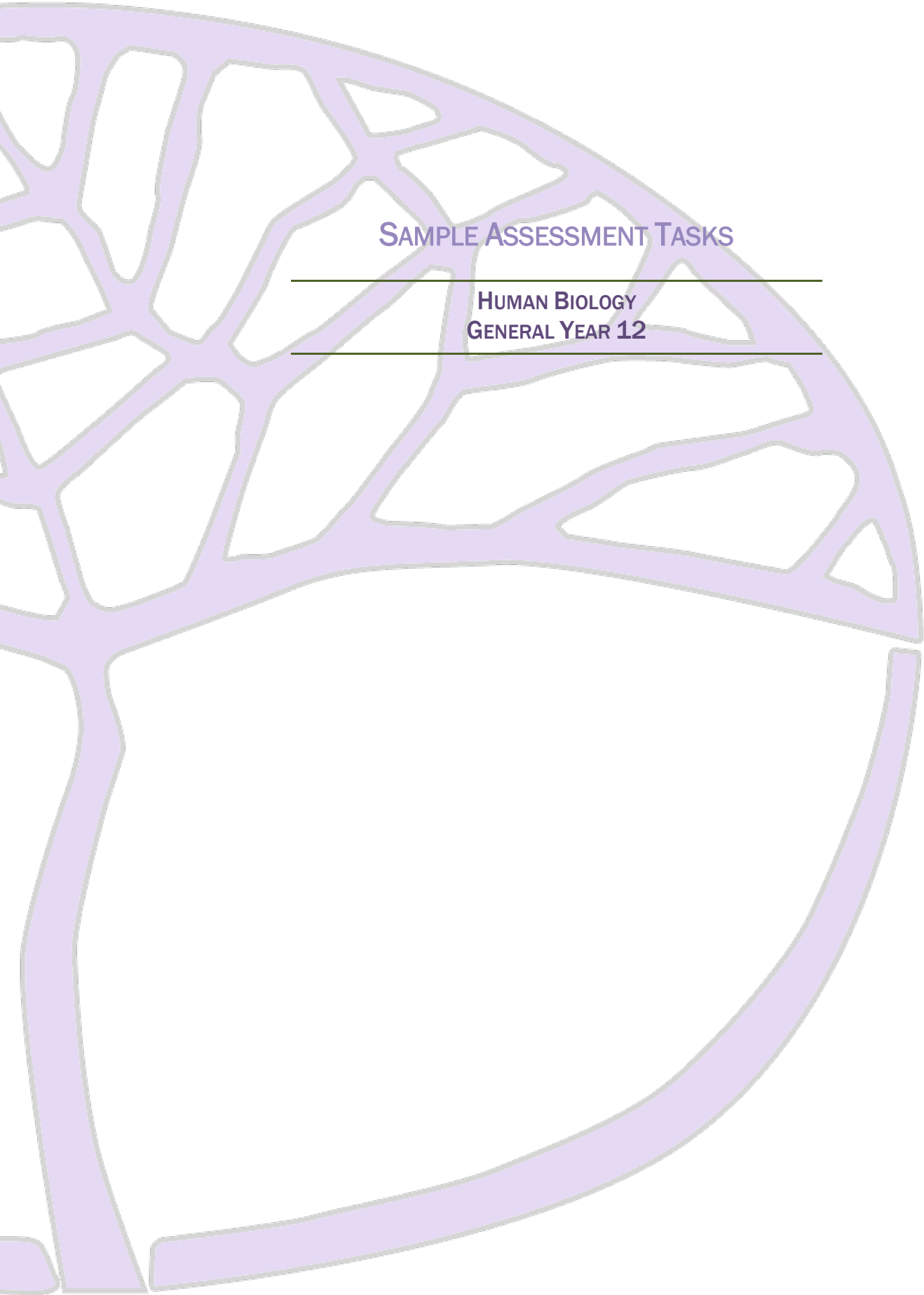




SAMPLE ASSESSMENT TASKS

HUMAN BIOLOGY
GENERAL YEAR 12



Copyright

© School Curriculum and Standards Authority, 2015

This document – apart from any third party copyright material contained in it – may be freely copied, or communicated on an intranet, for non-commercial purposes in educational institutions, provided that the School Curriculum and Standards Authority is acknowledged as the copyright owner, and that the Authority's moral rights are not infringed.

Copying or communication for any other purpose can be done only within the terms of the *Copyright Act 1968* or with prior written permission of the School Curriculum and Standards Authority. Copying or communication of any third party copyright material can be done only within the terms of the *Copyright Act 1968* or with permission of the copyright owners.

Any content in this document that has been derived from the Australian Curriculum may be used under the terms of the [Creative Commons Attribution-NonCommercial 3.0 Australia licence](#)

Disclaimer

Any resources such as texts, websites and so on that may be referred to in this document are provided as examples of resources that teachers can use to support their learning programs. Their inclusion does not imply that they are mandatory or that they are the only resources relevant to the course.

Sample assessment task

Human Biology – General Year 12

Task 1 – Unit 3

Assessment type: Extended response

Conditions

Period allowed for completion of Part I: one week; Part II: 60 minutes

Task weighting

10% of the school mark for this pair of units

Task 1: Conditions relating to sporting injuries or damage to the nervous system (research and validation) (27 marks)

This task is presented in two parts.

Part A: Research phase (5 marks)

Research and take notes on a number of conditions relating to sporting injuries or damage to the nervous system.

Part B: In-class validation (22 marks)

Write responses to short answer style questions. You will not see these questions prior to sitting the in-class validation. This part is to be completed under test conditions. You may bring your note-taking sheet with you.

Part A – Research

1. (a) Research and take notes on the following conditions: elbow dislocation, elbow sprain, torn anterior cruciate ligament, fracture of the lower leg (including stress fractures), paraplegia and quadriplegia. Research should include:
 - the injury/condition
 - the symptoms/signs of the injury/condition
 - diagnosis
 - treatment of the injury/condition. (3 marks)
- (b) Reference your research using a standard referencing format of your choice; for example, APA, MLA, Harvard or Chicago. Hand this in as a separate sheet attached to your note-taking sheet. You must include at least four references. (2 marks)

Name: _____

Part B – In-class validation questions

(27 marks)

This section consists of three questions. Answer ALL of the parts to each question on the lined paper provided.

You may illustrate your answers with diagrams where appropriate.

2. You are waiting in a doctor's surgery and see a teenager come in with a suspected dislocation of his elbow.
 - (a) Describe **four** symptoms that could be similar for both a dislocation and a sprain of his elbow. (4 marks)
 - (b) How would the doctor determine if the injury is a dislocation or a sprain? (2 marks)
 - (c) Describe the medical treatment of a dislocation and explain how it is different from the treatment of an elbow strain. (4 marks)
3. You are playing basketball with some friends at the local basketball court and one of your friends falls to the ground in pain.
 - (a) List **four** symptoms or signs you could use to determine if the injury had resulted from a torn anterior cruciate ligament (ACL)? (4 marks)
 - (b) Describe the treatment you could offer her on the court. (4 marks)
 - (c) Your friend had been complaining of soreness in her foot for some time, especially when playing and training frequently. If this pain was a result of a stress fracture of a bone in her foot, how would a doctor diagnose and treat this condition? (2 marks)
4. You read a newspaper article about a serious motor-cross accident. It describes the prospect of the accident victim becoming a paraplegic or a quadriplegic.

What are **two** differences between paraplegia and quadriplegia? (2 marks)

Marking key for sample assessment Task 1 – Unit 3

1. (a) Research and take notes on the following conditions: elbow dislocation, elbow sprain, torn anterior cruciate ligament, fracture of the lower leg (including stress fractures), paraplegia and quadriplegia. Research should include:
- the injury/condition
 - the symptoms/signs of the injury/condition
 - diagnosis
 - treatment of the injury/condition.

Description	Marks
Research presented in a note-taking format	1
Notes are concise and do not include irrelevant information	1
Notes cover all recommended research areas	1
Total	/3

- (b) Reference your research using a standard referencing format of your choice; for example, APA, MLA, Harvard or Chicago. Hand this in as a separate sheet attached to your note-taking sheet. You must include at least four references.

Description	Marks
Minimum of four references	1
Correct format used for selected referencing style	1
Total	/2

2. You are waiting in a doctor's surgery and see a teenager come in with a suspected dislocation of his elbow.
- (a) Describe **four** symptoms that could be similar for both dislocation and a sprain of his elbow.

Description	Marks
Description of four symptoms	1–4
Total	/4
Answer could include, but is not limited to:	
<ul style="list-style-type: none"> • pain in the injured area • swelling in the injured area • difficulty using or moving the injured area in a normal manner • bruising or redness (heat) in the injured area • joint pain when bearing weight • reduced joint mobility 	

- (b) How would the doctor determine if the injury is a dislocation or a sprain?

Description	Marks
Identification of suitable methods of distinguishing between a dislocation and a sprain	1–2
Total	/2
Answer could include, but is not limited to:	
<ul style="list-style-type: none"> • the doctor would ask how the injury occurred • the doctor would order an X-ray or magnetic resonance imaging (MRI) • the doctor would check for a deformity of the painful area which would indicate a dislocation 	

- (c) Describe the medical treatment of a dislocation and explain how it is different from the treatment of an elbow strain.

Description	Marks
Description of elbow dislocation medical treatment	1–2
Subtotal	/2
Answer could include, but is not limited to:	
<ul style="list-style-type: none"> • bones in an elbow dislocation need to be realigned so the elbow joint is placed back into its proper position • realignment requires a force to be applied to the bones either by traction or by manipulation of the bones of the arm by the doctor. • doctor will give the patient an anaesthetic before realigning the bones of the joint 	
Differences between dislocation and sprain	1–2
Subtotal	/2
Answer could include, but is not limited to:	
<ul style="list-style-type: none"> • no realignment of the elbow is necessary • no force is applied to the elbow • the doctor may prescribe an analgesic 	
Final total	/4

3. You are playing basketball with some friends at the local basketball court and one of your friends falls to the ground in pain.
- (a) List **four** symptoms or signs you could use to determine if the injury had resulted from a torn anterior cruciate ligament (ACL)?

Description	Marks
Four symptoms or signs used to determine an ALC injury	1–4
Total	/4
Answer could include, but is not limited to:	
<ul style="list-style-type: none"> • the knee may give out suddenly when the ACL is torn, and there may be a popping sound upon injury • torn ACL could result in knee pain • torn ACL could result in swelling • torn ACL could result in stiffness • torn ACL could result in bruising • walking is painful and the knee feels unstable caused by the bones in knee joint sliding too far (this can result in damage to the cartilage). 	

- (b) Describe the treatment you could offer her on the court.

Description	Marks
Rest from any activity that increases your pain. Ideally lie down in a comfortable position to minimise bleeding, swelling and further damage	1
Ice the injured area for 20 minutes every two hours. Do not place ice directly on the skin, wrap it in a hand towel	1
Compress the injured area with a compression bandage to minimise swelling	1
Elevate the injured area above the level of your heart (provided this does not cause an increase in pain) for as long as possible, to minimise bleeding and swelling	1
Total	/4

- (c) Your friend had been complaining of soreness in her foot for some time, especially when playing and training frequently. If this pain was a result of a stress fracture of a bone in her foot, how would a doctor diagnose and treat this condition?

Description	Marks
Diagnosis The doctor would recommend a bone scan or a MRI scan (MRI is more sensitive than an X-ray and may be used to detect stress fractures early).	1
Subtotal	/1
Treatment depends on the severity of the stress fracture	1
Subtotal	/1
Final total	/2
Answer could include, but is not limited to:	
<ul style="list-style-type: none"> • rest: it takes from six to eight weeks to allow a stress fracture to heal • cast: a cast may be required to keep the bones of the foot in a fixed position which should reduce the stress on the foot • surgery: pins, screws or plates could be inserted to hold the foot bones together when it is healing 	

4. You read a newspaper article about a serious motor-cross accident. It describes the prospect of the accident victim becoming a paraplegic or a quadriplegic.

What are **two** differences between paraplegia and quadriplegia?

Description	Marks
Differences between paraplegia and quadriplegia	1–2
Total	/2
Answer could include, but is not limited to:	
<ul style="list-style-type: none"> • paraplegia results when the spine is injured below the level of the neck • quadriplegia is caused by an injury in the neck of the cervical cord segments • paraplegia causes paralysis and loss of feeling in the legs, abdomen, bladder, bowel and sex organs • in addition to this, quadriplegia causes a loss of feeling in the arms as well and may require a ventilator <p>Note: The severity of the paralysis depends on whether the injury is complete (total loss of feeling below the injury) or incomplete (some messages are getting through).</p>	

Sample assessment task

Human Biology– General Year 12

Task 6 – Unit 3

Assessment type: Test

Conditions

Time for the task: 60 minutes

Task weighting

8.5% of the school mark for this pair of units

Test: Nervous and endocrine systems (47 marks)

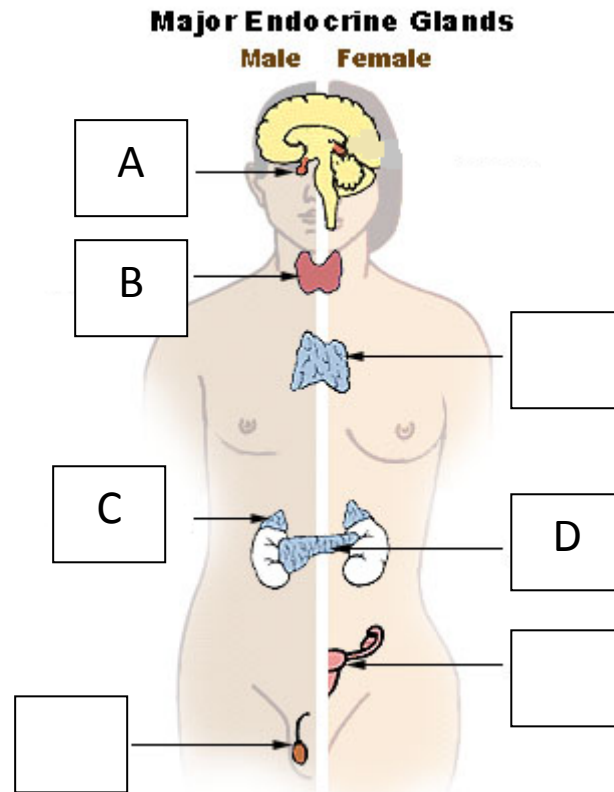
Part A: Multiple-choice (10 marks)

This section has 10 questions. Answer all questions on the separate multiple-choice answer sheet.

- Which of the following list of components of a feedback loop is in correct order?
 - stimulus, response, effector, modulator, feedback, receptor
 - receptor, modulator, feedback, stimulus, effector, response
 - stimulus, receptor, modulator, effector, response, feedback
 - stimulus, effector, modulator, receptor, response, feedback
- Which of the following is not part of the withdrawal reflex arc involved when pain receptors in the skin are stimulated?
 - interneurones in the spinal cord
 - motor neurones
 - the brain
 - sensory neurones
- One main function of cerebrospinal fluid is to:
 - aid in the transmission of sensory impulses in the brain.
 - help lubricate the discs between each vertebra.
 - transmit nerve impulses from inside the brain to other areas of the body.
 - aid in the protection of the central nervous system.
- A function of the cerebellum is to:
 - initiate impulses involved in the reflex knee jerk action.
 - receive impulses from all incoming motor neurons.
 - coordinate impulses concerned with muscular tone and balance.
 - control the rate of breathing, especially during exercise.

5. Which of the following separates the middle ear from the inner ear?
- (a) cochlea
 - (b) oval window
 - (c) tympanic membrane
 - (d) ossicles
6. The sensations of heat and cold are
- (a) only detected by the finger tips.
 - (b) detected by the same receptor.
 - (c) detected by different receptors.
 - (d) detected by olfactory receptors.
7. The part of the eye which focuses light is the
- (a) pupil.
 - (b) lens.
 - (c) retina.
 - (d) iris.
8. Hormones enter cells directly from the
- (a) blood.
 - (b) exocrine glands.
 - (c) endocrine glands.
 - (d) extracellular fluid.
9. A person detects the smell of hot food in the air as he passes a restaurant. Shortly afterwards he notices the amount of saliva in his mouth has increased considerably.
- Which of the following statements is correct?
- (a) The smell of the hot food is the receptor and the brain is the effector.
 - (b) The smell of the hot food is the sensor and the nasal membranes are the effector.
 - (c) The smell of the hot food is the reflex and the central nervous system is the effector.
 - (d) The smell of the hot food is the stimulus and the salivary gland is the effector.

A student made a sketch of some of the endocrine glands found in the human body, but forgot to name the labels.



10. Match each endocrine gland with the correct label.

	A	B	C	D
(a)	pituitary	pancreas	thyroid	ovary
(b)	pituitary	thyroid	pancreas	adrenal
(c)	pituitary	thyroid	adrenal	pancreas
(d)	thyroid	pituitary	ovary	pancreas

End of Part A

Part B: Short answer

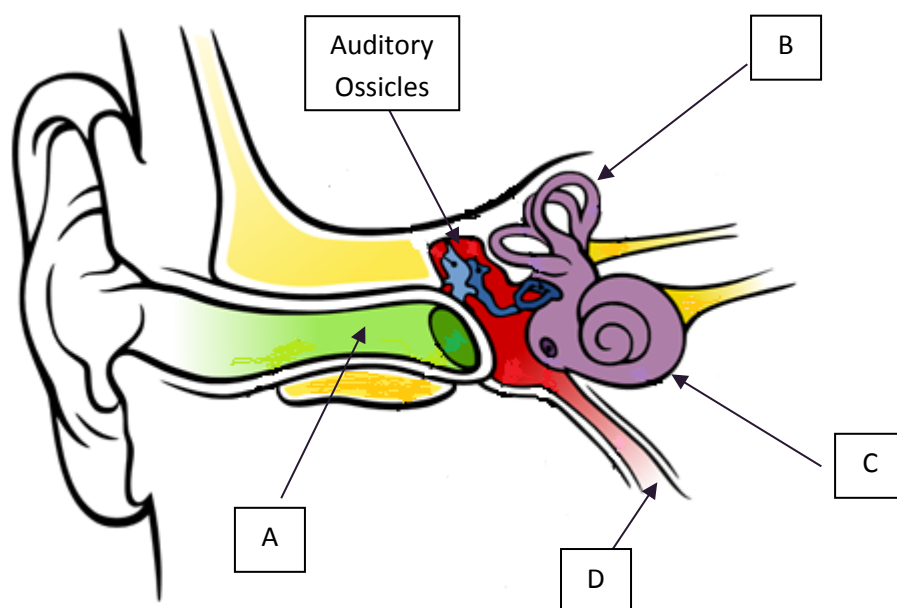
(37 marks)

This section has **six** questions. Answer all questions in the spaces provided.

11. (a) Based on its structure, the nervous system can be divided into the central nervous system and the peripheral nervous system. Describe the structures which make up these two parts of the nervous system. (4 marks)

- (b) What are **two** main functions of the central nervous system and the peripheral nervous system? (2 marks)

12. Use the diagram of the ear below to answer the questions on the following page. The diagram is not drawn to scale.



- (a) Name and describe the function of each of the structures A, B and C in the diagram on the previous page. (6 marks)

A _____

B _____

C _____

- (b) What would be **one** consequence if structure D became blocked? (1 mark)

- (c) What would be **one** consequence of the auditory ossicles fusing or joining together? Describe **two** reasons why this may occur? (3 marks)

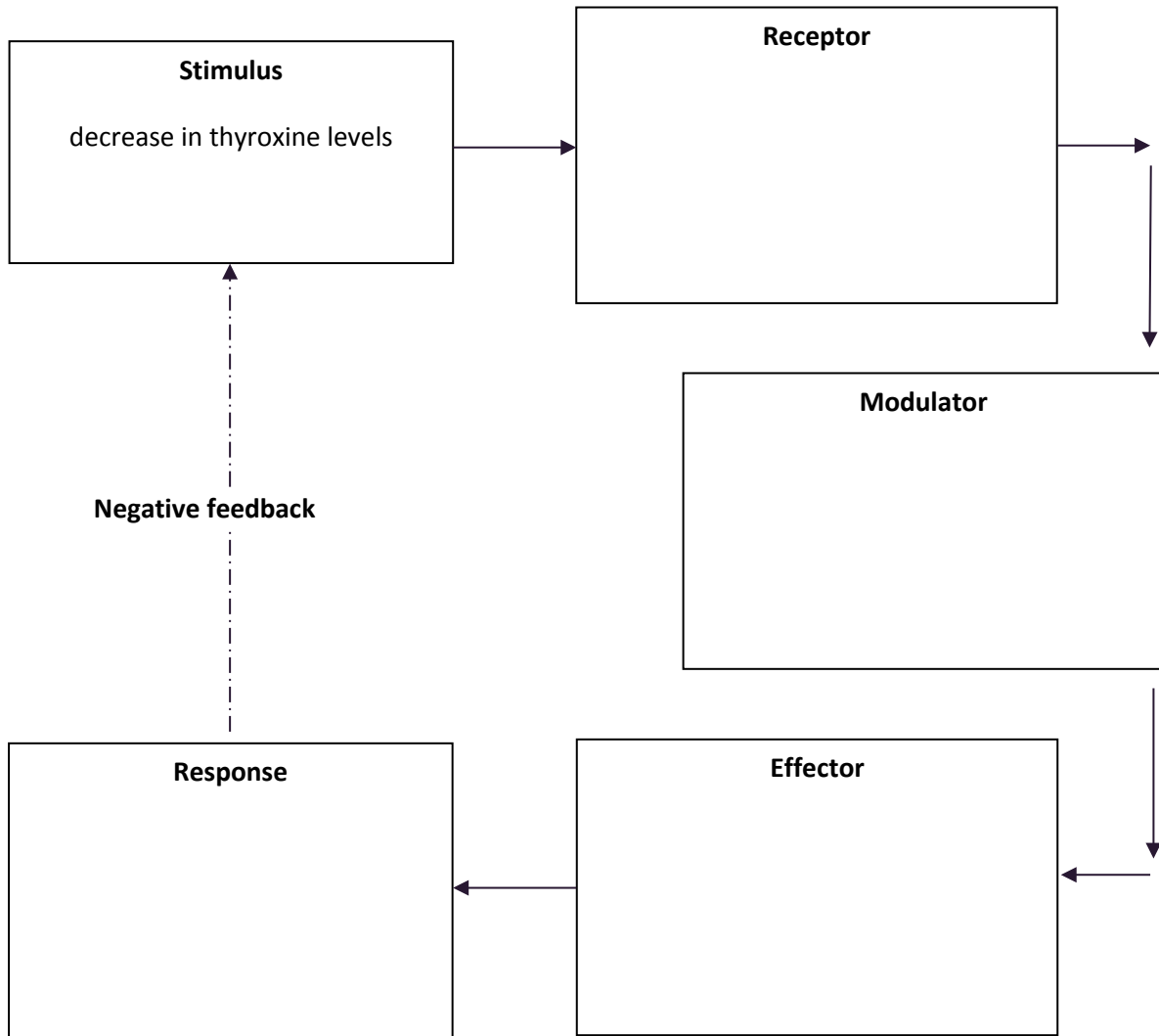
13. You are looking at an electrical storm. You see a flash of lightning. List **five** structures that the light wave would pass through before it focuses on the retina. (5 marks)

14. Complete the table below by listing **one** structure in the human body that has receptors for the stimulus. The first one has been done for you. (4 marks)

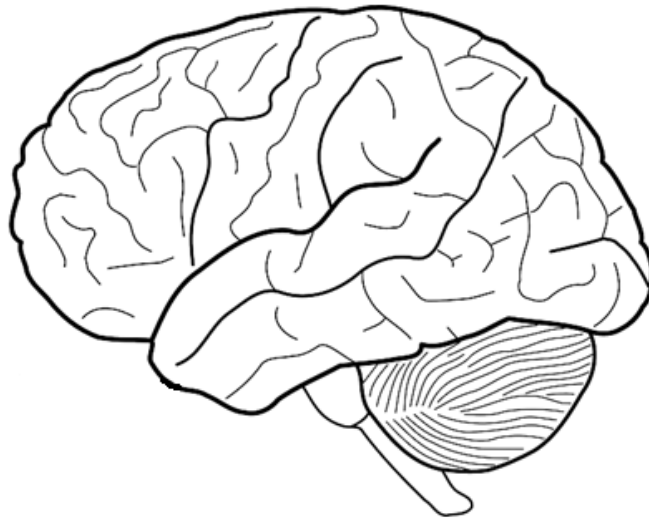
Type of stimulus	Structure containing receptors for that stimulus
sound	cochlea/ear
chemicals	
pressure	
pain	
temperature	

15. Negative feedback is an important mechanism for maintaining homeostasis in the body. Thyroxine plays a part in increasing the metabolic processes in the body.

Complete the following steady-state feedback loop to show how an initial decrease in thyroxine level can lead to an increase in thyroxine level. (4 marks)



16. (a) Label the diagram below with the following parts of the brain: cerebellum, spinal cord, brain stem and cerebral cortex (4 marks)



- (b) In the table below describe **one** function of each of the parts labelled above. (4 marks)

Structure	Function
cerebral cortex	
cerebellum	
spinal cord	
brain stem	

End of test

ACKNOWLEDGEMENTS

Assessment task

Question 1 Image adapted from: US Government. (2011). *Major endocrine glands* (public domain). Retrieved March, 2015, from Wikimedia Commons website:
http://commons.wikimedia.org/wiki/File:Illu_endocrine_system_New.png

Question 12 Image adapted from: Chittka, L., & Brockmann, A. (2009). *Anatomy of the Human Ear*. Retrieved March, 2015, from Wikimedia Commons website:
http://commons.wikimedia.org/wiki/File:Anatomy_of_the_Human_Ear.svg
Used under a Creative Commons Attribution 2.5 Generic licence.

Question 16(a) Diagram adapted from: Nemo. (2013). *Brain* (public domain). Retrieved March, 2015, from <http://pixabay.com/en/brain-diagram-anatomy-biology-40377/>

Marking key

Question 16(a) Diagram adapted from: Nemo. (2013). *Brain* (public domain). Retrieved March, 2015, from <http://pixabay.com/en/brain-diagram-anatomy-biology-40377/>

Marking key for sample assessment Task 6 – Unit 3

Part A: Multiple-choice

Description		Marks
Question	Answer	
1	c	1
2	c	1
3	d	1
4	c	1
5	b	1
6	c	1
7	b	1
8	d	1
9	d	1
10	c	1
Total		/10

11. (a) Based on its structure, the nervous system can be divided into the central nervous system and the peripheral nervous system. Describe the structures which make up these two parts of the nervous system.

Description	Marks
the central nervous system is made up of the brain	1
spinal cord	1
the peripheral nervous system is made up of nerves that lead to the central nervous system/sensory nerves	1
away from the central nervous system/motor nerves	1
Total	/4

- (b) What are **two** main functions of the central nervous system and the peripheral nervous system?

Description	Marks
the central nervous system processes incoming messages and initiates a response	1
the peripheral nervous system carries messages to and from the central nervous system	1
Total	/2

12. (a) Name and describe the function of each of the structures A, B and C in the diagram on the previous page.

Description	Marks
A: auditory canal	1
transmits sound waves from the outside environment to the ear drum/tympanic membrane	1
B: semi-circular canals	1
detect movement of the head/motion detector/directional balance	1
C: cochlea	1
organ of hearing	1
Total	/6

(b) What would be **one** consequence if structure D became blocked?

Description	Marks
Answer could include, but is not limited to	
<ul style="list-style-type: none"> the pressure in the middle ear would not equalise with the atmospheric pressure the ear drum may burst 	1
Total	/1

(c) What would be **one** consequence of the auditory ossicles fusing or joining together?
Describe **two** reasons why this may occur?

Description	Marks
loss of hearing	1
the bones/auditory ossicles could no longer vibrate	1
the vibration would not get from the ear drum to the oval window	1
Total	/3

13. You are looking at an electrical storm. You see a flash of lightning. List **five** structures that the light wave would pass through before it focuses on the retina.

Description	Marks
conjunctiva	1
cornea	1
aqueous humour/anterior cavity	1
lens	1
vitreous humour/posterior cavity	1
Total	/5

14. Complete the table by listing **one** structure in the human body that has receptors for the stimulus. The first one has been done for you.

(b) In the table below, describe **one** function of each of the parts labelled above.

Type of Stimulus	Structure containing receptor for that stimulus
sound	Cochlea/ear
chemicals	
pressure	
pain	
temperature	

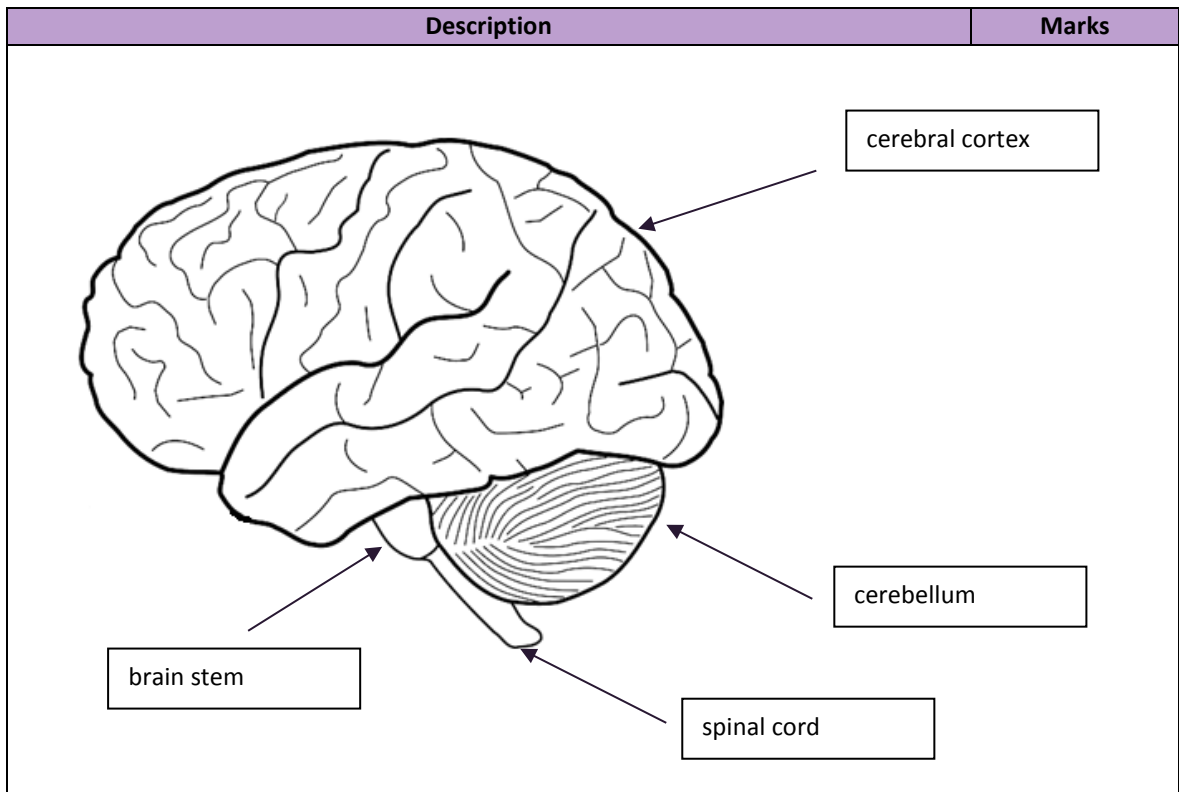
Description	Marks
Answer could include, but is not limited to :	
chemicals	
<ul style="list-style-type: none"> nose mouth/taste buds heart pancreas 	1
Subtotal	/1
pressure	
<ul style="list-style-type: none"> skin ear 	1
Subtotal	/1

Pain	
<ul style="list-style-type: none"> • skin • muscle • blood vessels • joints • bones • internal organs 	1
Subtotal	/1
Temperature	
<ul style="list-style-type: none"> • skin • hypothalamus 	1
Subtotal	/1
Final total	/4

15. Negative feedback is an important mechanism for maintaining homeostasis in the body. Thyroxine plays a part in increasing the metabolic processes in the body. Complete the following steady-state feedback loop to show how an initial decrease in thyroxine level can lead to an increase in thyroxine level.

Description	Marks
receptor: chemo/chemical receptor in the hypothalamus/brain	1
modulator: hypothalamus tells the pituitary to release thyroid stimulating hormone	1
effector: the thyroid stimulating hormone is transported to the thyroid gland	1
response: the thyroid gland is stimulated to release thyroxine	1
Total	/4

16. (a) Label the diagram below with the following parts of the brain: cerebellum, spinal cord, brain stem and cerebral cortex



correct location of cerebellum	1
correct location of spinal cord	1
correct location of brain stem	1
correct location of cerebral cortex	1
Total	/4

(b) In the table below, describe **one** function of each of the parts labelled above.

Structure	Function
cerebral cortex	
cerebellum	
spinal cord	
brain stem	

Description	Marks
Answer could include, but is not limited to :	
cerebral cortex	
<ul style="list-style-type: none"> • thinking • reasoning • memory • learning 	1
Subtotal	/1
cerebellum	
<ul style="list-style-type: none"> • maintenance of posture and movement • receives information from sensory systems, and spinal cord and then regulates motor movement • maintenance of smooth muscular movements 	1
Subtotal	/1
spinal cord	
<ul style="list-style-type: none"> • conducts sensory information to the brain • conducts messages from the brain to effectors such as muscles and glands • takes part in the reflex arc 	1
Subtotal	/1
brain stem	
<ul style="list-style-type: none"> • regulation of heart rate • regulation of blood pressure • regulation of breathing rate • regulation of the sleep cycle • regulation of hunger • regulation of thirst • reflexes such as coughing, swallowing and vomiting 	1
Subtotal	/1
Final total	/4

Sample assessment task

Human Biology – General Year 12

Task 8 – Unit 4

Assessment type: Science inquiry

Conditions

Period allowed for completion of the task:

- One lesson for the introduction, group allocation and class discussion of the safety procedures required for the investigation and to prepare and pour the agar into the petri dishes (class work)
- One week to conduct the activity and record the growth of the micro-organisms (group work)
- One lesson to complete questions one and two (individual work)
- One lesson to complete questions three to 10 of task questions (individual work)

Task weighting: 7% of the school mark for this pair of units

Task 8: Investigation – Does the environment affect the growth of micro-organisms? (34 marks)

Set up: Growing bacterial and fungal cultures

Equipment per group of three students:

- eight sterilised petri dishes
- 500mL beaker of prepared liquid agar nutrient broth
- sticky tape
- wax pencil or permanent marker
- one piece of universal indicator (UI) paper
- access to incubator
- timer/stop watch

Procedure: (Your teacher may have a special area where this first part can be carried out to reduce any extra contamination of the agar broth such as a fume hood.)

1. Collect the equipment listed above.
2. Using the UI paper, dip it into the prepared liquid agar broth to determine the pH reading.
3. Record the result and determine the pH of the agar broth. _____
4. Carefully pour agar into each of your eight dishes, cover immediately, then allow to set.
5. Once set, using the wax pencil, label each lid in small neat printing with the following:
Dish 1 and Dish 2 – Control (group initials)
Dish 3 and Dish 4 – Location 1 (group initials)
Dish 5 and Dish 6 – Location 2 (group initials)
Dish 7 and Dish 8 – Location 3 (group initials)

6. In your group, decide on three different locations around the school for each pair of dishes (suggestions could be canteen, toilets, classroom, corridor). Write these locations below.

Location 1 _____

Location 2 _____

Location 3 _____

7. Take dish 1 and dish 2 and seal them immediately with sticky tape. These are the control group. Your teacher will instruct you on how best to do this. Keep these dishes in the classroom as these dishes will serve as a comparison for the other plates.
8. Take one pair of dishes to the first location. Take the lids off the two dishes and leave them open in the area for 10 minutes exactly.
9. At the end of the 10 minutes, replace the lids, return to class and seal them with sticky tape.
10. Repeat this procedure for the next two locations.
11. Place all eight sealed dishes in the incubator. Record the temperature of the incubator below.

Temperature of the incubator _____

10. Make a prediction on which location would have the most number of:

(a) bacteria _____

(b) fungi _____

11. Construct a data table on the next page to record your observations for the week. You must record any growth on your data sheets every day. You may document the growth of the colonies with photographic evidence and record the number of colonies at a later time.

NOTE: Bacterial colonies usually look like shiny, round, symmetrical growths, and fungi look fuzzy and not always perfectly round (asymmetrical).

IMPORTANT SAFETY RULE:
AGAR PLATES CANNOT BE OPENED AGAIN
DURING THE COURSE OF THIS INVESTIGATION!

Name: _____

Investigation data questions one and two (one class period)

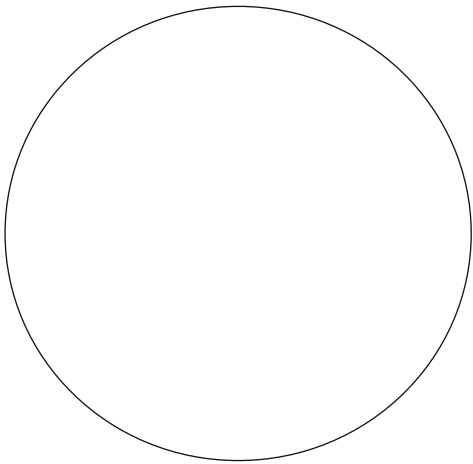
Take all eight plates out of the incubator and place them next to each other so you will be able to observe and compare them during this session.

You will have 10 minutes at each pair of dishes before you need to move on to the next set of dishes. Wait quietly if you finish before the 10 minutes is up.

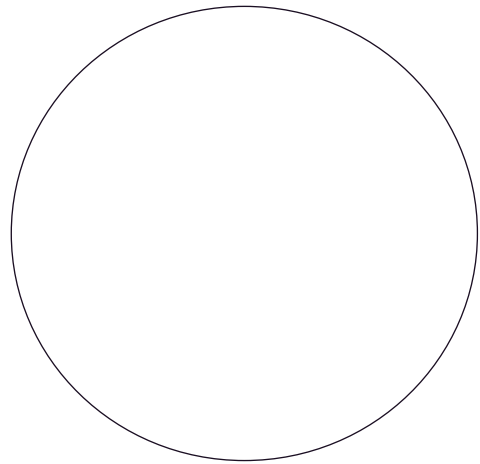
1. (a) draw the colonies on each of the dishes as accurately as possible
(b) clearly label which are bacterial and which are fungal colonies
(c) use pencil

(3 marks)

CONTROL _____

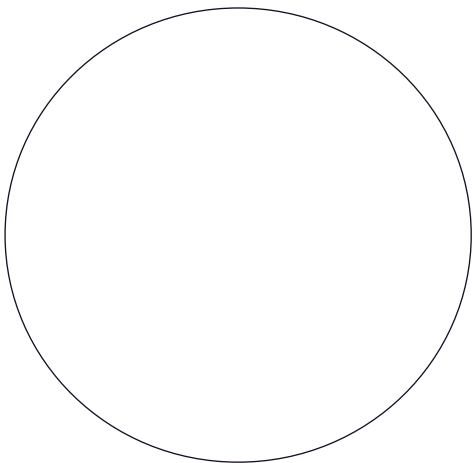


DISH 1

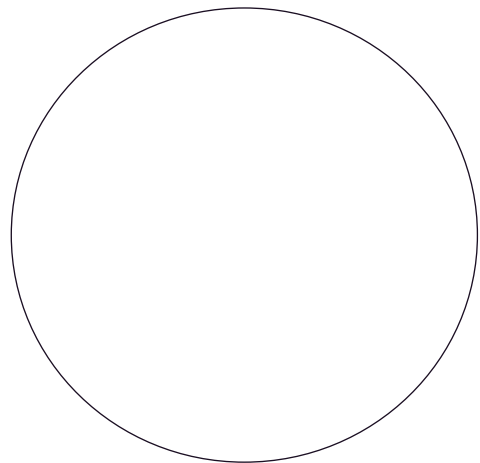


DISH 2

LOCATION 1 _____

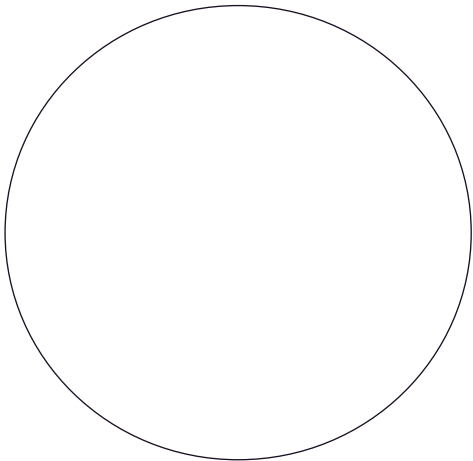


DISH 3

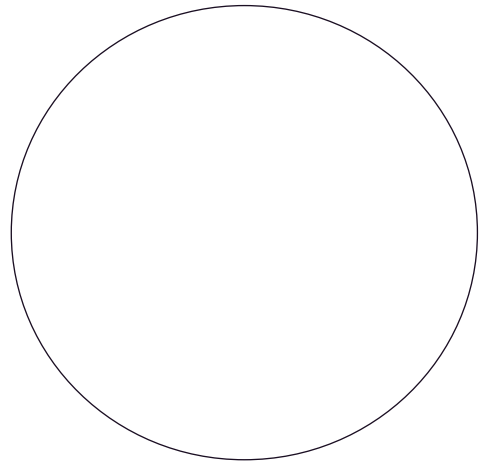


DISH 4

LOCATION 2 _____

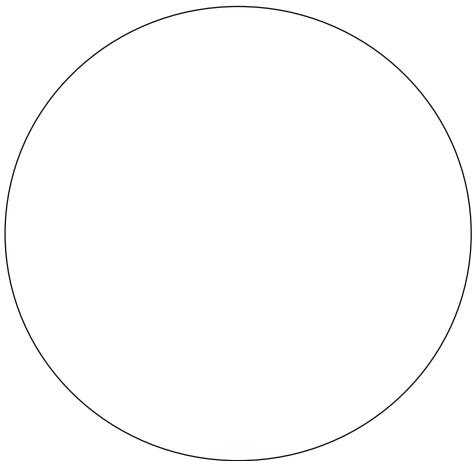


DISH 5

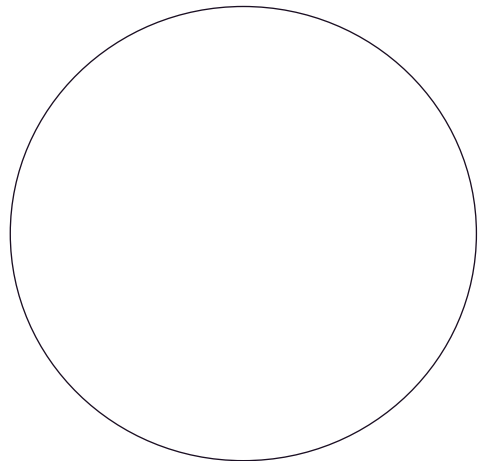


DISH 6

LOCATION 3 _____



DISH 7



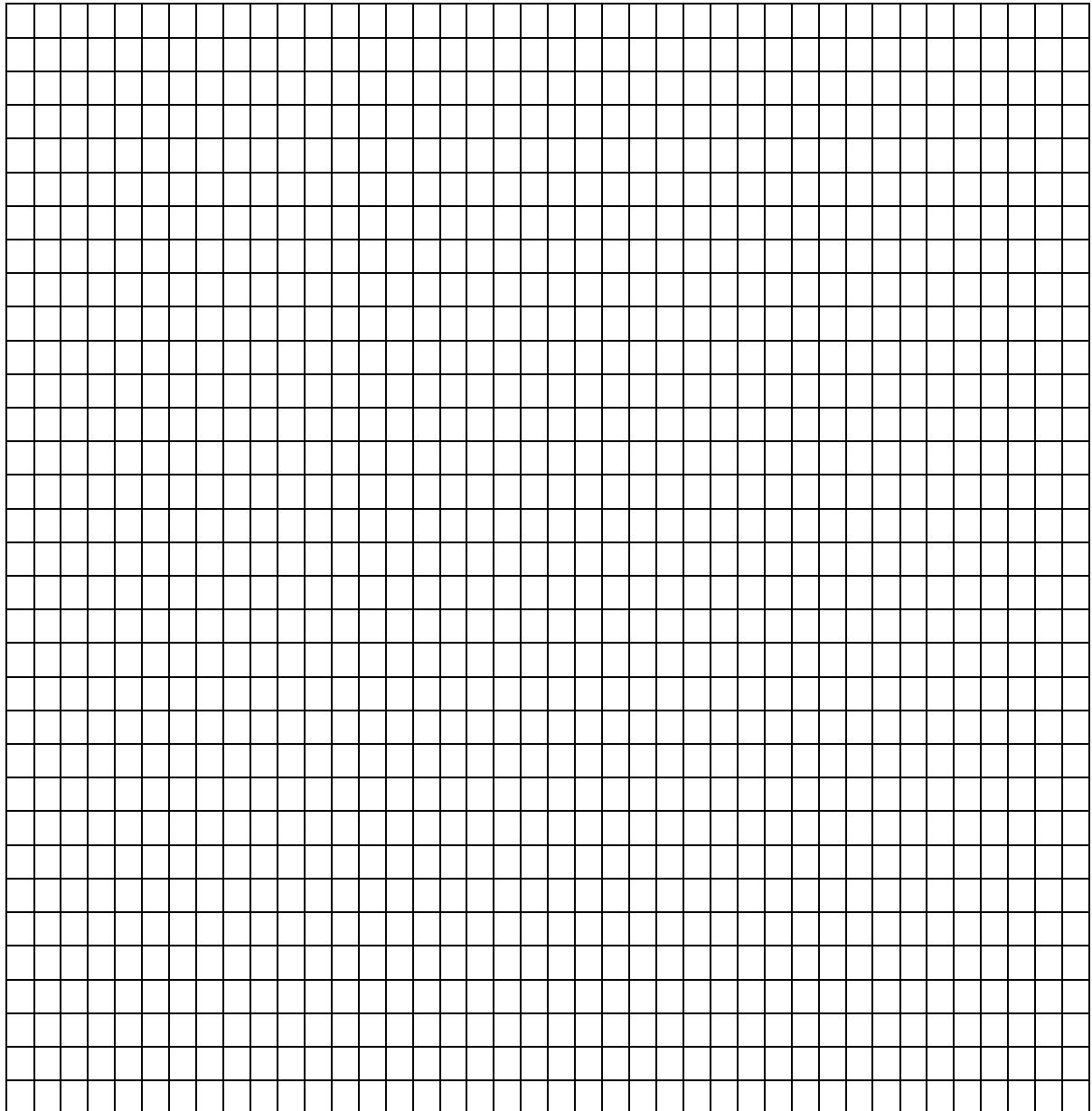
DISH 8

2. In the space below, construct a table to record the final number of bacterial and fungal colonies. Calculate an average between the two dishes in the same location and include this in the table. (5 marks)

Name: _____

Investigation data questions three to 10 (one class period)

- 3. Draw a column graph of the average of your final results from your experiment on the grid below. The location should be on the horizontal axis. (5 marks)



4. Which of the dishes grew the greatest number of: (2 marks)

(a) bacterial colonies? _____

(b) fungal colonies? _____

5. Look back at your prediction. Did the evidence support your prediction? Compare the locations. (3 marks)

6. What happened to the control dishes? Explain why this happened. (2 marks)

7. Give **four** conditions/variables that you kept constant in this investigation. (4 marks)

8. If another class was to conduct this investigation, list **three** ways that the experimental design could be improved. (3 marks)

9. In some cases you may see a clear ring around a bacterial colony. Suggest **two** possible explanations for this. (2 marks)

10. Which location had the most ideal conditions for the growth of bacteria and fungi? Give **two** reasons why this location had the most ideal conditions? (3 marks)

11. Why was it necessary to measure and record the pH of the agar broth and the temperature of the incubator? (2 marks)

Marking key for sample assessment Task 8 – Unit 4

1. (a) draw the colonies on each of the dishes as accurately as possible
- (b) clearly label which are bacterial and which are fungal colonies
- (c) use pencil

Description	Marks
colonies drawn as accurately as possible	1
bacterial and fungal colonies clearly labelled	1
colonies drawn in pencil	1
Total	/3

2. In the space below, construct a table to record the final number of bacterial and fungal colonies. Calculate an average between the two dishes in the same location and include this in the table.

Description	Marks
ruler used to draw table	1
independent variable in the first column – Location	1
dependent variable in the other columns – Number of colonies	1
realistic counts	1
averages calculated	
Total	/5

3. Draw a column graph of the average of your final results from your experiment on the grid below. The location should be on the horizontal axis.

Description	Marks
columns correctly plotted	1
suitable scale used	1
title appropriate with both variables included	1
key for different columns (bacteria and fungi)	1
axes labelled with correct title and unit	1
Total	/5

4. Which of the dishes grew the greatest number of:
 - (a) bacterial colonies?
 - (b) fungal colonies?

Description	Marks
correct count and dish for bacterial colonies	1
correct count and dish for fungal colonies	1
Total	/2

5. Look back at your prediction. Did the evidence support your prediction? Compare the locations.

Description	Marks
yes/no	1
Subtotal	/1
student must compare the data of the two other locations with the location that had the most colonies	
location x had a many more bacterial and fungal colonies than location y	1
location x had b many more bacterial and fungal colonies than location z	1
Subtotal	/2
Final total	/3

6. What happened to the control dishes? Explain why this happened.

Description	Marks
either no colonies formed	1
the dish was not exposed	1
OR	
a few colonies formed	1
the bacteria and fungi landed on the dish during preparation	1
Total	/2

7. Give **four** conditions/variables that you kept constant in this investigation.

Description	Marks
four variables described	1–4
Total	/4
Answer could include, but is not limited to:	
<ul style="list-style-type: none"> • same size petri dish • same type of petri dish • same incubator set at one temperature/same temperature • set at one temperature/same temperature • same growth medium/agar • same pH • same amount of time that the dishes were kept for 	

8. If another class was to conduct this investigation, list **three** ways that the experimental design could be improved.

Description	Marks
list of three ways that the experimental design could have been improved	1–3
Total	/3
Answer could include, but is not limited to:	
<ul style="list-style-type: none"> • include repeat trials • more petri dishes at each location • ensure the pouring of agar is conducted in a sterile environment • any other valid improvement 	

9. In some cases you may see a clear ring around a bacterial colony. Suggest **two** possible explanations for this.

Description	Marks
two possible explanations for the rings around a bacterial colony	1–2
Total	/2
Answer could include, but is not limited to :	
<ul style="list-style-type: none"> the bacteria has produced a toxin/substance which killed/affected other micro-organisms the bacteria killed/affected the other micro-organisms around it the bacteria produced wastes that killed/affected other microbes 	

10. Which location had the most ideal conditions for the growth of bacteria and fungi? Give **two** reasons why this location had the most ideal conditions?

Description	Marks
use the student data for the correct location	1
Subtotal	/1
two reasons why the location was most ideal	1–2
Subtotal	/2
Final total	/3
Answer could include, but is not limited to:	
<ul style="list-style-type: none"> this area is not cleaned as often or the cleaners always clean this area there is moisture created by the water fountain there is heavy foot traffic in this area many students eat their lunch in this location 	

11. Why was it necessary to measure and record the pH of the agar broth and the temperature of the incubator?

Description	Marks
reasons why it was necessary to measure and record the pH	1–2
Total	/2
Answer could include, but is not limited :	
<ul style="list-style-type: none"> bacteria and fungi are suited to a particular pH and temperature range if the pH was too acidic or too basic, it could affect the growth of these organisms; kill the bacteria or fungi if the temperature is too cold, it would reduce the rate of growth of the organisms; if it was too high, it could kill them/damage proteins 	