Write your name here

Surname	Other names

Centre Number | Candidate Number

Edexcel GCE

Biology

Advanced

Unit 6B: Practical Biology and Investigative Skills

Monday 16 January 2012 – Morning
Time: 1 hour 30 minutes

Paper Reference
6BI08/01

You must have:
Ruler, Calculator, HB Pencil

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Write your answers in the spaces provided in this question paper – *there may be more space than you need.*

Information

- You will be assessed on your ability to organise and present information, ideas, descriptions and arguments clearly and logically, including your use of grammar, punctuation and spelling.
- The total mark for this paper is 50.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*
- Any blank pages are indicated.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

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P 3 9 5 0 8 A 0 1 1 6

PEARSON

Answer ALL questions.

1 Seeds contain a plant embryo and a food supply. Cell growth in the seeds will begin when the temperature and moisture conditions are favourable. During cell growth, enzymes break down the stored food supply and ATP is generated by respiration.

(a) Describe an experiment to investigate the effect of temperature (the independent variable) on the rate of respiration in seeds.

(5)

(b) (i) State **two** variables, other than temperature, which could affect the investigation.

(2)

(ii) Choose **one** of the variables from (b)(i). Suggest how this variable could have been controlled. Describe what effect it could have had on the results if it had not been controlled.

(2)

Variable .....

How to control the variable .....

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Effect on the results if the variable had not been controlled .....

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(c) If the seeds had not been exposed to any oxygen during this investigation, suggest the effect this may have on the results. Give an explanation for your answer.

(3)

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(Total for Question 1 = 12 marks)

2 A student investigated the effect of caffeine concentration on the heart rate of animals.

He selected five *Daphnia* (A to E), and measured the heart rate, in beats per minute, of each of them in water. This was repeated using six concentrations of caffeine solution (0.01%, 0.1%, 0.5%, 1.0%, 2.0%, 5.0%).

A copy of his raw results (starting from water (0%) on the left increasing to 5% caffeine solution on the right) for each *Daphnia* is shown below.

A 176, 240, 256, 260, 268, 274, 282.

B 178, 238, 256, 262, 270, 282, 274.

C 184, 244, 260, 264, 270, 278, 284.

D 172, 236, 248, 254, 260, 270, 278.

E 182, 246, 264, 266, 268, 272, 286.

(a) Write a suitable **null** hypothesis for this investigation.

(1)

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(b) State and explain **one** ethical reason why the student chose to use *Daphnia* for this investigation.

(2)

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(c) Calculate the mean heart rates for each concentration of caffeine.

(3)

Mean heart rate at 0.0% caffeine concentration .....

Mean heart rate at 0.01% caffeine concentration .....

Mean heart rate at 0.1% caffeine concentration .....

Mean heart rate at 0.5% caffeine concentration .....

Mean heart rate at 1.0% caffeine concentration .....

Mean heart rate at 2.0% caffeine concentration .....

Mean heart rate at 5.0% caffeine concentration .....

(d) Prepare a table to display the raw data and your calculated values for the mean heart rates.

(3)

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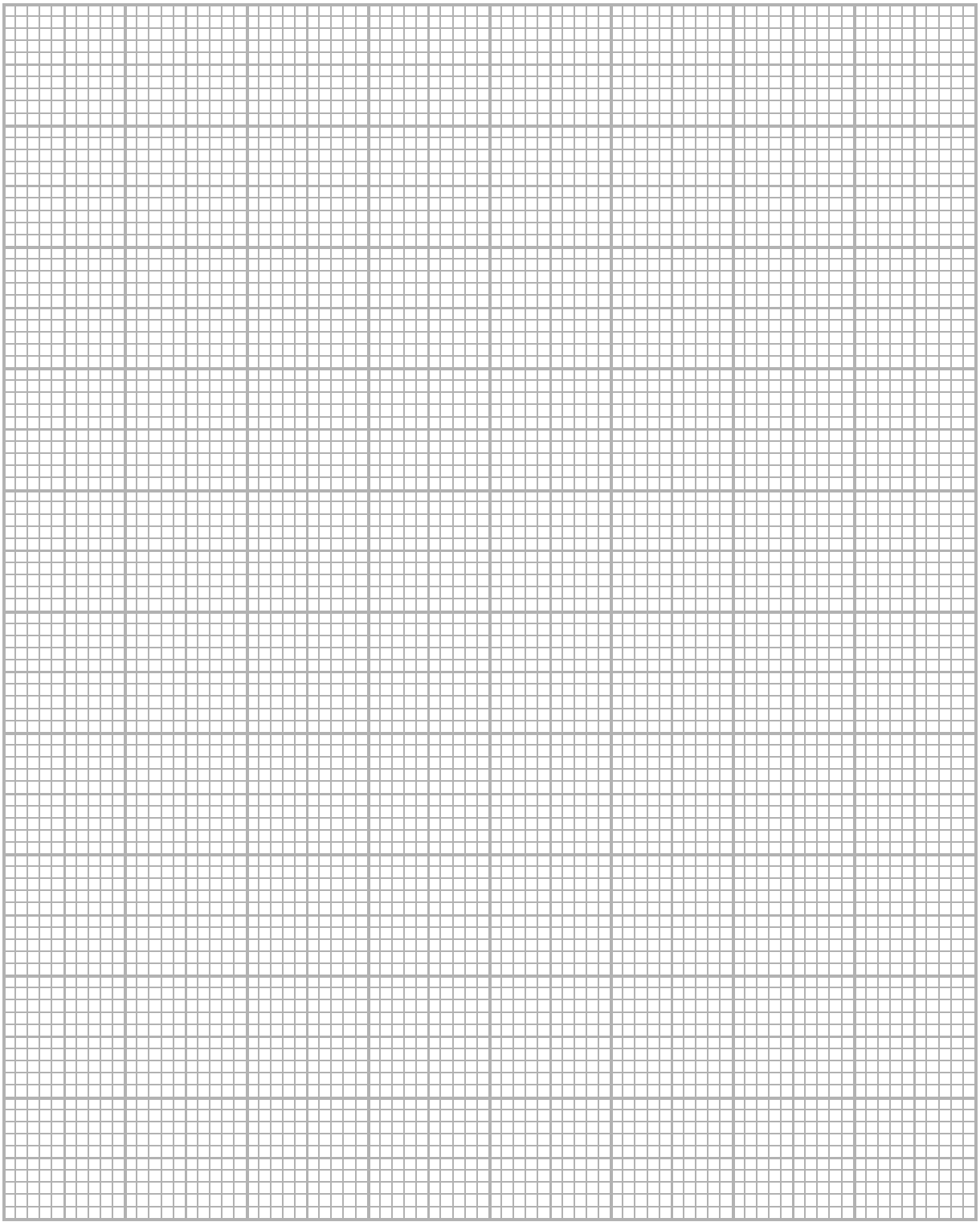
(e) On the graph paper below, draw a suitable graph to illustrate the effect of caffeine concentration on the mean heart rate of *Daphnia*.

(3)



(f) The student used a statistical test to investigate the significance of the correlation between the mean heart rates and the caffeine concentrations.
His calculation gave a correlation value of 1.00.

The table below shows significance levels and correlation values for this statistical test.

Number of means	Significance level (p)				
	0.50	**0.20**	**0.10**	**0.05**	**0.01**
4	0.60	1.00	–	–	–
5	0.50	0.80	0.90	–	–
6	0.37	0.66	0.83	0.89	1.00
7	0.32	0.57	0.71	0.79	0.93
8	0.31	0.52	0.64	0.74	0.88
9	0.27	0.48	0.60	0.70	0.83
10	0.25	0.46	0.56	0.65	0.79

What conclusions can be drawn from this investigation?

Use the information provided in the table above and in the graph you have drawn, together with your knowledge and understanding, to **explain** your answer.

(4)

(Total for Question 2 = 16 marks)

3 When scientists genetically modify a plant to contain a useful gene, they usually produce clones of the plant for further testing and evaluation.

Plant tissue culture can be used to grow a large number of clones from small pieces of plant tissue. Plant growth regulators are used in tissue cultures to control the growth of the plant tissue.

Plan an investigation to test the following hypothesis: '*The higher the concentration of a plant growth regulator the greater the rate of growth of the plant tissue.*'

Your answer should give details under the following headings.

(a) A consideration of whether there are any safety issues that you would need to take into account.

(2)

(b) Suggestions for preliminary work that you might undertake to ensure your proposed method would provide meaningful data.

(3)

(c) A detailed method including an explanation of how important variables are to be controlled or monitored.

(10)

(d) A clear explanation of how your data are to be recorded, presented and analysed in order to draw conclusions from your investigation.

(4)

(e) The limitations of your proposed method.

(3)

(Total for Question 3 = 22 marks)

TOTAL FOR PAPER = 50 MARKS

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