

Biology A (Salters Nuffield)  
Advanced  
PAPER 2: Energy, Exercise and Coordination

Friday 14 June 2024 – Morning

Time: 2 hours

Diagram Booklet

THIS DIAGRAM BOOKLET MUST BE RETURNED WITH THE QUESTION PAPER AT THE END OF THE EXAMINATION.

In the boxes below, write your name, centre number and candidate number.

|                  |  |  |  |  |  |
|------------------|--|--|--|--|--|
| Surname          |  |  |  |  |  |
| Other names      |  |  |  |  |  |
| Centre Number    |  |  |  |  |  |
| Candidate Number |  |  |  |  |  |

## INSTRUCTIONS

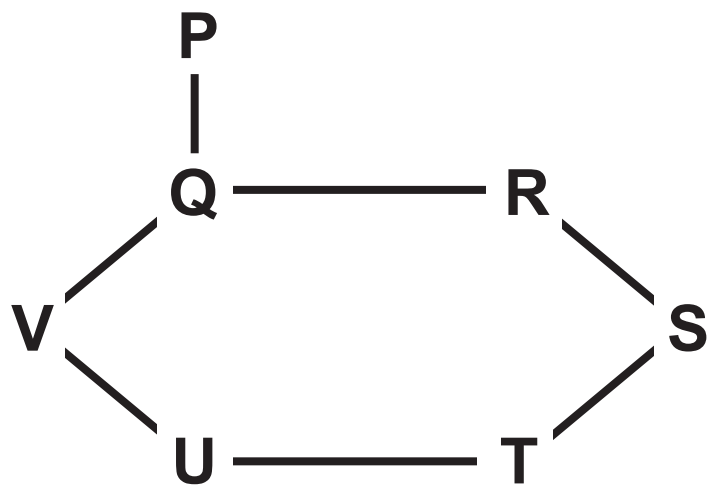
There may be spare copies of some diagrams in case you need them.

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## Question 1(a)



Question 1(b)(ii)

IMAGE 1

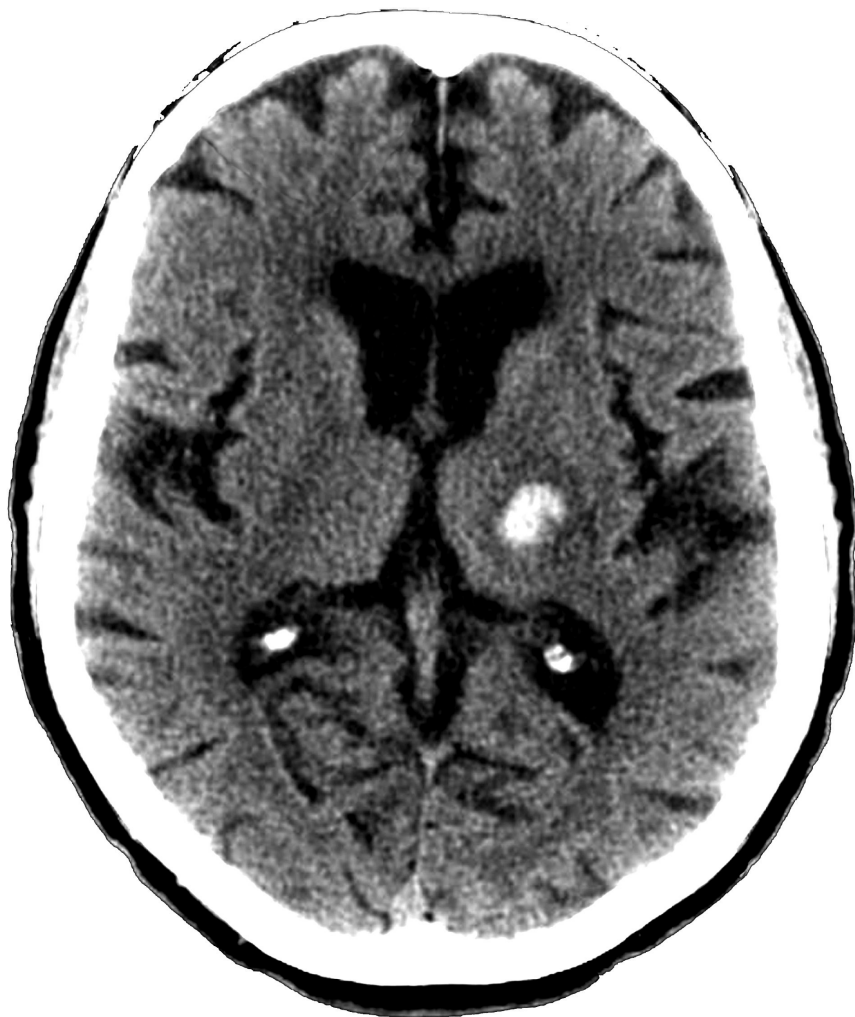
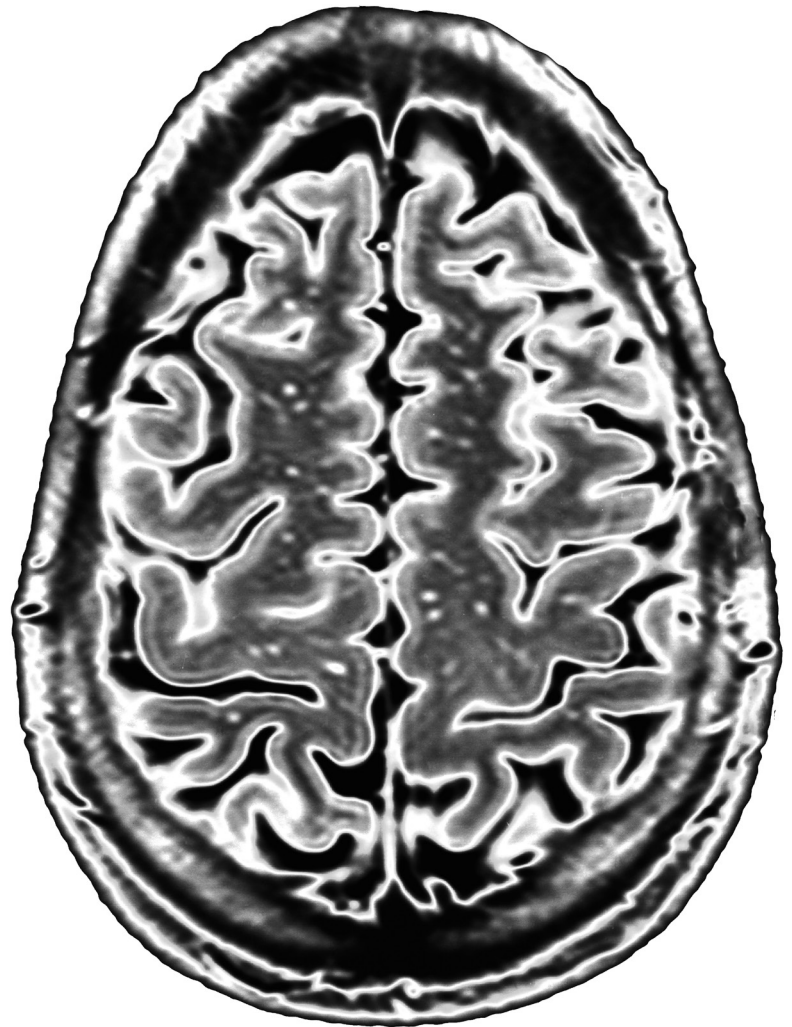
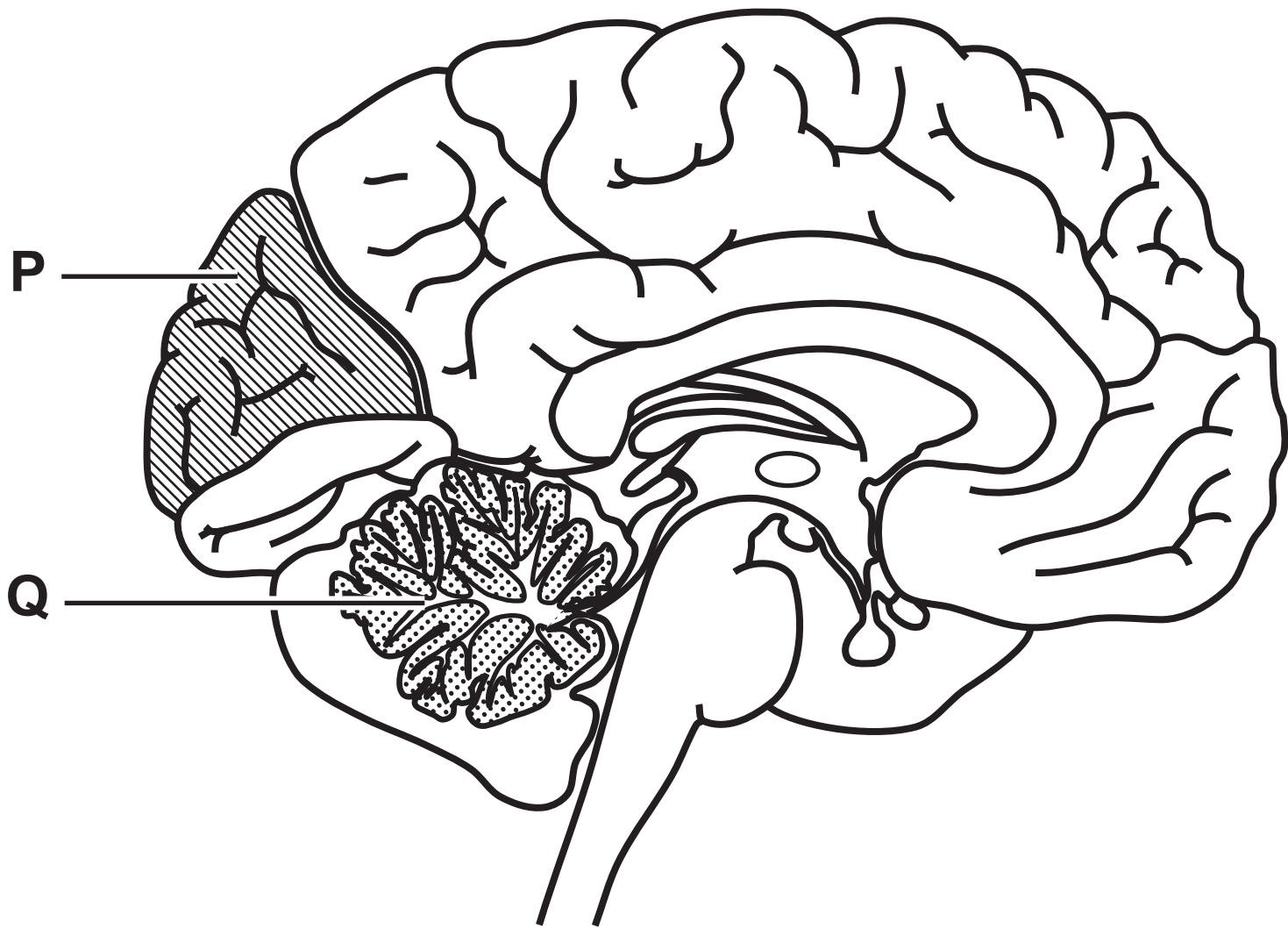


IMAGE 2

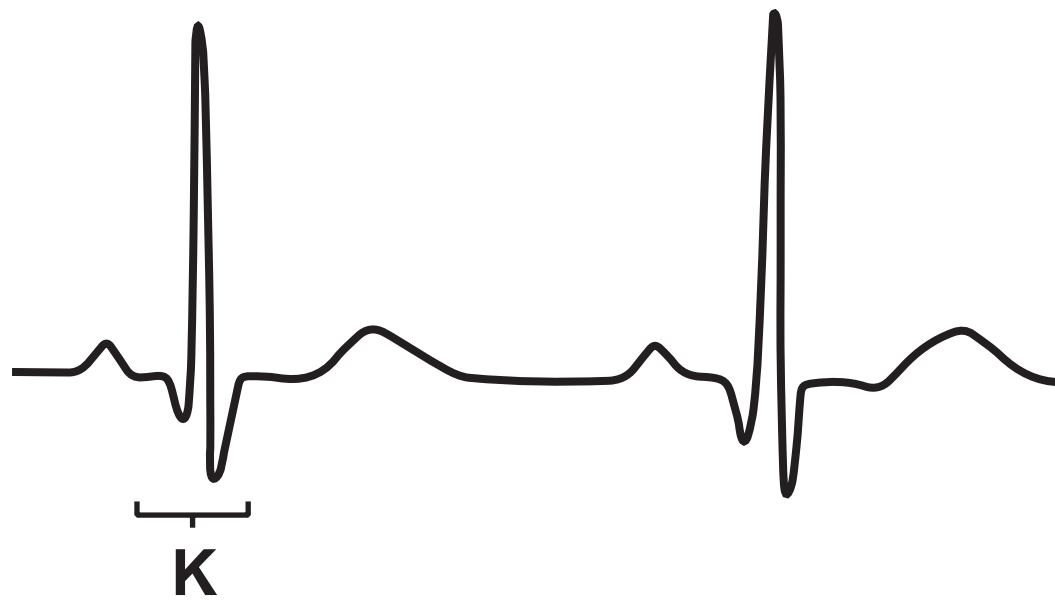


## Question 1(c)

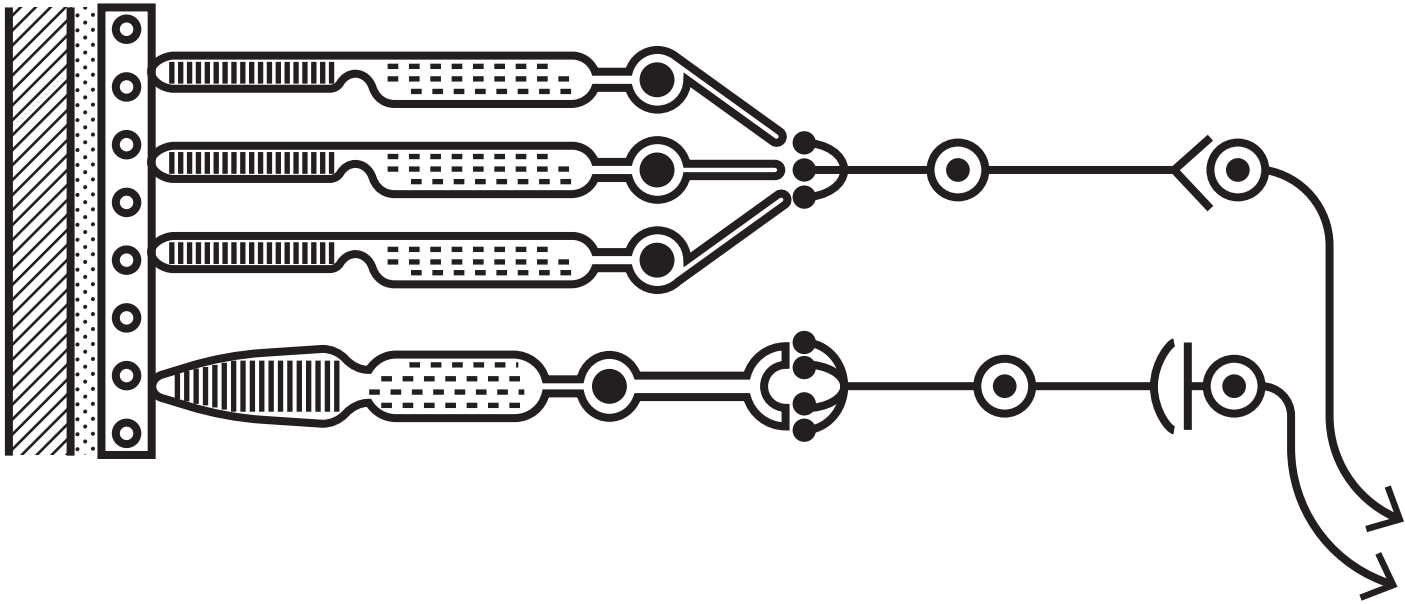


## Question 2(a)



**Question 3(b)**

## Question 7(a)

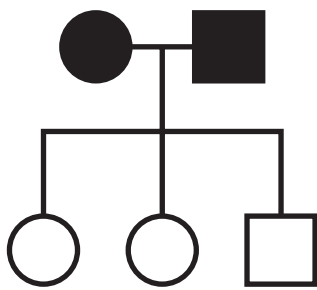


## Question 7(b)(ii)

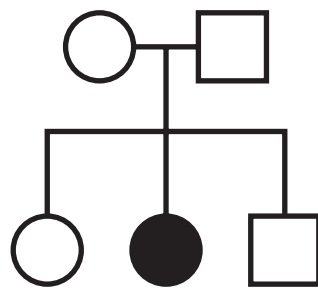
## KEY

a shaded shape shows the person has the condition

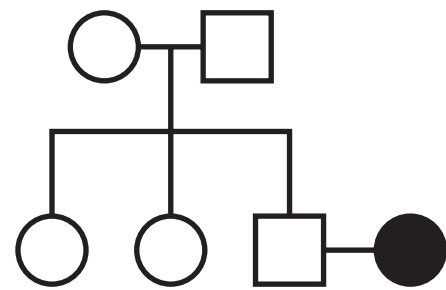
Pedigree 1



Pedigree 2



Pedigree 3



Question 7(c)(ii)

| Type of colour blindness | Number of females | Number of males |
|--------------------------|-------------------|-----------------|
| Blue                     | 1                 | 2               |
| Green                    | 10                | 91              |
| Red                      | 2                 | 25              |

## Question 9(a)(i)

| <b>Tissue</b>                 | <b>Mean concentration of TTX<br/>/ mass per gram of tissue</b> |
|-------------------------------|----------------------------------------------------------------|
| <b>Liver</b>                  | <b>0·046 mg</b>                                                |
| <b>Muscle</b>                 | <b>2·000 µg</b>                                                |
| <b>Gonad (ovary / testis)</b> | <b>0·365 mg</b>                                                |
| <b>Skin</b>                   | <b>25·000 µg</b>                                               |

Question 9(a)(ii)

|             |                                                                      |        |       |      |
|-------------|----------------------------------------------------------------------|--------|-------|------|
|             | Level of toxicity per gram of<br>pufferfish tissue / arbitrary units |        |       |      |
| Sex of fish | Liver                                                                | Muscle | Gonad | Skin |
| Female      | 126                                                                  | 4      | 398   | 18   |
| Female      | 239                                                                  | 6      | 485   | 17   |
| Female      | 112                                                                  | 4      | 350   | 16   |
| Male        | 4                                                                    | 3      | 3     | 15   |
| Male        | 4                                                                    | 3      | 4     | 17   |

Question 10

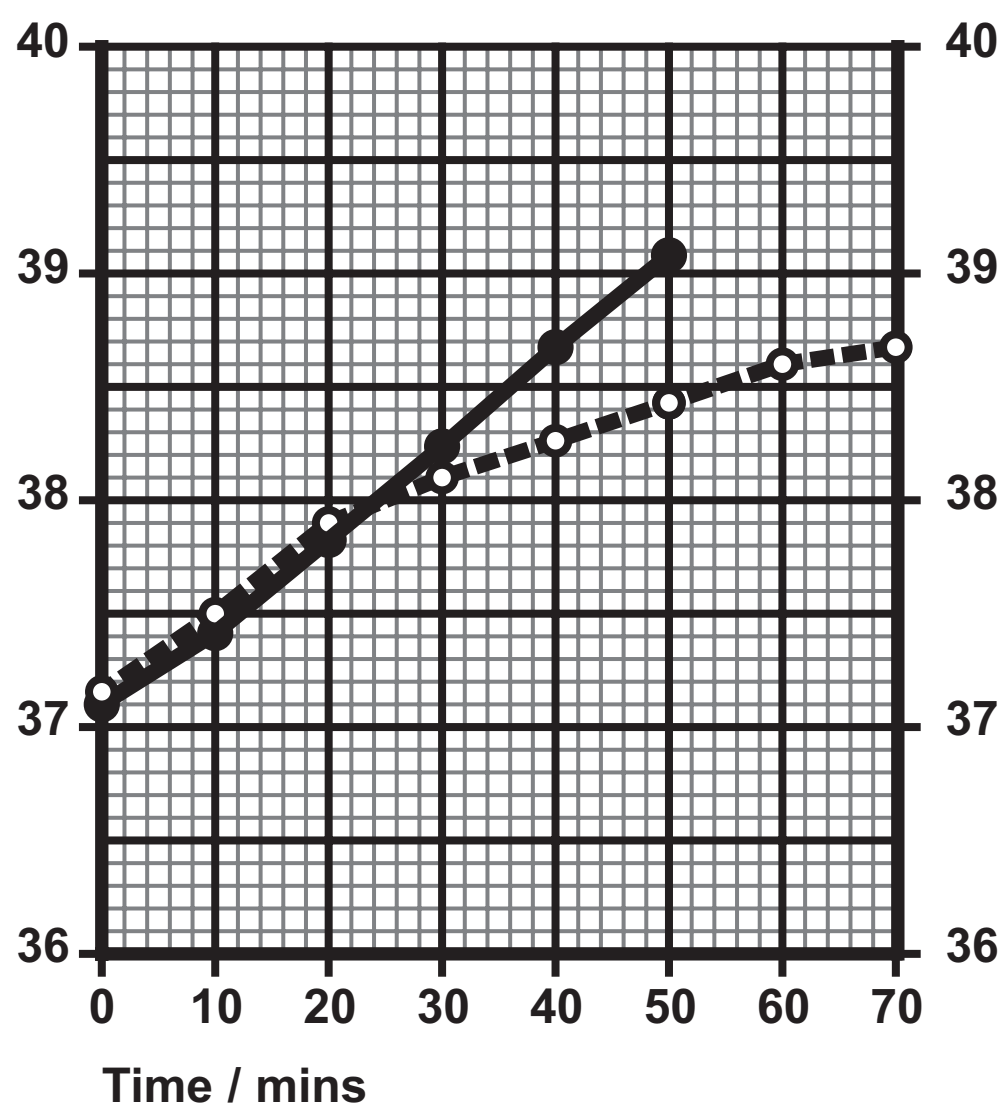
| Group based on type of sport | Total number of athletes | Number of male athletes | Mean age / years |
|------------------------------|--------------------------|-------------------------|------------------|
| Endurance (e.g. cycling)     | 27                       | 12                      | 25               |
| Mix-trained (e.g. hockey)    | 31                       | 22                      | 27               |

## Question 10(b)(ii)

## KEY

—●— exercise and warm-up at 32°C

- -○- - exercise and warm-up at 16°C

Mean core body  
temperature / °C

|               | Mean length of exercise / min |          | Mean maximum power output / a.u. |          | Mean rate of sweating / kg hour–1 |          |
|---------------|-------------------------------|----------|----------------------------------|----------|-----------------------------------|----------|
|               | at 16 °C                      | at 32 °C | at 16 °C                         | at 32 °C | at 16 °C                          | at 32 °C |
| Type of sport |                               |          |                                  |          |                                   |          |
| Endurance     | 64                            | 47       | 4·4                              | 3·7      | 0·9                               | 1·6      |
| Mix-trained   | 57                            | 40       | 3·0                              | 2·5      | 0·9                               | 1·7      |

## **Source information**

### **Question 1(b)(ii)**

**(Source: Zephyr/Science Photo Library)**

**(Source: Alfred Pasieka/Science Photo Library)**

### **Question 3(b)**

**(Source: Kateryna Kon/Science Photo Library)**