8.1 Water Insecurity: Physical and Human Causes of Water Stress: 30-minute Pack

AQA 8035 · Calculators not allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Define the term 'water scarcity' in the context of national or regional water resources.

(Total for Question 1 is 1 mark)

2 'Governance and human behaviour are more important than climate in causing water insecurity.' Assess the extent to which you agree with this statement, using named or hypothetical examples.

(Total for Question 2 is 12 marks)

3 Give TWO physical causes of water stress related to climate and weather patterns.

(Total for Question 3 is 2 marks)

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4 Explain how pollution of groundwater by agricultural chemicals can reduce long-term water security for a farming region.

(Total for Question 4 is 4 marks)

5 Suggest TWO reasons why conflict or political instability can be a human cause of water insecurity, focusing on supply systems and maintenance.

(Total for Question 5 is 2 marks)

6 Table A shows an invented water-stress index category for six countries. The category names are: Low stress, Moderate stress, High stress, and Severe stress. Table A: Country P 9% population in Severe stress, Country Q 40% in Severe, Country R 0% Severe, Country S 25% Severe, Country T 2% Severe, Country U 60% Severe. Use these figures to answer parts a to c about the distribution of severe water stress.

(a) Using Table A, state which country has the highest proportion of its population in the Severe stress category. **(1)**

(b) Describe the pattern shown by the Severe stress percentages across the six countries in Table A. **(3)**

(c) Calculate the mean percentage of population in the Severe stress category across the six countries. Give your answer to one decimal place. **(2)**

(Total for Question 6 is 6 marks)

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Mark scheme · 8.1 Water Insecurity: Physical and Human Causes of Water Stress: 30-minute Pack

Question 1

a more severe shortage where available water supplies are insufficient to meet basic human and environmental needs, oe — **B1**

Answer: Water scarcity is a more severe shortage where available water supplies are insufficient to meet basic human and environmental needs.

Question 2

Level 1 Simple, limited response with a few general points about either governance or climate, little development, and no clear judgement. — **1-3**

Level 2 A reasonable assessment that discusses both governance/human behaviour and climate, with some evidence or example, but the analysis is limited and the conclusion is only partly justified. — **4-6**

Level 3 A detailed, well-balanced assessment that uses specific evidence or named examples to weigh the roles of governance/human behaviour and climate; reaches a clear, justified conclusion about the relative importance of each factor. — **7-9**

Indicative content:

- Arguments supporting the statement: poor governance, under-investment, corruption and unsustainable abstraction policies directly reduce water access and quality even where physical supply might be adequate, showing human factors can be decisive.
- Human behaviour examples include overuse in agriculture and industry, pollution and lack of water pricing, which can create scarcity by wasting or contaminating available resources.
- Arguments against the statement: prolonged drought or low rainfall due to climate variability and change can drastically reduce renewable freshwater and make even well-managed systems struggle, so climate can be the dominant driver in some regions.
- Combination points: in many real cases both factors interact, e.g. Cape Town 2017-2018 combined low rainfall with increasing demand and governance choices about supply augmentation and restrictions.
- A strong answer will weigh examples, consider variability between regions, and conclude whether governance and behaviour generally outweigh climate, or whether their relative importance depends on the context.

Question 3

low or unreliable rainfall, oe — **B1**

prolonged drought periods reducing river flow and groundwater recharge, oe — **B1**

Answer: Low or unreliable rainfall; prolonged drought periods reducing river flow and groundwater recharge.

Question 4

chemicals such as nitrates and pesticides can percolate into aquifers and contaminate groundwater, oe — **B1**

contaminated groundwater is unsafe to drink and may exceed health limits, increasing treatment needs, oe — **B1**

linked consequence, e.g. expensive treatment or abandonment of wells reduces available safe water and imposes costs on farmers and households, oe — **B1**

linked long-term point, e.g. some aquifers are hard to clean and contamination can persist for decades, reducing long-term security, oe — **B1**

Answer: Nitrates and pesticides can percolate into aquifers contaminating groundwater; this makes water unsafe to drink and increases treatment needs, and because aquifers are hard to clean, contamination can persist for decades so available safe water is reduced and costly to restore.

Question 5

damage to pipelines, treatment works or pumping stations during conflict reduces supply, oe — **B1**

disruption of staff, funding and logistics prevents maintenance and repairs, leading to longer-term system failure, oe — **B1**

Answer: Conflict can damage pipelines and treatment works reducing supply, and can disrupt staff, funding and logistics so maintenance and repairs do not happen, causing longer-term system failure.

Question 6

(a) Country U — **B1**

(a) Answer: Country U.

(b) there is a wide range from 0% to 60%, showing great variation between countries, oe — **B1**

(b) some countries have very low Severe stress (e.g. Country R 0%, Country T 2%) while others have high values (Country Q 40%, Country U 60%), oe — **B1**

(b) this suggests water stress is unevenly distributed and depends on country-specific factors, oe — **B1**

(b) Answer: The percentages vary widely from 0% to 60%, with some countries showing very low severe stress (Country R 0%, Country T 2%) and others very high (Country Q 40%, Country U 60%), indicating uneven distribution of severe water stress between countries.

(c) sum 9 + 40 + 0 + 25 + 2 + 60 = 136 seen, oe — **M1**

(c) 22.7% cao — **A1**

(c) Answer: 22.7%.

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