National
Qualifications
2021 ASSESSMENT RESOURCE

X840/76/12

Human Biology
Paper 1 — Multiple choice

Duration — 40 minutes

Total marks — 25

Attempt ALL questions.

You may use a calculator.

Instructions for the completion of Paper 1 are given on *page 02* of your answer booklet X840/76/02.

Record your answers on the answer grid on *page 03* of your answer booklet.

Space for rough work is provided at the end of this booklet.

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

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Total marks — 25

Attempt ALL questions

1. Which row in the table describes one type of cell division?

	Type of division	Parental cell type	Cells produced
A	mitosis	germline	somatic
B	meiosis	somatic	somatic
C	meiosis	germline	gametes
D	mitosis	somatic	gametes

2. Single gene mutations involve the alteration of a DNA nucleotide sequence as a result of

A deletion, substitution or insertion

B duplication, insertion or substitution

C duplication, substitution or inversion

D deletion, inversion or translocation.

3. Personalised medicine researchers identified three mutated sequences of mRNA.

Mutated sequence	Effects of mutation
AUUG	non-harmful
ACUU	harmful
ACUG	non-harmful

A drug was designed to bind to the mutated mRNA preventing its harmful effects.

Which of the following DNA sequences would be found in individuals who could be prescribed this drug as part of their treatment?

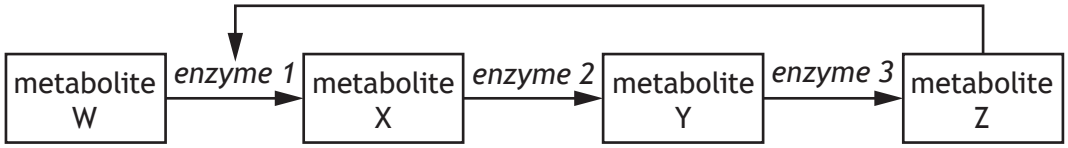
A CGACUUC

B TAACGAT

C GCTGAAT

D TCTTGAC

4. This metabolic pathway is regulated by feedback inhibition.



Which of the following would occur if a mutation caused enzyme 3 to be non-functional?

A Metabolite Z would inhibit enzyme 1

B Metabolite Z would increase in concentration

C Metabolite Y would not be converted to metabolite Z

D Metabolite W would not be converted to metabolite X

[Turn over

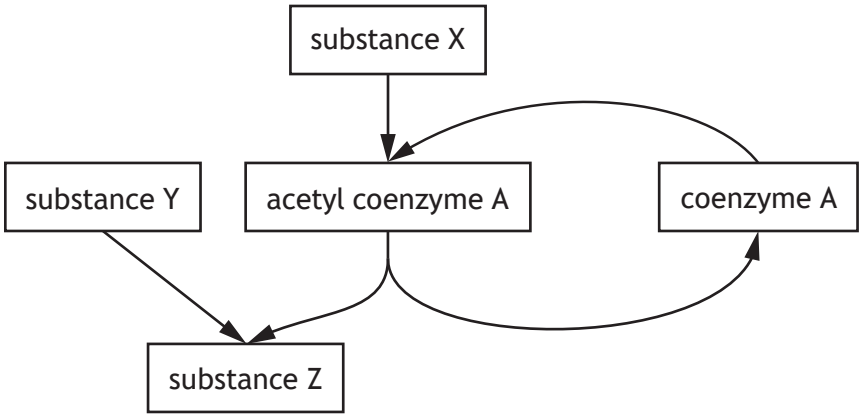
5. Three stages of respiration are listed.

1. Glycolysis
2. Citric acid cycle
3. Electron transport chain

Oxygen is used in

A stage 2 only
B stage 3 only
C stages 2 and 3 only
D stages 1, 2 and 3.

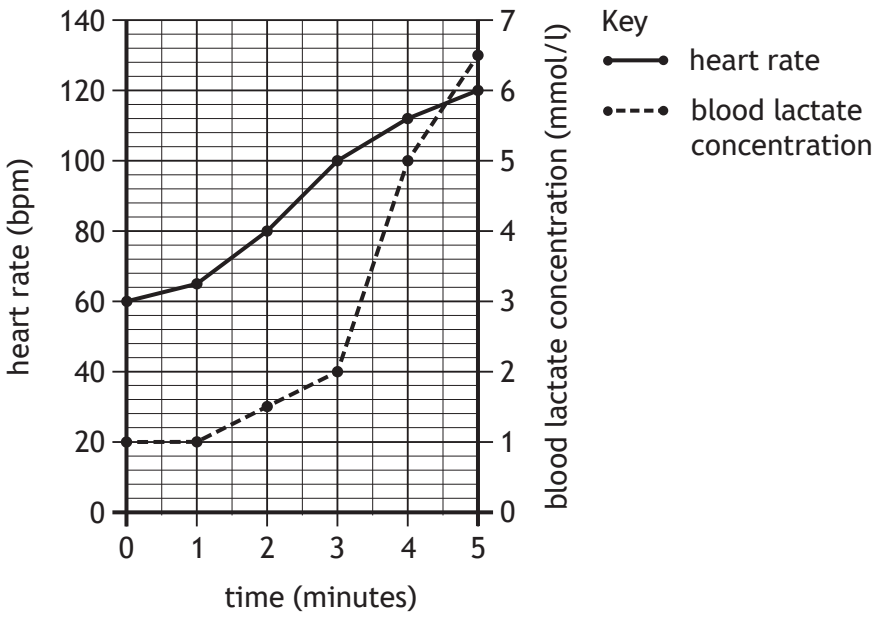
6. The diagram represents part of the respiratory pathway.



Which row in the table identifies substances X, Y and Z?

	Substance X	**Substance Y**	**Substance Z**
A	acetyl group	oxaloacetate	citrate
B	acetyl group	citrate	oxaloacetate
C	pyruvate	oxaloacetate	citrate
D	pyruvate	citrate	oxaloacetate

7. The graph shows an athlete's heart rate and blood lactate concentration while cycling for 5 minutes.



Which of the following statements is correct?

A When the blood lactate concentration was 5 mmol/l the heart rate was 100 bpm

B The greatest increase in blood lactate concentration occurs between minutes 2 and 3

C Both heart rate and blood lactate concentration increased during every minute of exercise

D Over the 5 minutes, the average increase in heart rate was 12 bpm

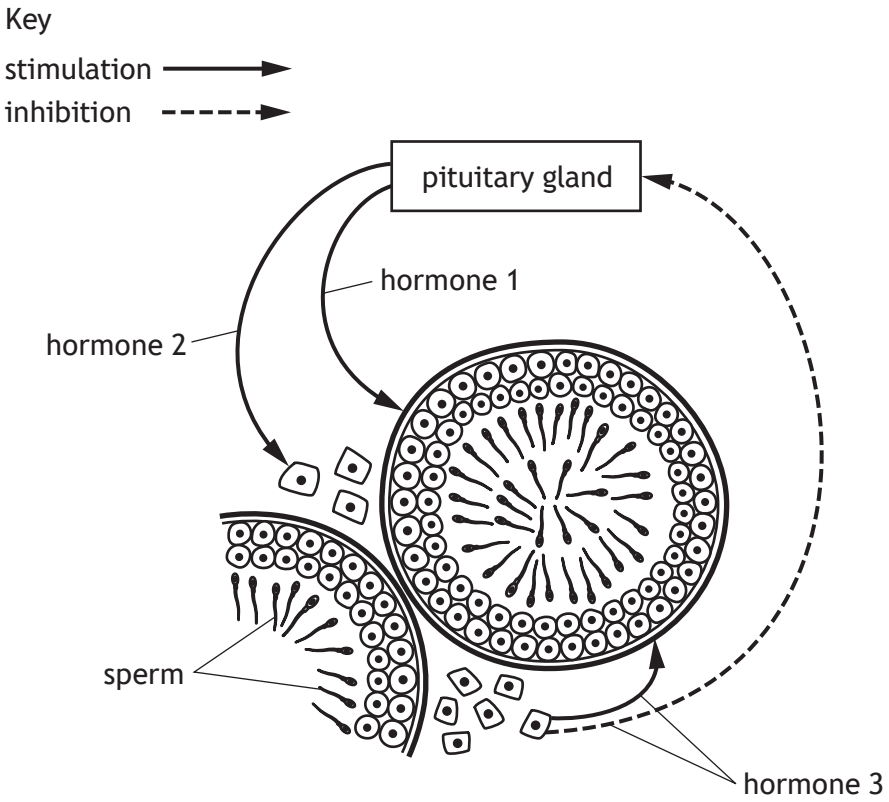
8. A sample of leg muscle from an Olympic 100 metre sprinter was analysed.

Which row in the table is most likely to indicate the results of this analysis?

	Most common muscle fibre type	**Mitochondria per cell**
A	fast-twitch	2000
B	slow-twitch	2000
C	fast-twitch	500
D	slow-twitch	500

[Turn over

9. The diagram represents the hormonal control of sperm production.



Which row in the table identifies each hormone?

	Hormone 1	**Hormone 2**	**Hormone 3**
A	ICSH	FSH	testosterone
B	testosterone	ICSH	FSH
C	FSH	ICSH	testosterone
D	FSH	testosterone	ICSH

10. Which row in the table matches a method of contraception with its effect?

	Method of contraception	Effect
A	combined oral contraceptive pill	prevents release of FSH
B	progesterone-only pill	prevents implantation
C	combined oral contraceptive pill	prevents implantation
D	progesterone-only pill	prevents release of FSH

11. The table shows information a woman used to monitor her fertility.

Date	Temperature (°C)	Consistency of cervical mucus
14 November	37·3	thick
18 November	37·3	thin
22 November	37·8	thin
26 November	37·8	thick

On which date is ovulation most likely to have occurred?

A 14 November
B 17 November
C 21 November
D 26 November

[Turn over

12. Duchenne muscular dystrophy is a sex-linked recessive condition that results in weakening of skeletal muscles over time.

An unaffected man and a carrier woman have a child.

The percentage chance that the child will have Duchenne muscular dystrophy is

A 0%

B 25%

C 50%

D 100%

13. A study was carried out into the effect of caffeine on blood pressure.

The blood pressure of four individuals was measured before and after consumption of a drink containing caffeine.

The results are shown in the table.

Individual	Initial blood pressure (mmHg)	Final blood pressure (mmHg)
1	120/75	146/97
2	115/79	132/99
3	127/86	159/100
4	118/80	139/96

The average increase in systolic blood pressure was

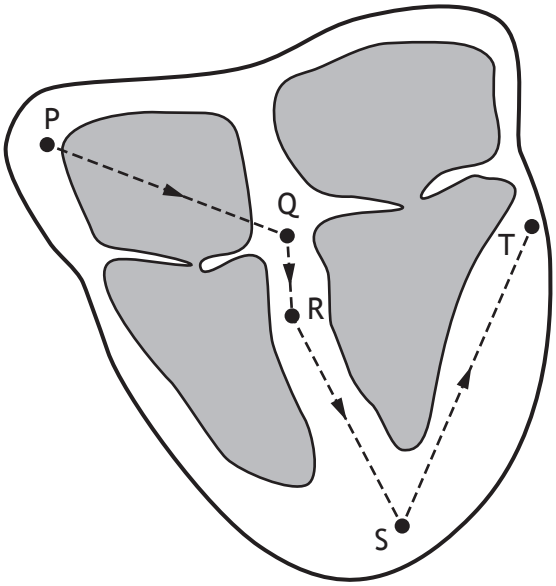
A 18

B 24

C 72

D 96.

14. The diagram shows a section through a heart and the pathway an impulse takes through the heart muscle.



Key

● location in heart muscle

---- pathway of impulse

The table shows the distance and the time taken for the impulse to travel through each section of the pathway.

Section of pathway	Distance travelled (mm)	Time taken (s)
P to Q	40	0·07
Q to R	20	0·09
R to S	85	0·04
S to T	115	0·05

Through which section of the pathway does an impulse travel fastest?

A P to Q

B Q to R

C R to S

D S to T

[Turn over

15. A group of individuals took part in an investigation into the effect of a drug on their heart rate.

Which of the following procedures should have been carried out to ensure the results were valid?

A There should have been a larger number of individuals in the group

B The results should have been regularly recorded using a heart rate monitor

C The investigation should have been repeated with another group of individuals

D The activity levels of the individuals during the investigation should have been the same

16. Atheromas can rupture, damaging the endothelium and triggering the following events.

1. A thrombus forms
2. Clotting factors are released
3. Fibrinogen is converted into fibrin
4. Prothrombin is converted into thrombin

Which of the following sequences shows the order in which these events occur?

A 1, 3, 4, 2

B 2, 4, 3, 1

C 2, 3, 4, 1

D 1, 2, 4, 3

17. The table shows the result of a glucose tolerance test carried out on two individuals. One of the individuals was found to have diabetes.

Time after drinking glucose solution (minutes)	Blood glucose concentration (mmol/l)	
	Individual 1	Individual 2
0	5·5	7·5
20	7·5	12·0
40	8·0	15·0
60	7·5	15·0
80	7·0	13·5
100	6·5	12·0
120	6·0	10·5

The blood glucose concentration of the individual with diabetes would be expected to return to its initial value after a further

A 20 minutes
B 40 minutes
C 140 minutes
D 160 minutes.

18. A neural pathway in which neurons later in the pathway link with earlier neurons is a

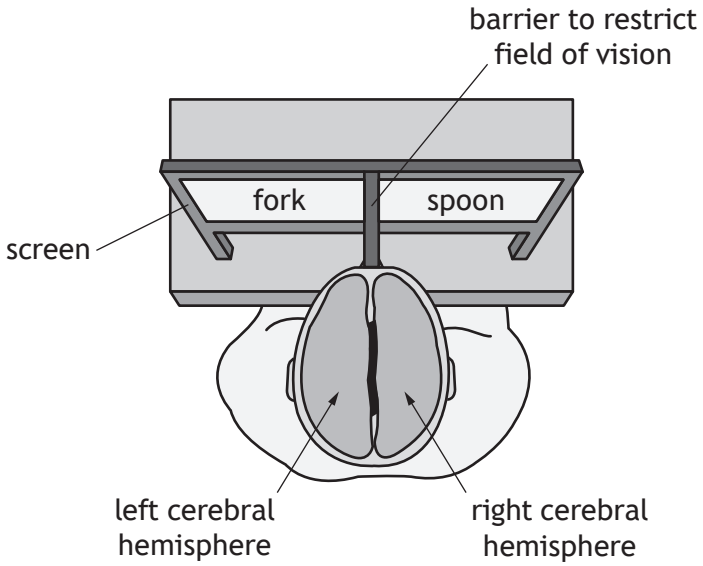
A diverging pathway
B converging pathway
C summation pathway
D reverberating pathway.

[Turn over

19. The left cerebral hemisphere controls speech production and processes information from the right eye while the right cerebral hemisphere processes information from the left eye.

An individual whose corpus callosum had been cut for medical reasons took part in a study. They had to press their forehead against a barrier so that their left eye could only see to the left of the barrier and their right eye to the right of the barrier.

The diagram shows the setup of the study.



The individual was asked to look straight ahead and then the words 'fork' and 'spoon' appeared briefly on the screen as shown. The individual was then asked to say what they had just seen.

The individual would be most likely to say

A fork only

B spoon only

C nothing

D fork and spoon.

20. A group of 18 people took part in an experiment on memory.

The table shows the number of people who could recall words from a list that had been read out to them.

Place of word in list	Number of people who could recall word
1st	18
2nd	18
3rd	18
4th	13
5th	12
6th	10
7th	12
8th	16
9th	17
10th	18

The change in the number of people who recalled the words in the middle of the list was due to

A chunking

B rehearsal

C displacement

D elaborative encoding.

21. Drug addiction affects neurotransmitter receptors by

A increasing their sensitivity as a result of exposure to antagonists

B decreasing their sensitivity as a result of exposure to antagonists

C increasing their sensitivity as a result of exposure to agonists

D decreasing their sensitivity as a result of exposure to agonists.

[Turn over

22. Parkinson's disease results in reduced levels of the neurotransmitter dopamine in the brain.

Which of the following drugs would be a suitable treatment for this disease?

A Dopamine agonists

B Dopamine inhibitors

C Dopamine antagonists

D Dopamine reuptake activators

23. Cytokines act at the site of infection by

A signalling the production of phagocytes

B stimulating phagocytes to release antibodies

C carrying out phagocytosis to engulf bacteria

D causing the accumulation of phagocytes.

24. The herd immunity threshold for measles in a particular population is 90%.

The table shows the number of individuals vaccinated within the population in a four year period.

Year	Population	Number of individuals vaccinated
2012	300 000	270 000
2013	310 000	280 000
2014	325 000	285 000
2015	335 000	310 000

A measles outbreak would most likely have occurred in

A 2012

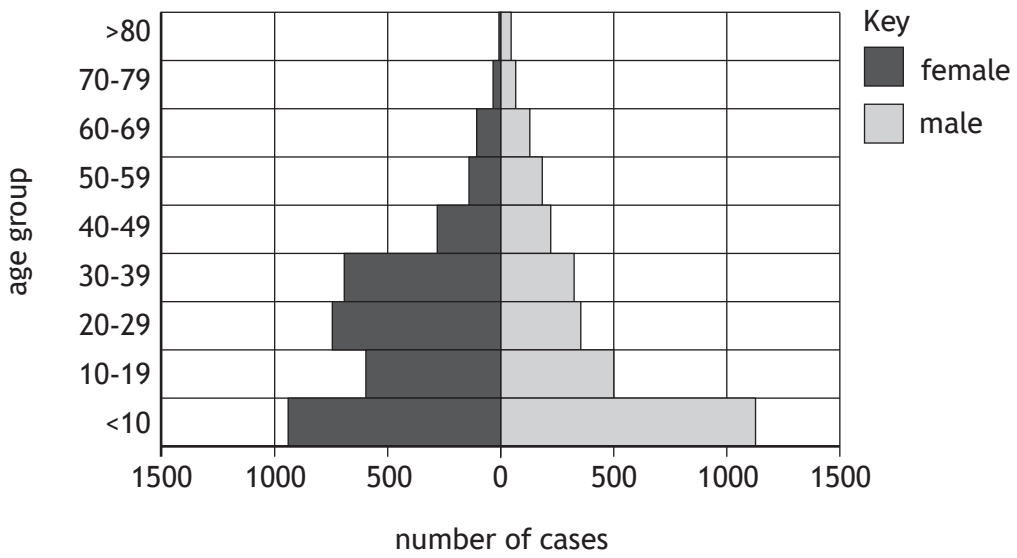
B 2014

C 2012 and 2014

D 2012, 2013 and 2015.

25. Cryptosporidium is a parasite that causes individuals to suffer from severe diarrhoea.

The graph shows details of the number of cases of cryptosporidium infection in a country in 2016.



What conclusion can be drawn from the graph?

A In all age groups there are fewer cases in females than males

B In all age groups there are fewer cases in males than females

C As the age group of females increases the number of cases always decreases

D As the age group of males increases the number of cases always decreases

[END OF QUESTION PAPER]

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