



HARROW
SCHOOL

ENTRANCE SCHOLARSHIPS EXAMINATION 2015

BIOLOGY

30 Minutes

GENERAL INSTRUCTIONS:

You have 30 minutes to answer all of the questions.

You may use a calculator.

The maximum mark for this paper is 36.

Question 1

- Answer the following general knowledge multiple-choice questions. Underline the correct answer with a ruler as shown in the example below:

Example question: Which of the following diseases affects the lungs?

- diabetes
- bronchitis
- cholera
- hepatitis

a) What is the largest fish in the ocean? **(1)**

- giant squid
- blue whale
- great white shark
- whale shark

b) Which branch of medicine is concerned with the study of cancer? **(1)**

- gynaecology
- endocrinology
- oncology
- neurology

c) Approximately what volume of blood is pumped out of the left side of the heart in one minute when a person is at rest? **(1)**

- 5 litres
- 50 litres
- 500 litres
- 5000 litres

d) Which of the following substances is used to test for the presence of starch? **(1)**

- Benedict's reagent
- Biuret's reagent
- lime water
- iodine solution

e) Which is the correct sequence of organs through which food passes along a human's digestive system? **(1)**

- i. stomach → large intestine → oesophagus → small intestine
- ii. oesophagus → stomach → small intestine → large intestine
- iii. stomach → small intestine → large intestine → oesophagus
- iv. oesophagus → small intestine → stomach → large intestine

f) Which of the following human characteristics shows discontinuous variation? **(1)**

- i. eye colour
- ii. body mass
- iii. hand span
- iv. hair length

g) Which of the following primates is not a great ape? **(1)**

- i. gorilla
- ii. chimpanzee
- iii. human
- iv. baboon

h) How should the scientific name for humans be written? **(1)**

- i. *homosapiens*
- ii. *Homo Sapiens*
- iii. *homo Sapiens*
- iv. *Homo sapiens*

i) Which food contains the most energy per gram? **(1)**

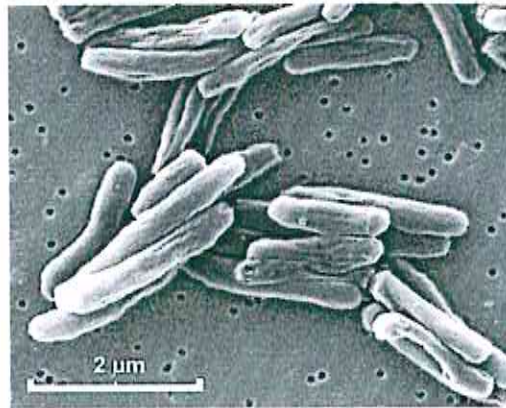
- i. chocolate biscuit
- ii. rice
- iii. fruit juice
- iv. butter

/ 9 marks

Question 2

Tuberculosis (or TB) is an infectious disease caused by a bacterium. The TB bacterium infects many different organs of the body but especially the lungs where it can damage the alveoli (air sacs). When an infected person coughs or sneezes tiny droplets of moisture are expelled that contain TB bacteria. If another person inhales these droplets they can become infected.

The image below is of some TB bacteria taken with a very powerful (electron) microscope. The length of the scale bar on the image is $2\ \mu\text{m}$ (micrometres).



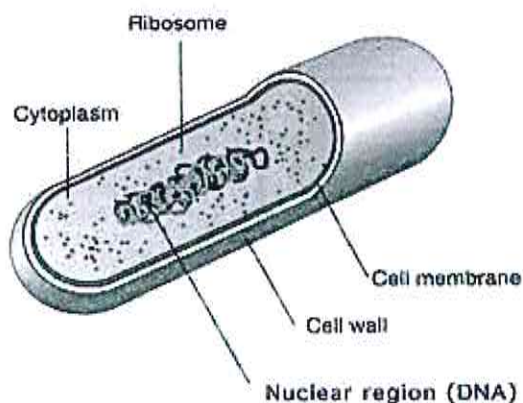
- a) Approximately how long (in mm) is one of the bacteria? (Note that $1\ \text{mm} = 1000\ \mu\text{m}$.)
Show your working. (2)

Answer =mm

- b) Calculate the magnification of the image. Show your working. (2)

Answer =

The diagram below shows the basic structure of a bacterial cell.



c) What is the function of a cell membrane? (1)

.....

d) State two differences between the structure of a bacterial cell and an animal cell. (2)

.....
.....

e) Explain in detail how damage to the alveoli in the lungs would affect the ability of a patient with TB to do exercise. (4)

.....
.....
.....
.....
.....
.....

The table below shows the incidence of TB in different countries around the world in 2013. Incidence is the number of new cases of TB that occur each year per 100 000 people in the population.

Country	Number of new cases of TB per 100 000 population
Algeria	81
Australia	6
Brazil	46
Nepal	156
UK	13
Zambia	410

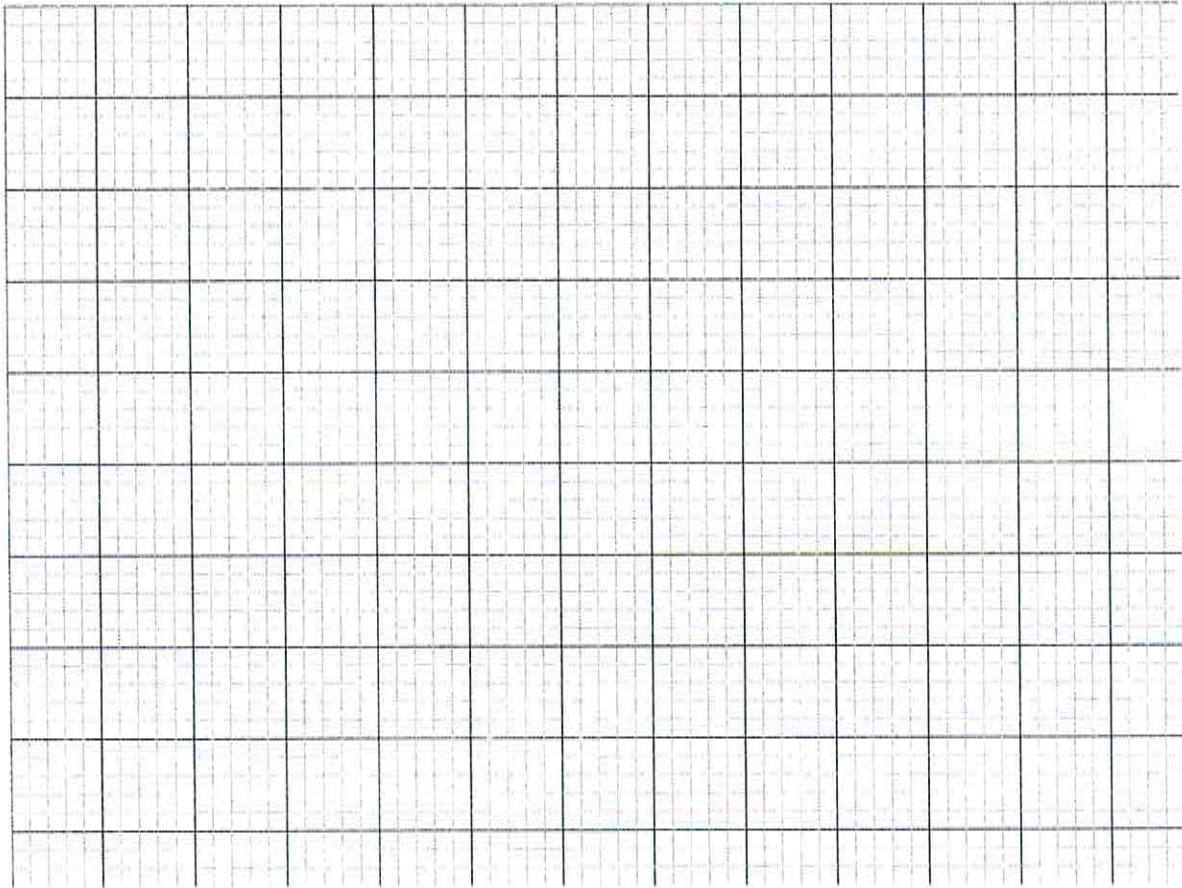
f) If the population of the UK was 64 million, what was the total number of new cases of TB in the UK in 2013? Show your working. (2)

Answer =

g) Suggest why the incidence is calculated per 100 000 of the population. (2)

.....
.....
.....

h) Plot this data in a suitable graph or chart on the graph paper below. Make sure that the axes are fully labelled. (4)



i) Describe and explain two different measures that can be taken to control the spread of TB. (4)

.....
.....
.....
.....
.....
.....

/ 23 marks