OCR
RECOGNISING ACHIEVEMENT

GCSE

SCIENCE A

F **A214/01**

Science A Unit 4 Ideas in Context

Specimen Paper 45 mins

Candidates answer on the question paper:
Additional materials: ruler (cm/mm), calculator

Candidate Name	

Centre Number						Candidate Number				

TIME 45 mins

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers on the dotted lines unless the question says otherwise.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- There is a space after most questions. Use it to do your working. In many questions marks will be given for a correct method even if the answer is incorrect.
- Do not write in the bar code. Do not write in the grey area between the pages.
- DO NOT WRITE IN THE AREA OUTSIDE THE BOX BORDERING EACH PAGE. ANY WRITING IN THIS AREA WILL NOT BE MARKED.

INFORMATION FOR CANDIDATES

- 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 **40.**

This specimen paper consists of 16 printed pages.

 Registered Charity Number: 1066969

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Answer all questions.

Question 1

Is "Bird Flu" coming our way?

What is bird flu?

Bird flu was thought only to infect birds until the first human cases were seen in Hong Kong in 1997.

Humans can catch the disease through close contact with live infected birds.

Bird flu produces similar symptoms to other types of flu such as fever, sore throats and coughs.

The World Health Organisation said that, by the end of January 2005, there had been 55 confirmed cases of bird flu and 42 deaths in Asia.

There are signs that bird flu can be passed from person to person.

In Thailand a girl who had the disease may have passed the virus to her mother. They both died. The girl's aunt, who was also infected, survived the virus.

Fortunately the normal virus only seems to pass to close relatives and spreads no further.

What really worries experts is if the virus could exchange genes with a human flu virus.

If the modified virus is able to pass easily between humans the results could be catastrophic. Worldwide experts predict anything between 2million and 50million deaths could occur.

The Government plan for bird flu

In a normal year between 12 000 and 18 000 people die in Britain from normal flu.
The British government has started preparing for an epidemic of modified bird flu.
They have produced a plan to buy 14.6 million courses of an antiviral drug called Tamiflu.
Experts say that the government should order supplies of the vaccine against the normal bird flu that is present in Asia.
Of course this might not work against a modified bird flu virus.
Another difficulty at the moment is that the main vaccine factory in Britain has been having problems.
It was closed for a while because microorganisms were contaminating the vaccine.
Animal-rights protesters have also been targeting the factory.

How bird flu vaccine is made

Bird flu virus is first weakened.

⇩

It is then grown on hens' eggs.

⇩

Genetic material from the virus is extracted and mixed with genetic material from other known strains.

⇩

The vaccine is then tested on animals.

Human testing then takes place.

How serious is the threat?

	number of people who will die in Britain		
death rate	if 10% are infected	if 25% is infected	if 50% are infected
1.0	56 700	141 800	283 700
1.5	85 100	212 800	425 500
2.0	141 800	354 600	709 300

1. **(a)** Flu usually produces similar effects on most people.

(i) Put a (ring) around one of these effects.

blindness **fever** **weak bones**

[1]

(ii) The following four stages happen when a person catches bird flu.

A body cells are damaged

B virus is breathed in

C close contact with birds

D virus reproduces in the lungs

Write the letters to show the correct order of the stages.

The first one has been done for you.

C _____ _____ _____ _____ [2]

(b) The number of people who die from any disease depends on two factors.

1. The percentage of people who are infected.
2. The percentage of these people who die (the percentage death rate).

(i) In 1918 a new strain of flu virus caused an epidemic in Britain.

It infected about 45% of the population.

The percentage death rate was 1%.

Put a (ring) around the number of people who died of the flu in 1918.

Use the table in the article to help you.

50 000 **100 000** **150 000** **250 000**

[1]

(ii) The article says that 55 people in Asia have been infected by normal bird flu.

Of these people, 42 have died.

Calculate the percentage death rate.

..... % [2]

(iii) The percentage death rate for people with normal bird flu is very high.

However, scientists do not think that normal bird flu is much of a threat to people.

Tick (✓) one box next to the reason why they think this.

People who catch it are very unlikely to die. ☐

It does not pass very easily from person to person. ☐

Only people in Asia can be infected. ☐

[1]

(c) The article says that it is possible to make a vaccine against normal bird flu.

(i) Put a tick (✓) in the box next to the best definition of a **vaccine.**

A drug that attacks the virus in the body. ☐

A chemical that is sprayed on infected surfaces ☐

A weakened form of the virus that prepares the body to attack the virus if it enters the body ☐

[1]

(ii) When the vaccine is made, the virus is grown on hens' eggs.

Why are eggs **from hens** used?

.....[1]

(iii) Explain why the vaccine is tested on animals before humans.

.....

.....

.....[2]

(iv) Suggest why animal-rights protesters are targeting the vaccine factory.

.....

.....

.....

.....[2]

(d) The government is storing a drug called Tamiflu.

Tamiflu is not an antibiotic.

Why can't bird flu be treated with antibiotics?

.....

.....[1]

[Total:14]

Question 2

This newspaper article is about a food scare that occurred in February 2005.

Carcinogenic dye causes food scare

More than 400 well-known processed foods have been removed from sale because they are contaminated with an illegal red dye which may cause cancer.

The bright red dye (Sudan 1) had been used to colour a batch of chilli powder used as an ingredient in a brand of Worcester sauce. The sauce in turn was sold on to hundreds of food companies for manufacture into famous brands of food and supermarket ready meals.

Some flavours of crisps were removed from supermarket shelves.

This table shows how the crisis developed.

28 January 2005	Sudan 1 contamination of chilli powder is discovered by a laboratory in Italy.
1 February 2005	Sudan 1 is found in a brand of Worcester sauce. Environmental Health Officers are notified.
7 February 2005	Further tests finally confirm presence of the dye.
10 February 2005	The Food Standards Agency (FSA) demands a list of companies supplied the Worcester Sauce for use in other products.
14 February 2005	The list of 200 companies is received by the FSA. The FSA begins ringing the companies.
15 February 2005	The FSA begins telling the companies and supermarkets that they are planning a recall.
18 February 2005	Britain's largest food recall is launched, with more than 400 products withdrawn from supermarket shelves.

Sudan 1 has been shown to cause liver cancer in animal tests. It has not been shown to cause cancer in humans. Sudan 1 is not permitted as a dye for foods in the EU but is used as a colour for boot polish, industrial solvents and petrol.

“At the levels present the risk is likely to be very small but it is sensible to avoid eating any more. There is no risk of immediate ill-health,” said the chief executive of the FSA.

A further difficulty is that by the time the contaminated chilli has been used in other ingredients such as Worcester sauce it is present only in parts per billion making it virtually undetectable.

2. **(a)** Sudan 1 was added to make the chilli powder bright red.

(i) Suggest why the manufacturers wanted the chilli powder to be bright red.

.....

.....[1]

(ii) Why was it **not** a good idea to add Sudan 1 to chilli powder?

.....

.....[1]

(iii) Sudan 1 has a variety of uses that are not connected with food.

Describe **one** of these uses.

.....

.....[1]

(b) How long did it take from the discovery of Sudan 1 in a brand of Worcester sauce to the recall of contaminated food from UK supermarkets?

..... [1]

(c) Over 400 food products were removed from supermarket shelves.

One mark is for a clear, ordered answer.

Describe how the Sudan 1 contamination got into so many food products?

.....

.....

.....

..... [3 + 1]

(d) The chief executive of the FSA says that the risk from eating foods contaminated with Sudan 1 is very small.

Suggest why the risk is very small.

.....

.....[1]

(e) Scientists test a brand of meat pie for the presence of Sudan 1.

They test samples from two different supermarkets.

(i) The scientists test several samples from each supermarket.

Suggest why.

.....

.....

.....[2]

Results of their tests are shown in the table.

	Sudan 1 content in ppm							
sample	**1**	**2**	**3**	**4**	**5**	**6**	**range**	average
supermarket A	16	13	19	15	12	14	12 to 16	14
supermarket B	12	10	13	14	12	11	———	———

(ii) The scientists work out the range and average for the samples from supermarket **A.**

They ignore the value for sample 3.

Suggest why.

.....

.....[1]

(iii) Work out the range and best estimate for the samples from supermarket B.

range =..... to .....ppm

best estimate =.....…… ppm [2]

[Total: 14]

Question 3

X-Rays – seeing the 'invisible'

Discovery of X-rays

In the late 19th Century many scientists were investigating the way an electric current was carried through a gas in a glass tube.
The gas inside the tube glowed when an electric current passed through.
Wilhelm Röntgen was a German scientist. In November 1895 he was investigating the glowing gas when he made an unexpected observation.
Some fluorescent material, the other side of the room, was glowing. The gas tube was covered with a dark cloth, so it was not the light from the glowing gas which made the fluorescent material shine.
Over the following seven weeks Röntgen investigated what was causing the fluorescence. He discovered that the rays that were coming from the end of the glass tube penetrated wood, a thick book and metal sheets.

JEAN-LOUP CHARMET / SCIENCE PHOTO LIBRARY

Strangest of all he saw the bones of his hand on the fluorescent screen.
During these investigations Röntgen had his meals served in the laboratory and even moved his bed there so he could work undisturbed. Only once did he mention his work to colleagues, he said "I have discovered something quite interesting but I do not know whether my observations are correct".
On 1st January 1896 Röntgen sent his first report and some examples of X-ray photographs to scientific colleagues in several countries. These new rays became known as X-rays.
During 1896 other scientists investigated X-rays and found similar results. Many scientists gave lectures, with members of the audience paying a fee to have their hands or purses X-rayed.

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The first X-ray photograph of a human being shows the hand of Röntgen's wife, who was wearing a ring.

Dangers from X-rays

In the first few years after the discovery of X-rays there was no awareness of the risks of working with this new radiation.
The first known death from X-ray exposure was in 1904. At this time many radiologists suffered radiation burns as they used self-exposure experiments to determine exposure times for patients.
It was not until 1921 that the first recommendations were made to limit exposure to X-rays in hospitals. Commercial and industrial applications of X-rays were not controlled until much later.
Up until the late 1950s buying new shoes for children included the chance to see images of your feet inside the shoes to check the fit.
Governments now provide strict guidelines about the amount of exposure to ionising radiation – both for workers and for the public.

3. **(a)** X-Rays are part of the electromagnetic spectrum.

Fill in the gaps in this diagram of the electromagnetic spectrum.

Choose words from this list.

sound **infrared** **transverse** **X-ray**

	microwave	infrared	visible light	ultraviolet		gamma rays

[2]

(b) X-Rays are an **ionising** radiation.

Write down the names of **two** other types of ionising radiation.

1 .....

2 .....[2]

(c) Röntgen showed that it was not the light from the glowing gas that made the fluorescent material shine.

How did he do this?

.....

.....[2]

(d) Röntgen observed that the X-rays passed through many materials.

Write down the names of **two** materials that X-rays passed through in Röntgen's experiments.

1 .....

2 .....[2]

(e) The article describes the discovery of X-rays and how they became accepted as a new kind of radiation.

The list describes how a scientific discovery is made and accepted by other scientists. They are in the wrong order.

A A scientist makes an unexpected observation.

B The scientist tells other scientists about the results of the experiments.

C The new ideas are accepted as being correct.

D The other scientists repeat the experiments.

E The scientist carries out further experiments.

Fill in the boxes to show the right order. The first one has been done for you.

A				

[3]

(f) Suggest why it was not until 25 years after the discovery of X-rays that there were regulations to limit exposure to X-rays.

.....

.....[1]

[Total: 12]

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Specimen Mark Scheme

45 mins

Maximum mark for this paper is [40]

This specimen mark scheme consists of 3 printed pages.

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Question Number	Answer	Max Mark
1(a)i	Fever;	[1]
1(a)ii	(C),B,D,A B before D; D before A;	[2]
1(b)i	250 000	[1]
1(b)ii	42/55 x 100; = 76% (76.4%)	[2]
1(b)iii	It does not pass very easily from person to person;	[1]
1(c)i	A weakened form……..	[1]
1(c)ii	The virus usual reproduces/grows/lives in birds / hens are birds;	[1]
1(c)iii	To see if it works; To see if it is harmful;	[2]
1(c)iv	The factory is using animals to produce/test the virus; They believe that it is cruel to the animals;	[2]
1(d)	Antibiotics only work on bacteria/ Antibiotics don't work on viruses;	[1]
	Total mark	**[14]**

Question Number	Answer	Max Mark
2(a)i	because chillis are red / to look attractive / to attract buyers	[1]
2(a)ii	it is carcinogenic / it causes cancer / it has been found to cause liver cancer (in animal tests)	[1]
2(a)iii	a colour for boot polish/industrial solvents/petrol	[1]
2(b)	17 days **(accept 18)**	[1]
2(c)	Sudan 1 was added to chilli powder; chilli powder was used to make Worcester sauce; Worcester sauce was used as an ingredient (to a wide variety of food products QWC – The candidate has attempted to answer the question using statements which are ordered in a logical way.	[3] [1]
2(d)	the amount of Sudan 1 in food products is very small/is in parts per billion / Sudan 1 has not been shown to cause cancer in humans / Sudan 1 has been shown to cause cancer only in animals	[1]
2(e)i	**any two from:** to increase reliability; to get an average/mean; to identify/discard outliers; because content in samples varies; to avoid a one-off error	[2]
2(e)ii	it is an outlier / it is far different from all of the other results	[1]
2(e)iii	11 to 14; 12	[2]
	Total mark	**[14]**
3(a)	radio; X-ray	[2]
3(b)	ultraviolet; gamma; alpha; beta;	[2]
3(c)	covered the glass tube; no light reached the fluorescent paper;	[2]
3(d)	wood, book/paper , metal, hand, glass	[2]
3(e)	(A) E B D C	[3]
3(f)	took some time for damage to show / information was not collected together	[1]
	Total mark	**[12]**
	Overall mark	**[40]**