

Surname	Centre Number	Candidate Number
Other Names		0



GCSE

0235/02

**SCIENCE
HIGHER TIER
BIOLOGY 1**

P.M. WEDNESDAY, 30 May 2012

45 minutes

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	7	
2	5	
3	3	
4	4	
5	6	
6	5	
7	7	
8	6	
9	7	
Total	50	

ADDITIONAL MATERIALS

In addition to this paper you may require a calculator and a ruler.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

Answer **all** questions.

1. In chickens the comb on the top of the head exists in 2 forms called the rose comb and the single comb.

Rose comb



Single comb



- (a) A homozygous rose comb chicken is crossed with one which has a single comb. All the F1 offspring have rose combs.

Using **R** to represent the dominant allele and **r** to represent the recessive allele state the genotype of:

- (i) The rose comb parent [1]
 - (ii) The single comb parent [1]
 - (iii) The F1 offspring [1]
- (b) (i) Complete the Punnett square to show the offspring produced when the single comb parent is crossed with an F1 offspring. [2]

Gametes		

(ii) I. State the meaning of the term *phenotype*. [1]

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II. State the ratio of the different phenotypes found in the F2 generation. [1]

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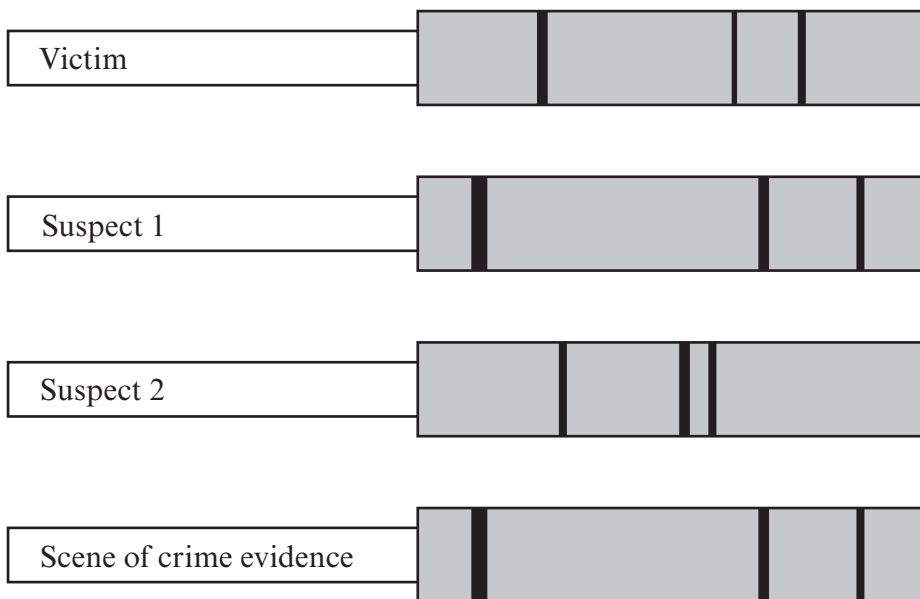
2. The photograph shows a sample of cells being taken from a suspect in a criminal investigation.



(a) What chemical from these cells is going to be analysed? [1]

.....

(b) The genetic 'fingerprints' shown below are from a murder case.



(i) Which of the suspects could have been the murderer? Explain your answer. [2]

.....
.....

(ii) The genetic fingerprints from both suspects would be kept on police records. Why do some people object to this? [1]

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.....

(c) State **one other** use of genetic ‘fingerprinting’ apart from in criminal cases. [1]

.....

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3. The spotted owl (*Strix occidentalis*) is an indicator species in the USA. It feeds on squirrels, birds, bats and large insects.



- (a) Explain how the spotted owl could be used as an indicator species in its habitat in the USA. [2]

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- (b) When scientists survey populations of spotted owls they always use its scientific rather than its common name. Explain why. [1]

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.....

- 4. Scientists have created genetically modified (GM) zebra fish that glow. These ‘GloFish’ have a gene for the production of a protein which causes them to glow. This gene was transferred to the zebra fish from a jellyfish.



- (a) Explain how the gene was transferred from the jellyfish to the zebra fish. [3]

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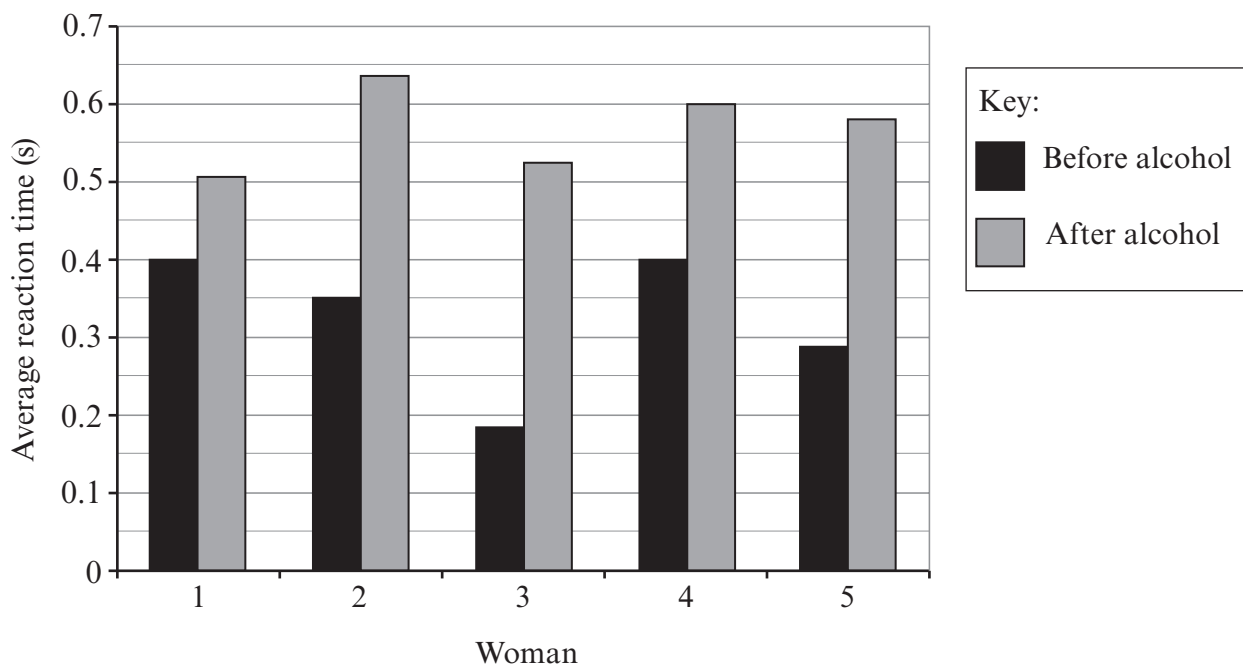
- (b) Zebra fish are kept by fish enthusiasts in aquaria but ‘GloFish’ are banned from sale in the European Union and in many of the states in the USA. [1]
Apart from ethical issues, suggest a reason for this ban.

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5. A scientist measured the reaction times of 5 women before and after drinking the same volume of alcohol. The women had to press a buzzer when a light flashed. This was repeated 5 times and the average reaction time was calculated for each woman. The results are shown in the graph below.



- (a) State **one** conclusion which can be drawn from the results. [1]

.....

.....

- (b) Why was the experiment repeated five times for each woman? [1]

.....

.....

- (c) Calculate the percentage change in the average reaction time for woman 4, after drinking alcohol. [1]

..... %

(d) Explain why there is a legal limit on the level of alcohol in the blood of drivers. [2]

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.....

(e) Apart from its effect on the nervous system state **one** *other* harmful effect alcohol can have on the body. [1]

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6. The following headline appeared in the Western Mail in May 2010.

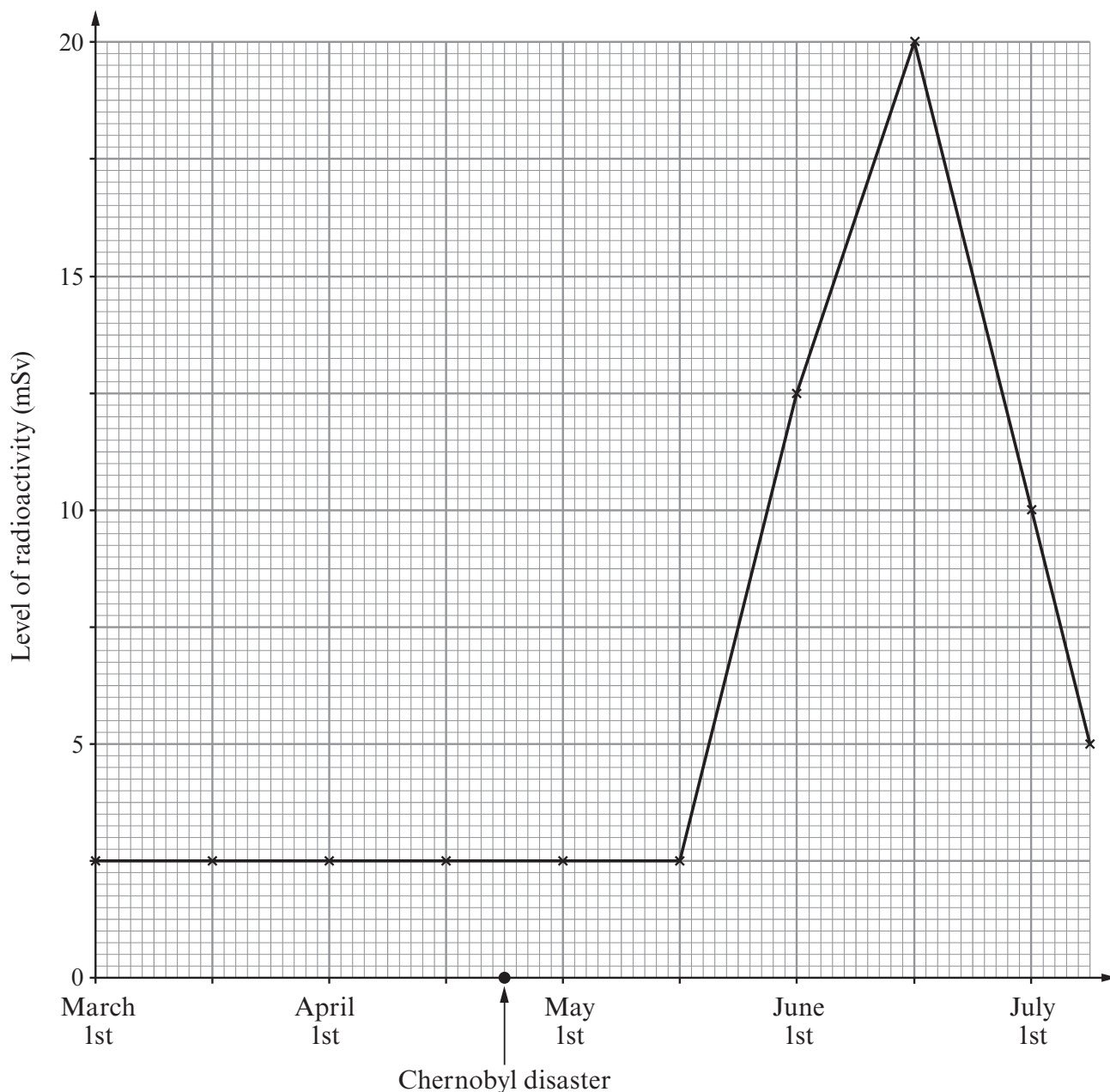
Farms still suffering Chernobyl restrictions

1986 disaster fall-out still a hazard

In April 1986 a disaster occurred at a nuclear power station at Chernobyl in the Ukraine. Radioactive substances escaped into the air and spread throughout parts of Europe, increasing the level of ionising radiation normally found in the environment. Thousands of sheep from 355 farms in North Wales are still being monitored for radiation. Meat from affected sheep is not allowed to enter the human food chain.

- (a) State **one** long term effect of increasing levels of ionising radiation on human health. [1]
-

- (b) The graph opposite shows the level of radioactivity in the meat of sheep in North Wales from March to July in 1986.



(i) From the graph, suggest the safe level of radioactivity in the meat for it to be legally sold as food. [1]

.....

(ii) Suggest a reason for the time delay between the Chernobyl disaster and the increase in radioactivity in the meat. [1]

.....

(c) (i) Suggest what restrictions were placed on sheep farmers in North Wales in 1986. [1]

.....

(ii) How would these restrictions affect the sheep farmers? [1]

.....

7. In 2009, scientists investigated a new treatment for people suffering from diabetes. They planned to take liver cells from people with diabetes and genetically modify them so that they could produce insulin. The modified cells would then be injected back into the same people. The scientists first tried this procedure with diabetic monkeys.

(a) There is a gene (Pdx-1) that controls the development of the gland that normally makes the protein, insulin.

Name

(i) the gland that normally makes insulin. [1]

.....

(ii) the chemical which controls the production of proteins. [1]

.....

(iii) the group of chemicals to which the protein, insulin belongs. [1]

.....

(b) The Pdx-1 gene is taken from a human embryo and put into the diabetic person's liver cells which are in the process of cell division. The modified liver cells are then injected back into the diabetic person.

(i) Name the type of cell division which takes place in the liver. [1]

.....

(ii) From which structure in the nucleus of a cell would the gene be taken? [1]

.....

(c) Use the above information and give **two** reasons why some people might object to this research. [2]

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8. (a) The following shows some processes which occur during a withdrawal reflex. They are not shown in the correct order.

- A An impulse passes along the motor nerve to the effector.
- B An impulse passes along the relay nerve.
- C An impulse passes from the receptor to the co-ordinator.
- D The receptor reacts to a stimulus.
- E The impulse passes across a synapse between the relay nerve and the motor nerve.

Re-arrange the statements and write the letters A–E in the correct order in which they take place. [3]

1st 2nd 3rd 4th 5th

(b) State **two** features of a withdrawal reflex. [1]

(i)

(ii)

(c) (i) Name the effector in a withdrawal reflex. [1]

.....

(ii) In which part of the body is the relay nerve found? [1]

.....

9.



- Sea campion is a flowering plant that grows on sea cliffs.
- Its stem length is controlled by environmental factors and by genes.
- The stems are either long, short or medium.
- Insects pollinate the flowers and therefore help the plants reproduce sexually.

A scientist noted that insects did not often stay on the flowers with the longest or shortest stems for enough time to pollinate them.

(a) Investigations into the evolution of the sea campion required knowledge of natural selection and of the basic principles of inheritance. Who was the first person to explain the basic principles of inheritance? [1]

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(b) In a population of sea campion, what would you expect to be the most common stem length? [1]

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(c) Describe how natural selection has allowed this stem length to become the most common. [2]

.....

(d) Suggest **three environmental** factors which might cause the difference in stem length in populations of sea campion. [3]

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