



WESTMINSTER SCHOOL
THE CHALLENGE 2014

BIOLOGY

Thursday 1 May 2014

Time allowed: 30 minutes

Please write in black or blue ink.

Write your answers in the spaces provided.

For examiner use only

Total	
Mark	

Answer **all** the questions.

B1 Many insects live in freshwater habitats such as rivers for part of their life cycle.

Fig. 1.1 shows six common insects found in freshwaters in the UK.

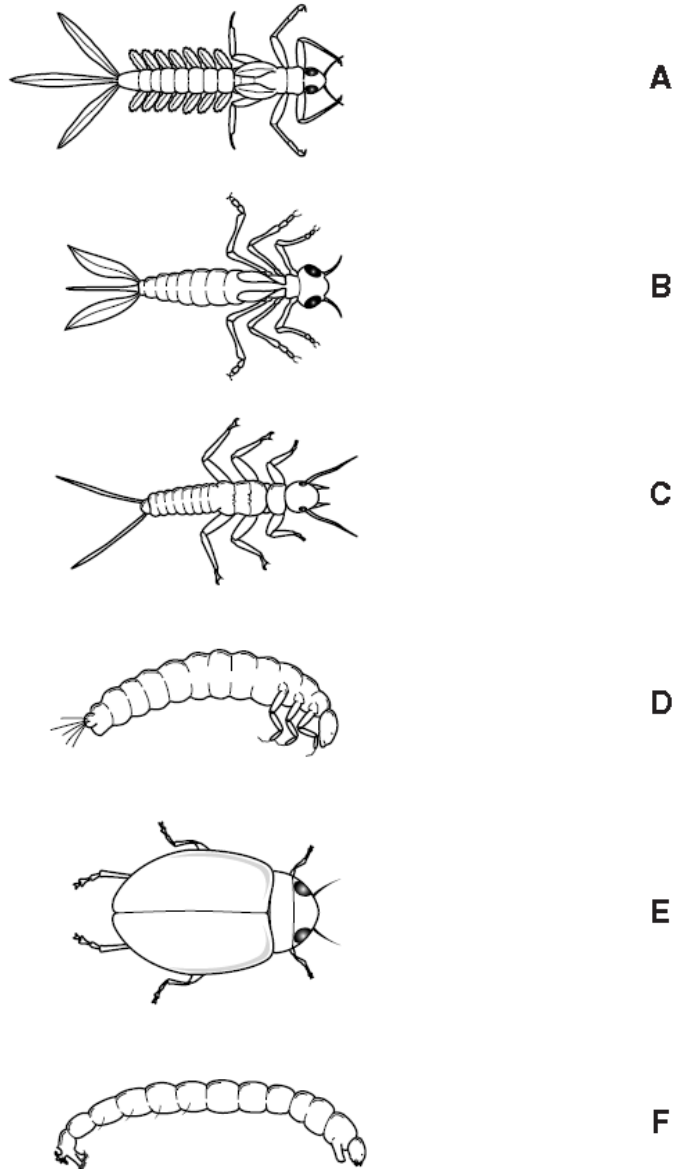


Fig. 1.1

Table 1.1 shows a key used for the classification of insects.

Key:			
Question 1	Does it have jointed limbs?	yes no	go to question 2 bloodworm
Question 2	Does it have an oval body shape?	yes no	diving beetle go to question 3
Question 3	Is the length of the tail greater than the length of three abdominal segments?	yes no	go to question 4 caddis fly larva
Question 4	Are gills attached to the abdominal segments?	yes no	mayfly larva go to question 5
Question 5	Does it have two narrow tails?	yes no	stonefly larva damsel fly larva

Table 1.1

(a) Use Table 1.1 to identify the insects labelled **A** to **F** shown in Fig. 1.1.

- A**
- B**
- C**
- D**
- E**
- F** [3]

(b) Name the **kingdom** of organisms to which all the insects shown in Fig. 1.1 belong.

..... [1]

(c) Suggest **and** explain **one** adaptation shown by at least one of the insects in Fig. 1.1 that allows them to survive in an aquatic environment.

.....

 [1]

B2 Fig. 2.1 shows the life cycle of the threadworm. This is a common parasite in young children.

A parasite is an organism that lives on or in an organism of another species, known as the host, which it harms.

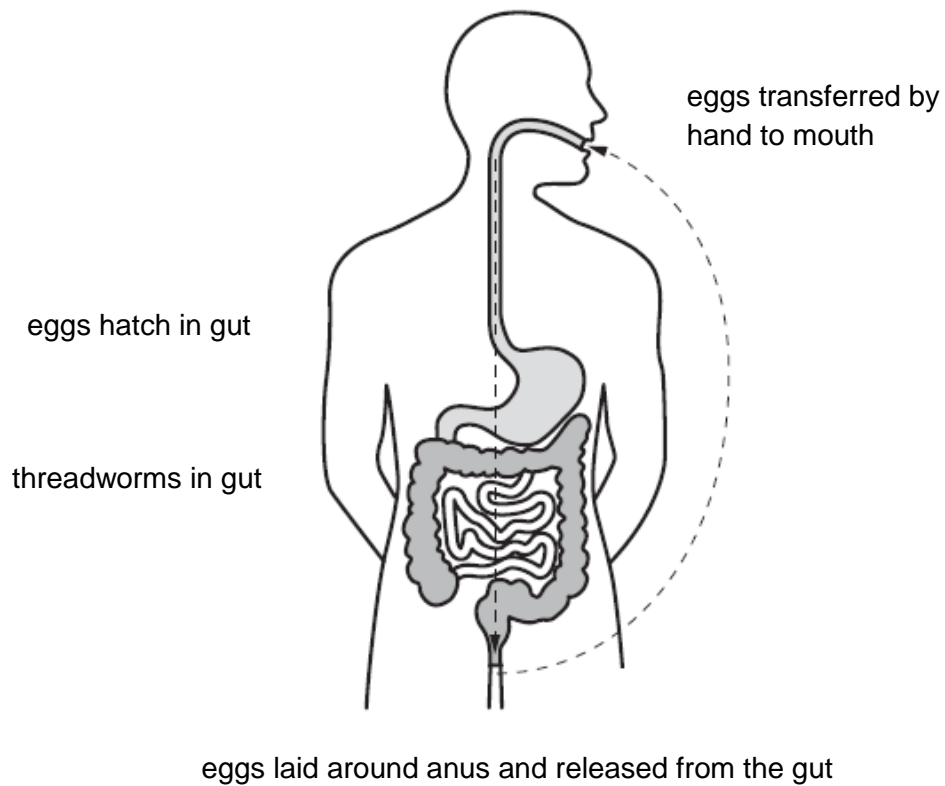


Fig. 2.1

(a) Suggest how the threadworm benefits from this relationship.

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..... [2]

(b) Using the information in Fig. 2.1, suggest **two** ways in which the cycle of infection could be broken.

1
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2
..... [2]

B3 This question is about selective breeding.

Fig. 3.1 shows a Scottish wildcat, *Felis sylvestris*. Modern domestic cats evolved from a wild ancestor of similar appearance to the Scottish wildcat.

Fig 3.2 shows a breed of domestic cat, *Felis cattus*. This breed is called the Colourpoint Persian cat.



Fig. 3.1

Scottish wildcat (*Felis sylvestris*)



Fig. 3.2

Colourpoint Persian cat (*Felis cattus*)

(a) Describe **two** observable differences between the Scottish wildcat in Fig. 3.1 and the Colourpoint Persian cat in Fig. 3.2.

1

.....

2

..... [2]

(b) Selective breeding has been used to produce cats such as the Colourpoint Persian.

When breeding long-haired cats, breeders keep 5% of the longest-haired males and 20% of the longest-haired females for future mating.

Suggest why fewer males than females are kept for breeding.

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..... [2]

B4 Puberty is the process of physical changes by which a child's body matures into an adult body capable of sexual reproduction.

An investigation was carried out into the effect of the diet of pregnant female rats on the average age of onset of puberty in their female offspring.

Pregnant female rats were fed either a high fat diet or a normal diet. Their offspring were also fed either a high fat diet or a normal diet. The percentage of offspring that had reached puberty was measured at intervals until the offspring were 39 days old.

The results are shown in Fig. 4.1

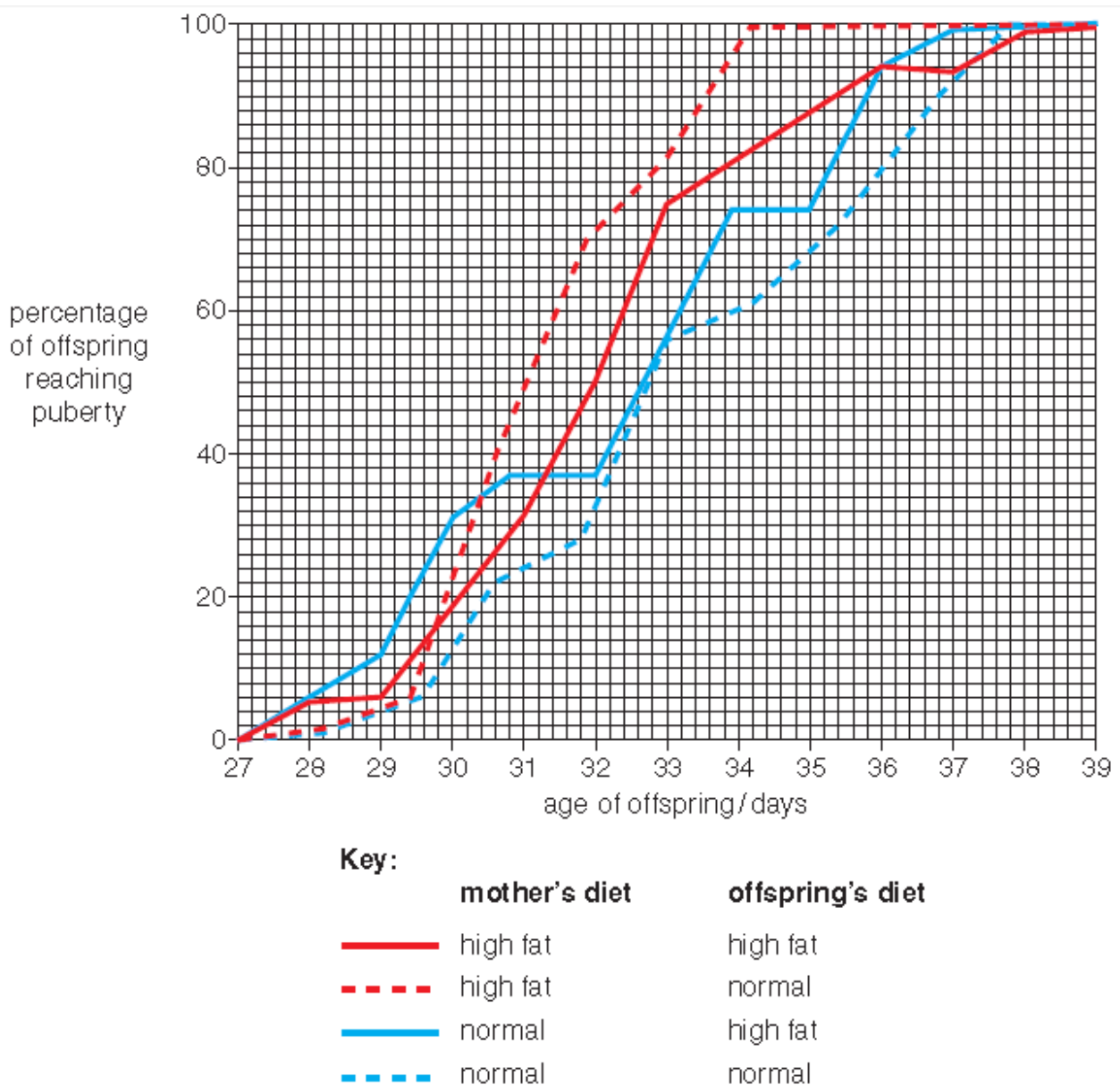


Fig. 4.1

(a) Suggest how the researchers determined if the offspring had reached puberty.

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..... [1]

(b) State the age at which 50% of offspring reached puberty when both the mother and her offspring ate a normal diet.

..... [1]

(c) During the 20th century, the average age of onset of puberty in European girls decreased from about 17 years to about 12 years of age. It has been suggested that a change to a higher fat diet is largely responsible for this decrease.

With reference to the data in Fig. 4.1, **evaluate** the evidence that changes in diet may be responsible for this decrease in the age of onset of puberty in European girls.

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..... [4]

B5 Asthma is a chronic disease where the lungs are sensitive to certain environmental triggers that can cause acute asthma attacks. During an attack, smooth muscle in the lungs contracts, reducing the diameter of the airways.

(a) Explain why it is very difficult to exercise during an asthma attack.

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..... [4]

(b) The difficulty in breathing that occurs during an asthma attack can be relieved by **inhaling** a drug called salbutamol.

Suggest why salbutamol is best administered by inhalation rather than in tablet form.

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..... [3]

B6 Complete the following table by inserting the correct terms.

The first is done for you.

cell organelle involved in aerobic respiration	mitochondrion
structure in flower made of anther and filament	
length of DNA that controls the production of a protein in the cell	
enzyme that digests starch into simple sugars	
mineral required for synthesising chlorophyll	
removal of undigested food from the anus	
yellow film formed on teeth by bacteria trying to attach themselves to tooth surface	

[6]

[Total marks: 33]

END OF BIOLOGY SECTION