Centre Number Candidate N	Tumber For Examiner's Use
Surname	
Other Names	Examiner's Initials
Candidate Signature	



General Certificate of Secondary Education Foundation Tier June 2013

SCA2FP

## Science A 2

#### Unit 6

## Thursday 13 June 2013 9.00 am to 10.30 am

For this paper you must have:

- a ruler
- the Chemistry Data Sheet and
- Physics Equations Sheet Booklet (enclosed). You may use a calculator.

You may use a calculator

#### Time allowed

1 hour 30 minutes

#### Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer all questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

#### Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 90.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- Question 11(b)(ii) should be answered in continuous prose. In this question you will be marked on your ability to:
  - use good English
  - organise information clearly
  - use specialist vocabulary where appropriate.

#### Advice

• In all calculations, show clearly how you work out your answer.



Examiner	r's Initials
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
TOTAL	











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## **3 (b)** Scientists can produce several kittens from one fertilised egg.

The fertilised egg is allowed to divide to form an embryo. Cells of the embryo are then separated and each cell develops into an embryo. These embryos are then put into different host mothers.



**3 (b) (i)** Draw a ring around the correct answer to complete the sentence.

tissue culture.

This technique is called

embryo transplant.

adult cell cloning.

(1 mark)



3 (b) (ii)	What will the offspring look like?
	Tick (✓) <b>one</b> box.
	The offspring will be identical to the father.
	The offspring will be identical to the host mother.
	The offspring will be identical to each other.
	(1 mark)
3 (c)	The same technique could be used to produce human babies.
	Suggest <b>one</b> ethical reason why many people would disagree with using this technique.
	(1 mark)

## Turn over for the next question







4 (b) (ii)	What conclusion can be made from the results shown in the graph?	
		(1 mark)
4 (c)	Temperature can affect the rate of decay.	
	The graph shows the rate of decay at different oxygen concentrations temperature was 20 °C.	when the
	Draw a line on the graph to show the results you would expect at a ten	nperature of 15°C. <i>(1 mark)</i>
4 (d) (i)	Complete the following sentences about decay processes.	
	Materials are constantly cycled.	
	Dead organisms decay because they are broken down and digested b	у
	The decay process releases substances. These substances help the	growth of
	Carbon dioxide is also released when dead organisms decay. Carbor	n dioxide is a
	waste product of	(2 m a daa)
		(3 marks)
4 (d) (ii)	Draw a ring around the correct answer to complete the sentence.	
	When the processes that remove materials from the environment are	balanced by
		growing.
	processes that return materials to the environment, the community is	stable.
		getting smaller.
		(1 mark)



Turn over ►



atmosphere of Mars.

(2 marks)



|--|

#### Table 2

	Earth	Mars	Venus
Mean surface temperature in °C	20	-23	460

Oceans cover 71% of the Earth's surface.

Mars and Venus have water vapour in their atmospheres.

Why does the water vapour not form oceans on their surfaces?

Mars:	
Venus:	
	(2 marks)

### Turn over for the next question







Turn over ►







## Turn over for the next question







The biofuel is used to heat ..... which changes into steam.

The steam turns a ...... which is connected to a generator. (2 marks)

Turn over for the next question







9 (b)	Two students investigate the reflection of sound waves from a building.
	One student hits two metal bars together to produce a sound wave.
	The second student starts a stop clock when the metal bars are hit together and stops the stop clock when she hears the echo.
	The students want to calculate the time it takes the sound wave to travel to the building.
9 (b) (i)	Why must the students divide the time on the stop clock by 2 to calculate the time it takes the sound wave to travel to the building?
	Question 9 continues on the next page



Turn over ►

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Trial 1 Trial 2 **Trial 3** Mean 0.27 **Time in seconds** 0.33 0.30 Calculate the mean of the 3 results. Write the mean in the table. ..... (2 marks) 9 (b) (iii) The time taken for the sound wave to reach the building, from different distances, is shown in the graph. 200 Distance to building in 100 metres 0 0.1 0.2 0.3 0.4 0.0 0.5 Time in seconds Use the mean time from the table to determine the distance to the building. Distance = ..... m (1 mark)



9 (b) (ii) The students divide each time by 2 and record their results in a table.

9 (b) (iv) The students see differences between the results.

Choose **one** improvement the students could make to the investigation.

Tick  $(\checkmark)$  one box.

	Improvement	Tick (√)
	Decrease the distance between the students and the building.	
	Use a sound sensor and a datalogger to measure the time.	
	Play a long note on a musical instrument instead of using metal bars.	
		(1 m
9 (b) (v)	The students listen to the echo. The echo is quieter than the sound heat metal bars are hit together.	ard when the

How does the amplitude of the echo compare with the amplitude of the sound wave produced by the metal bars?

.....

	(1 mark)

8

Turn over for the next question







# **10 (c)** The different parts of the electromagnetic spectrum are used for different methods of communication.

Complete the table by giving an example of a use of each part of the electromagnetic spectrum for communication.

Part of electromagnetic spectrum	Use for communication
Infrared	
Microwave	
Radio wave	
Visible light	

(4 marks)

Turn over for the next question



(2 marks)

**11 (b) (ii)** In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate. The food chains show some organisms that live near a hydrothermal vent and some organisms that live near the surface of the sea. A food chain found near a hydrothermal vent: bacteria  $\rightarrow$  limpet  $\rightarrow$  crab A food chain found near the surface of the sea: green seaweed  $\rightarrow$  limpet  $\rightarrow$  crab Give a difference between the food chain found near a hydrothermal vent and the food chain found near the surface of the sea. Use information given in this question and your own knowledge to suggest reasons for the difference. ..... ..... ..... ..... (6 marks)





## **Chemistry Questions** 12 A scientist investigated how much water hydrogel pellets absorb. The scientist: measured 500 cm<sup>3</sup> of water into a beaker added 2g of hydrogel pellets left the hydrogel pellets in the water overnight. The next day, the scientist calculated the volume of water that had been absorbed by the hydrogel pellets. The scientist repeated the investigation with different masses of hydrogel pellets. The scientist plotted the results. 500 400 Volume × 300 of water absorbed 200 in cm<sup>3</sup> × 100 0 5 10 15 0 Mass of hydrogel pellets in g 12 (a) (i) Draw a line of best fit on the graph. (1 mark) 12 (a) (ii) Which result should be taken again? Mass of hydrogel pellets: ...... g Volume of water: ...... cm<sup>3</sup> Why did you choose this result to retest? . . . . . . . . . . . . . (2 marks)



12 (b)	Describe the relationship between the mass of hydrogel pellets used and the volume of water absorbed.
	(1 mark)
12 (c)	Give one control variable in the investigation.
	(1 mark)
	(Than)
	Turn over for the next question



**13** Leonardo da Vinci was a famous Italian artist, scientist and engineer. He lived from 1452 to 1519.



He had little education and did not go to university. When he was 14 years old he started to work with an artist to learn how to paint.

Leonardo da Vinci made his own paints. He mixed coloured powders with linseed oil (a vegetable oil). He added water to the linseed oil and powder mixture to make an emulsion.

**13 (a)** Paints are used in the form of emulsions.

Suggest **two** reasons why.

(2 marks)

- 13 (b) Scientists in the fifteenth century observed sea shells in rock layers in mountains. Some scientists said this was because of the Great Flood described in the Bible. Leonardo da Vinci said it was because at different times the seabed was raised. Leonardo da Vinci's theory is similar to the tectonic plate theory scientists use today.
- **13 (b) (i)** Most scientists in the fifteenth century ignored Leonardo da Vinci's scientific work.

,,,,	, ,	
	Suggest why.	
		(1 mark)



13 (b) (ii)	What are tectonic plates?	
		(2 marks)
	Turn over for the next question	
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14 (c) (ii)	The graph shows that 1000m away you can still hear the noise the wind turbines produce.		
	A sound level of 30 dB is the same as a person whispering in another person's ear. The nearest house to the wind turbine is 1000 m away.		
	Some people do not want the wind turbines because of the noise the wind turbines produce.		
	Are these people justified in not wanting wind turbines?		
	Give reasons for your answer.		
	(2 marks)		
14 (d)	On the mainland, wind turbines are connected to the National Grid.		
	Electricity is transmitted through the power lines of the National Grid at very high voltages and low currents.		
	State why.		
	(1 mark)		
	(T mark)		
	END OF QUESTIONS		



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