Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel
International
Advanced Level

Centre Number | | | | | |

Candidate Number | | | | |

Thursday 8 November 2018

Morning (Time: 1 hour 30 minutes) | Paper Reference **WBI06/01**

Biology

Advanced

Unit 6: Practical Biology and Investigative Skills

You must have:
Calculator, HB pencil, ruler

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.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*

Information

- 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.*
- 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.
- Candidates may use a calculator.

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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Pearson

Answer ALL questions.

1 *Daphnia* is a freshwater animal. *Daphnia* is transparent and the heart can be seen beating.

The photograph below shows *Daphnia*.

Magnification ×20

Daphnia can be affected by pesticides in freshwater.

Pyrethrum is a pesticide obtained from plants.

Permethrin is a synthetic pesticide with a similar structure to pyrethrum.

(a) Describe an experiment to compare the effect of these two pesticides on the heart rate of *Daphnia*.

(5)

(b) (i) State **one** abiotic variable and **one** biotic variable, other than the independent variable, that could affect this experiment.

(2)

Abiotic variable .....

.....

Biotic variable .....

.....

(ii) Choose **one** of the variables in (b)(i). Explain how this variable could be controlled. Describe what effect it could have on the results if it is not controlled.

(2)

Variable .....

How this variable is controlled.

.....

.....

.....

Effect it could have on the results if it is not controlled.

.....

.....

.....

(c) Suggest how these pesticides could enter *Daphnia* and cause a change in the heart rate.

(3)

(Total for Question 1 = 12 marks)

2 Bile salts are produced by the livers of mammals. Bile salts are released into the intestine and aid digestion.

A student investigated the effect of bile salts on the release of the red pigment contained in beetroot cells.

The student prepared cylinders of beetroot and placed them in solutions containing different concentrations of bile salts at 30 °C.

The cylinders were left for 20 minutes.

The cylinders were then removed and the colour of each solution was measured. The colour was measured by shining a light through the solution and recording the amount of light absorbed (absorbance).

This investigation was repeated three times for each concentration of bile salts.

The raw data are shown below.

Concentration of bile salts	0.2%	absorbance a.u.	13	14	12
Concentration of bile salts	0.4%	absorbance a.u.	28	27	23
Concentration of bile salts	0.6%	absorbance a.u.	31	23	33
Concentration of bile salts	0.8%	absorbance a.u.	35	42	34
Concentration of bile salts	1.0%	absorbance a.u.	49	46	40

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

(2)

.....

.....

.....

.....

(b) Calculate the mean absorbance for each concentration of bile salts.

Prepare a suitable table to display the **raw data** and your calculated **means** for each concentration of bile salts.

(3)

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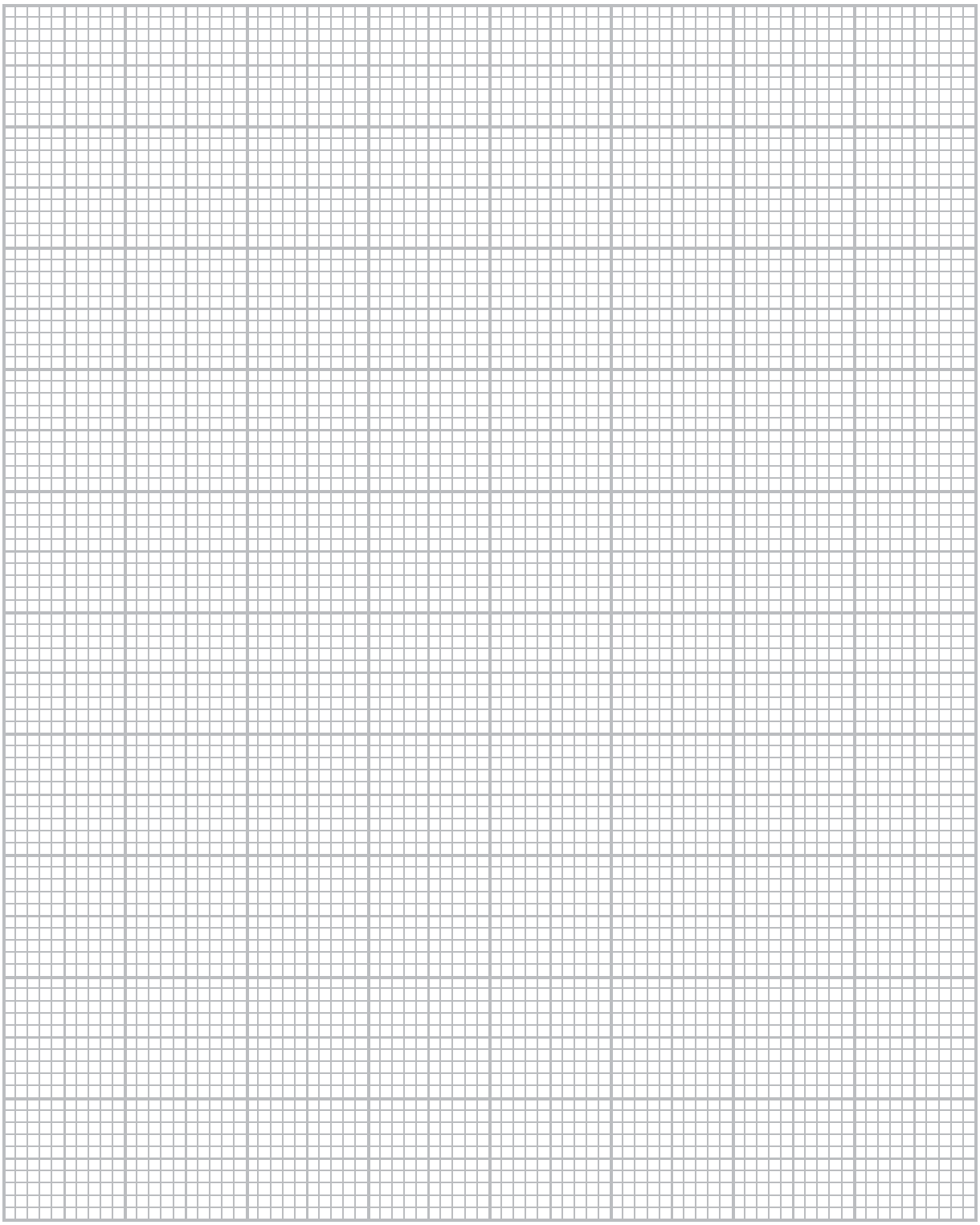
Question 2 continues on the next page

(c) On the graph paper below, draw a suitable graph to show the mean absorbance for each concentration of bile salts.

Include an indication of the variability of the data.

(3)



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(d) The student used the Spearman's rank correlation (***r***) to analyse the data.

The student obtained a value of 0.95 for ***r***.

The table below shows some critical values for the Spearman's rank correlation.

Significance level (p)	0.1	0.05	0.01	0.001
Critical value of *r*	0.39	0.48	0.65	0.79

What conclusion can be drawn from this investigation?

Using your graph and the information given in the table of critical values, explain your answer.

(4)

(e) Comment on the validity of this investigation and of the results obtained.

(4)

(Total for Question 2 = 16 marks)

3 Glaciers are made of ice.

When the ice melts, the glacier shrinks and leaves rock particles on the exposed surface.

The photograph below shows a plant colonising the exposed surface.

A student formed the following hypothesis:

The abundance of plant species increases as the distance from the front edge of this glacier increases.

Plan an investigation to obtain evidence to support or reject this hypothesis.

Your answer should give details under the following headings.

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

(2)

(b) Suggestions for preliminary practical 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)

[2 marks are available in this section for the quality of written communication.]

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

(4)

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(e) The limitations of your proposed method.

(3)

(Total for Question 3 = 22 marks)

TOTAL FOR PAPER = 50 MARKS

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