AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

GCSE
COMBINED SCIENCE: TRILOGY

H

Higher Tier
Biology Paper 2H

Monday 11 June 2018 Morning Time allowed: 1 hour 15 minutes

Materials
For this paper you must have:
- a ruler
- a scientific calculator.

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want to be marked.
- In all calculations, show clearly how you work out your answer.

Information
- The maximum mark for this paper is 70.
- The marks for questions are shown in brackets.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	

Do not write outside the box

0 1 Many biotic and abiotic factors can affect the growth of plants.

0 1 . 1 Are the factors in **Table 1** biotic or abiotic?

[2 marks]

Tick **one** box for each factor.

Table 1

Factor	Biotic	Abiotic
Diseases		
Herbivores		
Temperature		
Water		

Two students investigated the effect of light intensity on the distribution of small plants.

The plants are growing under a tree in a park.

The students made the following hypothesis:

'As you move outwards from a tree there will be more plant growth.'

0 1 . 2 Explain why the students thought their hypothesis would be correct.

[3 marks]

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0 1 . 3 The students used two pieces of equipment.

Give the scientific name of each piece of equipment.

[2 marks]

A square frame measuring 0.5 m × 0.5 m _____

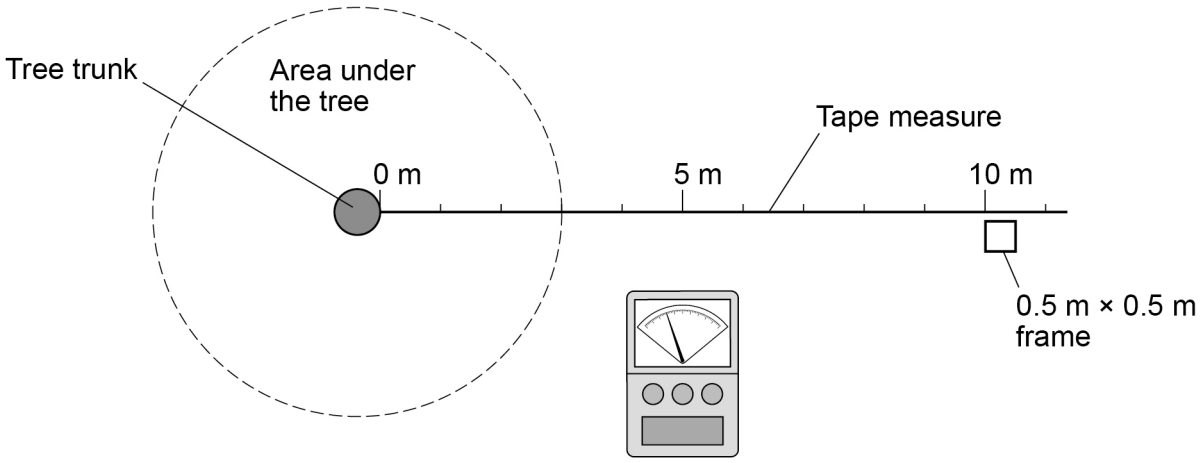
An electronic device to measure light intensity _____

This is the method used.

1. Fix one end of a tape measure at the base of the tree.
2. Fix the other end of the tape measure 11 metres from the tree.
3. At 0 metres put the square frame on the ground.
4. Identify all the plant species growing inside the frame.
5. Estimate and record the percentage cover of each plant species.
6. Measure the light intensity inside the frame.
7. Put the square frame on the ground every 2 metres along the tape to 10 metres.
8. Repeat steps 4 – 6 in every frame.

Figure 1 shows the equipment in this investigation.

Figure 1



0 1 . 4 Calculate the total area sampled.

[1 mark]

_____

_____

Total area sampled = _____ m^2

Turn over ►

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0 1 . 5 The whole investigation was done as quickly as possible on the same day.

Suggest **one** reason why.

[1 mark]

0 1 . 6 Give **one** way the investigation could be improved.

[1 mark]

Table 2 shows the results.

Table 2

	Distance from tree in metres					
	0	**2**	**4**	**6**	**8**	**10**
Percentage cover of grass	15	50	35	16	15	15
Percentage cover of plantain	0	5	10	40	25	30
Percentage cover of daisy	0	0	0	4	20	10
Percentage cover of clover	1	10	25	40	40	45
Total percentage cover of plants	16	65	70	100	100	100
Light intensity in arbitrary units	37	59	150	175	>200	>200

0 1 . 7 Which plant species in **Table 2** will only grow at high light intensity?

[1 mark]

Do not write outside the box

0 1 . 8 What conclusion can be made about the relationship between light intensity and the total percentage cover of plants?

Use data from **Table 2** in your answer.

[2 marks]

0 1 . 9 Light intensity might **not** be the cause of this pattern of plant distribution.

Suggest **one** different factor that may cause these results.

Give **one** reason for your answer.

[2 marks]

Factor

Reason

15

Turn over for the next question

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0 2 *Pseudomonas* bacteria cause infections in hospital patients.

A new strain of *Pseudomonas* bacteria has evolved. This new strain can only be killed by one antibiotic called fluroquinolone.

Scientists want to prevent the new strain of *Pseudomonas* from spreading in the human population.

Explain the advice doctors should be given to prevent the spread of the new strain.

[6 marks]

6

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0 3 Scientists have removed microorganisms from inside rocks in caves in Mexico.

The microorganisms have been trapped there for between 10 000 and 50 000 years.

The caves are dark, very hot, humid and acidic.

0 3 . 1 Why are these microorganisms called extremophiles?

[2 marks]

Tick **two** boxes.

- They are thousands of years old ☐
- They survive in high humidity ☐
- They survive in high temperatures ☐
- They survive in the dark ☐
- They survive inside rocks ☐
- They survive where it is acidic ☐

Question 3 continues on the next page

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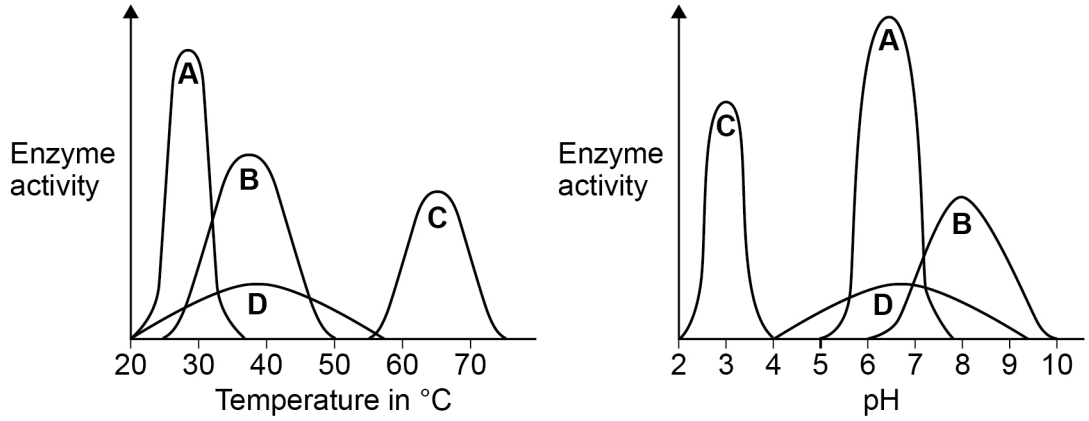
The microorganisms have been inactive for thousands of years but the scientists have reactivated them.

Figure 2 shows the results of enzyme analysis on four enzymes, **A**, **B**, **C** and **D**.

Three of the enzymes were from microorganisms found in the soil near the caves.

One of the enzymes was from a reactivated microorganism from the caves.

Figure 2



0 3 . 2 Which enzyme comes from the microorganism from the caves?

[1 mark]

Tick **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

0 3 . 3 Give the reasons for your answer to question **03.2**

[1 mark]

Do not write outside the box

0 3 . 4 Carl Woese developed the 'three-domain system' of classification.

Describe the 'three-domain system' of classification.

[3 marks]

0 3 . 5 Most of the microorganisms from the caves were classified as belonging to the Archaea domain of the 'three-domain system'.

Suggest why.

[1 mark]

8

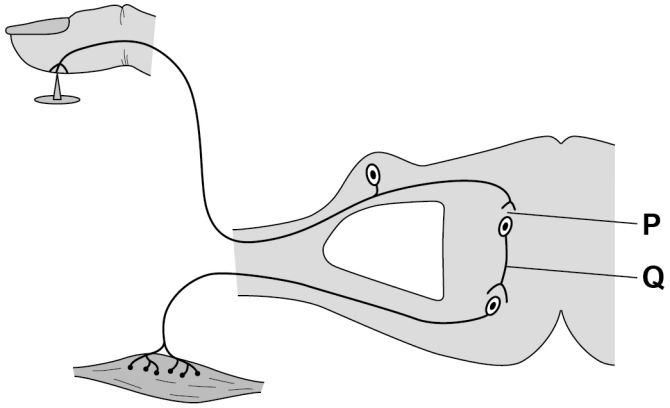
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0 4 This question is about the nervous system.

Figure 3 shows a reflex arc.

Figure 3



0 4 . 1 Name parts **P** and **Q** shown on **Figure 3**

[2 marks]

P _____

Q _____

0 4 . 2 Compare how information is transferred along a neurone with how information is transferred across gap **P**.

[2 marks]

_____

_____

_____

_____

0 4 . 3 Why does a conscious action take longer than a reflex action?

[1 mark]

_____

_____

Do not write outside the box

0 4 . 4 Information travels at 120 metres per second in neurones.

Calculate the time it would take for the information to travel 1.6 m along a neurone.

Give your answer in milliseconds.

[3 marks]

Time = _____ ms

0 4 . 5 Doctors tested people of different ages to time how long it took between touching a sharp pin and the arm muscle contracting.

Table 3 shows the results.

Table 3

Age in years	Time for muscle to contract in milliseconds
30	18.9
40	20.2
50	23.1
60	26.7
70	31.3
80	37.0

Describe the relationship between age in years and time for the muscle to contract.

[2 marks]

10

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0 5 Read the following.

In the 1950s farmers in India could not grow enough rice to feed the rapidly increasing population.

At the International Rice Research Institute (IRRI) scientists began a selective breeding programme with 10 000 different varieties of rice plants.

In 1966 the IRRI produced a new variety called IR8 which gave a yield of up to ten times the traditional varieties. IR8 has short stems and large rice grains.

IR8 was grown by farmers all over India so people had enough to eat.

0 5 . 1 The IR8 variety of rice was produced by selective breeding.

Describe the steps the scientists would have taken to produce IR8

[4 marks]

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0 5 . 2 The IRRI has now developed several new varieties of genetically modified (GM) rice plants.

Some people in India agree and some people disagree with GM varieties of rice being grown.

Explain why.

[4 marks]

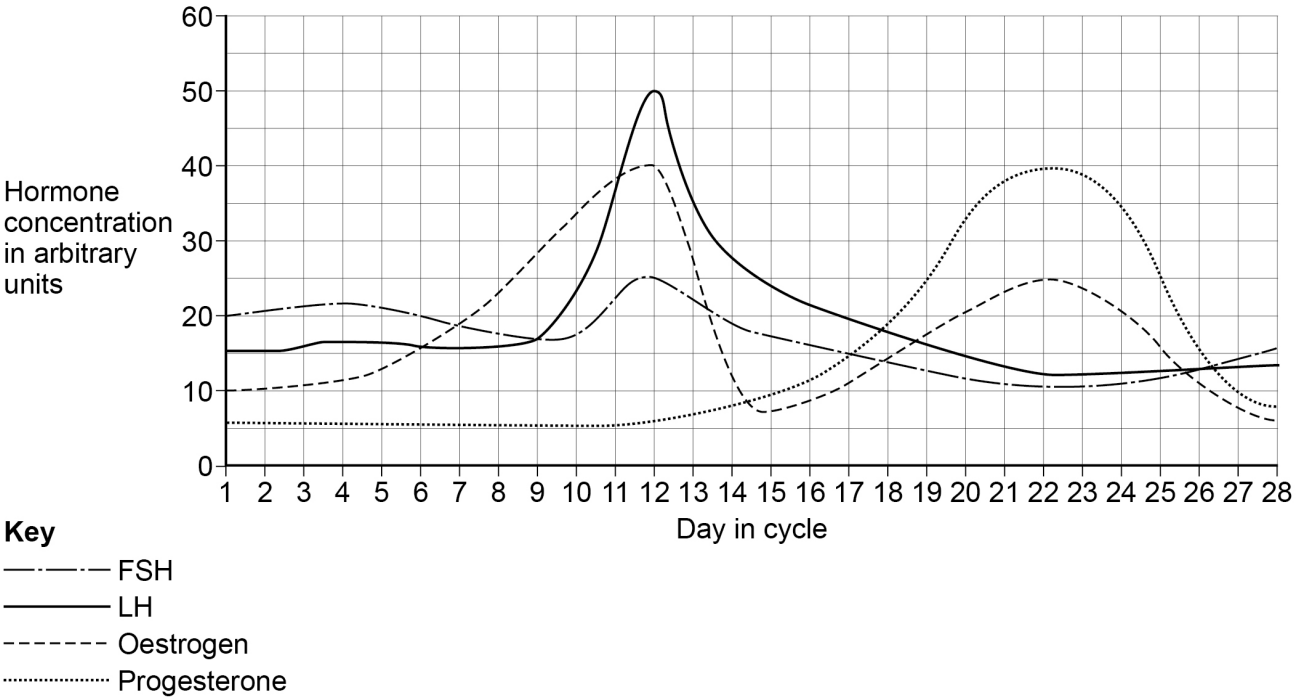
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0 6 **Figure 4** shows how hormone concentrations vary during a normal human menstrual cycle if a woman does not become pregnant.

Figure 4



0 6 . 1 Calculate the rate of increase in LH concentration between day 9 and day 12

Give your answer in arbitrary units per hour.

Give your answer to 2 significant figures.

[2 marks]

Rate = _____ arbitrary units per hour

Do not write outside the box

0 6 . 2 Describe the sequence of hormone interactions in the menstrual cycle.

Name where each hormone is produced.

[5 marks]

0 6 . 3 Progesterone is used in some contraceptives.

Suggest **one** advantage of using a progesterone patch rather than a progesterone oral contraceptive.

[1 mark]

8

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0 7 Many people eat shellfish called oysters.

An oyster has 20 chromosomes in each body cell.

0 7 . 1 Which arrangement of chromosomes will a male oyster have in each body cell?

[1 mark]

Tick **one** box.

One X and one Y chromosome and 8 pairs of other chromosomes ☐

Two X and two Y chromosomes and 8 pairs of other chromosomes ☐

One X and one Y chromosome and 9 pairs of other chromosomes ☐

Two X chromosomes and 9 pairs of other chromosomes ☐

0 7 . 2 Oyster gametes only contain half the amount of DNA compared to a normal oyster body cell.

Describe the type of cell division that produces gametes.

[3 marks]

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Biologists have discovered a way to produce oysters that have three sets of chromosomes (triploid) instead of the usual two sets (diploid).

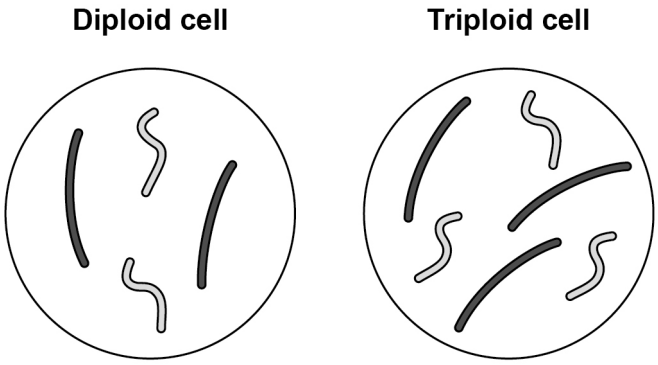
The triploid oysters cannot reproduce and so they grow more quickly.

Diploid oysters do not taste good in the reproductive season. Triploid oysters taste good all year.

Figure 5 shows the chromosomes in a diploid cell and in a triploid cell.

Only two sets of chromosomes are shown.

Figure 5



0 7 . 3 Suggest why the triploid oysters are **not** able to reproduce.

[1 mark]

0 7 . 4 Explain why the triploid oysters grow more quickly than the diploid oysters.

[2 marks]

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0 7 . 5 The population of diploid oysters growing in the wild has reduced by over 80% in the last 20 years.

Suggest **two** environmental factors which may be causing this reduction.

Give a reason why each factor may be causing the reduction in the population.

[2 marks]

1 _____

_____

2 _____

_____

0 7 . 6 Oyster farmers grow the triploid oysters from young seed oysters.

The production of seed oysters involves the use of a chemical called cytochalasin B. Cytochalasin B has been shown to cause cancer in mice.

Evaluate the production of triploid oysters for supermarkets and restaurants.

[6 marks]

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END OF QUESTIONS

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