www.dynamicpapers.com

Write your name here

Surname	Other names

Centre Number | Candidate Number

Edexcel GCE

Biology

Advanced

Unit 5: Energy, Exercise and Coordination

Tuesday 31 January 2012 – Afternoon
Time: 1 hour 45 minutes

Paper Reference
6BI05/01

You must have:
A copy of the scientific article taken from The Biologist articles (enclosed)

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 90.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (*) are ones where the quality of your written communication will be assessed
  – *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

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 ▶

P39506A

©2012 Pearson Education Ltd.

1/1/1/1/1/

P 3 9 5 0 6 A 0 1 2 4

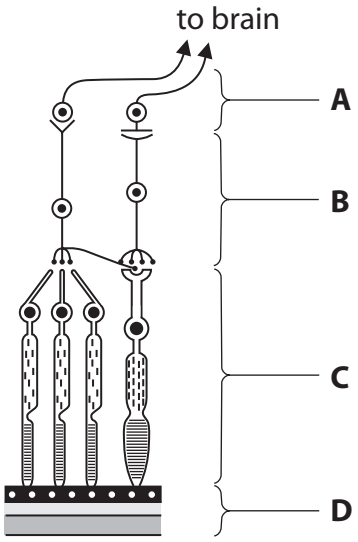
PEARSON

www.dynamicpapers.com

Answer ALL questions.

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

1 The diagram below shows the position of some of the cells in the retina of the eye.



(a) Place a cross in the box ☒ next to the correct letter to complete each of the following statements.

(i) Rod cells are found in the layer labelled

(1)

☒ **A** ☒ **B** ☒ **C** ☒ **D**

(ii) The neurones of the optic nerve begin in the layer labelled

(1)

☒ **A** ☒ **B** ☒ **C** ☒ **D**

(iii) In this diagram of the retina, the light would pass through from

(1)

☒ **A** bottom to top

☒ **B** left to right

☒ **C** right to left

☒ **D** top to bottom

www.dynamicpapers.com

(b) The macula is the central part of the retina in the eye.
Macular degeneration is a common cause of blindness.

Recent research has shown that macular degeneration in adult mice can be successfully treated. This involves injecting embryonic stem cell-derived photoreceptors into their retinas.

(i) Suggest why this sort of treatment might not restore vision in people with macular problems who have been blind from an early age.

(3)

(ii) Suggest why this type of treatment for blindness in humans could be regarded as controversial.

(2)

www.dynamicpapers.com

(c) A group of scientists proposed to investigate a treatment for people who have been blind from an early age.

This investigation involves kittens having their eyes kept shut immediately after birth. After 12 weeks, their eyes will be opened and stem cells injected into the cerebral hemispheres of their brains.

These kittens will then be raised for two years in a constant environment and the development of their retinas will be compared with a control group.

(i) Suggest why the stem cells will be injected into the cerebral hemispheres.

(2)

.....

.....

.....

.....

.....

.....

(ii) Suggest why the environment should be kept constant in this investigation.

(2)

.....

.....

.....

.....

(Total for Question 1 = 12 marks)

www.dynamicpapers.com

2 Florence (Flo-Jo) Griffith-Joyner's world record of 10.49 seconds for the 100 m women's sprint in 1988 is unbeaten.



In this short time, a sprinter such as Flo-Jo could not deliver enough oxygen to her muscles to maintain aerobic respiration.

* (a) Describe how a sprinter is able to release sufficient energy for the 100 m sprint without having enough oxygen available for her muscles.

(6)

www.dynamicpapers.com

(b) (i) Lactate (lactic acid) can build up in the muscles of a sprinter.
Suggest why the build-up of lactate may prevent any further increase in speed.

(2)

(ii) Explain the fate of lactate following a sprint.

(4)

(Total for Question 2 = 12 marks)

www.dynamicpapers.com

3 The table below shows information about the top ten fastest men and women in both the 100 m sprint and the marathon race of 42.2 km.

Race	Mean speed / m s^{-1}	Standard deviation
Men's 100 m sprint	10.22	0.10
Women's 100 m sprint	9.35	0.08
Men's marathon	5.65	0.02
Women's marathon	5.06	0.05

(a) (i) Give reasons why the data in the table may be considered to be reliable.

(2)

.....

.....

.....

.....

.....

.....

(ii) For the marathon, the women's mean speed is 89.6% of the men's mean speed.

For the 100 m sprint, calculate the women's mean speed as a percentage of the men's mean speed.
Show your working.

(2)

Answer = ...%

www.dynamicpapers.com

(iii) Using the information in the table, describe the difference between the mean speeds for men and women for the 100 m sprint.
Suggest a reason for the difference.

(2)

.....

.....

.....

.....

.....

.....

(b) Suggest why the mean speeds for the marathon are less than the 100 m sprint for both men and women.

(3)

.....

.....

.....

.....

.....

.....

.....

.....

(Total for Question 3 = 9 marks)

www.dynamicpapers.com

BLANK PAGE

QUESTION 4 STARTS ON THE NEXT PAGE

www.dynamicpapers.com

4 A study examined the risk of developing a mental disorder.
This study determined the risk for both the population as a whole and for those who had a close relative (parent, brother, sister or child) with the same disorder.

The results are shown in the table below.

Mental disorder	Risk of developing mental disorder (%)		
	Population as a whole		Those with a close relative with the same disorder
	Males	Females	
Alcoholism	7.0	2.0	15
Anxiety	3.0	6.0	15
Manic depression	2.0	3.0	15
Neurotic depression	6.0	12.0	11
Obsessive compulsive	0.1	0.1	10
Schizophrenia	1.0	1.0	10

(a) (i) People with obsessive compulsive disorder (OCD) have symptoms such as repeated washing, checking, touching, counting or arranging.

Using the data in this table, give the evidence that OCD is an inherited condition.

(2)

.....

.....

.....

.....

.....

.....

www.dynamicpapers.com

(ii) Using the data in the table, explain the validity of the statement that 'OCD is an inherited condition'.

(2)

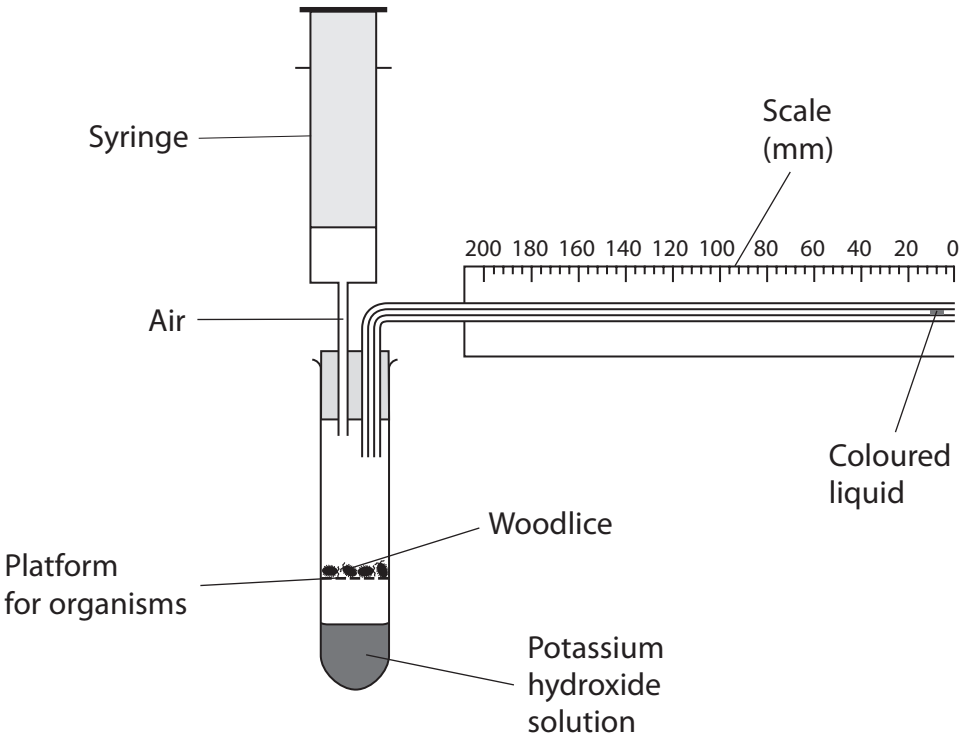
(iii) Using the data in the table, state which disorder is least likely to be an inherited condition.
Give a reason for your answer.

(2)

(Total for Question 4 = 6 marks)

www.dynamicpapers.com

5 The apparatus shown in the diagram below can be used to measure the rate of respiration of small animals such as woodlice.



(a) (i) Potassium hydroxide solution absorbs carbon dioxide.
Suggest a reason for absorbing carbon dioxide in this apparatus.

(1)

.....

.....

.....

(ii) Suggest what the syringe is used for in this apparatus.

(2)

.....

.....

.....

.....

www.dynamicpapers.com

*(b) Describe how this apparatus could be used to find the mean rate of respiration of woodlice.

(6)

(Total for Question 5 = 9 marks)

www.dynamicpapers.com

6 Muscles, bones and joints allow movement of the skeleton.

(a) Place a cross in the box ☒ next to the correct word to complete each of the following statements.

(i) Muscles are attached to bones by

(1)

☒ **A** cartilage

☒ **B** ligaments

☒ **C** synapses

☒ **D** tendons

(ii) In a joint, bones are joined to each other by

(1)

☒ **A** cartilage

☒ **B** ligaments

☒ **C** synapses

☒ **D** tendons

(iii) Muscles that work in pairs across a joint are known as

(1)

☒ **A** agonists

☒ **B** antagonists

☒ **C** extensors

☒ **D** flexors

(iv) In key-hole surgery, cruciate ligaments are repaired using tissue from

(1)

☒ **A** bones

☒ **B** cartilage

☒ **C** ligaments

☒ **D** tendons

(v) Fast twitch muscle fibres have

(1)

☒ **A** few capillaries

☒ **B** high myoglobin content

☒ **C** low glycogen content

☒ **D** many mitochondria

www.dynamicpapers.com

(vi) Slow twitch muscle fibres

(1)

☒ **A** fatigue quickly

☒ **B** have no myoglobin

☒ **C** have low glycogen content

☒ **D** have few mitochondria

(Total for Question 6 = 6 marks)

www.dynamicpapers.com

7 In an investigation into dieting and obesity, mice were fed a restricted quantity of food. It has been found that the stress of having less food causes the release of the hormone noradrenaline. This causes the mice to hunt for food.
These food-restricted mice will tolerate electric shocks in order to eat.

(a) Suggest why this investigation might be regarded as unacceptable.

(2)

(b) Noradrenaline acts by increasing blood flow to the muscles.

(i) Suggest how this increase in blood flow is brought about.

(2)

(ii) Suggest why this increase in blood flow would be of advantage to the food-restricted mice.

(2)

(Total for Question 7 = 6 marks)

www.dynamicpapers.com

8 The scientific document you have studied is adapted from an article in 'The Biologist'.

Use the information from the scientific article and your own knowledge to answer the following questions.

(a) Describe **two** symptoms of Parkinson's disease.

(2)

(b) Patients with Parkinson's disease have little of the neurotransmitter dopamine in the motor cortex of their brains.

Explain how 'dopamine agonists' might be a useful treatment for Parkinson's disease (paragraph 10).

(2)

(c) Dopamine is not given to the patients as it is not effective.
However, the precursor L-Dopa (levadopa) can be given to patients.

Suggest why L-Dopa might be a useful treatment for patients with Parkinson's disease.

(3)

www.dynamicpapers.com

(d) Describe the advantages of deep brain stimulation (DBS) to patients with Parkinson's disease who do not respond to treatment with drugs.

(3)

(e) Suggest why the 'stereotactic frame' has proved to be so useful in DBS (paragraph 22).

(2)

(f) Suggest how DBS affects the cell membranes of brain cells (paragraph 22).

(3)

www.dynamicpapers.com

(g) Explain why Jamie is able to stay awake during the operation without feeling any associated pain (paragraph 22).

(2)

(h) Suggest the advantage of Jamie being conscious during the operation.

(1)

(i) Explain how the experimental model for Parkinson's disease in monkeys was created (paragraphs 54 to 56).

(2)

(j) The subthalamic nucleus and the external segment of the globus pallidus (Table 1, paragraph 62) are connected to each other.

Suggest why this might be relevant for the DBS treatment of Parkinson's disease.

(2)

www.dynamicpapers.com

(k) Describe how fMRI can be used to monitor the activity of different areas of the brain (paragraph 62).

(3)

(l) fMRI can produce four images per second.
Explain why this is unlikely to monitor the effects of DBS (paragraph 62).

(2)

(m) Explain what is meant by the phrase 'placebo responders' (paragraph 64).

(2)

www.dynamicpapers.com

(n) Explain what is meant by the 'causal' nature of DBS (paragraph 73).

(1)

.....

.....

.....

(Total for Question 8 = 30 marks)

TOTAL FOR PAPER = 90 MARKS

www.dynamicpapers.com

BLANK PAGE

www.dynamicpapers.com

BLANK PAGE

www.dynamicpapers.com

BLANK PAGE