4.

(a) The Salmonella came from one of the three possible food outlets – the restaurant, the take away outlet or the camp kitchen. [1]

(b) By questioning all the people suffering Salmonella symptoms in an effort to pin down the source of the infection and by asking where non-sufferers ate their meals. [2]

(c) If there are other people not connected to the camp who only ate at, for example, the take-away outlet who are all sick and if no-one else who ate at the restaurant or camp are ill, you could conclude the source was the take away outlet. If there was access to laboratory facilities, food samples and swabs of bench tops, etc. could be done to confirm your investigation. [2]

(d) Isolate the infected students. Enforce hygiene measures – washing hands etc. Use separate crockery and utensils. Send the infected students home. Find the source of infection. [2]

5.

(a) It is more common in groups F, G, H, I and J than in groups A to D [1]

(b) Lifestyle – sedentary, diet, maybe some ethnic groups are more prone to it (a genetic factor). [1]

(c) No, because this only represents a small sample of people in a specific age range. [2]

(d) Separate males from females. [1]

(e) This is the age group that is at risk of this disease. [1]

(f) Increase public awareness of its causes, education at school level and promote ways to combat the problem via the mass media – TV, radio, newspaper. [2]

Section 3: Extended Answer (20 marks)

Each dot point = one mark unless otherwise stated.

Hypothesis: elderly people who practise Tai Chi fall less often than people who do not practise Tai Chi. [1]

- Select a large group of elderly people, i.e. 60 years of age and older.
- Divide into two groups.
- Use both males and females – randomly allocated to each group.
- Have at least 100 people (the more the better) in each group.
- They should be in the same age range and general health.
- Could use retirement home residents because their lifestyles are similar.
- Participants have no previous experience of Tai Chi.
- Record the numbers of falls and/or fractures each individual has experienced so far in their lifetime.
- Train one group in the techniques of Tai Chi (they are the experimental group).
- The other group is then the control group and go about their lives as usual.
- Encourage the test group to practise the techniques every day for a year.
- At the end of the year survey both groups again for the number of falls and/or fractures suffered over the year.
- Compare these results using graphs and appropriate statistical analyses (e.g. mean, standard deviation, significant difference). [2]
- If the experimental group has experienced less falls and or fractures than the control group, the hypothesis is supported.
- If there is no difference in the number of falls or fractures between the experimental and control group, the hypothesis is refuted.
- Repeat the experiment.

Allocate 2 marks for presentation, spelling, grammar and clarity.

TT 2 – THE ENDOCRINE SYSTEM

Section 1: Multiple Choice (30 marks)

1.	a	6.	c
2.	c	7.	d
3.	c	8.	d
4.	d	9.	b
5.	a	10.	c

Section 2: Short Answer (50 marks)

1.

(i) pituitary
(ii) pancreas
(iii) hypothalamus
(iv) ovulation
(v) ribosome
(vi) islets of Langerhans (beta cells)
(vii) thyroid gland
(viii) oxytocin
(ix) FSH
(x) prolactin [10]

2. A hormone is a chemical substance produced and released by an endocrine gland [1] which will affect how other particular cells (responsive to that hormone) function [1], e.g. speed up or slow down chemical reactions in those responsive cells.

3. Specificity of hormones means that each hormone will only affect particular target cells with the appropriate receptor sites. [1] Some hormones affect lots of cells, e.g. growth hormone, others only affect particular cells,

e.g. follicle stimulating hormone. [1]

4.

(a) thyroid gland [1]
(b) adrenal cortex in adrenal gland [1]
(c) islets of Langerhans - alpha cells [1]
(d) ovaries or corpus luteum [1]
(e) hypothalamus [1]
(f) anterior pituitary [1]

5. *The hypothalamus is connected to the pituitary gland [1] by a stalk of tissue called the infundibulum. The hypothalamus produces two sorts of chemicals (called releasing factors and inhibiting factors) [1] which move down the infundibulum to the pituitary and either stimulate the release of, or inhibit the release of, [1] hormones from the pituitary. The hormones then directly or indirectly affect functions of the body. [1]*

6.

(a) Any 3 of the following: increased heart rate, increased breathing rate, dilation of pupil, blood vessels to skin and digestive tract constrict, blood vessels to skeletal muscles and brain dilate, body temperature increases, or production of digestive enzymes decreases. [any 3 = 3 marks]
(b) adrenal medulla [1]
(c) adrenalin [1]
NB: The sympathetic nervous system is also involved but the question only asked about the endocrine system.

7.

(a) A, B, C and D are all endocrine glands and release hormones directly into the blood/ extracellular fluid. [2]
(b) A = pancreas, B = thyroid, C = pituitary, D = adrenal [4]
(c) C produces thyroid stimulating hormone which stimulates production of thyroxine from the thyroid gland. [2]
(d) A - insulin or glucagon [1]
D - aldosterone, cortisol, adrenalin or noradrenalin. [1]

8.

Nerve action	Hormonal action
Fast response	Slower response
Nerve impulse carried along neuron	Hormone carried in blood
Effects last for short time	Effect lasts for long time
Electrochemical impulse	Chemical substance

[any 3 for each = 6 marks]

9. *Low levels of thyroxine in the blood stimulates the release of thyroxine releasing factor from the hypothalamus [1]. This stimulates the release of thyroxine stimulating hormone (T.S.H.) from the anterior pituitary [1]. T.S.H. stimulates the thyroid gland to produce and release thyroxine. [1] As the level of thyroxine in the blood increases, it inhibits the activity of the hypothalamus [1] and hence the release of T.S.H. from the pituitary. [1]*

Section 3: Extended Answer (20 marks)

Each dot point = one mark unless otherwise stated.

- *Define homeostasis as the maintenance of a constant internal environment. [2]*
- *External or internal stimuli cause changes in the way the body functions.*
- *To maintain homeostasis, these have to be responded to in appropriate ways.*
- *The endocrine system, comprising endocrine glands is one way the body responds to change.*
- *Nerve impulses will also result in hormones being released.*
- *Endocrine glands release hormones (chemicals) that affect the way the body functions.*
- *These are released directly into the blood so potentially could affect every cell in the body, but specific receptors on cells determine which ones respond.*
- *The levels of various hormones in the blood are monitored by the hypothalamus. This produces releasing or inhibiting factors which directly affect the pituitary.*
- *This results in the hormones from the pituitary being produced in greater or lesser amounts.*
- *These hormones circulate in the blood and affect specific cells and tissues bringing about a response.*
- *For example, the release of growth hormone stimulates general body growth.*
- *For example, follicle-stimulating hormone, stimulates the development of ova and production of sperm and secretion of oestrogen by the ovaries.*
- *Some of the hormones from the pituitary affect other endocrine glands and influence the production and release of hormones from them.*
- *For example, thyroid-stimulating hormone from the pituitary affects the thyroid gland. This stimulates the thyroid to produce and release thyroid hormones. In turn, these affect the metabolic rate of the body.*
- *Most of these hormones work on a negative feedback system which makes constant adjustments to keep aspects of the body's physiology within tolerance limits.*
- *E.g. blood pressure, gas concentrations, blood sugar levels, body fluid concentrations and body temperature.*
- *Positive feedback systems only operate on systems that do not occur frequently such as child birth.*
- *For example, when labour begins and the uterus is stretched, this stimulates the*

production and release of oxytocin from the pituitary. Oxytocin causes the uterus to contract more. As the uterus increasingly stretches, more oxytocin is released and the contractions increase. The contractions only stop when the baby is born.

- If aspects of the body's physiology went beyond the tolerance limit, for example, body temperature, it could have serious, if not, lethal consequences for the body, e.g. hyperthermia or hypothermia.

TT 3 – THE CENTRAL AND PERIPHERAL NERVOUS SYSTEM

Section 1 - Multiple Choice (30 marks)

1. c
2. b
3. a
4. d
5. a
6. b
7. c
8. a
9. c
10. d

Section 2: Short Answer (50 marks)

1.
(i) axon
(ii) cerebellum
(iii) voluntary
(iv) motor end plate
(v) antagonistic
(vi) meninges
(vii) medulla
(viii) hypothalamus
(ix) ventricles
(x) interneurons (connector, association)
(xi) cranial
(xii) ganglion
(xiii) involuntary
(xiv) grey matter
(xv) Alzheimer's Disease

[15]

2.
(a)
A: cerebral cortex (cerebrum)
B: cerebellum
C: spinal cord
D: medulla oblongata
E: midbrain
F: ventricle
G: pituitary gland
H: hypothalamus

[8]

(b)
A
- Receives information from sense receptors and interprets it.
- Controls muscular movements and initiates impulses to them.
- Retains memory, thinks in abstract terms.

[any 2]

B
- Controls posture.
- Controls balance.
- Coordinates fine movements.

[any 2]

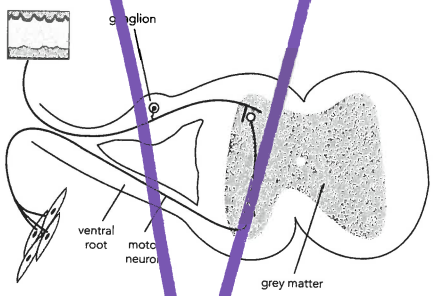
C
- Carries sensory impulses upwards to the brain.
- Carries motor impulses down from the brain.
- Links sensory impulses to motor impulses in reflexes.

[any 2]

H
- Regulates body temperature, heart rate.
- Produces feelings of hunger and thirst.
- Regulates the release of hormones from the pituitary gland.
- Oversees the activities of the autonomic nervous system.

[any 2]

3.
(a)



[3]

(b) Motor neuron marked. [1]

(c) If a dorsal root was cut, no sensory impulses from the receptors connected to the sensory neurons that run through the dorsal root would reach the spinal cord. The brain would not receive sensory information from those particular receptors and any stimulations there would not be processed.

[2]

(d) Reflex [1]

(e) The stimulus pressure is felt by receptors in the toe; a nerve impulse travels up the afferent neuron (sensory neuron) to a connector neuron in the spinal cord then down a motor (effector) neuron to muscles in the leg. These muscles are effectors and contract, lifting the foot which is the response. [5]

(f) Pain is felt after you lift your foot because a nerve impulse to the brain is sent from the spinal cord. By the time it gets there, impulses have already raised the leg.

[1]

4.
(a) Emergency situations = Sympathetic nervous system [1]
Relaxed state = Parasympathetic nervous system [1]

(b) The sympathetic nervous system causes the heart rate to increase, breathing rate to