others
- C** It can help overcomes design fixation

Q4. What is 'Right to repair'?

- A** Law for manufacturers to make their products more reliable
- B** Law to make spare parts for expensive
- C** Law to protect you from policies that make it difficult/expensive to repair products on your own

Q5. Which box one of the following is a feature of a product designed for maintenance?

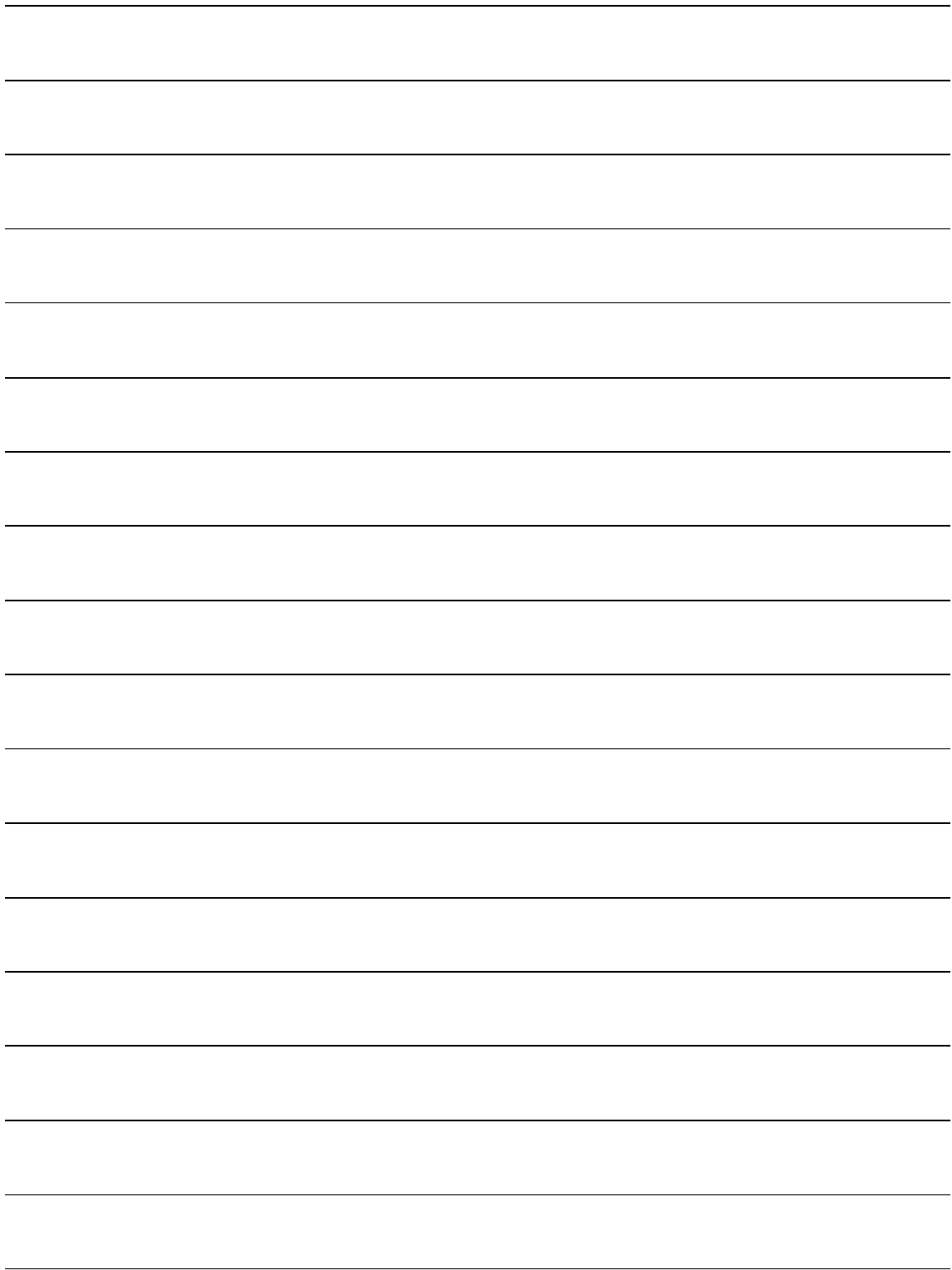
- A** Biodegradable materials
- B** Planned obsolescence
- C** Repairable components

Q6. The application of user centred can lead to innovative products being created. Explain the concept of user centred design **(4 marks)**

Q7. The image below shows a representation of the circular economy.



Evaluate the use of the circular economy with reference to suppliers and consumers **(9 marks)**



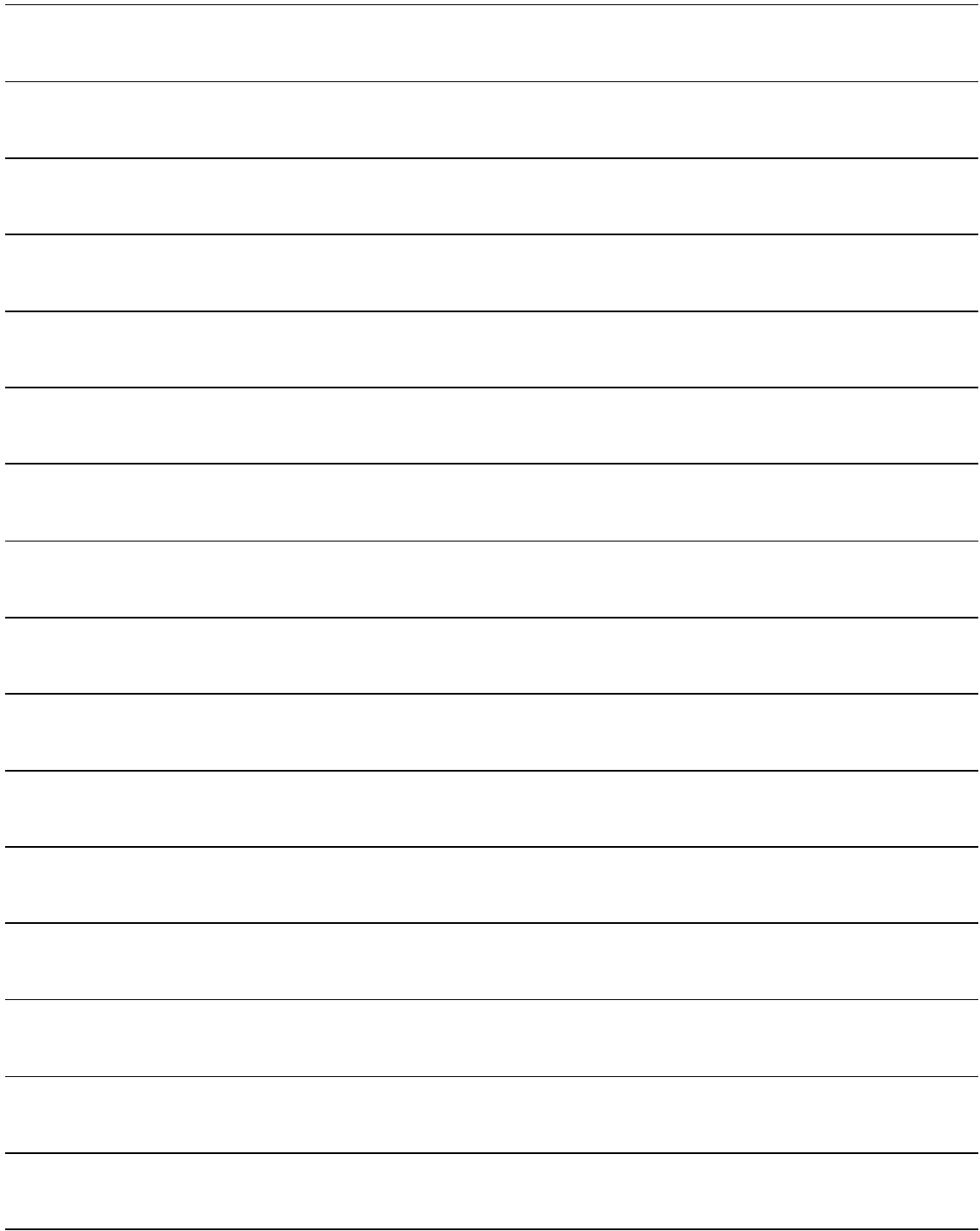
Q8a. The image below shows a picture of a multi-purpose chair that can be used from birth to four years of age.



Key design features of the multi-purpose chair include:

- Folding frame with four lockable wheels
- Removable tray and removable activity centre
- Padded reducer to suit different ages / sizes of children
- 8 adjustable height positions
- Adjustable footrest positions
- Reversible padded seating
- Security harness.

Discuss how user centred design may have been used to ensure that the multi-purpose chair is fit-for-purpose for the target market group **(9 marks)**



Q8b. Explain three considerations the designer could consider when designing the multi-purpose chair to reduce its lifetime impact on the environment **(9 marks)**

1.

2.

3.

[illegible]

Answers

Q1. B

Q2. A

Q3. A

Q4. C

Q5. C

Q6.

- Designers recognize that they do not fully understand how users will instinctively interact with a product (1) so observing consumers use a design is essential. (1)
- It is a reiterative process (1) to achieve the optimum outcome. (1)
- The design is adapted to suit the user (1) rather than the user adapting to suit the design. (1)

Q7.

Candidates might refer to the following in their responses:

- Design out/Minimisation of waste, and energy leakage
- Decoupling economic activity from the consumption of finite resources
- Keeps products/materials in use
- A shift from fossil fuels to renewable energies
- Emphasises 'cradle to cradle' approach
- Slowing, closing and narrowing material and energy loops
- Contrast to a linear economy which is a 'take, make, dispose' model of production
- Optimisation of systems
- Circular framework
- Approach taken to deal with the end of the cheap oil and fossil fuels era
- Transition to a low carbon economy
- Prioritisation of regenerative resources
- Use waste as a resource
- Designing for a lifetime and extended future use
- Preserving and extending what is already made
- Collaboration to create joint value
- Incorporation of digital technologies to track and optimise resource use
- Circular business models

Expansion that can be used to justify judgments relating to positive or negative points:

- Company image and sales
- Consumers need to support and 'buy-in' to the circular economy as they can 'break the chain'
- Classic less fashion approach to products to maintain appeal (slow fashion)
- Costs associated with circular economy implementation and alternative energy
- Sustainability benefits and 'green credentials'
- Consumer support feeling that they are 'doing their bit for the environment'
- Increase in recycling, associated costs and benefits
- Requirement for recycling infrastructure
- Negative pressure from oil companies and oil producing countries
- Positive support from governments and environmental pressure groups
 - Investment in waste recovery systems
- Increased use of repair and upgrade programmes including buyback programmes and supporting logistics
- Prices reflecting real cost

Q8a.

Candidates might refer to the following in their responses:

- Focus on users and their needs
- Framework process
- Two users – the baby and the adult
- Anthropometrics and ergonomics of both users
- Use of investigative methods
- Use of generative methods
- Iterative process
- User feedback throughout
- Understanding the context of use
- Specifying user requirements
- Production of design solutions
- Evaluation/testing against requirements
- Use of consumer panels
- Real life prototype testing
- More likely to meet expectations and requirements

- Helps designers understand the diversity of cultures
- Key design features of the chair and how USD may have influenced these features.

Q8b.

- Consideration of materials selection (1) by use of green/sustainable materials that will reduce the use of finite resources (1) and use of recycled / recyclable materials. (1)
- Consideration of manufacturing methods (1) designing for processes that minimise energy use (1) and achieve optimum use of materials / minimise waste. (1)
- Consideration of distribution methods / packaging shape and size (1) by efficient use of vehicles (1) minimising journey length / use of renewable energy / alternative fuelled vehicles. (1)
- Consideration of how the product is used (1) by designing for energy efficiency (1) and designing for repair rather than replacement. (1)
- Consideration of ease of repair and maintenance (1) by standardisation / use of modular parts (1) and ease of access to components. (1)
- Consideration of end of product life (1) by designing for disassembly / use of recoverable / recyclable materials (1) non-reusable parts suitable for landfill / biodegradable. (1)

Q9a.

- Systems thinking is an approach where all parts of a manufacturing enterprise are seen as linked together (1).
- It recognises that changes in one area, like production, can impact others, such as supply chains and customer service (1).
- By using systems thinking, a company can improve how departments work together to make commercial activity more efficient and successful (1).

Q9b.

- Define systems thinking: Seeing a manufacturing enterprise as a set of interconnected systems working together.
- Explain the idea of connections: A change in one area (like production) affects others (like supply chain or sales).
- Communication improvement: Systems thinking encourages better communication between departments.

- Efficiency: It helps make processes more efficient by spotting problems early across the system.
- Risk reduction: Identifies knock-on effects early, preventing bigger issues later.
- Resource management: Helps use materials, time, and staff more effectively.
- Example: If the design department changes a product, systems thinking ensures production and marketing are informed early to avoid delays.
- Another example: If suppliers delay materials, production schedules can be adjusted proactively to avoid downtime.
- Overall performance: Leads to smoother operations, fewer mistakes, quicker problem solving, and better commercial success.