Science Revision Session CS

Describe and explain

Name: _____
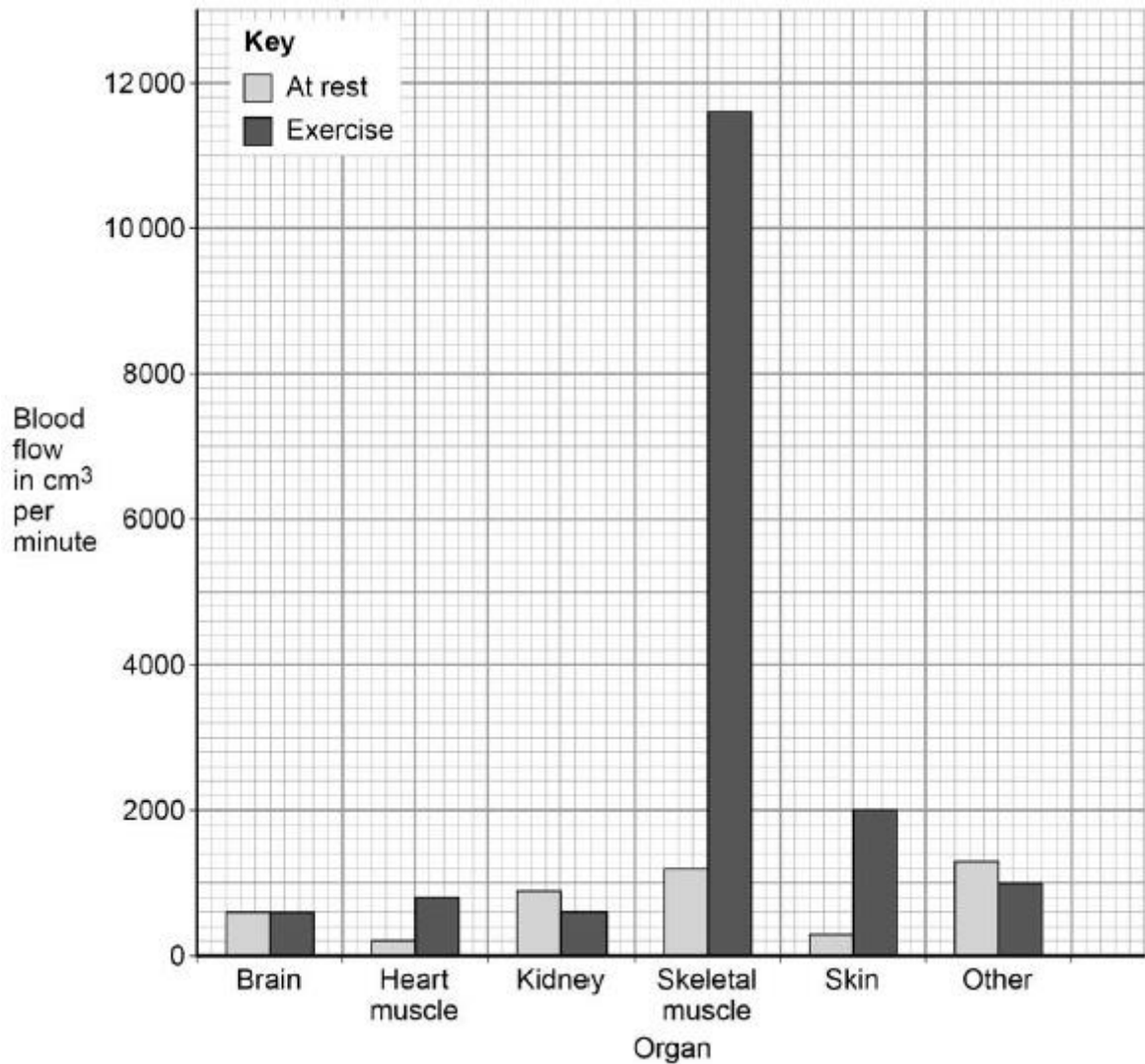
Class: _____

Date: _____

Time: **37 minutes**

Marks: **36 marks**

Comments:

Q1.

The graph shows the rate of blood flow through different organs at rest and during exercise.

(a)   Determine the total volume of blood that flows through the brain in 1 hour.

_____

_____

Volume = _____ cm³

(1)

(b)   Look at the blood flow through the skeletal muscle.

Calculate how many times the blood flow increases by during exercise compared to at rest.

_____

_____

_____

Answer = _____

(2)

(c)   Explain why the blood flow to the skeletal muscles increases during exercise.

_____

_____

_____

_____

_____

_____

(3)

(d)   Arteries and veins have different structures and different functions.

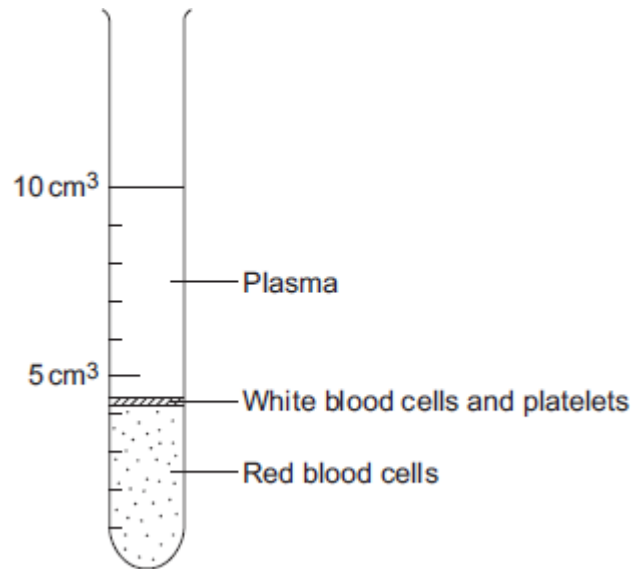Explain how the different structure of arteries and veins relates to their different functions.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(6)
(Total 12 marks)

Q2.

The parts of the blood can be separated from each other by spinning the blood in a centrifuge.

The image below shows the separated parts of a 10 cm^3 blood sample.

(a)   Calculate the percentage of the blood that is made up of plasma.

_____

_____

Answer = _____ %

(2)

(b)   Name **three** chemical substances transported by the plasma.

1. _____

2. _____

3. _____

(3)

(c)   **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

White blood cells are part of the immune system. White blood cells help the body to defend itself against pathogens.

Describe how pathogens cause infections **and** describe how the immune system defends the body against these pathogens.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

(6)

(Total 11 marks)

Q3.

Some infections are caused by bacteria.

(a)   The genetic material is arranged differently in the cells of bacteria compared with animal and plant cells.

Describe **two** differences.

_____

_____

_____

_____

(2)

(b)   Tuberculosis (TB) is an infection caused by bacteria.

The table below shows the number of cases of TB in different regions of southern England from 2000–2011.

Number of cases of TB per 100 000 people

Year	London	South East	South West
2000	37	5	3
2001	36	6	4
2002	42	6	6
2003	42	7	4
2004	42	7	5
2005	49	8	5
2006	44	8	3
2007	43	8	5
2008	44	8	5
2009	44	9	6

2010	42	9	5
2011	45	10	5

(i) How does the number of cases of TB for London compare with the rest of southern England?

_____

_____

_____

(1)

(ii) Describe the pattern in the data for cases of TB in the South East.

_____

_____

(1)

(iii) Describe the pattern in the data for cases of TB in the South West.
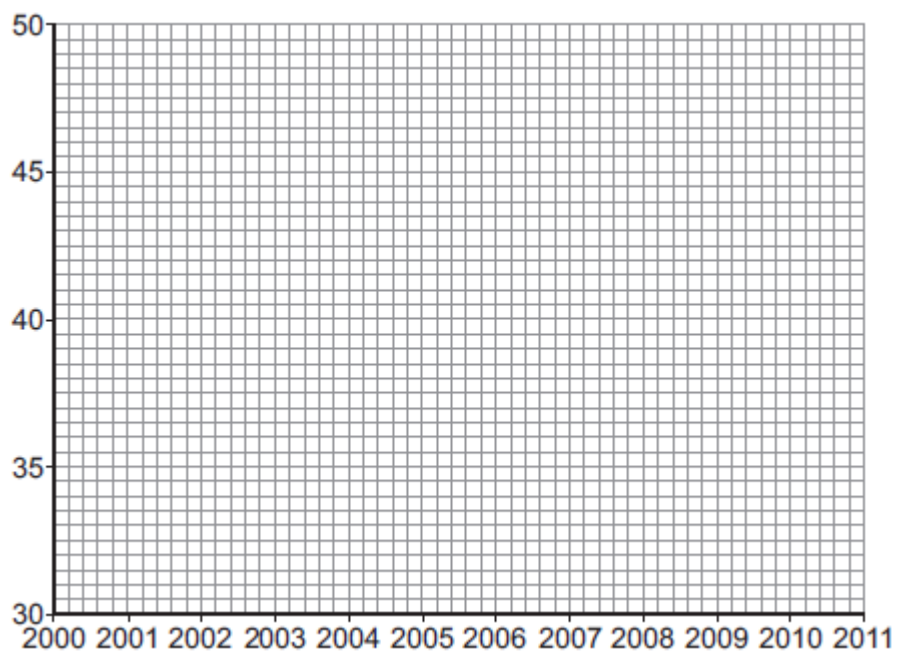
_____

_____

_____

_____

(2)

(c) (i) On the graph paper below:

• plot the number of cases of TB in **London**

• label both the axes on the graph

• draw a line of best fit.

(4)

(ii)   Suggest why a student thought the value for 2005 in London was anomalous.

_____

_____

(1)

(d)   People can be vaccinated against TB.

Suggest how a vaccination programme would reduce the number of people with TB.

Details of how a vaccine works are **not** required.

_____

_____

_____

_____

(2)
(Total 13 marks)

Mark schemes

Q1.

(a)   36 000 (cm^3)

1

(b)   11600 / 1200

1

9.66666r

allow any number of decimals

1

(c)   muscles need more energy (for contraction)

1

(so) more oxygen / glucose needed

need at least one reference to 'more' for full marks

allow so more carbon dioxide / thermal energy needs to be removed

1

(for) increased respiration

1

(d)

Level 3: Relevant points (differences / functions) are identified, given in detail and linked logically to form a clear account.	5-6
Level 2: Relevant points (differences / functions) are identified and there are attempts at logical linking. The resulting account is not fully clear.	3-4
Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1-2
No relevant content	0
Indicative content • artery has a thicker wall • (because) artery has to withstand higher pressure • artery has thicker layer of elastic tissue / fibres • (so) it can stretch • (so) artery returns to original size / shape • artery has thicker layer of muscle • to maintain a force on the blood	

• vein has valves	
• (valves) prevent backflow of blood	
• artery carries blood away from the heart	
• vein carries blood towards the heart	
ignore references to oxygenated / deoxygenated blood	

6

[12]

Q2.

(a) 55%

> **2** marks for correct answer alone
> accept 54 − 56
> 5.5 / 10 × 100 alone gains **1** mark

2

(b) any **three** from:

- amino acids
- antibodies
- antitoxins
- carbon dioxide
- cholesterol
- enzymes
- fatty acid
- glucose
- glycerol
- hormones / named hormones
- ions / named ions
- proteins
- urea
- vitamins
- water.

> ignore blood cells and platelets
> ignore oxygen
> max 1 named example of each for ions and hormones
> allow minerals

3

(c) Marks awarded for this answer will be determined by the Quality of Communication (QC) as well as the standard of the scientific response. Examiners should also refer to the information in the Marking Guidance and apply a 'best-fit' approach to the marking.

0 marks
No relevant content.

Level 1 (1 – 2 marks)
There is a description of pathogens with errors or roles confused.
or
the immune response with errors or roles confused.

Level 2 (3 – 4 marks)
There is a description of pathogens **and** the immune response with some errors or confusion
or
a clear description of either pathogens **or** the immune response with few errors or little confusion.

Level 3 (5 – 6 marks)
There is a good description of pathogens **and** the immune response with very few errors or omissions.

Examples of biology points made in the response:

- bacteria and viruses are pathogens
    credit any ref to bacteria and viruses
- they reproduce rapidly inside the body
- bacteria may produce poisons / toxins (that make us feel ill)
- viruses live (and reproduce) inside cells (causing damage).

white blood cells help to defend against pathogens by:

- ingesting pathogens / bacteria / (cells containing) viruses
    credit engulf / digest / phagocytosis
- to destroy (particular) pathogen / bacteria / viruses
- producing antibodies
- to destroy particular / specific pathogens
- producing antitoxins
- to counteract toxins (released by pathogens)
    credit memory cells / correct description
- this leads to immunity from that pathogen.

6

[11]

Q3.

(a) any **two** from:

- only one 'chromosome'
    allow one strand of DNA
- circular
    allow loop
- may have plasmids
- not in a nucleus / no nucleus

2

(b) (i) any **one** from:

- London is much higher
    or converse
- more variable / wider range
    allow 'on average it is 5 / 6 times greater'

1

(ii) increases
    Included figures must be correct

1

<table>
<tr><td>(iii)</td><td colspan="2">overall slight increase
     accept 'doesn't change much'</td><td>**1**</td></tr>
<tr><td></td><td colspan="2">variable / goes up and down</td><td>**1**</td></tr>
<tr><td>(c)</td><td>(i)</td><td>both axes correctly labelled

x = Year

y = Number of cases</td><td>**1**</td></tr>
<tr><td></td><td></td><td>correct points
     *all correct = **2** marks*
     *1-2 errors = **1** mark*
     *> 2 errors = **0** marks*</td><td>**2**</td></tr>
<tr><td></td><td></td><td>suitable line of best fit
     accept straight line or smooth curve</td><td>**1**</td></tr>
<tr><td></td><td>(ii)</td><td>doesn't fit the pattern / line of best fit</td><td>**1**</td></tr>
<tr><td>(d)</td><td colspan="2">provides immunity / protection (to TB)
     ignore 'stops people catching it'
     ignore 'resistance'</td><td>**1**</td></tr>
<tr><td></td><td colspan="2">prevents TB <u>spreading</u>
     accept ref to herd immunity</td><td>**1**</td></tr>
</table>

[13]

Q2.

(a) Over three quarters of students were able to complete the calculation correctly. However, many students misread the scale or did not attempt this question.

(b) This question provided a good range of discrimination between students. Almost half the students were able to name three chemical substances transported in the blood. The most common incorrect responses were: red blood cells, white blood cells and platelets.

(c) This six-mark question produced a broad range of marks and it was very well answered by some students. Many students were able to access level 2 by either describing the pathogens or defence mechanisms in detail.

A considerable number of students however, misread the question and spent a lot of time and effort describing how pathogens are prevented from entering the body. Many wrote at length about skin being a barrier, stomach acid and tears. They also described clotting of blood at wounds and formation of scabs. None of this was creditworthy.

A number of students, when describing how pathogens cause infections wrote in general terms and failed to use the words 'bacteria' or 'virus'. Those who did, usually went on to describe viruses living in cells and bacteria producing toxins and so were able to gain more marks.

The second part of the question was generally better answered. Most students understood phagocytosis and antibody production. Few, however, talked about the specificity of antibodies. Antitoxin production was well described but few went on to mention about future immunity as a result of previous exposure to a pathogen. However, this was not required to gain full marks. A number of students used rather weak language e.g. 'fight' pathogens, 'kill' toxins, although many were familiar with the terms 'phagocyte' and 'lymphocyte'. One fairly common confusion was between the words 'antigen' and 'antibody'. Nevertheless, the question was generally well answered.

Q3.

(a) The majority of students gained at least one mark, mainly due to their knowledge that bacteria did not have a nucleus. Many also scored the second mark for identifying the presence of plasmids in bacteria. However, there were many students who failed to score the second mark because they wrote that bacteria have several chromosomes, or several strands of DNA, or several loops of DNA instead.

(b) (i) Most students were able to identify the fact that London had a significantly higher rate of TB than the rest of Southern England.

(ii) This was another well answered question, with almost all students stating that the number of infections had increased. There were a few students who identified data that showed that the number of cases had stayed level for a few years at a time, but then did not go on to mention that there was an overall increase.

(iii) Few students scored both marks in this question. Most could identify the data as fluctuating with peaks and troughs and were able to point out the

corresponding dates.

The first marking point, 'slight change' or 'doesn't change much', was rarely awarded. Students either said that the numbers had stayed constant for just the last few years, thus ignoring the fact that they had not for the first few, or they simply stated that overall there had been an increase, ignoring the very low numbers involved.

(c)   (i)   Most students were able to plot the points accurately - with only the plotting of years 2002–2004 being a stumbling block for some. Some students also lost marks because they failed to label the axes correctly or at all.

            However, the most frequent error was accurately drawing a line of best fit or a curve. Students should endeavour to have equal numbers of points either side of the line and credit was given if four or more were above and below the line plotted. Statistically, a straight line should go from around 39 to 46 cases.

    (ii)   Under half were able to spot that an anomalous result is one that does not fit the pattern. Students who simply pointed out that the result was far higher than the others, or who said that the result was 'furthest from the line of best fit', did not gain the mark.

(d)   Three-quarters of the students scored at least one mark in this question. Many stated that a 'vaccination stops you catching TB', but there were many students who understood that vaccination conferred immunity or protection.

Some students were able to access the second mark by stating that the spread of TB was reduced by immunisation, and some used the term 'herd immunity'. However, it was not always clear whether students fully understood this term, but most were given the benefit of doubt if there was no contradiction.