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

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

Independent Schools Examinations Board

COMMON ENTRANCE EXAMINATION AT 13+

SCIENCE

LEVEL 2

BIOLOGY

Monday 27 January 2014

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 word or phrase which best completes each of the following.

(a) All living organisms

breathe **grow** **jump** **sweat**

(b) In the presence of starch, iodine solution turns

blue/black **cloudy** **colourless** **orange/brown**

(c) In a simple food chain, a predator would be

a carnivore **a herbivore** **a plant** **the Sun**

(d) Genes, found in the nucleus of a cell, are made of

DNA **energy** **fats** **protein**

(e) A person suffering from scurvy would benefit most from eating more

butter **cake** **oranges** **spinach**

(f) A process which animals and plants carry out in order to obtain energy is

exhalation **perspiration** **photosynthesis** **respiration**

(g) Root hair cells are best adapted to their function because they

are small **have a large surface area** **have a tail** **have cytoplasm**

(h) The substance most likely to pass across the placenta from the baby's blood to the mother's blood is

carbon dioxide **energy** **food** **oxygen** (8)

2. Emily is 5 years old.

At school, she has been learning some biology.

She tells her mum that she has learnt:

'We need food to grow and we must eat our fruit and vegetables to keep us healthy!'

(a) (i) Name the food group which is needed for growth and repair of cells.

..... (1)

(ii) Write down a good source of the food from this group.

..... (1)

(iii) Write down the two food groups, found mainly in fruit and vegetables, which we need in *small* amounts to keep us healthy.

1: ..... (1)

2: ..... (1)

(b) (i) Pregnant women need a lot of calcium in their diet.

Suggest a reason for this.

..... (1)

(ii) Underline the food below which is the best source of calcium.

bacon **bread** **cheese** **potato** (1)

Emily's teacher also told her that it is unhealthy for people to eat too much fat in their diet.

(c) Give two reasons why a diet with too much fat is bad for a person's health.

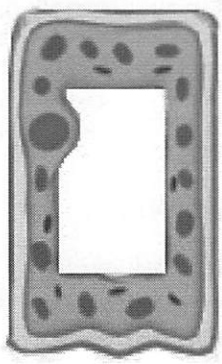
1: ..... (1)

2: ..... (1)

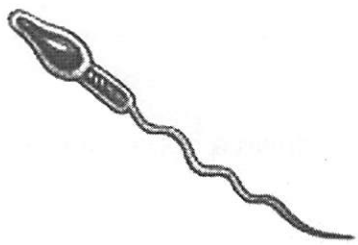
3. This question is about specialised cells.

The diagrams below show a plant cell and an animal cell.

cell A



cell B



(a) State which cell, **A** or **B**, is a plant cell.

cell ..... (1)

(b) Name and state the function of cell **B**.

name: ..... (1)

function: ..... (1)

(c) State two structures, shown in the diagram above, which are found in plant cells but not in animal cells.

1: ..... (1)

2: ..... (1)

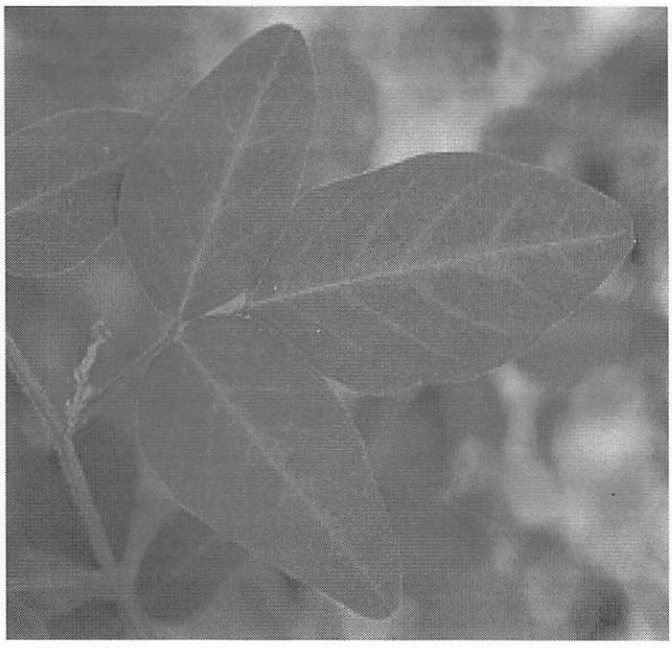
(d) Draw a straight line between each cell structure in the left column and its correct function in the right column.

(The first one has been done for you.)

cell structure	**function**
mitochondria	main site of energy release in respiration
nucleus	chemical reactions take place here
cytoplasm	controls entry and exit of substances into and out of the cell
cell membrane	controls the activities of the cell

(3)

4. The picture below shows some leaves on a plant.



(a) Suggest and explain the advantage to this plant of having broad, flat leaves.

.....

..... (2)

(b) Complete the word equation for photosynthesis by filling in the two spaces below.

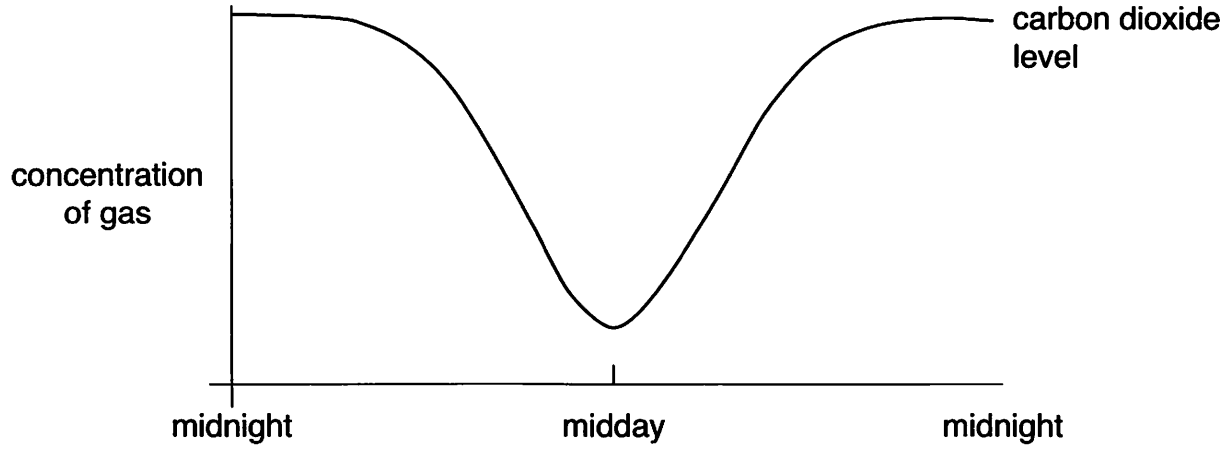
..... + carbon dioxide → oxygen + ... (2)

(c) Light energy is needed for photosynthesis to happen.
Name the green substance needed to absorb the light energy.

..... (1)

The concentration of carbon dioxide and oxygen around a plant's leaves changes throughout the day and night.

The graph below shows how the concentration of carbon dioxide changes during a 24 hour period.



(d) (i) Describe how the concentration of carbon dioxide changes over this 24-hour period.

.....

.....

..... (2)

(ii) Explain why the concentration of carbon dioxide changes in this way.

.....

.....

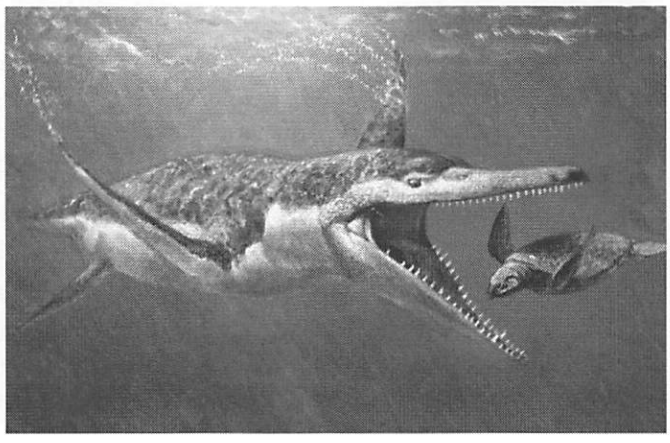
..... (2)

(e) On the graph above, draw a line to show how you think the concentration of oxygen around a plant's leaves will change during the same 24-hour period.

You should use a pencil to draw your line. (2)

5. In 2009, the fossil skull and teeth of a huge pliosaur was found on the Dorset coast in England.

The picture shows what scientists think a pliosaur looked like.



The pliosaur is about to eat a turtle.

(a) Suggest why scientists think the pliosaur was a successful predator.

..... (1)

(b) Pliosaurs were top predators which probably fed on small dinosaurs.

Re-arrange the following organisms into a food chain.

pliosaur **seaweed** **small dinosaur** **herbivorous fish**

..... → ..... → ..... → ..... (2)

(c) Pliosaurs were reptiles, similar to crocodiles.

State two features of reptiles.

1: .....

2: ..... (2)

The blue whale is probably the largest and heaviest animal which has ever lived on Earth.

This is because blue whales are very well adapted to their environment.

(d) (i) Suggest a reason why animals which live in water can grow larger than those which live on land.

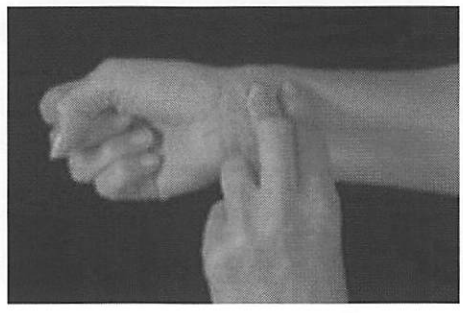
..... (1)

(ii) Suggest two ways in which a blue whale is adapted to its environment.

1: ..... (1)

2: ..... (1)

6. Tom wanted to investigate the effects of drinking fizzy cola on his pulse rate.



First, he measured his *resting* pulse rate every minute for four minutes when sitting down.

Then he drank some cola.

He continued to measure his pulse rate each minute for the next five minutes.

(a) Suggest why Tom began the investigation by first measuring his resting pulse rate.

.....

..... (1)

Tom's four readings for his resting pulse rate, in beats per minute, are listed below.

70 75 65 74

(b) Calculate an average resting pulse rate for Tom.
Make sure you show your working.

..... beats per minute. (2)

(c) Suggest why Tom took several readings to establish his resting pulse rate.

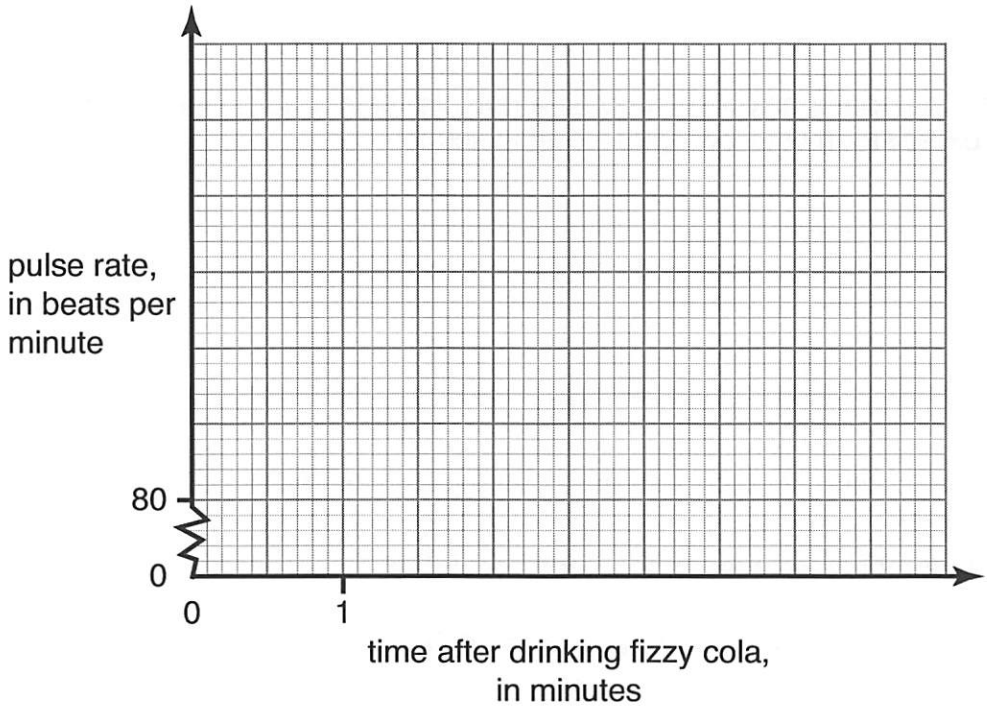
..... (1)

The table below shows Tom's pulse rate for the five minutes after he drank the fizzy cola.

time after drinking fizzy cola, in minutes	pulse rate, in beats per minute
1	81
2	85
3	88
4	90
5	91

(d) (i) Complete the scales on the horizontal and vertical axes. (2)

(ii) Plot the results on the axes and join the points with a smooth curve. (3)



TURN OVER FOR REST OF QUESTION 6

(iii) Describe the effect of fizzy cola on Tom's pulse rate.

.....

.....

..... (2)

(iv) Tom's teacher suggested he also measured his pulse rate after he drank fizzy water.

Explain why measuring Tom's pulse rate before and after he drank fizzy water improved the investigation.

.....

.....

..... (2)

(v) Use the space below to suggest a reliable method for investigating the effect of exercise on your own pulse rate in school.

.....

.....

.....

.....

.....

.....

.....

..... (4)

(Total marks: 60)