

KINGSWAY CHRISTIAN COLLEGE

HUMAN BIOLOGY - UNIT 3

Semester One, ATAR course examination 2021

Marking Key

Marking keys are an explicit statement about what the examining panel expect of candidates when they respond to particular examination items. They help ensure a consistent interpretation of the criteria that guide the awarding of marks.

Section One: Multiple choice

30% (30 Marks)

Question	Answer
1	a
2	b
3	b
4	d
5	a
6	b
7	c
8	d
9	a
10	c
11	a
12	b
13	a
14	d
15	d
16	b
17	c
18	d
19	c
20	a
21	b
22	b
23	c
24	b
25	c
26	a
27	d
28	b
29	c
30	d

End of Section One

Suggested working time: 40 minutes.

1. Antiviral medication
 - (a) interrupts the replication process of viruses.
 - (b) encourages the activity of T cells.
 - (c) can be used to inhibit the action of enzymes in bacteria.
 - (d) encourages macrophages to engulf viruses.

2. Calcium and phosphate levels in the blood are controlled by hormones secreted by the
 - (a) adrenal glands.
 - (b) parathyroid glands.
 - (c) ovaries.
 - (d) pancreas.

3. Which of the following is not a sympathetic effect on the body?
 - (a) pupil dilation
 - (b) relaxing of muscle walls of the bladder
 - (c) glycogenolysis
 - (d) decreased activity in the digestive system (none of the above – all sym.)

4. Endocrine glands involved in the homeostatic control of temperature include
 - (a) the pancreas, thyroid gland and the hypothalamus.
 - (b) the thyroid gland, parathyroid glands and the anterior pituitary gland.
 - (c) the adrenal glands, pancreas and the anterior pituitary gland.
 - (d) the thyroid gland, adrenal glands and the hypothalamus.

5. The main advantage of maintaining a constant body temperature is to
 - (a) enable enzymes to function optimally.
 - (b) reduce heat loss.
 - (c) reduce water loss through the skin.
 - (d) kill pathogens that enter the body.

6. Which of the following hormones is not secreted from the anterior pituitary gland?

- (a) LH
- (b) Oxytocin
- (c) ACTH
- (d) Growth hormone

7. Endocrine organs are composed of

- (a) secretory cells and have ducts.
- (b) nerve cells without ducts.
- (c) tissue that secretes hormones into the blood.
- (d) target cells surrounded by extracellular fluid.

8. Alzheimer's disease affects

- (a) the production of myelin in neurons of the CNS.
- (b) the production of dopamine in the basal ganglia.
- (c) the cerebellum and therefore coordinated movement.
- (d) areas in the frontal lobe of the cerebrum.

9. Motor neurons in the peripheral nervous system are categorized by structure as

- (a) multipolar neurons with multiple dendrites.
- (b) unipolar neurons with only one dendrite.
- (c) multipolar neurons with multiple axons.
- (d) bipolar neurons with at least two dendrites.

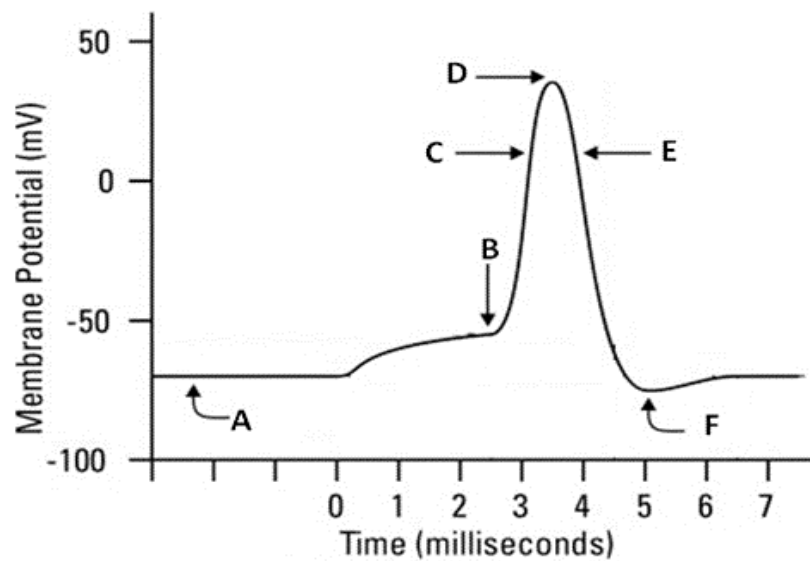
10. Susie suffers from diabetes mellitus Type 1. She must inject insulin to maintain blood glucose homeostasis. Occasionally her glucose levels decrease causing weakness and dizziness.

Which of the following could be the cause of a decrease in blood glucose?

- I. Eating too much carbohydrate
- II. Eating too little carbohydrate
- III. Injecting too much insulin
- IV. Injecting too little insulin
- V. Too much exercise
- VI. Too little exercise

- (a) I, III and V
- (b) I, IV and VI
- (c) II, III and V
- (d) II, IV and VI

Questions 11, 12 and 13 refer to the diagram below.



11. At the point labelled B on the diagram above, which of the following is occurring?

- (a) The threshold for depolarization is reached.
- (b) Sodium ion channels in the membrane open.
- (c) Potassium ion channels in the membrane open.
- (d) Sodium ion channels in the membrane close.

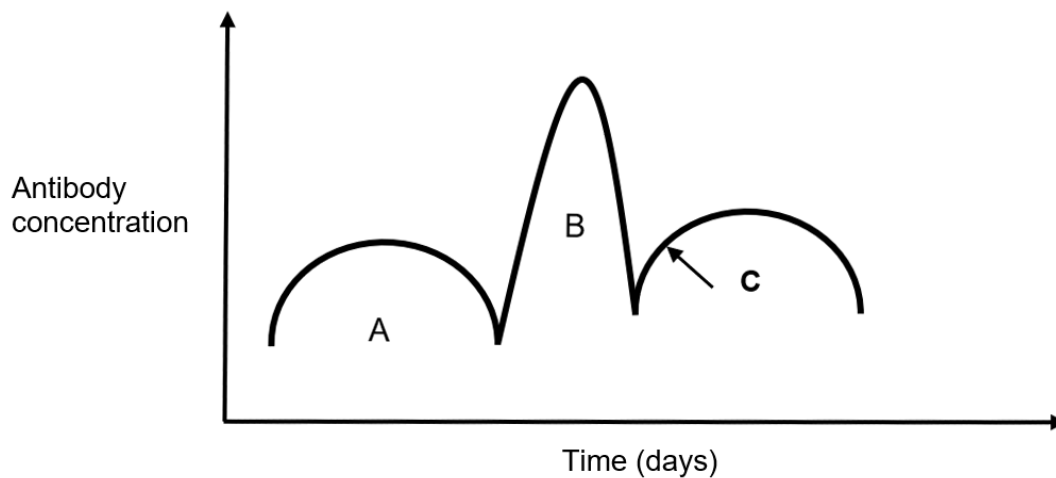
12. The refractory period occurs between points

- (a) A and B.
- (b) B and F.
- (c) B and D.
- (d) A and F.

13. Point D on the diagram represents

- (a) depolarisation.
- (b) hyperpolarisation.
- (c) polarisation.
- (d) resting membrane potential.

Questions 14 and 15 refer to the following graph depicting the production of antibodies following an infection.



14. During the period indicated by arrow C

- (a) antibodies are being produced by T cells due to a new infection.
- (b) antibodies are being produced by memory cells in response to the original infection.
- (c) passive natural immunity is occurring against a new infection.
- (d) antibodies are being produced by plasma cells in response to a new infection.

15. The curve shown as B is a

- (a) secondary response involving T cells engulfing the original antigen.
- (b) response to a different antigen and plasma cells recognising it.
- (c) response to using specific antibiotics to treat the infection.
- (d) secondary response involving memory cells recognising the original antigen.

16. Which of the following statements about Diabetes Type 2 is correct?

- (a) It can be treated easily with vitamin and mineral supplements.
- (b) The risk factors include smoking and lack of physical activity.
- (c) The only treatment is insulin injections.
- (d) It is caused by an autoimmune condition.

17. Herd immunity is important because it

- (a) results in all people in the population being immune to a disease.
- (b) means that entire populations are vaccinated against specific diseases.
- (c) results in less chance of a disease being transmitted between people.
- (d) means that people can travel overseas without risk of contracting disease.

18. Reabsorption of salt in the kidney is regulated by a hormone secreted by the
- (a) anterior pituitary gland.
 - (b) hypothalamus.
 - (c) posterior pituitary gland.
 - (d) adrenal gland.
19. Patterns of sleeping and waking are controlled by the
- (a) cerebrum.
 - (b) cerebellum.
 - (c) hypothalamus.
 - (d) medulla oblongata.
20. Synthetic hormones, such as insulin, can be manufactured by using technology such as recombinant DNA. This process involves
- (a) the use of vectors to introduce the desired DNA into host cells.
 - (b) the use of viruses to manufacture large quantities of hormone.
 - (c) the use of gene therapy to isolate the required gene for cloning.
 - (d) the manufacture of large quantities of normal pancreatic cells.
21. Recombinant DNA technology uses restriction enzymes to
- (a) catalyse reactions within the host cell.
 - (b) cut DNA at recognition sites.
 - (c) join pieces of DNA in a plasmid.
 - (d) introduce healthy DNA into host cells.
22. Receptors that detect changes in water concentrations in the body are called
- (a) thermoreceptors.
 - (b) osmoreceptors.
 - (c) pain receptors.
 - (d) chemoreceptors.

Questions 23, 24 and 25 refer to the information and table below.

A researcher was interested to find out if the amount of caffeine consumed per day affected blood pressure in adults. He asked for volunteers and 40 participants signed up for the investigation. They were allocated to four groups of ten and their baseline blood pressure was recorded before they consumed cups of coffee. Group A consumed one cup of caffeinated coffee during a 3-hour period. Group B consumed three cups of caffeinated coffee during a 3-hour period and Group C consumed six cups of caffeinated coffee during a 3-hour period. Group D consumed three cups of decaffeinated coffee during a 3-hour period. All participants were asked to sit and relax in a room that was supervised by the researcher.

The results are shown below.

Group	Average baseline blood pressure (mmHg)	Average blood pressure following consumption of coffee (mmHg)
A	120/72	121/74
B	118/68	127/80
C	122/74	138/88
D	123/76	123/72

23. From the data in the table, which group had the greatest increase in blood pressure following the consumption of caffeine?
- (a) A
 - (b) B
 - (c) C
 - (d) D

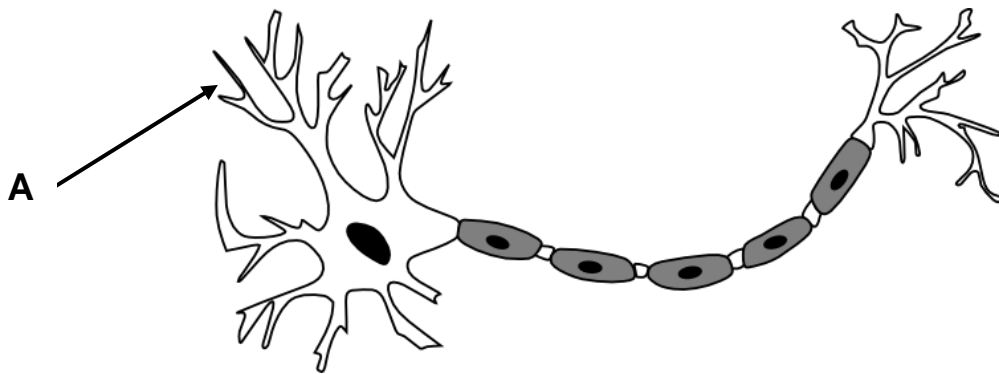
24. One of the problems with the validity of this investigation is that

- (a) how the participants relaxed was not considered.
- (b) the concentration of the caffeine was not measured accurately.
- (c) the groups were too small.
- (d) it was not ethical as the participants did not sign consent forms.

25. Which of the following should have been considered to ensure that the investigation results were reliable?

- (a) The temperature of the room should have been controlled.
- (b) The weight of each participant should have been considered.
- (c) The sample size should have been greater and more tests conducted.
- (d) The initial blood pressure should have been the same for all volunteers.

Questions 26 and 27 refer to the diagram below.



26. The neuron shown above is located in the
- efferent division of the peripheral nervous system.
 - afferent division of the peripheral nervous system.
 - afferent division of the central nervous system.
 - efferent division of the central nervous system.
27. Structure A
- controls the function of the neuron.
 - increases the speed of transmission of impulses.
 - is only found in motor neurons.
 - conducts impulses from other neurons to the cell body.
28. The thirst reflex is triggered by water loss from body fluids and results in
- the secretion of ADH and reabsorption of water in the nephron.
 - the thirst centre in the hypothalamus to stimulate conscious fluid intake.
 - the thirst centre in the medulla to stimulate conscious fluid intake.
 - the secretion of aldosterone and reabsorption of water in the nephron.
29. In cold conditions, a decrease in heat loss occurs when
- shivering occurs.
 - there is an increase in physical activity.
 - there is a reduction in sweating.
 - metabolic rate increases due to hormonal activity.
30. The skin has many functions that assist with the maintenance of homeostasis. Which of the following is correct?
- Skin contains receptors that detect fluid balance and pain.
 - Skin produces hormones that prevent damage from UV radiation.
 - Skin is covered in hairs that play a role in defence against disease.
 - Skin is involved in thermoregulation and defence against disease.

Section Two: Short answer

50% (106 Marks)

Question 31

(16 marks)

- (a) Name the hormone secreted by the thyroid gland. (1 mark)

Description	Marks
Thyroxine	1
Total	1

- (b) State
- two**
- possible causes of hypothyroidism. (2 marks)

Description	Marks
Any two of the following	
Lack of iodine in the diet	1-2
Autoimmune disease/Hashimoto's disease	
Partial or total removal of thyroid gland/surgery for cancer	
Total	2

- (c) Use a steady state control model to help explain why the concentrations of TSH are measured. (7 marks)

Description	Marks
Must use steady state control model as a flow chart or list	
Stimulus: Decreased thyroxine in blood/Increased thyroxine in blood	1
Receptor: Hypothalamus secretes TSHRF/TSH inhibitor	1
Modulator: Anterior pituitary gland	1
APG secretes more TSH/ less TSH	1
Effector: thyroid gland	1
Response: secretes more/less thyroxine	1
The blood concentrations will accurately determine whether thyroxine levels are higher or lower than normal as a result of the feedback	1
Total	7

- (d) Explain why the sufferer would experience intolerance to cold. (2 marks)

Description	Marks
Lack of thyroxine decreases metabolic rate	1
Less heat is produced to maintain internal/core body temperature	1
Total	2

(e) Outline the production of Recombinant Thyroid Stimulating Hormone.

(4 marks)

Identify	Marks
TSH gene is located and cut out using restriction enzyme	1
Bacterial plasmid cut open using same restriction enzyme	1
Gene for TSH 'glued' into plasmid using the enzyme ligase	1
Multiple copies created by recombinant bacteria	1
Total	4

Question 32

(19 marks)

- (a) Describe the homeostatic mechanism that would have assisted in maintaining Joni's body fluid concentration. (6 marks)

Description	Marks
Stimulus = increased osmotic pressure/low water concentration in blood	1
Receptors = osmoreceptors in hypothalamus	1
Modulator = hypothalamus stimulates posterior pituitary to release ADH/antidiuretic hormone	1
Effector = DCT and collecting tubule in nephron (kidney)	1
Response = reabsorption of water from tubules into blood	1
Feedback = increased water concentration/decreased osmotic pressure	1
Total	6

- (b) Explain why Joni was feeling so uncomfortable despite sweating which would normally assist with cooling the body. (3 marks)

Description	Marks
It was a humid day/moisture in the air	1
Sweating cools the body by evaporation	1
Humidity prevents evaporation so less cooling	1
Total	3

- (c) Use a steady state model to explain why Joni almost stopped breathing. (6 marks)

Description	Marks
Stimulus is low levels/concentration CO ₂ /decreased H ⁺ ions	1
Receptors are chemoreceptors in aortic arch and carotid bodies	1
Chemoreceptors in medulla oblongata are less stimulated/saturated	1
Modulator: respiratory centre in medulla oblongata is less responsive to the decreasing levels of CO ₂	1
Effectors are diaphragm and intercostal muscles	1
Response is to decrease/stop breathing/decrease rate and depth breathing	1
Total	6

- (d) Explain how breathing into a bag would have helped to cause her breathing to return to normal. (4 marks)

Description	Marks
Joni expels/breathes out carbon dioxide into the bag	1
Concentrations of CO ₂ increase in the blood	1
Chemoreceptors in medulla oblongata are more stimulated/saturated	1
Respiratory centre responds by increasing rate and depth of breathing	1
Total	4

Question 33

(18 marks)

- (a) Describe the structural and functional relationship between the hypothalamus and the anterior pituitary gland. (3 marks)

Description	Marks
Hypothalamus is connected to APG by complex network of blood vessels/portal system	1
Hypothalamus secretes stimulating or inhibiting hormones through blood	1
APG is stimulated to release its hormones	1
Total	3

- (b) Explain why the posterior pituitary gland is not considered to be a true endocrine gland. (4 marks)

Description	Marks
Posterior Pituitary gland does not produce its own hormones	1
Hypothalamus produces hormones/ADH and oxytocin	1
Hormones travel through nerve fibres to PPG	1
Where they are stored for release	1
Total	4

- (c) Name the endocrine gland that secretes insulin. Be as specific as possible. (1 mark)

Description	Marks
Beta cells in the Islets of Langerhans (cannot just answer pancreas)	1
Total	1

- (d) Describe the mode of action of water-soluble hormones such as insulin. (4 marks)

Description	Marks
Water soluble hormones cannot pass through the cell membrane	1
Attach to receptors on cell membrane	1
Causes a secondary messenger to diffuse through the cell	1
Causes activation of enzymes	1
Total	4

- (e) Use a feedback loop to describe the function of insulin when maintaining blood glucose homeostasis. (6 marks)

Description	Marks
Stimulus: is increase in blood glucose/sugar concentrations	1
Receptors: Beta cells (in Islets of Langerhans)	1
Modulator: Beta cells (in Islets of Langerhans) release insulin	1
Effectors: Liver/skeletal muscles/cells	1
Response: Glycogenesis/ glucose converted to glycogen in liver and muscles/increase cell uptake of glucose	1
Feedback: decreased blood glucose concentrations	1
Total	6

Question 34

(12 marks)

(a) On the diagram above correctly label the sensory, relay and motor neurons. (3 marks)

Description	Marks
Correct position/label of sensory neuron	1
Correct position/label of relay neuron	1
Correct position/label of motor neuron	1
Total	3

Sample answer

(b) State the **four** properties that all reflexes possess. (4 marks)

Description	Marks
Stimulus required	1
Involuntary/ no conscious thought	1
Rapid	1
Stereotyped	1
Total	4

(c) Explain why Lorraine pulled her finger away before she felt any pain. (3 marks)

Description	Marks
Reflex bypasses the brain/does not involve the brain/is involuntary	1
Impulses are sent to the brain which is a distance from spinal cord	1
Impulses to brain cause awareness following/after the reflex	1
Total	3

Question 34 (continued)

- (d) The grey matter in the spinal cord contains many nerve cell bodies. State the other location of nerve cell bodies in the diagram and name the structure formed by the collection of the cell bodies. (2 marks)

Description	Marks
Nerve cell bodies located in the dorsal root/sensory/afferent nerve entering the spinal cord	1
Ganglion	1
Total	2

Question 35

(22 marks)

- (a) (i) State the location of the body's "thermostat". (1 mark)

Description	Marks
Hypothalamus	1
Total	1

- (ii) Describe the processes that the body experiences during the full course of a fever, from the initial change to the "thermostat" until the body temperature returns to normal.

(6 marks)

Description	Marks
Infection causes substances/chemicals/pyrogens to set the thermostat at abnormally high temperatures	1
The body feels cold as a result	1
Responds by shivering to produce more heat	1
Vasoconstriction occurs in the skin to decrease heat loss	1
Body temperature rises	1
Fever breaks with sweating and vasodilation to cool the body	1
Total	6

- (b) (i) Describe how a subunit vaccine could bring about a humoral response. (5 marks)

Describe	Marks
Subunit vaccine introduces antigen	1
B cells activated	1
B cells enlarge and divide into clones	1
Most clones become plasma cells	1
Plasma cells produce antibodies	1
Total	5

- (ii) Explain why a person would be protected from the virus after receiving the vaccine. (4 marks)

Explain	Marks
Memory cells produced during primary exposure	1
Antigen recognised rapidly	1
At subsequent/ secondary exposure memory cells divide to form large number of plasma cells	1
Antibodies produced in larger numbers	1
Total	4

- (iii) Explain what is meant by a 'clinical trial'. (1 mark)

Explanation	Marks
A trial that involves people	1
Total	1

- (iv) List three (3) ethical principles that must be adhered to while carrying out clinical trials. (3 marks)

List	Marks
Voluntary participation	Any 3
Informed consent	
No risk of harm	
Confidentiality	
Total	3

- (v) Provide one social and one cultural reason why someone may be reluctant to receive the Novavax vaccine. (2 marks)

Explanation	Marks
Social- use of animals (ethical), use of human tissue, not fully informed, misinformation via social media (any reasonable)	1
Cultural- religious beliefs, belief in holistic medication, belief in vaccine production being contradictory to cultures beliefs (any reasonable)	1
Total	2

Question 36**(19 marks)**

(a) Write a hypothesis for this investigation.

(2 marks)

Description	Marks
Olive leaf Extract capsules prevent the development of colds or flu	1
More than placebos taken every morning for one year	1
Total	2

(b) Other than age and gender, identify **three** variables that should have been controlled in this investigation.

(3 marks)

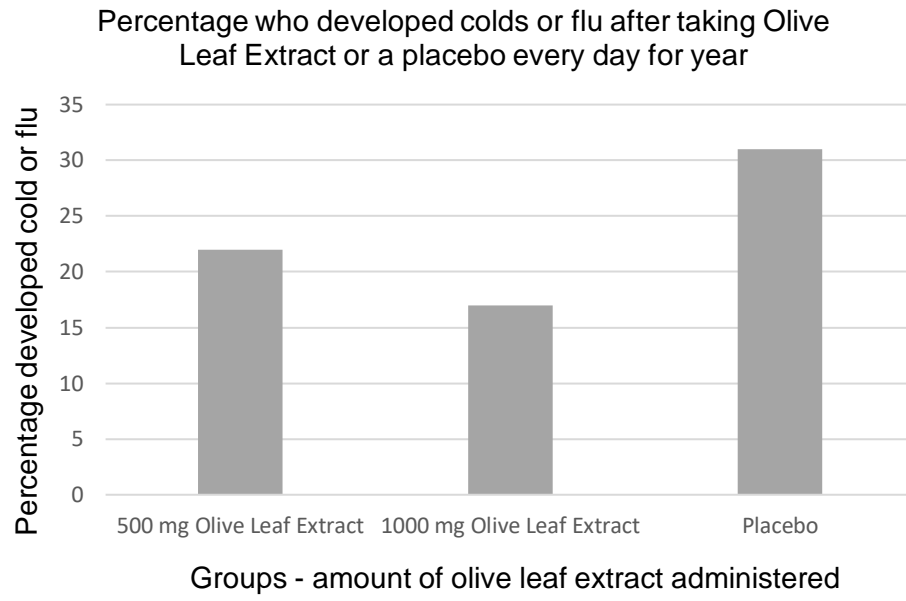
Description	Marks
Any three of the following/reasonable answers	
Same exposure to cold and flu virus in home/work environments/travel	1-3
All participants maintain healthy lifestyle	
Same brand of extract	
No other medications being taken that may affect immunity	
Total	3

(c) Graph the data from the table on the grid below.

(5 marks)

Description	Marks
Title	1
Correctly labelled axes	1
Correct scale	1
Correct/accurate plotting	1
Correct type of graph	1
Total	5

Note: If students treat the data as continuous, they may draw a line graph.



Question 36 (continued)

- (d) Define the term 'placebo' and describe the ideal composition of the placebo in this study. (3 marks)

Description	Marks
Placebo is a substance that has no physiological effect, but eliminates psychological bias	1
Same size and colour capsule	1
with inactive substance inside	1
Total	3

- (e) Describe **two** possible sources of error in this investigation. (2 marks)

Description	Marks
Participants not giving accurate reporting about illness	1
Participants forgetting/not taking capsule every day	1
Total	2
Any other reasonable but must affect the measurement/gathering of accurate data	

- (f) State the conclusion for the experiment based on the results. (3 marks)

Description	Marks
Individuals taking one capsule of Olive Leaf Extract every morning for a year decreases the number of cases of colds or flu	1
Compared to having no Olive Leaf Extract/the placebo	1
The higher dose of Olive Leaf Extract was more effective	1
Total	3

- (g) State **one** way that reliability could have been improved for this investigation. (1 mark)

Description	Marks
Any one of the following but not larger sample as it was very large at 10 000	
Repeating the tests	1
Using a more accurate way of measuring	1
Total	1

End of Section Two

Section Three: Extended answer

20% (40 Marks)

Question 37

(20 marks)

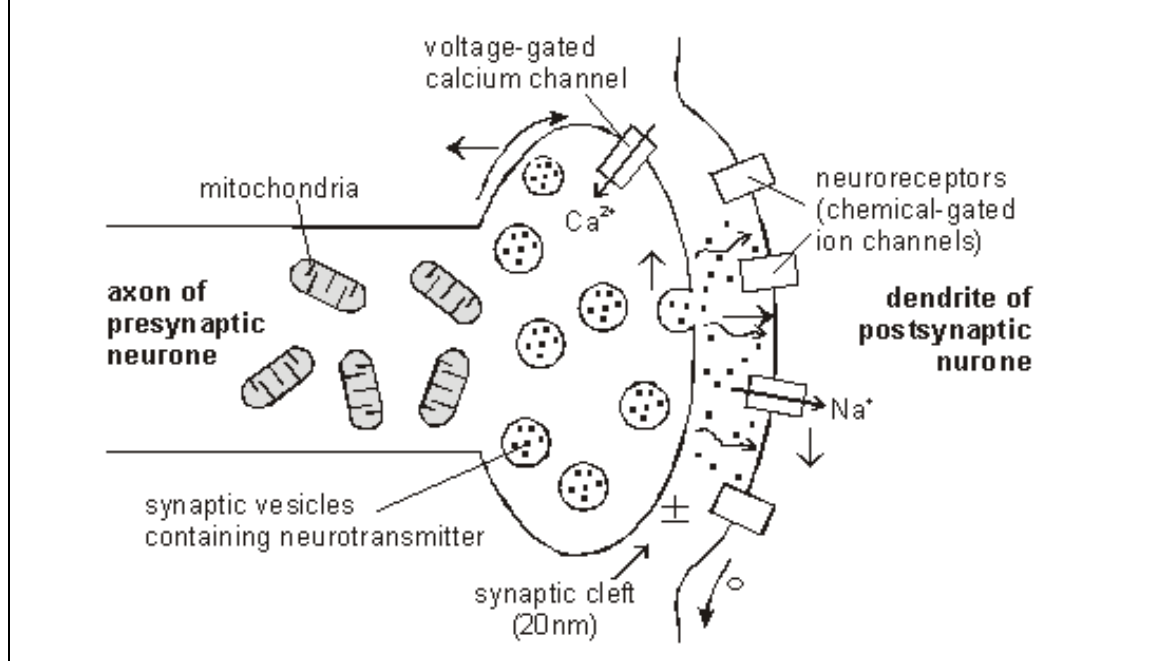
- (a) Name the divisions of the nervous system and describe the relationships between them. (10 marks)

Description	Marks
Must present the answer as an annotated flow chart as per the question to gain full marks Must include the following points for 1 mark each.	
<ul style="list-style-type: none"> • <i>Central nervous system</i> • Consists of brain and spinal cord • <i>Peripheral nervous system</i> consists of cranial and spinal nerves • <i>Efferent division of PNS</i> carries impulses/messages away from the CNS • <i>Somatic Division</i> carries impulses/message to the skeletal muscles via motor neurons • <i>Autonomic Division</i> sends impulses to the heart and involuntary muscles and glands/visceral organs • Divided into <i>sympathetic</i> division responsible for "fight or flight" responses • And <i>parasympathetic</i> division maintains the body during quiet times • <i>Afferent division</i> carries impulses/message from the body to the CNS • <i>Somatic and visceral sensory</i> neurons send impulses from skin, muscles and organs 	1-10
Total	10

- (b) Describe, in detail, the processes that occur as an impulse is transmitted from the axon of one neuron to the dendrite of another. (10 marks)

Description	Marks
Action potential/impulse reaches axonal endings	1
Voltage gated calcium channels open	1
Causing influx of calcium ions	1
Vesicles containing neurotransmitter fuse with surface of presynaptic membrane	1
Neurotransmitter released by exocytosis into synapse/synaptic gap	1
Diffuses across gap/cleft	1
Bind to receptors on post synaptic membrane/membrane of dendrite	1
Causes sodium channels/gates to open	1
Sodium flows into post synaptic membrane	1
If threshold is reached an action potential is triggered	1
Total	10

Sample answer: Students may answer the question with a detailed annotated diagram (see below for example of suitable diagram)



Question 38

(20 marks)

- (a) Explain the reasons for the increase in air temperature in the container and the increase in carbon dioxide concentration. (4 marks)

Description	Marks
While the people are alive their cells continue to undergo respiration producing heat	1
As the container was sealed the heat would have accumulated/been trapped thus increasing the temperature (of the environment)	1
Respiration also results in the production of carbon dioxide (as a waste product)	1
With 39 people breathing out/exhaling/excreting Carbon dioxide it would accumulate rapidly	1
Total	4

- (b) Explain how a person's body would respond to these conditions in an attempt to regulate body temperature. (11 marks)

Description	Marks
Students must have the first eight points to gain full marks.	
Stimulus: Heat production from metabolism causes external environmental temperature to increase	1
Receptors are thermoreceptors in skin/peripheral thermoreceptors	1
Central thermoreceptors in hypothalamus stimulated	1
Modulator: hypothalamus sends nerve impulses via autonomic and somatic divisions responding to increase temperature	1
Effectors: blood vessels/arterioles in the skin	1
Effectors: sweat glands	1
Response is vasodilation so heat is lost by radiation	1
Response is increase sweating to cause heat loss by evaporation	1
Plus any three of the following	
Hypothalamus secretes TSH inhibiting factor	1-3
Anterior pituitary gland decreases secretion of TSH	
Thyroid decreases secretion of thyroxine	
Resulting in decrease metabolic rate	
Behavioural Responses/conscious activity might include taking off clothing, fanning, decreased activity	
Normally the feedback would be a decrease in body temperature	
Without the ability to let the excess heat out due to being in a confined sealed environment this could not occur	
Total	11

- (c) State which division of the nervous system would have responded in this situation and describe four physiological effects that would have resulted. (5 marks)

Description	Marks
Sympathetic nervous system	1
Any four of the following for 1 mark each (must describe)	
<ul style="list-style-type: none"> • Increased rate and strength of contraction of the heart • Vasoconstriction of the blood vessels/arterioles in the skin • Dilates blood vessels to skeletal muscle • Dilation of bronchioles in lungs • Decreased activity/smooth muscle movement in digestive system • Breakdown of glycogen/glycogenolysis in liver releasing glucose • Dilation of pupil in eye • Increased sweat production from sweat glands • Salivary glands decrease secretion of saliva • Smooth muscle walls of bladder relax • Adrenal medulla secretes more adrenaline 	1-4
Total	5

Question 39

(20 marks)

- (a) Describe five (5) non-specific external defences that prevent pathogens from entering and invading the body tissues. (10 marks)

Description	Marks
Any five of the following named and described	
Skin – effective, waterproof barrier to pathogens/microflora/bacteria colonies prevent potential pathogens from flourishing/reproducing/sebum is produced and kills some bacteria/sweat secreted that prevents growth of many micro-organisms	1-2
Mucous membranes – secrete mucous that inhibits entry of pathogens	1-2
Hairs – in nose/ears trap foreign particles	1-2
Cilia – beating of cilia in respiratory tract moves micro-organisms to throat to be coughed out	1-2
Acid – stomach juices are acidic and kills many bacteria/vaginal acids kill and reduce bacterial growth	1-2
Lysozyme – enzyme that kills bacteria in tears/saliva/sweat/secretions of nose	1-2
Cerumen/ear wax – protects ear from pathogens entering and growing in the cavity	1-2
Flushing action – body fluids such as urine keeps the ureter free of bacterial growth/tears in eyes/saliva in mouth	1-2
Total	10

- (b) Explain the reasons for the need for people to socially distance, wear masks and maintain hand hygiene. (10 marks)

Description	Marks
COVID is transmitted in a number of ways including contact, airborne and by droplets	1
COVID viruses lives/can be found on surfaces that have been touched or coughed/sneezed on by an infected person	1
Maintaining hand hygiene/constant hand sanitizing kills the virus prevents it from being transferred from the hand to the mouth/nose/face	1
Maintaining hand hygiene/constant hand sanitizing also prevents the spread from person to person through touch	1
COVID is easily spread through the air in droplets by sneezing and coughing	1
Wearing masks prevents the droplets from travelling any distance/dispersing into surrounding air by an infected person	1
Wearing masks prevents viruses from entering the mouth or nose of the wearer if they are sneezed/coughed on by an infected person	1
Social distancing means that people should stay at least 1.5 – 2m away from each other in public places/places where people gather	1
Social distancing prevents people touching each other and transmitting virus by contact	1
Social distancing creates distance between people coughing/sneezing decreasing the risk of the droplets travelling through the air far enough to infect someone	1
Total	10

Question 40

(20 marks)

- (a) Compare and contrast the 4 types of immunity. Provide examples for how each may be gained. (14 marks)

Compare	Marks
All provide specific protection of the body	1
All function within the blood	1
<i>Active artificial</i>	1
Injection (or other named method) of harmless antigen (vaccine) into the body by health care provider	1
Immune response activated by presence of non-self-antigen	Any 1
Memory cells created	
Long lasting immunity	
<i>Active natural</i>	1
Exposure to pathogen in the environment which enters internal environment	1
Presence of non-self-antigens initiates immune response	Any 1
Memory cells created	
Long lasting immunity	
<i>Passive artificial</i>	1
Injection of pre-made antibodies by health care provider after exposure to serious pathogen	1
No immune response by person receiving antibodies and no memory cell secreted	Any 1
Instant immunity	
Very short lived	
<i>Passive natural</i>	1
Antibodies passed from mum to baby via placenta or breastmilk	1
Recipient does not create the antibodies or memory cells	Any 1
Immunity is instant	
But short lived	
Total	14

- (b) Outline the role of T lymphocytes in specific immunity. (6 marks)

Outline	Marks
Antigen presenting cell presents antigen to T cell	Any 6
T cell is sensitised	
T cells enlarge and clones produced	
Memory T cells produced	
Cytotoxic T-cells/ killer T cells produced	
Cytotoxic T-cells migrate to site of infection	
Attach to non-self-cell/ antigen	
Secrete chemicals that destroy cell	
Total	6