Section 12: Nervous System

Answer Key

12.1	What is the role of the human nervous system?	The nervous system detects stimuli from the internal or external environment and uses electrical impulses to bring about the fast, but short-lived, responses.
12.2	**Describe 2 ways of measuring reaction time.**	**Dropping a ruler and catching it, computerised tests involving pressing a button in response to seeing something on the screen – time recorded by the computer**
12.3	Summarise the **order** in which the nervous system works?	**Stimuli, receptor, sensory neurone, CNS, motor neurone, effector, response**
12.4	Name **3 types of neuron.**	**Sensory, Motor and Relay**
12.5	What is a **synapse** and how does it work?	The methods by which the nervous impulse crosses the gap between neurones. **1. Impulse arrives at the end of neurone A** **2. Neurotransmitter is released into the synaptic gap** **3. Neurotransmitter diffuses across the synaptic gap** **4. Neurotransmitter binds to the receptors on neurone B** 5. **A new electrical impulse is generated in neurone B**
12.6	What neurone is involved in a reflex?	Relay
12.7	Why are reflexes important?	**Reaction remove your body** from danger.
12.8	Why are reflexes faster?	The **do not involve the conscious part of the brain**, therefore no conscious thought
12.9	What is **a receptor?** State 3 examples.	Cells that detect stimuli (changes in the internal or external environment). Eyes, ears, skin, thermoreceptors, pressure receptors, tongue, nose
12.10	What is a stimulus?	**A change in the environment**(internal/external)
12.11	What carries out a response? Give 3 examples.	**Effectors – Muscle, gland or Organ**
12.12	How is a nerve cell adapted?	• The cell body contains cytoplasm and nucleus (the control centre of the cell) • The axon is a long extension of the cytoplasm (can be up to 1m). this means nerve impulses can be transmitted to the extremities by 1 cell. • The myelin sheath is a fatty layer that surrounds to axon. The sheath act as an insulator and spreads up nerve impulses. • The branched ends of the axon and the smaller branches coming from the cell body allow the neurone to make connections with other neurones.

Section 13 – Endocrine System

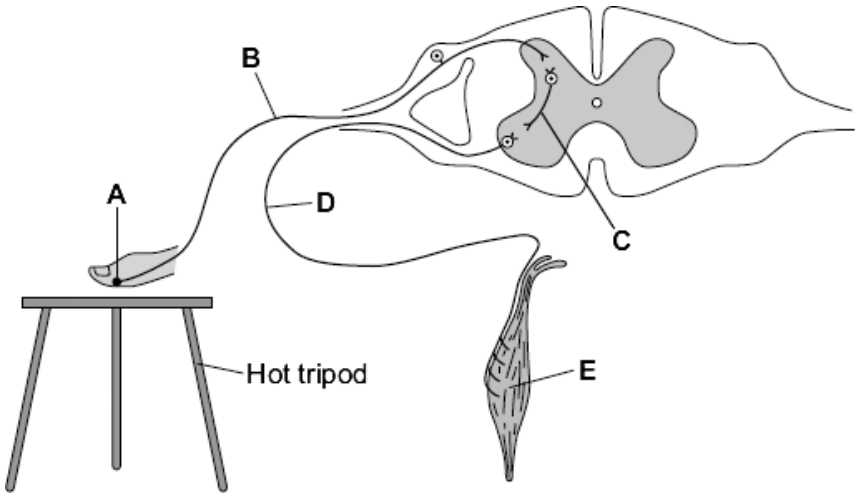
Answer Key

13.1	What is the **endocrine system** made of?	Glands which **secrete hormones**
13.2	How are chemical messages transported around the body?	Glands release hormones into the bloodstream which then travel to the target organ to produce an effect.
13.3	What is produced if blood glucose is **a) Too high** **b) Too Low**	a) Insulin b) Glucagon
13.4	Name 2 places in the body where glycogen is stored.	**Muscles and Liver** cells
13.5	What is the process called that **restores the body back to normal** levels?	Negative feedback
13.6	Name the hormones involved in reproduction (male and female)	Testosterone Oestrogen Follicle stimulating hormone Luteinising hormone
13.7	State the names and function of the **hormones in the menstrual cycle**.	**FSH – matures the egg** **Oestrogen – Causes the uterus lining to thicken and stop FSH production** **LH – releases the mature egg**
13.8	What are the 2 main categories of **contraception**?	Physical barriers and **chemical** methods
13.9	Summarise the stages of IVF.	1. Mother given FSH and LH to mature several eggs 2. Eggs are collected from the mother and by sperm from the father in a lab. 3. Fertilised eggs develop into embryos 4. Some Embryos are inserted into the mothers uterus
13.10	State 2 advantages and disadvantages of fertility treatment.	Disadvantages – emotionally and physically stressful, low success rate, multiple births Advantages – allows pregnancy when not possible, embryo screened for genetic disorders

Foundation Tier

Q1. If you touch a hot object you automatically pull your hand away. This is called a reflex action. The reflex action happens quickly and protects the body from harm.

The diagram shows the structures involved in this reflex action.



The flow diagram shows the pathway of a nerve impulse in a reflex action.

Use information from the diagram to complete the flow diagram.

Stimulus is the hot tripod.

↓

A Stimulus is detected by a _____ in the skin.

↓

B An impulse passes along a _____ neurone.

↓

C The impulse passes to a relay neurone in the _____ .

↓

D The impulse passes to a _____ neurone.

↓

E The impulse reaches the muscle. The muscle is the _____ .

↓

Response – hand pulled away from hot object.

(Total 5 marks)

Q2. Hormones regulate the functions of many organs. Complete the following sentences.

(a) Hormones control the monthly release of an egg from

the woman's _____ .

(1)

(b) Hormones also control the thickness of the lining of her _____ .

(1)

(c) Hormones given to women to stimulate the release of eggs

are called _____ drugs.

(1)

(d) How are hormones transported around the body?

_____

(1)

(Total 4 marks)

Q3.

(a) **List A** gives the names of three hormones. **List B** gives information about the three hormones.

Draw a line from each substance in **List A** to the correct information in **List B**.

List A Hormone	**List B Information**
	Used in some contraceptive pills to stop eggs maturing
FSH	
	Used as a fertility drug to make eggs mature
LH	
	Causes the lining of the womb to break down
Oestrogen	
	Stimulates the release of eggs in IVF

(3)

(b) The table gives information about three methods of giving hormones to stop a woman becoming pregnant.

	The 'pill'	The 'patch'	The 'implant'
How the hormone is given	Swallowed each day for 21 days out of every 28 days.	Stuck onto the skin. Each patch lasts three weeks. There is a one week gap between each patch.	Needs an operation to put it under the skin. Lasts for up to 5 years.

Use the information in the table to answer these questions.

(i) Which of the three methods is likely to be the most reliable?

_____

(1)

(ii) Explain why you chose this method.

_____

_____

(1)

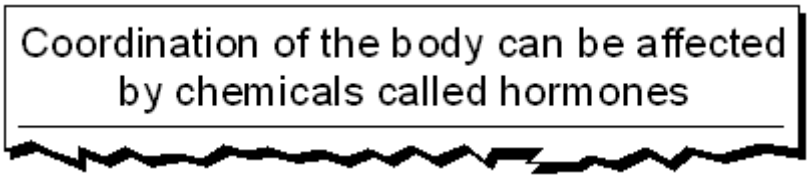
(iii) Give **one** disadvantage of the method you have chosen.

_____

(1)

(Total 6 marks)

Q4.



(a) (i) Where are hormones produced?

_____

(1)

(ii) How do hormones move around the body?

_____

(1)

(b) Insulin is a hormone.

(i) Where is insulin produced?

_____

(1)

(ii) Explain the role of insulin in controlling blood sugar levels.

_____

(4)

(Total 7 marks)

Q5.

The pancreas is involved in digestion and controlling the internal conditions of the body.

(a) Name **two** digestive enzymes produced by the pancreas.

1. _____

2. _____

(2)

(b) Diabetes may be caused by a lack of insulin.

Part of the treatment for someone with diabetes is to pay careful attention to the diet.

(i) Give **one** symptom of diabetes.

_____

_____

(1)

(ii) Give **one** way in which a diabetic may be advised to change their diet.

_____

_____

(1)

(iii) How does this change in diet help the diabetic?

_____

_____

(1)

(iv) State **one** other way in which the symptoms of diabetes may be treated.

_____

(1)

(c) Many of the cells in the pancreas contain large numbers of ribosomes.

What is the function of ribosomes in a cell?

_____

_____

(1)

(Total 7 marks)

Higher Tier

Q6.

This question is about homeostasis.

(a) Define the term homeostasis.

_____

_____

_____

_____

(2)

(b) Name the hormone released if the blood glucose concentration falls too low.

_____

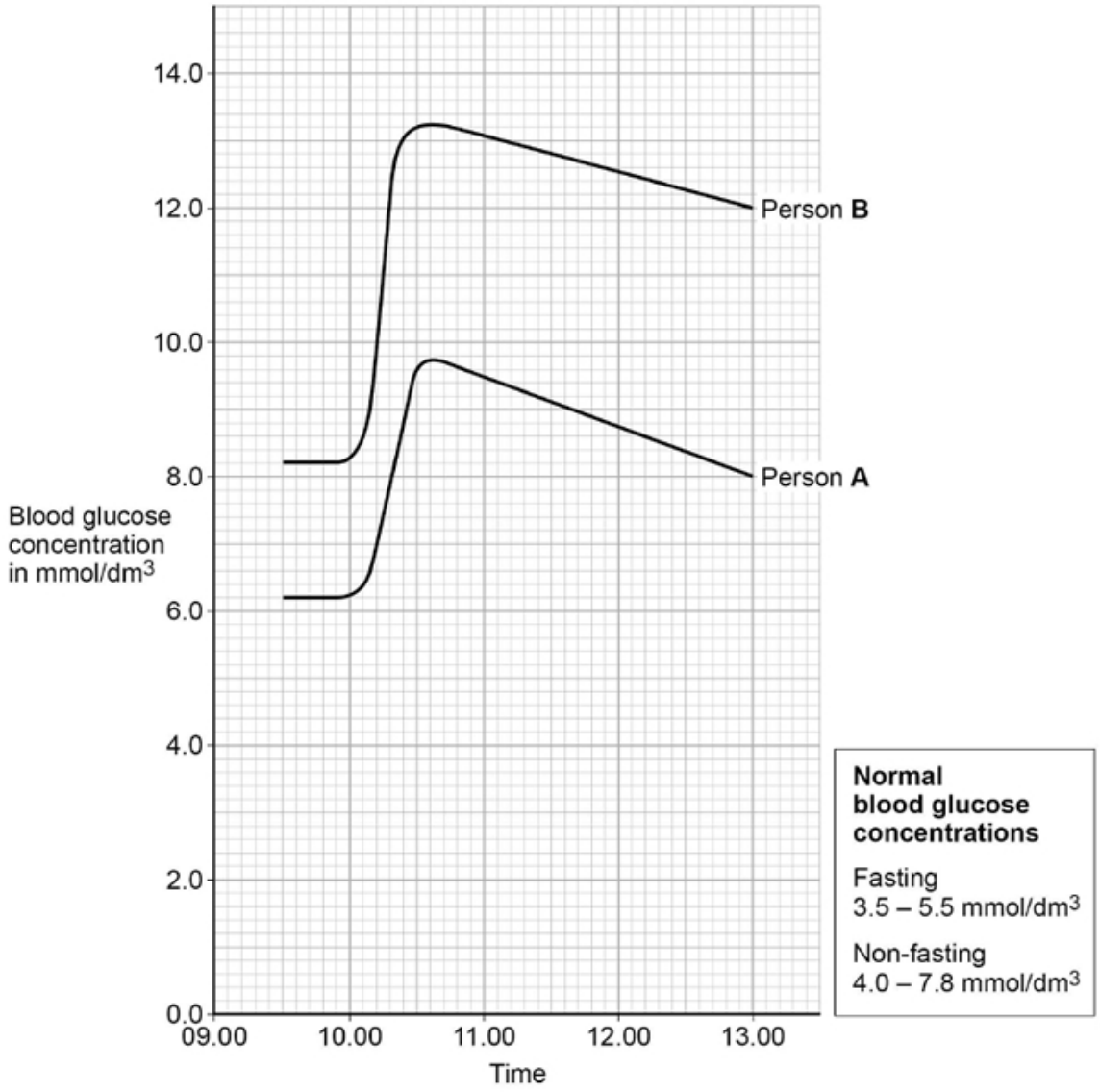
(1)

Two people were sent to a hospital to find out if they have diabetes.

This is the method used at the hospital.

- Do not eat or drink after midnight. This is called fasting.
- Measure blood glucose concentration at 9.30 am
- Drink a glucose solution at 10.00 am
- Measure blood glucose concentration for the next 3 hours.

The graph shows the results.



Person **A** and person **B** have diabetes.

(c) Describe how the graph above shows that person **B** has diabetes.

Use data from the graph.

(3)

(d) Person **A** and person **B** had a test to measure the concentration of insulin in their blood when they were fasting.

The table shows the results.

Person	**Fasting blood insulin concentration in arbitrary units**
A	280
B	20
Normal range	50–175

Suggest which type of diabetes person **A** and person **B** have.

Give a reason for each answer.

Person **A**

Type of diabetes _____

Reason _____

_____

Person **B**

Type of diabetes _____

Reason _____

_____

(2)

(e) Toxic hypoglycaemia syndrome (THS) has caused the deaths of hundreds of starving children in some tropical countries.

- The starving children have had nothing to eat all day.
- The starving children then eat many lychee fruits.
- The lychee fruits contain a molecule which stops an enzyme in the liver working.
- This enzyme normally converts stored fats into glucose.

Children who have eaten during the day are **not** affected by eating many lychee fruits.

Starving children may die from eating many lychee fruits but children who have eaten during the day are not affected.

Explain why.

(6)

(Total 14 marks)

Q7. Two 18-year-old male students measured their reaction times.

The students used two methods, Method **1** and Method **2**.

Method 1

1. Sit in front of a tablet computer.
2. When the tablet makes a sound, touch the tablet screen as quickly as possible.
3. Record the reaction time shown on the tablet.
4. Repeat steps **1** to **3** another two times.

Method 2

1. Hold a metre rule so the bottom of the rule is level with the top of the other student's thumb.
2. Let go of the metre rule.
3. The other student catches the metre rule.
4. Record the position of the student's thumb on the metre rule.
5. Convert the position on the metre rule to a reaction time using a conversion table.
6. Repeat steps **1** to **5** another two times.

The table below shows the results.

Student	**Reaction time in seconds**							
	Method 1				**Method 2**			
	Test 1	**Test 2**	**Test 3**	**Mean**	**Test 1**	**Test 2**	**Test 3**	**Mean**
A	0.72	0.69	0.71	0.71	0.8	0.6	0.8	0.7
B	0.53	0.49	0.52	0.51	0.6	0.7	0.5	0.6

(a) Student **A** and student **B** had different reaction times.

Suggest **two** reasons why student **A**'s reaction time was longer than student **B**'s reaction time.

1. _____

_____

2. _____

_____

(2)

(b) Give **two** reasons why Method **1** would give more accurate results than Method **2**.

1. _____

_____

_____

2. _____

_____

_____

(2)

(c) In Method **1** the students react to a sound.

In Method **2** the students react when they see the metre rule drop.

A sound wave is a longitudinal wave. Visible light is a transverse wave.

Describe the difference between a longitudinal wave and a transverse wave.

_____

_____

_____

_____

_____

_____

(2)

(d) The nervous system coordinates reflex actions.

A person accidentally touches a hot object. The person moves their hand away quickly.

Describe how information about the hot object is detected, **and** how the information reaches the muscles in the arm.

_____

_____

_____

_____

_____

_____

_____

(4)

(Total 10 mark

Mark schemes

Q1.

A – receptor

ignore organ / nerve

1

B – sensory

allow sensor

1

C – CNS / central nervous system

accept spinal cord
allow coordinator
ignore brain
*do **not** accept spine*

1

D – motor

1

E – effector

1

[5]

Q2.

(a) ovary

1

(b) womb / uterus

1

(c) fertility

1

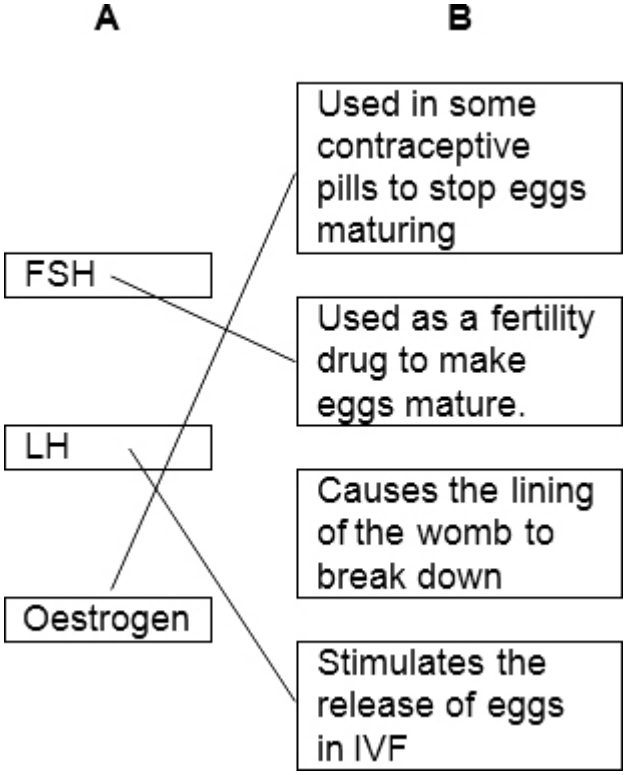
(d) by the blood system

1

[4]

Q3.

(a)



mark each line from left hand box

two lines from left hand box cancels mark for that box

3

(b) (i) implant

1

(ii) any **one** from:

allow explanation for their method in (b)(i)

- lasts for 5 years / long(est)
- cannot forget to take / replace it / lose it
- (hormone) there all the time

ignore expense

ignore STDs

ignore side effects

1

(iii) any **one** from:

accept correct disadvantage for wrong method in (b)(i)

- needs surgery / operation
  allow it could go wrong
- painful
- infection
- have to wait five years for a child or more difficult to have a change of mind
  ignore expense
  ignore STDs
  ignore side effects

1

[6]

Q4.

(a) (i) endocrine glands **or** endocrine system

allow a specific named gland

1

(ii) (dissolved) in the blood(stream) **or** plasma

1

(b) (i) pancreas **or** islets of Langerhans

1

(ii) (it **or** insulin) lowers blood sugar level [1]

(by) (speeding up **or** increasing) conversion of glucose to glycogen [1]

in the liver [1]

(and) speeding up **or** increasing uptake of glucose by body cells [1]

4

[7]

Q5.

(a) any **two** from:

- amylase / carbohydrase
- protease
  allow trypsin
- lipase

2

(b) (i) high / above normal blood sugar
or cannot control blood sugar

allow other symptoms
*eg frequent / plentiful urination **or** sugar in urine **or** thirst **or** weight loss **or** coma*

ignore consequential effects eg blood pressure / circulation / glaucoma / tiredness

1

(ii) any **one** from:

- small / regular meals
- low sugar (meals) or low GI / GL **or** carbohydrates as starch

allow high fibre

ignore reference to low carbohydrate

1

(iii) any **one** from:

- keep constant(blood) sugar **or** prevent high (blood) sugar **or** reduces surge / rush of sugar into blood
- reduce the need for insulin

1

(iv) (take) insulin

allow pancreas transplant

1

(c) protein / hormone / enzyme synthesis **or** synthesis of named example **or** combine amino acids

1

[7]

Q6.

(a) regulation / control / maintenance of internal conditions (of a cell / body)

allow keeping the internal conditions (of a cell / body) the same

1

for optimum (cell / enzyme activity)

allow description of optimum functioning (of cell / body)

1

(b) glucagon

correct spelling only

1

(c) any **two** from:

- fasting blood glucose is higher than normal range
- reached a very high concentration after glucose drink
- did not return to normal after 3 hours
- **or**
- fell slowly after reaching peak.

use of correct data in comparison to normal ranges given for any of the above points

allow ± half a small square for values quoted from the graph

1

ignore references to person A

2

(d) (person A has Type) 2 (pancreas) producing (lots of) insulin but body cells cannot respond to it.

*allow cells becoming resistant to insulin for respond to insulin. do **not** accept the person has become resistant to insulin*

1

(person B has Type) 1 (pancreas) not producing enough insulin (to control concentration of glucose in the blood)

1

type of diabetes must be correct

(e) starving children have used up their glycogen stores

allow starving children have no / low glycogen stores

1

(so) would need (liver enzyme) to release glucose from fats

1

as enzyme is stopped from working they get low / no glucose

allow no working enzyme leads to hypoglycaemia

1

(cell) respiration is insufficient (so they die)

allow starving children use proteins to release energy (which leads to death)

1

children that are not starving have glycogen stores in liver / muscle

1

(so) glucagon will continue to release glucose (into the blood for them)

1

[14]

Q7.

(a) any **two** from:

- was more tired
- less practice
- less caffeine

allow correct reference to named drug

- had drunk alcohol

*allow converse if clearly describing student **B***

ignore experimental method ignore fitter

2

(b) the computer (timer) had a higher resolution

1

the metre rule could slip through the hand causing inaccurate readings

allow it is harder to catch a ruler than press a button

ignore reference to human error ignore reference to

accuracy / precision

allow converse

1

(c) in a longitudinal wave, the oscillations / vibrations are parallel to the direction of energy transfer

allow direction of travel for energy transfer

1

in a transverse wave, the oscillations / vibrations are perpendicular to the direction of energy transfer

allow direction of travel for energy transfer

*if no other mark scored allow **1** mark for transverse waves have peaks and troughs **and** longitudinal waves have compressions and rarefactions*

1

(d) (temperature) receptors (in the skin / hand detect the information)

1

an (electrical) impulse travels along the sensory neurone

ignore message / signal / information

1

(then) travels along the relay neurone and then the motor neurone

1

chemical moves / diffuses across the synapse