SURNAME ..... FIRST NAME .....

JUNIOR SCHOOL ..... SENIOR SCHOOL .....

Independent Schools Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

SCIENCE

LEVEL 2

BIOLOGY

Specimen Paper

(for first examination in Autumn 2017)

Please read this information before the examination starts.

- This examination is 40 minutes long.
- Answer **all** the questions.
- Calculators may be required.

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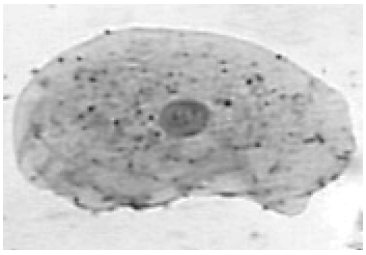
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1. Underline the option which best completes each of the following.

(a) In cells, respiration takes place in the

chloroplasts **mitochondria** **nucleus** **vacuole**

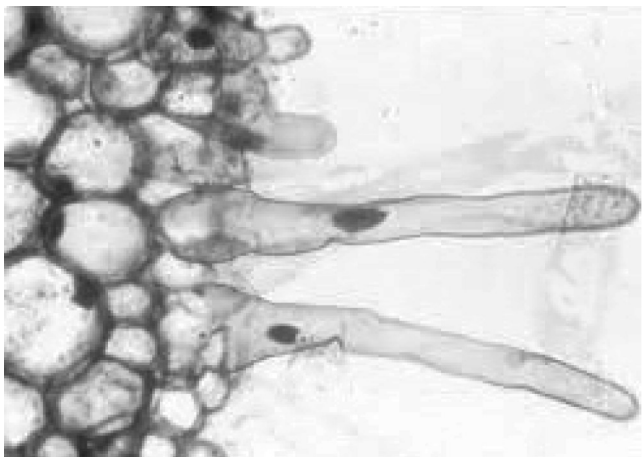
(b) The human cheek cell shown in the photograph below is 0.09 mm in length.



The magnification of the photograph is approximately

×50 **×100** **×500** **×1000**

(c) The root hair cells in the photograph below are adapted to



absorb light **absorb water**

collect pollen grains **germinate in soil**

(d) The joining of the male and female gametes at fertilisation produces

an embryo **a fetus** **a sperm** **a zygote**

(e) Energy from the Sun is converted into chemical energy in

aerobic respiration **anaerobic respiration**

fermentation **photosynthesis**

(f) A disease caused by a vitamin deficiency is

athlete's foot **chicken pox** **influenza** **scurvy**

(g) The place where animals and plants live is their

biome **community** **ecosystem** **habitat**

(h) Humans and gorillas are classified as different

classes **invertebrates** **kingdoms** **species**

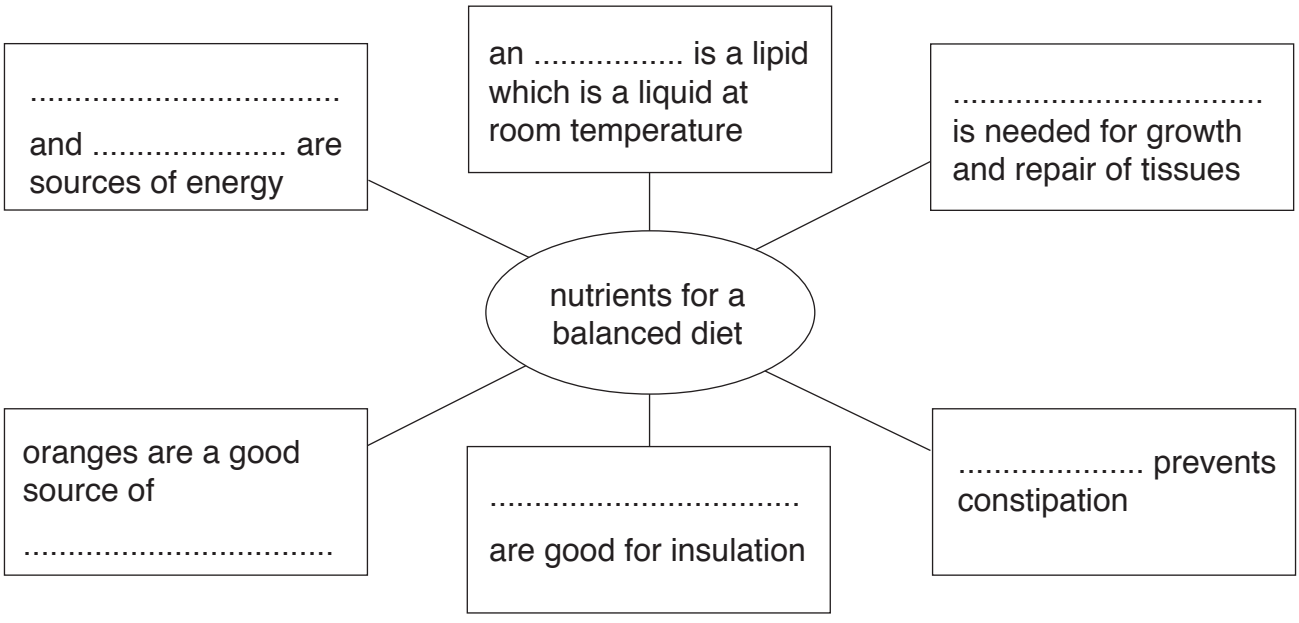
(8)

2. This question is about the content of a healthy human diet.

butter	**carbohydrates**	**fats**	**fibre**	**heart disease**	
iodine	**lipids**	**minerals**	**obesity**	**oil**	**protein**
rickets	**scurvy**	**sugar**	**water**	**vitamin C**	

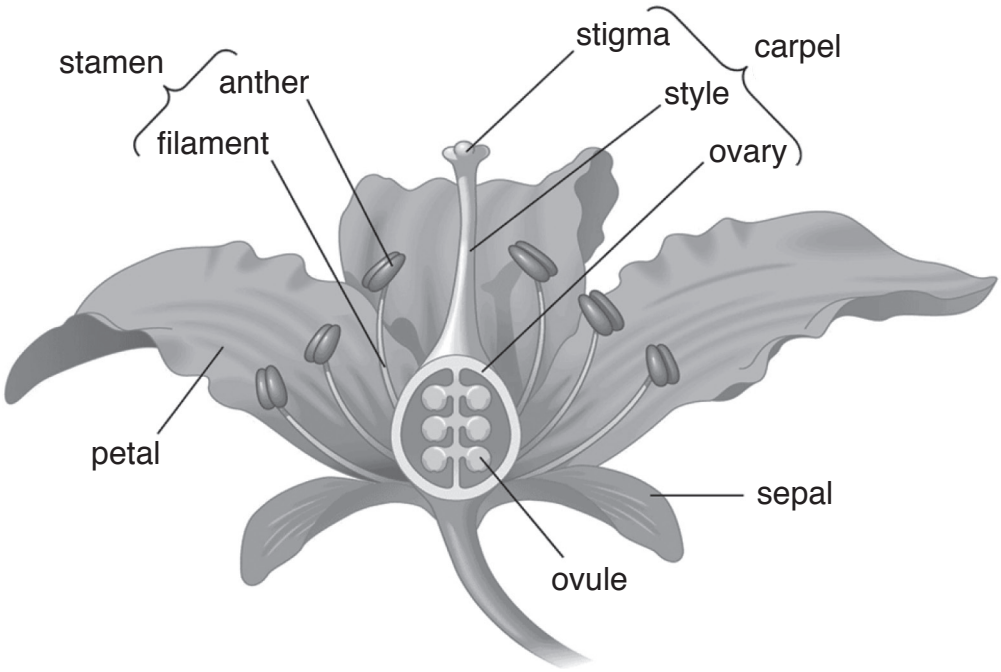
Using only words from the box above, fill in the spaces in the diagram below with the words you think are most suitable.

Each word may be used once, more than once or not at all.



(6)

3. The diagram below shows the parts of a flower which is pollinated by insects.



(a) State the functions of the following parts of the flower.

anther: .....

..... (1)

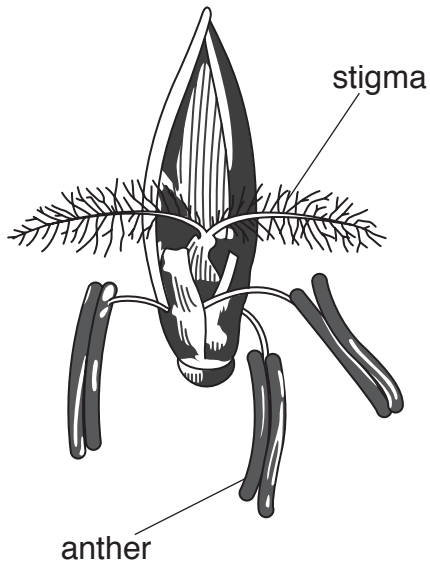
stigma: .....

..... (1)

ovule: .....

..... (1)

The diagram below shows a wind-pollinated flower.



(b) Describe **two** differences between wind-pollinated and insect-pollinated flowers.

difference 1: .....

..... (1)

difference 2: .....

..... (1)

(c) Explain the differences between wind pollination and seed dispersal.

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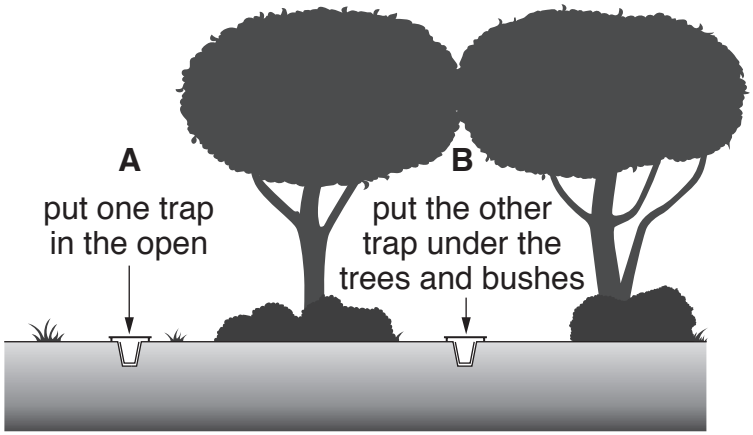
..... (2)

4. Emily and Anya wanted to investigate the numbers of soil invertebrates near some trees in the school grounds.

They dug two holes and placed pitfall traps in them.

The location of the traps is shown in the diagram below.

They emptied the traps every day for five days.



Emily and Anya's results are shown in the table below.

day	the number of invertebrates found in the pitfall traps in area **A**	the number of invertebrates found in the pitfall traps in area **B**
1	15	27
2	9	14
3	32	40
4	11	52
5	20	42

(a) (i) Calculate the average numbers of invertebrates found in the pitfall traps in areas **A** and **B**.

area **A**: .....

area **B**: ..... (2)

(ii) Suggest an explanation for the results of day 2.

.....

.....

.....

..... (2)

Anya suggested that there was more food for the invertebrates in area **B**.

(b) (i) Suggest a scientific hypothesis which would explain Anya's suggestion.

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.....

..... (3)

(ii) Suggest what you would need to find out in order to test your hypothesis.

.....

.....

.....

..... (2)

TURN OVER FOR THE REST OF QUESTION 4

Emily found the organism shown below in the pitfall trap.



(c) Use the biological key below to identify this organism.

question 1	Does it have a hard exoskeleton?	Go to Question 2.
	Does it have a soft body?	*Phylum Annelida* ……..
question 2	Does it have legs?	Go to Question 3.
	Does it have no legs?	*Phylum Mollusca* …….
question 3	Does it have legs on all body sections? Go to Question 4.	
	Does it have legs on only some body sections? Go to Question 5.	
question 4	Does it have one pair of legs per body segment?	
	Class *Chilopoda* ……..	
	Does it have more than one pair of legs per segment?	
	Class *Diplopoda* …..	
question 5	Does it have a tail?	Subphylum *Crustacean* ……
	Does it have no tail?	Go to question 6.
question 6	Does it have 8 legs?	Class *Arachnida* ……
	Does it have 6 legs?	Class *Insecta* ……..

Emily's organism is: ..... (1)

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5. Badgers are mammals which are common in woodlands in England.

The picture below shows a young badger.



(a) Describe the characteristics which badgers share with other mammals.

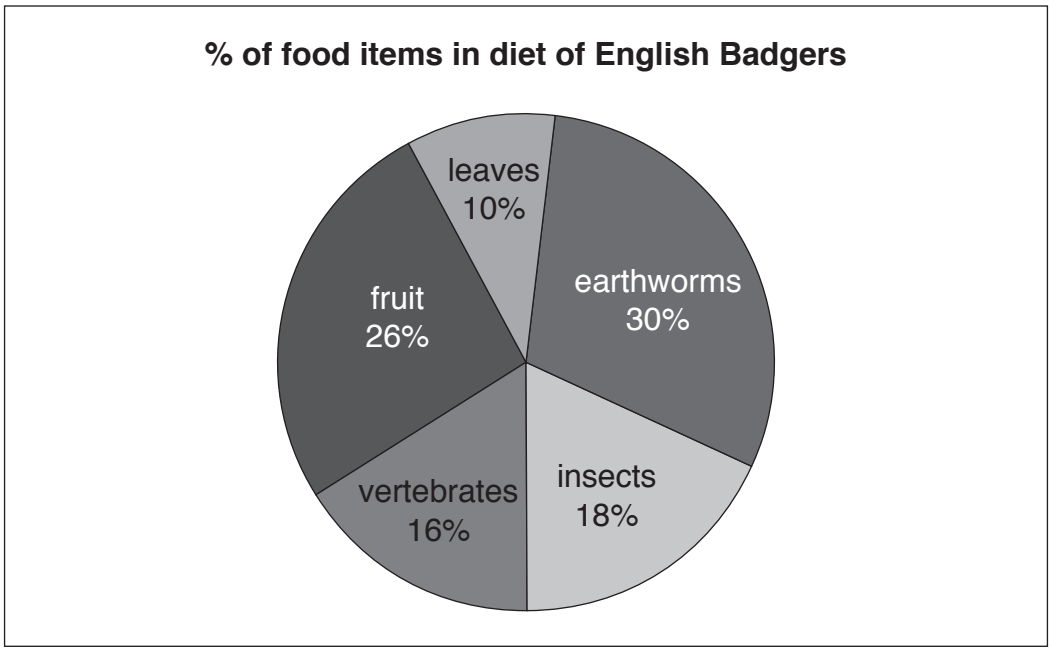
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..... (2)

The diet of badgers living in an English woodland was investigated.

The results are shown below.



(b) (i) Calculate the % of the diet which consists of invertebrate items.

..... (1)

(ii) Calculate the % of the diet which consists of plant items.

..... (1)

Some scientists have argued that badgers are 'opportunistic omnivores'. (*Opportunistic* means 'taking advantage of good situations when they arise'.)

Other scientists disagree and argue that badgers are 'specialists at eating earthworms.' (*Specialist* means 'being highly skilled at doing one thing'.)

(c) (i) Describe the evidence which supports the claim that badgers are *opportunistic* omnivores.

.....

.....

..... (2)

(ii) Describe the evidence which supports the claim that badgers are *specialists* at eating earthworms.

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..... (2)

(iii) Which of these claims do you think is the stronger?

Explain your answer.

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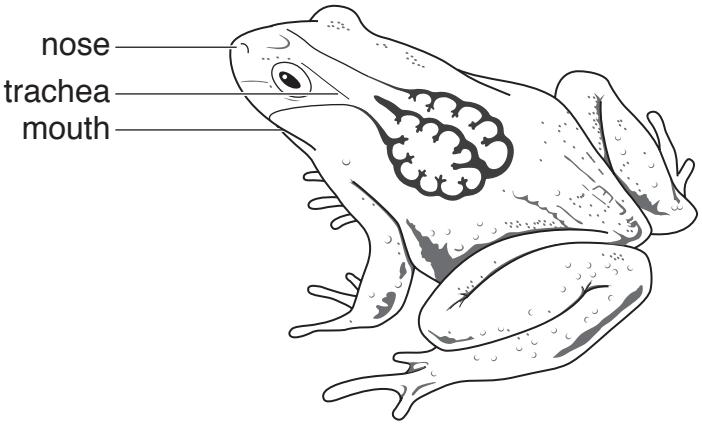
.....

..... (3)

6. The diagram below is of a European common frog.

The lungs and the trachea are shown.

The trachea carries air into and out of the lungs.



(a) Describe the evidence which suggests that the frog breathes through its nose and its mouth.

.....

.....

..... (2)

(b) Describe the function of breathing in frogs.

.....

.....

..... (2)

The total surface area of the lungs is important in determining how good the lungs are at gaseous exchange.

The table below shows the total surface area per kg of body mass for a frog and a mouse.

animal	total surface area of the lungs (m^2 per kg body mass)
frog	0.25
mouse	5.00

(c) (i) Calculate how many times greater the surface area of the lungs of a mouse is compared with that of a frog.

Show your working.

.....

.....

..... (1)

(ii) Suggest why it is important that the surface area data is presented as per kg of body mass.

.....

.....

..... (2)

Frogs are able to exchange gases across the surface of their skin.

(d) (i) Use the information in this question to explain why the ability to exchange gases across the surface of the skin is important for the survival of frogs.

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..... (3)

(ii) Frogs are amphibians.

Explain why amphibians have to live in or close to water.

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..... (2)

7. Yeast is a micro-organism which is very important in brewing beer.
Beer is brewed by fermentation, which requires yeast to respire anaerobically.
The photograph below shows beer being brewed at home in a fermenter.



(a) (i) Explain what is meant by the term *anaerobic*.

..... (1)

(ii) Name gas X, which is produced during fermentation.

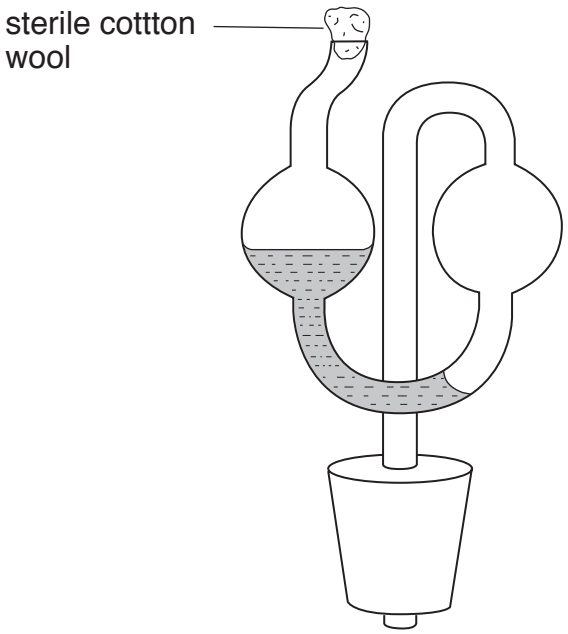
..... (1)

TURN OVER FOR THE REST OF QUESTION 7

When brewing beer, it is essential to have an airlock at the top of the fermenter.

The airlock is designed to allow gas X to escape, whilst preventing air getting into the fermenter.

The diagram below shows one type of airlock during fermentation.



(b) (i) Explain why it is necessary for the cotton wool in the mouth of the fermenter to be sterile.

.....

..... (2)

(ii) Explain why it is necessary to prevent air from entering the fermenter.

.....

..... (2)

(Total marks: 60)