Surname	Centre Number	Candidate Number
Other Names		0

GCSE – NEW

C400U20-1

S18-C400U20-1

BIOLOGY – Component 2
Applications in Biology

FOUNDATION TIER

MONDAY, 11 JUNE 2018 – MORNING

1 hour 15 minutes

	For Examiner's use only		
	Question	**Maximum Mark**	**Mark Awarded**
Section A	**1.**	**9**	
	2.	**9**	
	3.	**7**	
	4.	**12**	
	5.	**8**	
Section B	**6.**	**15**	
	Total	**60**	

C400U201
01

ADDITIONAL MATERIALS

In addition to this examination paper you will require, a calculator and a ruler.

A Resource Booklet for use with Section B.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

This paper is in 2 sections, **A** and **B**.

Section **A**: 45 marks. Answer **all** questions. You are advised to spend about 50 minutes on this section.

Section **B**: 15 marks. Read the article in the resource booklet carefully then answer **all** questions. You are advised to spend about 25 minutes on this section.

The number of marks is given in brackets at the end of each question or part-question.

The assessment of the quality of extended response (QER) will take place in question **3*(a)***.

Examiner only

SECTION A

Answer **all** *questions.*

1. The images below show a fruit smoothie drink and the label from the bottle.

MAGIC
Banana – vanilla
FRUIT SMOOTHIE

The SUGAR FREE smoothie!!

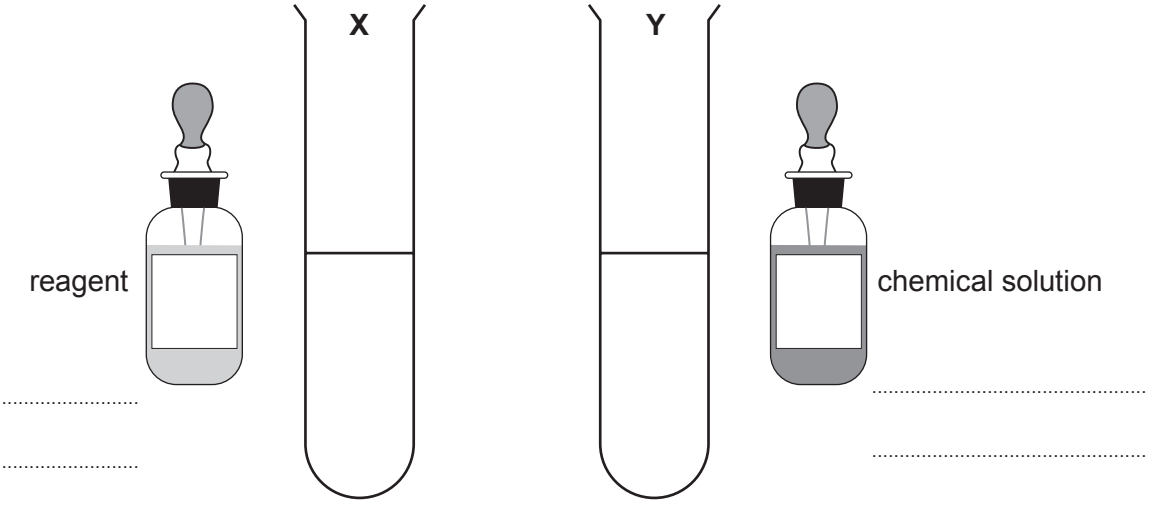
All the goodness of fruit but NONE of the Sugar

Kids love it straight from the fridge!

Some students decided to test the contents of the fruit smoothie.

(a) Firstly, they placed samples taken from the smoothie into two test tubes. They tested one (tube **X**) for the presence of protein and the other (tube **Y**) for the presence of starch.

(i) **Complete the diagrams** by adding the names of the reagent they used in tube **X** and the chemical solution they used in tube **Y**. [2]



.....

.....

.....

.....

(ii) The results obtained are shown in the table. **Complete the table** to give the students' observations and conclusions. [2]

Test tube	Class of food	Observation in test tube	Conclusion
X	protein	colour remains blue	.....
Y	starch	....	starch is present

(b) The students also tested the smoothie for the presence of sugar to see if the claim on its label was correct.

(i) Describe how they would carry out a test for glucose (sugar) on a sample of the smoothie in a test tube, stating the name of the reagent which they would use and **one** hazard in this experiment. [3]

.....

.....

.....

.....

.....

(ii) The students observed an orange – red colour developing in the test tube at the end of the procedure.
They wrote to the manufacturer of the smoothie complaining that the label made a false claim.

State the evidence that the label on the smoothie was incorrect. [1]

.....

.....

(iii) Starch molecules can break down when stored at low temperatures for a long time. Explain why this may be the reason for the results obtained by the students. [1]

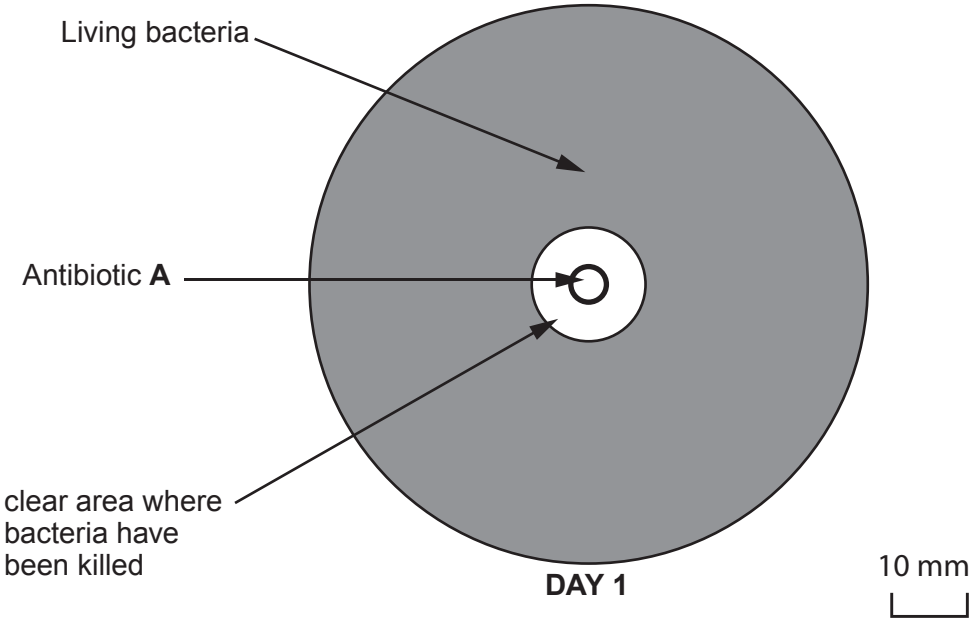
.....

.....

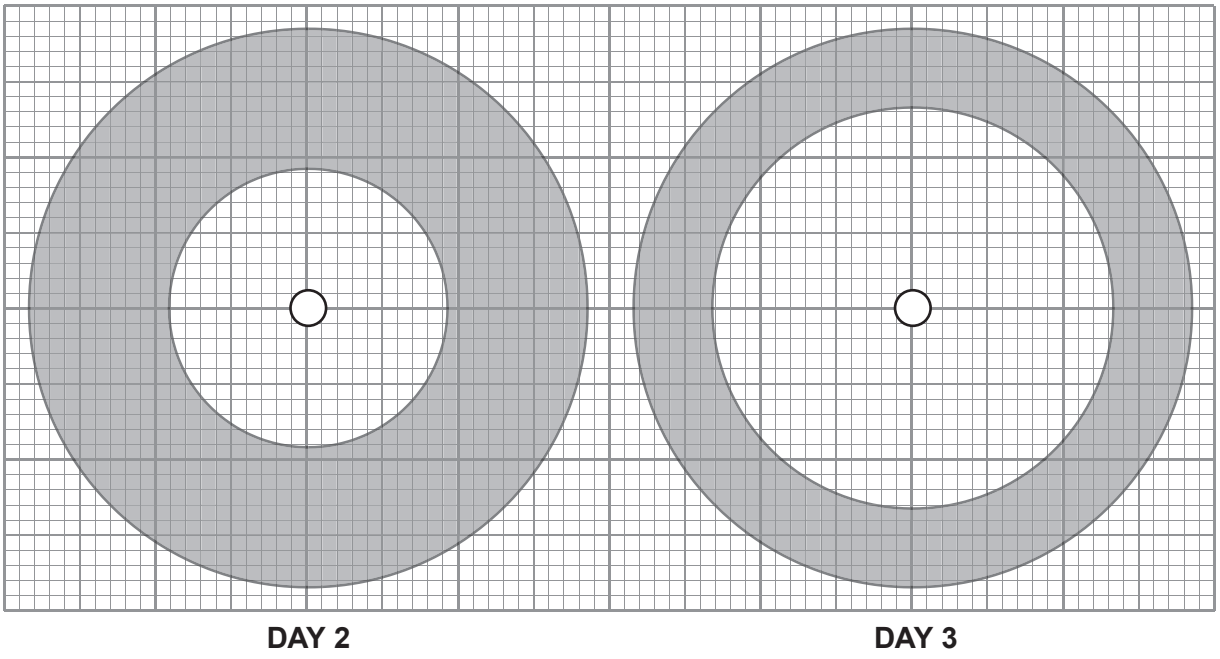
2. A scientist working in a hospital laboratory investigated three antibiotics **A**, **B** and **C** which acted against a bacterium that caused infection in humans.

She seeded three agar plates with bacteria and applied one of the antibiotics to the centre of each plate. The plates were then sealed with tape and placed in an incubator for three days during which time the antibiotics spread through the agar.

The diagrams below show the results for antibiotic **A**.



Results for antibiotic A on Days 2 and 3



Examiner only

(a) Describe how the scientist would have applied the antibiotics to the agar plates using aseptic techniques. [3]

.....

.....

.....

.....

(b) (i) From the diagram, **complete the results table** by measuring the diameter of the clear area for antibiotic **A** on day **2**. [1]

Antibiotic	Diameter of clear area (mm)		
	Day 1	Day 2	Day 3
A	15	.....	53
B	15	32	65
C	29	43	47

(ii) Use the table to answer the questions.

I. State the antibiotic which was the quickest to act, giving a reason for your answer. [1]

.....

.....

II. Most courses of antibiotic treatment prescribed by doctors last five days. State which of the antibiotics you would expect to be most effective after five days. Explain your answer. [1]

.....

.....

Examiner only

(c) (i) At which of the following temperatures should the agar plates have been incubated in the hospital laboratory? **Circle** your answer and state the reason for your choice. [2]

10 – 15°C **20 – 25°C** **35 – 40°C** **40 – 45°C**

Reason .....

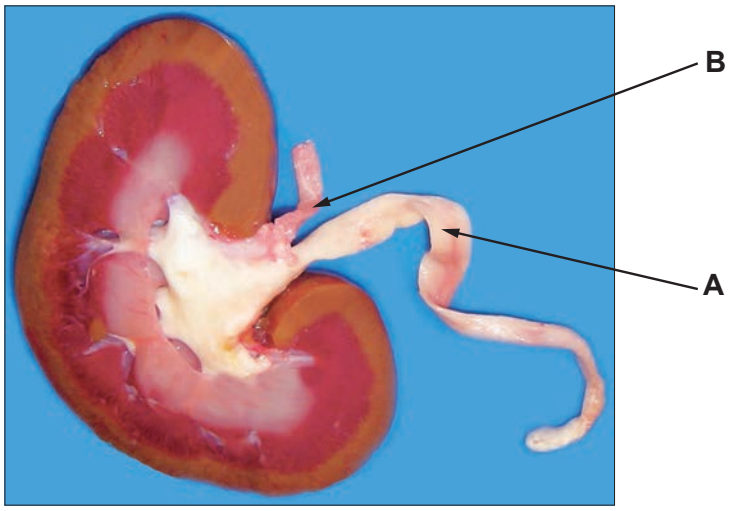
(ii) State why it was important that lids of the agar plates were securely sealed with tape during the investigation. [1]

.....

9

Examiner only

3. The photograph shows a section through a dissected kidney.



(a) Describe the structure of the kidney as shown in the dissection and explain the functions of **A** and **B**. [6 QER]

(b) State why it is important to wear protective gloves when carrying out a kidney dissection. [1]

C400U201
07

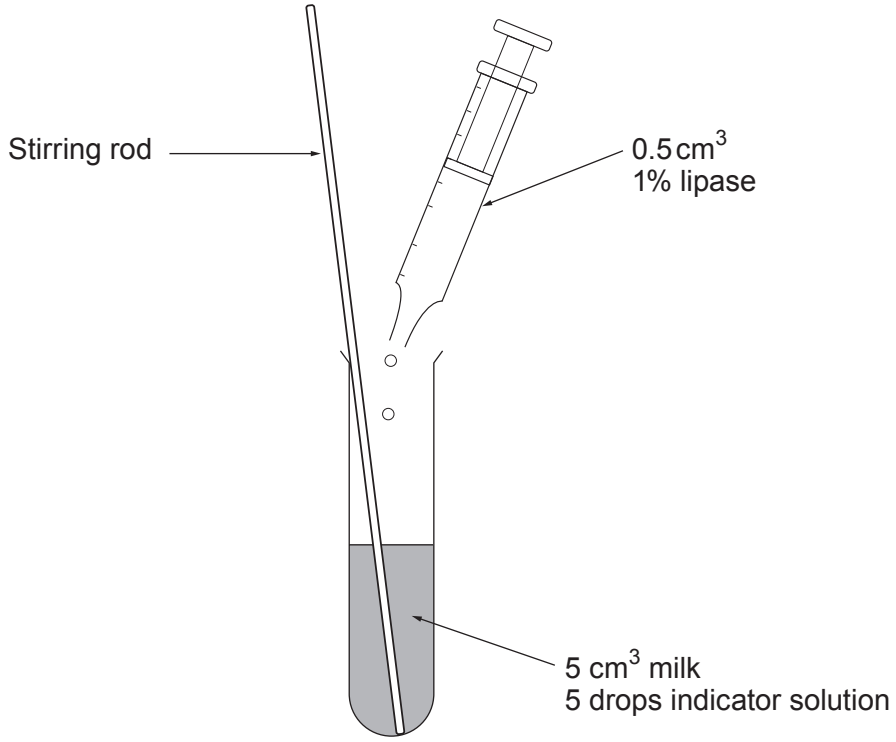
7

4. The function of the enzyme lipase is to digest fat.

Some students investigated the activity of lipase at six different temperatures using the apparatus shown in the diagram below.

They placed a 5 cm^3 sample of milk in each of six test tubes. They then placed 5 drops of an indicator solution in each tube. Finally they added 0.5 cm^3 1 % lipase to each tube and stirred the contents of the tubes.

The indicator solution made the liquid in the tubes pink but the colour faded as the lipase digested the fat in the milk. The time taken for the pink colour to be lost was recorded and the rate of lipase activity was then calculated.



The results of the investigation are shown in the table.

Test tube	Temperature (°C)	Rate of lipase activity (µmol fat digested/min)
1	10	0.10
2	20	0.35
3	30	0.60
4	40	0.85
5	50	0.50
6	60	0.05

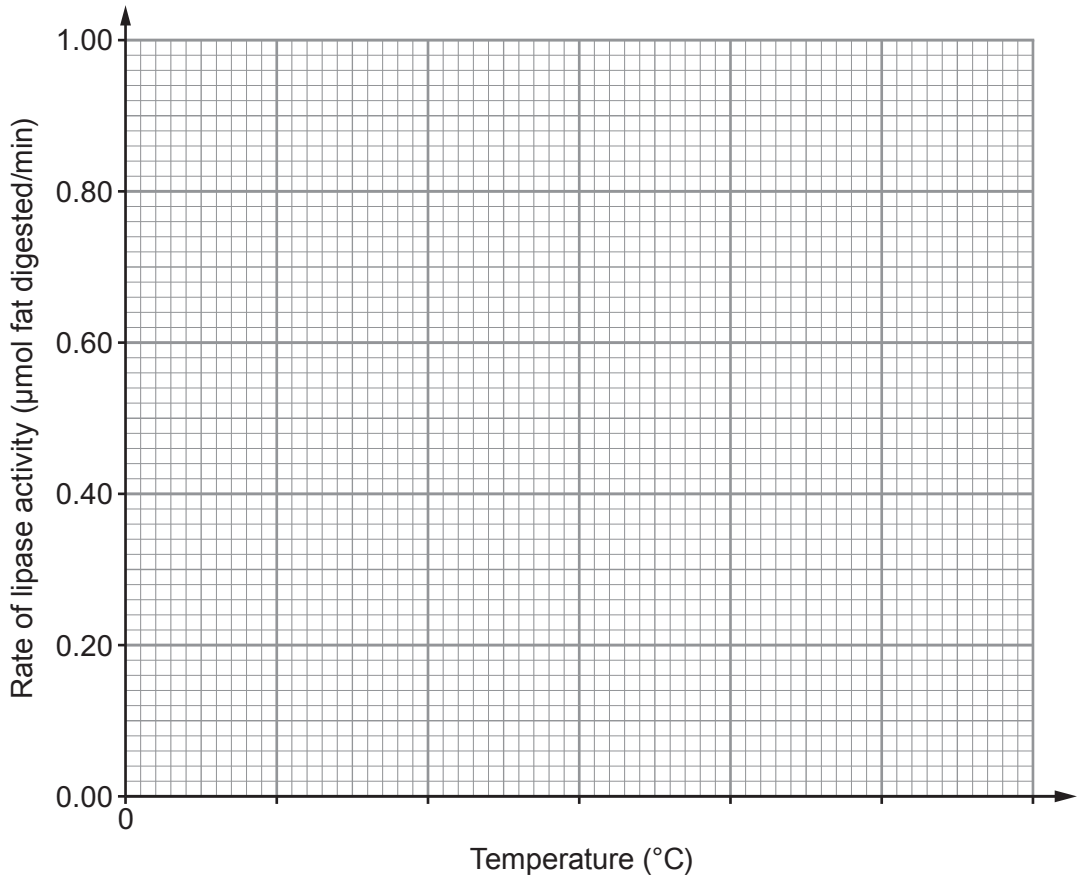
Examiner only

(a) Draw a line graph of the results on the grid below by:

I. adding the scale for temperature; [1]

II. plotting the results from the table; [2]

III. using a ruler to join your plots. [1]



(b) Use your graph to answer the following questions.

(i) Describe the effect of temperature on the rate of lipase activity. [2]

.....

.....

.....

.....

Examiner only

(ii) Calculate the change in the rate of activity of lipase between 25 °C and 35 °C. Include a unit for your answer. [2]

Change .....

Unit .....

(iii) Explain the reason for the change in the rate of activity of lipase between 10 °C and 30 °C. [2]

.....

.....

.....

.....

(iv) Explain the effect of temperature on the lipase molecules between 50 °C and 60 °C. [2]

.....

.....

.....

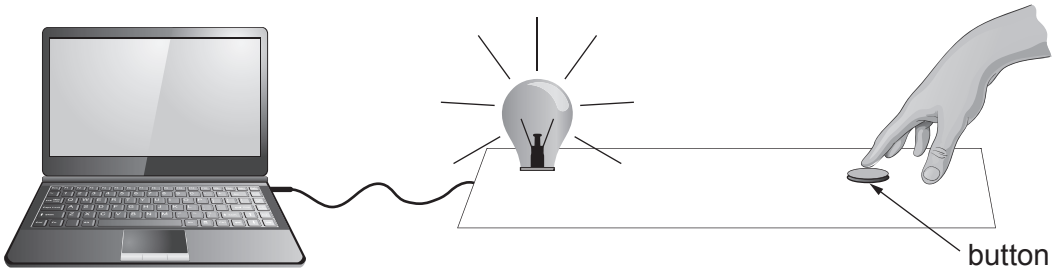
.....

12

BLANK PAGE

Examiner only

5. Human reaction times can be tested using the apparatus in the diagram below.



When the investigator starts the computer program, the light flashes randomly. The person being tested presses the button when each flash of light is seen. The time taken for the reaction (the time between the light being switched on and the button being pressed) is recorded in milliseconds.

(a) You have been asked to test the following hypothesis.

"For people aged 15 – 45 in a school community, reaction time increases with increased age."

Use the following outline method to plan an investigation in a school where there are boys, girls and staff. The age range within the school is from 11 – 65.

- Select five relevant ages from the school population
- Find a sample of volunteers for each of these ages
- Test the reactions of your volunteers using the apparatus in the diagram
- Calculate mean results for each volunteer

(i) State the ages of the people included in your investigation and the suggested sample size for each of the ages. [2]

.....

.....

.....

(ii) Describe how you would carry out a fair test of reaction time for the individual people. [3]

.....

.....

.....

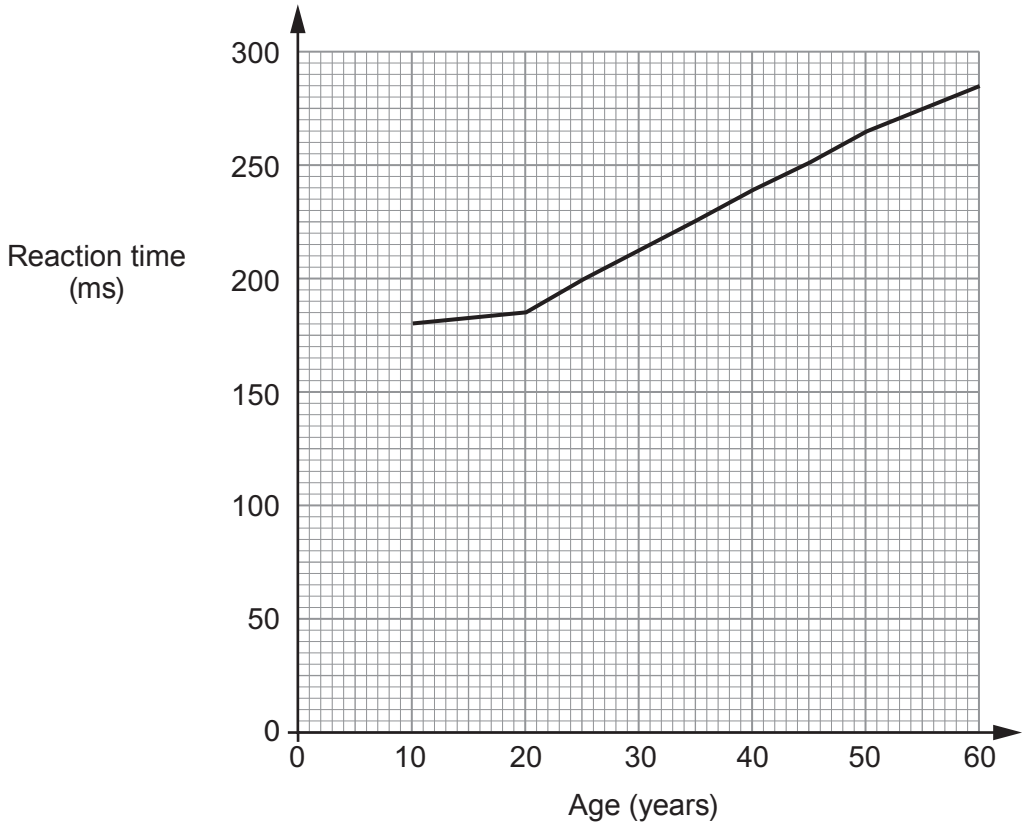
.....

.....

.....

Examiner only

(b) The graph below shows the results of another investigation carried out on males aged from 10 – 60.



From this graph, describe how reaction time is affected by age. Evaluate the extent to which these results support the hypothesis in part *(a)*. [3]

.....

.....

.....

.....

.....

8

Examiner only

SECTION B

Read the article in the resource booklet carefully and answer **all** *the questions that follow.*

6. *(a)* (i) State **one** way in which communicable diseases caused by viruses can be spread by humans. [1]

.....

(ii) Explain why a doctor would not prescribe antibiotics as a treatment for measles.[1]

.....

(iii) Using the information in **Figure 1** explain how 'herd immunity' provides protection for the unvaccinated population. [1]

.....

.....

.....

(iv) Explain why 'herd immunity' is particularly important for people with HIV/AIDS. [1]

.....

.....

(b) (i) Using **Figure 2**, describe the trend in deaths from measles in England and Wales between 1901 and 1995. [1]

.....

(ii) Suggest how the data in **Figure 2** could be used to argue that vaccination had no effect on deaths from measles between 1901 and 1995. [1]

.....

.....

(c) (i) The national census in 2011 estimated that the number of children aged 2 in England was approximately 670 000.
Use **Figure 3** to calculate an estimate of the number of children aged 2 who had been vaccinated against MMR in 2011. [2]

Number vaccinated = ...

Examiner only

(ii) Suggest **one** reason why the 1998 study was discredited and how the study could have been improved. [2]

.....

.....

.....

(d) Describe how the MMR vaccine causes the body to develop immunity against measles, mumps and rubella. [5]

.....

.....

.....

.....

.....

.....

.....

.....

.....

15

END OF PAPER