

FOR OFFICIAL USE

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C

KU	PS

Total Marks

0300/402

NATIONAL
QUALIFICATIONS
2005

WEDNESDAY, 18 MAY
10.50 AM – 12.20 PM

BIOLOGY
STANDARD GRADE
Credit Level

Fill in these boxes and read what is printed below.

Full name of centre

Town

Forename(s)

Surname

Date of birth

Day Month Year

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Scottish candidate number

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Number of seat

- 1 All questions should be attempted.
- 2 The questions may be answered in any order but all answers are to be written in the spaces provided in this answer book, and must be written clearly and legibly in ink.
- 3 Rough work, if any should be necessary, as well as the fair copy, is to be written in this book. Additional spaces for answers and for rough work will be found at the end of the book. Rough work should be scored through when the fair copy has been written.
- 4 Before leaving the examination room you must give this book to the invigilator. If you do not, you may lose all the marks for this paper.

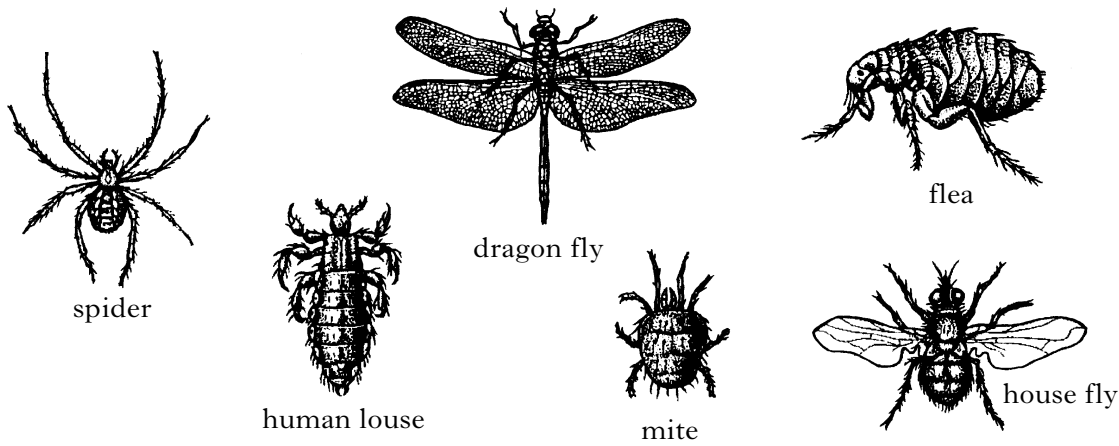


Marks

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1. (a) Use information from the diagrams of invertebrates to complete the following paired statement key.

The diagrams are not to the same scale.



1 Wings present Go to 1

Wings absent Go to 3

2 One pair of wings house fly

..... dragon fly 1

3 Four pairs of legs Go to 4

Three pairs of legs Go to 5

4 Body clearly divided into two parts

Body not clearly divided into two parts 1

5 Hooked claw on legs human louse

No claw on legs flea

(b) Give **two** features mentioned in the key which the human louse and the flea have in common.

1 _____

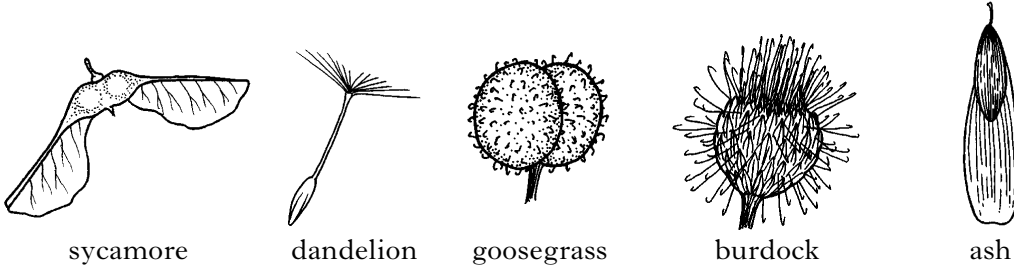
2 _____ 1

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3. (continued)

(d) Plants may also produce seeds which can be dispersed away from the parent plant. The diagrams below show some seeds and fruits of named plants. They all use one of two methods of seed dispersal.



sycamore

dandelion

goosegrass

burdock

ash

(i) Complete the following table to identify each of these methods of seed dispersal and the plants which use them.

<i>Method of seed dispersal</i>	<i>Plants which use this method</i>

2

(ii) Plants with succulent fruits use a different method of seed dispersal.

Describe this method.

1

[Turn over

Marks

KU	PS
1	
	1
1	

4. (continued)

- (b) (i) At which distances between the lamp and the *Elodea* did light act as a limiting factor on the rate of photosynthesis?

Tick the correct box.

50 – 150 mm

150 – 400 mm

400 – 500 mm

- (ii) Name **one** other factor which could limit the rate of photosynthesis.

- (c) The investigation was carried out several times and the average results were used to plot the graph. Why was this good experimental technique?

[Turn over

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1	
1	
	1

5. The water quality at beaches is tested to check that it is not affected by any untreated sewage.

The table gives information about the number of beaches which were tested in one particular year and the number passed as suitable for swimming.

Country	Number of beaches tested	Number of beaches suitable for swimming	Percentage of beaches suitable for swimming
England	271	239	88.2
Scotland	93	68	
Wales	128	102	79.7
Northern Ireland	17	16	94.1

- (a) Complete the table to show the percentage of beaches suitable for swimming in Scotland.

Space for calculation

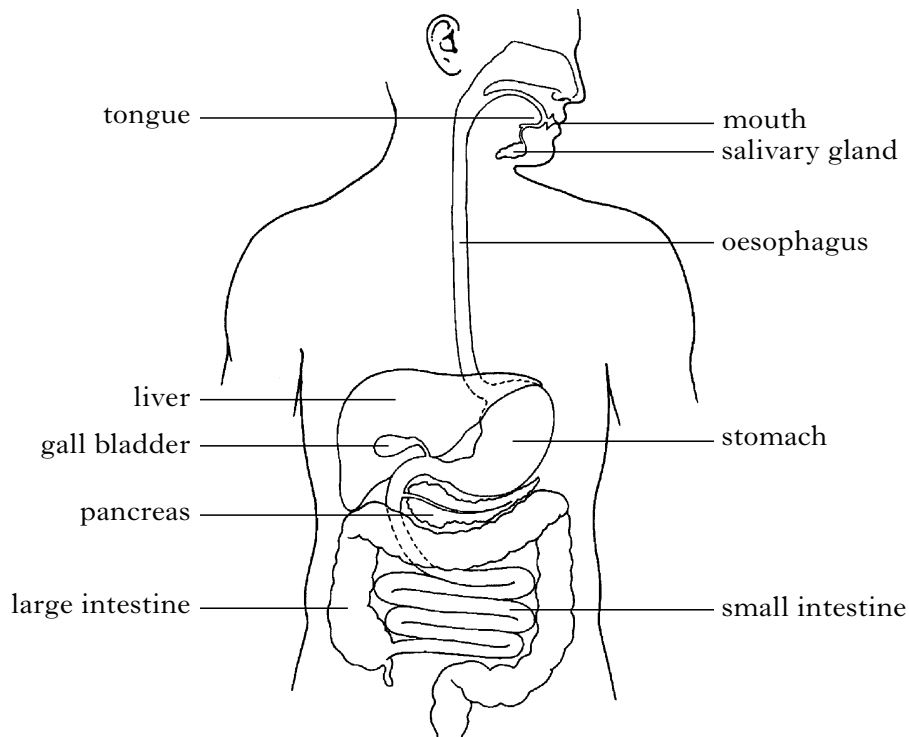
- (b) Why should the percentages of beaches which passed be used when comparing the results from the four countries, rather than the actual number?

- (c) The samples of water from the beaches can be examined for the presence of certain species. This technique gives information about water pollution. What name is given to such species?

Marks

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7. The following diagram shows the human digestive system.



(a) Name **three** structures from the diagram that produce digestive juices.

- 1 _____
- 2 _____
- 3 _____

2

(b) (i) Complete the following table to show the substrates and products of some digestive enzymes.

<i>Enzyme</i>	<i>Substrate</i>	<i>Product(s)</i>
		maltose
	protein	
lipase		1
		2

3

(ii) What word describes the conditions in which enzymes work best?

1

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9. The table shows the number of people with each blood group in a population of 1500.

Blood group	Number of people
A	610
B	143
O	675
AB	72

- (a) What percentage of the population has blood group O?

Space for calculation

_____ %

1

- (b) In the population, the ratio of males to females with blood group AB is 5:3. How many males would have blood group AB?

Space for calculation

Number of males _____

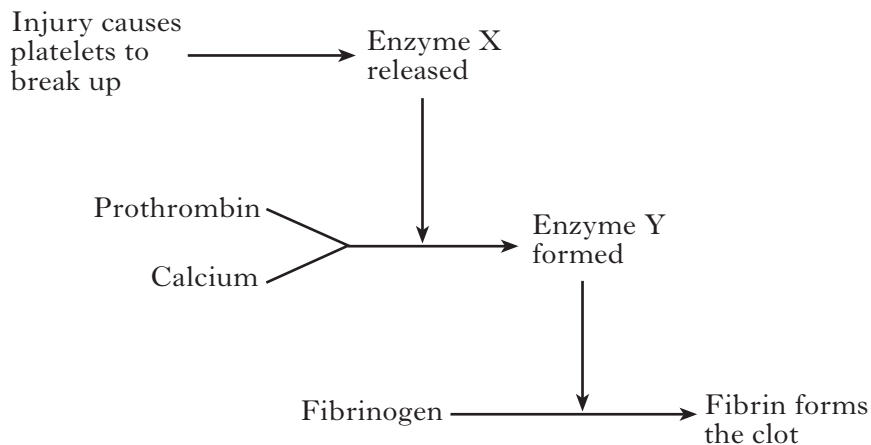
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1	

9. (continued)

- (c) Blood platelets are important in the formation of blood clots at the site of an injury. The following diagram shows the sequence of reactions which produce the clot when platelets gather at the injury.



- (i) Suggest **one** benefit of a blood clot forming at the site of an injury.

1

- (ii) Explain why low calcium levels would reduce the blood's ability to clot.

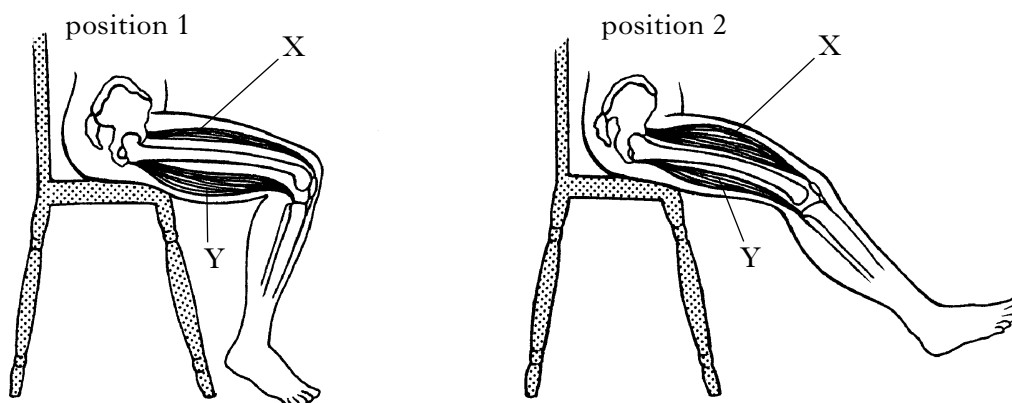
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1	
1	
2	
1	

11. The diagrams below show some of the muscles in the leg.



- (a) (i) Describe the action of muscles X and Y as the leg moves from position 1 to position 2.

Muscle X _____

Muscle Y _____

- (ii) Name the structures which attach muscles to bones.

- (b) (i) Draw a line from each of the following parts of the brain to its correct function.

Part	Function
cerebrum	controls heart rate
cerebellum	controls balance
medulla	enables conscious thought and memory

- (ii) Underline one option in each bracket to describe the flow of information in the nervous system.

Information from the environment is detected by the { heart
sense organs
brain }

and sent to the { central nervous system
circulation system
skin } which responds by

sending messages to the { muscles
blood
bones } .

1

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12. The table gives the average yield of maize (corn) per hectare in the USA since 1960.

Year	1960	1970	1980	1990	2000
Average annual yield (tonnes per hectare)	4.05	5.32	7.14	8.21	10.05

(a) (i) Calculate the average annual increase in yield in the 40 year period from 1960 to 2000.

Space for calculation

Average annual increase in yield _____ tonnes per hectare

1

(ii) Which ten year period showed the greatest average increase in yield?

Tick the correct box.

Space for calculation

1960 – 1970

1980 – 1990

1970 – 1980

1990 – 2000

1

(b) Each individual plant in the field gives a different yield which can be any value between the lowest and the highest.

What name is given to this type of variation?

1

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12. (continued)

- (c) (i) The improvement in yield has been largely due to the production of new varieties of maize by *selective breeding*.

Explain what is meant by this term.

1

- (ii) It is possible to produce new varieties of maize by introducing genes from species which do not interbreed with maize.

What general name is given to these techniques?

1

- (d) In order to increase the variation available for selective breeding, plant biologists treat maize in ways that can increase the rate of mutation.

- (i) What is meant by the term *mutation*?

1

- (ii) Give an example of a factor that can increase the rate of mutation.

1

- (e) Farmers try to ensure the maximum yield of crops. This requires a plentiful supply of plant nutrients and little competition from other plants.

Describe how each of these can be achieved.

Plentiful supply of plant nutrients

1

Reduced competition from other plants

1

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1	
1	
	1

14. In an investigation on gas exchange, samples of breathed air were collected from several volunteers. The table shows the volumes of carbon dioxide and oxygen in 1000 cm³ of each sample.

Sample	Volume of carbon dioxide (cm ³)	Volume of oxygen (cm ³)
A	10	153
B	7	148
C	6	154
D	11	153
E	6	152
Average	8	

- (a) Complete the table by calculating the average volume of oxygen in the samples.

Space for calculation

- (b) Calculate the percentage of oxygen in sample C.

Space for calculation

_____ %

- (c) Name the chemical in the blood which combines with oxygen to transport it to the body tissues.

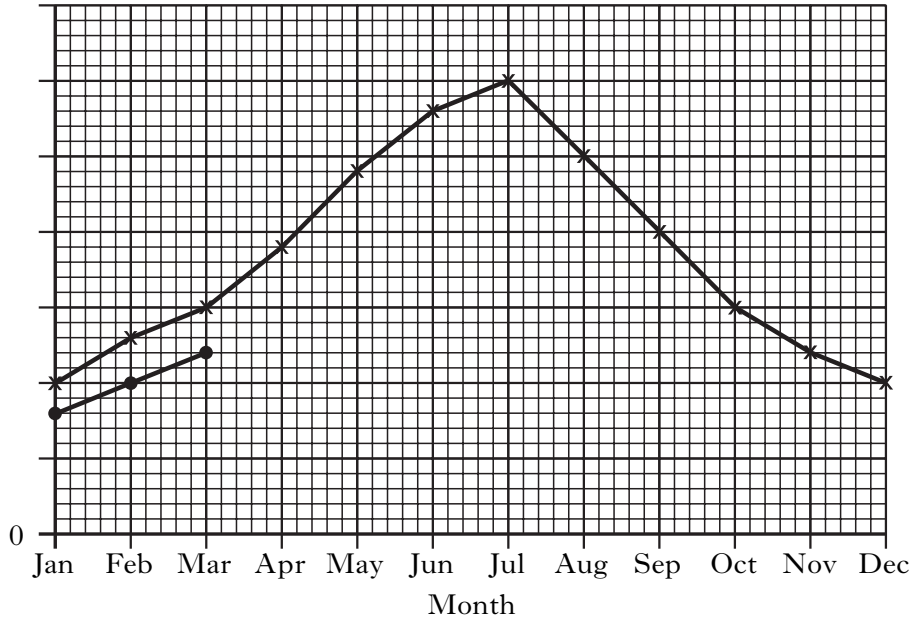
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ADDITIONAL GRAPH PAPER FOR QUESTION 2(a)

Key

x—x _____

●—● _____



SPACE FOR ANSWERS
AND FOR ROUGH WORKING

SPACE FOR ANSWERS
AND FOR ROUGH WORKING