WJEC 2014 Online Exam Review

GCSE Additional Applied Science 4791-02

All Candidates' performance across questions

Question Title	N	Mean	S D	Max Mark	F F	Attempt %
1	82	4.5	2	10	45.2	100
2	80	0.8	1.1	8	9.8	97.6
3	82	6.6	1.7	10	65.7	100
4	82	5	1.4	8	62.5	100
5	82	2.3	1.6	7	32.4	100
6	81	2.8	1.9	8	34.9	98.8
7	79	2.1	2	9	23.8	96.3

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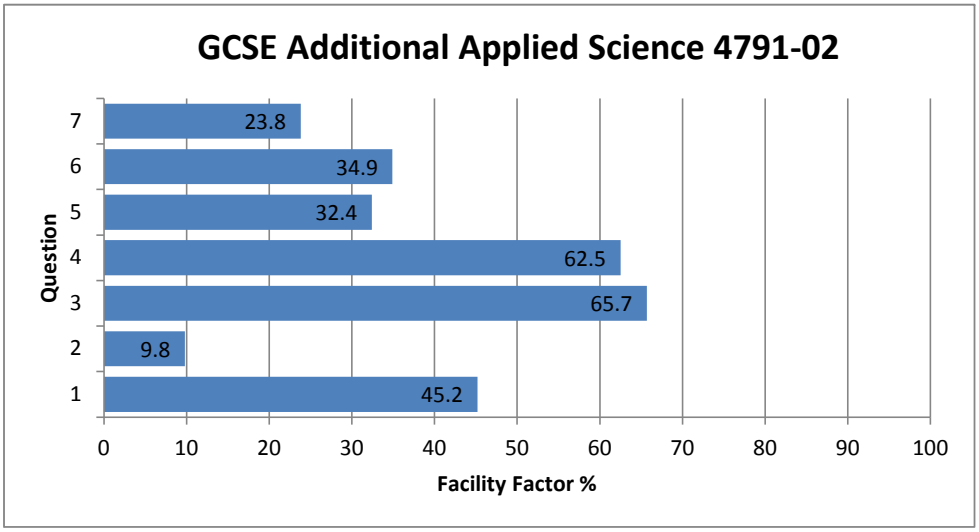


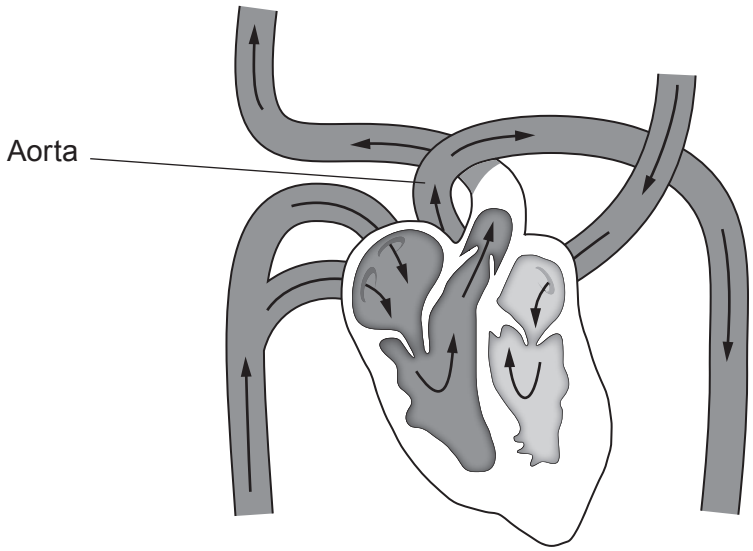
Answer **all** *the questions in the spaces provided.*

Examiner only

1. The diagram below shows the heart and the blood vessels connected to it. The arrows show the direction of the blood flow.

(i) Label the following parts on the diagram below. [4]

ventricle *atrium* *vein* *artery*



(ii) Explain how the cardiovascular system enables aerobic respiration to occur in muscles. [QWC 6]

Include in your answer:

- the reactants needed and how they get to the muscles;
- what happens to the waste products.

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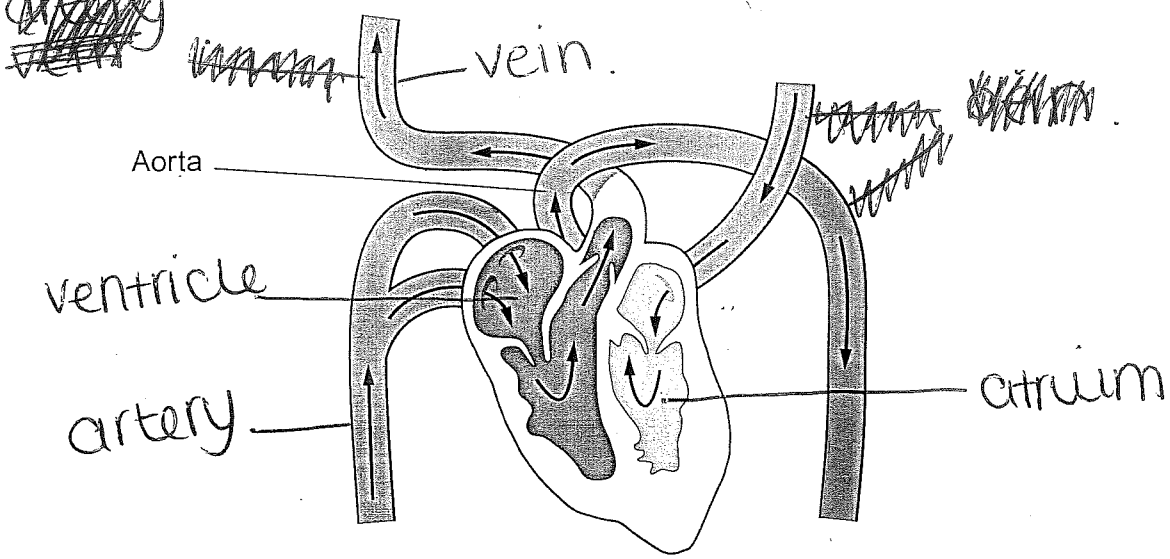

(ii) Explain how the cardiovascular system enables aerobic respiration to occur in muscles. [QWC 6]

Include in your answer:

- the reactants needed and how they get to the muscles;
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The blood is entered into the heart through the right ventricle and it is deoxygenated blood. The heart pumps this through the vein where it is taken to the lungs. The lungs oxygenate the blood and the red blood cells now carry the oxygen. The oxygenated blood returns to the heart into the left ventricle it is then pumped from the left ~~atrium~~ atrium into the aorta, where it is then pumped all the way around the body, oxygen carried by the red blood cells, giving the muscles energy. The waste products are carried by the blood plasma.

As the oxygen reaches the muscle cells, the oxygen is transferred in and glucose and CO_2 is transferred out. This is carried by the blood plasma.

Examiner only

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Examiner only

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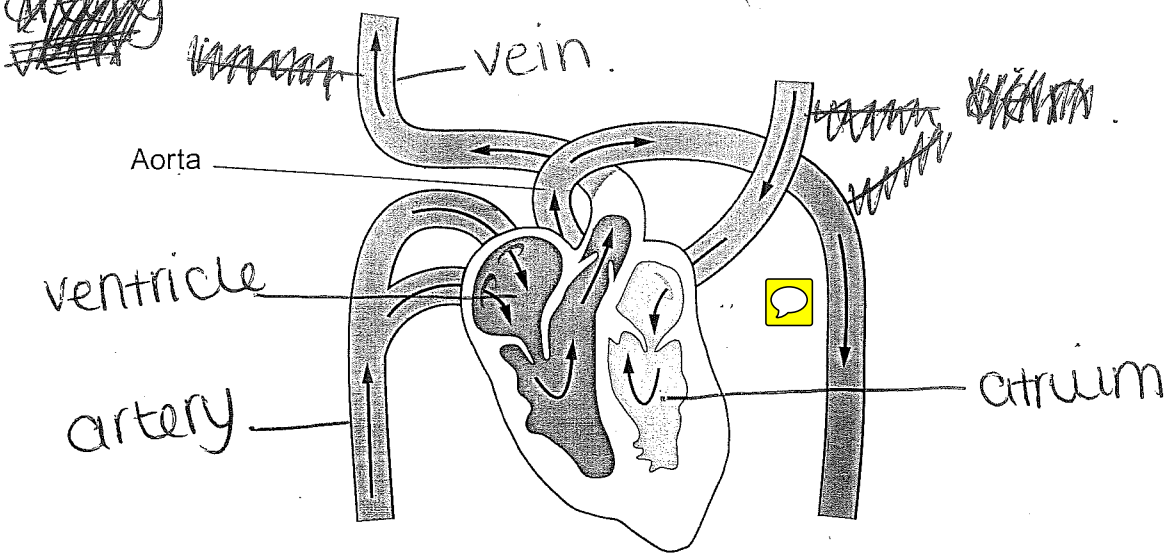

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Examiner only

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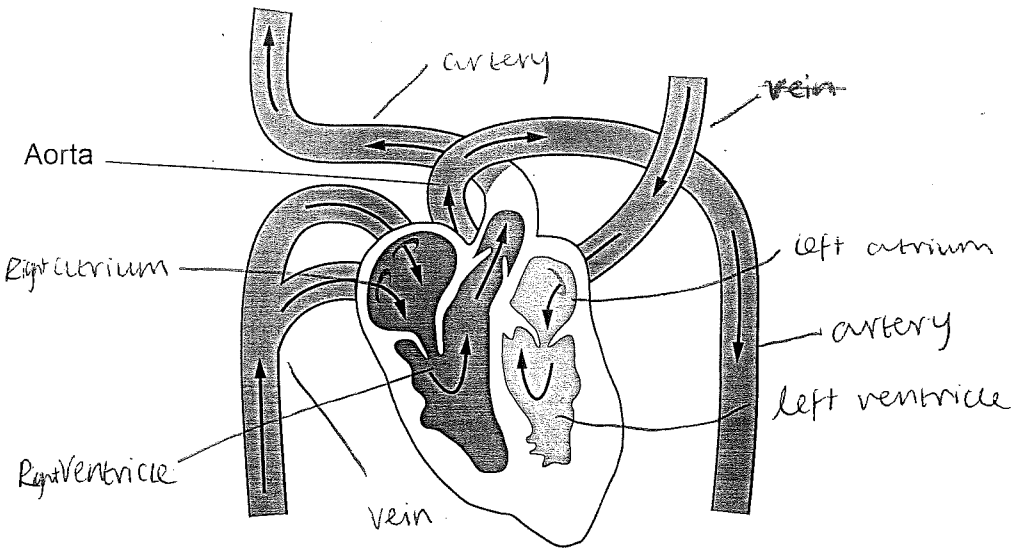
Answer **all** *the questions in the spaces provided.*

Examiner only

1. The diagram below shows the heart and the blood vessels connected to it. The arrows show the direction of the blood flow.

(i) Label the following parts on the diagram below. [4]

~~ventricle~~ ~~atrium~~ vein carries blood to artery carries blood away



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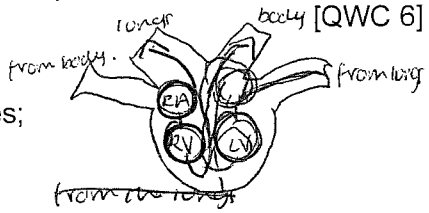

The right atrium recieves deoxygenated blood, the right ventricle recieves deoxgenated blood from the right atrium which allows the left atrium to recieve oxgenated blood from the lungs. This passes through the left ventricle which pumps to the whole body. Aerobic respiration needs plenty of oxygen glucose + Oxgen → carbon dioxide + water + energy. The waste product need to be converted back into glucose

Examiner only

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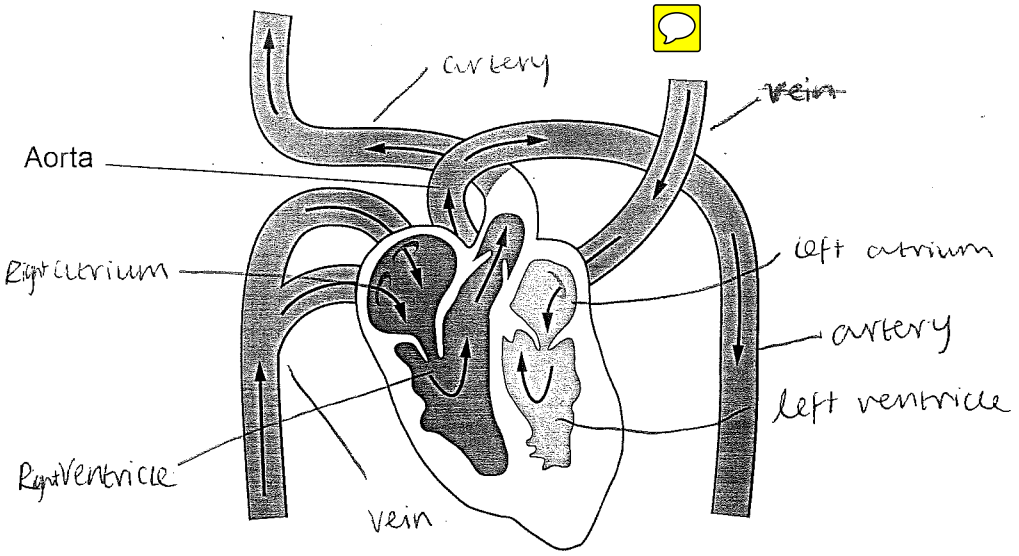

(ii) Explain how the cardiovascular system enables aerobic respiration to occur in muscles. [QWC 6] 2

Include in your answer:

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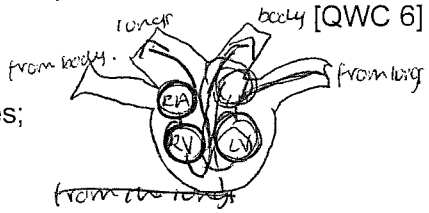

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Examiner only

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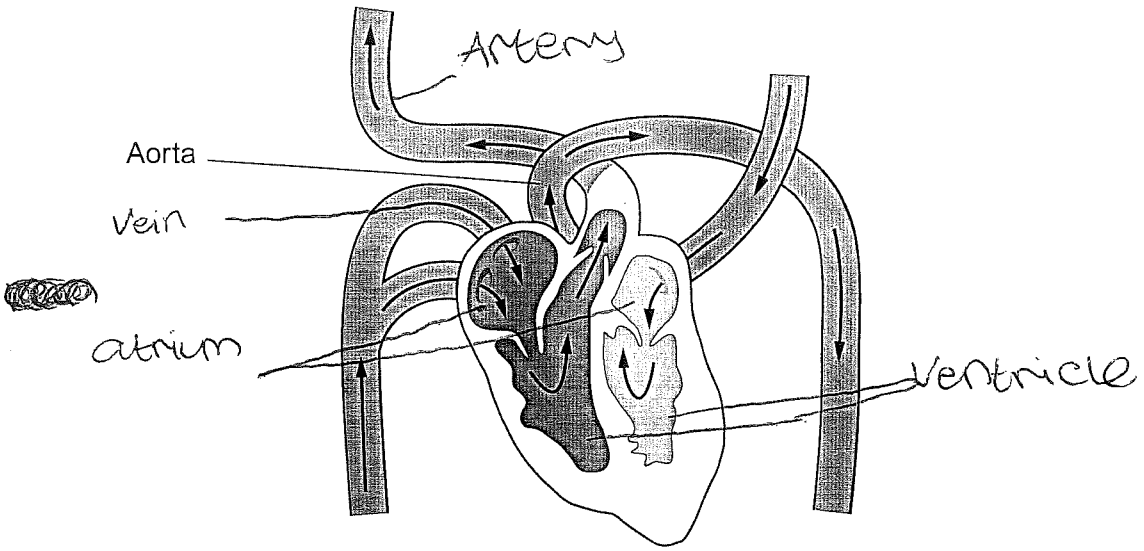

(ii) Explain how the cardiovascular system enables aerobic respiration to occur in muscles. [QWC 6]

Include in your answer:

- the reactants needed and how they get to the muscles;
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aerobic is where there is plenty of oxygen. When the red blood cells move around the body they deliever the oxygen they have to the muscles. The waste products like carbon dioxide is then forced out when you breathe out.

Examiner only

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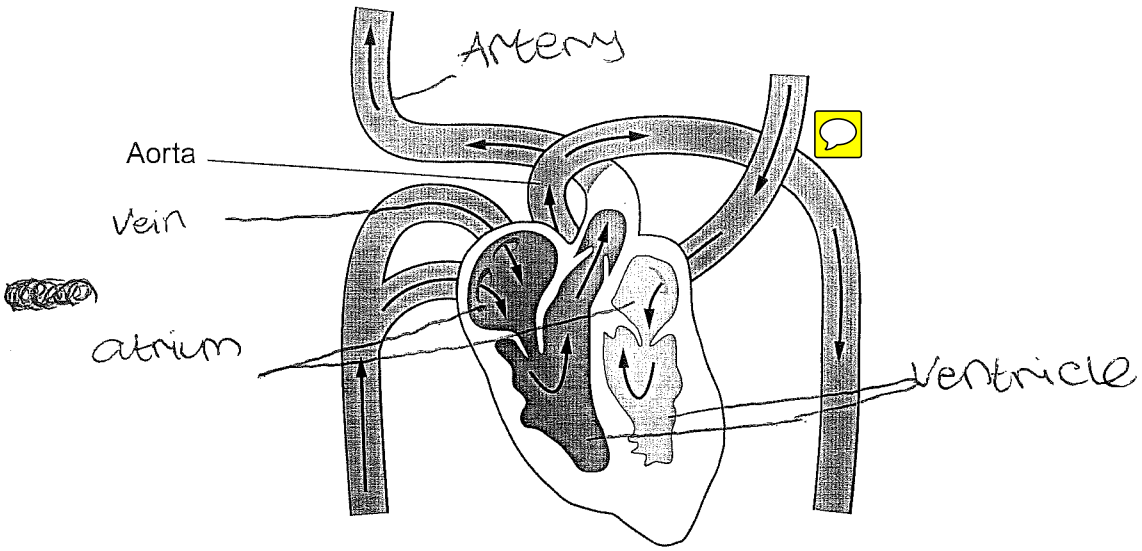

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Examiner only

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Examiner only

5. Growers and plant breeders use trials to make decisions about improving productivity.

(i) In one trial, growers investigated whether the rate of germination (when seeds sprout and begin to grow) is affected by stratification. Stratification exposes the seeds to cold, moist conditions for a period of time.

Four groups of 100 seeds were treated as shown in the table below. The table also shows the numbers of seeds that germinated at 10-day intervals after being removed from cold storage and planted.

		Number of seeds germinating after:						
Group	No of days 100 seeds were kept at 5ºC before planting	0 days	10 days	20 days	30 days	40 days	50 days	60 days
A	120	0	3	37	55	66	70	73
B	100	0	2	37	43	46	50	50
C	40	0	0	0	0	2	9	10
D	Not stratified	0	0	0	0	0	0	0

What conclusions should the growers make from their results? [3]

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Examiner only

(ii) The germinated seeds were grown in a controlled environment as shown in the photograph below.

Explain how the use of this controlled environment can increase food production. [4]

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Turn over.

Examiner only

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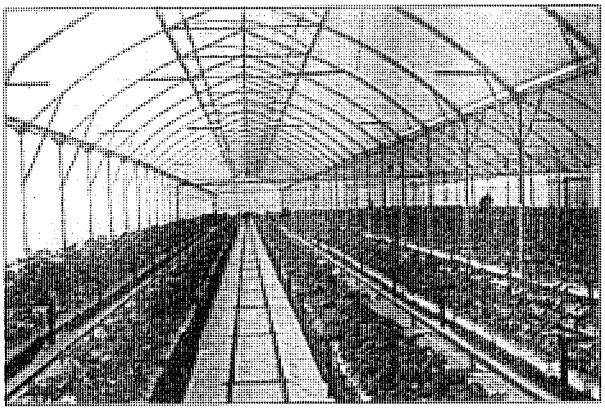
What conclusions should the growers make from their results? [3]

The table shows that the longer the 100 seeds were kept at 5°c before planting, the higher the number of seeds germinating will be. It also effects the timing of when the seeds germinate, making more seeds germinate both earlier and later than the rest.

Examiner only

(ii) The germinated seeds were grown in a controlled environment as shown in the photograph below.



Explain how the use of this controlled environment can increase food production. [4]

The plants are protected from the harsh weather, meaning that, for example, they will not be drowned from the rain or ruined from the wind. This increased the amount of plants surviving. Also, pests would be kept to a minimum, so more of the plants and its fruit would survive. Also, they can grow them exactly how they want them, so more of the fruit would meet the requirements so less would be wasted.

(using the word fruit in the terms of the plants food).

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Examiner only

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What conclusions should the growers make from their results? [3] 2

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Examiner only

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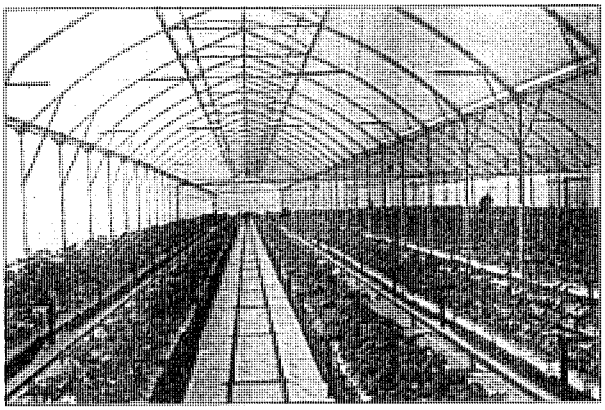

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What conclusions should the growers make from their results? [3]

The most days gone by, the bigger number of seeds germinating. The less time spent at 5°c, the less seeds germinate and so you should keep them cool for only a few days to risk the chance of your seeds germinating.

Examiner only

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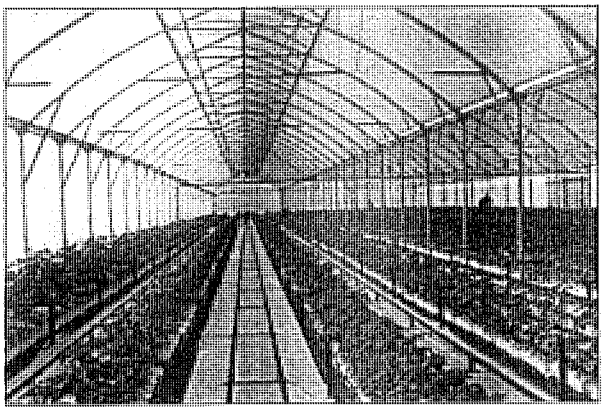

Explain how the use of this controlled environment can increase food production. [4]

If they are in a controlled environment, it means that the seeds can get everything they need especially the right amount of it to grow. It keeps everything controlled e.g. if the temperature was too cold and they couldn't get enough sunlight, the plants wouldn't grow and die. Plants need certain nutrients to be able to produce the food using photosynthesis. They need magnesium for photosynthesis, nitrates for healthy leaf growth, phosphates for good root development and potassium for a high fruit yield and so by being kept in a controlled environment, everything is steady. These things can happen, therefore food production is increased.

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Examiner only

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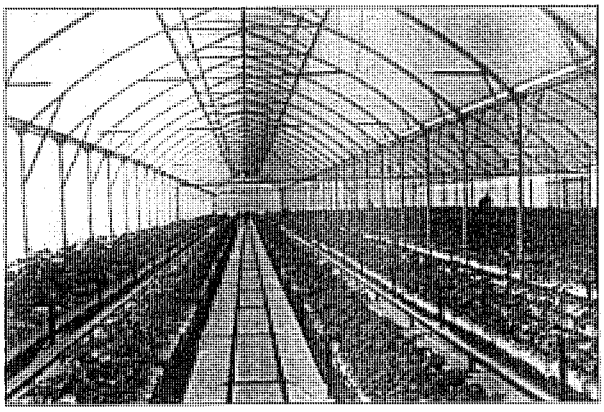

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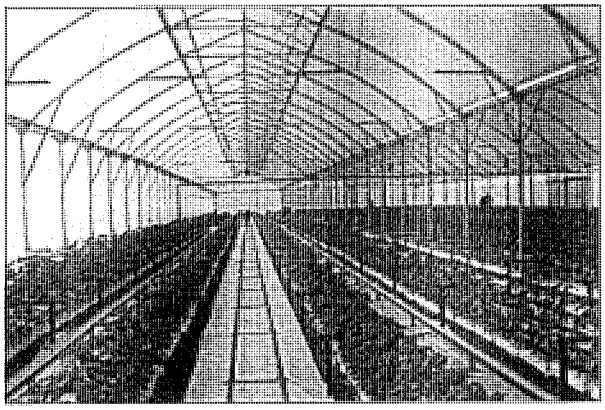
What conclusions should the growers make from their results? [3]

The best group would be A because on day 60 they had the highest amount of growths, then B, then C and D would be the worst because nothing grewed or even sproated.

Examiner only

(ii) The germinated seeds were grown in a controlled environment as shown in the photograph below.



Explain how the use of this controlled environment can increase food production. [4]

controlled enviroment like this would increase the food population because they are all being grown together which is known as intensive farming. Intensive farming is a quicker method to grow as many crops as possible.

7

Examiner only

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Examiner only

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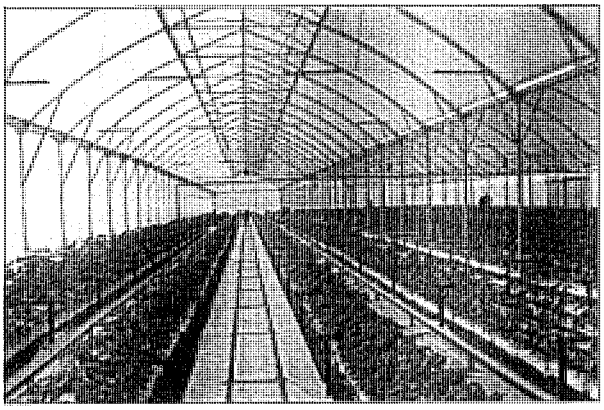

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Examiner only

6. (i) Describe the optimum conditions required for food spoilage. [3]

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(ii) Explain **one** way in which food spoilage can be slowed down. [2]

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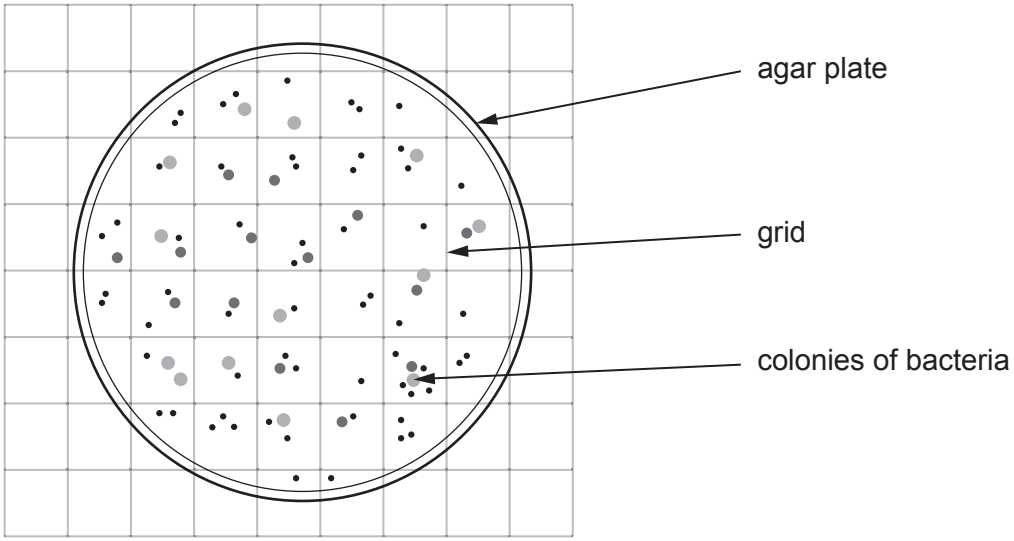
(iii) It is suspected that a cause of food poisoning is bottled water. Samples of water, each of volume 100 cm^3 are taken and prepared for testing on agar plates of **area 57.4 cm^2**. The sample of water smeared on the plates is 2.5 cm^3. After a period of time, the number of bacterial colonies in four 1 cm^2 grid squares is counted.



Examiner only

The results are shown below. The table has been completed for E-coli bacteria.
Complete the table for coliform bacteria. [3]

		E-coli	*Coliform bacteria*
Number of colonies in grid section	1	0	2
	2	1	1
	3	1	1
	4	0	1
Mean (colonies per cm^2)		0.5	.....
Mean colonies per plate		28.7	.....
Sample volume (cm^3)		2.5	2.5
Colony-forming units estimate (mean number per 100 cm^3)		1148	.....

8

Examiner only

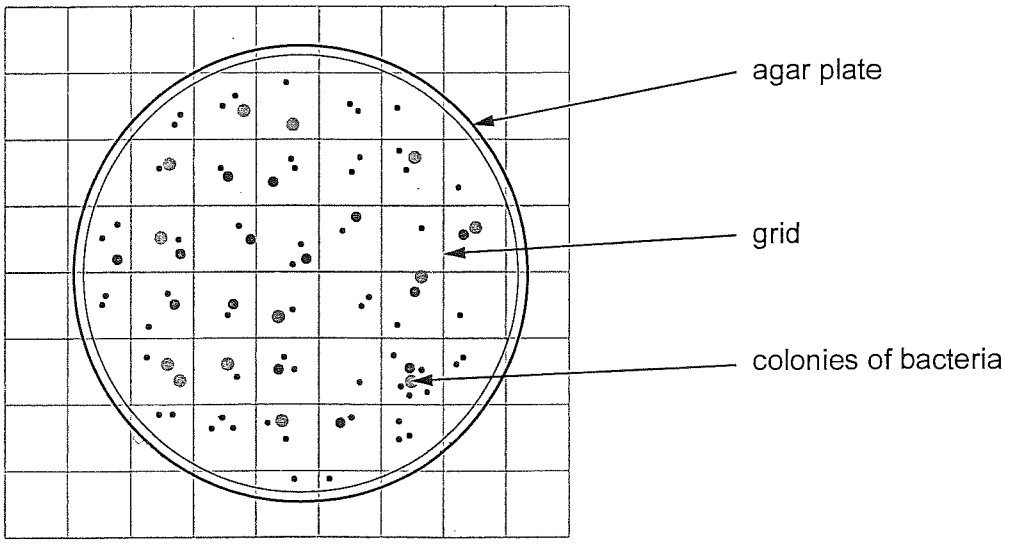
6. (i) Describe the optimum conditions required for food spoilage. [3]

warm, wet and open for bacteria to get in.

(ii) Explain **one** way in which food spoilage can be slowed down. [2]

by cooling the food because bacteria need heat to multiply, so this couldn't happen as quick.

(iii) It is suspected that a cause of food poisoning is bottled water. Samples of water, each of volume 100 cm^3 are taken and prepared for testing on agar plates of **area 57.4 cm^2**. The sample of water smeared on the plates is 2.5 cm^3. After a period of time, the number of bacterial colonies in four 1 cm^2 grid squares is counted.



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Complete the table for coliform bacteria. [3]

		E-coli	*Coliform bacteria*
Number of colonies in grid section	1	0	2
	2	1	1
	3	1	1
	4	0	1
Mean (colonies per cm^2)		0.5	1.25
Mean colonies per plate		28.7	71.75
Sample volume (cm^3)		2.5	2.5
Colony-forming units estimate (mean number per 100 cm^3)		1148	2870

8

mean per cm^2 $= \frac{2+1+1+1}{2} = 1.25$

mean per plate $= 57.4 \times 1.25 = 71.75$

mean per 100 cm^3 $= 71.75 \times 40 = 2870$

Examiner only

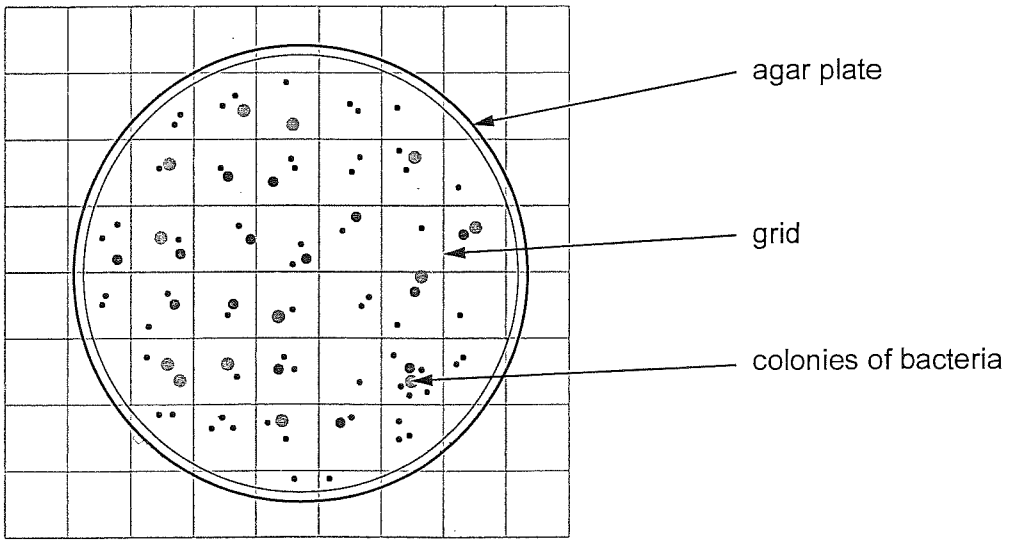
6. (i) Describe the optimum conditions required for food spoilage. [3] 2

warm, wet and open for bacteria to get in.

(ii) Explain **one** way in which food spoilage can be slowed down. [2] 2

by cooling the food because bacteria need heat to multiply, so this couldn't happen as quick.

(iii) It is suspected that a cause of food poisoning is bottled water. Samples of water, each of volume 100 cm^3 are taken and prepared for testing on agar plates of **area 57.4 cm^2**. The sample of water smeared on the plates is 2.5 cm^3. After a period of time, the number of bacterial colonies in four 1 cm^2 grid squares is counted.



Examiner only

The results are shown below. The table has been completed for E-coli bacteria.
Complete the table for coliform bacteria. [3]

3

		E-coli	*Coliform bacteria*
Number of colonies in grid section	1	0	2
	2	1	1
	3	1	1
	4	0	1
Mean (colonies per cm^2)		0.5	1.25
Mean colonies per plate		28.7	71.75
Sample volume (cm^3)		2.5	2.5
Colony-forming units estimate (mean number per 100 cm^3)		1148	2870

7

8

Mean per cm^2 $= \frac{2+1+1+1}{2} = 1.25$

mean per plate $= 57.4 \times 1.25 = 71.75$

mean per 100 cm^3 $= 71.75 \times 40 = 2870$

Examiner only

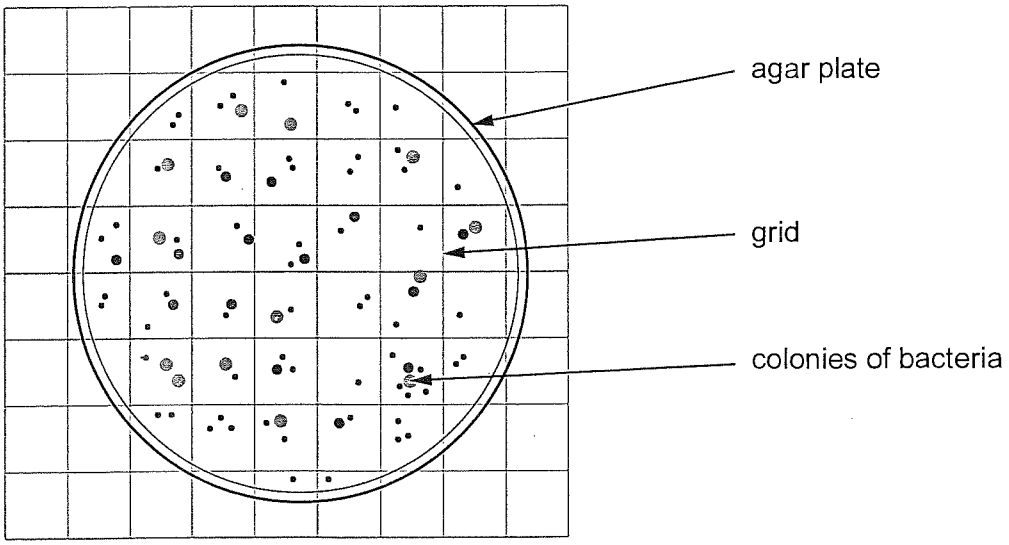
6. (i) Describe the optimum (higher temp.) conditions required for food spoilage. [3]

For food to stay green they need warm, moist conditions and so for the food to go spoilt, the it would have to be dark to that there is no water for them to survive and also quite cool so that bacteria cannot be killed.

(ii) Explain **one** way in which food spoilage can be slowed down. [2]

food spoilage can be slowed down by placing something in the fridge as this helps slow down the bacteria so that the micro-organisms can't grow and multiply

(iii) It is suspected that a cause of food poisoning is bottled water. Samples of water, each of volume 100 cm^3 are taken and prepared for testing on agar plates of **area 57.4 cm^2**. The sample of water smeared on the plates is 2.5 cm^3. After a period of time, the number of bacterial colonies in four 1 cm^2 grid squares is counted.



Examiner only

The results are shown below. The table has been completed for E-coli bacteria.
Complete the table for coliform bacteria. [3]

		E-coli	*Coliform bacteria*
Number of colonies in grid section	1	0	2
	2	1	1
	3	1	1
	4	0	1
Mean (colonies per cm^2)		0.5	1·5
Mean colonies per plate		28.7	29
Sample volume (cm^3)		2.5	2.5
Colony-forming units estimate (mean number per 100 cm^3)		1148	1665

8

Examiner only

0

6. (i) Describe the optimum conditions required for food spoilage. [3]

higher temp.

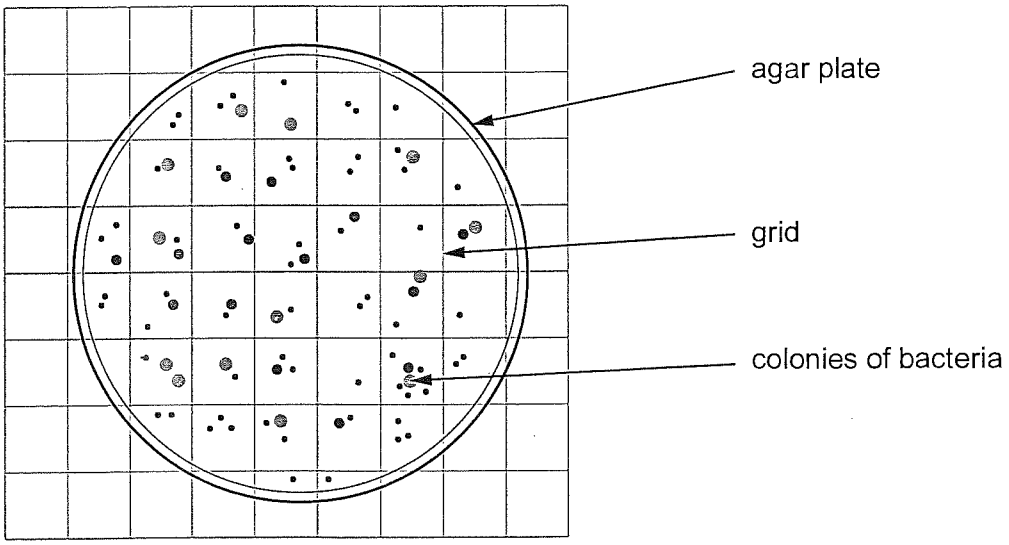
For food to stay green they need warm, moist conditions and so for the food to go spoilt, they would have to be dry to that there is no water for them to survive and also quite cool so that bacteria cannot be killed.

2

(ii) Explain **one** way in which food spoilage can be slowed down. [2]

food spoilage can be slowed down by placing something in the fridge as this helps slow down the bacteria so that the micro-organisms can't grow and multiply

(iii) It is suspected that a cause of food poisoning is bottled water. Samples of water, each of volume 100 cm^3 are taken and prepared for testing on agar plates of **area 57.4 cm^2**. The sample of water smeared on the plates is 2.5 cm^3. After a period of time, the number of bacterial colonies in four 1 cm^2 grid squares is counted.



Examiner only

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Mean colonies per plate		28.7	29
Sample volume (cm^3)		2.5	2.5
Colony-forming units estimate (mean number per 100 cm^3)		1148	1665

0

2

8

Examiner only

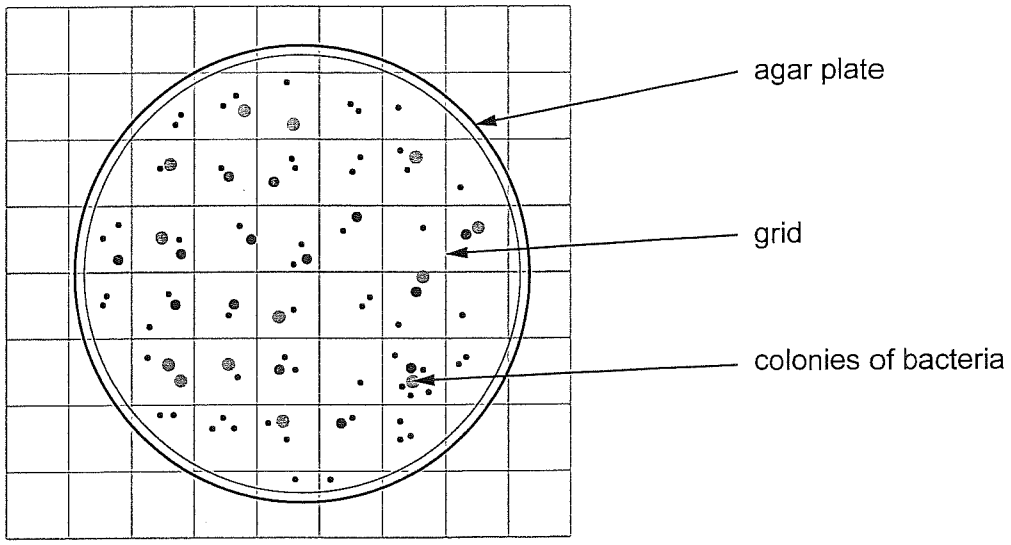
6. (i) Describe the optimum conditions required for food spoilage. [3]

food spoilage will only happen in warm, moist places

(ii) Explain **one** way in which food spoilage can be slowed down. [2]

refridgeration can slow down food spoilage and also pickling bacteria

(iii) It is suspected that a cause of food poisoning is bottled water. Samples of water, each of volume 100 cm^3 are taken and prepared for testing on agar plates of **area 57.4 cm^2**. The sample of water smeared on the plates is 2.5 cm^3. After a period of time, the number of bacterial colonies in four 1 cm^2 grid squares is counted.



Examiner only

The results are shown below. The table has been completed for E-coli bacteria.
Complete the table for coliform bacteria. [3]

		E-coli	*Coliform bacteria*
Number of colonies in grid section	1	0	2
	2	1	1
	3	1	1
	4	0	1
Mean (colonies per cm^2)		0.5	1.25
Mean colonies per plate		28.7	71.9
Sample volume (cm^3)		2.5	2.5
Colony-forming units estimate (mean number per 100 cm^3)		1148	

8

0.5 x 2.5 = 1.25

1.25 x 28.7 =

57.4² ÷ 2.5 =

÷ 28.7

0.5 x 100 =

50

÷ 2.5

50 x 28.7

= 1435

$57.4^2 = 3294.76$

Examiner only

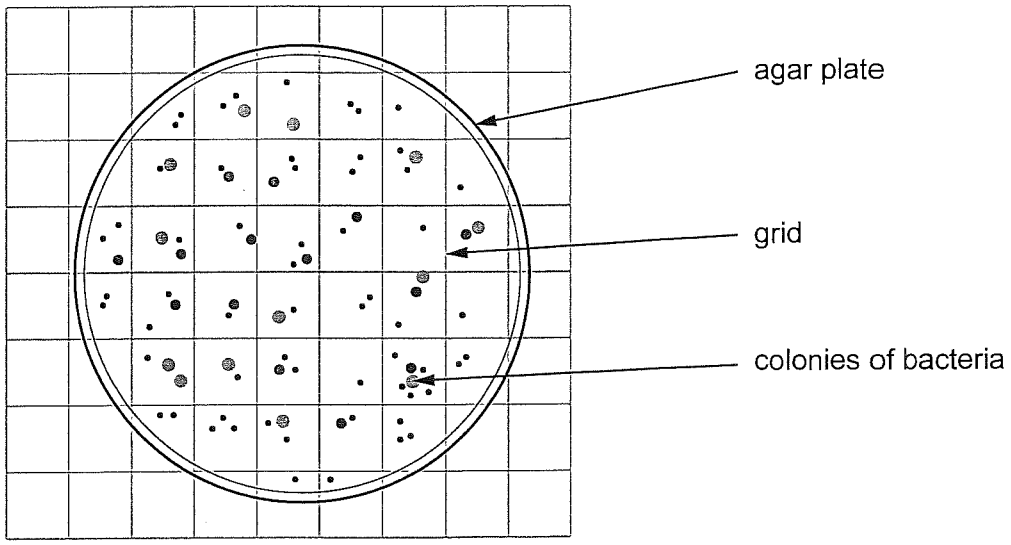
6. (i) Describe the optimum conditions required for food spoilage. [3] 2

food spoilage will only happen in warm, moist places

(ii) Explain **one** way in which food spoilage can be slowed down. [2] 1

refridgeration can slow down food spoilage and also pickling

(iii) It is suspected that a cause of food poisoning is bottled water. Samples of water, each of volume 100 cm^3 are taken and prepared for testing on agar plates of **area 57.4 cm^2**. The sample of water smeared on the plates is 2.5 cm^3. After a period of time, the number of bacterial colonies in four 1 cm^2 grid squares is counted.



Examiner only

The results are shown below. The table has been completed for E-coli bacteria.
Complete the table for coliform bacteria. [3]

1

		E-coli	*Coliform bacteria*
Number of colonies in grid section	1	0	2
	2	1	1
	3	1	1
	4	0	1
Mean (colonies per cm^2)		0.5	1.25
Mean colonies per plate		28.7	71.9
Sample volume (cm^3)		2.5	2.5
Colony-forming units estimate (mean number per 100 cm^3)		1148	

4
8

0.5 x 2.5 = 1.25

1.25 x 28.7 =

57.4² ÷ 2.5 =

÷ 28.7

0.5 x 100 =
50

÷ 2.5

50 x 28.7
= 1435

$57.4^2 = 3294.76$