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

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

Independent Schools Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

SCIENCE

BIOLOGY

Monday 23 January 2012

Please read this information before the examination starts.

- This examination is 40 minutes long.
- The answers should be written on the question paper.
- Answer **all** the questions.
- Calculators may be required.

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

(a) In a cell, the genes are found in the

cell membrane **cytoplasm** **nucleus** **vacuole**

(b) In plants, the male sex cell is found in the

ovule **petals** **pollen grain** **seed**

(c) Potatoes are a good source of

fat **carbohydrate** **protein** **vitamin D**

(d) The reactants in respiration are

carbon dioxide and oxygen **carbon dioxide and water**

glucose and oxygen **glucose and water**

(e) To test for starch you would use

a microscope **iodine solution** **limewater** **methylene blue**

(f) In Britain in summer, the population of plants growing on the forest floor is likely to be smaller than in spring because of

an unsuitable temperature **competition for food**

competition for light **predation**

(g) A dolphin is not considered a fish because it

can swim **gives birth to live young**

has a backbone **has fins**

(h) Root hair cells are well adapted to absorbing water because they

can move **have a large surface area**

have a nucleus **have no chloroplasts**

(i) Drinking excessive amounts of alcohol causes most damage to the

eyes **throat** **liver** **lungs** (9)

2. This question is about human reproduction.

(a) Four reproductive organs are listed below.

Link each organ on the left to the most appropriate function on the right with a

3. Here is a typical food chain for a woodland in Britain:

oak tree → caterpillars → blue tits

(a) Use the words in the box to fill in the spaces in the passage below.
Each word may be used once, more than once or not at all.

carnivores	**energy**	**food**	**web**
herbivores	**photosynthesis**		**respiration**

A food chain shows the flow of *energy* ..... between living things.

Producers, such as green plants, are found at the start of all food chains

because they can produce their own ..... . For example, an

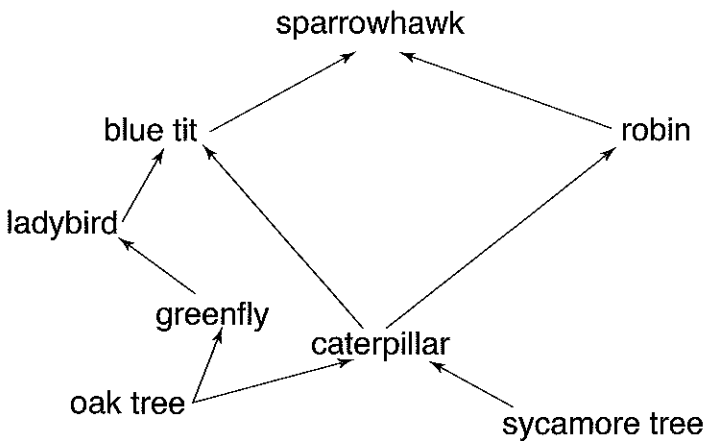
oak tree produces sugar through ..... . Primary consumers

or ..... eat the producers. ..... eat the

primary consumers. (4)

In reality, many food chains interlink to produce food webs.

(b) Identify a primary consumer and the top carnivore in the following food web:



primary consumer: .....

top carnivore: ..... (2)

4. Below is a list of six of the essential food groups in a balanced diet.

carbohydrate	**fats**	**fibre**
minerals	**vitamins**	**water**

(a) One food group is missing from the table.

(i) Write down this missing food group.

..... (1)

(ii) Write down what this missing food group is used for in the body.

..... (1)

(iii) Name one food which is a good source of this missing food group.

..... (1)

(b) Plants store carbohydrate as starch.
Outline how you could test an oak leaf for starch in your laboratory.
(Remember to include any safety precautions which you would take.)

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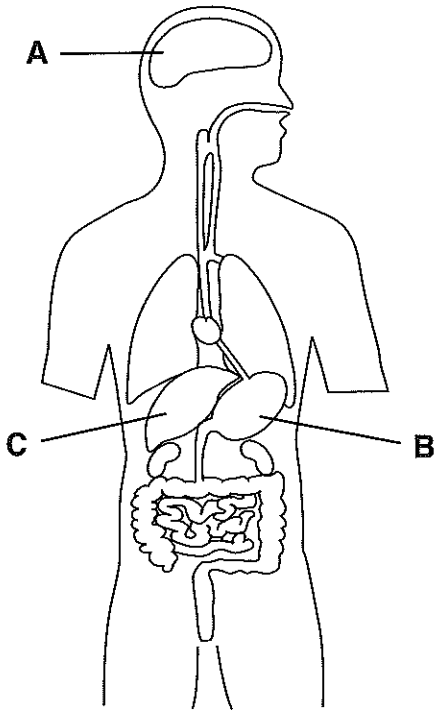
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..... (4)

5. The diagram below shows the positions of some major organs in the body.

(a) Identify organs **A**, **B** and **C**.



A: .....

B: .....

C: ..... (3)

(b) The lungs are also shown on the diagram.
They are part of the respiratory system.
Gas exchange takes place inside the lungs.
Write down two features which makes the lungs well adapted for gas exchange.

feature one: ..... (1)

feature two: ..... (1)

The table below shows the differences between air breathed in (inhaled air) and air breathed out (exhaled air).

gas	% in inhaled air	% in exhaled air
nitrogen	78.00	78.00
oxygen	21.00	16.05
carbon dioxide	0.05	
other gases	0.95	0.95

(c) Complete the table to show the percentage of carbon dioxide in exhaled air. (1)

6. George investigated how carbon dioxide concentration affected the rate of photosynthesis in pondweed.

He used the increase in mass of pondweed as an indicator for the rate of photosynthesis.

A table of his results is shown below.

concentration of carbon dioxide available to pondweed, in %	starting mass of pondweed, in g	final mass of pondweed, in g	increase in mass, in g
0	2.00	2.00	0.00
0.5	2.00	2.20	0.20
1	2.00	2.40	
1.5	2.00	2.50	
2	2.00	2.55	0.55

(a) Write the word equation for photosynthesis below. (2)

$$\text{.....} + \text{.....} \xrightarrow[\text{sunlight}]{\text{chlorophyll}} \text{.....} + \text{.....}$$

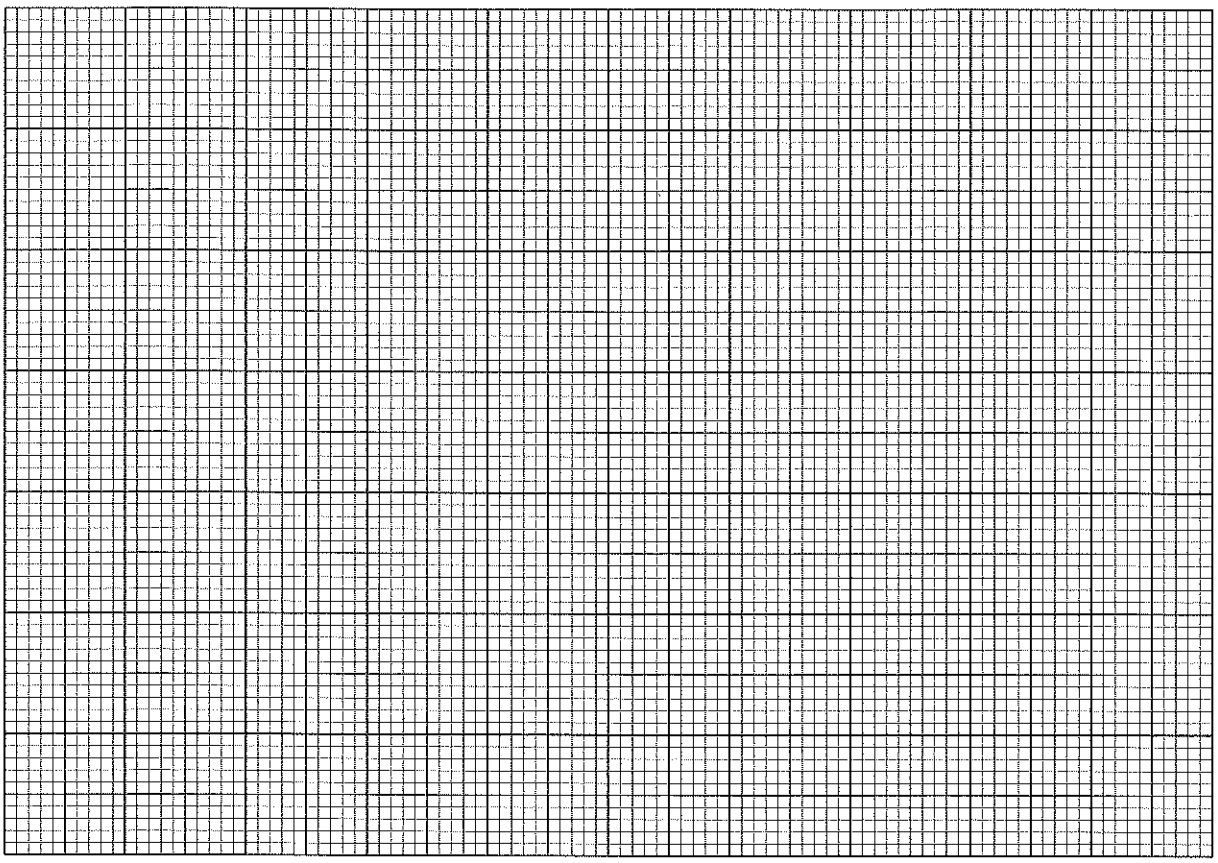
(b) Complete the table above by calculating the increase in mass for the 1% and 1.5% carbon dioxide concentrations. (2)

(c) Using the instructions below, plot a line graph of George's results to show how the increase in mass of pondweed changes with carbon dioxide concentration.

instruction 1: add sensible number scales to each axis (2)

instruction 2: carefully plot the five points on the graph to show the increase in mass of the pondweed at the five different carbon dioxide concentrations (2)

instruction 3: draw a smooth curve of best fit through the data points (1)



(d) Using your graph, describe the relationship between carbon dioxide concentration and the increase in mass of the pondweed.

.....

.....

..... (2)

(e) Give one way in which George could have improved the reliability of his investigation.

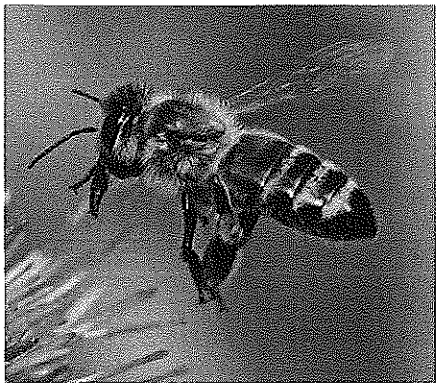
..... (1)

7. The picture below shows a honey bee.

Honey bees are insects and extremely important pollinators of many food plants, including broccoli, cauliflower and apple.

Without honey bees, some of these plants would not be able to reproduce.

Over the last few years, the population size of honey bees has decreased significantly.



(a) Give two features of insects.

feature 1: ..... (1)

feature 2: ..... (1)

(b) Suggest two possible reasons why the honey bee population has decreased recently.

reason 1: ..... (1)

reason 2: ..... (1)

Research needs to be done to find ways in which we can help to increase the size of the honey bee population.

A group of students decided to investigate which colours were most attractive to honey bees.

They set out four trays of different colours in a meadow of wild flowers and four in a garden.

Each tray was lined with a harmless sticky glue to catch any bees which landed on the trays.

They left all the trays for 12 hours (7am to 7pm) and then recorded the number of bees found in each tray.

The bees were then released at the end of the investigation.

Their results are shown in the table below.

colour	number of honey bees	
	meadow	garden
blue	6	12
yellow	3	1
red	0	0
white	1	0

(c) Suggest why you think these four colours were chosen.

..... (1)

(d) Describe the students' results for the number of honey bees found in the different trays in both areas.

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..... (3)

(e) Using the results of the investigation, or otherwise, suggest ways in which the population of honey bees could be increased.

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..... (2)

(Total marks: 60)