



National  
Qualifications  
2016

**X740/76/02**

**Human Biology  
Section 1 — Questions**

MONDAY, 9 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.



\* X 7 4 0 7 6 0 2 \*

**SECTION 1 — 20 marks**

**Attempt ALL questions**

1. In a developing embryo, tissues such as muscle and nerve are produced by
- A somatic cells dividing by meiosis
  - B germline cells dividing by meiosis
  - C somatic cells dividing by mitosis
  - D germline cells dividing by mitosis.
2. A genetic disorder of the nervous system results from a mutation in which a nucleotide is inserted into a gene.
- Which of the following types of mutation causes this genetic disorder?
- A nonsense
  - B missense
  - C translocation
  - D frame-shift
3. The following steps occur during the Polymerase Chain Reaction (PCR).
- 1. Binding of primer
  - 2. Replication of DNA
  - 3. Heating of sample DNA
  - 4. Separation of DNA strands

In which sequence do these steps occur?

- A 1 → 2 → 4 → 3
- B 1 → 2 → 3 → 4
- C 3 → 4 → 1 → 2
- D 3 → 4 → 2 → 1

4. The diagrams below represent the shapes of an enzyme molecule and its substrate.

*Enzyme molecule*



*Substrate molecule*



Which row in the table below shows the possible shapes of two types of molecule that could inhibit the enzyme above?

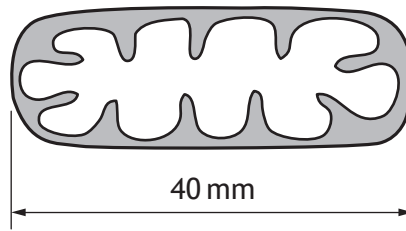
	<i>Competitive Inhibitor</i>	<i>Non-competitive Inhibitor</i>
A		
B		
C		
D		

5. During glycolysis, dehydrogenase enzymes catalyse the

- A removal of hydrogen ions from  $\text{NADH}_2$
- B removal of hydrogen ions from citrate
- C transfer of hydrogen ions to glucose
- D transfer of hydrogen ions to NAD.

[Turn over

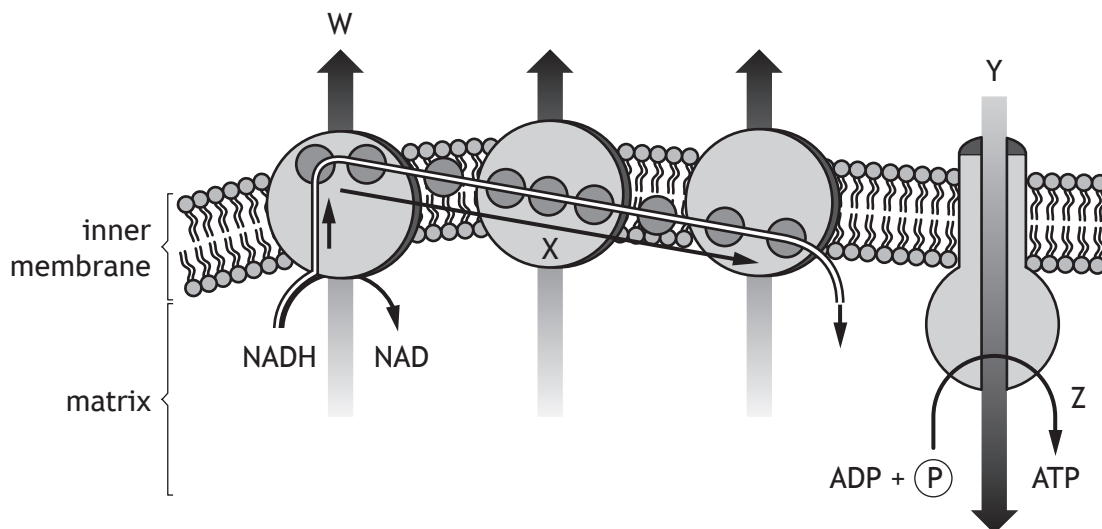
6. The diagram below represents a mitochondrion which has been magnified 10 000 times.



What is the actual length of this mitochondrion?

(1 mm = 1000 micrometres)

- A 0.04 micrometres
  - B 0.4 micrometres
  - C 4 micrometres
  - D 40 micrometres
7. The diagram below represents some of the processes which occur at the inner membrane of a mitochondrion.

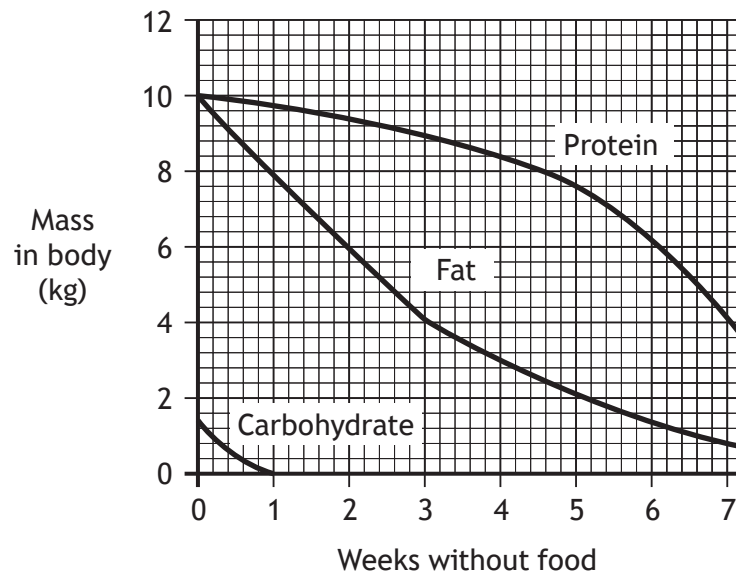


Which letter represents the transfer of high energy electrons?

- A W
- B X
- C Y
- D Z

8. During cellular respiration, the activity of phosphofructokinase can be inhibited by
- A ATP and citrate
  - B ADP and citrate
  - C ATP and lactic acid
  - D ADP and lactic acid.

9. The graph below shows changes which occur in the masses of protein, fat and carbohydrate in a person's body during seven weeks without food.



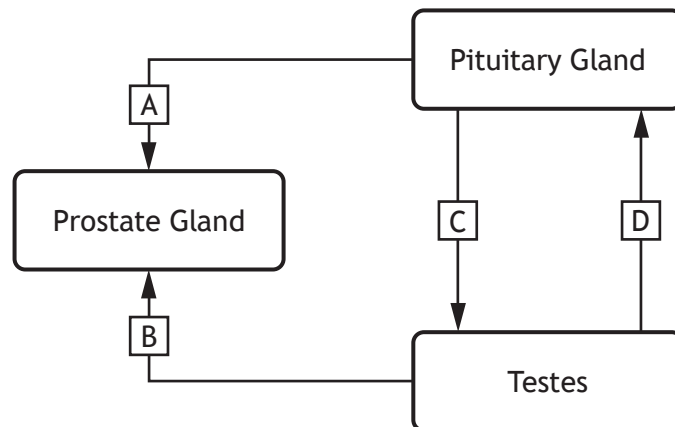
The person's starting mass was 60 kg.

Predict their mass after two weeks without food.

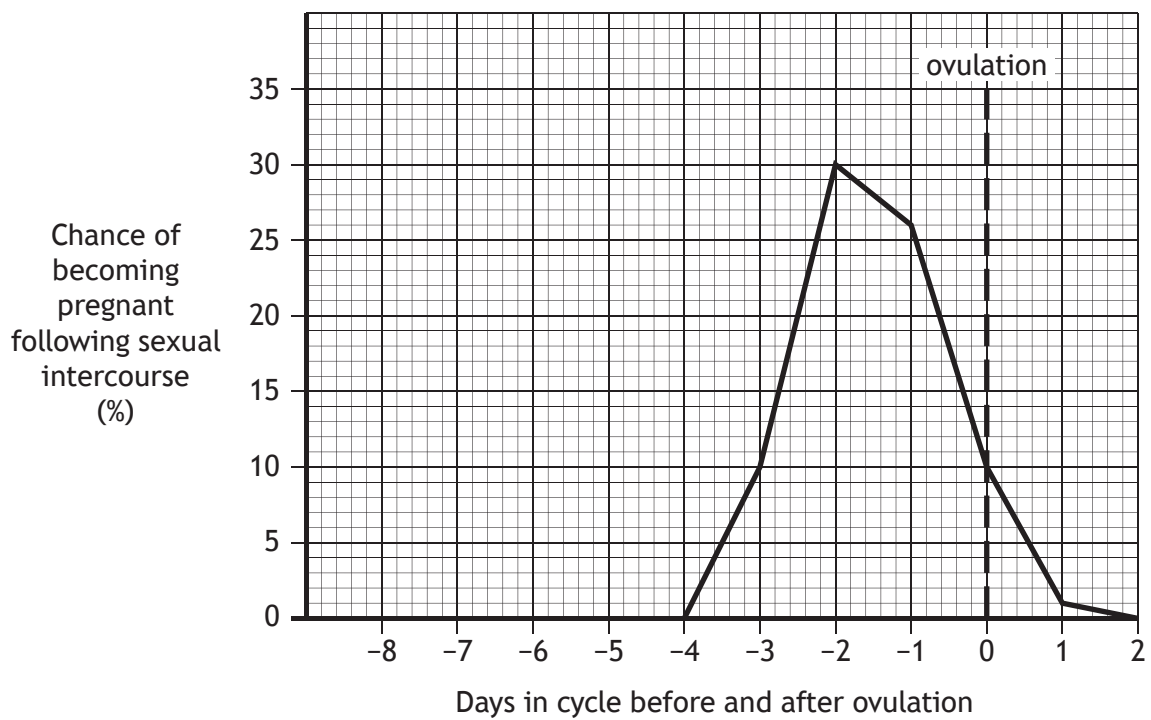
- A 57 kg
- B 54 kg
- C 50 kg
- D 43 kg

[Turn over

10. The diagram below represents connections between parts of the male reproductive system. Which arrow in the diagram does **not** represent a male reproductive hormone?



11. The graph below shows the chance of a woman becoming pregnant, following sexual intercourse, on the days before and after ovulation.

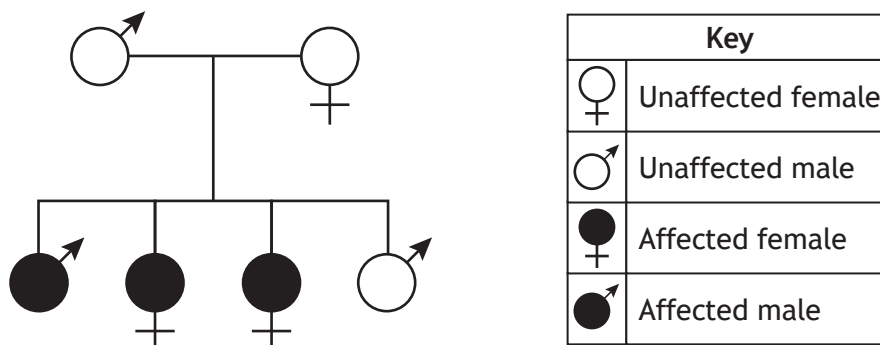


This woman has a 28 day menstrual cycle and ovulates on the 3rd of May.

On which day in May would having sexual intercourse give her the best chance of becoming pregnant?

- A 3rd May
- B 17th May
- C 29th May
- D 31st May

12. In the treatment of infertility, ovulation can be stimulated by drugs that prevent the negative feedback effect of
- A oestrogen on LH secretion
  - B oestrogen on FSH secretion
  - C progesterone on LH secretion
  - D progesterone on FSH secretion.
13. During antenatal care, which **two** techniques can be used to obtain cells for production of a karyotype?
- A Chorionic villus sampling (CVS) and amniocentesis
  - B Ultrasound imaging and chorionic villus sampling (CVS)
  - C Amniocentesis and pre-implantation genetic diagnosis (PGD)
  - D Pre-implantation genetic diagnosis (PGD) and ultrasound imaging
14. The inheritance of an allele for deafness is shown in the family tree below.



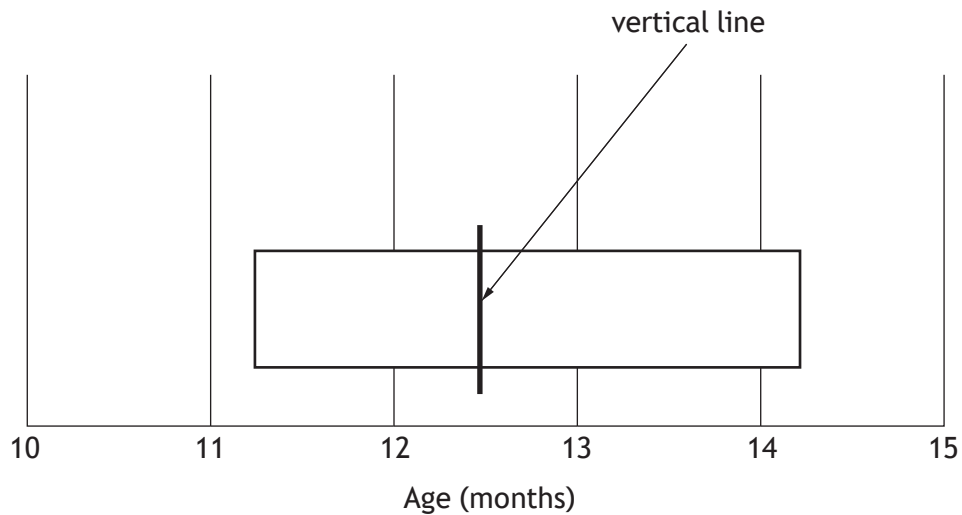
This condition is controlled by an allele which is

- A dominant and sex-linked
- B recessive and sex-linked
- C dominant and not sex-linked
- D recessive and not sex-linked.

[Turn over

15. Which of the following memories would be stored in the limbic system only?
- A The tune to your favourite song.
  - B How to keep three balls in the air when juggling.
  - C The route to your bed across your bedroom in the dark.
  - D The taste of your favourite food.
16. Playing cards normally have hearts and diamonds in red, and spades and clubs in black. An investigation showed that the speed and accuracy in recognising the cards decreased when the colours were reversed, for example when hearts appeared black. This result was most likely to have been caused by the effect of
- A a perceptual set
  - B a binocular disparity
  - C a segregation into figure and ground
  - D an organisation into coherent patterns.

17. The diagram below shows the ages at which infants are able to walk unaided. The left end of the bar shows the age at which 25% of infants can walk unaided. The right end of the bar shows the age at which 90% of infants can walk unaided. The vertical line on the bar shows the age at which 50% of infants can walk unaided.



If 24 infants, aged 12 months, were tested, how many would be expected to walk unaided?

- A 6  
 B 10  
 C 14  
 D 18
18. The table below contains information about two groups of students who were asked to construct a paper model from a set of instructions.

<i>Group</i>	<i>Arrangement of students</i>	<i>Average time to complete model (s)</i>
1	all students together in one room	105
2	each student in a separate room	140

The improved performance of the students in group 1 is likely to be due to

- A shaping  
 B discrimination  
 C deindividuation  
 D social facilitation.

19. When tissue is damaged, mast cells release histamine which **immediately** results in
- A an accumulation of phagocytes
  - B increased delivery of antimicrobial proteins and clotting elements
  - C increased localised blood vessel dilation and capillary permeability
  - D stimulation of a specific immune response by activating lymphocytes.
20. In Scotland cases of influenza are always present but occasionally they rise to unusually high levels. In this case, the disease is said to have changed from being
- A epidemic to endemic
  - B endemic to epidemic
  - C sporadic to epidemic
  - D endemic to sporadic.

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

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