

**Wednesday 30 May 2012 – Afternoon**

**GCSE ADDITIONAL APPLIED SCIENCE**

**A191/02 Science in Society (Higher Tier)**

Candidates answer on the Question Paper.  
A calculator may be used for this paper.

**Duration: 1 hour**

**OCR supplied materials:**  
None

**Other materials required:**

- Pencil
- Ruler (cm/mm)



Candidate forename		Candidate surname	
--------------------	--	-------------------	--

Centre number						Candidate number				
---------------	--	--	--	--	--	------------------	--	--	--	--

**INSTRUCTIONS TO CANDIDATES**

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

**INFORMATION FOR CANDIDATES**

- Your quality of written communication is assessed in questions marked with a pencil (✎).
- The number of marks is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **50**.
- This document consists of **12** pages. Any blank pages are indicated.

Answer **all** the questions.

1 Mike is a talented athlete.  
He trains at the local gym.

(a) Describe the jobs of **two** qualified practitioners working at the gym who make his **training** more effective.

.....

.....

.....

..... [2]

(b) Mike does a standard fitness test for athletes.

(i) For five minutes he steps up and down on a gym bench quickly.  
He then measures his pulse rate three times at one minute intervals.

These are his results.

		pulse rate per minute
pulse rate 1	1 minute after finishing test	85
pulse rate 2	2 minutes after finishing test	73
pulse rate 3	3 minutes after finishing test	71

Use this formula to show that Mike's fitness number is close to 66.

$$\text{fitness number} = \frac{30000}{2 \times (\text{pulse rate 1} + \text{pulse rate 2} + \text{pulse rate 3})}$$

Show your working.

[2]

(ii) Mike uses this table of fitness numbers to claim that his fitness is average.

gender	excellent	above average	average	below average	poor
male	more than 90	90–80	79–65	64–55	less than 55
female	more than 86	86–76	75–61	60–51	less than 50

Is Mike justified in making this claim?

Explain your answer using information from this table.

.....

.....

..... [2]

[Total: 6]

2 Anita and Paul cannot have a baby by normal means. Anita is given IVF treatment.

(a) Look at the stages involved in IVF treatment. They are not in the correct order.

Write down the stages in the correct order. The first and last have been done for you.

- A eggs are collected
- B has counselling
- C eggs are implanted
- D make first visit to doctor
- E baby is born
- F eggs are fertilised in a glass dish
- G has hormone treatment

<b>D</b>							<b>E</b>
----------	--	--	--	--	--	--	----------

[2]

(b) Anita visits the antenatal care clinic once she is pregnant. She has an ultrasound scan, her urine is tested and her blood pressure taken.

Explain why she has each of these tests.

.....

.....

.....

.....

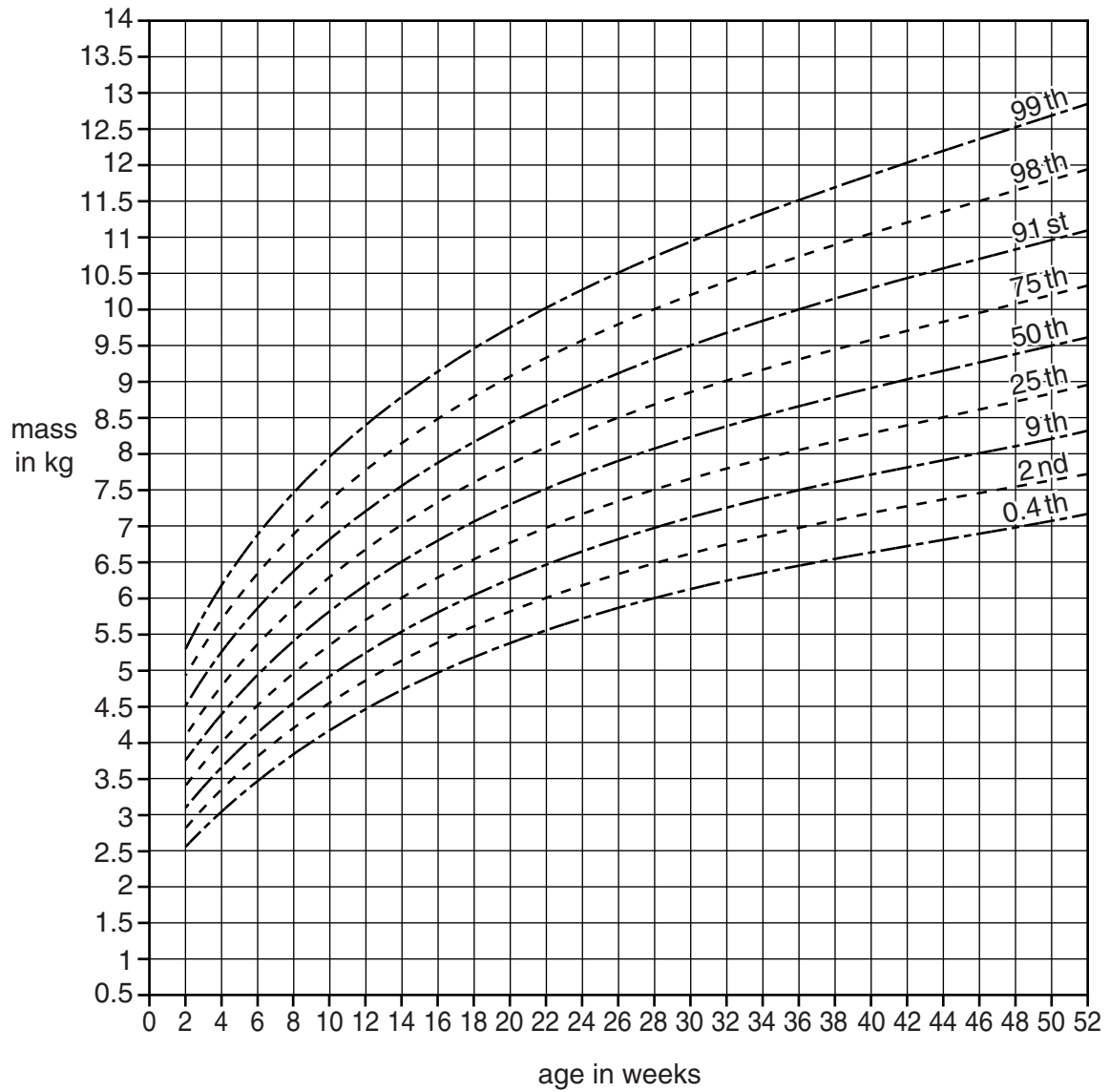
.....

.....

..... [3]



- 3 The diagram shows a growth chart, which can be used to monitor the mass of a baby boy during the first year of life.



Here is some data about a baby boy.

age of baby in weeks	mass of baby in kg
2	3.7
12	6.2
28	10.0

Explain how to use and interpret the growth chart for this baby.



*The quality of written communication will be assessed in your answer.*

.....

.....

.....

.....

.....

.....

.....

.....

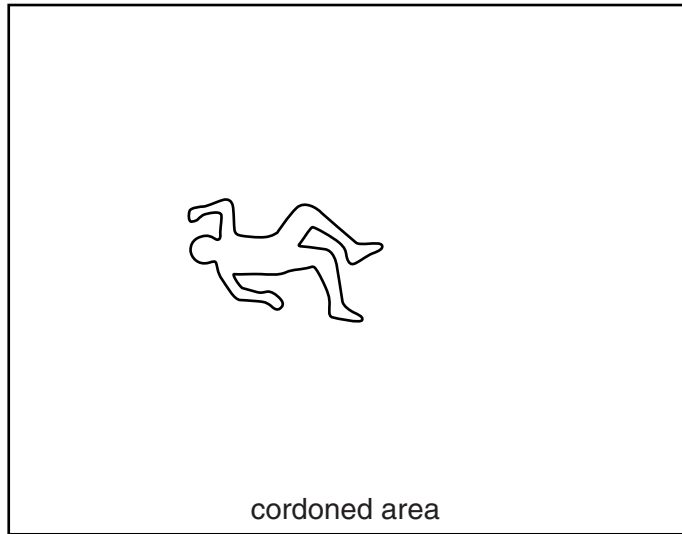
.....

.....

..... [6]

**[Total: 6]**

- 4 Scene of crime officers cordon off a crime scene. They draw this scale diagram of the crime scene.



scale  $\overline{\hspace{1cm}} \text{ 2 m}$

- (a) Use the scale to calculate the area cordoned off by the officers. Show your working.

area ..... unit ..... [2]

- (b) The officers are aware of possible uncertainty in this measurement of area. Suggest a **systematic error** and a **random error** that could occur in their measurement of the area.

.....  
.....  
..... [2]

- (c) Distinguish between the **accuracy** and **precision** of their measurements.

.....  
.....  
..... [2]

- (d) Explain why your calculated area has a greater uncertainty than your measured lengths.

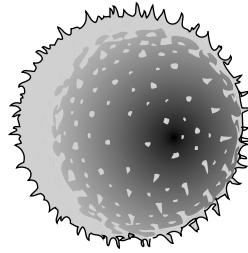
.....  
..... [2]

[Total: 8]



5 Detectives obtain samples of pollen from the scene of a crime.

They use a microscope to compare their samples with pollen from their main suspect's clothes.



Electron microscopes may have greater **resolving power** and produce images with a greater **depth of field** than light microscopes.

(a) By explaining the meaning of the words **in bold**, suggest why the detectives choose to use an electron microscope to study the pollen.



*The quality of written communication will be assessed in your answer.*

..... [6]

(b) Describe and explain the disadvantages of using an electron microscope to study samples taken from a crime scene.

..... [2]

**[Total: 8]**

6 Police authorities store DNA samples from suspects at a crime scene for possible use in court cases.

- (a) Some police officers want to produce a national DNA database of every person in the UK. Other police officers do not.

Explain the ethical implications of producing a DNA database that holds the DNA of every person in the UK.

.....  
.....  
.....  
.....  
.....  
.....  
..... [3]

- (b) Electrophoresis is useful in identifying biological molecules such as DNA.

Complete these sentences about electrophoresis.

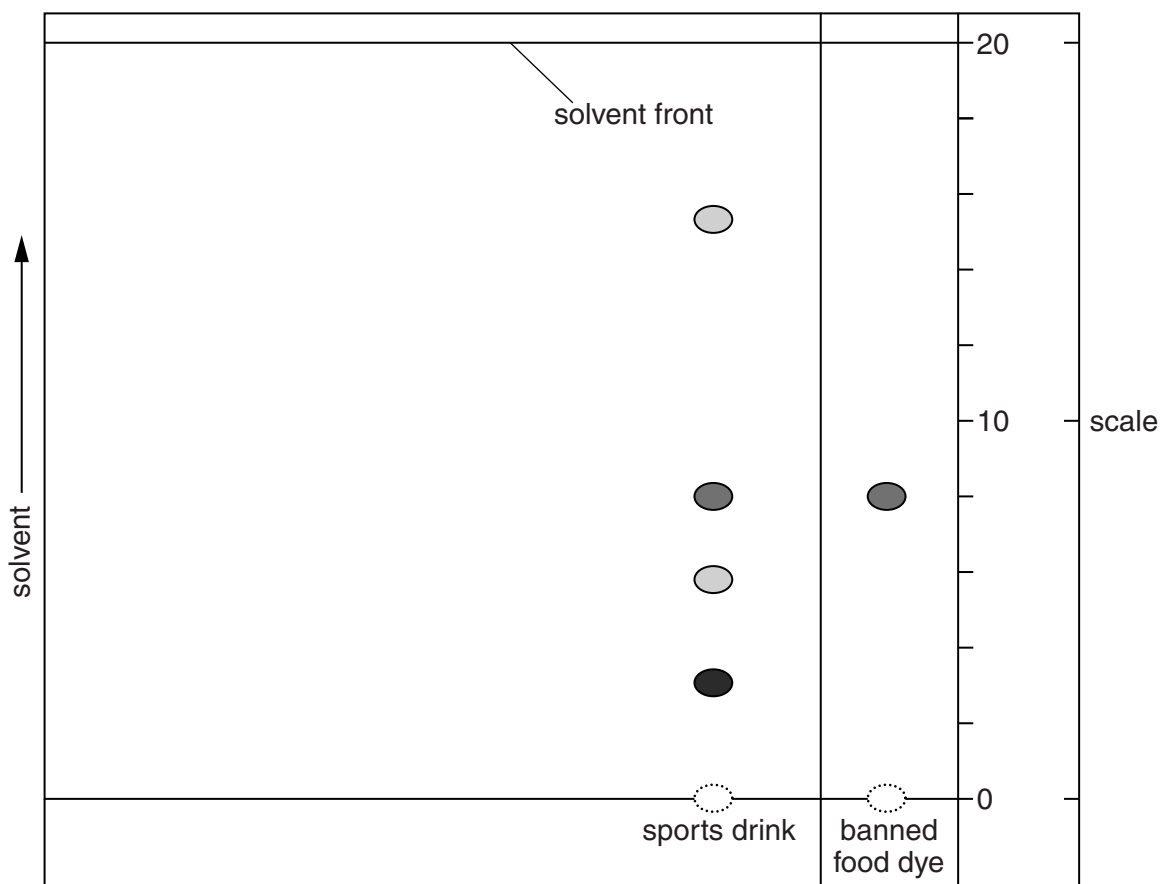
Electrophoresis separates components in a mixture.

It works because particles carry ..... Positive particles move ..... a ..... electrode.

Particles separate during electrophoresis because the particles differ in the magnitude of their ..... and their ..... [4]

[Total: 7]

7 Food scientists test a sports drink to ensure that it does not contain a banned food dye. They use paper chromatography for the test.



(a) Calculate the R<sub>f</sub> value of the banned dye. Show your working.

answer .....

[3]

(b) Suggest why your R<sub>f</sub> value does not definitely prove that the sports drink contains the banned dye.

.....

..... [1]

[Total: 4]

END OF QUESTION PAPER

**PLEASE DO NOT WRITE ON THIS PAGE**



**Copyright Information**

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website ([www.ocr.org.uk](http://www.ocr.org.uk)) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact the Copyright Team, First Floor, 9 Hills Road, Cambridge CB2 1GE.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.