



National
Qualifications
2017

X740/76/02

**Human Biology
Section 1 — Questions**

TUESDAY, 23 MAY

1:00 PM – 3:30 PM

Instructions for the completion of Section 1 are given on *Page 02* of your question and answer booklet X740/76/01.

Record your answers on the answer grid on *Page 03* of your question and answer booklet.

Before leaving the examination room you must give your question and answer booklet to the Invigilator; if you do not, you may lose all the marks for this paper.



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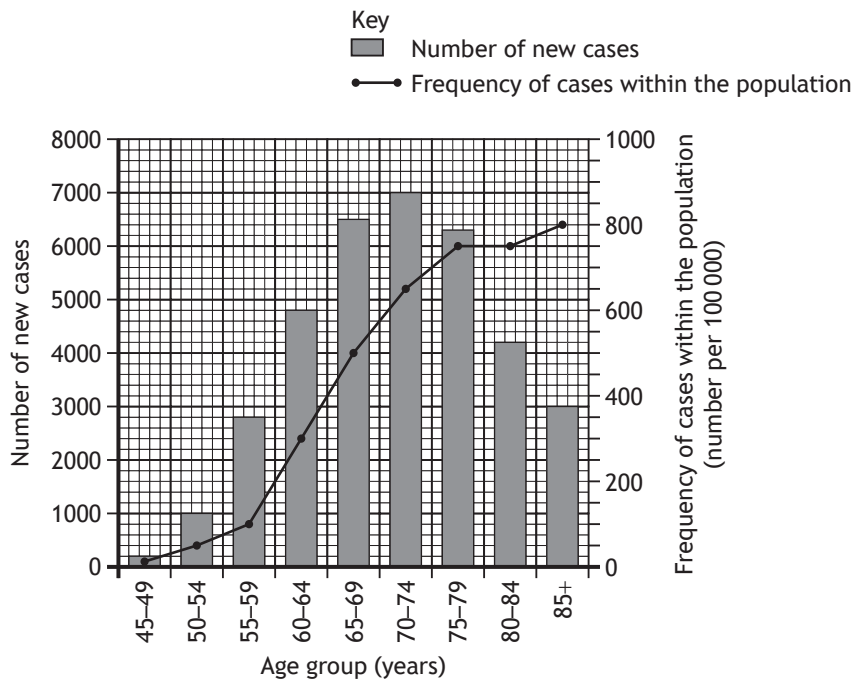
SECTION 1 — 20 marks

Attempt ALL questions

1. Which row in the table shows the type of stem cell that has the potential to form the greatest variety of specialised cells?

	Type of stem cell	State of differentiation
A	embryonic	differentiated
B	tissue	differentiated
C	embryonic	undifferentiated
D	tissue	undifferentiated

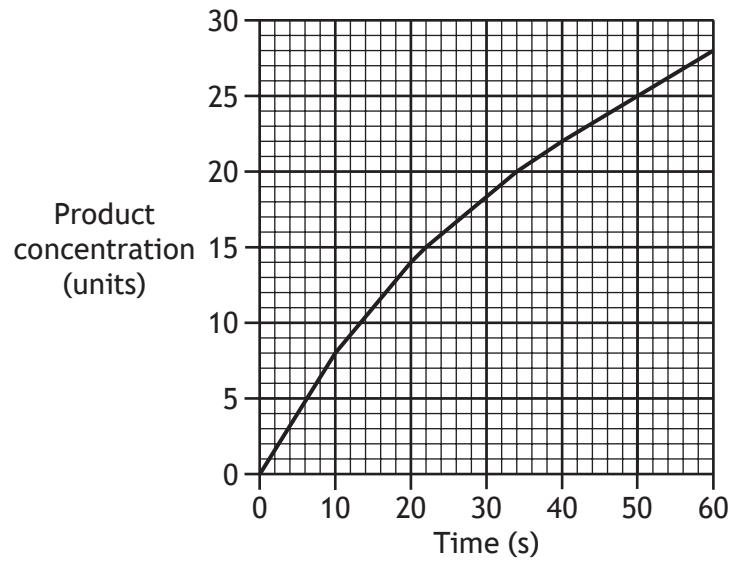
2. The graph contains information about prostate cancer in the UK in 2006.



Which of the following conclusions can be drawn from the graph?

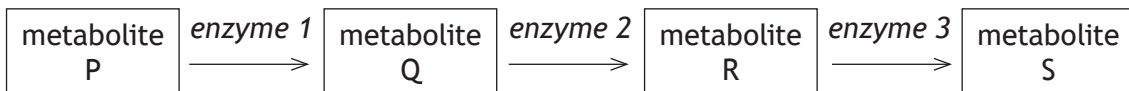
- A The highest frequency of cases within the population was in the 70–74 year old age group.
- B As the age group increases, the frequency of cases within the population always increases.
- C When there were 4800 new cases, the frequency of cases within the population was 600 per 100 000.
- D The greatest increase in the number of new cases, between consecutive age groups, occurred between 55–59 and 60–64.

3. The graph shows how the concentration of product changes during an enzyme-controlled reaction.



How long does it take the product concentration to reach 50% of its final concentration?

- A 20 s
 - B 22 s
 - C 25 s
 - D 28 s
4. A metabolic pathway is shown.



In end-product inhibition

- A enzyme 3 binds to enzyme 1
- B enzyme 3 binds to metabolite P
- C metabolite S binds to enzyme 1
- D metabolite S binds to metabolite P.

[Turn over

5. Mature red blood cells have no nucleus and no mitochondria.

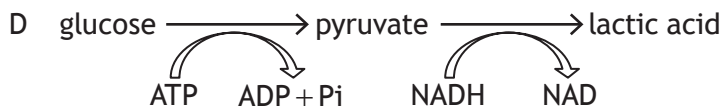
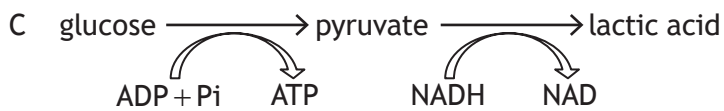
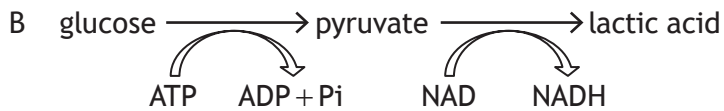
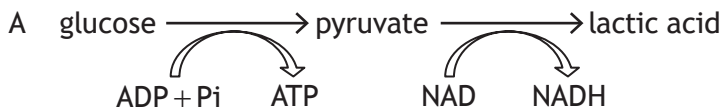
Which of the following processes can be carried out by a mature red blood cell?

- A Glycolysis
- B Cell division
- C Protein synthesis
- D Electron transport chain

6. During respiration most ATP is produced when

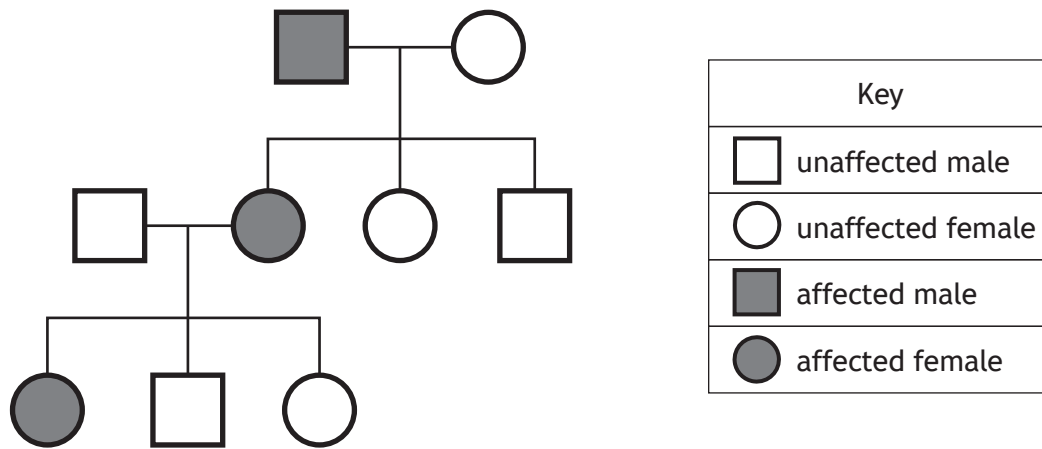
- A electrons are passed through the membrane protein ATP synthase
- B hydrogen ions are passed through the membrane protein ATP synthase
- C electrons are pumped through the outer membrane of the mitochondrion
- D hydrogen ions are moved along carriers in the inner membrane of the mitochondrion.

7. Which of the following equations summarises the conversion of glucose to lactic acid?



8. The diagram shows the inheritance of familial hypercholesterolaemia (FH) in three generations of a family.

FH is caused by an autosomal dominant allele.



How many individuals in this family are homozygous dominant for this condition?

- A 0
 B 1
 C 2
 D 3
9. Red-green colour vision deficiency is a sex-linked recessive condition. Females heterozygous for the condition are described as being 'carriers'. A colour vision deficient woman and an unaffected man have children. Which of the following show the expected phenotypic ratio of the children?

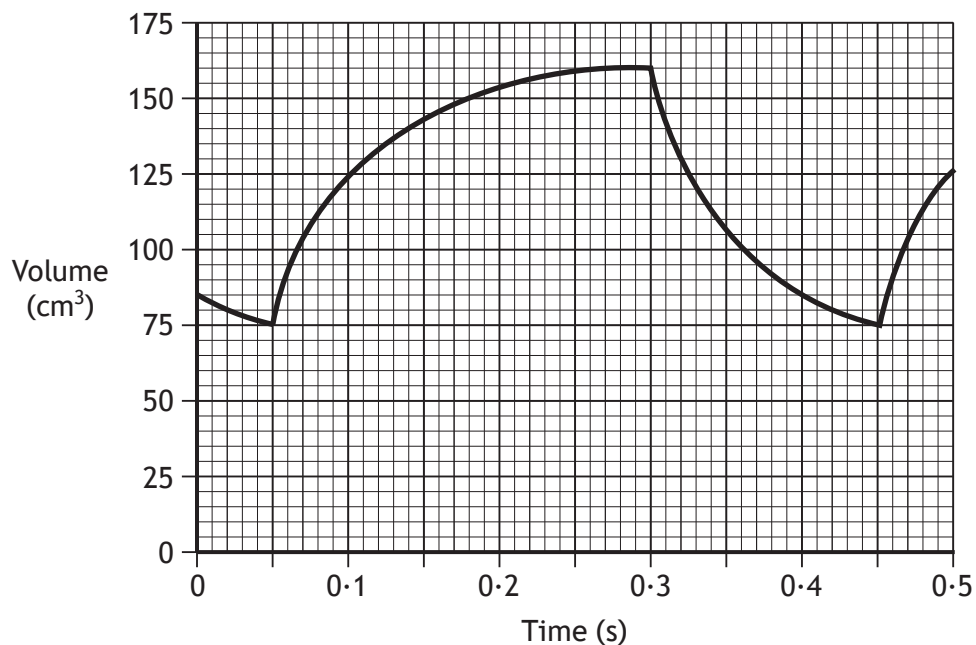
- A 1 carrier daughter : 1 colour vision deficient son
- B 1 unaffected daughter : 1 colour vision deficient son
- C 1 unaffected daughter : 1 colour vision deficient son : 1 unaffected son : 1 carrier daughter
- D 1 carrier daughter : 1 colour vision deficient son : 1 unaffected son : 1 colour vision deficient daughter

[Turn over

10. Which row in the table shows how the autonomic nervous system controls an increase in heart rate?

	<i>Branch of autonomic nervous system</i>	<i>Neurotransmitter</i>
A	sympathetic	acetylcholine
B	parasympathetic	noradrenaline
C	sympathetic	noradrenaline
D	parasympathetic	acetylcholine

11. The graph shows changes in the volume of blood in the left ventricle of an individual's heart while running.



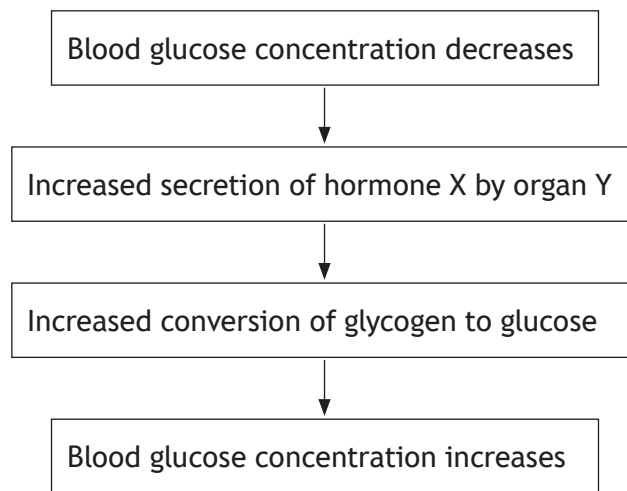
The cardiac output of this individual is

- A 5 100 cm³/min
- B 10 200 cm³/min
- C 12 750 cm³/min
- D 24 000 cm³/min.

12. During clot formation, thrombin

- A forms prothrombin
- B causes formation of fibrin threads
- C causes the release of clotting factors
- D forms a meshwork that clots the blood.

13. The flow diagram shows how the concentration of glucose in the blood is controlled during exercise.



Which row in the table identifies hormone X and organ Y?

	<i>Hormone X</i>	<i>Organ Y</i>
A	insulin	liver
B	glucagon	liver
C	insulin	pancreas
D	glucagon	pancreas

14. A person is 170 cm tall and weighs 70 kg.

They have a body mass index (BMI) of

- A 2.4
- B 24.2
- C 28.8
- D 41.2.

[Turn over

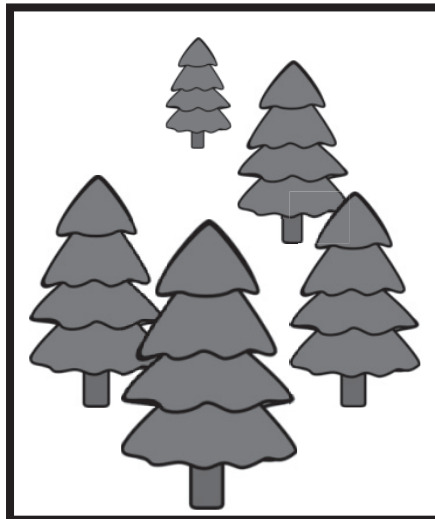
15. The following list shows three areas of the brain.

- 1 Cortex
- 2 Limbic system
- 3 Corpus callosum

Which of these areas are involved in storing spatial memories?

- A 1 only
- B 2 only
- C 1 and 2 only
- D 1, 2 and 3

16. The picture shows a scene with trees.



What visual cues are used in the perception of depth in this picture?

- 1 Relative size
 - 2 Relative height
 - 3 Superimposition
 - 4 Perceptual constancy
- A 1 only
 - B 1 and 2 only
 - C 1, 2 and 3 only
 - D 1, 2, 3 and 4

17. Some individuals who suffer head injuries forget the events that happened a few seconds before the injury occurred.

This memory loss is most likely to be due to the injury affecting

- A retrieval
- B displacement
- C long-term memory
- D short-term memory.

18. Three groups of students were asked to make paper aeroplanes.

Each student had to make five aeroplanes.

The table shows the conditions under which each group worked.

<i>Group</i>	<i>Written set of instructions supplied</i>	<i>Demonstration given on how to fold the paper</i>	<i>Prize awarded to the first student finished</i>
1	yes	no	no
2	no	yes	no
3	no	no	yes

What behavioural term is used to describe the method of learning used by group 2 only?

- A Shaping
- B Imitation
- C Trial and error
- D Reinforcement

[Turn over for next question

19. The table shows the numbers of different types of white blood cells found in blood samples taken from a healthy person and from three different patients.

<i>Type of white blood cell</i>	<i>White blood cells found in blood sample (cells/mm³)</i>			
	<i>Healthy person</i>	<i>Patient X</i>	<i>Patient Y</i>	<i>Patient Z</i>
Phagocyte	7000	7000	8000	7000
Lymphocyte	3000	2000	3000	3500
Mast cell	1000	1000	1000	1500

Use the information above to match each condition to the correct patient.

	<i>Condition</i>		
	<i>Allergic response</i>	<i>HIV</i>	<i>Infected wound</i>
A	Y	X	Z
B	X	Z	Y
C	Z	Y	X
D	Z	X	Y

20. Which term would be used to describe a global outbreak of an infectious disease?
- A Endemic
 - B Sporadic
 - C Epidemic
 - D Pandemic

[END OF SECTION 1. NOW ATTEMPT THE QUESTIONS IN SECTION 2 OF YOUR QUESTION AND ANSWER BOOKLET.]

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