



Mark Scheme (Results)

November 2021

Pearson Edexcel A Level
In Geography (9GE0)
Paper 3

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question number	Indicative content	Mark
1	AO1 (4 marks) Award 1 mark for identifying a basic reason for the inevitability; for example the >400ppm levels of CO₂ already in the atmosphere up to 3 further marks for expansion up to a maximum of 4 marks. For example: • Greenhouse gas levels rising at unprecedented rates (1) no political unanimity to deal with the crisis (1) risk of positive feedback loops (1) such as Arctic Ice and global albedo and/or permafrost melting in Arctic and/or rates of deforestation very high (1) • The movement towards climate change denying populist governments (1) who are untroubled by increasing use of fossil fuels (1) opening new unconventional supplies (1) such as fracking • The commitment of many politicians to economic growth (1) which remains a politically popular goal (1) makes it challenging to reduce carbon emissions (1) when per capita incomes and consumption are rising (1) Please note that candidates can offer two reasons which if both are developed would be sufficient for 4 marks Accept any other appropriate response.	(4)

Question number		Mark
2 (a)	A03 (4 marks) Correct calculations of missing data 1. $d^2 = 0.25$ (1) 2. $\sum d^2 = 231$ (1) Correct calculation of R_s -0.05 (1) Correct method $231 \times 6 / 1386 = 1 - 1.05 = -0.05$ (1)	(4)
Question number		Mark
2(b)	A03 (4 marks) For each reason, award 1 mark for identifying a basic reason why there may be flaws in the original data set and/or the reliability of the statistical methods used. Each basic point can be developed for up to 3 further marks. For example; Because the original data is taken every five years, so we have no information as to the other years (1) which may, if available, show a different trend (1) This is only information for the northern hemisphere (1) we have no data provided for the southern hemisphere so we cannot know the global pattern (1) Correlation is not causation (1) to establish a causal link would require much more data on climate changes (1) Accept any other appropriate response.	(4)

Question number	
3	A01 (4 marks)/A03 (4 marks) Marking instructions Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. Indicative content guidance The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: A01 • Climate change in these regions poses a particular threat to sea-level changes because of ice melt affecting stores and flows – an extreme consequence • Feedback mechanisms will exacerbate this especially in Arctic regions increasing temperatures further • Albedo impact of melting ice and melting of permafrost and sea-floor methane clathrates contributing to significant positive feedback loops • Possibility that tipping points already exceeded • Shifting climate belts might threaten food supplies • Changes in the thermohaline circulation may lead to very significant temperature changes in the northern hemisphere • Threats to ocean health pose threats to human well-being • Major changes can be expected in the hydrological cycle A03 • Global temperatures have risen by about 0.8° C since the 1980's • Arctic temperatures have risen considerably faster to >2.0° C in the same time period and are 'extreme' when compared to global changes on Figure 2 • Arctic changes appear to be exponential whereas global changes are more consistent/constant • The pattern of change is broadly similar suggesting a common cause • Antarctic changes vary a great deal but in some locations are close to +0.1° C per year so over 36 (1980-2016) years amount to +4.0° C • Other areas of Antarctica have much slower rates and even decreases in some regions so a more nuanced picture Accept any other appropriate responses.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–3	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Investigates the question/issue to produce a limited analysis of data/evidence, making few connections to geographical ideas. (AO3)
Level 2	4–6	• Demonstrates geographical knowledge and understanding, which is mostly relevant but may include some inaccuracies. (AO1) • Critically investigates the question/issue to produce an analysis of data/evidence, making some logical connections to geographical ideas, which are mostly relevant. (AO3)
Level 3	7–8	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Critically investigates the question/issue to produce a coherent analysis of data/evidence, making logical connections to relevant geographical ideas. (AO3)

Question number	Indicative content
4	AO1 (4 marks) AO3 (4 marks) Marking instructions Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. Indicative content guidance The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: AO1 • More significant politically, socially and economically in the Arctic because of its global location and its resident population • Antarctic changes are more significant environmentally in the long-term, because of contribution to sea-level rise but probably less so in the short-term • ..and therefore also more significant in political, economic and social long-term too • Albedo effect more likely an Arctic issue given limited sea-ice changes in Antarctica • Sea-level changes important consequences but Greenland data not addressed here with preoccupation on sea-ice in northern hemisphere AO3 • Figure 4 suggests that sea-ice loss is significant in the Antarctic but • ... very rapid in the Arctic with implications for global climate feedback mechanisms • Sea-ice changes maybe related to variable climate data from Figs 2 and 3 • Figure 5 shows that ice-loss from the main ice-sheet in Antarctica is very significant – 14mm of sea-level rise since 1979 at an accelerating rate • Its long-term significance is enormous given the amount of water locked up • Arctic ice is thin but extensive on area – thinness makes it vulnerable to temperature changes – summer ice predicted to disappear by 2100 (Figure 6) • Text references to 'greater geopolitical significance' of Arctic changes Accept any other appropriate response.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–3	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Investigates the question/issue to produce a limited analysis of data/evidence, making few connections to geographical ideas. (AO3)
Level 2	4–6	• Demonstrates geographical knowledge and understanding, which is mostly relevant but may include some inaccuracies. (AO1) • Critically investigates the question/issue to produce an analysis of data/evidence, making some logical connections to geographical ideas, which are mostly relevant. (AO3)
Level 3	7–8	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Critically investigates the question/issue to produce a coherent analysis of data/evidence, making logical connections to relevant geographical ideas. (AO3)

Question number	
5	AO1 (3 marks)/AO2 (9 marks)/AO3 (6 marks) Marking instructions Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. Indicative content guidance The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: AO1 • Globalisation inevitably impacts on the environment, not always positively • It can cause major environmental problems through the over-exploitation of resources. • Superpower tensions are a likely outcome of trade route competition • There are benefits stemming from increased trade both in terms of the cost of goods and the spread of technology • Resource shortages can be both positive and negative AO2 • All economic development has to start with the extraction and/or the growth of resources. • Natural resources are often a source of conflict and this is especially true when sovereignty is unclear and/or contested e.g. Antarctica and Arctic • Costs obviously include substantial environmental issues • Tourism to Antarctica is hard to justify and unclear who benefits other than companies who run it • Not compatible to manage a 'wilderness' but also allow exploitation of natural resources – applicable to both poles • Unlikely that indigenous groups benefit either from job opportunities or from profits of sold resources. • Some will benefit e.g. shareholders of shipping companies or oil/gas corporations. • Short term profits probably inevitable although some investments might be high risk – echoes of Deepwater Horizon • Pursuing fossil fuel sits very uneasily with long-term goals for addressing climate change • Irony that regions most affected by climate change are focus of this exploitation • Some politicians will gain by delivering economic 'growth'

Question number	
	A03 • Figure 7 shows tourists arriving in Antarctica – an otherwise largely pristine environment • Figure 7 shows cruise ships \anchored off-shore • Figure 7 shows penguins • Figure 7 (text) references the growth of Antarctic tourism • Figure 8 (text) references the existence of indigenous people in the Arctic • Figure 8 shows very significant oil and gas reserves, largely in coastal waters • Figure 8 shows that highest probabilities are in Russian territorial waters • Figure 8 shows that significant resources exist beyond the 200 nautical mile limit • Figure 8 shows that many indigenous groups live in and around the high probability areas • Figure 9 shows that there are very significant savings to be made from an ice-free Arctic • Figure 9 shows that one of the main beneficiaries would be China exporting from Dalian to Europe and North America • Figure 9 (text) gives some potential savings from adopting new trade routes and identifies Japan as well as China as potential beneficiaries Accept any other appropriate response.

Level	Mark	Descriptor
	0	No rewardable material.
Level 1	1–6	• Demonstrates isolated elements of geographical knowledge and understanding, some of which may be inaccurate or irrelevant. (AO1) • Applies knowledge and understanding of geographical information/ideas, making limited and rarely logical connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce an interpretation with limited relevance and/or support. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce an unsupported or generic conclusion, drawn from an argument that is unbalanced or lacks coherence. (AO2) • Makes superficial judgements about the value and reliability of quantitative and qualitative data/evidence. (AO3) • Investigates the question/issue to produce a limited interpretation of quantitative and qualitative data/evidence, but lacks meaningful connections to geographical ideas from across the course of study. (AO3)
Level 2	7–12	• Demonstrates geographical knowledge and understanding, which is mostly relevant but may include some inaccuracies. (AO1) • Applies knowledge and understanding of geographical information/ideas to find some logical connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce a partial but coherent interpretation that is supported by some evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a conclusion, partially supported by an argument that may be unbalanced or partially coherent. (AO2) • Makes some valid judgements about the value and reliability of quantitative and qualitative data/evidence. (AO3) • Investigates the question/issue to produce an interpretation of quantitative and qualitative data/evidence, making some meaningful connections to geographical ideas from across the course of study. (AO3)
Level 3	13–18	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Applies knowledge and understanding of geographical information/ideas to find fully logical and relevant connections/relationships. (AO2)

Level	Mark	Descriptor
		• Applies knowledge and understanding of geographical information/ideas to produce a full and coherent interpretation that is supported by evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a rational, substantiated conclusion, fully supported by a balanced argument that is drawn together coherently. (AO2) • Makes valid judgements about the value and reliability of quantitative and qualitative data/evidence throughout. (AO3) • Critically investigates the question/issue to produce a coherent interpretation of quantitative and qualitative data/evidence, making meaningful connections to relevant geographical ideas from across the course of study throughout the response. (AO3)

Question number	Indicative content
6	AO1 (4 marks)/AO2 (12 marks)/AO3 (8 marks) Marking instructions Markers must apply the descriptors in line with the general marking guidance and the qualities outlined in the levels-based mark scheme below. Indicative content guidance The indicative content below is not prescriptive and candidates are not required to include all of it. Other relevant material not suggested below must also be credited. Relevant points may include: There is no 'correct' answer here, although answers that argue that whilst these regions continue to be contested there is an increasing likelihood of conflict in one form or another, as a consequence of resource shortages. AO1 • Globalisation in its current version has, since the 1970s, widened the development gap between countries and also accelerated the search for resources. • Many international conflicts originate from resource shortages. • Superpowers and emerging countries have substantial resource which will grow in the future • The demands of economic growth inevitably affect the environment negatively. • Resource usage is very uneven and that is probably not sustainable. • There are important IGOs that control the world economy including the IMF, WTO and World Bank. • The history is global governance is not promising • TNCs are important in the global economy and the global economy and may be more important than national governments. AO2 • Global governance is generally regarded as weak and largely ineffective in managing conflict making conflict more likely • There has been rising international tension in many regions e.g the South China Sea • Global governance is seen by some superpowers as an intrusion into their sphere of influence so it's unlikely to be a route pursued by many other than NGOs • The Antarctic treaty would not be fit for purpose if a superpower took it upon themselves to exploit the available resources • The Arctic is clearly contested more actively and thus more likely to be a potential area of disputed claims and tensions and thus probably a more likely focus for conflict • With Russia as the dominant regional power in the Arctic recent history e.g. Crimea, Ukraine, might give rise to growing tensions

Question number	Indicative content
	- Russians northern coast has been largely ice-bound so global warming might be seen positively – this might be a general truth given the climate of much of Siberia - Under Trump exploitation of unconventional energy sources was encouraged including the Alaskan north slope - Indigenous peoples have their livelihoods threatened but governments are very likely to ignore these issues if past policies are a guide - Without global governance conflict might be seen as more likely than not although not necessarily armed conflict - China is likely to be the major challenge to the USA in Antarctica whilst the Russians pose the greatest threat in the Arctic A03 Figure 10 (text) indicates that only 53 countries are signatories to the treaty which is not enforceable Figure 10 (text) indicates that the treaty has never been tested Figure 10 (text) states that there are 70 research stations on the continent Figure 10 (text) infers that northern hemisphere countries have a significant role in the management of the continent. Figure 10 shows that three superpowers (China, Russia, USA) have a significant presence Figure 11 (text) shows that there are substantial disputes in the Arctic over sovereignty Figure 11 (text) suggests that Russia is a major claimant and has the largest 'footprint' in the Arctic Figure 11 (map) shows that there are several areas of overlapping claims Figure 12 (text) confirms the above Figure 12 (map) shows that Russian bases outnumber all others Section B materials include the following points; - Sea-ice changes will make both regions more accessible - The changes in the Arctic are faster and more significant in their impact - Antarctic changes are not short-term and so less significant although that may not be the case for its off shore resources - However, the remoteness of Antarctica pose more infrastructure issues for exploitation Section A materials include the following points - Arctic changes are more immediate - Arctic changes are faster - Arctic changes are more important in the short term - There are significant risks of feedback mechanisms accelerating changes

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Level 2	7–12	• Demonstrates geographical knowledge and understanding, which is occasionally relevant and may include some inaccuracies. (AO1) • Applies knowledge and understanding of geographical information/ideas with limited but logical connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce a partial interpretation that is supported by some evidence but has limited coherence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a conclusion, partially supported by an unbalanced argument with limited coherence. (AO2) • Makes some valid judgements about the value and reliability of quantitative and qualitative data/evidence. (AO3) • Investigates the question/issue to produce an interpretation of quantitative and qualitative data/evidence, making few connections to geographical ideas from across the course of study, which may not be meaningful. (AO3)

Level	Mark	Descriptor
Level 3	13-18	• Demonstrates geographical knowledge and understanding, which is mostly relevant and accurate. (AO1) • Applies knowledge and understanding of geographical information/ideas to find some logical and relevant connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce a partial but coherent interpretation that is supported by some evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a conclusion, largely supported by an argument that may be unbalanced or partially coherent. (AO2) • Makes mostly valid judgements about the value and reliability of quantitative and qualitative data/evidence. (AO3) • Critically investigates the question/issue to produce a coherent interpretation of quantitative and qualitative data/evidence, making connections to relevant geographical ideas from across the course of study, some of which are meaningful. (AO3)
Level 4	19-24	• Demonstrates accurate and relevant geographical knowledge and understanding throughout. (AO1) • Applies knowledge and understanding of geographical information/ideas to find fully logical and relevant connections/relationships. (AO2) • Applies knowledge and understanding of geographical information/ideas to produce a full and coherent interpretation that is supported by evidence. (AO2) • Applies knowledge and understanding of geographical information/ideas to come to a rational, substantiated conclusion, fully supported by a balanced argument that is drawn together coherently. (AO2) • Makes valid judgements about the value and reliability of quantitative and qualitative data/evidence throughout. (AO3) • Critically investigates the question/issue to produce a coherent interpretation of quantitative and qualitative data/evidence, comprehensively making meaningful connections to relevant geographical ideas from across the course of study throughout the response. (AO3)

