

Candidate forename		Candidate surname	
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Centre number						Candidate number				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
GCSE**

**B731/01**

**GATEWAY SCIENCE**

**BIOLOGY B**

**Biology modules B1, B2, B3 (Foundation Tier)**

**THURSDAY 12 JANUARY 2012: Morning**

**DURATION: 1 hour 15 minutes**

**SUITABLE FOR VISUALLY IMPAIRED CANDIDATES**

**Candidates answer on the Question Paper.  
A calculator may be used for this paper.**

**OCR SUPPLIED MATERIALS:**

**None**

**OTHER MATERIALS REQUIRED:**

**Pencil**


**Ruler (cm/mm)**

**READ INSTRUCTIONS OVERLEAF**

## **INSTRUCTIONS TO CANDIDATES**

- **Write your name, centre number and candidate number in the boxes on the first page. Please write clearly and in capital letters.**
- **Use black ink. HB pencil may be used for graphs and diagrams only.**
- **Answer ALL the questions.**
- **Read each question carefully. Make sure you know what you have to do before starting your answer.**
- **Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).**

## **INFORMATION FOR CANDIDATES**

- **Your quality of written communication is assessed in questions marked with a pencil ().**
- **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 75.**

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**Answer ALL the questions.**

**SECTION A – MODULE B1**

**1 Simon is going sledging with his friends.**

**(a) Simon’s body needs to keep warm in the snow.**

**Why is it important that Simon’s body temperature does NOT fall too low?**

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**[2]**

**(b) Simon’s body sweats less to stop him losing too much heat.**

**Describe OTHER changes that can happen in Simon’s body to keep him warm.**

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**[2]**

**(c) Simon's dad has some wine with his lunch.**

**Simon and his dad then have a snowball fight.**

**His dad loses the fight. He blames this on the alcohol.**

**Explain how the alcohol might affect Simon's dad during a snowball fight.**

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[2]

[Total: 6]

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**2 A virus causes flu.**

**(a) Viruses are one type of pathogen.**

**(i) Write down the name of ONE OTHER type of pathogen and a disease it causes.**

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**[2]**

**(ii) Doctors can use drugs to treat diseases.**

**New drugs need to be tested.**

**Write down ONE reason why they are tested.**

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**[1]**

**(b) Emma takes her sick cat to the vet.**

**The vet says it has cat flu and that the virus infected the cells of the cat's LUNGS.**

**The virus must have got past the cat's defence mechanisms.**

**The vet says that cats have similar defence mechanisms to humans.**

**Emma thought the cat's body should have stopped the virus infecting its cells.**

**Suggest how the flu virus got into the cat and describe the cat's defence mechanisms against the virus.**



***The quality of written communication will be assessed in your answer to this question.***

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[6]

**[Total: 9]**

**3 Rafik plays rugby.**

**Rafik thinks he needs a special diet.**

**He finds out about diets for rugby players.**

**Read the information Rafik finds.**

**The training diet of a rugby player should**

- **BE HIGH IN CARBOHYDRATE-RICH FOODS**  
eg cereal, bread, rice, pasta, potato, fruit
- **BE MODERATE IN PROTEIN-RICH FOODS**  
eg meat, chicken, fish, milk and cheese
- **BE LOW IN FAT** eg avoid too much butter,  
fatty meats, high fat snacks and fried food
- **INCLUDE FRUIT & VEGETABLES** to help  
prevent illness.

**(a) Suggest why rugby players need a diet high in carbohydrates.**

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[1]

**(b) The diet says rugby players need moderate amounts of protein.**

**Rafik knows proteins are needed for muscle growth.**

**Rafik also knows he could take performance enhancers to develop his muscles.**

**Many people believe rugby players should NOT take performance enhancers.**

**Suggest why.**

---

**[1]**

- (c) Rafik is concerned that he might be too overweight to play rugby.

Read the information in the box.

**Body Mass Index (BMI)**

$$\text{BMI} = \frac{\text{mass in kg}}{(\text{height in m})^2}$$

- underweight < 18.5
- normal weight = 18.5–24.9
- overweight = 25–29.9
- obese = 30 or more.

- (i) Rafik is 180 cm tall and has a mass of 85 kg.

Calculate Rafik's BMI.

Show your working.

BMI = \_\_\_\_\_

[2]

**(ii) Is Rafik overweight? \_\_\_\_\_**

**Use the information in the box opposite to explain your answer.**

\_\_\_\_\_  
\_\_\_\_\_ **[1]**

**(iii) Rafik finds out about the BMI of other rugby players.**

**He finds out that most of the England rugby team have a BMI greater than 30.**

**Rafik's friend tells him that a high BMI does not mean you are unfit AND unhealthy.**

**Is Rafik's friend correct? \_\_\_\_\_**

**Suggest reasons for your answer.**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ **[2]**

**[Total: 7]**

**4 Jason and Sandra are investigating how plants grow.**

**They start with two identical plants.**

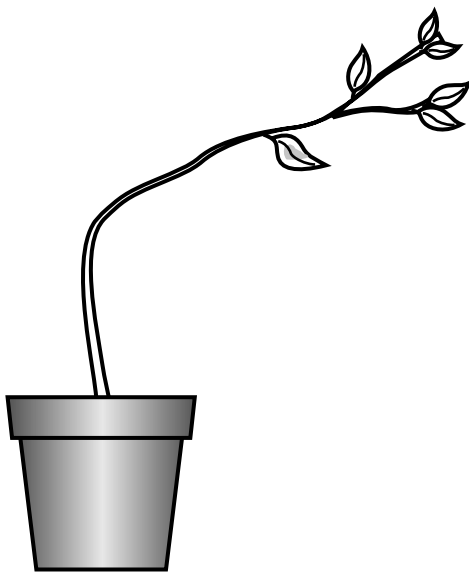
**They put one plant in the middle of a room and the second plant under a lamp.**

**The only light in the room comes from the lamp.**

**The plants are watered the same amount each day.**

**Look at the picture below. It shows each plant after they have been left for a week.**

**plant A in the middle of the room**



**plant B under the lamp**



**(a) Jason thinks the reason the plants look different is because of the effect of the light.**

**Explain how the results support his conclusion.**

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**[1]**

**(b) Sandra thinks the plants might be growing towards the heat from the lamp.**

**They think about ways to change their experiment to see if the plants are responding to light NOT heat.**

**They start with two more identical plants.**

**Put ticks (✓) in TWO boxes below to describe the BEST changes they could make.**

**Put a heat shield between the plants and the lamp.**

**Put the plant from the middle of the room into a box.**

**Take the lamp away.**

**Take the lamp away and replace with a heater.**

**Water the plants to stop them getting too hot.**

**[2]**

**[Total: 3]**

## SECTION B – MODULE B2

5 Read this article about mammoths.

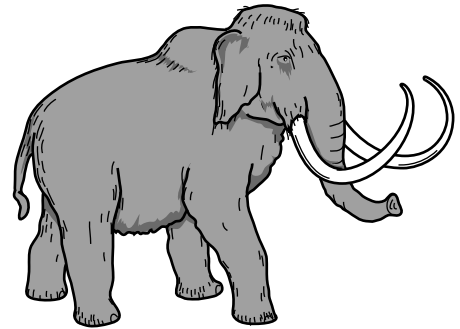
**Mammoths were large elephant-like animals that are now extinct.**

**The bodies of more and more mammoths are being found preserved in ice.**

**This is because the global temperature is increasing. This is melting the ice caps.**

**Some people suggest using mammoth tusks instead of elephant tusks as a source of ivory. They hope that this will stop elephants from becoming extinct.**

**However, they know that this is not a long term solution because mammoth ivory is not sustainable.**



**(a) Mammoths are now extinct.**

**(i) Write down ONE possible cause of animals becoming extinct.**

\_\_\_\_\_ [1]

**(ii) Some people are worried that elephants in Africa might become extinct.**

**Suggest ONE way that preventing the extinction of elephants could BENEFIT people that live in Africa.**

\_\_\_\_\_ [1]



- (b) Elephants and mammoths are thought to be related.**

**Elephants have developed due to groups of animals changing over long periods of time.**

**Natural selection is a theory that explains how these changes happened.**

- (i) What name is given to a gradual change in a group of organisms?**

\_\_\_\_\_ [1]

- (ii) Write down the name of the scientist who suggested the theory of natural selection.**

\_\_\_\_\_ [1]

- (c) The increase in global temperature is melting ice and exposing the dead mammoths.**

**Many people think that the increase in global temperature is due to increased carbon dioxide levels in the atmosphere.**

**Explain how increased carbon dioxide levels could lead to global warming.**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

**(d) Using mammoth ivory instead of elephant ivory is NOT sustainable.**

**Explain why this is.**

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**[2]**

**[Total: 8]**

**6 (a) Buffalo are herbivores that live in Africa.**

**Buffalo feed on grass.**

**Small birds called yellow-billed oxpeckers are often seen sitting on buffalo.**

**Yellow-billed oxpeckers hunt for live ticks that feed on buffalo.**

**The ticks feed on buffalo blood.**

**(i) How many trophic levels are there in this food chain?**

\_\_\_\_\_ [1]

**(ii) How does energy enter and flow through this food chain?**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

**(iii) The ticks are PARASITES of the buffalo.**

**What does the word parasite mean?**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

**(iv) Suggest how the buffalo might benefit from the yellow-billed oxpecker.**

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**[2]**

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**(b) A different species of oxpecker lives in another part of Africa.**

**This is the red-billed oxpecker. It also lives on buffalo.**

**A scientist wants to investigate whether buffalo also benefit from the red-billed oxpecker.**

**He counts the number of ticks on six buffalo.**

**He stops red-billed oxpeckers from sitting on three of the buffalo.**

**Red-billed oxpeckers are allowed to sit on the other three buffalo.**

**After several days he works out the change in the number of ticks on each buffalo.**

**His results are in the table below.**

	<b>CHANGE IN THE NUMBER OF TICKS ON EACH BUFFALO AFTER THE EXPERIMENT</b>			<b>AVERAGE CHANGE</b>
<b>buffalo with red-billed oxpeckers</b>	<b>+3</b>	<b>+7</b>	<b>-4</b>	<b>+2</b>
<b>buffalo without red-billed oxpeckers</b>	<b>+4</b>	<b>-4</b>	<b>+6</b>	

**(i) Work out the average change in ticks on the buffalo WITHOUT red-billed oxpeckers.**

**average change = \_\_\_\_\_ [1]**

**(ii) What is the conclusion from this experiment?**

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[1]

**(iii) Buffalo often have small wounds and sores on their bodies.**

**The scientist also looks at the effect that red-billed oxpeckers have on these wounds.**

	<b>NUMBER OF WOUNDS THAT DO NOT HEAL</b>	<b>NUMBER OF WOUNDS THAT HEAL</b>	<b>TOTAL NUMBER OF WOUNDS</b>
<b>buffalo with red-billed oxpeckers</b>	<b>49</b>	<b>55</b>	<b>104</b>
<b>buffalo without red-billed oxpeckers</b>	<b>3</b>	<b>24</b>	<b>27</b>

**Use this information to suggest what the red-billed oxpeckers do to the buffalo.**

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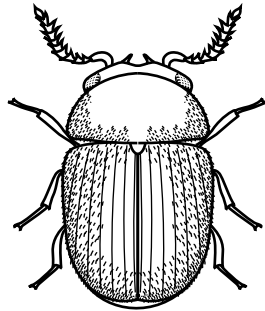
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[2]

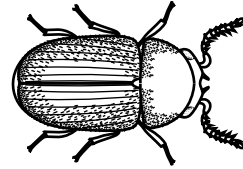
**[Total: 11]**

**7 Scientists discover TWO new organisms living in a remote forest.**

**organism 1**



**organism 2**



**Two of the scientists are discussing the organisms.**

**DR SMITH says, “We know that they are definitely ANIMALS. I would also classify them both as ARTHROPODS and INSECTS.”**

**DR JONES says, “They certainly look similar. It would be interesting to find out if they are both members of the same SPECIES.”**

**The scientists want to find out if their ideas about classifying these organisms are correct, and if both organisms are members of the same species.**

**Write about the characteristics that the scientists would look for in order to test their ideas.**





## SECTION C – MODULE B3

- 8 Bull sperm cells contain a different number of chromosomes to the number in body cells.

**Bull SKIN cells contain 60 chromosomes.**

**Work out how many chromosomes are in a bull sperm cell.**

**Use this to explain why skin cells have 60 chromosomes.**

**bull sperm cell = \_\_\_\_\_ chromosomes**

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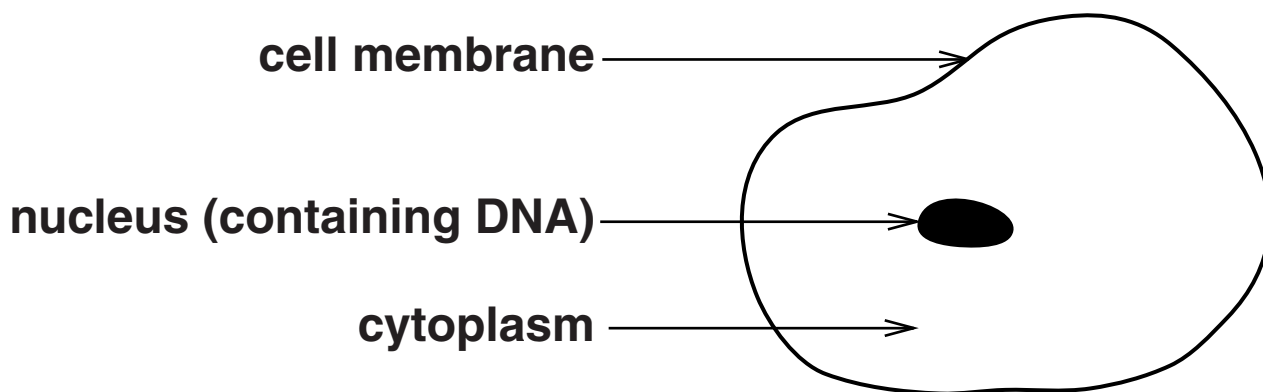
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[3]

**[Total: 3]**

**9 Look at the diagram of a human cheek cell.**



- (a) (i) DNA contains the code for the production of a substance needed for growth.**

**Write down the name of this substance.**

\_\_\_\_\_ [1]

- (ii) Cell division occurs during growth.**

**Write down the name of the type of cell division used for growth.**

\_\_\_\_\_ [1]

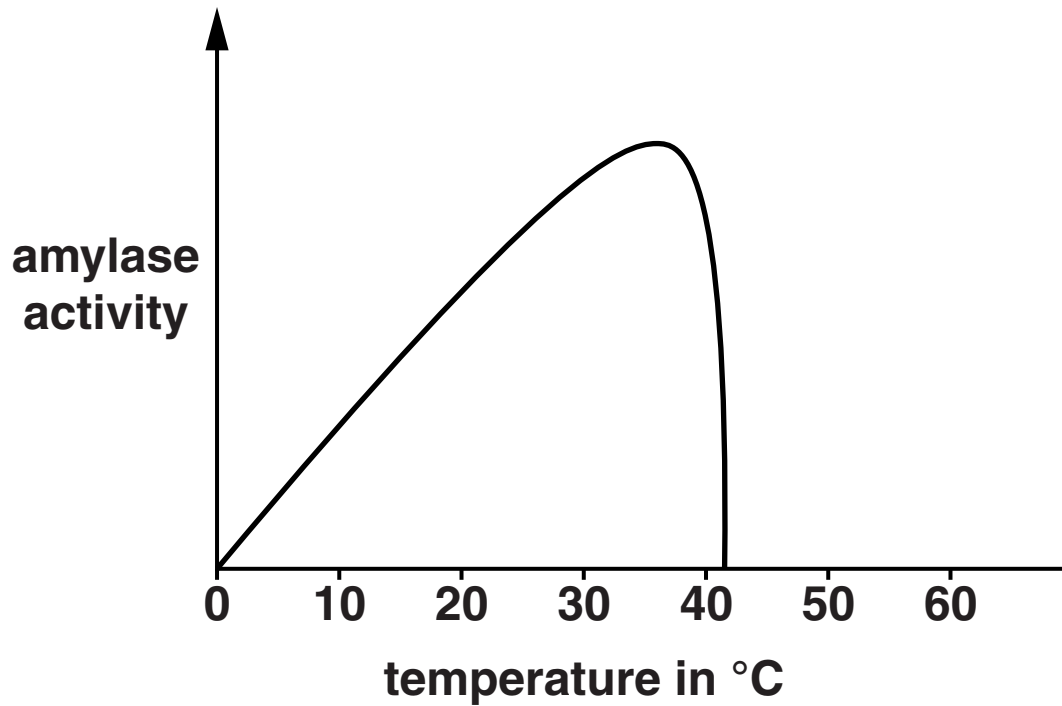
- (iii) Explain why DNA replicates BEFORE cells divide.**

\_\_\_\_\_  
\_\_\_\_\_ [1]

**(b) Amylase is an enzyme which is found in saliva. It only digests starchy foods.**

**Look at the graph.**

**It shows the effect of temperature on amylase.**





- (ii) Bacteria which live in hot water springs also produce amylase enzymes.**

**Genetic engineering can be used to produce this amylase in large amounts.**

**What is meant by GENETIC ENGINEERING?**

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[2]

**[Total: 11]**

**10 Carl is an athlete.**

**He competes in the 200 m sprint.**

**(a) Sprinting needs energy.**

**RESPIRATION is a process that releases energy.**

**Describe this process and suggest how it helps movement during the sprint.**

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**[2]**

**(b) During the sprint Carl's breathing rate and pulse rate increase.**

**Write down TWO reasons why.**

**1** \_\_\_\_\_

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**2** \_\_\_\_\_

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**[2]**

**(c) Look at the table of data below.**

**It shows the maximum oxygen consumption for males of different fitness levels.**

**The males are aged between 13 and 29 years old.**

<b>MAXIMUM OXYGEN CONSUMPTION IN cm<sup>3</sup> PER kg PER MINUTE</b>						
<b>AGE IN YEARS</b>	<b>FITNESS LEVELS</b>					
	<b>VERY POOR</b>	<b>POOR</b>	<b>FAIR</b>	<b>GOOD</b>	<b>EXCELLENT</b>	<b>SUPERIOR</b>
<b>13–19</b>	<b>less than 35</b>	<b>35–38</b>	<b>39–45</b>	<b>46–50</b>	<b>51–55</b>	<b>more than 55</b>
<b>20–29</b>	<b>less than 33</b>	<b>33–35</b>	<b>36–42</b>	<b>43–46</b>	<b>47–52</b>	<b>more than 52</b>

**(i) Carl is 25 years old.**

**He has a maximum oxygen consumption of 44 cm<sup>3</sup> per kg per minute.**

**Carl wants to improve his fitness level to EXCELLENT.**

**Look at the table above.**



**Calculate Carl's maximum oxygen consumption as a percentage of the LOWEST EXCELLENT value.**

**answer \_\_\_\_\_% [1]**

- (ii) Carl was tested to obtain his maximum oxygen consumption after further training.**

**He trained for one week doing gentle jogging. His maximum oxygen consumption at the end of the week was 45 cm<sup>3</sup> per kg per minute.**

**The second week, he trained by sprinting and jogging. His maximum oxygen consumption at the end of this week was 48 cm<sup>3</sup> per kg per minute.**

**Make a conclusion about Carl's fitness level and the training he used.**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ [2]

**[Total: 7]**

**11 (a) Blood is important for transport in the body.**

**Blood contains different parts.**

**Draw straight lines to connect each PART OF THE BLOOD, on the left, to the JOB IT DOES, on the right.**

**PART OF  
THE BLOOD**

**red blood cell**

**platelet**

**white blood cell**

**JOB IT DOES**

**defends against disease**

**transports oxygen**

**helps blood clotting**

**[2]**

**(b) Leukaemia is a disease of the blood.**

**Research scientists do experiments using blood from people with leukaemia.**

**This allows a more detailed understanding of leukaemia.**

**Other scientists repeat these experiments.**

**Explain the benefits of repeating the research scientists' experiments.**

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**[2]**

**[Total: 4]**

**END OF QUESTION PAPER**

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