Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						6	1	0	6	/	0	3	Signature	

Paper Reference(s)

6106/03

Edexcel GCE

Biology

Biology (Human)

Advanced

Unit Test 6 Paper 03 Synoptic Paper

Monday 28 January 2008 – Afternoon

Time: 1 hour 10 minutes

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4B	
5H	
Total	

Materials required for examination
Ruler

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initial(s) and signature.
The paper reference is shown above.
Check that you have the correct question paper.
Answer Questions 1 and 2 and then *either* Question 3 *or either* 4B *or* 5H in the spaces provided in this question paper.
Indicate which question you are answering by marking the box with a cross (☒). If you change your mind, put a line through the box (☒) and then indicate your new question with a cross (☒).
Show all the steps in any calculations and state the units. Calculators may be used.
Include diagrams in your answers where these are helpful.

Information for Candidates

The marks for individual questions and parts of questions are shown in round brackets: e.g. **(2)**.
The total mark for this paper is 38.

Advice to Candidates

You will be assessed on your ability to organise and present information, ideas, descriptions and arguments clearly and logically, taking account of your use of grammar, punctuation and spelling.
This question paper is designed to give you the opportunity to make connections between different areas of biology and to use skills and ideas developed throughout the course in new contexts. You should include in your answers any relevant information from the whole of your course.

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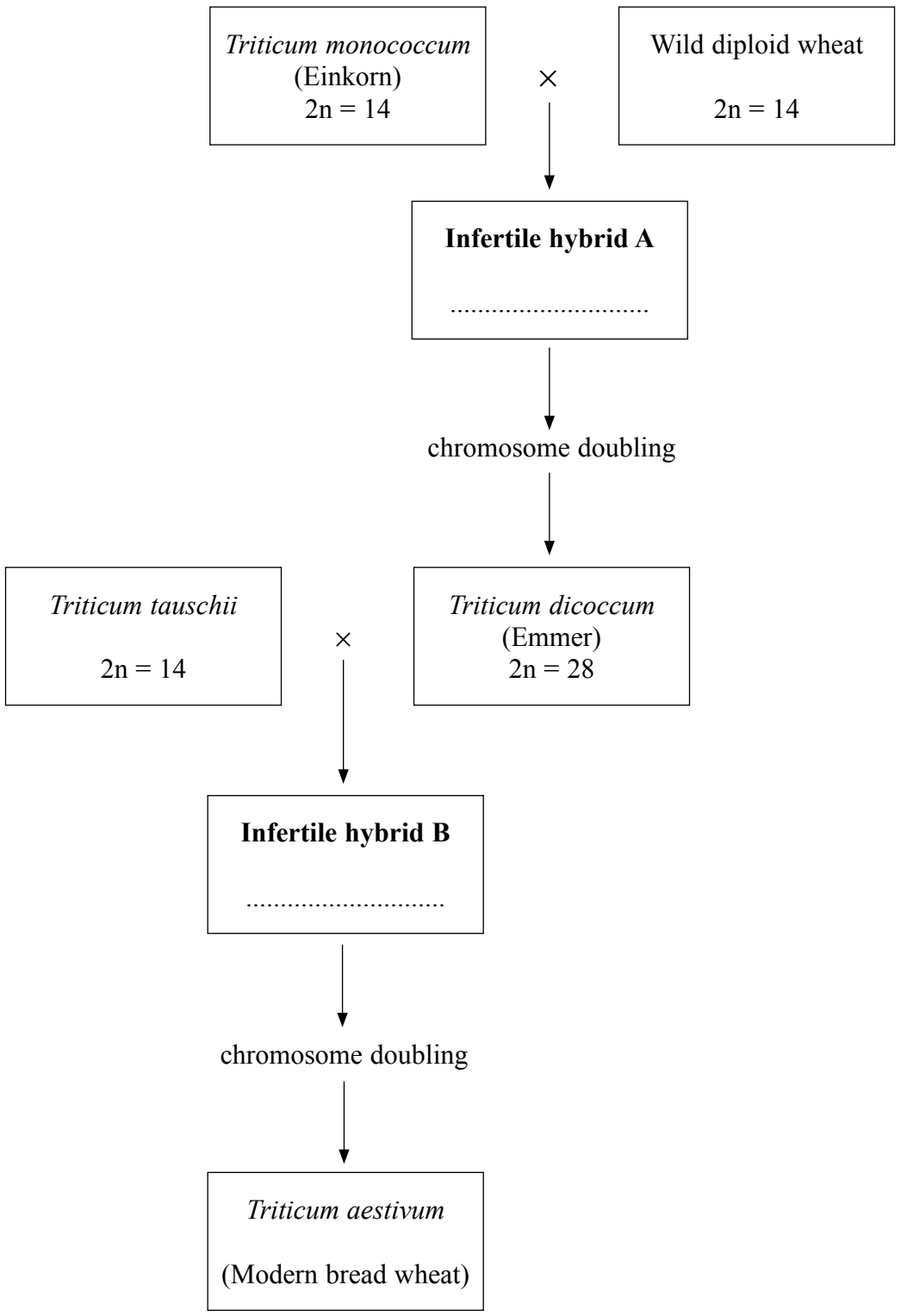
Answer Questions 1 and 2 in the spaces provided.

Leave blank

1. Modern bread wheat (*Triticum aestivum*) is an example of a polyploid plant that has arisen naturally, by cross-pollination between different species of wild grasses, and has been selected by humans.

The diagram below shows how this may have happened.



Leave blank

(a) In the boxes provided on the diagram, write the chromosome numbers of the **infertile hybrid A** and the **infertile hybrid B**.

(2)

(b) (i) Suggest why hybrids A and B are infertile.

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(1)

(ii) Suggest how chromosome doubling may have happened.

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(2)

(iii) Suggest why chromosome doubling results in these infertile hybrids becoming fertile.

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(2)

(c) *Triticum durum* is another species of modern wheat. Suggest why it is important that there should be more than one species of modern wheat cultivated.

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(1) **Q1**

(Total 8 marks)

Leave blank

2. (a) Describe the role of erythrocytes (red blood cells) in the transport of carbon dioxide.

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(4)

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(b) Seals are mammals that are adapted to an aquatic way of life, including the ability to dive under water for relatively long periods of time.

A common seal

Atmospheric air contains approximately 0.03% carbon dioxide. The table below shows the effect of carbon dioxide concentration in inspired air on volumes of air breathed by a human and by a seal. The volumes of air breathed are expressed as a percentage of the normal volume.

Percentage of carbon dioxide in inspired air (%)	Volume of air breathed expressed as a percentage of the normal volume (%)	
	Human	Seal
0.03 (atmospheric air)	100	100
2.00	120	240
4.00	205	380
6.00	410	580
8.00	690	610

Leave blank

(i) Name the part of the brain that controls the rate and depth of breathing.

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(1)

(ii) Describe the relationship between carbon dioxide concentration and the volume of air breathed by a human.

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(2)

(iii) Compare the effect of carbon dioxide concentration on the volumes of air breathed by a human and by a seal.

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(3)

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(c) The table below gives information about the volumes of oxygen in the blood and muscle of a human and of a seal.

Mammal	Volume of oxygen in blood / cm^3 per 100 cm^3	Volume of oxygen in muscle / cm^3 per kg
Human	20	15
Seal	25	45

Suggest explanations for each of the following.

(i) Seal blood is able to carry more oxygen, per unit volume, than human blood.

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(2)

(ii) Seal muscle is able to store more oxygen, per unit mass, than human muscle.

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(2)

(d) The concentration of lactic acid (lactate) in the blood of a seal was measured before and immediately after the seal had dived for 12 minutes. The lactic acid concentration was found to have increased by 30 mg per 100 cm^3. Suggest a reason for this change.

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(1)

Q2

(Total 15 marks)

Leave blank

Write an essay on ONE of the following topics.

For Biology you should choose EITHER Question 3 OR Question 4B.

3. The structure and roles of carbohydrates in living organisms.

(15 marks)

4B. The structure and roles of chloroplasts.

(15 marks)

For Biology (Human) you should choose EITHER Question 3 OR Question 5H.

3. The structure and roles of carbohydrates in living organisms.

(15 marks)

5H. The regulation of the internal environment in humans.

(15 marks)

Marks will be awarded for scientific content, coverage of the topic, and the quality of written communication. You should include in your answer any relevant information from the whole of your course. You may include diagrams if you wish, but make sure that they are relevant to your essay and add extra information to it.

Leave blank

Indicate which question you have chosen by marking the box (☒). If you change your mind, put a line through the box (☒) and then indicate your new question with a cross (☒).

Chosen question number: **Question 3** ☒

Question 4B ☒

Question 5H ☒

Write your answer, including any plan, here.

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(Total 15 marks)

TOTAL FOR PAPER: 38 MARKS

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