



Oxford Cambridge and RSA

Cambridge National

Engineering

R105/01: Engineering Design: Design briefs, design specifications and user requirements

Level 1/2 Cambridge National Certificate/Award

Mark Scheme for January 2023

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, Cambridge Nationals, Cambridge Technicals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

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.

© OCR 2023

MARKING INSTRUCTIONS

PREPARATION FOR MARKING ON-SCREEN RM ASSESSOR

1. Make sure that you have accessed and completed the relevant and training packages for on-screen Marking: *RM assessor Online Training* and the *OCR Essential Guide to Marking*.
2. Make sure that you have read and understood the Instructions for On-Screen Marking and the Mark scheme and the question paper for this unit. These are posted on the RM Cambridge Assessment Support Portal <http://www.rm.com/support/ca>
3. Log-in to RM assessor and mark the **required number** of standardisation responses.

YOU MUST MARK 10 PRACTICE AND 10 STANDARDISATION RESPONSES BEFORE YOU CAN BE APPROVED TO MARK LIVE SCRIPTS.

MARKING

1. Mark strictly to the Mark scheme.
2. Marks awarded must relate directly to the marking criteria.
3. The schedule of dates is very important. It is essential that you meet the RM assessor 50% and 100% (traditional 40% Batch 1 and 100% Batch 2) deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.
4. If you are in any doubt about applying the mark scheme, consult your Team Leader by telephone or the RM assessor messaging system, or by email.
5. **Crossed Out Responses**
Where a candidate has crossed out a response and provided a clear alternative then the crossed out response is not marked. Where no alternative response has been provided, examiners may give candidates the benefit of the doubt and mark the crossed out response where legible.

Rubric Error Responses – Optional Questions

Where candidates have a choice of questions across a whole paper or a whole section and have provided more answers than required, then all responses are marked and the highest mark allowable within the rubric is given. Enter a mark for each question answered into RM assessor, which will select the highest mark from those awarded. (The underlying assumption is that the candidate has penalised themselves by attempting more questions than necessary in the time allowed.)

Multiple Choice Question Responses

When a multiple choice question has only a single, correct response and a candidate provides two responses (even if one of these responses is correct), then no mark should be awarded (as it is not possible to determine which was the first response selected by the candidate). When a question requires candidates to select more than one option/multiple options, then local marking arrangements need to ensure consistency of approach.

Contradictory Responses

When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.

Short Answer Questions (requiring only a list by way of a response, usually worth only **one mark per response)**

Where candidates are required to provide a set number of short answer responses then only the set number of responses should be marked. The response space should be marked from left to right on each line and then line by line until the required number of responses have been considered. The remaining responses should not then be marked. Examiners will have to apply judgement as to whether a 'second response' on a line is a development of the 'first response', rather than a separate, discrete response. (The underlying assumption is that the candidate is attempting to hedge their bets and therefore getting undue benefit rather than engaging with the question and giving the most relevant/correct responses.)

Short Answer Questions (requiring a more developed response, worth **two or more marks)**

If the candidates are required to provide a description of, say, three items or factors and four items or factors are provided, then mark on a similar basis – that is downwards (as it is unlikely in this situation that a candidate will provide more than one response in each section of the response space.)

Longer Answer Questions (requiring a developed response)

Where candidates have provided two (or more) responses to a medium or high tariff question which only required a single (developed) response and not crossed out the first response, then only the first response should be marked. Examiners will need to apply professional judgement as to whether the second (or a subsequent) response is a 'new start' or simply a poorly expressed continuation of the first response.

6. Always check the pages (and additional objects if present) at the end of the response in case any answers have been continued there. If the candidate has continued an answer there then add a tick to confirm that the work has been seen.

7. Award No Response (NR) if:
- there is nothing written in the answer space

Award Zero '0' if:



- anything is written in the answer space and is not worthy of credit (this includes text and symbols).

Team Leaders must confirm the correct use of the NR button with their markers before live marking commences and should check this when reviewing scripts.

8. The RM assessor **comments box** is used by your team leader to explain the Marking of the practice responses. Please refer to these comments when checking your practice responses. **Do not use the comments box for any other reason.** If you have any questions or comments for your team leader, use the phone, the RM assessor messaging system, or e-mail.
9. *Assistant Examiners will send a brief report on the performance of candidates to their Team Leader (Supervisor) via email by the end of the marking period. The report should contain notes on particular strengths displayed as well as common errors or weaknesses. Constructive criticism of the question paper/mark scheme is also appreciated.*
10. For answers marked by levels of response: Not applicable in F501
- To determine the level** – start at the highest level and work down until you reach the level that matches the answer
 - To determine the mark within the level**, consider the following:

Descriptor	Award Mark
On the borderline of this level and the one below	At bottom of level
Just enough achievement on balance for this level	Above bottom and either below middle or at middle of level (depending on number of Marks available)
Meets the criteria but with some slight inconsistency	Above middle and either below top of level or at middle of level (depending on number of Marks available)
Consistently meets the criteria for this level	At top of level

11. These are the annotations, (including abbreviations), including those used in RM assessor, which are used when Marking

Annotation	Meaning of annotation
BP	Blank page
VG	Vague
	Tick - No Ticks to be used for question 5c*
SEEN	Noted but no credit given
	Unclear
REP	Repeat
BOD	Benefit of doubt
	Annotations for use with question 5c* only NO TICKS ARE USED FOR THIS QUESTION
DEV	Development of knowledge
K	Knowledge point/statement shown
L1	Level 1 - add a L1 at the end of the marked question to show the Level of response is at Level 1 Note: for example, 3 x 'K' does not necessarily = 3 marks
L2	Level 2 - add a L2 at the end of the marked question to show the Level of response is at Level 2
L3	Level 3 - add a L2 at the end of the marked question to show the Level of response is at Level 3

12. Here are the subject specific instructions for this question paper

Subject specific Marking instructions that apply across the whole question paper must appear here. These must be compatible with the OCR Marking Instructions above.

MARK SCHEME

Question	Answer / Indicative Content	Mark	Guidance
1 (a) (i) & (ii)	<p>1st Identify phase (1) Activity:</p> <ul style="list-style-type: none"> • States the requirement of the brief (1) • What is to be designed (1) • Ensures designer understands the brief (1) • Defines user needs (1) • Find gap in the market (1) • Research product needs (any research) (1) • Collecting data (1) • Process planning (1) • Identifying what is to be made (1) • What the product is (1) <p>2nd Design phase – Development of a range of design ideas.</p> <p>3rd Optimise phase (1) Activity:</p> <ul style="list-style-type: none"> • Model and prototype (1) • Error proofing of the product (1) • Design optimisation (1) • Proposing how solution can be improved (1) • Make sure its perfect/ the best it can be (1) • Make changes to the product/design (1) • Improving the design (1) <p>4th Validate phase (1) Activity:</p> <ul style="list-style-type: none"> • Reviews design decisions (1) • Testing the market (1) • Testing the product (1) • Suggests modifications (adding or removing parts) (1) • 'Evaluate' / evaluate impact of product (1) <i>(continued next page)</i> 	6	<p>Award marks for correct Activity answers for the appropriate Design Cycle Phase which may not be listed (<i>left column</i>), of which there may be a range of other answers.</p> <p><u>Mark column one first ('Design Cycle Phase'), and then mark 'Activity' column.</u></p> <p>If Design Cycle Phase is in the <u>incorrect order</u>, mark as incorrect. <u>However</u>, the mark can still be awarded for the correct Activity, if this correctly relates to the Design phase given (Error Carried Forward) [ECF].</p> <ul style="list-style-type: none"> • i.e. if 'Validate is put as the 3rd, design phase, but the 'activity' is correct for 'validate', the activity for validate is given the mark. <p>- Prototyping must be in the Optimise phase - Error proofing must be in the Optimise phase.</p>

Question			Answer / Indicative Content	Mark	Guidance															
			<ul style="list-style-type: none"> • Compare against specification or brief (1) • 'See if it works as intended/designed' (1) • Final product made (1) • Finalise the design brief (1) • Customer feedback (1) • Life Cycle Analysis (1) <p style="text-align: right;">(3x1) + (3x1)</p>		<p>Correct answers to 1(a)(i) are inserted as below:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Order</th> <th style="width: 50%;">Design Cycle Phase</th> <th style="width: 40%;">Activity</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1st</td> <td style="text-align: center;">Identify phase</td> <td></td> </tr> <tr> <td style="text-align: center;">2nd</td> <td style="text-align: center;">Design phase</td> <td style="text-align: center;">Development of a range of design ideas.</td> </tr> <tr> <td style="text-align: center;">3rd</td> <td style="text-align: center;">Optimise phase</td> <td></td> </tr> <tr> <td style="text-align: center;">4th</td> <td style="text-align: center;">Validate phase</td> <td></td> </tr> </tbody> </table>	Order	Design Cycle Phase	Activity	1st	Identify phase		2nd	Design phase	Development of a range of design ideas.	3rd	Optimise phase		4th	Validate phase	
Order	Design Cycle Phase	Activity																		
1st	Identify phase																			
2nd	Design phase	Development of a range of design ideas.																		
3rd	Optimise phase																			
4th	Validate phase																			
1	(b)	(i)	<ul style="list-style-type: none"> • Three pins are arranged so that the plug will only fit the socket in one way (1) • 'Only fits in one way' (1) • Cannot be inserted incorrectly (1) • The top of the of the plug must be inserted before the other pins will go in (1) • Safety or plastic pin is longer than the others (1) • The plug cannot be inserted incorrectly (1) • The plug and socket are arranged so they can fit together (1) <p style="text-align: right;">(1x1)</p>	1	<p>Look for some mention of the pin or position of the pins being a safety feature, i.e., 'pushing another part open to allow other pins to go in when in use' etc.</p> <p>Do not award:</p> <ul style="list-style-type: none"> • Switch to turn on and off • Switch is covered in plastic to prevent harm • 'the plug casing' / 'insulation' • describing the 3 pin plug with no reference to error proofing feature. 															
1	(b)	(ii)	<ul style="list-style-type: none"> • To ensure that products are assembled correctly (1) • To make sure it [product] is made correctly (1) • To reduce production errors (1) • To reduce wasted materials (1) <p style="text-align: right;">(1x1)</p>	1	<p>This question is about preventing the product being <u>manufactured</u> incorrectly.</p> <p>No marks for answers related to the product in use, product safety, or benefit to the user.</p> <p>Award a mark for 'User assembly' [self-assembly].</p>															

Question			Answer / Indicative Content	Mark	Guidance
1	b	(iii)	<ul style="list-style-type: none"> It ensures that the product is safe to use (1) User feels they will not be injured / harmed (1) User/customer can't injure themselves (1) Prevents the product being used incorrectly (1) User understands how to use the product properly (1) Makes the product easier to use (1) Prevents damage to the product through misuse (1) Lets the user know if there is a fault with the product (1) <p style="text-align: right;">(1x1)</p>	2	<p>If candidates provide an example of error proofing, an additional the mark can be awarded.</p> <p>Do not award:</p> <ul style="list-style-type: none"> manufacture getting sued / taken to court etc. 'work as intended' 'more sales, better reviews'
2	(a)	(i)	<ul style="list-style-type: none"> The person who gives the initial instructions / brief to the designer (1) The customer requesting the design (1) The person/company who: <ul style="list-style-type: none"> requests the design / wants something designed (1) gives the initial instruction (1) orders a design brief (1) you are designing/making the product for (1) <p style="text-align: right;">(1x1)</p>	1	<p>Allow variations that demonstrate understanding of the client (person who is commissioning the design)</p> <p>Award 'the person 'buying/ordering' the product, as BOD</p> <p>Do not award:</p> <ul style="list-style-type: none"> 'who the product is for' 'who is going to use the product' / 'user if the product'
2	(a)	(ii)	<ul style="list-style-type: none"> The person who will create ideas that will solve the client's needs / problem (1) The person / firm that creates the design for the client / customer (1) The client discusses what they want the designer to create a design for (1) The person / firm that design the product (1) <p style="text-align: right;">(1x1)</p>	1	<p>Do not award:</p> <p>'the person who makes the product' <i>unless</i> also designing i.e. 'the person making and designing it'.</p>

Question			Answer / Indicative Content	Mark	Guidance
2	(b)	(i)	<ul style="list-style-type: none"> • To promote / advertise / identification of the company (1) • So customers will recognise company and boost sales (1) • Reputation and customer confidence (1) • Distinguishes brand from competitors' brand / products (1) • Buyers prefer recognised / popular brands (1) • Builds trust (1) • Shows who makes the product (1) • Enhances marketability (1) • Helps sell the product, added value (1) • Makes the product more appealing as buyers want to be seen with the branded product (1) <p style="text-align: right;">(2x1)</p>	2	<p>Award any two points from the list.</p> <p>Do not award:</p> <ul style="list-style-type: none"> • 'Shows product is safe' • Shows it's sustainable, enviro. / eco-friendly etc. • 'Shows who owns the product / design' • 'So they don't steal your product / brand' • 'Stops others brands saying it's theirs' 'keeps secure' • Good quality • Any reference to trademarks, copyright, intellectual property, certified.
2	(b)	(ii)	<ul style="list-style-type: none"> • Adding a logo (1) • Brand name (1) • Embossed / engraved / machined onto surface of product (1) • Label (1) • Sticker (1) • Tags (1) • Symbols (1) • Moto (1) • Slogan (1) • Specific colours associated with the brand (1) <p style="text-align: right;">(2x1)</p>	2	<p>Award any two points from the list</p> <p>'Written or found on the packaging' (BOD)</p> <p>Do not award:</p> <ul style="list-style-type: none"> • Advertisement (too vague) • QR code • 'shape' • 'uniqueness'. • Kitemark, safety symbol (or similar)

Question	Answer / Indicative Content	Mark	Guidance
2 (c)	<ul style="list-style-type: none"> • People / potential customers across a range of profiles can: discuss / give views (1) needs (1) opinions of the product (1) 1 mark each. • Could be given prototypes to review / test (1) • Could be given existing products to review (1) • Evaluating the product (1) • Questionnaire (including online) (1) • Survey (1) • Interview (1) • Could be given the opportunity to provide ideas / modifications (1) • Suggest what is in fashion / trending (1) <p style="text-align: right;">(2x1)</p>	2	<p>Award any two points from the list.</p> <p>Do not award the following:</p> <ul style="list-style-type: none"> • A description of what a focus group is /benefits i.e. 'they are honest' • large scale of people to ask • 'social media' • data
2 (d)	<ul style="list-style-type: none"> • A pattern that occurs in the sales of a product (1) • A pattern that occurs in consumers behaviour when buying a product (1) • A product that is in trend will be popular with consumers and sales will be high (1) • A change in trend when there is a decline in consumers buying the product (1) • When a product is popular (1) or in demand (1) • Consumers like a certain feature / style of it. (1) • What buyers want based on popularity, rush to buy (1) • In fashion / fashionable trend in demand (1) • Change or a following of what customers prefer (1) • Trends follow a cycle, then may tail off / slow (1) • Trends influence or change the features of the design (1) <p style="text-align: right;">(2x1)</p>	2	<p>Award any two points from the list.</p> <p>Award a mark for an example that shows understanding, i.e., 'Fidget spinners were a trend ...'</p> <p>Be careful to look out for answers that merely use /repeat the 'stem' of the question (i.e., 'consumer' or 'trends') without describing what is meant.</p>

Question	Answer / Indicative Content	Mark	Guidance
3 (a)	<p>Process of finding creative uses for products at the end of their life (1) so that they do not need to be recycled or disposed of (1)</p> <p>Waste materials can be changed to create new products (1) to prevent the waste of potentially useful materials that would otherwise be thrown away (1)</p> <p>Taking a product apart/changing/modifying (1) and making it into another product (1)</p> <p>Reused for another purpose (1) <u>instead</u> /rather than of being recycled or going to landfill (1)</p> <p>Used in a different way so it doesn't just get thrown away (1)</p> <p>Answers may include:</p> <p>Taking something old and changing it to something new (1)</p> <p>Materials / products/parts reused (1)</p> <p>Makes something useable out of it (1)</p> <p>Dismantling / taking apart / part used again (1)</p> <p style="text-align: right;">(2x1)</p>	2	<p>Award marks for an example e.g., Plastic cup is upcycled into a pen holder (1)</p> <p>Do not award:</p> <ul style="list-style-type: none"> • 'recycling' • melting down / melting down metal to make it into a different / new product) • repairing, giving it longer life.
3 (b)	<ul style="list-style-type: none"> • Reusing (1) • Recycling / Recycle (1) <p style="text-align: right;">(2x1)</p>	2	<p>These two are the only correct answers.</p> <p>Do not award:</p> <ul style="list-style-type: none"> • Upcycling (question is asking for 'other processes') • Repairing • Repurposing • Restoring.

Question	Answer / Indicative Content	Mark	Guidance
3 (c)	<p>Answers will relate to either / and / or Environments, User, Manufacturing benefits. e.g.:</p> <p>Environmental benefits:</p> <ul style="list-style-type: none"> • Doesn't create harm / is safe / good to the environment, animals, and habitats (1) • Less impact on environment (1) • Biodegradable (1) • Sustainable / less likely to run out (1) • Less waste is produced / Reduction in landfill sites (1) • Made from natural resources (1) • Reduction in greenhouse gas emissions (through less landfill) (1) <p>User benefits:</p> <ul style="list-style-type: none"> • Using eco-materials is preferred [right thing to do] (1) • Increased popularity [customers] due to the 'green benefits' / more likely to buy products with eco-materials (1) • Easier to dispose of (1) <p>Manufacturing benefits:</p> <ul style="list-style-type: none"> • Reduces use of some resources e.g., plastics / fossil fuels / finite materials (1) • Less toxic when disposed of (1) • Less plastic waste (1) • Attractive to customers /sales / company reputation (1) <p style="text-align: right;">(2x1)</p>	2	<p>Award any two points from the list.</p> <p>Do not award (generalisations):</p> <ul style="list-style-type: none"> • recycled, can be reused, repurposed • 'environmentally friendly' • smaller 'carbon footprint' • 'save the planet' • prevents global warming • decreases pollution.

Question	Answer / Indicative Content	Mark	Guidance
3 (d)	<p>Award up to 4 marks for a explanation that correctly focuses on the effects that EXTRACTION has on the environment, not just environmental generalisations.</p> <ul style="list-style-type: none"> • Damaging / negative impact to the environment (1) • Extracting non-renewable resources depletes the earth of finite resources. • Reduces limited supply of non-renewable resources (1) • Energy is used to extract materials i.e., use of fossil fuels (1) • Can damage the <u>appearance</u> of the countryside [visual pollution] (1) • Damage habitats effecting wildlife / eco-systems (1) • Extraction results in large amounts of rock and soil that is transported to be dumped in other locations (1) • Depletion of natural resources i.e., – trees, (1) • Creates unwanted waste (1) • Cutting down trees (deforestation) reduces absorption of CO₂ and production of wanted / needed oxygen (1) <p style="text-align: right;">(4x1)</p>	4	<p>One point fully explained and justified or up to two single points with a justification point for the 2nd marks each.</p> <p>Award a mark for using an example i.e., mining or a type of extracted material: fossil fuels, ores, coal, gas, oil, <u>etc.</u></p> <p>Answers may also <u>correctly</u> include references to:</p> <ul style="list-style-type: none"> • contamination to the environment during extraction, • energy used to transport non-renewable resources from source • damage to the environment and waterways such as when fracking. • Mining uses chemicals etc. <p>Do not award:</p> <ul style="list-style-type: none"> • ‘Greenhouse gases’ <i>unless</i> linked to transport or machinery (fuel used) • Landfill, as the question is about extraction, not disposal • Pollution <i>without</i> stating how/why i.e., fossil fuels used in extraction process, i.e., noise, extracted waste dumped. • ‘Produces Co2’ (<i>unless</i> linked to the source e.g., fossil fuels).

Question	Answer / Indicative Content	Mark	Guidance
4 (a)	<p>Designing a product/item that is fit / suitable / comfortable (1) for the user (1)</p> <p>The study of how people interact with objects they use (1) and the environment that they use them in (1)</p> <p>Product is easy to use (1)</p> <p>How the product feels to the user: texture, hard, soft, comfort (1)</p> <p style="text-align: right;">(2x1)</p>	2	<p>Award other appropriate answers.</p> <p>Award a mark for a supporting example, i.e., chair, car seat, headphones, pen, gaming controller, mouse <u>etc.</u></p> <p>Award only 1 mark for reference to size, if correct.</p> <p>Do not award terms such as:</p> <ul style="list-style-type: none"> • useful • convenient • 'user friendly' <p>Be careful not to award marks for anthropometrics i.e., average size / body size measurements.</p>
4 (b)	<ul style="list-style-type: none"> • Shape so it is easy to hold (1) • Has a grip/ makes easy to hold (1) • Size of toothbrush head so it can fit in mouth (1) • Appropriate size / length of the handle (1) • Soft bristles / brush head (i.e., comfortable / won't hurt) (1) • Smooth body (1) <p style="text-align: right;">(2x1)</p>	2	<p>Any two points from list.</p> <p>Do not award simple statements / words <i>without</i> further justifications e.g.:</p> <ul style="list-style-type: none"> • 'The handle' or 'head size' • 'The bristles' • 'Not too small' • 'Big enough' • 'It has a handle' • 'No sharp edges'.

Question	Answer / Indicative Content	Mark	Guidance
4 (c)	<p>Award up to 3 marks for correct explanations with 3 relevant points made e.g.:</p> <ul style="list-style-type: none"> • Ergonomics are important to provide ease of use (1) • Comfort for the user (1). • If ergonomics were not considered, this would limit the range of users able to comfortably use the chair. (1) • Designed to be light and portable (1) • Designed to be comfortable/suit a wide range of consumers (1) <p style="text-align: right;">(3x1)</p>	3	<p>A justified answer must be given to gain full marks. Award similar correct answers.</p> <p>A mark can be awarded for an ergonomic example i.e., references to the back of the chair or seat cushioning.</p> <p>Be careful not to award marks for anthropometric specifics such as leg lengths etc.</p>
4 (d)	<p>Award up to 3 marks for correct explanations with relevant points made e.g.:</p> <ul style="list-style-type: none"> • Anthropometric data on the average height /hip height of adult men and women (1) • Anthropometrics have been used in the design of the chair back (1), using average shoulder height (1) • Body measurements (1) ensure the shape / angle of the back provides comfortable support (1) so that the average size user does not need to lean forward or back (1) • Anthropometrics have been used to determine the most suitable depth of the chair seat (1) so that the seat reaches the back of the average person's thigh (1) to suit a wide range of users (1). • Reference to 5th – 95th percentiles / meeting the needs of the 90% of the population (1) • References related to weight of the person (1) <p style="text-align: right;">(3x1)</p>	3	<p>Example answers show that there are more than 3 potential suitable ways the explanation can gain 3 marks.</p> <p>Award 1 mark for specific anthropometric data example. e.g., Average hand size etc</p> <p>Answers must relate to at Anthropometric measured aspects of the design. Do not award answers that relate specifically to ergonomic features.</p>

Question			Answer / Indicative Content	Mark	Guidance
5	(a)	(i)	<ul style="list-style-type: none"> • How much wear / pressure / damage it can withstand. • 'What it can withstand' (1) • How easy it is to break / withstand impact (1) • How well the product can endure use (1) • Will it work after it is dropped (1) • How resistant it is (BOD) (1) resist wear / corrosion (1) • How robust a product is (1) • Maintain its integrity / not damage if knocked over (1) <p style="text-align: right;">(1x1)</p>	1	<p>Do not award:</p> <ul style="list-style-type: none"> • 'strength' or 'strong' unless <i>qualified</i> such as 'will not break easy' • 'long lasting' unless <i>qualified</i> i.e. how long it will last by <u>using it every day</u>, or in a certain <u>environment</u> • 'durable' (this is a repeat) – unless it is <i>qualified</i> with an additional justification.
5		(ii)	<ul style="list-style-type: none"> • How consistently / well a product can do / perform its job / function (1) • Trustworthy to work / continue working (1) • Expecting the product not to fail / break (1) • How much you can rely on the product to work / perform (1) • How much you can trust / <u>depend</u> on the product (1) • Always works when needed (1) • Works/performs consistently well / as it should (1) • How well it will work for you (1) <p style="text-align: right;">(1x1)</p>	1	<p>Award a mark where an example is used to support their answer.</p> <p>Do not award:</p> <ul style="list-style-type: none"> • 'Long lasting' / 'how long it will last for' • 'How reliable the product is'.
5	(b)		<ul style="list-style-type: none"> • 'So you have enough / know you can get the required amount of materials' (1) • Supply and demand can fluctuate over time (1) if availability of material not checked it could lead to a modification of the design (1) • Quantity of material required may not be available (1) or in the timescale required (1) causing a delay in /stop production /unable to finish products (1) • If the material is scarce, the material may be hard to get (1) increasing costs (1) of the design / production (1) • 'So you know you can get / have enough materials for production (1) and how easy it is to get them' (1) • Reference to a limiting the number of products can be made / manufactured (1) <p style="text-align: right;">(2x1)</p>	2	<p>Any two appropriate points or one point with justification.</p> <p>A mark can also be awarded for:</p> <ul style="list-style-type: none"> • customer dissatisfaction for product delays due to material availability, and / or loss of reputation due to late production • demand for the product may increase the scale of production required.

Question	Answer / Indicative Content	Mark	Guidance
5 c*	<p>Award <u>up to</u> six marks for a discussion on how scale of production affects production costs.</p> <p>Level 3 (5–6 Marks) Learners provide a thorough discussion of how scale of production affects production costs. They show a clear understanding of the required question material. Specialist language and terms would be used in the appropriate areas being discussed and the required information will be well structured in its presentation. Good examples used to discuss scale of production and production costs. Learners will demonstrate an accurate level of spelling, punctuation, and grammar.</p> <p>Level 2 (3–4 Marks) Learners provide an adequate discussion of how scale of production affects production costs. Some examples used to discuss scale of production and production costs. Some evidence of the use of specialist language although not always in the appropriate areas being discussed. Information, for the most part, will be reasonably structured but may contain occasional errors in spelling, punctuation, and grammar.</p> <p>Level 1 (1–2 Marks) Learners provide a basic discussion which shows some understanding of the question material but use little or no specialist language.</p> <p>Few or no examples used to discuss scale of production and production costs. Answers may be ambiguous or disjointed. Contains obvious errors in spelling, punctuation, and grammar.</p> <p>0 marks = no response or no response worthy of credit.</p> <p>Annotate as ‘Seen’ at end of the response if worth 0 marks.</p> <p style="text-align: right;"><i>(Continues next page)</i></p>	6	<p><u>EXAMINERS – REMEMBER TO USE ONLY THE FOLLOWING ANNOTATIONS: (No ticks) (see page 5)</u></p> <p>K (knowledge) – DEV (developed knowledge point) – and entre L1, or L2, or L3 at the end of the marked question to show level of response.</p> <p>Be careful regarding misconceptions related to scale of production i.e., incorrect statements: t more units manufactured, the cheaper the product, or mass production is of a lower quality – responses should link to volume, number of units and cost of materials/set up costs.</p> <p>Examples and relevant points could include.</p> <ul style="list-style-type: none"> • Explanation of what is scale of production – one off, batch, mass production. Types of products that could be produced in each type of production. • Producing many products on a large scale can offset the cost of production and investment in production processes and machinery / equipment. • Injection moulding and blow moulding are examples of production processes where large-scale production becomes cost effective when producing large volumes of products to cover the cost of investment and tooling. • Automation is used to increase productivity, and quality while reducing the cost per unit, but requires significant investment to be cost effective. The automotive industry uses automation and manual labour to be cost effective.

Question	Answer / Indicative Content	Mark	Guidance
			<ul style="list-style-type: none"> • Small scale production and one-off / bespoke tailored products can only be made cost effective when the customer is willing to pay for the bespoke service. These products usually are high-end expensive products and may require manual craftsmanship. • Manual / automated processes – needed to reflect production of item produced using identified production method(s). Labour / automation used in the different types of production. • Investment in tooling and equipment preparation/costs ready for scale of production. • Quantity required/produced and consideration of costs per unit. • Costs: <ul style="list-style-type: none"> • material/equipment / components / labour / specialist training / production methods/automation set up. • Component/material availability and access / supply – storage / Just-in-time (JIT) delivery.

Question			Answer / Indicative Content	Mark	Guidance
6	(a)	(i)	<ul style="list-style-type: none"> • Accuracy of work (1) • Repetition of process / can mass produce (1) • Consistency (1) • Reliable (1) • Continuous work 24/7 (1) • No need for sleep/breaks / holidays (1) • Safer working environment - robots can carry out dangerous tasks (1) • No <u>human</u> errors (1) • No human injuries (1) • Increased productivity/output - manufactured quicker / fast speed (1) • Can perform complex processes (1) • Robots can move heavy objects / move objects that humans may not (1) • Lowers the reliance on human labour (1) <p style="text-align: right;">(2x1)</p>	2	<p>Any two points from the list</p> <p>Do not award:</p> <ul style="list-style-type: none"> • no errors • easier • 'more efficient' or 'cost efficient' • 'Quick' or 'less time consuming' (to award a mark it must be <i>qualified</i> i.e., increases volume of production) • 'Don't have to pay them wages' / 'saves on staffing/labour' – to award a mark, must be <i>qualified</i> i.e., initial investment costs offset by lack of wages to pay.
6	(a)	(ii)	<ul style="list-style-type: none"> • <u>Cost</u> of introduction. (1) • <u>Cost</u> of Maintenance / to fix / repairs (1) • Expensive to purchase (1) • Training of workforce to program / operate (1) • Smaller workforce / Redundancies (1) • Can only perform what it is programmed to do, not as flexible. <p style="text-align: right;">(2x1)</p>	p	<p>Any two points from the list.</p> <p>Do not award:</p> <ul style="list-style-type: none"> • May breakdown or malfunction unless <i>qualified</i> i.e., it will be very expensive to repair and manufacturing will stop) • 'use a lot of energy' • 'Need regular maintenance' (must relate to the cost of maintenance to be awarded a mark).

Question	Answer / Indicative Content	Mark	Guidance
6 (b)	<ul style="list-style-type: none"> • Ready made by sub-contractors / suppliers (1) • Ready to fit in product (1) • Sub-contractor has greater expertise in manufacturing the component (1) • Saves the company from having to make additional products (1) which they may not have facilities to carry out (1) • Can arrive only when needed and can go straight onto assembly line – JIT (1) • Pre-manufactured products are of a consistent standard and quality / reliable (1) • Not enough room to keep pre-manufactured components in a warehouse / factory (1) <p style="text-align: right;">(2x1)</p>	2	<p>Any two points from the list.</p> <p>Do not award answers that relate to <u>Standard</u> components e.g.:</p> <ul style="list-style-type: none"> • Easy to find and buy • bought in bulk • Available in large quantities • Can be reused etc. • Cheaper, cost less • 'less time consuming' • Reduces assembly time • Less skilled workers / no special tools required • Will be faster. <p>'Cost less to buy/manufacture' must be <i>qualified</i> by stating additionally 'than to manufacture themselves'.</p> <p>'Saves time' – must be <i>qualified</i> with how/why – for the manufacturing of the overall product, allowing parts to be assembled at a greater pace.</p>
6 (c) (i)	<p>Answers will cover the ability to:</p> <ul style="list-style-type: none"> • Store / storing data (1) • Access data (1) • Share data over the internet (1) rather than having to use a computer hard drive (1) using a virtual disk / storage (1) • Share design drawings (1) • A network of computers sharing designs / files (1) • Upload data (1) where it can be accessed anywhere (1) • Backing up data / files (1) • Cloud storage types including; 'One drive' – 'Google cloud' – 'Drop box' [there may be others] (1) <p style="text-align: right;">(2x1)</p>	2	<p>Award a mark for a valid example e.g., Storing / sharing -</p> <ul style="list-style-type: none"> • Files/ data • Designs • Photographs • Drawings, CAD • Video, etc. <p>Do not award:</p> <ul style="list-style-type: none"> • Used for producing CAD drawings • Producing design virtual ideas • Researching on the internet.

Question			Answer / Indicative Content	Mark	Guidance
6	(c)	(ii)	<ul style="list-style-type: none"> • Helps designers / manufacturers and machines to access data (1) • Available from anywhere in the world at any time (1) in real time (1) • Ability to respond immediately to changing demands (1) • Manufacturers can respond to issues e.g., demand from customers (1) • Address problems on production line (1), live monitoring of machine performance (1) • Manufacturers can update suppliers on material requirements (1) with greater accuracy and quicker response time (1) • Easier for clients to see the design, as its shared online (1) • Good way of sharing design ideas / sent around to others (1) • Less chance of data being lost in event of machine failure (1) • No need to physically store designs/prototypes (1) • Large capacity to store / large amounts of data can be stored (1) • Secure data/network (1) • Cloud storage is encrypted (1) • Can be assessed by other people/employees (1) • Accessible from any computer (1) • Quicker to recover data (1). <p style="text-align: right;">(2x1)</p>	2	<p>Any two points from the list.</p> <p>Do not award:</p> <ul style="list-style-type: none"> • 'save money' • Answers that relate to CAD design tools.

			Total for paper	60	
--	--	--	------------------------	-----------	--

Need to get in touch?

If you ever have any questions about OCR qualifications or services (including administration, logistics and teaching) please feel free to get in touch with our customer support centre.

Call us on

01223 553998

Alternatively, you can email us on

support@ocr.org.uk

For more information visit

 ocr.org.uk/qualifications/resource-finder

 ocr.org.uk

 [Twitter/ocrexams](https://twitter.com/ocrexams)

 [/ocrexams](https://twitter.com/ocrexams)

 [/company/ocr](https://www.linkedin.com/company/ocr)

 [/ocrexams](https://www.youtube.com/ocrexams)



OCR is part of Cambridge University Press & Assessment, a department of the University of Cambridge. For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored. © OCR 2023 Oxford Cambridge and RSA Examinations is a Company Limited by Guarantee. Registered in England. Registered office The Triangle Building, Shaftesbury Road, Cambridge, CB2 8EA. Registered company number 3484466. OCR is an exempt charity.

OCR operates academic and vocational qualifications regulated by Ofqual, Qualifications Wales and CCEA as listed in their qualifications registers including A Levels, GCSEs, Cambridge Technicals and Cambridge Nationals.

OCR provides resources to help you deliver our qualifications. These resources do not represent any particular teaching method we expect you to use. We update our resources regularly and aim to make sure content is accurate but please check the OCR website so that you have the most up-to-date version. OCR cannot be held responsible for any errors or omissions in these resources.

Though we make every effort to check our resources, there may be contradictions between published support and the specification, so it is important that you always use information in the latest specification. We indicate any specification changes within the document itself, change the version number and provide a summary of the changes. If you do notice a discrepancy between the specification and a resource, please [contact us](#).

Whether you already offer OCR qualifications, are new to OCR or are thinking about switching, you can request more information using our [Expression of Interest form](#).

Please [get in touch](#) if you want to discuss the accessibility of resources we offer to support you in delivering our qualifications.