THIS IS A NEW SPECIFICATION

OCR
RECOGNISING ACHIEVEMENT

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Monday 14 January 2013 – Morning

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.

OCR supplied materials:
None

Other materials required:
- Pencil
- Ruler (cm/mm)

Duration: 1 hour

MODIFIED LANGUAGE

* A 1 9 1 0 2 *

* 1 4 9 7 1 0 9 6 6 6 *

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 Gill decides to get fit.
She trains at the local gym with a fitness trainer.

(a) The trainer must always assess the risk to a client before commencing training.

Write down reasons why the trainer has to assess risk.

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

(b) The trainer needs to know Gill's body mass index (BMI).

(i) Gill is 1.8 metres tall and has a body mass of 92 kg.
Write down the BMI formula and calculate Gill's BMI.
Show your working.

Gill's BMI = ... **[3]**

(ii) Use the table to determine in which weight category Gill's BMI places her.

Weight category	BMI
underweight	<18.6
normal weight	18.6 to 24.9
overweight	25.0 to 29.9
obese	>29.9

Weight category = ... **[1]**

(iii) Suggest why the calculation of Gill's BMI may not give an accurate representation of the weight category to which she belongs.

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

[Total: 8]

2 Images of microorganisms can be collected by using either light or scanning electron microscopes. Explain the advantages and limitations of using a **scanning electron microscope** when viewing images of bacteria.

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

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..... **[6]**

[Total: 6]

3 The human body responds to changes in temperature.
A student did the following homework on how the human body controls its temperature.

> My homework – when we feel too hot
>
> 1. When we feel too hot, temperature capillaries in the skin respond to the temperature rise and send a message to our brain.
> 2. The brain sends a message to make blood vessels move towards the surface of the skin.
> 3. This causes the skin to turn pale.
> 4. The skin then absorbs heat from the surrounding air.

(a) Each sentence contains a mistake.
Identify the mistakes and write down the correct sentences.

The first one has been done for you.

When we feel too hot, temperature **receptors** in the skin respond to the temperature rise and send a message to our brain.

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

(b) When we get out of a swimming pool we usually feel cooler.
Suggest and explain why.

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

[Total: 6]

4 Tom and Jane have been unable to conceive a baby.
They decide to have IVF treatment.

Describe and explain the stages of IVF that could lead to Tom and Jane having their own child.

Quality of written communication will be assessed in your answer.

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..... **[6]**

[Total: 6]

5 Sunita would like to have a baby.
She goes to see her doctor.

(a) She has a blood test.
This is what happens when she has her blood test:

- A pressure collar is applied to the upper arm.
- The skin is sterilised with alcohol.
- A hypodermic needle is inserted into a vein and a sample of blood is drawn into the syringe.
- The blood is placed into a sample tube and labelled.

Suggest **why** these steps are carried out.

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

(b) Sunita gets pregnant and she has a premature baby.
The premature baby is assessed by a doctor.
The doctor uses this table to calculate the baby's APGAR score.

Observations	**Scores 0**	**Scores 1**	**Scores 2**
Appearance	blue or pale all over	pink body but pale or blue fingers	pink all over
Pulse	0	less than 100	100 or more
Grimace	no response to stimulation	feeble grimace or feeble cry when stimulated	cry or pull away when stimulated
Activity	no bending of joints	joints bend easily	joints bend with resistance from the baby
Respiration	no breathing	weak irregular breathing	strong deep regular breathing

Sunita's premature baby is breathing normally.
Its pulse rate is 92 beats per minute.
Its body is pink but the hands and feet are white.
The doctor can bend the baby's knee easily.
The baby clearly cries when picked up.

(i) Calculate the baby's APGAR score.
Use the table to show your working.

A	
P	
G	
A	
R	

APGAR score = ... **[1]**

(ii) Explain what this score means for the premature baby.

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..... **[1]**

(iii) Suggest **two** reasons why this score cannot be completely accurate.

1 .....

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2 .....

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[2]

(c) The doctor needs to carry out a small medical procedure on the baby.
The doctor knows that the procedure carries a small element of risk.

Suggest why the doctor carries out the procedure even though there is an element of risk.

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

[Total: 9]

6 Scientists need to observe and take measurements.
When several measurements of the same quantity are taken, the individual results often have different values. This may be due to random and systematic errors.

Put a tick (✓) in the correct column to identify whether each **option** could have a **random error**, **systematic error** or **neither**.

Option	Random error	Systematic error	Neither
lifestyle factors			
a clinical thermometer			
working out Rf values from a chromatogram			
the importance of teamwork			
a sphygmomanometer			
Health and Safety Regulations			
counting a person's pulse using your fingers			

[4]

[Total: 4]

7 Colorimeters can be used to get quantitative data.
Explain how you would use a colorimeter to produce quantitative data about the concentration of a food dye in a child's fruit drink.

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

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..... **[6]**

[Total: 6]

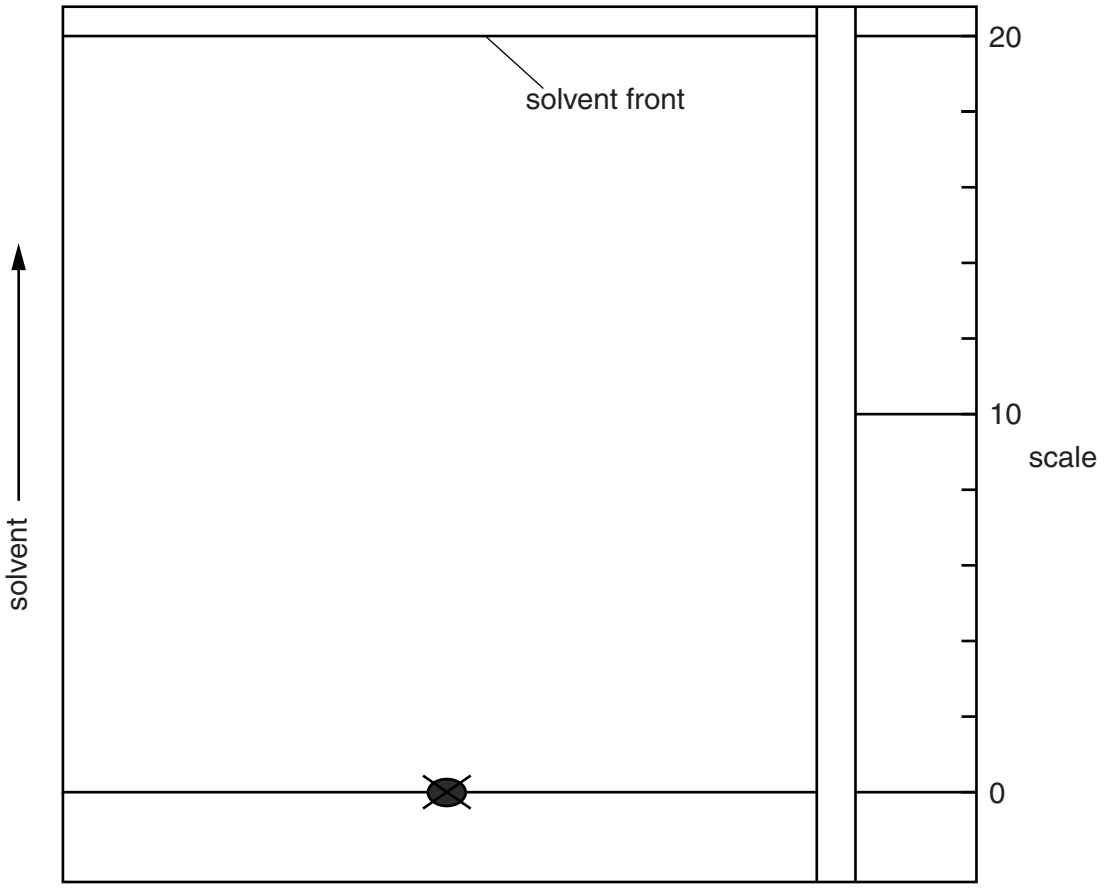
8 Chromatography is a useful technique for analysing unknown mixtures.

(a) Which pair of statements when taken together **best** describes how chromatography works?

A	Some components are much heavier than others.		**1**	The amount of separation depends upon the relative attraction of molecules of the solute to the solvent and the medium.
B	Some colours are dark and some are pale.		**2**	The Rf changes depending upon how quickly the solvent evaporates.
C	Substances move between mobile and stationary phases.	and	**3**	Heavy components fall to the bottom, lighter ones go to the top.
D	Different components have different Rf values.		**4**	Pale colours separate out faster than darker colours.

answer ..... and ..... **[2]**

(b) A student prepared a paper chromatogram to separate dyes used in a food colouring.



The food colouring contains four different dyes.
These are the Rf values of the different dyes.

Dye	Rf
blueberry	0.6
orange	0.2
sunshine	0.6
moonlight	0.8

(i) Plot the expected positions of the dyes on the chromatogram by drawing a circle (**O**) for each dye.
Label each circle. **[1]**

(ii) What do these results show about the limitations of chromatography when trying to separate dyes in a food colouring?
Suggest how this limitation could be overcome.

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

[Total: 5]

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE