

Write your name here

Surname

Other names

**Pearson Edexcel**  
**International**  
**Advanced Level**

Centre Number

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Candidate Number

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# Biology

**International Advanced Level**

**Unit 6: Practical Skills in Biology II**

Sample Assessment Materials for first teaching September 2018

**Time: 1 hour 20 minutes**

Paper Reference

**WBI16/01**

**You must have:**

Scientific calculator, ruler, HB pencil

Total Marks

## Instructions

- Use **black** ink or **black** 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.*
- **Show all your working in calculations and include units where appropriate.**

## 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.*

## Advice

- Read each question carefully before you start to answer it.
- 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.**

**Write your answers in the spaces provided.**

- 1** The photograph shows a germinating pea seed.



© Bblickrwinkel / Alamy Stock Photo

Magnification  $\times 2.0$

The embryo in a seed will start to grow when temperature and moisture conditions are favourable.

The seed contains a food supply which is broken down by enzymes. This provides substrates for respiration.

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- (a) Describe an experiment to investigate the effect of temperature on the rate of respiration of germinating pea seeds.

(5)

- (b) State two variables, other than the independent variable, that could affect this experiment.

(2)

(c) Name one of the variables you have identified in (b).

Variable .....

(i) State how this variable could be controlled.

(1)

(ii) Suggest what effect not controlling this variable could have on the results.

(1)

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2 The photograph shows *Daphnia*, a freshwater animal.



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Magnification  $\times 20$

*Daphnia* is transparent and the heart can be seen beating.

A student investigated the effect of caffeine concentration on the heart rate of *Daphnia*.

The student selected five *Daphnia*: A, B, C, D and E. The student measured the heart rate, in beats per minute (bpm), of each *Daphnia* in water.

This was repeated using five different concentrations of caffeine solution: 0.1%, 0.5%, 1.0%, 2.0% and 5.0%.

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The table shows the data from this investigation.

| <i>Daphnia</i>      | Concentration of caffeine (%) |     |     |     |     |     |
|---------------------|-------------------------------|-----|-----|-----|-----|-----|
|                     | 0.0                           | 0.1 | 0.5 | 1.0 | 2.0 | 5.0 |
| A                   | 176                           | 257 | 259 | 268 | 274 | 282 |
| B                   | 178                           | 256 | 260 | 270 | 282 | 274 |
| C                   | 184                           | 262 | 264 | 270 | 278 | 285 |
| D                   | 172                           | 248 | 251 | 260 | 270 | 278 |
| E                   | 182                           | 264 | 258 | 272 | 272 | 286 |
| mean heart rate/bpm | 178                           | 261 | 258 | 267 | 275 |     |

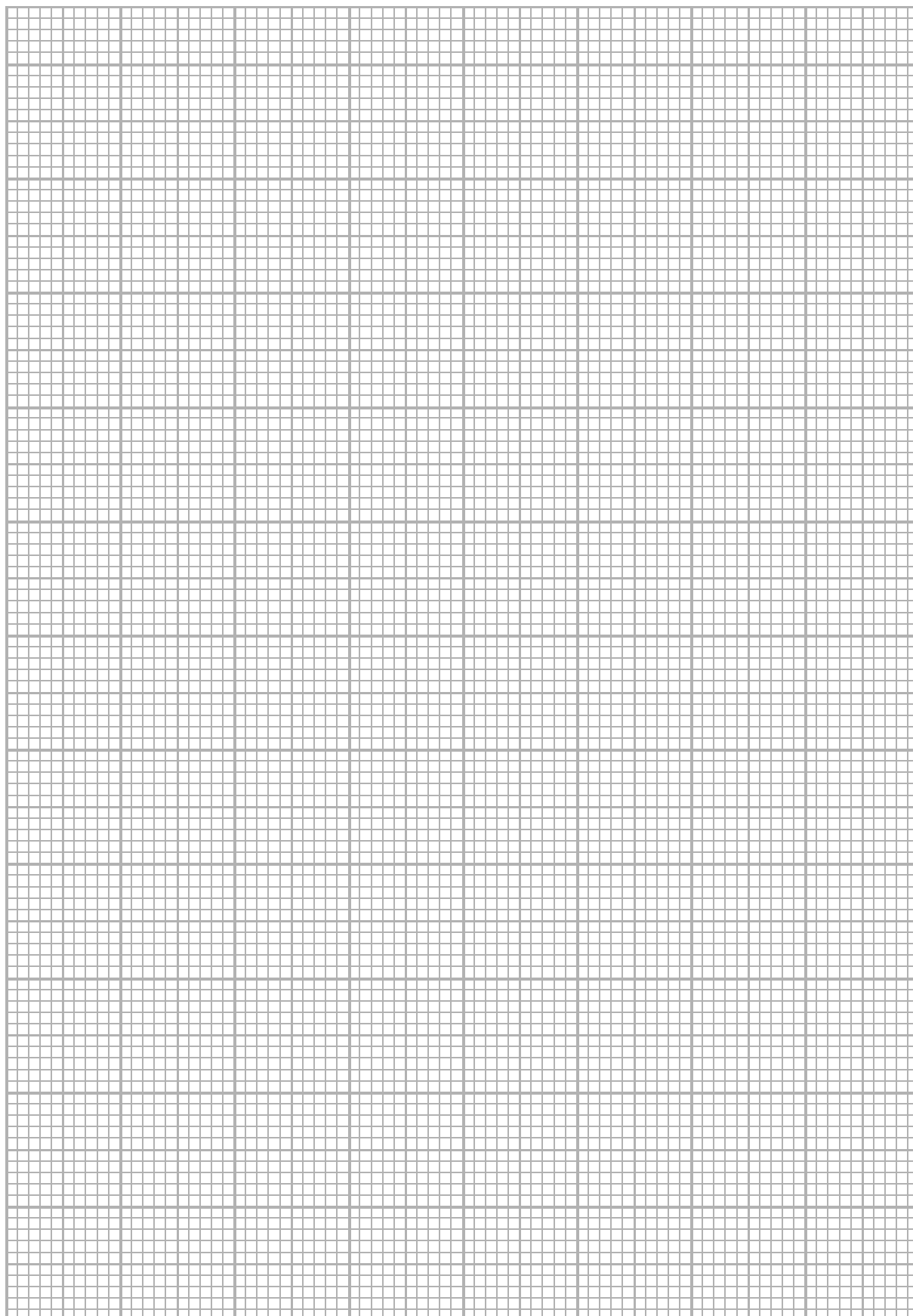
(a) Calculate the mean heart rate (bpm) for the 5.0% caffeine concentration.

(1)

Answer.....bpm

- (b) Plot a suitable graph to show the effect of caffeine concentration on the mean heart rate of *Daphnia*.

(3)



(c) State a suitable null hypothesis for this investigation.

(2)

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(d) Explain one ethical reason why the student chose to use *Daphnia* for this investigation.

(2)

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- (e) The student used a statistical test to investigate the significance of the correlation between the mean heart rate and the caffeine concentration.

To calculate the correlation coefficient, the student produced the following table.

| Caffeine concentration<br>% (a) | Mean heart<br>rate (b) | Rank a | Rank b | <i>d</i> |
|---------------------------------|------------------------|--------|--------|----------|
| 0.0                             | 178                    | 1      | 1      | 0        |
| 0.1                             | 261                    | 2      | 3      | -1       |
| 0.5                             | 258                    | 3      | 2      | 1        |
| 1.0                             | 267                    | 4      | 4      | 0        |
| 2.0                             | 275                    | 5      | 5      | 0        |
| 5.0                             |                        | 6      | 6      | 0        |

- (i) Calculate the correlation coefficient,  $r_s$ , using the formula:

(3)

$$r_s = 1 - \frac{6 \sum d^2}{n(n^2 - 1)}$$

Where:

$\Sigma$  = the sum of

$d$  = the difference between each pair of ranks

$n$  = the size of the sample (number of pairs of values)

Answer.....

(ii) The table shows some critical values for this statistical test.

| Number of pairs of values | Level of significance (p) |       |       |
|---------------------------|---------------------------|-------|-------|
|                           | 0.10                      | 0.05  | 0.01  |
| 4                         | 1.000                     | –     | –     |
| 5                         | 0.900                     | 1.000 | –     |
| 6                         | 0.829                     | 0.886 | 1.000 |
| 7                         | 0.714                     | 0.786 | 0.929 |
| 8                         | 0.643                     | 0.738 | 0.881 |
| 9                         | 0.600                     | 0.700 | 0.833 |
| 10                        | 0.564                     | 0.648 | 0.794 |

Explain how the student could use the graph and the statistical test to draw conclusions from this investigation.

(5)

(Total for Question 2 = 16 marks)

**3** Germinating cereal grains, such as barley, produce the enzyme amylase.

The production of amylase is affected by gibberellin, a plant growth regulator.

A student formed the following hypothesis.

The higher the concentration of gibberellin, the greater the production of amylase by germinating cereal grains.

Plan an investigation to test this hypothesis.

(a) State two safety issues you would need to take into account.

(2)

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- (b) Describe preliminary practical work that you might undertake to ensure your proposed method would provide quantitative results.

(3)

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(c) Devise a detailed method, including an explanation of how you would control and monitor important variables.

(10)

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(4)

[illegible]

(e) Suggest three limitations of your proposed method.

(3)

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**(Total for Question 3 = 22 marks)**

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**TOTAL FOR PAPER = 50 MARKS**