8.7 Strategies to Increase Water Supply: Transfer, Dams and Local Schemes: 30-minute Pack

AQA 8035 · Calculators not allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Give TWO examples of small-scale water supply schemes suitable for rural communities in low-income countries.

(Total for Question 1 is 2 marks)

2 Describe the basic stages of a simple household sand and charcoal filtration system used to make collected water safer to drink in a rural settlement.

(Total for Question 2 is 3 marks)

3 Compare the advantages and disadvantages of large-scale and small-scale water supply strategies.

(Total for Question 3 is 6 marks)

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4 Describe how a basic rainwater harvesting system works in a village setting to increase local water supply.

(Total for Question 4 is 3 marks)

5 Suggest TWO practical ways that an urban water supply network can reduce water loss through leakage.

(Total for Question 5 is 2 marks)

6 Explain TWO disadvantages of mega-dams and large reservoirs for water supply and local communities.

(Total for Question 6 is 4 marks)

7 Compare the likely initial financial cost and the time taken to implement a large-scale water transfer scheme with a small-scale local scheme such as rainwater harvesting.

(Total for Question 7 is 3 marks)

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8 A town's water utility reduces annual losses from leaks from 1200 megalitres to 1080 megalitres by repairing pipes. Calculate the percentage reduction in water lost. Give your answer to one decimal place.

(Total for Question 8 is 2 marks)

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9 Explain how involving a local community in the management of a hand-dug well increases the sustainability of that small-scale water supply scheme.

(Total for Question 9 is 4 marks)

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Mark scheme · 8.7 Strategies to Increase Water Supply: Transfer, Dams and Local Schemes: 30-minute Pack

Question 1

example 1, e.g. rainwater harvesting (collection from roofs into tanks), oe **B1**

example 2, e.g. hand-dug wells with rope-and-bucket or small solar pump, or household sand filtration, oe **B1**

Answer: Examples include rainwater harvesting from roofs into tanks, and hand-dug wells with a rope-and-bucket or small pump, or simple household sand filtration systems.

Question 2

stage 1, e.g. coarse screening to remove large debris, such as a cloth or mesh, oe **B1**

stage 2, e.g. water passes through layers of sand and gravel to remove particles, oe **B1**

stage 3, e.g. charcoal or activated carbon removes odors and some impurities and water is boiled or disinfected for safety, oe **B1**

Answer: First water is screened through cloth or mesh to remove large debris, then it passes through layers of sand and gravel which trap particles, and finally charcoal absorbs odors and some chemicals; water is then boiled or disinfected before drinking.

Question 3

Level 3 A well-developed comparison that evaluates both large-scale and small-scale strategies, using specific and balanced points about cost, timescale, environmental and social impacts, scalability and sustainability, and reaches a justified conclusion about which approach is more appropriate in different contexts. **5-6**

Level 2 A clear comparison that discusses advantages and disadvantages of both approaches with some development, but with limited balance or few contextual judgements, and includes a simple conclusion. **3-4**

Level 1 One or two relevant points about advantages or disadvantages of one or both approaches, with limited or no comparison and no clear conclusion. **1-2**

Indicative content:

- Advantages of large-scale strategies: can deliver large volumes of water to meet urban and industrial demand; provide storage for droughts and regulate river flow; can support economic growth at regional scale.
- Disadvantages of large-scale strategies: very high capital cost and long construction time; can displace communities and damage ecosystems; political disputes over water allocation and high maintenance or sedimentation costs.
- Advantages of small-scale strategies: low initial cost, quick to implement, use local materials and skills, empower communities and are more easily adapted to local needs; lower environmental footprint and easier to maintain locally.
- Disadvantages of small-scale strategies: limited reach and volume so may not meet the needs of large cities or intensive agriculture; can be vulnerable to seasonal variability and may require many installations to scale up.
- Context matters: in densely populated urban regions a mix of approaches may be needed, while in remote rural areas small-scale methods are often most appropriate; consider long-term sustainability, governance and who benefits when judging which approach is preferable.
- A balanced conclusion should weigh capacity, cost, social and environmental impacts and sustainability to justify when each approach is most suitable, or why a combination may be best.

Question 4

catchment described, e.g. rainwater collected from roof gutters into downpipes, oe **B1**

storage described, e.g. water stored in a tank, cistern or barrel for later use, oe **B1**

use or basic treatment described, e.g. simple lids or first-flush devices reduce contamination and water is used for drinking with basic treatment or for domestic uses, oe **B1**

Answer: Rainwater is collected from roof gutters into downpipes, directed into a storage tank or cistern, and kept covered to reduce contamination; water can be used for domestic needs and treated simply before drinking.

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Question 5

way 1, e.g. regular maintenance and rapid repair of burst pipes, oe **B1**

way 2, e.g. pressure management and leakage detection using sensors and district metering, oe **B1**

Answer: Regular maintenance and rapid repair of burst pipes; and pressure management plus leakage detection using sensors and district metering.

Question 6

disadvantage 1 named, e.g. displacement of people when land is flooded for the reservoir, oe **B1**

linked detail, e.g. communities lose homes, farmland and cultural sites and may not receive adequate compensation, oe **B1**

disadvantage 2 named, e.g. environmental impacts such as loss of habitat and changes to river ecosystems, oe **B1**

linked detail, e.g. reduced sediment flow can affect fisheries and downstream soil fertility, and wetlands can be lost, oe **B1**

Answer: Disadvantages include displacement of people when land is flooded for the reservoir, with loss of homes and farmland and often inadequate compensation; and environmental impacts such as loss of habitat, altered river flow and reduced sediment downstream affecting fisheries and soil fertility.

Question 7

large-scale cost point, e.g. large transfer schemes require very high initial capital investment, oe **B1**

small-scale cost point, e.g. small schemes are much cheaper per community and use local materials, oe **B1**

time to implement comparison, e.g. large schemes take many years to plan and build while small schemes can be set up quickly, oe **B1**

Answer: Large-scale transfers require very high initial capital investment and long planning and construction times, whereas small-scale schemes cost much less per community, use local materials and can be set up quickly.

Question 8

method seen: (1200-1080) / 1200 x 100 or 120 / 1200 x 100, oe **M1**

10.0% cao **A1**

Answer: 10.0%.

Question 9

point 1, e.g. local ownership encourages careful use and maintenance, oe **B1**

linked detail, e.g. users are more likely to repair and protect the well if they organised and contributed to it, oe **B1**

point 2, e.g. training and local management build skills and reduce reliance on external technicians, oe **B1**

linked detail, e.g. community-trained caretakers can manage simple repairs and maintain hygiene standards, extending the life of the scheme, oe **B1**

Answer: Local ownership encourages careful use and maintenance because people who organised and contributed to the well are more likely to protect and repair it; training local caretakers builds skills and reduces reliance on external technicians, so the scheme lasts longer and hygiene is maintained.

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