

Name:

(First name *and* surname - CAPITAL LETTERS please)

Current school:



St Paul's School
FOUNDED 1509

16+ Examination

SAMPLE PAPER

Biology

45 Minutes

Instructions for Candidates

- Write your name in the space at the top of this page.
- Answer all of the questions.
- Write your answers in the spaces provided on the question paper.

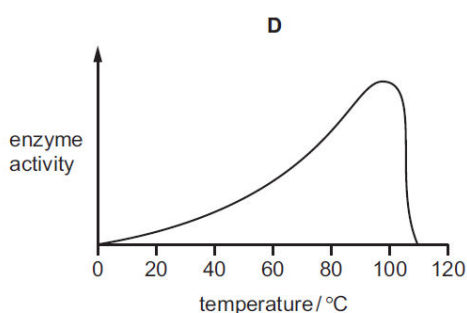
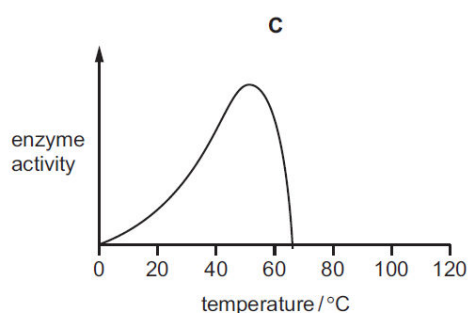
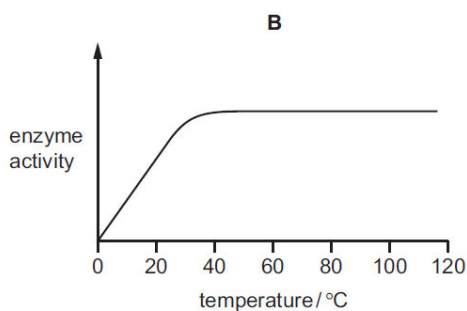
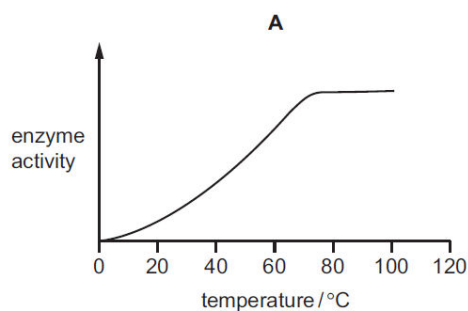
Information for Candidates

- The number of marks available is shown in brackets [] at the end of each question or part question. The total mark for the paper is 50.
- The marks allocated and the spaces provided for your answers are a good indication of the length of answer required.
- You may use a calculator.
- There are two sections:
 - *Section A: General biological knowledge (25 marks)*
 - *Section B: Understanding and application of biological knowledge (25 marks)*

Section A.

Answer all the questions by ringing the letter corresponding to the correct answer. Read the questions carefully and choose the letter that gives the BEST answer. If you make a mistake, be sure to indicate clearly what your chosen answer is. Each question is worth one mark.

- 1** A bacterium lives in hot springs at temperatures of 75 °C to 85 °C. Which graph represents the activity of enzymes found in these bacteria?

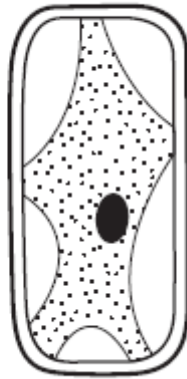


- 2** Which features do animal cells share with fungal cells?

	Chloroplast	Mitochondria	Cytoplasm	Nucleus
A	✓	x	✓	✓
B	✓	✓	✓	x
C	x	x	x	✓
D	x	✓	✓	✓
E	✓	✓	✓	✓

- 3 What is a characteristic of all catalysts?
- A. They are made of carbohydrates
 - B. They are made of proteins
 - C. They are not changed by the reaction
 - D. They are used up in the reaction
 - E. They may slow down the rate of a reaction

- 4 The diagram shows a cell. Which type of cell does it show?



- A. A bacterium placed in a concentrated sucrose solution
- B. A plant cell placed in a concentrated sucrose solution
- C. A plant cell placed in distilled water
- D. An animal cell placed in a concentrated sucrose solution
- E. An animal cell placed in distilled water

5 Which of the following are products of photosynthesis?

1. oxygen

2. carbon dioxide

3. water

4. glucose

A. 1, 2, & 4 only

B. 1 & 4 only

C. 2, 3 & 4 only

D. 2 & 3 only

E. All of them

6 The table shows the rates of absorption of two different sugars, arabinose and glucose, in living and dead intestines.

The concentrations of the sugars inside the intestines were the same in each case.

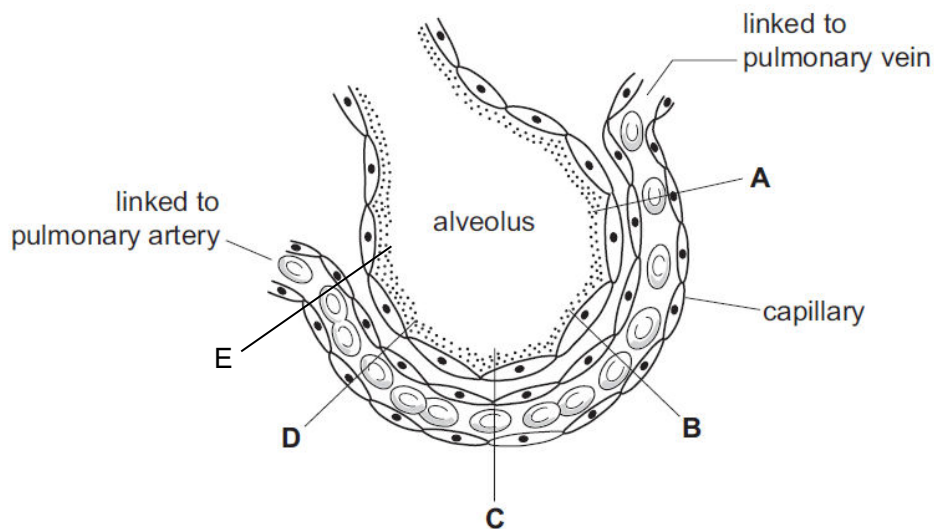
	Rate of Absorption (arbitrary units)	
	arabinose	glucose
living intestine	31	102
dead intestine	31	34

What are the main methods of absorption of arabinose and glucose in living intestine?

	arabinose	glucose
A	active transport	active transport
B	active transport	diffusion
C	diffusion	active transport
D	diffusion	diffusion

- 7 How many molecules of carbon dioxide and water would be produced by the aerobic respiration of one molecule of glucose?
- A. 12 molecules of carbon dioxide and 12 molecules of water
 - B. 12 molecules of carbon dioxide and 6 molecules of water
 - C. 2 molecules of carbon dioxide and 2 molecules of water
 - D. 6 molecules of carbon dioxide and 12 molecules of water
 - E. 6 molecules of carbon dioxide and 6 molecules of water

- 8 The diagram shows an alveolus and an associated blood capillary. At which point will the least rate of diffusion of carbon dioxide occur?



- 9 An advantage of plants using starch as a storage molecule is:
- A. It can be rapidly broken down into amino acids
 - B. It increases the water potential of the cytoplasm
 - C. It is insoluble in water
 - D. It is soluble in water
 - E. It lowers the water potential of the cytoplasm

- 10** A species of plant contains 56 chromosomes in the nucleus of a leaf mesophyll cell. How many chromosomes will be present in the nucleus of a pollen grain produced by that plant?
- A. 0
 - B. 14
 - C. 28
 - D. 56
 - E. 112

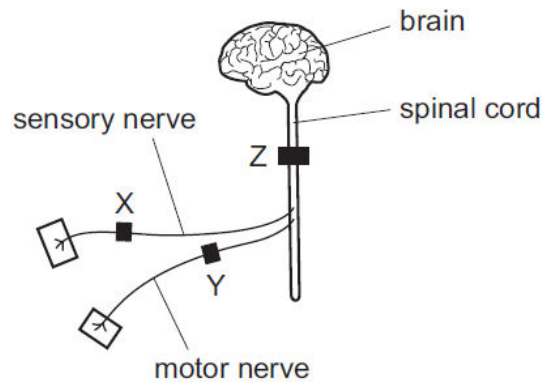
- 11** What is not an excretory product of mammals?

- A. Carbon dioxide in expired air
- B. Undigested food in faeces
- C. Urea in sweat
- D. Urea in urine

- 12** In which direction do water molecules move in the phloem and in the xylem of a plant stem?

	phloem	xylem
A	down only	down only
B	up only	up only
C	both up and down	both up and down
D	both up and down	up only
E	both up and down	down only

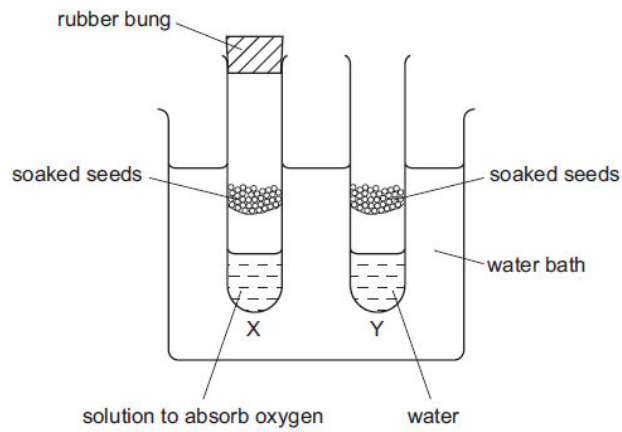
- 13 A local anaesthetic is a drug used to block nerve impulses. The diagram represents part of the nervous system. X, Y, and Z show sites where the anaesthetic can be injected.



In an experiment, one person can feel a pin prick their leg but cannot move their leg. Where was the anaesthetic injected in this person?

- A. X, Y and Z
 - B. X only
 - C. X and Y
 - D. Y only
 - E. X and Z
- 14 Which of the following are arranged in order of *increasing* size?
- A. bacterium, virus, sperm cell, ovum
 - B. plant cell, bacterium, sperm cell, yeast cell
 - C. virus, bacterium, sperm cell, ovum
 - D. virus, yeast cell, ovum, sperm cell
 - E. yeast cell, bacterium, ovum, sperm cell

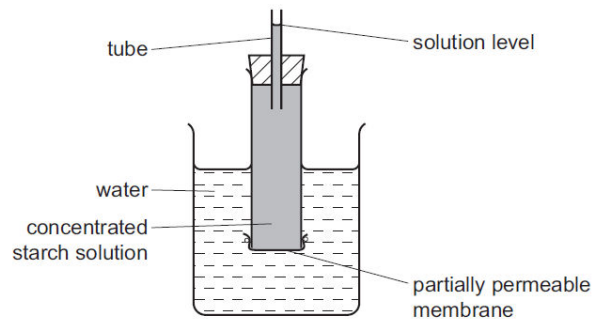
15 The diagram shows an experiment to find out if seeds need oxygen to germinate.



Which of the following would make tube Y an effective control?

- A. Ensure the seeds in tube Y are identical to those in tube X
- B. Put a rubber bung in tube Y
- C. Put a solution that absorbs carbon dioxide in the bottom of tube Y
- D. Replace the seeds in tube Y with glass beads
- E. Replace the soaked seeds in tube Y with seeds that have been boiled

16 The diagram represents apparatus used to investigate osmosis.



Explain why the level of the solution in the tube rises.

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..... [3]

Give a one sentence description of the following biological terms:

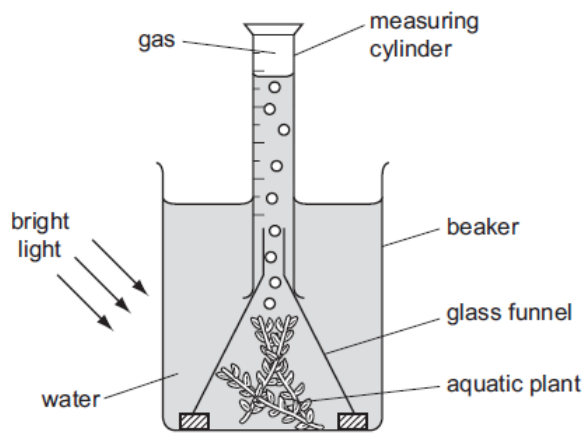
17 Respiration

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..... [1]

18 Homeostasis

.....
..... [1]

19 The diagram shows the apparatus used in an investigation to measure the rate of oxygen production during photosynthesis.



The investigation was repeated several times and the average volume of gas collected was calculated.

(a) What was the gas that was collected in the measuring cylinder?

..... [1]

(b) Name one other gas that may have been present in the measuring cylinder, and explain why it would be found there.

.....
..... [2]

(c) Name two factors that must be kept constant during this investigation.

..... [2]

END OF SECTION A

Section B. 25 marks

Make sure you read all of the question carefully. Pay careful attention to the number of marks available as this will indicate the level of detail required in your answers.

- 1** An experiment was carried out to investigate the amount of sweat produced by an athlete. The method used was as follows:
- i. The forehead of an athlete was washed with distilled water and then dried.
 - ii. A piece of absorbent paper of known mass and 4 cm² in area was placed on the forehead of the athlete. The absorbent paper was completely covered with a piece of plastic sheet of known mass and kept in place with sticky tape. The absorbent paper was made of a substance that did not react with the chemicals in sweat.
 - iii. The athlete did exercise for two hours.
 - iv. At the end of the exercise the absorbent paper and the plastic sheet were immediately reweighed.
 - v. The absorbent paper and the plastic sheet were washed in distilled water. The resulting solution was now analysed to find the concentration of chemicals in the sweat.

The results of the experiment are shown in the table below:

Concentration of sodium ions	78.3 arbitrary units
Concentration of potassium ions	7.6 arbitrary units
Concentration of chloride ions	73.2 arbitrary units
Flow of sweat from one sweat gland	0.013 mm ³ per minute

(a) Why was the forehead of the athlete washed with distilled water and dried before the start of the experiment?

.....
..... [2]

(b) Why was the piece of absorbent paper covered with a piece of plastic sheeting?

.....
..... [1]

- (c) It was known that the area covered by the absorbent paper had 1080 sweat glands. Calculate the volume of sweat that was produced by this area of the body in 2 hours.

Answer: [2]

- (d) It requires 2260 kJ of energy to turn 1 litre of sweat into vapour. Calculate the amount of energy that would have been required to turn the sweat produced in two hours by the 4 cm² of the forehead into water vapour.

Answer: [2]

- (e) Explain fully why the body produces more sweat during physical activity.

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..... [3]

- 2 The table below shows the total number of deaths from lung cancer and from all other causes in the United Kingdom in 1990.

Age Group	Men		Women	
	lung cancer	all causes	lung cancer	all causes
all ages	26 924	314 601	12 345	327 198
0 – 34 years	15	13 108	19	6 870
35 – 69 years	12 120	106 638	5 685	67 970

(a) How many women died from lung cancer in 1990?
 [1]

(b) What percentage of deaths of men aged 0 – 34 years were caused by lung cancer?
 Give your answer to two decimal places.

Answer..... [2]

(c) Suggest three reasons why the total number of deaths from lung cancer is much lower in the 0 – 34 age group than in the 35 – 69 age group.

- 1
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- 2
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- 3
- [3]

(d) Explain the effect smoking may have on the development of a fetus in a pregnant woman who smokes.

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..... [3]

(e) What other information would be useful to scientists investigating the link between smoking and lung cancer?

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..... [1]

End of Section B

END OF PAPER