



Pearson

Examiners' Report

June 2017

GCE Design and Technology
Production Design 3 6GR03 01

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications come from Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk.

Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.



Giving you insight to inform next steps

ResultsPlus is Pearson's free online service giving instant and detailed analysis of your students' exam results.

- See students' scores for every exam question.
- Understand how your students' performance compares with class and national averages.
- Identify potential topics, skills and types of question where students may need to develop their learning further.

For more information on ResultsPlus, or to log in, visit www.edexcel.com/resultsplus. Your exams officer will be able to set up your ResultsPlus account in minutes via Edexcel Online.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk.

June 2017

Publications Code 6GR03_01_1706_ER

All the material in this publication is copyright
© Pearson Education Ltd 2017

Introduction

The examined unit covers knowledge and understanding of a range of modern design and manufacturing practices and contemporary design issues. This includes a good working knowledge of the use of ICT, systems and control technology and industrial production systems in the design and manufacture of commercial products. Additionally, candidates need to be aware of important contributions by designers from the past which may provide the inspiration for future designs. Candidates also need to know that sustainable product design is a key feature of modern design practice. More able candidates performed well across the paper demonstrating detailed knowledge and understanding of key concepts and content. They were able to:

- Analyse and respond appropriately to the command verb used in the question
- Read the question carefully and respond appropriately to the specific focus or scenario of the question
- Draw upon detailed knowledge of the specification content
- Demonstrate understanding of the design movements including their design style and philosophy
- Demonstrate a sound understanding of modern industrial systems including 'just-in-time'
- Demonstrate understanding of artificial intelligence and expert systems
- Demonstrate understanding of the benefits of sustainable design practice and the use of biodegradable polymers
- Demonstrate an understanding of new technologies and their impact on consumers including: modern materials, built-in obsolescence and product miniaturisation
- Demonstrate understanding of sustainable power production

Less able candidates:

- Provided more generic responses rather than focusing upon the specific requirements of the question
- Were not able to differentiate between different industrial systems and design movements and provided confused answers
- Relied upon knowledge recall rather than application.

Candidates need to have covered all areas of the specification in detail and be able to differentiate between key technologies. Centres are encouraged to place increased emphasis on production systems as each year this proves to be a problem area for many candidates. Overall the paper performed well and in line with previous examination series providing appropriate content and rigour across the ability range.

Question 1 (a)

This question required candidates to 'state' two ways of reducing the environmental impact during the transportation of products. The command verb 'state' does not therefore require candidates to describe or explain their answers although many attempted to do so. The second key word is products taken in the context of the question stem 'Manufacturers aim to be more environmentally friendly both in the production and distribution of their products'. The focus is therefore on the distribution of manufacturers' products and not the sourcing of raw materials and components required for the manufacturing process. A number of candidates mistakenly focussed on environmental issues in the sourcing of the raw materials such as using local suppliers. The question was however generally well answered and worked well as an introductory question with 96.7% of candidates achieving at least one mark and 66.0% of candidates achieving the full two marks.

This response relates to the reduction of the size and weight of a product which is not an acceptable solution especially in the short term. What would have been acceptable is the reduction in size and weight of the packaging which would then have allowed more products to be carried in a single consignment. The focus of the question is about reducing the environmental impact of the manufacturer's current range of products.

Answer ALL questions. Write your answers in the spaces provided.

- 1** Manufacturers aim to be more environmentally friendly both in the production and distribution of their products.

(a) State **two** ways of reducing the environmental impact during the transportation of products.

(2)

- 1 Reduction of product weight means less fuel is required to move the same distance.
- 2 Reduction of product size means more items can be shipped in a single container (single lorry).



ResultsPlus
Examiner Comments

This responses was awarded zero marks.



ResultsPlus
Examiner Tip

Read both the stem and the question itself to establish relevant links and make sure that you are clear about the focus of the question.

Question 1 (b)

This was a four mark question and was under the same stem wording as question 1(a) which indicated that responses could relate to either the products or the packaging. The question was generally well answered and the performance of candidates followed a normal distribution, slightly skewed towards the upper end of the mark tariff of four, which is what would be expected at this stage of the paper. This was mostly well answered with 79.8% of candidates achieving 2 or more marks. Many candidates limited themselves to a mark of two by only discussing two applications of biodegradable polymers and often focussed on describing the production of polymers rather than their applications.

This is a response where the candidate did not focus on the applications of biodegradable polymers but simply attempted to express their knowledge of biodegradable polymers. The candidate did not therefore answer the question which related to the applications of biodegradable polymers.

(b) Discuss common applications of biodegradable polymers.

(4)

- You can not recycle biodegradable polymers with plastic (it has to be recycled differently)
- ~~Polymers~~ are biodegradable polymers are degradable
- Polymers are made from starch like materials
- A lot of equipments needed to produce biodegradable product
- Expensive set up
- Consist of biodegradable materials and plastics



ResultsPlus Examiner Comments

This response was awarded zero marks because it did not address the requirements of the question.



ResultsPlus Examiner Tip

Analyse the wording of the question, identify the command verb (discuss) and the key focus of the question which in this question is 'applications' (of biodegradable polymers).

Question 1 (c)

The question here has a stem that excludes the most obvious answer. The question requires the candidate to discuss **other** disadvantages of biodegradable polymers. The use of 'other' is because their lack of durability is covered in the stem. Despite this a considerable number of candidates focussed on durability as a disadvantage of biodegradable polymers. However, the question was once again still generally well answered, with candidates displaying a good knowledge and understanding of other disadvantages of biodegradable polymers, and the performance of candidates followed a normal distribution, slightly skewed towards the upper end of the mark tariff of four, which again is what would be expected at this stage of the paper.

Question 2 (a)

This was a question that required candidates to 'outline the advantages of electronic data interchange (EDI)'. Whilst some candidates demonstrated a good understanding of EDI many confused the system with basic email and aspects of manufacturing systems including product data management systems and enterprise resource planning systems, which restricted the marks that they were able to achieve on this question. Additionally 'outline', as a command verb, does not require detailed descriptions or explanations but merely required brief coverage of the key focus of the question. In this question four marks were available so four advantages needed to be covered within the response. However, the question did allow candidates to demonstrate knowledge and understanding with 34.1% of candidates achieving the full four marks.

This is a typical response where the candidate has produced a generic response that is more relevant to email rather than EDI.

- 2 Modern industrial and commercial practice incorporates modern technologies that improve the efficiency of industry.

➔ (a) Outline the advantages of Electronic Data Interchange (EDI).

(4)

EDI is a much faster way of exchanging documents between businesses than if the post service was used. It reduces carbon emissions of the transporting of information by vehicle benefiting the environment. Money is saved on postage costing to send documents for the company. The same document can be sent to many ~~other~~ people with ease. Interactive data such as videos can be sent which can give more information than a document.



ResultsPlus Examiner Comments

This response was awarded one mark for the reference to a faster way of exchanging documents. The rest of the response clearly relates to the use of email and does not cover any of the key advantages specific or more relevant to EDI.



ResultsPlus

Examiner Tip

Remember to learn the key features of different systems used within industry and how they differ system by system so that you do not mix up system features within your answer.

This is a good clear well written response where the candidate demonstrates a sound knowledge and understanding of EDI with no confusion with other systems.

- 2** Modern industrial and commercial practice incorporates modern technologies that improve the efficiency of industry.

(a) Outline the advantages of Electronic Data Interchange (EDI).

(4)

EDI is a 'paperless' system and ~~used~~ uses a computer network and so reduces material used in company and so less trees are cut. It is a reliable system by using an identification code around electronic documents and so will have a wider expansion of customers. EDI can translate documents into the required format of the customer and so can cater to varied customers' needs. ~~EDI is a worldwide~~ EDI is used worldwide and so companies can widen their customer base.



ResultsPlus

Examiner Comments

This response covers a range of points that are covered in the mark scheme and the candidate was awarded the full 4 marks.



ResultsPlus

Examiner Tip

Good clear neat writing like this reduces the chance of your written work being misunderstood. Try to write in your neatest clearest handwriting.

Question 2 (b)

This question required candidates to 'explain three disadvantages of 'just-in-time' (JIT) in lean manufacturing systems. This sub-question was covered by a stem that focussed on improving the efficiency of industry. The question required three separate explanations, so in each explanation would receive a mark for a key identification and a further mark for a linked response that covers why the identified point is a disadvantage. The question performed well as a discriminator across the grades with candidates generally being able to cover one, two or three explanations with only 8.5% of candidates achieving the full six marks. The distribution of marks generally followed a normal distribution with peaks at two or four marks where candidates were able to explain one or two disadvantages. The modal mark was four with 28.9% of candidates achieving this mark. A common mistake was for candidates to consider some environmental issues which then moved away from the focus contained within the question stem.

This is a good example of a response where the candidate has clearly covered three appropriate linked explanations. These include interruptions to supply, increase in demand and loss of bulk buying potential. All three identified points have linked explanations covering the consequences of the identified disadvantage.

(b) Explain **three** disadvantages of 'just-in-time' (JIT) in lean manufacturing systems. ~~Explain three~~ (6)

1. If there is a problem with the supplier, production may stop as materials are not available to pull through production.
2. A sudden increase in demand may not be met as materials will not be available - the company would have to wait for delivery, increasing the time to market.
3. The company cannot benefit as well from discounts in bulk buying and economies of scale, as only small amounts of raw materials are being ordered. This means material costs are higher, increasing the price of the final product.



ResultsPlus

Examiner Comments

This is a good response covering three linked explanations that are covered in the mark scheme. The full six marks were awarded.



ResultsPlus

Examiner Tip

Remember the command verb 'explain' requires an identified point with a relevant linked explanation.

This is a poor response indicating lack of revision and preparation for the examination. The candidate has attempted two explanations neither of which are correct. The candidate appears to have guessed what they believe is an appropriate response given the question wording.

(b) Explain **three** disadvantages of 'just-in-time' (JIT) in lean manufacturing systems.

(6)

1 "Just-in-time" in lean manufacturing is not very accurate, therefore making the quality worse.

2 "Just-in-time" in lean manufacturing causes rushed products as its last minute.



ResultsPlus

Examiner Comments

This response was awarded zero marks as there is no rewardable content.



ResultsPlus

Examiner Tip

Remember that thorough revision will provide knowledge and understanding to help you achieve success.

Question 2 (c)

This was a relatively straightforward question asking candidates to 'explain the term artificial intelligence'. Candidates were generally able to demonstrate a sound understanding of the underlying principle of artificial intelligence ie exhibiting human like intelligence and behaviour, having the ability to learn, adapt and make decisions. Overall 55.3% of candidates achieved the full two marks with 81.8% of candidates achieving at least one mark or above.

This is a clear well composed response that provides the required response without additional and excessive content.

(c) Explain the term artificial intelligence.

(2)

artificial intelligence is the term used to describe a computer programmed to think and act like a human, by giving it the ability to make decisions.



ResultsPlus
Examiner Comments

The candidate here was awarded the full two marks for 'thinking and acting like a human by giving it the ability to make decisions'.

Question 2 (d)

This was a question that provided difficulties for many candidates. Over half the entry (52.2%) scored zero on this question with only 6% of the candidates achieving the full four marks. The question required candidates to 'outline the characteristics of an expert system' and candidates wrote, in the main, about various manufacturing systems confusing features of those systems with expert systems. Other candidates discussed human experts working together on the production line to provide an overall expert system approach to manufacturing.

This is a clear well written response that is concise yet covers a range of mark scheme points.

(d) Outline the characteristics of an expert system.

(4)

An expert system is a data base of facts to get answers. It is so-called because it can process a lot of information and make decisions which are similar to humans. It can process lots of information based on data base and logic system.

An expert system can also be coupled with voice recognition system to allow robots or machines with expert system to work alongside human and help to make simple decisions.



ResultsPlus

Examiner Comments

This response was awarded the full four marks covering mark scheme points 1, 2, 8 and 9 including processing a lot of information, making decisions, use of voice recognition and allowing robots to work alongside humans (as co-workers).



ResultsPlus

Examiner Tip

Remember revision is the key to success.

This is a typical response where the candidate has attempted to describe a specialist approach as being an expert system.

(d) Outline the characteristics of an expert system.

(4)

An expert system is a manufacturing system which is specialised in ~~one~~ one specific field. This means that it can produce that product with great efficiency and speed while maintaining a high standard of quality.



ResultsPlus
Examiner Comments

Zero marks were awarded as there is no rewardable content.

Question 3 (a)

This question gave candidates the opportunity to discuss the design characteristics of either Art Nouveau or Bauhaus. This question was generally well answered with Art Nouveau being the more common option although both options, in the main, were well answered. A few candidates opting for Art Nouveau confused some of the features of Art Deco. There was less confusion with candidates opting for the Bauhaus route where candidates demonstrated a clearer understanding of the movement's characteristics with no 'rogue' characteristics from other movements slipping into the response. Candidates achieved a good level of success on this question with 43.6% of candidates achieving five or six marks. Only 3.8% of candidates did not score any marks on this question and this was usually when they wrote about a different design movement, eg Art Deco or Post Modernism, as there were very few blank responses.

This candidate had opted to discuss the characteristics of the Bauhaus design movement and provided a clear easy to read response. Via discussion the candidate clearly demonstrates a sound understanding of the movement's design characteristics.

3 Design movements have influenced the design of commercial products and the built environment.

(a) Discuss the design characteristics of **one** of the following design movements:

- Art Nouveau
- Bauhaus.

Name of the movement you are discussing Bauhaus
~~Art Nouveau~~

(6)

~~Art nouveau used~~ Bauhaus used mostly mass production and machine work to produce the products as it was easier to do and was accurate. Didn't like the work of everything being hand crafted but it was the start of the machine age where everything was made by machine. Products had to be simple and the movement liked the idea of having everything deconstructed so that there was less decoration on the products being produced. Mostly used primary colours and tubular steel to make the products, ~~as~~ also the products contained a lot of lines to create simplicity to ~~the~~ the product. The design movement wanted to make sure that

everything that was produced could be afforded by people so that ~~that~~ they could use them within their day to day life.



ResultsPlus Examiner Comments

This response was awarded the full six marks by meeting a range of marking points included in the mark scheme.



ResultsPlus Examiner Tip

When six marks are available make sure that you clearly discuss six key points or characteristics.

Question 3 (b)

This question was an 'evaluate' question looking into how the work of Philippe Starck has contributed to the design of consumer products. As this command verb has been used, a balanced argument is required, therefore both positive and negative impacts need to be considered. If a candidate produces a response that is wholly positive or wholly negative then the maximum possible score on this question is five. However, candidates were able to demonstrate sound knowledge of the influence of Philippe Starck utilising a broad range of points from the mark scheme. The modal score of five accounted for 27.8% of responses but this percentage may have been boosted by candidates limited to five because of lack of balance. Overall 50.2% of candidates scored five or six on this question. Only 6.7% of candidates did not score any marks on this question, usually when they considered a different design movement, believing that Philippe Starck belonged to Raymond Loewy's streamlining movement.

A well written and detailed response that mainly focuses on positive influences of Philippe Starck's designs but does consider a limited number of negative impacts for example: '... but did not work very well and his kettle was even dangerous for use ...'. The full range of marks were therefore available for this response.

(b) Evaluate how the work of Philippe Starck has contributed to the design of consumer products.

(6)

Philippe Starck is a contemporary 'New design style' and post-modern designer who has created products that are consumer products that ~~where~~ where 'form over function' is the most important factor. This means Starck creates designs that are made to suit an aesthetic environment being more aesthetically pleasing for the consumer than being functional and easy to use. Starck has made many kitchen appliances such as his kettle or lemon juicer which showed creative unusual and futuristic designs but did not work very well as his kettle was even dangerous for use being made fully from metal and the spout being the handle which would get too hot to hold. ^{this product was recalled and stopped being sold.} Starck's work has also helped contribute to the design of consumer products by looking

individual and unique so that they stand out through the use of bright colours and bold shapes. The form of these products can be very unusual as well as being made out of contemporary, new, modern materials which can be expensive but allow easy shapes to produce in mass production to suit a consumerist society. The design of consumer products are numerous and (Total for Question 3 = 12 marks) fun and are produced for consumers who want to show them off to make a statement about their lifestyle through the products. As modern customers & consumers focus more on aesthetic qualities of products and want them to look good and impressive



ResultsPlus Examiner Comments

This is an excellent response that was awarded the full six marks because a wide range of mark scheme responses are evident and the response is balanced covering both sides of the argument.



ResultsPlus Examiner Tip

If you start to run out of space ask for an additional answer booklet or sheets rather than trying to compress your answer into the available space. You should only write on the area where lines are provided.

Question 4 (a)

This is a six mark question that requires candidates to explain three ways built-in obsolescence impacts on consumers. The question required three separate explanations, so each explanation would receive a mark for a key reason and a further mark for a linked response that covers why the identified point is an impact on the consumer. The question performed well as a discriminator across the grades with candidates generally being able to cover one, two or three explanations with only 21.4% of candidates achieving the full six marks. The modal mark of 4 indicates that the third part of the response provided more stretch and challenge. Most candidates demonstrated a sound understanding of built in obsolescence splitting their responses into planned obsolescence, postponed obsolescence and style obsolescence.

This response covers goods going out of fashion, newer products containing updated/better technology and the disposal of obsolete products.

- 4 The constant introduction of new technologies and products has had a number of impacts on consumers.
- older technology becomes redundant
• can get the newest technology
• things go out of fashion
• more money spent.

(a) Explain **three** ways built-in obsolescence impacts on consumers.

(6)

1. Things like ~~fashion~~ ^{clothing} go out of fashion and are no longer seen as desirable so therefore the consumers buy more clothing that is not needed but is popular.
2. Older technology like mobile phones become redundant very quickly as a newer & better model comes out with ~~the~~ better technology at an affordable ~~price~~ price as there with ~~be~~ ^{newer models in future}.
3. More waste of products that consumers no longer use, there are either stored away or thrown in landfill even if they are working okay.



ResultsPlus

Examiner Comments

A good response that was awarded the full six marks for three linked explanations.



ResultsPlus

Examiner Tip

Remember a six mark explain question requires three linked explanations.

Question 4 (b)

This question performed very well at this point of the paper with the range of marks following a normal distribution around a modal mark of three. The command verb was 'discuss' which gave candidates the freedom to express their knowledge without the constraints of linked responses. Candidates generally covered advanced integrated circuits, thinner LCD screens and advanced battery technologies but only the more able candidates were able to go beyond these initial three marks with only 37.4% of the cohort scoring four marks or above.

This is a well written response covering a wide range of mark scheme responses. The candidate has gone beyond considering the batteries, integrated circuits and LCD screens to consider other components, methods of manufacture and how the device interacts with other media.

(b) Mobile electronic devices have reduced in size since their introduction.

Discuss the key technological developments that have allowed this to happen.

(6)

Various developments have allowed this to happen, such as advancements in LCD and other screen technologies (touch screens etc.) meaning that screens can be produced which are smaller as well as having higher definition (more pixels) images. The advancement of communicative technologies themselves have also allowed this, the refinement of components such as speakers and receivers (having been around for a considerable time) meaning they too can be made smaller. Phones also no longer requiring a large antennae in order to receive phone signal also. The refinement of components such as processors and cameras also meaning these can be made much smaller to fit a smartphone. Machinery now being used in production with accuracy levels high enough in order to make such small components, which couldn't be done by hand. The development of mobile signal technologies such as 3/4G internet which is accessible from almost any location also meaning phones can be smaller.

(Total for Question 4 = 12 marks)

as they no longer require wired connection to something such as a land line. Wireless technology such as Satellite Communications also allowing this to happen as signal can be access anywhere in the world wirelessly, through satellite signals.



ResultsPlus
Examiner Comments

This response was awarded six marks. It actually meets a vast range of mark scheme points but is limited to the maximum mark of six for this question.



ResultsPlus
Examiner Tip

If you need to write more than can fit on the lined space ask for additional answer sheets.

This is a simplistic response with no rewardable content.

(b) Mobile electronic devices have reduced in size since their introduction.

Discuss the key technological developments that have allowed this to happen.

(6)

- Increased knowledge of computer systems allows to reduce sizes of electrical components
- New technology and machinery to produce smarter material



ResultsPlus
Examiner Comments

Zero marks were awarded for this response.

Question 5 (a)

This question required candidates to outline two applications of thermochromic pigments. Candidates performed very well on this question and demonstrated knowledge and understanding of thermochromic pigments. Overall 85.5% of candidates achieved the full two marks. Many candidates went on to explain or evaluate the thermochromic pigments but all that was required was a simple outline.

A good well written response that clearly goes beyond the requirements of the 'outline' command verb.

***5** Smart materials have many applications in today's consumer society.

(a) Outline **two** applications of thermochromic pigments.

(2)

- 1 Baby bath toys where by you can put in the bath and it will change colour if it is too hot because it reacts to the heat and kinetic energy making it safe for the baby.
- 2 Thermometers which can be used to show a persons ~~temp~~ temperature when put on their body to determine their body heat.



ResultsPlus Examiner Comments

Two marks were awarded for baby bath toys and thermometers. The candidate has gone beyond what is required to be awarded the marks.



ResultsPlus Examiner Tip

When outline is the command verb you do not have to provide a linked explanation.

In this response the candidate is mistaking thermochromic pigments for either smart glass or photochromic reactive glass.

***5** Smart materials have many applications in today's consumer society.

(a) Outline **two** applications of thermochromic pigments.

(2)

- 1 ~~Smart~~ Glasses for if the sun does appear
- 2 Windows to allow privacy.



ResultsPlus Examiner Comments

The response was awarded zero marks as there was no rewardable content.



ResultsPlus Examiner Tip

Thorough revision helps to provide clarity of response.

Question 5 (b)

This question requires candidates to evaluate the use of shape memory alloys (SMAs) for spectacle frames. The question performed well producing results in a normal distribution either side of a modal mark of three. As the 'evaluate' command verb has been used, a balanced argument is required, therefore both advantages and disadvantages of SMAs for this application need to be considered. If a candidate produces a response that is wholly advantages or wholly disadvantages then the maximum possible score on this question is five. However, the question did provide some stretch and challenge with only 8.3% of candidates scoring the full six marks. The most common mistake was to spend time writing about fitting the frames to the users head which of course applies to all frames including polymer frames and other types of metal frames.

This is an example of a well written response that covers a wide range of mark scheme points. The candidate has demonstrated sound knowledge and understanding of the use of SMAs for spectacle frames.

to safely indicate the temperature through colour ~~change~~.

(b) Evaluate the use of shape memory alloys (SMAs) for spectacle frames. (6)

SMAs are used in spectacle frames so that the shape of the frame will not ever permanently get bent out of shape since the crystals in SMAs can go back to their original form. These frames contain titanium so ~~that~~ they are very strong and durable as well as high quality and are flexible so can change shape slightly in order to fit the users head perfectly without bending or snapping. Although there are a few disadvantages of SMAs being used for glasses frames such as the frames may cost just as much as usual ones then regular plastic or metal frames making them expensive to produce and purchase. As well as this, SMAs are not completely unbreakable glasses frames so with enough strain or power they will break and would be difficult to repair and may have to be replaced (Total for Question 5 = 8 marks) which would be expensive for the user.



ResultsPlus

Examiner Comments

This response was awarded the full six marks as a range of points from the mark scheme have been considered including both advantages and disadvantages.



ResultsPlus

Examiner Tip

Remember with 'evaluate' questions like this one you must consider both advantages and disadvantages in order to score full marks.

Here the candidate has attempted to write about SMAs but has insufficient knowledge of the topic, which is evident in the response.

(b) Evaluate the use of shape memory alloys (SMAs) for spectacle frames.

(6)

The reason for SMA's being good for spectacle frames is that they can hold lenses very securely, this is because the alloy remembers it's previous shape which then holds the lense tightly in the frame. They are also good because they can have lots of different finishes to them which allows the wearer to have lots more choice. However they are very ~~delect~~ thin and if dropped they can snap bend or break.



ResultsPlus

Examiner Comments

This response was awarded zero marks as there was no rewardable content.



ResultsPlus

Examiner Tip

Remember thorough revision is the key to success.

Question 6 (a)

Question 6 has a stem that states that 'meeting future needs is a concern for governments', which provided a focus for candidates' responses. The question required candidates to 'explain three advantages of hydroelectric power'. The question required three separate explanations, so each explanation would receive a mark for a key point and a further mark for a linked response that covers why the identified point is an advantage of hydroelectric power. The question worked well at this stage of the paper with a modal mark of four. Candidates were able to demonstrate knowledge and understanding using a range of points identified within the mark scheme. Candidates, in the main, were able to identify three key features of hydroelectric power but were often limited by their ability to provide three linked reasons explaining the advantage or benefits. A broad range of responses from the mark scheme were covered in candidates' responses.

This candidate has demonstrated a sound knowledge of hydroelectric power and has provided three appropriately linked explanations.

*6 Meeting future energy needs is a concern for governments.

(a) Explain **three** advantages of hydroelectric power.

(6)

- 1 Hydroelectric power is ~~a~~ produced from water which is a renewable source that is available constantly. Providing a constant flow of water to dams and water stations which would produce energy constantly with out stopping so a large amount of energy is produced.
- 2 Dams and reservoirs created attract tourism as well as locals for water sport activities which would regenerate the local ^{economy} ~~economy~~ in the area around the dam making more profit for the business and local area.
- 3 High yields ^{of} energy are produced so cost from constructing the dam and station are quickly made back as well as dams protecting local downstream reducing the risk of flooding in areas.



ResultsPlus

Examiner Comments

This response was awarded six marks for three complete linked explanations. The first explanation covers a sustainable (renewable) resource that provides a constant amount of energy. The second response covers reservoirs providing sport and recreation facilities. The third response covers dams preventing downstream flooding.

This candidate has confused hydroelectric power and wind power so there is no rewardable content as the responses are inappropriate and out of context.

***6** Meeting future energy needs is a concern for governments.

(a) Explain **three** advantages of hydroelectric power.

(6)

- 1 HYDROELECTRIC POWER can be very effective in countries such as the UK where there is a highly likely continuous level of wind source. If used to power small coastal areas where the wind is high, it could be the primary source.
- 2 HYDROELECTRIC POWER also requires less green space than energy plants or power stations. saving an land or cooling areas in



ResultsPlus

Examiner Comments

This response scored zero marks as there was no rewardable content.

Question 6 (b)

This question was answered very well and candidates demonstrated an excellent understanding of the use of nuclear energy as a means of satisfying the demand for electricity hence the modal score was the maximum mark of six with 41.1% of candidates achieving this score. As the 'evaluate' command verb was used, a balanced argument was required. Therefore both advantages and disadvantages of nuclear energy needed to be considered. If a candidate produced a response that was wholly advantages or wholly disadvantages then the maximum possible score on this question was five. A broad range of responses from the mark scheme were seen in candidates' responses with most providing a balance of advantages and disadvantages.

A well written concise answer that demonstrates how to be concise and include many key points without unnecessarily increasing the word count.

(b) Evaluate the use of nuclear energy as a means of satisfying the demand for electricity.

(6)

A lot of energy is produced for a small amount of radioactive fuel. The energy used can heat and power homes. Very little greenhouse gasses are given off in the production of nuclear energy. Very reliable energy source which meets the vast majority of energy needs. But, the waste from nuclear energy is very dangerous and can be used to make nuclear weapons. Failures and malfunctions can lead to huge disasters. Nuclear power plants have huge maintenance and investment costs. Loss of habitat and biodiversity as a lot of land is needed to produce build the power plants. Nuclear power can't change to meet surges in demand. Reduces the need for fossil fuels to be used.



ResultsPlus

Examiner Comments

The full six marks were awarded for a broad range of points from the mark scheme.



ResultsPlus

Examiner Tip

Long responses do not necessarily gain higher marks. Be concise and include all key points.

A very good well planned and well written response. The candidate has demonstrated a sound understanding of the benefits and drawbacks of nuclear power.

(b) Evaluate the use of nuclear energy as a means of satisfying the demand for electricity.

(6)

Nuclear energy is very efficient it produces lots of electricity for not much Uranium fuel needed. The production of power can also be very accurately tailored to the countries needs producing more when needed. The raw material Uranium is extremely abundant and so we don't need much to produce electricity the raw material will last a long time. Nuclear power stations also don't produce greenhouse gases so in this respect aren't a cause of global warming. Nuclear power however is very dangerous, workers that work in the reactor core work at high risk. Events such as Fukushima and Chernobyl show that mistakes can lead to devastating costs. People who argue due to the danger posed by any minor nuclear power stations are a security threat in terms of terrorism. Nuclear power stations also produce nuclear waste, this is extremely difficult to dispose of as it takes thousands of years to decay to a safe level. The process for dealing with waste is also extremely

expensive, as well as the cost of building a nuclear power station.

Development in nuclear fusion suggest nuclear energy may be possible with not as much waste production though.



ResultsPlus Examiner Comments

The candidate was awarded the full six marks as the response covers a broad range of mark scheme points.

Here the candidate is confused and has written about using fossil fuels to meet the demand for electricity.

(b) Evaluate the use of nuclear energy as a means of satisfying the demand for electricity.

(6)

Nuclear energy is produced by burning fossil fuels. The advantages of nuclear energy is that it make alot of energy by burning the fossil fuels. Therefore it can satisfy the increasing demand. It also doesn't rely upon any specific conditions meaning the energy can be generated at continuous rates with no interference. However there are negative impacts of nuclear energy, due to the fact that they burn fossil fuels it means they are one of the lead contributors to Global warming, due to the amounts of CO_2 that is release, when they are burnt. Even though currently they are a constant supply eventually if producing energy by burning fossil fuels the fossil fuels will run out. This makes this produce not sustainable for the future, which therefore can mean eventually they will not be able to stasify the demand for electricity. To conclude I believe the use of nuclear energy is not surficent for supplying

demand for the future. As the resource will eventually run out it is not sustainable. Also the process has negative effects for the environment, which also shows a negative for

(Total for Question 6 = 12 marks)

nuclear power.

TOTAL FOR PAPER = 70 MARKS



ResultsPlus

Examiner Comments

As the response is written in the context of the evaluation of fossil fuels, in meeting the demand for electricity, there is no rewardable content and scored zero marks.

Paper summary

Overall the paper performed as expected and designed allowing sufficient stretch to discriminate across the full range of available grades yet providing accessibility for all candidates.

Based on their performance on this paper, candidates are offered the following advice:

- Gain an understanding of the use of command verbs in examination questions and the type of expected response
- Read the question thoroughly so you understand the focus of specific questions
- Identify how many marks are available for the question
- Avoid the temptation to write all you know about a generic topic area as you will lose the focus of the question
- Revise the full breadth and depth of the specification, anything that could be interpreted from the specification content could be included on the paper
- Use all available resources, including core textbooks, when preparing for the examination
- Use the learning opportunities presented during the completion of coursework to help prepare for the examination.

Grade Boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:

<http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx>

Ofqual



Llywodraeth Cynulliad Cymru
Welsh Assembly Government

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London WC2R 0RL.

