

GCSE Biology

Worksheet: Factors affecting food security

TIME 35 min	TOTAL 32 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Factors affecting food security

NAME _____

CLASS _____

DATE _____

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

Sustainable methods must be found to feed all the people on Earth.

0 1 . 1

What is meant by **food security**?

.....

.....

[1 mark]

0 1 . 2

Which **two** of the following threaten food security?

Tick (✓) **two** boxes.

New pests and pathogens that affect farming

☐

An increasing birth rate

☐

Better storage of harvested crops

☐

Higher crop yields

☐

[2 marks]

0 1 . 3

Give **one** other factor that threatens food security.

.....

.....

[1 mark]

0 2

Food security means having enough food to feed a population. Several biological factors are threatening food security.

0 2 . 1

Table 1

Example	Factor (letter)
A new fungal disease destroys much of a country's wheat crop.	
The rains fail for three years in a row.	
The price of fertiliser doubles, so farmers use less of it.	
Fighting stops farmers from reaching their fields.	

Table 1 gives four examples. Write the letter of the factor that each example shows.

- A** new pests and pathogens that affect farming
- B** environmental changes that affect food production
- C** the cost of agricultural inputs
- D** conflicts that affect the availability of water or food
- E** an increasing birth rate

.....

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.....

.....

[4 marks]

0 2 . 2

Which of these is a sustainable way to improve food security?

Tick (✓) **one** box.

Reducing the amount of food that is wasted

☐

Clearing rainforest to grow more crops

☐

Catching as many fish as possible

☐

Taking more water from rivers than is replaced by rain

☐

[1 mark]

0 3

A country produces 20 million tonnes of food each year. About 30% of this food is wasted, for example in shops and homes. One person eats about 600 kg of food each year.

1 tonne = 1000 kg

0 3 . 1

Calculate the mass of food wasted each year. Give your answer in millions of tonnes.

.....

.....

.....

Mass wasted = million tonnes

[1 mark]

0 3 . 2

Calculate how many people could be fed for a year with the wasted food. Give your answer in millions of people.

.....

.....

.....

.....

Number of people = million

[2 marks]

0 3 . 3

Give **one** other sustainable way to improve food security.

.....

.....

[1 mark]

0 4

Table 2 shows how the mean meat consumption per person, and the mass of grain used to feed farm animals, changed in one country.

Table 2

Year	Mean meat consumption per person in kg per year	Grain used to feed farm animals in millions of tonnes per year
1990	20	30
2020	50	110

0 4 . 1

Calculate the percentage increase in meat consumption per person between 1990 and 2020.

.....

.....

.....

.....

Percentage increase = %

[2 marks]

0 4 . 2

Explain why an increase in meat consumption increases the demand for grain.

.....

.....

.....

.....

[2 marks]

0 4 . 3

Changing diets in developed countries mean that scarce food resources are transported around the world.
Explain how this can threaten food security in poorer countries.

.....

.....

.....

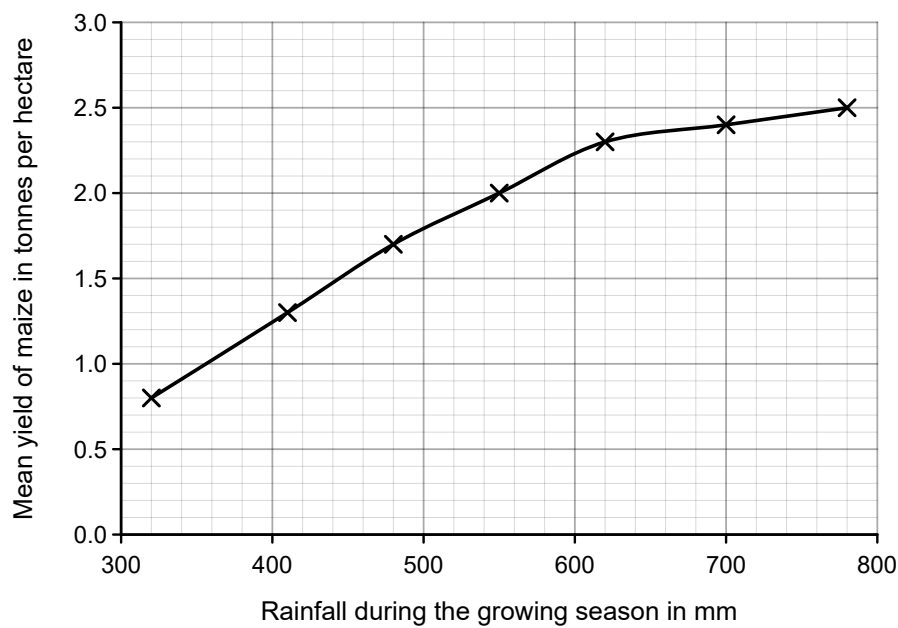
.....

[2 marks]

0 5

Figure 1 shows the mean yield of maize and the rainfall during the growing season in one region in several different years.

Figure 1



0 5 . 1

Describe the relationship between rainfall and the yield of maize.

.....

.....

.....

.....

[2 marks]

0 5 . 2

In one year the rainfall was 350 mm.
Use Figure 1 to estimate the yield of maize.

.....

.....

.....

Yield = tonnes per hectare

[1 mark]

0 5 . 3

Explain why low rainfall reduces the yield of maize.

.....

.....

.....

.....

[2 marks]

0 5 . 4

Explain how the failure of the rains can threaten food security.

.....

.....

[1 mark]

.....

0 6

Table 3 shows the population of a country and the mass of cereals produced there.

Table 3

Year	Population in millions	Cereal production in millions of tonnes
2000	40	12.0
2010	52	14.6
2020	66	16.5

0 6 . 1

Calculate the mass of cereal produced per person in 2020. Give your answer in kg. (1 tonne = 1000 kg)

.....

.....

.....

.....

Mass per person = kg

[2 marks]

0 6 . 2

In 2000, 300 kg of cereal was produced per person.
Describe what the data show about food security in this country.

.....

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.....

.....

[2 marks]

0 6 . 3

Suggest **two** biological factors that could explain why cereal production did not keep up with population growth.

.....

.....

.....

.....

[2 marks]

0 6 . 4

Suggest **one** sustainable way the country could improve its food security.

.....

.....

[1 mark]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Biology · Worksheet: Factors affecting food security · 32 marks

Question 1 (4 marks)

01.1 [1 mark]

Answer: Having enough food to feed a population

- having enough food to feed a population (1)
-

01.2 [2 marks]

Correct: New pests and pathogens that affect farming; An increasing birth rate

01.3 [1 mark]

- changing diets in developed countries, so scarce food resources are transported around the world (1)
- environmental changes, e.g. rains failing (famine) (1)
- the cost of agricultural inputs (e.g. fertiliser, fuel) (1)
- conflicts that affect the availability of water or food (1)

Any 1 of the points above.

Question 2 (5 marks)

02.1 [4 marks]

Answer: A; B; C; D

- fungal disease: A (1)
 - rains fail: B (1)
 - price of fertiliser: C (1)
 - fighting: D (1)
-

02.2 [1 mark]

Correct: Reducing the amount of food that is wasted

Question 3 (4 marks)

03.1 [1 mark]

Answer: 6 million tonnes

- $20 \times 0.3 = 6$ (million tonnes) (1)

03.2 [2 marks]

Answer: 10 million people

- 6 million tonnes = 6000 million kg (1)
- $6000 \div 600 = 10$ (million people) (1)

Notes: Allow ECF from the previous part. An answer of 10 000 000 (written in full) scores 2 marks.

03.3 [1 mark]

- grow crop varieties that resist pests, diseases or drought (1)
- improve storage so that less food is lost to pests or moulds (1)
- use biological control of pests (1)
- eat less meat, so that more crops feed people directly (1)
- improve irrigation and water storage (1)

Any 1 of the points above.

Question 4 (6 marks)

04.1 [2 marks]

Answer: 150%

- $(50 - 20) \div 20 \times 100$ (1)
- 150 (%) (1)

04.2 [2 marks]

- farm animals are fed on grain (1)
- only about 10% of the biomass eaten by an animal becomes part of its body, so several kilograms of grain are needed to produce 1 kg of meat (1)

04.3 [2 marks]

- land in poorer countries may be used to grow crops (e.g. animal feed) for export instead of food for local people (1)
 - greater demand makes food prices rise, so poorer people cannot afford enough food (1)
-

Question 5 (6 marks)

05.1 [2 marks]

- as rainfall increases, the yield increases (1)
- the increase is large at low rainfall and becomes smaller / levels off above about 650 mm (1)

05.2 [1 mark]

Answer: 1.0 tonnes per hectare

- 1.0 (allow 0.9–1.1) (1)

05.3 [2 marks]

- less water is available for photosynthesis / the plants wilt (1)
- stomata close to reduce water loss, so less carbon dioxide enters the leaves and less glucose is made for growth (1)

05.4 [1 mark]

- less food is produced, so there may not be enough food for the population / famine / food prices rise (1)
-

Question 6 (7 marks)

06.1 [2 marks]

Answer: 250 kg

- $16.5 \div 66 = 0.25$ tonnes (1)
 - 250 (kg) (1)
-

06.2 [2 marks]

- cereal production increased, but the population increased faster (1)
 - so the mass of cereal per person decreased (from 300 kg to 250 kg) / food security decreased (1)
-

06.3 [2 marks]

- new pests or pathogens reduced yields (1)
- drought / rains failed / other environmental changes (1)
- the cost of fertiliser and other inputs reduced their use (1)
- conflict reduced the availability of water / land (1)

Any 2 of the points above.

06.4 [1 mark]

- grow pest- or disease-resistant crop varieties (e.g. from selective breeding or genetic modification) (1)
- reduce food waste / improve storage (1)
- improve irrigation / water storage (1)
- eat less meat, so more crops feed people directly (1)

Any 1 of the points above.
