

NAME:



Shrewsbury School

SHREWSBURY SCHOOL

SIXTH FORM ENTRANCE EXAMINATION 2014

BIOLOGY (1 hour)

Instructions to candidates:

- Answer all questions in the spaces provided.
- Total marks available: 50

Question 1

In each of the following items write the letter of the response which best answers the question in the box at the end of the question:

1. Which of the following best describes the function of a cell membrane?

- A It keeps the cell in shape
- B It controls the substances entering and leaving the cell
- C It controls the substances entering the cell
- D It supports the cell structures

2. Which of the following best describes respiration?

- A It is breathing
- B It releases energy for animal cells
- C It is a source of oxygen for living organisms
- D It releases energy for all living cells

3. Which of the following is not part of the human digestive system?

- A Stomach
- B Mouth
- C Liver
- D Colon

4. In the following food chain which is the primary consumer?

Leaf  caterpillar  blue tit  hawk

- A
- B
- C
- D

5. Which of the following are typically found in both plant and animal cells

- A cell walls
- B chloroplasts
- C nuclei
- D permanent vacuoles

6. Which of these molecules is too big to diffuse through a cell membrane using simple diffusion?

- A Starch
- B Oxygen
- C Carbon dioxide
- D Water

7. Which of these best describes arteries?

- A carry oxygenated blood
- B carry blood away from organs
- C carry blood away from the heart
- D have valves to prevent backflow of blood

8. Photosynthesis commonly occurs in

- A plants and animals
- B fungi
- C plants and algae
- D plants and fungi

9. Evidence for evolution comes from

A laboratory experiments

B fossils

C genetic engineering

D micro propagation

10. The process by which plants lose water is called

A translocation

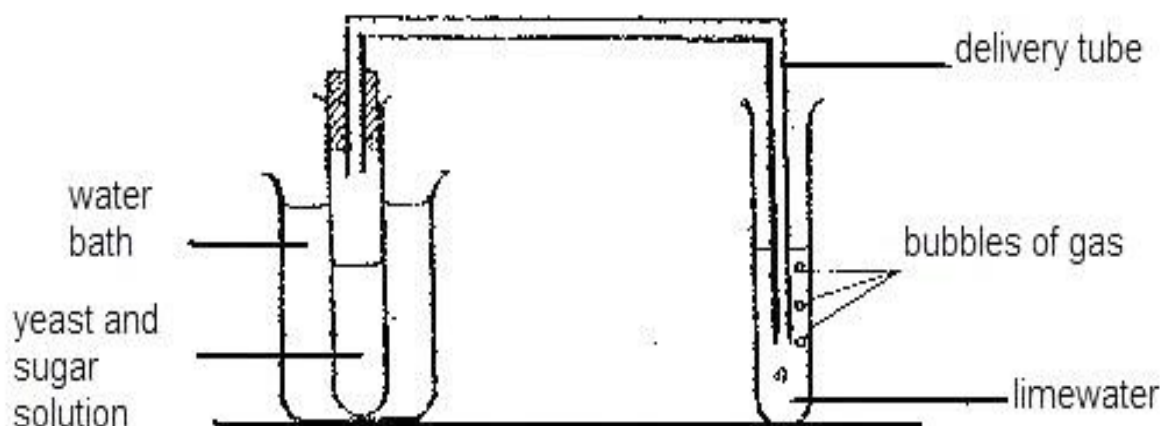
B transportation

C transpiration

D transduction

Question 2

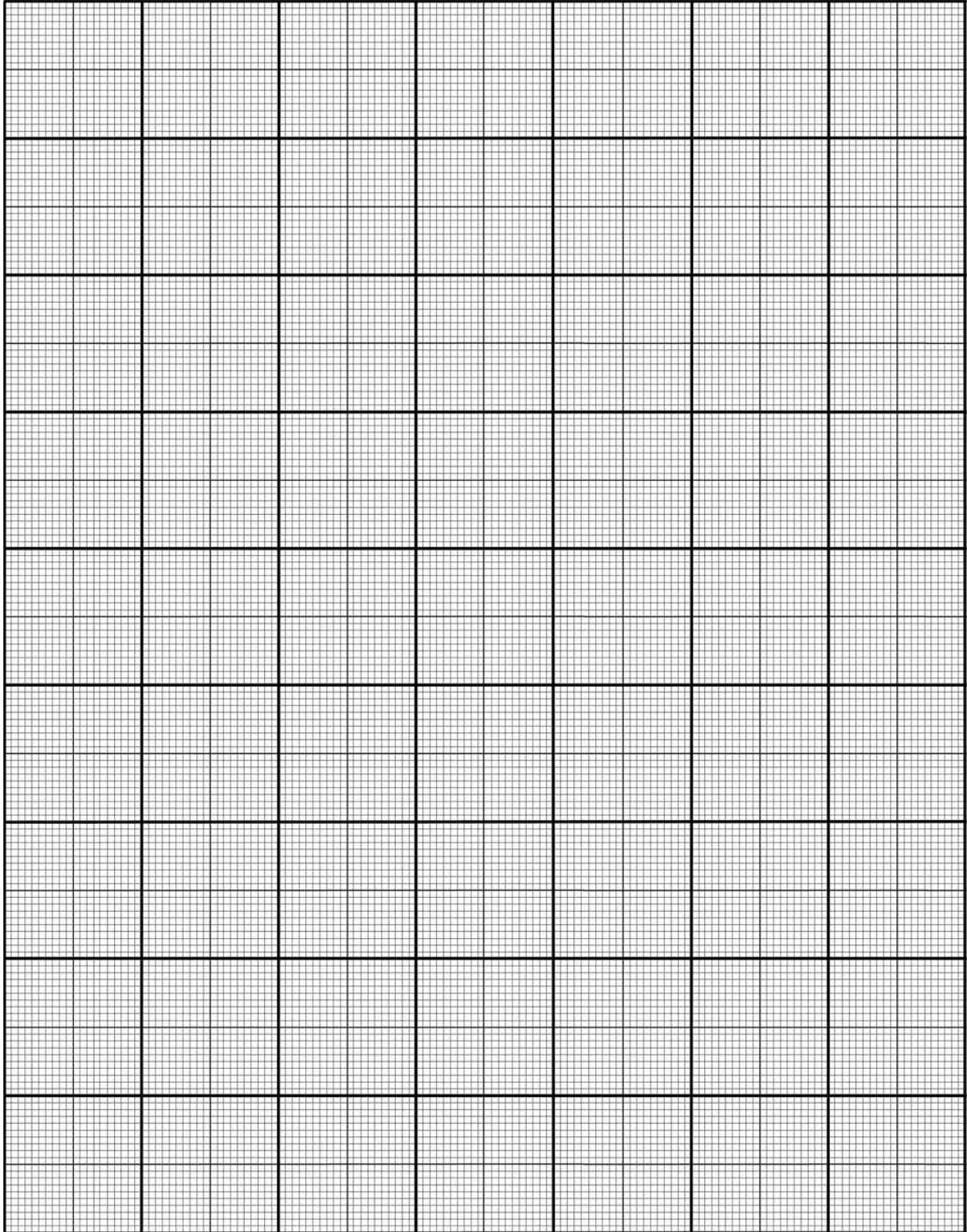
In the experimental setup shown below respiring yeast cells were placed in a 10% glucose solution. It was observed that bubbles of gas were being produced. The number of bubbles produced in 20 seconds at various temperatures were recorded in the results table.



Temperature of waterbath (°C)	Number of bubbles produced in 20 seconds				Rate of bubble production (bubbles per minute)
	Run 1	Run 2	Run 3	Mean	
10	4	2	3	3	9
15	6	7	6	6	18
20	12	11	14		
25	17	20	24		
35	23	24	22	25	75
40	30	32	28		

- What gas is being produced? _____(1)
- What effect will this have on the limewater? _____(1)
- Complete the blanks in the table _____(2)

- d) On the grid provided draw a graph of the mean number of bubbles produced in 20 seconds at the six different temperatures (4)



e) Describe the results shown on the graph

(2)

f) What results would you have expected at 60 C? Explain your answer

(3)

g) Each time the student changed the temperature of the waterbath they waited two minutes before taking any readings explain why this was done?

(2)

h) Another student suggested that this method was not a very accurate way of determining the rate of gas production. How do you think the accuracy could be improved?

(2)

Total 17 marks

Question 3

Read the following on Cane toads a species introduced to Australia, then answer the questions which follow.

1. The cane toad (*Rhinella marina*), was introduced to Australia from Hawaii in June 1935 by the Bureau of Sugar Experiment Stations in an attempt to control the native grey-backed cane beetle and Frenchi beetle. These beetles are native to Australia and they are detrimental to sugar cane crops, which are a major source of income for Australia.
2. Cane toads have glands which produce a milky toxic secretion which is used for defence against predators. This poison primarily affects the functioning of the heart but is usually not fatal for humans.



An adult cane toad

3. The cane toad in Australia is regarded as a "feral species", others being rabbits, foxes and pigs. Australia's relative isolation provided no natural predators for many of the species subsequently introduced. The recent, sudden introduction of foreign species has led to severe breakdowns in Australian ecology. Also many of the introduced species had no effective natural predators or parasites and often displaced native species. Cane toads have been very successful as an invasive species.
4. Since their release, cane toads have rapidly multiplied in population and now number over 200 million and have affected local biodiversity. The introduction of the toads has not only caused large environmental detriment, but there is also no evidence that they have had an impact on the cane beetles they were introduced to predate.

5. Numerous native species have been reported as successfully preying on toads. Some birds, such as the Black Kite have learned to attack the toad's belly, avoiding the poison-producing glands on the back of the head. It is suggested that a small native frog, Dahl's Aquatic Frog, is able to eat the tadpoles and live young of the toad without being affected by the poison that often kills other predators. The Saw-shelled Turtle is another native species which is a successful predator of cane toads. The larger the animal, or predator, is the better chance they have of survival, as their body weight effectively dilutes the concentration of the toxin in their body.
6. Two strategies have been proposed, both of which focus on the ability of cane toads to reproduce. One involves the release of sterile males into the population. These males would compete for resources with other males, while themselves not being able to reproduce. A second strategy would be to insert a gene into female toads which would allow them to only create male offspring.

1. In paragraph 1, how would you describe grey-backed cane beetle and Frenchi beetles in relation to sugar cane? _____ (1)
2. In paragraph 1 what does the term "**native**" mean? _____
_____ (1)
3. In paragraph 3 what does the term "**feral**" mean? _____
_____ (2)
4. How has the "introduction of species led to breakdowns in Australian ecology"?

_____ (2)
5. How have cane toads been able to increase in numbers so quickly? _____

_____ (2)

6. What does the term **“biodiversity”** mean, in paragraph 4?

(2)

7. How is Dahl’s frog able to eat the cane toads and survive whereas larger animals are killed by the toxin. _____

(2)

8. How do you think the two strategies relating to cane toad reproduction in paragraph 6 may lead to a reduction in numbers?

(2)

9. What term could you use to describe inserting a gene into the female toads?

(1)

10. Which strategy would you use, and why, to reduce cane toad numbers?

(2)

Total 17 marks

