



NCFE Level 1/2 Technical Award in Engineering (603/7006/3)

Examined assessment

Paper number: Past paper

Date: Summer 2024

Mark Scheme

v1.0 Post-standardisation

Past paper

This Mark Scheme has been written by the assessment writer and refined, alongside the relevant questions, by a panel of subject experts through the external assessment writing process and at standardisation meetings.

The purpose of this Mark Scheme is to give you:

- examples and criteria of the types of response expected from a learner
- information on how individual marks are to be awarded
- the allocated assessment objective (AO) and total mark for each question.

Marking guidelines

General guidelines

You must apply the following marking guidelines to all marking undertaken throughout the marking period. This is to ensure fairness to all learners, who must receive the same treatment. You must mark the first learner in exactly the same way as you mark the last.

- The Mark Scheme must be referred to throughout the marking period and applied consistently. Do not change your approach to marking once you have been standardised.
- Reward learners positively giving credit for what they have shown, rather than what they might have omitted.
- Utilise the whole mark range and always award full marks when the response merits them.
- Be prepared to award zero marks if the learner's response has no creditworthy material.
- Do not credit irrelevant material that does not answer the question, no matter how impressive the response might be.
- The marks awarded for each response should be clearly and legibly recorded in the grid on the back of the question paper.
- If you are in any doubt about the application of the Mark Scheme, you must consult with your team leader or the chief examiner.

Guidelines for using extended-response marking grids

Extended-response marking grids have been designed to award a learner's response holistically and should follow a best-fit approach. The grids are broken down into levels, with each level having an associated descriptor indicating the performance at that level. You should determine the level before determining the mark.

When determining a level, you should use a bottom-up approach. If the response meets all the descriptors in the lowest level, you should move to the next one, and so on, until the response matches the level descriptor. Remember to look at the overall quality of the response and reward learners positively, rather than focussing on small omissions. If the response covers aspects at different levels, you should use a best-fit approach at this stage, and use the available marks within the level to credit the response appropriately.

When determining a mark, your decision should be based on the quality of the response in relation to the descriptors. You must also consider the relative weightings of the AOs, so as

not to over / under credit a response. Standardisation materials, marked by the chief examiner, will help you with determining a mark. You will be able to use exemplar learner responses to compare to live responses, to decide if it is the same, better or worse.

You are reminded that the indicative content provided under the marking grid is there as a guide, and therefore you must credit any other suitable responses a learner may produce. It is not a requirement either, that learners must cover all of the indicative content to be awarded full marks.

Assessment objectives (AOs)

This unit requires learners to:

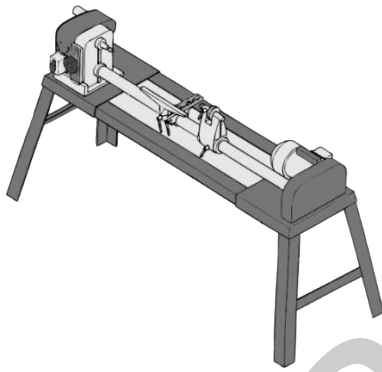
AO1	Recall knowledge and show understanding The emphasis here is for learners to recall and communicate the fundamental elements of knowledge and understanding.
AO2	Apply knowledge and understanding The emphasis here is for learners to apply their knowledge and understanding to real-world contexts and novel situations.
AO3	Analyse and evaluate knowledge and understanding The emphasis here is for learners to develop analytical thinking skills to make reasoned judgements and reach conclusions.

The weightings of each AO can be found in the Qualification Specification.

Qu	Mark Scheme	Total marks
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Section A

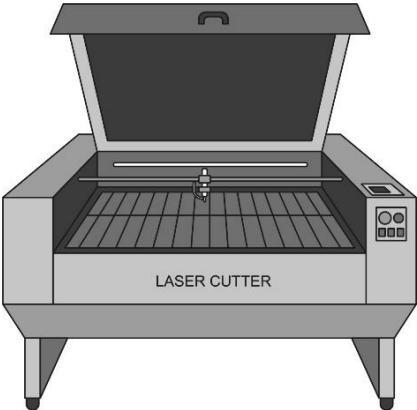
Total for this section: 32 marks

1	Figure 1 shows a piece of machinery used in a materials workshop. Figure 1  Name the piece of machinery shown in Figure 1. Answer: wood lathe (1) Do not accept lathe	1 AO1=1
2	Give two items of PPE that should be worn when using the machine in Figure 1. Award one mark for each valid answer from those listed below up to a maximum of two marks: • face guard / face shield (1) • goggles / safety glasses (1) • dust mask / respirator (1) • apron (1) • overalls (1) • ear plugs / ear defenders (1). Accept any other suitable responses.	2 AO2=2

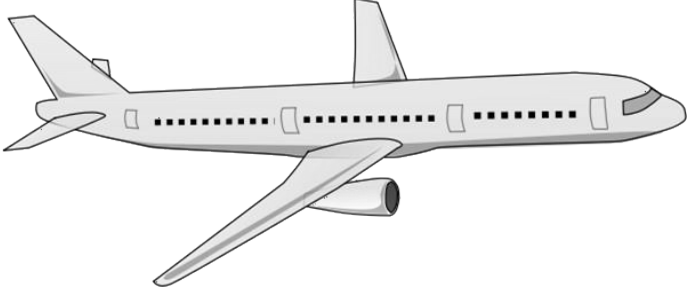
3	Which one of the following ceramics can be formed naturally? A Brick B Cement C Diamond D Pottery Answer: C – Diamond (1)	1 AO1=1
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4	Which one of the following metals is a non-ferrous alloy? A Aluminium B Bronze C Cast iron D Stainless steel Answer: B – Bronze (1)	1 AO1=1
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5	Which one of the following materials turns a blue-green colour when it oxidises? A Acrylic B Copper C Lead D Solder Answer: B – Copper (1)	1 AO1=1
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6	Figure 2 shows a laser cutter. Figure 2  Give two advantages and two disadvantages of using a laser cutter to manufacture products. Award one mark for each valid advantage up to a maximum of two marks. Award one mark for each valid disadvantage up to a maximum of two marks. Advantages: • accuracy of the final product (1) • designs can be repeated and quality remains the same (1) • can cut complex shapes with detail (1) • multiple materials can be cut out (1) • designs can be etched as well as cut (1) • designs can be easily transferred from CAD to the machine (1) • it cuts quickly and accurately (1) • requires limited operation input from an engineer (1). Disadvantages: • expensive to buy and set up (1) • can be expensive to maintain and repair (1) • replacement parts can be expensive (1) • requires training to use effectively (1) • can make harmful fumes on some materials so needs effective extraction system (1) • high energy consumption (1) • limited depth of cut with materials (1) • laser cutter needs regular cleaning and maintenance (1). • Accept any other suitable responses.	4 AO2=4
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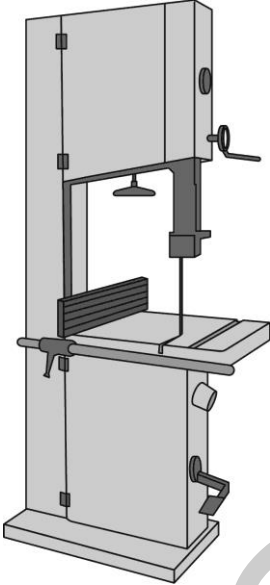
7	Analyse why it is beneficial for a manufacturer to recycle waste materials. Award one mark for each valid reason up to a maximum of two marks. • Waste could be sold for scrap (1). • Waste materials can be sold and reused for other products (1). • Better for the environment as fewer resources are wasted (1). • Less energy is used to recycle than process materials so less pollution (1). • Reduces waste going to landfill (1). • Reduces the need to extract raw materials from the Earth, which is often more expensive and destructive (1). • It is more sustainable to recycle materials (1). • Less damage to the surface of the earth – less industrial scarring of the planet (1). • Recycling reduces the chances of pollution in water or on land (1). • Less waste will mean less poisonous or toxic materials being released (1). Accept any other suitable responses.	2 AO3=2
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8	Figure 3 shows an aircraft. Figure 3  Aluminium is often used in the construction of aircraft. State two properties of aluminium and describe why each property is useful in the production of aircraft. AO1 Award one mark for each valid property up to a maximum of two marks: • good strength to weight ratio (1) • lightweight (1) • it is a ductile metal (1) • corrosion resistant (1) • soft or malleable (1). AO2 Award one mark for each connected description up to a maximum of two marks. • (good strength to weight ratio) Less material is needed to build the fuselage of the plane (1) • (lightweight) Allows aircraft to be larger / less powerful engines are needed to get lift (1) • (it is a ductile metal) Is capable of being shaped and deformed without losing physical properties such as toughness and pliability (1) • (corrosion resistant) The aircraft body will need less maintenance / will last longer than other metals (1) • (soft or malleable) It can be shaped into complex forms (1). Accept any other suitable responses.	4 AO1=2 AO2=2
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9	State which type of engineering includes the manufacture of aircraft. Aerospace engineering / aeronautical engineering. (1) Accept any other suitable responses.	1 AO1=1
10	State two products, other than transportation, that are commonly made from aluminium. Award one mark for each valid use up to a maximum of two marks: • baking foil (1) • drinks cans (1) • window and door frames (1) • overhead power cables (1) • kitchen utensils (1) • door hardware (1) • beer kegs (1) • electrical appliances (1). Accept any other suitable responses. Do not accept aircraft and aircraft related parts.	2 AO1=2

11	Most power plants generate electricity in AC form, which is then converted to DC. Which one of the following is DC an abbreviation of? A Daily current B Direct current C Distant current D Diverse current Answer: B – Direct current (1)	1 AO1=1
12	Which one of the following devices or machines uses pulleys to gain a mechanical advantage? A Car suspension B Mechanical scales C Tower crane D Wheelbarrow Answer: C – Tower crane (1)	1 AO1=1
13	Which one of the following is a hardwood? A Cedar B Pine C Spruce D Sycamore Answer: D – Sycamore (1)	1 AO1=1

14	Describe two reasons why AC (alternating current) is used more often than DC. Award one mark for each valid reason up to a maximum of two marks. • AC can be stepped down / increased or decreased / converted via a transformer (1). • AC can travel longer distances without significant loss of power (1). • AC can power more homes over a wider area than DC (1). • High voltage AC means less current and less heat generated in power lines (1). • It is easier to generate AC due to the way power is made in power plants (1). • AC is considered to be less dangerous to work with (1). • DC is not easily converted to higher or lower voltages (1). • It can travel in both directions (1). Accept any other suitable responses.	2 AO2=2
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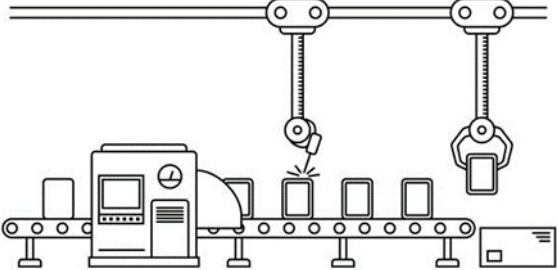
15	Figure 4 shows a bandsaw, which is used by staff in a workshop. Figure 4  Identify three safety features found on a bandsaw. Award one mark for each correct safety feature identified up to a maximum of three marks: • a blade guard / guidepost (1) • micro switches on casing and doors (1) • emergency stop switch / button (1) • emergency foot or knee switches / button (1) • dust extraction (1) • table fence (1) • light (1). • Accept any other suitable responses.	3 AO1=3
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16	COSHH is an acronym for Control of Substances Hazardous to Health. Figure 5 is a warning sign that is used within COSHH regulations. Figure 5  Describe two hazards where this sign would be used. Award one mark for each valid response to a maximum of two marks: - chemicals that may catch fire (in contact with air) (1) - chemicals that will burn with brief contact with an ignition source (1) - chemicals that have a very low flash point (1) - chemicals that may evolve highly flammable gases in contact with water (1) - extremely flammable gas / flammable gas (1) - extremely flammable aerosol / flammable aerosol (1) - highly flammable liquid and vapour (1) - flammable solid (1). Accept any other suitable responses.	2 AO2=2
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17	Identify three methods used to securely fix pieces of wood together. Award one mark for each of the methods below up to a maximum of three marks: • nails (1) • panel pins (1) • wooden dowels (1) • wood screws (1) • adhesive / wood glue / PVA (polyvinyl acetate) (1) • biscuit fitting (1) • nuts and bolts (1) • wood joints (1). Accept any other suitable responses. Do not accept hot glue / super glue / rivets / clamp.	3 AO1=3
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Section B

Total for this section: 14 marks

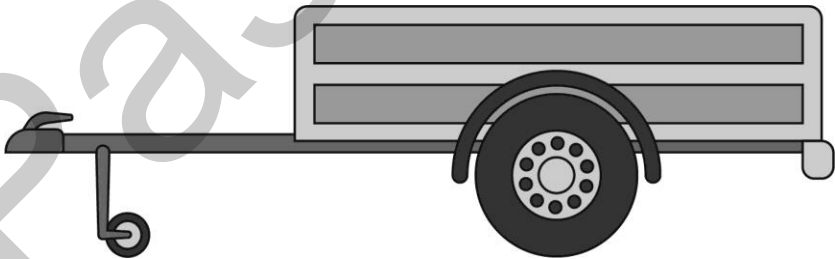
18	Figure 6 shows an automated production line. Figure 6  Quality control measures are used in manufacturing. Give one reason why quality control is important during the manufacture of a product. Award one mark for any valid response: • to ensure accuracy and consistency of a product (1) • to enhance product quality (1) • reduction of faults in the product (1) • gain production efficiency (1) • ensures that production issues can be resolved / fixed (1) • helps to minimise waste if faulty products are made (1) • saves money and time to salvage or recycle faulty products (1) • quality products help customers to have confidence (1). Accept any other suitable responses.	1 AO2=1
19	An engineering manufacturer uses a Gantt chart before and during production. Identify what a Gantt chart is and describe how it is used. AO1 Award one mark for an identifying statement: • a Gantt chart is a bar chart that shows the progress (of time) in a project (1)	3 AO1=1 AO2=2

	- Gantt charts show all the steps / stages that are required to complete a project (1) - Gantt charts can track progress and be regularly updated during production (1). Accept any other suitable responses. AO2 Award a maximum of two marks for a description if there is a justification and sufficient detail as shown in the example responses below: - they help to visualise a project (1) using coloured horizontal bars (1) - they help to monitor progress of a project (1) along a timeline or schedule (1) - a schedule of tasks can be laid out using a Gantt chart (1) so that resources can be planned (1) - tasks can be shown as horizontal bars (1) and can be compared against other tasks represented on other lines (1) - start and end dates are shown (1) and these allow for a tasks and resources to be scheduled (1) - the Gantt chart helps to keep a project on time (1) and identifies when something or someone is falling behind (1) - it can help to identify links between tasks (1) and how each aspect is dependent on another (1) - it can help identify workloads (1) and the availability of resources or staff (1) - you would follow this plan (1) to manufacture a product (1). Accept any other suitable responses.	
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20	Which one of the following shows the number of seconds in an hour? A 360 B 600 C 3600 D 6000 Answer: C – 3600 (1)	1 AO1=1
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21	Which one of the following SI units relates to temperature? A Candela B Inch C Kelvin D Metre Answer: C – Kelvin (1)	1 AO1=1
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22	A casing is being made for the hydraulic mechanism of a swing bridge. The cylindrical casing has a length of 200 cm and has a radius of 5 cm. Calculate the internal volume of the casing using the formula below. Volume = $\pi \times \text{radius}^2 \times \text{height of cylinder}$ Show all of your workings out. AO1 Award one mark as below, up to a maximum of two marks. Award one mark for radius squared sum (1). Award one mark for stating the value of Pi (1). Pi can be written as one of the following 3.14, 3.142 or 3.1415 AO2 Award one mark for the correct final figure based on either sum shown below. SI units are not required. Volume of a cylinder – $V = \pi r^2 h$ $r^2 = 5 \times 5 = 25$ (1) $V = 3.14 \times 25 \times 200 = \mathbf{15,700 \text{ cm}^3}$ OR $V = 3.142 \times 25 \times 200 = \mathbf{15,710 \text{ cm}^3}$	3 AO1=2 AO2=1
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23	A delivery truck weighs 2400 kg partly loaded. A truck gains speed at a rate of 5.2 m/s². Calculate the force required for the truck to move at the rate of 5.2 m/s² using the formula below. force (F) = mass (m) x acceleration (a) State the units of force with your answer. AO1 Award one mark for stating the units of force. AO2 Award one mark for the calculation and the total. Force = 2400 x 5.2 = 12 480 (1) Force = 12 480 (N) or (Newtons) (1)	2 AO1=1 AO2=1
24	Figure 7 shows a lightweight trailer. Figure 7  An engineering company is manufacturing a trailer using aluminium sheet and a tubular steel subframe. Identify one method that could be used to securely attach the aluminium sheet to the steel subframe of the trailer. Award one mark for any of the following responses:	1 AO1=1

	• rivets (1) • bolts (with nuts) (1) • sheet metal screws (1) • self-tapping screws (1) • mechanical clips (1). Accept any other suitable responses. Do not accept welding	
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25	Suggest one reason why the mild steel subframe of the trailer in Figure 7 needs a surface finish. Award one mark for any of the following responses: • mild steel will rust (1) • mild steel will corrode if exposed to weather (1) • it will become weaker if not protected from water and rusting (1) • so that it will last longer than it would without a surface finish (1) • aesthetic reasons / to make it look better (1) • so it is more attractive to customers (1). Accept any other suitable responses.	1 AO2=1
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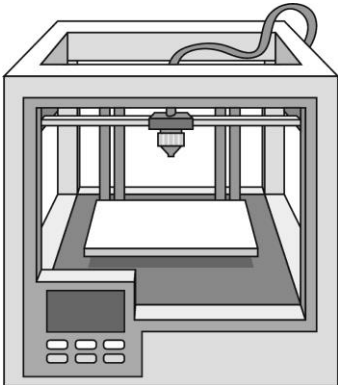
26	State what the abbreviation PPE means. Answer: – Personal Protective Equipment (1)	1 AO1=1
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Section C

Total for this section: 16 marks

27	Figure 8 shows a notation that would be found on some engineering drawings. Figure 8 ±0.2 State what the numbers shown above indicate on an engineering drawing? Award one mark for any of the following responses: • tolerance (1) • tolerance of parts (1) • there is an allowance of sizes for fitting together different parts (1) • a specific tolerance of 0.2 (1) • it shows that parts can vary by up to 0.2 (1). Accept any other suitable responses.	1 AO1=1
28	An engineer uses a scale of 1:5 to draw a product. The largest dimension of the product is 3 metres. State what size the dimension would be on the drawing. Award one mark for correct reduced measurement. Calculation – 3 metres = 300 cm 300 cm divided by 5 = 60 cm (1) OR Also accept 3 metres divided by 5 = 0.6 m (1) Units are not required on final answers or for answers seen within working. Answer can also be in mm (600 mm)	1 AO1=1

29	A design company has been asked to produce some orthographic drawings of a new electric bicycle prototype. The prototype will include a pre-existing electric motor and battery pack. Explain and analyse why accurate measurements should be included on the drawings. Award one mark for each valid point made up to a maximum of four marks. Explain: • to allow the accurate transfer of sizes to CAD programs and CAM production machinery (1) • to ensure that the pre-existing parts will fit with any newly designed / manufactured parts (1) • to allow for tolerances between parts and components (1) • to allow for the calculation of costings of materials (1) • to enable manufacturing planning based on the scale of the design (1) • to ensure that the various parts when made fit together (1). Analyse: • there would be faults and wasted materials if things were not accurate (1) • time and money will be saved if the measurements are accurate (1) • fittings for the motor can be used without the need for custom parts to be made (1) • savings in materials and manufacturing costs will be reduced as the design allows for the use of existing components (1). Accept any other suitable responses. Do not award full marks for explanation or analysis only.	4 AO3=4
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30	Figure 9 shows a 3D printer. Figure 9  A 3D printer uses reels of plastics that form a shape from the base upwards. Give the term that can be used to describe this kind of manufacture. Answer: – Additive manufacturing or just additive (1). Accept CAM (Computer Aided Manufacture) (1).	1 AO2=1
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31	3D printers are often used in both commercial and domestic settings. Users can create a wide range of products using these machines. Describe three ways in which cheap 3D printers and CAD software have helped engineers and society. Award one mark for each valid point made up to a maximum of three marks. Possible responses: • production costs have reduced for one-off designs (1) • prototyping can be completed easily in any location (1) • maker spaces can set up anywhere (1) • advanced manufacturing has become accessible (1) • designers can use 'opensource' plans to create products (1) • design files can be shared for the benefit of others, for example, prosthetic hands (1) • parts can be reproduced for devices that are no longer manufactured (1) • new applications are regularly being developed, for example 3D printed buildings / custom fitted products (1). Accept any other suitable responses.	3 AO2=3
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32	Give two reasons why rendering a product sketch is useful. Award one mark for each valid reason to a maximum of two marks. • It helps make the product look realistic / more 3D (1). • It helps to visualise how the product will look when made (1). • It will help the designer to choose materials for aesthetic purposes (1). • It can be presented to customers to give them an idea of the product (1). • It could prompt new design ideas if it does not look good (1). • It will allow other designers to interpret the design more easily (1). Accept any other suitable responses.	2 AO2=2
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33	Drawings and freehand sketches are an essential part of the design process to develop ideas. Analyse why it is important to include additional information with drawings. Give two examples in your analysis and justify each example you give. Award one mark for a valid example, only two valid examples are required, up to a maximum of two marks. Award one mark for a valid justification per example, up to a maximum of two marks. • Annotations (1) can provide information that will help other designers or engineers (1). • Notations can help to describe a drawing (1), if it has hidden features that are difficult to draw (1). • Information about materials choices (1) and suggestions are useful when planning the manufacturing processes (1). • Decisions about fixings and mechanisms (1) will allow a manufacturer to source readily available consumables like bolts, screws and hinges (1). • Giving dimensions and material info (1) will allow the product to be costed and a cutting list to be produced for manufacture (1).	4 AO3=4
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	• Suggested manufacturing details (1) can help narrow down materials choices and therefore costs in making a prototype (1). • Descriptions of the uses and function of various parts of the design (1) will help decisions on materials and manufacturing processes (1). • Adding notes and specific information to a drawing (1) will help to minimise misunderstandings between design and manufacturing stages (1). Accept any other suitable responses.	
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Section D

Total for this section: 18 marks

34	The transport of resources, materials and goods is an important part of the economy and supports trade and industry. Analyse the use of different vehicles for this purpose and give examples of the effects of each mode of transport used. <table border="1" data-bbox="300 562 1235 2004"> <thead> <tr> <th>Level</th><th>Mark</th><th>Descriptor</th></tr> </thead> <tbody> <tr> <td>3</td><td>7 to 9</td><td> AO3 – Excellent analysis of the importance of an effective transportation system and how it benefits trade and industry that is comprehensive and highly relevant. AO2 – Excellent application of knowledge and understanding of how the use of transportation supports trade and industry that is comprehensive and highly detailed and highly relevant. AO1 – Excellent recall of knowledge and understanding of the available forms of vehicles and transport networks that is comprehensive. Subject specific terminology is used consistently throughout. </td></tr> <tr> <td>2</td><td>4 to 6</td><td> AO3 – Good analysis of the importance of an effective transportation system and how it benefits trade and industry that is detailed and mostly relevant. AO2 – Good application of knowledge and understanding of how the use of transportation supports trade and industry that is detailed and mostly relevant to the question. AO1 – Good recall of knowledge and understanding of the available forms of vehicles and transport networks that is mostly detailed. Subject specific terminology is used, but not always consistently. </td></tr> <tr> <td>1</td><td>1 to 3</td><td> AO3 – Limited analysis of the importance of an effective transportation system and how it benefits trade and industry that has minimal detail and is mostly superficial. </td></tr> </tbody> </table>	Level	Mark	Descriptor	3	7 to 9	AO3 – Excellent analysis of the importance of an effective transportation system and how it benefits trade and industry that is comprehensive and highly relevant. AO2 – Excellent application of knowledge and understanding of how the use of transportation supports trade and industry that is comprehensive and highly detailed and highly relevant. AO1 – Excellent recall of knowledge and understanding of the available forms of vehicles and transport networks that is comprehensive. Subject specific terminology is used consistently throughout.	2	4 to 6	AO3 – Good analysis of the importance of an effective transportation system and how it benefits trade and industry that is detailed and mostly relevant. AO2 – Good application of knowledge and understanding of how the use of transportation supports trade and industry that is detailed and mostly relevant to the question. AO1 – Good recall of knowledge and understanding of the available forms of vehicles and transport networks that is mostly detailed. Subject specific terminology is used, but not always consistently.	1	1 to 3	AO3 – Limited analysis of the importance of an effective transportation system and how it benefits trade and industry that has minimal detail and is mostly superficial.	9 AO1=3 AO2=3 AO3=3
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		0	No rewardable material.	

Examiners are reminded that indicative content reflects content-related points that a learner may make but is not an exhaustive list, nor is it a model answer. Learners may make all, some or none of the points included in the indicative content. Learners must be credited for any other appropriate response.

It is not a requirement that the learner formulate a response specifically against each assessment objective (AO) as laid out in the indicative content.

Indicative content

AO1

AO1 – Learner will recall knowledge and understanding of the available forms of vehicles and transport networks.

- Goods can be carried by road or rail.
- Trains can carry large loads of freight.
- Trucks can carry loads to most places.
- Railways are limited in the areas they cover.
- Roads cover most areas of the UK.
- Aircraft can transport goods over long distances quickly and efficiently.
- Cargo ships / boats can transport raw goods from different countries for manufacturing.

AO2

AO2 – Learner will apply knowledge and understanding of how the use of transportation supports trade and industry.

- Identifying how road and rail transportation will be operated to supply materials, resources and goods to business:
 - Trucks will collect cargo / freight from depots and distribute using the national road network.
 - Haulage firms using trucks can use multidrop routes and deliver to many companies and industries.

	○ Freight can be carried from ports by rail / trains to factories, powerplants. • Suggesting what may be carried to and from industry: ○ Raw materials can be taken directly from source to factories to manufacture goods. ○ Finished products can be distributed to points of sale, distribution hubs or taken to ports / airports for overseas trade. ○ Waste products could be transported for recycling and resale or disposal to allow industry to clear space. AO3 AO3 – Learners will analyse the importance of an effective transportation system and how it benefits trade and industry. • Impacts of a co-ordinated transport network: ○ Efficient transport links allow industry to operate to set budgets. ○ Industry can plan for the delivery of resources to allow productions to continue uninterrupted. ○ Knock-on effects of being able to provide goods and services to customers and consumers with the ability to predict delivery. ○ Trade is productive when transport operates with predictable schedules and availability. ○ Money is saved if businesses can order when they need materials rather than having to invest large sums in stock. ○ Resources are less likely to be stockpiled if regular deliveries are maintained thus saving money and keeping business outlay down. Accept any other suitable response.	
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35	Raw materials extracted from the earth are in constant demand for the building and manufacture of products. Analyse the effects of extracting and processing materials into useful commodities. Provide examples and justify your answers.	9
AO1=3 AO2=3 AO3=3		
Level	Mark	Descriptor
3	7 to 9	AO3 – Excellent analysis of the effects of extracting and processing materials into useful commodities that is comprehensive and highly relevant. AO2 – Excellent application of knowledge and understanding of how raw materials are extracted and processed that is comprehensive and highly detailed and highly relevant. AO1 – Excellent recall of knowledge and understanding of the extraction of raw materials that is comprehensive. Subject specific terminology is used consistently throughout.
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1	1 to 3	AO3 – Limited analysis of the effects of extracting and processing materials into useful commodities that has minimal detail and is mostly superficial.

		AO2 – Limited application of knowledge and understanding of how raw materials are extracted and processed that has minimal detail and is mostly superficial. AO1 – Limited recall of knowledge and understanding of the extraction of raw materials that has minimal detail. Subject specific terminology is often inappropriate, and a lack of understanding is evident.	
	0	No rewardable material.	

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It is not a requirement that the learner formulate a response specifically against each assessment objective (AO) as laid out in the indicative content.

Indicative content

AO1 – Learner will recall knowledge and understanding of the extraction of raw materials.

- Raw materials are needed to make products.
- Metal ores will be mined from the earth.
- Different methods of mining could be used – underground, open pit or surface mines.
- Raw materials are finite and cannot be replaced.
- The extraction of oil.
- Cutting down of trees for natural timber.

AO2 – Learner will apply knowledge and understanding of how raw materials are extracted and processed.

- Wood will be harvested from forests that are either managed or self-seeded and natural. Industrial scale logging and men with chainsaws cut selected trees down.
- Minerals can be extracted from ores or collected in pure form from below ground. They are often separated from the ore with complex chemical or mechanical processes.
- Raw materials are extracted to make other materials and are often combined with other elements to create a specific physical property needed.

	AO3 – Learners will analyse the effects of extracting and processing materials into useful commodities. • Extraction of raw materials can damage the environment, because large scale machinery is used to extract raw materials and leaves behind a lot of waste. • Extraction of raw materials uses a lot of energy to collect a small amount of the resource, this can be both wasteful and expensive. • Degradation of soil and habitats can be a side effect of forestry activities. As trees are cut down soil can more easily be eroded by the weather as it is no longer being held by the tree roots and other plant life around the trees. • Open cast mining leaves large holes on the surface of the earth and these will take many years to be populated by nature as often the holes are barren and unsuitable for a diverse ecosystem. • Waste materials will be left behind that are not useful for manufacturing – this will significantly change the landscape. For example, slag heaps around coal mines need years to be regenerated. • Pollution is created by the machinery and processing plants that convert the raw materials into useful commodities such as steel or glass. Accept any other suitable responses.	
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Assessment objective grids

Section A

Question	AO1	AO2	AO3	Total
1	1			1
2		2		2
3	1			1
4	1			1
5	1			1
6		4		4
7			2	2
8	2	2		4
9	1			1
10	2			2
11	1			1
12	1			1
13	1			1
14		2		2
15	3			3
16		2		2
17	3			3
Total	18	12	2	32

Section B

Question	AO1	AO2	AO3	Total
18		1		1
19	1	2		3
20	1			1
21	1			1
22	2	1		3
23	1	1		2
24	1			1
25		1		1
26	1			1
Total	8	6	0	14

Section C

Question	AO1	AO2	AO3	Total
27	1			1
28	1			1
29			4	4
30		1		1
31		3		3
32		2		2
33			4	4
Total	2	6	8	16

Section D

Question	AO1	AO2	AO3	Total
34	3	3	3	9
35	3	3	3	9
Total	6	6	6	18