2.4 Water, food and energy security

Name: _____ Class: _____ Date: _____ **Total: 30 marks**

KEY WORDS water security • food security • energy security • water–food–energy nexus - -

Objective

Build the skills to answer exam questions on **water security** , **food security** and **energy security** , the **water–food–energy nexus** - - , and how places try to make their supplies secure.

You must be able to:

- distinguish physical and economic water insecurity with named places
- explain the four pillars of food security
- explain energy security and how a country can improve it
- explain links in the water–food–energy nexus with an example
- evaluate a strategy to improve resource security

1 Key knowledge and worked examples

Water, food and energy

- **Water security**: enough safe water at a fair price. Farming uses about **70 %** of the fresh water people withdraw. **Physical** water insecurity: too little water (the Middle East). **Economic** water insecurity: water exists but people cannot afford pipes and pumps (parts of sub-Saharan Africa).
- **Food security** has four pillars: **availability** (enough is produced or imported), **access** (people can afford and reach it), **utilization** (safe, nutritious food the body can use) and **stability** (all three last through bad years). A famine can happen when there is food in a country but poor people cannot afford it.
- **Energy security**: a reliable supply at an affordable price. China imports about **70 %** of the crude oil it uses, much of it by sea, one reason it invests in solar, wind, nuclear power and electric cars.

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The nexus

The three depend on each other: farms need water and energy (pumps, fertilizer); power stations need water for cooling; dams store water and make electricity. Growing maize for biofuel saves oil but uses farmland and water that could grow food.

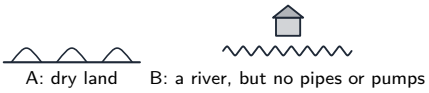
strategy	security improved	limit
desalination	water	needs a lot of energy; salty waste
drip irrigation	water and food	cost for small farmers
solar and wind	energy (and less CO_2)	output varies; needs storage
more than one supplier	energy, food	can be more expensive

Worked example. A farm withdraws 7,000 m^3 of water a year; drip irrigation cuts this by 30 %. Saving $= 0.30 \times 7{,}000 = 2{,}100$ m^3; new use $= 4{,}900$ m^3.

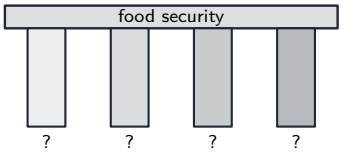
Answer shape for "explain a link": resource 1 → what it needs from resource 2 → a named example → the effect on security.

2 Practice

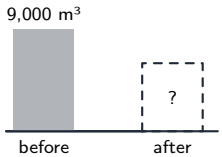
2.1 Distinguish between **physical** and **economic** water insecurity. [2]



2.2 Outline the **four** pillars of food security. [3]

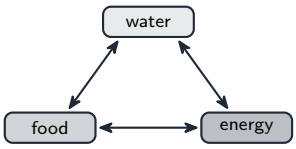


2.3 A farm withdraws 9,000 m^3 of water a year. Drip irrigation cuts its use by 40 %. Calculate the new water use. [2]



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2.4 Explain **one** link between water and energy in the water–food–energy nexus. [3]



2.5 China imports about 70 % of the crude oil it uses. Explain **two** ways China is trying to improve its energy security. [4]

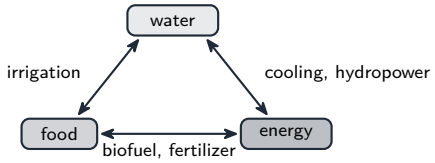


3 Exam-style questions

3.1 *(Paper 2 style.)* The diagram shows the water–food–energy nexus.

(a) Using **one** example, explain how using a resource for energy can reduce food security. [2]

(b) Explain **two** reasons why food insecurity can happen in a country that produces enough food. [4]



3.2 Evaluate the strategies used to improve water security in places you have studied. [10]

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