



Examiners' Report Lead Examiner Feedback

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Pearson BTEC Nationals
In Applied Science (31629H)
Unit 7: Contemporary Issues in Science

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Introduction

This is the fifth examination series for Unit 7 (Contemporary Issues in Science).

The scientific issue covered by the three articles was Chemicals - plastic waste in oceans (A1). The articles were:

- a newspaper article from 2019 which presented a discussion of plastic alternatives and their contribution to marine pollution
- an article exploring developments surrounding plastic pollution, with particular focus of innovative solutions in 2018
- an annual report from 2019 by the Environmental Investigation Agency and Greenpeace on the progress made by supermarkets to reduce their use of plastic packaging within the retail sector

The learning aims covered by the questions were:

- Question 1 - understanding the scientific issues in terms of ethical/ social/ economic/ environmental impact (A1)
- Question 2 - understanding the influence of different organisations/individuals on scientific issues (A2)
- Question 3 - interpretation and analysis of scientific information (B1); evaluation of scientific information (B2)
- Question 4 - potential areas for further research and development (B2)
- Question 5 - knowledge of how science is reported in different media and for different audiences (C1); understanding the presentation of science reporting and its relationship with the reporting medium and the target audience (C2)

Introduction to the Overall Performance of the Unit

In general, learners performed similarly on this paper by comparison to recent series.

Areas where learners performed well were:

- Question 1 – making links between different scientific issues and discussing the implications that arise
- Question 2 – identifying and describing different organisations or individuals from the articles
- Question 3 – discussing the reliability of sources and references in article 3
- Question 5 – discussing the concerns surrounding plastic disposal and use of alternative packaging

Areas where learners did not perform as well were:

- Question 1 – synthesis of information to create a focused discussion and making comprehensive linkages between implication areas for a specific issue
- Question 2 – explaining the sphere of influence for identified organisations or individuals
- Question 3 – identifying and explaining evidence from article 3 to discuss the validity of the conclusions or judgements being made
- Question 4 – expanding upon the areas of further research or development that were identified from the articles
- Question 5 – selecting an appropriate format and tone for the target audience

Individual Questions

Question 1

“Discuss the implications of the scientific issue identified in the articles.

(12)”

This question was typically answered best by learners, often with quite detailed responses, placing the majority in Band 3. Although this could be that as the first question, learners invested more time and effort, the cohort generally revealed a good comprehension of the three articles and preparation to tackle this question.

There were relatively few level 1 responses, with most learners appearing to be able to identify a few scientific issues and give clear implications related to these for a discussion. A small proportion simply summarised each article which revealed a weak understanding of what the question required.

Most learners were able to draw out “implications” (ie ethical, environmental, economic and social) from the issues raised and this provided a focus. The way in which the response was approached determined how well it scored. Most learners grouped their responses by article or by implication. The former “article-by-article” approach tended to be more limiting, as points were likely to be repeated later and ignore the previous points made. The latter “implication-by-implication” approach tended to score better as it allowed for integration of points from the different sources or consider differing opinions. However, a drawback with this approach was that links between the implications were often missed and therefore learners were unlikely to get into Band 4 unless the other traits were good enough to raise the overall mark. Those that grouped their answer by an identified scientific issue tended to give fuller responses with little repetition and good linkage to and between the implications. A few responses in this band also demonstrated research beyond the three articles, which enhanced the scope of the discussion.

Band 3 response

In Article one there are many implications for the reduction of plastic use amongst consumers. Firstly an environmental issue ^{was} that although compostable and biodegradable materials were being introduced, they were still contributing to the pollution of marine life, this feeds into economical issues because one of the reasons this happens is the consumers lack of understanding and agreement to the use of alternative packaging.

A social impact in article 1 ~~could~~ is stated by Neil Parrish as he talks about the lack of correct infrastructure to introduce new materials to the public consumers. This causes misinformation spread to the consumers which over time leads to the same incorrect distribution of ~~it~~ bioplastics. Overall making biodegradable plastic and regular

plastic have the same affect on marine life and pollution on land.

Ethically it is wrong to try and inforce the change from plastic to other 'more sustainable' materials straight away because it has alot environmental consequences such as a rapid increase in carbon emissions. Which is why the Green Alliance states that a change of material packaging should be carefully planned out and assed so that when it is introduced to the public, it will be a positive impact.

Within Article 2, the focus is more on overcoming the issue and finding solutions rather than just discussing it. An economical impact ~~of~~ discussed in Article 2 is that lightweight plastic holds less profitable value, therefore in order for ~~to~~ manufact-urers to make any sales they would have to use larger amounts

of plastic which clearly over time contributes even further to marine and land pollution. Environmentally there is also a dilemma in attempting to lessen the use of plastic because the majority of packaging consists of multiple types of plastic which each hold different purposes such as strenght, water proof ability and so on. However a solution in progress is a test that the University of Pittsburgh are carrying out. They are attempting to ~~put~~ apply nano engineering technology to create a recyclable material with the same multilayered packaging as unrecyclable plastic has.

The BBC series 'Blue Planet 2' has been a positive social impact on the public, or at least the percentage of the ~~the~~ public who did watch it because it has opened their eyes to the problems going on in the world they live in. However, ~~as~~ until the

public are educated and correctly informed enough on how to properly reduce, reuse and recycle, the progress on the 'plastic issue' will remain at a halt.

In Article 3, the main noticeable impact is social because it discusses supermarkets impact on the issue. Supermarkets have a vital role to play as a catalyst for change, being that they mass distribute and promote plastic to their customers. A factor like this is something that is socially unacceptable which makes it morally wrong, therefore also making this an ethical issue.

Lead Examiner comment:

The response takes an article-by-article approach and within this considers an issue and its implications. Information is selected from each article, but it is not always put together to make a deep or coherent discussion, and often reads as a series of facts or quotes with a comment. Links between implications are generally weak.

Band 4 response

~~Article 1~~ The ~~one~~ One of the social issues ~~is~~ mentioned in Article 1 is the lack of ~~consumer~~ ^{consumer} understanding ~~of~~ on plastic alternatives. Since people believe that ~~plastic~~ plastic that's 'biodegradable' ~~is~~ is safer to ~~be~~ litter into the environment, the actual use behind ~~this~~ this type of plastic won't be achieved as it will harm the environment in the same way ~~it would~~ as non-biodegradable plastic would. This is a social issue just as well as it's an environmental one because society ~~has~~ plays a big part in reducing plastic pollution, and not knowing the ~~fastest~~ ^{safest} way in doing that will only cause more harm to the environment, as well as health of people. Another social issue mentioned in Article 2 is that ~~it~~ it's not only plastic bags that make up most of the plastic waste but ~~it~~ it is also the ~~the~~ plastic things we use in our day to day lives such as plastic films for foods or plastic containers/wrappers used to store medical equipment. This is a social ~~issue~~ ^{issue} because despite there being an increasing amount of techniques to reduce plastic waste, society ~~has~~ still uses ~~these~~ things of importance such as medical equipment safe and clean which wouldn't be possible without plastic. This ~~issue~~ also links to economical issues because

plastics are usually very cheap and easy to use, or so inventing other storage materials may become more expensive which would also affect people who may no longer afford certain things due to their more complex expensive details. Lastly, a Article 3 mentions that the "modern dependence on single-use packaging and items is a symptom of a broken ~~issue~~" system." This is a social issue because when people do not know the harm they're causing to ecosystems it is much harder to fix the problem. A broken system shows that the ~~increasing~~ increasing plastic waste numbers rise because society has become too dependent on plastics. This ~~is~~ links to ~~economical~~ ^{economical} ~~issues~~ ethical issues as being dependent on plastic, despite the many advantages it has, will worsen the environments state due to the toxins found in plastic ~~and CO₂ emissions~~ which may cause potential health effects.

Article 4 mentions an ethical issue as it explained that the rapid introduction of plastic alternatives may increase pollution. It's an ethical issue because although they are designed to decrease plastic pollution, it hasn't been made very clear through the complex instructions ~~how~~ on how to safely dispose of these plastics, and so ~~as~~ they therefore stop being any better than non-biodegradable plastics.

This links to environmental issues because as people will think it ~~is~~ is safe to dispose the alternative plastics in the same way as other plastics, it would be increasingly harder to separate these materials to get them correctly recycled. This may end up in them being burned down instead which would increase CO₂ emissions into the atmosphere, worsening the effects of global warming. ~~After~~ The exposure "to a large variety of toxic chemicals" is another ethical issue that's mentioned in Article 3. This is because the plastic consumption ~~is~~ ~~increases~~ poses a risk to developing negative health effects through these toxins, so ~~the~~ plastic uses in some areas are considered to be unsafe.

Article 1 mentions an economical issue where it suggests says that more money is needed for non-governmental organisations to reduce plastic pollution. Since the article talks about plastic alternatives ~~being~~ posing the same level of threat as normal plastic, the organisation will have a lot more work to do in clearing up the pollution in the sea or land. This also links to social issues because ~~as~~ ~~the~~ important organisations such as Greenpeace or Green Alliance may take further actions to make sure to prevent increased pollution, which will start ~~bas~~ on how consumers

should change their behaviours (i.e. using reusable items instead of single use plastic items). Another economical issue is mentioned in Article 2 where 'magnetic additives' could be applied to materials for better insulation. This is an economical issue because the materials may become more expensive compared to plastics and therefore not be widely available for everyone to use. It is also an ethical issue as it has not been thoroughly researched yet and some people may be skeptical of using these additives. Furthermore, since plastic bottles and bags are very popular in the market, Article 2 suggests an economical issue of businesses failing. Since 40 - 60% rely on plastic brand items to increase their target markets, a reduction of plastic uses could ruin their sales and make people lose jobs.

Lead Examiner comment:

In this example, the learner sections their discussion and takes an issue or implication stemming from the article to discuss (eg consumer understanding, plastic alternatives, financing the reduction of plastic use). The response covers the four major implication categories (social, economic, ethical and environmental) and considers a number of strands within each area but also how it links to another. The learner selects evidence well from the three articles to support their discussion, and particularly uses information and quotes to make their point. The response explores positive and negative impacts, which provides an effective mode of discussion. The discussion shows development of ideas rather than repeating similar points. The response is written clearly and coherently, showing a comprehensive understanding of the scientific issue and its implications.

Question 2

"Identify the different organisations/individuals mentioned in the articles and suggest how they may have an influence on the scientific issue. (6)"

The majority of learners were able to identify organisations and/or individuals mentioned in the articles and provide some indication of how they were relevant to a scientific issue raised in the articles. Most learners scored in Band 2 for their responses, but many restricted themselves to Band 1 or the bottom of Band 2 as they did not qualify the organisation/individual's purpose and influence. This suggests that many learners did not understand what the question required in relation to "influence" (eg field of expertise, economic, legal, political, etc).

A frequent shortcoming in responses was to give the names of the people or organisations and then give a quote from the article without making a point or actually explaining who/what they represented. Conversely, some learners provided general detail about how a particular organisation influences rather than linking this to the issue in the article (eg Greenpeace protects the environment). Sometimes there was a disproportionate focus on one particular type of organisation (eg Environmental Investigation Agency) which did not show a breadth of consideration.

Responses in Band 3 were observed and were generally marked out by clearly identifying the organisation/individual, their background or purpose, how they might influence the scientific issue and who they might influence. The number of examples given were generally fewer in number than those in a weaker learner response but provided a detailed explanation.

It is not necessary for learners to produce an exhaustive list of all the organisations or individuals referenced in the articles but it would be advisable to provide an example from each of the categories listed in the essential content for Unit 7: Government and global organisations; Non-government organisations, professional bodies and associations; Universities and research groups; Private and multinational organisations; Voluntary pressure groups. This will then allow learners to describe different types of influence.

Band 2 response

A key organisation that ~~all the article~~ has an influence on all 3 articles are Greenpeace and the Environmental Investigation Agency (EIA) which are Non-Governmental Organisations that persuade the public and the committee to take action in order to help save the environment.

Another organisation is Green Alliance who want standards to be re-examined and to be biodegradable.

In article 2, it is seen that the television programme 'BBC series: Blue Planet 2' has had a significant ^{social} influence on this scientific issue as it raises the awareness to the public how pollution is affecting their planet.

The Ellen MacArthur Foundation and Prince of Wales International sustainability unit both have had an influence on the plastic issue as they had launched a New Plastics Innovation prize (2017) in collaboration with Think beyond plastic for a 12 month accelerator programme in order to ~~show~~ ^{engage} the public about the issue of plastic. This Innovation Prize was funded by Ellen MacArthur herself who owns the Ellen MacArthur Foundation.

In Article 3, Supermarkets like Sainsburys, Aldi, Asda and Waitrose all have an influence on plastic waste as they are the key cause for plastic waste ^{due to} from their products packaging as well as shopping bags.

An individual who has an influence on the plastic issue is Juliet Phillips from the (EIA) as she has stated ~~that~~ "a biodegradable cup would pose much of a problem to marine life as it would like a conventional plastic cup" and this changes the perspective of the use of biodegradable products.

Lead Examiner comment:

In this example, the learner has referred to a wide range of organisations and individuals from all three articles. However, only a brief mention of who they are or what they might do is provided. Top band responses must be able to explain how the identified party would be able to influence the issue, who they may influence and to what extent.

Band 3 response

Wendy Schmidt is the founder of the Schmidt Foundation along with her husband. She has helped to found the New Plastics Economy Innovation Prize and ~~the~~ her foundation is ~~totally~~ ^{concerned} with the environment and recycling. She has ~~previously~~ said that she doesn't think ~~recyclable~~ plastic is the solution even saying it is bad. This shows she is more interested in ~~new~~ completely new systems of plastic waste. She is funding stuff like the New Plastics Economy Innovation Prize. This shows she wants to help ~~make~~ completely new systems for how we handle packing and waste. ~~as it is~~ It is not enough to simply use alternative and in the future we will need ~~more~~ more circular systems and advances in plastic waste.

Greenpeace is an organisation that is ~~so~~ ^{now} focused on helping the environment so Greenpeace has helped with a ~~survey~~ ^{survey} of large ~~super~~ ^{super} supermarkets and ~~other~~ ^{online} retailers to see help them set goals for reducing plastic and see how they have done. Their report has shown that mainly supermarkets ~~it should~~ should try to reduce the amount of single use plastic they have

not only in their own brand products. If the
larger Supermarket chains were to put more effort
into reducing plastic waste then small shops and
Overall public would be made for more aware and
work towards less overall waste. They can do this
by showing ^{Supermarkets} their overall progress and
how they can make sustainability progress and the
targets that they need to reach.

Neil Parish is a Conservative MP and
has talked on the problem of recycling
and said to about how plastic substitutes are not
the ~~solution~~ solution if there is not the right public
understanding and infrastructure to
support it. He has talked to with recycling
societies to help them upgrade so they can
recycle more material and this would allow
for the proper infrastructure to allow new materials
and ideas to work for recycling so people leave
less plastic waste as it can be properly recycled
instead of just dumped.

Lead Examiner comment:

In this example, the learner has considered an organisation or individual in turn. A good choice of different types of organisation / individual has been given (philanthropist, pressure group, Member of Parliament) although there is scope for an even wider range to progress higher in the band. Those selected do have different view-points and vested interests, however, and each is covered in depth. Influence is

examined in areas such as funding (ie the Innovation Prize) or the influence upon other groups (ie supermarkets or the public).

Question 3

"Discuss whether article 3 has made valid judgements.

In your answer you should consider:

- how the article has interpreted and analysed the scientific information to support the conclusions/judgements being made*
- the validity and reliability of the data*
- references to other sources of information. (12)"*

This question focuses only on one article and provided several cues as to what responses should consist of (eg validity, reliability, referencing, etc). Whilst there were occasionally good responses, the majority of learners were in Band 2.

A small proportion of learners had not read the question carefully and discussed the issues of plastic waste again or ended up discussing articles 1 and 2 as well as 3. Occasionally, learners offered a critique of how article 3 was written – whilst there were elements that could be credited, this did not really consider the validity or reliability of the article.

Learners that did focus on the validity of conclusions in article 3 were not always clear what they were trying to achieve. This may be because they found it difficult to extract information that demonstrated valid judgements or possibly, they did not fully understand the terms "validity" and "reliability" in this context. At the other extreme, some learners prefaced their discussion with definitions of these terms, reflecting some sound teaching of what to look out for – however, this did have to be applied to the article in question and if it was not supported by evidence from article 3 then it lacked relevance. In any event, many responses did not consider the validity and reliability of the article, which restricted them to the lower bands.

Often learners were able to gain some credit for understanding that because the information was referenced then it was reliable, whilst better responses discussed the source, credibility of the authors, currency of the article and the quality of its references. However, some learners did forget that the requirement was for a "discussion" and would instead either hold an overwhelmingly positive or negative position on the article. This often tended to be manifest in statements about the article authors (or survey respondents) being either very reliable or very biased. Few learners actually discussed the survey methodology used or how the article had interpreted and analysed information to support the conclusions being made. Those that did attempt to go beyond generic statements and provide specifics were able to move into Band 3 and above.

Band 2 response

Validity means the quality or state of being acceptable.

Reliability means the quality of being trustworthy or consistently good.

Figures in Article 3 are represented as Percentage, bar graphs and other data graphs. This makes it reliable as the data can all be compared with one another to check if the same results would have been received. However data should have been shown in more graph formats to get the best accuracy.

References ~~get from diff~~ used in Article 3 are from different sources. This suggests to us that it might be unbiased as it is coming from different individuals and views.

Article 3 we are shown a significant amount of references from different sources. References can tell us how much research was done and if the piece of work is reliable. They must be accurate in order to allow the readers to find sources of information. Although the referencing are near dated, it is done incorrectly. The reference starts with the number "2" and skips citation numbers to number "36" which makes the article very unreliable.

In the title of article 3 the date was written "202 November 2019". This shows us that the article is up to date which makes it both reliable and valid. Near dated articles / piece of work would be more valid in comparison to an old one as it would be updated.

Some of the sources referenced are well known organisations who have major impact in the environmental issues. However some statistics in the article are not referenced for example figures 5 and table 2 has no reference therefore it can not be reliable as we do not know if the statistics are correct.

Considering Article 3 is the longest, not enough

reference is shown to back up the research.
The article started off with a few citations but
as we read on it completely stopped leaving the
article unreliable and the judgements invalid.

I believe with article 3 to a certain extent
about the conclusions and judgements made.
however, not enough evidence to support
findings therefore making most of the information
unreliable.

Lead Examiner comment:

In this example, the learner provides a response with some structure and coherence but is limited to basic points which do not always indicate a good understanding or discussion. The comments regarding presentation of the data for ease of comparison are good but this is also incorrectly linked to reliability and accuracy. Comments about number and variety of references are generic without giving any clear examples, and again incorrectly connect the sequence of numbering with reliability. Finally, the currency of the article is noted, and a fair point is made about validity in comparison to an older article, but also concludes that being up to date makes it reliable without any reasoning. Overall, the learner has made only a limited attempt to discuss the article and many of the points would benefit from greater exploration and exemplification.

Band 3 response

Article 3 discusses the issues of using plastics by the supermarkets and possible solutions of plastic recycle breakthroughs.

References to other sources of information includes The UK Greenpeace + EIA noticed that plastic use has been reduced by supermarkets. The Science UK packaging rate will increase by 22% between 2018 and 2030, plastic use must be reduced. Both EIA + UK Greenpeace collected data from a survey to see how various supermarkets are using plastics for packaging. The survey represented 10 largest supermarkets within UK to track their commitments and targets reduced of plastic use. Therefore this survey is reliable to give accurate results to plastic use. Questions used in the survey would allow performance of retailers to be measured according to the following categories: reduction targets, future targets uses of recyclable plastics, recyclability

and recycled targets of plastic.

The article has interpreted and analysed the scientific information to support the conclusions and judgements being made by including a lot of evidence such as bar graphs and tables. The table clearly shows that progress made on reduction and reuse had ~~Sainsbury's and Iceland~~ ~~and with the highest at 56%~~ and Waitrose with the highest percentage at 37% and Aldi the lowest with 13%. Future plans on reduction and reuse had Sainsbury's and Iceland with the highest percentage at 56% and Marks and Spencers with the lowest at 26%. Recyclability / recycled content had Marks and Spencers with the highest percentage at 60% and Iceland with the lowest at 20%. Then influencing suppliers had Tesco the highest with 80% and Aldi the lowest with 40%. Lastly, transparency had Waitrose and Morrisons the highest with 92% and Sainsbury's the lowest with 72%. Overall, the % score was Waitrose with 52% and the highest and Aldi 38% with the lowest. Companies in this table had increased their overall plastic footprint since last year and

had generally made the least progress to date on trialling and expanding packaging-free and reusable solutions. These companies had experienced sales growth and noted challenges in reducing their overall plastic footprint.

~~The ~~valid~~ results are reliable in Appendix 3 because it uses many different ways to represent~~

The data provided might be less reliable because some data groups from other organisations failed to respond to the survey. ~~More~~ However, another point is that convenience chains were not included in the study. This makes the survey therefore less reliable and accurately not representing the user and target reduction of plastics.

Overall, although 10 supermarkets have responded, positively to the survey there are some areas which remain unclear as some supermarkets failed to provide information about their sales of own branded products which are ~~recyclable~~ recyclable items. In the future all supermarkets will be encouraged to publish reports of their plastic footprint

in both tonnage and units to make accurate and reliable compared to plastic usage. By including many data presentations, it makes it much more clearer for the reader to see and understand. Also it makes the data more valid as it is ~~more~~ focusing on the x and y.

Lead Examiner comment:

In this example, the response is structured, coherent and logical but has some flaws. The learner begins their response well by indicating what the article is about and summarising the methodology. Information from the article has been cited but there is only a weak consideration of whether it supports the conclusions or how else it can be interpreted. There is a discussion of the reliability of the information collected, such as not all organisations responding and only big supermarket chains being in scope. There is no comment upon the reliability and source of the references which restricts the credit that can be awarded to the response.

Question 4

“Suggest potential areas for further development and/or research of the scientific issue from the three articles. (5)”

Most learners were in Band 1 or 2, with equal proportions at each of the three marks. A minority of learners left this question unanswered, suggesting that they struggled to understand what was required and/or were running short of time. Only learners that had researched beyond the articles or were able to show some creative thinking were able to score in Band 3.

It was very common to find that learners had simply discussed an article itself, regarding validity and intended audience, seemingly as a continuation or repetition of Question 3. These learners had clearly misunderstood the focus of this question and tended to offer suggestions of how the articles themselves could be developed rather than the scientific issues raised.

Others missed the point of research and development posed in the question altogether and simply summarised the current situation with plastic use, neglecting to comment upon what could be done to replace or dispose of it in the future.

Some learners took an approach that was essentially a list of developments that they had drawn from the three articles. This could sometimes present itself as a call for further research or development, but there were no suggestions to how this should be done, or problems/barriers that may be encountered. This then restricted these learners to the lower bands.

There was often a heavy focus on changes in attitude towards the usage of plastic from government, retailers and consumers. Whilst relevant, it did often reveal how much a learner had engaged with the scientific angle of this question.

Responses that were in Band 3 were not common. The best responses referred to several possible areas for further research and development, drawn from all three articles, giving a rationale and approach. For example, development of biodegradable plastics or alternative materials, methods and solutions for clearing plastics from the oceans, improvements to infrastructure or schemes to allow people to better recycle or compost, etc.

Band 2 response

In article 1, the alternatives should be slowly introduced and the society must be warned to what can happen in the future to reduce the risk of increased plastic pollution. Also, the government should be provided with data from all businesses so the problem can be resolved much quicker. Moreover, as the government is not addressing the root of the problem, the society must pressure them to take action.

In article 2, more competitions must be addressed to the plastic pollution so more people take part in them. Also, this problem must be addressed publicly, so more people know about it and will understand the risks of this problem continuing.

In article 3, the supermarkets should provide less food in plastic packaging as, for example, some drinks ~~as~~ such as juices can be provided in paper packages as it is recyclable, and foods such as vegetables, fruits, whole grains etc. can

be provided without plastic packages. Also, the plastic bags should be reduced and changed to paper bags as these can decay so the environment will not be damaged. Moreover, On-the-go and meal deals should be changed to different packaging as almost all products are sold in one-way packaging.

Lead Examiner comment:

In this example, the response shows some structure and attempts to provide some developments. There is very little suggestion that has any scientific basis or principles applied, however. Most comments tend to revolve around introduction or promotion of alternatives to society or vague calls for more data rather than researching a problem and proposing a solution or planning to tackle the issue.

Band 3 response

There are many areas for further development ~~from the environment and plastic usage~~ for this scientific issue.

- Recycling bins aren't everywhere, it could be made more accessible for people to recycle regardless of where they are.
- Not only create an alternative to plastic materials but create and develop a way of getting rid of the plastic that is already in the environment as it takes hundreds of years to break down so even if we created an alternative to plastic there will still be existing plastic polluting our planet.
- Government educate people on term 'Biodegradable' as it isn't an instant process and is misunderstood. They could educate people in the importance in recycling and how to.
- Make it unacceptable for supermarkets to be using unnecessary single use plastic with no option of a 5p carrier bag only reusable and refillable items.
- We should also focus on how other countries have overcome plastic pollution.

- For example - Germany uses the green dot system so retailers pay for this and the more packaging items have the higher the fee. This is a successful recycling system. It is the basic idea that consumers who see the green dot logo on items know that the manufacturer contributes to the cost of recycling. This encourages manufacturers to cut down on packaging as it will save them less fees.
- Sweden uses the Panta system where they receive money back when they recycle.
 - Italy uses Porta a porta so garbage collectors pick up the trash daily according to a specific item so recycling can be done efficiently.

↓
We could follow in the same footsteps as ~~other~~^{these} countries we can do this by educating, motivating and putting costs on plastic packaging for the retailers to cut down on their usage.

(Total for Question 4 = 5 marks)

Lead Examiner comment:

In this example, the response is very well structured and developed. Each section takes a point from the articles and identifies how it could be researched or developed further. The response becomes more detailed and specific as it continues, particularly on the second page where initiatives in other countries are referred to and outlined.

There is evidence of other research and reading to exemplify the point beyond what is already established within the articles.

Question 5

"You are working as a technician for a food manufacturing company. The company would like to reduce the amount of plastic in its food packaging by 2025 and is exploring packaging alternatives. You have been asked to write a report on plant-based packaging for food. Your report needs to summarise the issues of use and disposal of plastic and to encourage the use of plant-based packaging for food. The company's Director of Environmental Sustainability, who is not a scientist, will read your report. (15)"

The majority of learners scored in Band 2 with their responses. Although almost all learners did attempt this question, answers were often too brief, which suggested time management issues. By comparison to recent series, fewer Band 4 responses were seen.

Weaker learners often became too focused upon the problems created by plastic disposal and pollution, which was only a part of the brief for the report. This left little time or thought about the use of plant-based packaging and severely limited marks awarded. When the subject matter was selected suitably, responses could often be vague and unsupported by facts from the articles. Many responses took a very one-sided approach – it was common to read **only** about disadvantages of plastic and advantages of plant-based packaging, rather than a balanced consideration of each one. Learners covered the environmental issues well but were less able to address other considerations of concern to a manufacturing company, such as cost, that would need to be mentioned within such a report.

Although the specified format was a report, learners often did not respond to this with any structuring that would distinguish this from an essay. Titles were sometimes observed but often seemed sensationalist. The tone often lacked a professional feel and whilst this was not meant to be a scientific report, it should still target an educated audience and so still have explanations using science. It was usually difficult to discern who the piece was intended for, as there was only occasional reference to a company or a director.

Better responses tended to:

- outline the benefits and problems that plastic packaging brings
- describe what plant-based packaging is and how it can provide an alternative to single-use plastic
- consider different factors that would influence the use of plant-based packaging (ie environmental, economic, technological, political, etc)
- discuss each point in a balanced way
- justify points made with information from the articles
- provide an overall conclusion or recommendation on their use

Band 2 response

Why using a Plant based packaging
is the new way.

Plastic pollution is damaging our planet each day and the only way we could solve this is by coming together. A ~~the~~ Plant based packaging is very suitable and could increase ~~improve~~ number of customers as people will start to notice that we as a company wants to reduce the use of plastic and save the world. Plastic pollution has gotten so bad that ~~organism~~ marine life are now being affected. Organism are starting to die each day, this shows us why we should reduce the amount of plastic used as it is not only affecting our land but now ~~it has~~ our sea. ~~A plant based packaging~~ Making a plant based packaging will not cause carbon emission which is wonderful because human health

will no longer be affected, compared to the making of ~~plastic~~ biodegradable plastic where human's health was being affected, contaminating diseases such as cancer, kidney disease and Asthma. Now ask yourself Director, would you want human health to continue being affected. This is why a plant based packaging is the way to go. The disposable of plastic was always one of the hardest thing to do as some citizens would just discard this anywhere ^{damaging} into the environment. With plant based packaging citizens won't have to worry about where they discard this as because it ^{will} ~~be~~ be much easier to dispose as bacteria or fungi could dispose of this since it contains the use of plants. Furthermore, the use of plant based packaging will always be the better option to go since it is all natural no damages will be made to the earth.

Lead Examiner comment:

In this example, the learner has produced a response with some structure and coherence, but the format would seem closer to a brief essay than a report. There is a title and it can be identified that this is intended for internal reading at a company and for a director at points during the piece. Statements are made in a colloquial and sensationalist manner which would not be suitable for a professional and educated audience, however. There is a call to address the environmental problems but does not consider wider aspects such as disadvantages of plant-based plastics. The scientific reasoning and basis for comments is often vague, and whilst this does respond to the topic covered by the articles, points are not clearly supported with information from them.

Band 4 response

There are some alternatives to using plastic as a way of reducing the amount of plastic that is wasted and ~~is~~ negatively impacts the environment. Plant-based food packaging is a viable option as an alternative but should not be the only alternative considered due to current expense + other issues which will be mentioned in this report.

Firstly, current estimates from the ^{IUCN} ~~United Nations~~ put the current amount of ^{annual} plastic production at around 8 million tonnes. According to a report from the United Nations, less than 20% of it is recycled or incinerated. The majority of the rest ends up in landfill or the ocean. This has a large negative impact on the environment. For example, due to the partial breaking down of these plastics, smaller units of plastic called microplastics are produced and these more easily become ingested by marine life which damages their internal tissues ^{and organs} which makes it ^{much} harder for them to survive because their functionality is ^{greatly} reduced and the food chain

fore-9.
becomes highly imbalanced. Fish[^] are highly affected directly by the ingestion of microplastics, which reduces their numbers significantly over time. This ~~impact~~ ^{reduces the number of} ~~from fisher~~ people who catch fish for a the economy, which causes job loss and economic degrowth as well.

Plant-based packaging will not have these impacts on the environment so it is worth considering for ethical, environmental and economic as well as social reasons. ~~Not~~ Despite this, it is known and accepted that the cost of making plant-based packaging is ^a higher than that of widely available plastics. ~~Even though it is~~ ^{packaging} ~~plants~~ like Sugarcane and corn-based packaging materials are currently 20-50% more expensive than plastic materials currently being made.

Despite the cost, ^{they are} ~~these~~ renewable materials that can also meet the level of demand for plastic right now and in the future projections. Also, ^{crude} ~~oil~~, which is ^{what} ~~how~~ the majority of plastics are made from, are a finite material and it is running out since crude oil is extracted from fossil. This is another reason why food-based alternatives are a good alternative because the environmental impacts are ^{positive} and the ^{short or} ~~to~~ long-term economic impact will be positive as cheaper methods of producing food-based packaging become available, since research and investments are being made into creating cheaper ways to produce it.

Eric Beckman, ^a ~~the~~ distinguished senior professor and co-director of a plant-based food packaging company, has faith in the idea that ~~plant-based~~ biodegradable packaging is worth ^a switching to now as an alternative to plastic due to the positive environmental impact it has. He has dismissed claims that it will create competition for food sources by saying it won't be

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grown for consumption and will not cross over with that market.

There is a social aspect to the solution to the issue however. The introduction of the new plant-based materials into mainstream consumer markets ~~in~~ ^{may} encourage littering without proper public education around this issue. The ~~hope~~ ^{fact} that materials have been designed to be easily recyclable and biodegradable but if they are littered it could encourage diseases to spread faster, since it is a good place for ~~the~~ ^{some} pathogens to thrive before they infect people. Therefore, awareness programmes ~~it~~ would be recommended to ensure that this does not happen. ~~Over~~

In conclusion, food-based packaging is something ~~some~~ ^{that} all food packaging companies should consider and ~~as it is~~ ^{it is} advised that ~~it~~ ^{they} become the staple material to replace plastics as soon as possible.

Lead Examiner comment:

In this example, a very detailed response has been provided which synthesises information from all three articles and integrates this with additional research that the learner has gathered. The problems of plastic pollution are identified and supported with facts. There is a good use of technical language and scientific reasoning that would be understandable to an educated professional. There is recognition of areas of commerce and the environment that are relevant to the purpose of this question. The advantages and disadvantages of plant-based packaging are qualified well which allows for a discussion but does not conclude completely in favour of it. Whilst this response is comprehensive and structured, it does not clearly reflect a report format or identify who it is intended for, which restricts its placing within the band.

Summary

Question 1:

- Learners should clearly establish the scientific issue/issues before examining evidence from the articles for the implication areas
- Responses that simply take an article-by-article or implication-by-implication approach are unlikely to show links to and between implication areas
- The question requires a discussion so positives and negatives must be drawn out
- Learners must be careful to proportionate their time so that they do not spend too long on this particular question

Question 2:

- Learners must provide more depth than simply provide a list of organisations/individuals mentioned in the articles and should investigate who they are and what they represent as part of their preparation for this examination
- Responses need to consider how wide and deep the organisation or individual's sphere of influence is in respect of the scientific issue - this may be evident from the article, but further research may also be needed
- Consideration of a range of different organisations or individuals will allow learners to discuss different view-points and motivations

Question 3:

- The key focus of this question is the validity of the judgements being made by the article, so learners must identify what the conclusions are and whether these are justified and supported
- Whilst learners need to be clear about validity and reliability, they must be taught to be able to recognise and articulate the evidence for this from within the article
- The question requires a discussion so positives and negatives must be drawn out
- Learners should try to avoid reliance on generic statements such as the number and currency of references

Question 4:

- Identification of areas for further research or development within articles is a good starting point, but learners must be able to extrapolate from this with their own suggestions and ideas
- Whilst there should be reference and identification of areas from the articles, learners should undertake their own wider research to integrate with what they have learnt from the articles
- Learners should take more steps to understand and research the science underpinning the articles rather than reliance on socio-economic developments

Question 5:

- Learners need to respond to the format of the evidence required by the question, in this case a report which would be structured in parts such as introduction / background, discussion and conclusion / recommendation
- Responses need to consider their target audience. Some key considerations are who is the audience, what is relevant to the audience, what is the level of understanding of the issue, what should be the tone they should be addressed in, and should the evidence be advising or informing
- Learners should bear in mind to give both sides of an argument within a discussion, not just advantages or disadvantages for an issue
- Learners must be careful to proportionate their time so that they have sufficient time on this particular question, which is almost one-third of the marks available



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