Reflex actions

Responding to change

Homeostasis

B1.2 Coordination and Control

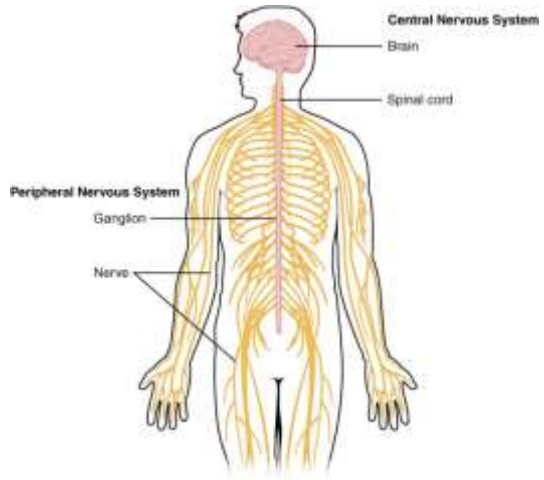
Fertility

Hormones and plant growth

Hormones and menstrual cycle

Responding to change

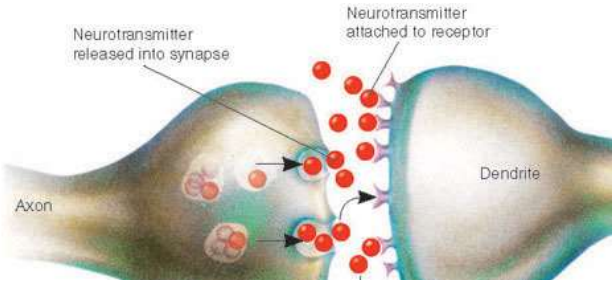
- The ***nervous system*** carries ***impulses*** along ***neurons*** enabling you to react to your surroundings and coordinate your behaviour.

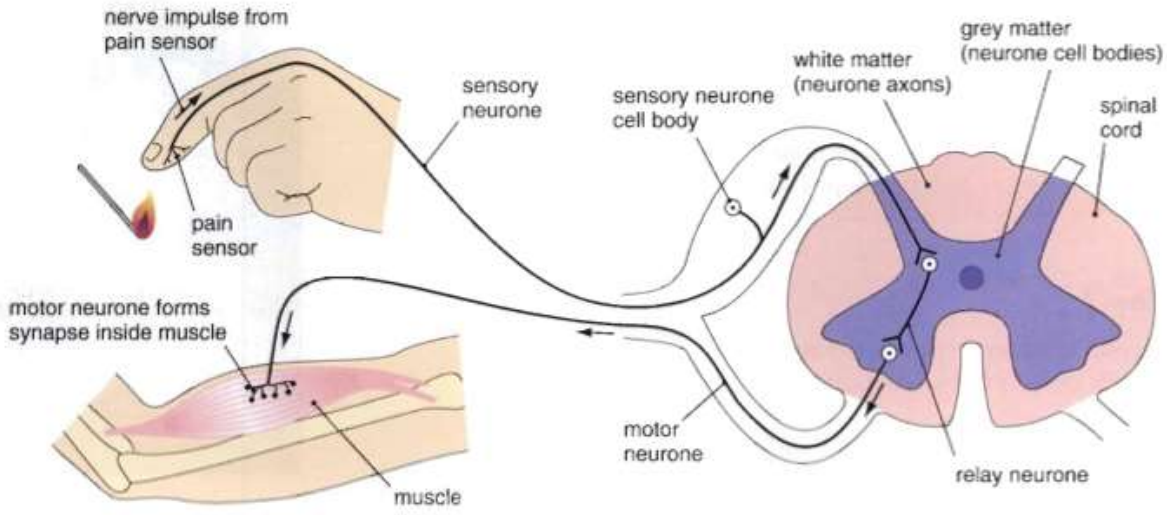


Stimulus	*Change in the environment*
Receptor	*E.g. Eyes, skins, found in sense organs*
Sensory neuron	
CNS	*Brain and spinal cord- coordinates response*
Motor neuron	
Effector	*Muscles (contract) or glands (secrete)*

Reflex actions

- Automatic responses important for survival
- Similar response to a normal conscious action but involves a ***relay neuron*** in the spinal cord or unconscious area of the brain
- It then travels to the conscious area so you know about the reflex - after it has happened





Synapses

Junctions between nerves

Impulses cross the synapses

Chemicals released into the gap between neurons

Chemicals attach to the surface of the next neuron and set up a new electrical impulse

Sensory receptor → sensory neuron → CNS → relay neuron (spinal cord) → motor neuron → effector

Hormones and fertility

- Glands secrete hormones which are then carried around in the blood

Menstrual cycle
Brought about by ***hormones*** made and released by **pituitary** gland and ovaries
Hormones:
FSH
-causes eggs to mature
-Stimulates the ovary to produce oestrogen
Oestrogen
-Causes the lining of the uterus to develop
-Inhibits FSH production
-Stimulates the release of the mature egg
Others: progesterone and LH

Contraception
Inhibits production of FSH so eggs don't mature in the ovaries

Fertility treatments
FSH used to stimulate eggs to mature and trigger oestrogen production
IVF - eggs collected and fertilised in the lab then implanted

28 days: *womb lining thickens, Eggs released from ovary after 14 days - ovulation, If not fertilised, the womb lining and egg come out as a period*

Advantages - fewer children (cost), women freedom
Disadvantages - expensive, multiple births, embryo use

Homeostasis

Internal environment is maintained by homeostasis

Controlling water and ions

-Water moves in an out of body cells

-taken in from food and drink

-lost from breathing out, sweat and urine (salt lost here too)

-Kidneys control this

Controlling temperature

-Core temperature 37C, enzymes work best

-Sweat to cool down, shiver to warm up

-Below 35C hypothermia risk

- too high leads to heat stroke / heat exhaustion enzymes and cells don't work properly

Controlling blood glucose

-Kept constant by hormones from pancreas

Hormones and plant growth

Plants are sensitive, they need to grow the right way..

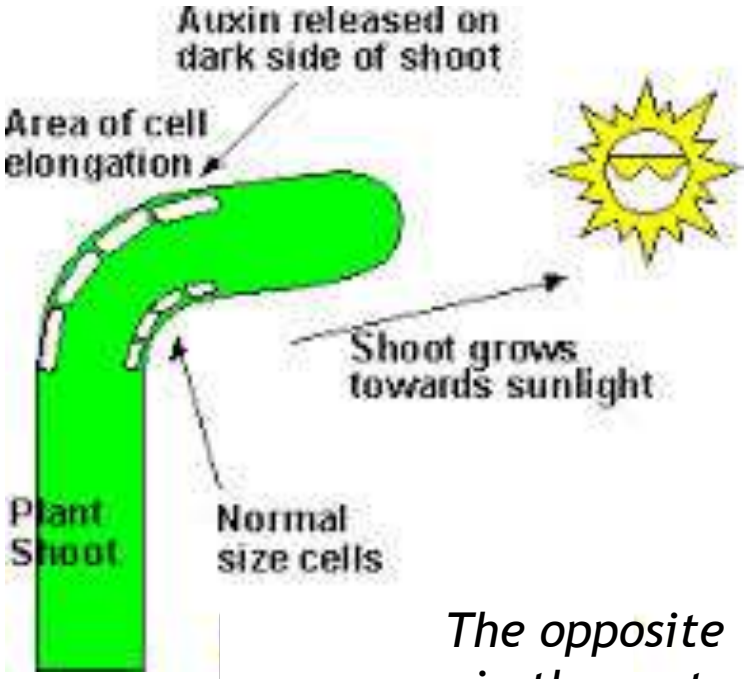
- Plant **roots** grow towards moisture and in the direction of force of gravity
- Plant **shoots** grow towards light and against the force of gravity

Phototropism – response of a plant to light

Gravitropism/geotropism – response of a plant to gravity

Auxin – hormone that controls responses of roots and shoots

Using plant hormones *– used as rooting powder or high doses as weed killers due to rapid uncontrolled growth*



The opposite occurs in the roots

Exam Questions

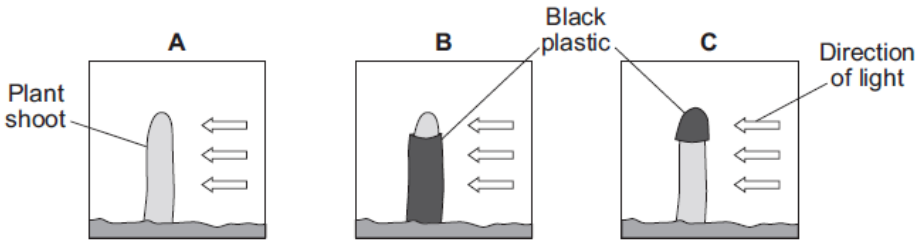
4 Charles Darwin investigated tropisms in plants.

Some students did an investigation similar to Darwin's investigation.

The students:

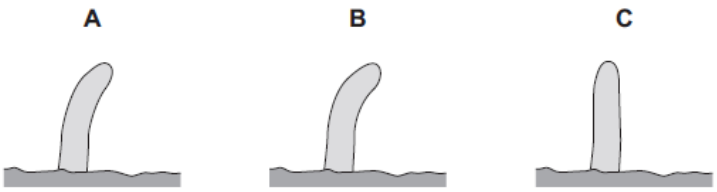
- grew seeds until short shoots had grown
- used black plastic to cover parts of some of the shoots
- put the shoots in light coming from one direction
- put boxes over the shoots to keep out other light.

The diagrams show how the investigation was set up.



Two days later the students took off the black plastic covers and looked at the shoots.

The diagrams show the results.



4 (a) Give **two** variables that the students should control in this investigation.

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(2 marks)

4 (b) Shoot **A** bent towards the light as it grew.

Explain how.

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(4 marks)

4 (c) What conclusions can be drawn from the results about:

4 (c) (i) the detection of the light stimulus

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(1 mark)

4 (c) (ii) where in the shoot the response to the light takes place.

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(1 mark)

4 (a)	any two control variables for 1 mark each: • age / size of shoots • species or type of plant / seeds • light intensity • (other) named condition eg temperature / water	 accept amount of light / colour of light 	2
4 (b)	ref to auxin / hormone unequal (lateral) distribution more hormone on dark side causes growth on dark side	ignore reference to phototropism	1 1 1 1
4 (c)(i)	(detection) in tip / top / end		1
4 (c)(ii)	(response) behind tip	allow at tip / end / top half	1
Total			8

4 The human body produces many hormones.

4 (a) (i) What is a *hormone*?

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(1 mark)

4 (a) (ii) Name an organ that produces a hormone.

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(1 mark)

4 (a) (iii) How are hormones transported to their target organs?

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(1 mark)

4 (b) Describe how the hormones FSH, oestrogen and LH are involved in the control of the menstrual cycle.

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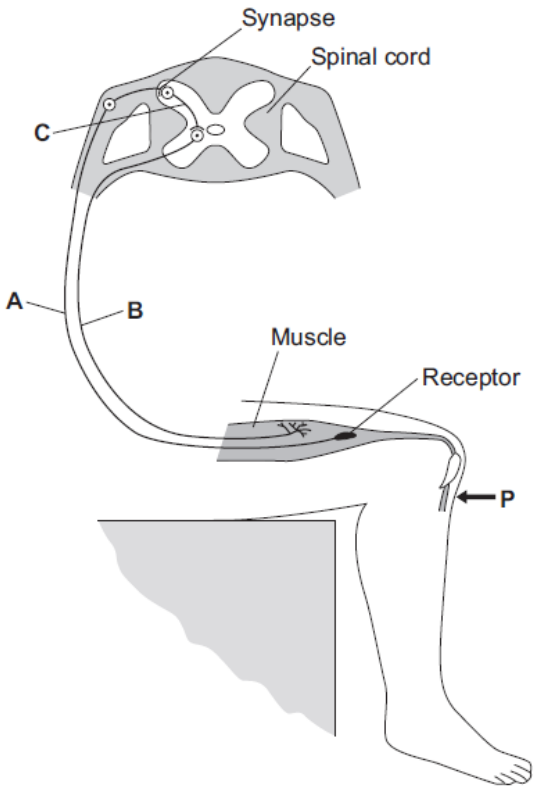
(3 marks)

4(a)(i)	any **one** from: • chemical messenger / message • chemical / substance produced by a gland • chemical / substance transported to / acting on a target organ • chemical / substance that controls body functions	allow substance / material which is a messenger allow material produced by a gland	1
4(a)(ii)	gland / named endocrine gland	brain alone is insufficient allow phonetic spelling	1
4(a)(iii)	in blood / plasma or circulatory system or bloodstream	accept blood vessels / named do **not** accept blood cells / named	1
4(b)		each hormone must be linked to correct action apply list principle ignore the gland producing hormone	
	FSH stimulates oestrogen (production) / egg maturation / egg ripening	ignore production / development of egg	1
	oestrogen inhibits FSH	allow oestrogen stimulates LH / build up of uterine lining	1
	LH stimulates egg / ovum release / ovulation	accept LH inhibits oestrogen accept LH controls / stimulates growth of corpus luteum ignore production of egg	1

7 The diagram shows the nervous pathway used to coordinate the knee-jerk reflex.
When the person is hit at point **P**, the lower leg is suddenly raised.



7 (a) Name neurones **A**, **B** and **C**.

A .....

B .....

C .....

(3 marks)

7 (b) The receptor in the muscle in the leg is sensitive to a stimulus.

Suggest the stimulus.

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(1 mark)

7 (c) Describe what happens at the synapse during this reflex.

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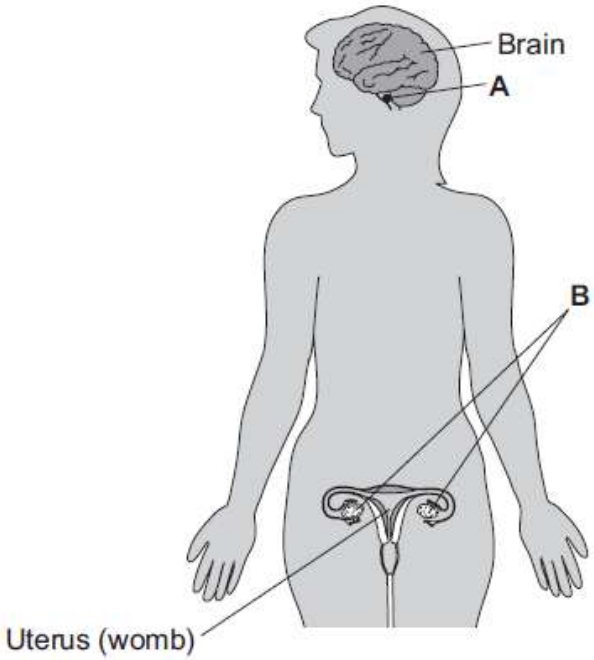
(3 marks)

7(a)		ignore nerve / neuron(e) throughout	
	A sensory	accept afferent	1
	B motor	accept efferent	1
	C relay	accept intermediate	1
7(b)	stretch	allow pressure / pull / tension (in muscle) allow a hit at (point) **P** ignore pain	1
7(c)	any **three** from: • chemical (release) • diffuses (across the gap / synapse) • transmits impulse / information (across synapse) • between neurones / nerve cells / named	 accept neurotransmitter / acetylcholine allow transmits signal / message if named, must be either sensory / A to relay / C or relay / C to motor / B allow 'to the next neurone'	3

2 The diagram shows the position of two glands, **A** and **B**, in a woman.



2 (a) (i) Name glands **A** and **B**.

A .....

B .....

(2 marks)

2 (a) (ii) Gland **A** produces the hormone Follicle Stimulating Hormone (FSH).

FSH controls changes in gland **B**.

How does FSH move from gland **A** to gland **B**?

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(1 mark)

2 (b) (i) A woman is not able to become pregnant. The woman does not produce mature eggs. The woman decides to have In Vitro Fertilisation (IVF) treatment.

Which **two** hormones will help the woman produce and release mature eggs?

Tick (✓) **one** box.

FSH and Luteinising Hormone (LH) ☐

FSH and oestrogen ☐

Luteinising Hormone (LH) and oestrogen ☐

(1 mark)

2 (b) (ii) Giving these hormones to the woman helps her to produce several mature eggs. Doctors collect the mature eggs from the woman in an operation.

Describe how the mature eggs are used in IVF treatment so that the woman may become pregnant.

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(3 marks)

2 (b) (iii) IVF clinics have been set a target to reduce multiple births.

> At least 76% of IVF treatments should result in single babies and a maximum of 24% of treatments should result in multiple births.

Suggest **one** reason why the clinics have been set this target to reduce multiple births.

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(1 mark)

2 (c) Two clinics, **R** and **S**, used IVF treatment on women in 2007. Doctors at each clinic used the results of the treatments to predict the success rate of treatments in 2008.

The table shows the information.

	Total number of IVF treatments in 2007	**Number of IVF treatments resulting in pregnancy in 2007**	**Predicted percentage success rate in 2008**
Clinic **R**	1004	200	18–23
Clinic **S**	98	20	3–56

2 (c) (i) Compare the success rates of the two clinics in 2007.

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(1 mark)

2 (c) (ii) The range of the predicted success rate in 2008 for clinic **R** is much smaller than the range of the predicted success rate for clinic **S**.

Suggest why.

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(2 marks)

2(a)(i)	**A** – pituitary **B** – ovary / ovaries	allow hypothalamus	1 1
2(a)(ii)	in blood (stream)	accept in plasma ignore dissolved	1
2(b)(i)	FSH and Luteinising Hormone (LH)		1
2(b)(ii)	fertilised OR reference to sperm form embryos / ball of cells or cell division (embryo) inserted into mother's womb / uterus	 allow (fertilised egg) is inserted into mother's womb / uterus	1 1 1
2(b)(iii)	any **one** from: • multiple births lead to low birth weight • multiple births cause possible harm to mother / fetus / embryo / baby / miscarriages	 allow premature ignore reference to cost / ethics / population	1
2(c)(i)	any **one** from: • almost identical • both approximately 20%	 allow S (slightly) more successful	1
2(c)(ii)	larger numbers (in clinic R) (in 2007) results likely to be more repeatable (in 2008)	allow only 98 (in S) (compared to 1004 (in R)) allow more reliable do **not** accept more reproducible / accurate / precise	1 1
Total			**11**