

**a** What is homeostasis?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**b** Name three things that are controlled by homeostasis.  
 1. \_\_\_\_\_  
 2. \_\_\_\_\_  
 3. \_\_\_\_\_

Choose the correct word and fill in the blanks:  
 Homeostasis is a voluntary/involuntary control system that involves \_\_\_\_\_ or \_\_\_\_\_ responses.

All control systems include receptors, effectors and coordination centres. Describe what the role of each is, and state the parts of the body that carry out the role.

Receptors:  
 \_\_\_\_\_  
 \_\_\_\_\_

Coordination centres:  
 \_\_\_\_\_  
 \_\_\_\_\_

Effectors:  
 \_\_\_\_\_  
 \_\_\_\_\_

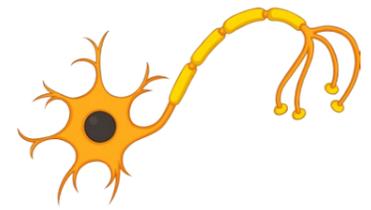
**c** What is the role of the nervous system?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

What does CNS stand for?  
 \_\_\_\_\_  
 \_\_\_\_\_

Which two organs make up the CNS?  
 \_\_\_\_\_  
 \_\_\_\_\_

**d** What is the function of the nerve cell?  
 \_\_\_\_\_  
 \_\_\_\_\_

Label the nerve cell diagram with the nucleus, cell body, dendrites, axon, myelin sheath and synapse.

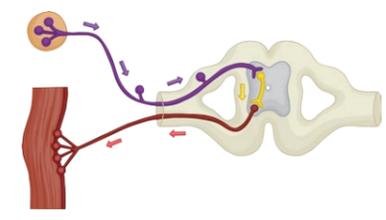


Explain how the nerve cell is adapted to its function.  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**e** Put the following terms into a flow diagram to summarise how the nervous system works.  
 effector, stimulus, response, CNS, receptor

**f** Why are reflexes important?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**g** Label the diagram below with the following key parts of a reflex arc: receptor, spinal cord, motor neurone, sensory neurone, relay neurone, synapse, effector.



Explain how the reflex arc works.  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**h** Which hormone is produced by the adrenal gland?  
 \_\_\_\_\_

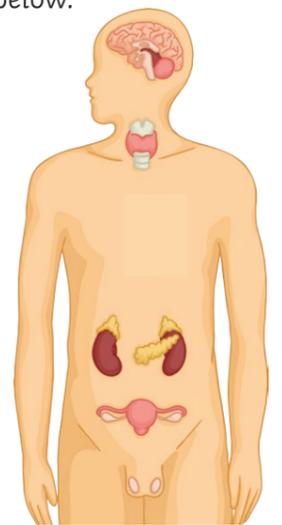
When is it produced?  
 \_\_\_\_\_

What are its effects?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**i** Explain how the endocrine system produces a response to a stimulus.  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Compare these hormonal effects with the response of the nervous system.  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**j** Label the main endocrine glands shown in the diagram below.



**k** Where is the hormone thyroxine produced?  
 \_\_\_\_\_

What is its role in the body?  
 \_\_\_\_\_  
 \_\_\_\_\_

How is the level of thyroxine controlled?  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



**a**  
 What is homeostasis?  
**The regulation of the internal conditions of a cell or organism to maintain optimum conditions for function, in response to internal and external changes.**

**b**  
 Name three things that are controlled by homeostasis.  
 1. **blood glucose concentration**  
 2. **body temperature**  
 3. **water levels**

Choose the correct word and fill in the blanks:  
 Homeostasis is a voluntary/**involuntary** control system that involves **nervous** or **chemical** responses.

All control systems include receptors, effectors and coordination centres. Describe what the role of each is, and state the parts of the body that carry out the role.

Receptors:  
**detect stimuli - specialised cells.**  
 Coordination centres:  
**receive and process information - brain, spinal cord and pancreas.**

Effectors:  
**bring about responses to restore optimum levels - muscles or glands.**

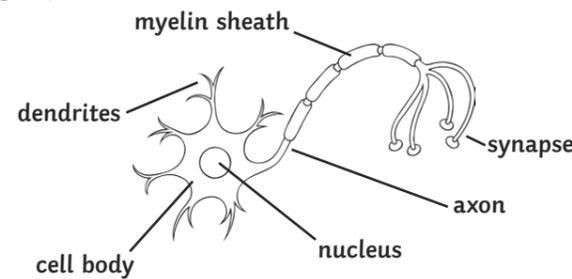
**c**  
 What is the role of the nervous system?  
**To enable us to react to our surroundings and coordinate our behavior.**

What does CNS stand for?  
**central nervous system**

Which two organs make up the CNS?  
**brain and spinal cord**

**d**  
 What is the function of the nerve cell?  
**To carry electrical impulses rapidly around the body.**

Label the nerve cell diagram with the nucleus, cell body, dendrites, axon, myelin sheath and synapse.



Explain how the nerve cell is adapted to its function.

- **It has lots of dendrites so that it can make lots of connections to other nerve cells.**
- **The axon is very long to carry the nerve impulse a long way.**
- **The axon is insulated so the impulses travel rapidly.**
- **The synapses have lots of mitochondria to transfer the energy needed to make transmitter chemicals.**

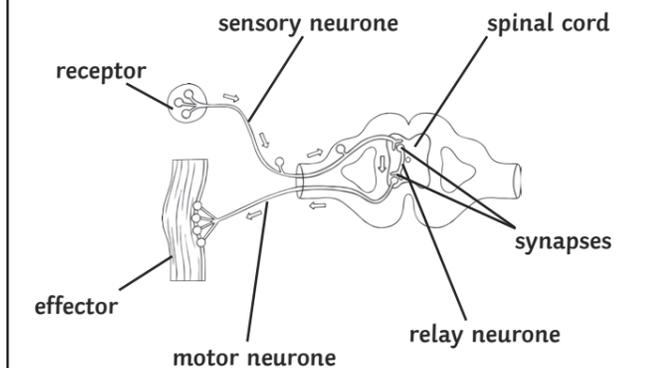
**e**  
 Put the following terms into a flow diagram to summarise how the nervous system works.

effector, stimulus, response, CNS, receptor  
**stimulus → receptor → CNS → effector → response**

**f**  
 Why are reflexes important?  
**They happen automatically and rapidly so they help you to avoid harm.**

**They take care of your body systems, like breathing and circulating blood, so you don't have to think about them all the time.**

**g**  
 Label the diagram below with the following key parts of a reflex arc: receptor, spinal cord, motor neurone, sensory neurone, relay neurone, synapse, effector.



Explain how the reflex arc works.

- **The receptor is stimulated.**
- **An electrical impulse travels along the sensory neurone to the CNS.**
- **At the synapse, a chemical is released. It diffuses across the synapse and triggers an electrical impulse in the relay neurone.**
- **When the impulse reaches the next synapse, a chemical is released which travels across the synapse and triggers an electrical impulse in the motor neurone.**
- **The impulse reaches the effector which is stimulated to respond.**

**h**  
 Which hormone is produced by the adrenal gland?  
**adrenaline**

When is it produced?  
**If you are scared or stressed.**

What are its effects?

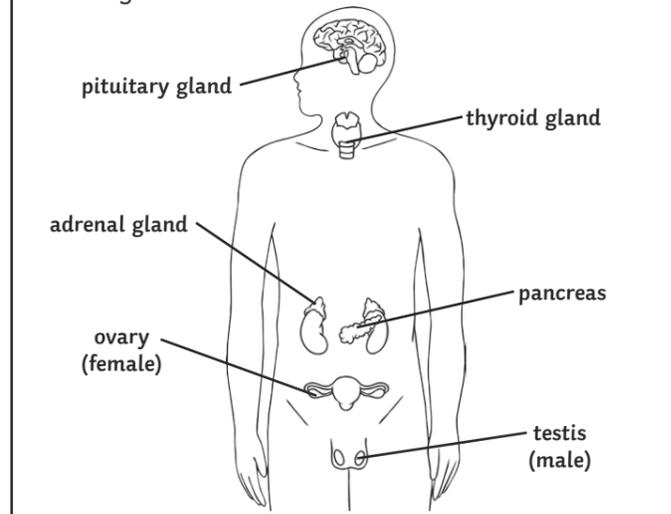
- **Increases the heart rate.**
- **Increases the breathing rate.**
- **Prepares your body for flight or fight.**

**i**  
 Explain how the endocrine system produces a response to a stimulus.

**The endocrine system produces a chemical response to a stimulus. The glands of the endocrine system secrete hormones into the blood stream. The blood carries hormones to target organs which have receptors to pick up the hormone, this causes them to respond.**

Compare these hormonal effects with the response of the nervous system.  
**Hormonal effects are slower than the nervous system but last for longer.**

**j**  
 Label the main endocrine glands shown in the diagram below.

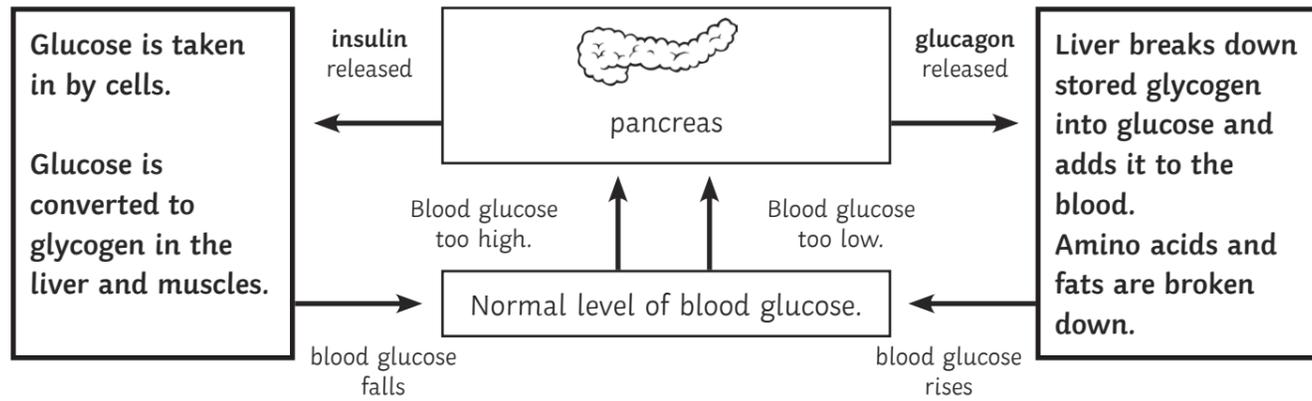


**k**  
 Where is the hormone thyroxine produced?  
**thyroid gland**

What is its role in the body?  
**It controls the basal metabolic rate. It is important in growth and development.**

How is the level of thyroxine controlled?  
**A negative feedback loop involving the pituitary gland and the hormone TSH/ thyroxine stimulating hormone.**

Complete the boxes to show how blood glucose levels are controlled.



Control of blood sugar is an example of a **negative feedback** loop. What does this mean?  
**Negative feedback maintains a steady state by ensuring that any changes in the system are reversed and returned back to the normal level.**

What causes type 1 diabetes?  
**The pancreas does not make enough insulin, so blood glucose isn't controlled and it gets very high after eating a meal.**

When does type 1 diabetes usually start?  
**In children and teenagers.**

How is type 1 diabetes treated?  
**With insulin injections.**

What is the main reproductive hormone in the female?  
**oestrogen**

What is ovulation?  
**When a mature egg is released from an ovary.**

What is the main reproductive hormone in the male?  
**testosterone**

What does this hormone do?  
**Stimulates sperm production.**

What is the role of each of the following hormones in the menstrual cycle?  
 Follicle stimulating hormone (FSH):  
**causes maturation of an egg in the ovary.**

Luteinising hormone (LH):  
**stimulates the release of an egg.**

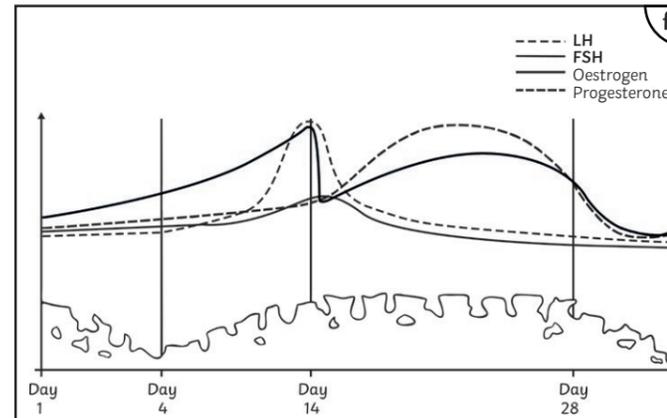
Oestrogen:  
**maintains the uterus lining.**

Progesterone:  
**maintains the uterus lining.**

What causes type 2 diabetes?  
**The cells in the body no longer respond to the insulin that is produced by the pancreas.**

What are the risk factors for type 2 diabetes?  
**Obesity and lack of exercise.**

How is type 2 diabetes treated?  
**A carbohydrate controlled diet and an exercise routine.**



Label the two remaining lines on the graph with the names of the hormones they represent. (LH is the line with the sharp peak, FSH is the other unlabelled line)

Use the diagram to explain the stages of the menstrual cycle, make links to the hormone interactions that happen at each stage.

**Day 1-4: The uterine lining breaks down causing a period, oestrogen and progesterone levels are at their lowest.**

**Day 4-14: Oestrogen increases and the uterine lining rebuilds. FSH increases and an egg in the ovary starts to mature, it also stimulates the ovaries to produce oestrogen. High levels of oestrogen at the end of this period inhibit the production of FSH and stimulate the release of LH.**

**Day 14: A peak in LH causes ovulation.**

**Day 14-28: Progesterone and oestrogen increases to maintain the uterine lining in preparation for fertilisation. Progesterone inhibits LH and FSH.**

**Day 28: The cycle restarts unless pregnancy has occurred.**

Explain how each method of contraception works.

Oral contraceptives: **these contain hormones that inhibit FSH production so that no eggs mature.**

Injection, implant or skin patch of progesterone: **inhibits the maturation and release for a number of months or years.**

Barrier methods, such as condoms and diaphragms: **these prevent the sperm reaching an egg.**

Intrauterine devices: **prevents the implantation of the embryo or release a hormone.**

Spermicidal agents: **these kill or disable sperm.**

Abstinence: **avoiding intercourse when an egg might be in the oviduct.**

Surgical methods: **sterilising the male or female by cutting, or tying, tubes to prevent the egg or sperm reaching their target area.**

Some women are infertile because they do not ovulate. Explain how artificial hormones can be used to treat infertility.

**Artificial FSH is given to stimulate the maturation of eggs and the production of oestrogen. Then artificial LH is given to trigger ovulation. The woman can then (possibly) become pregnant in the normal way.**

Describe the process of in vitro fertilisation (IVF).

- **The mother is given artificial FSH and LH to stimulate the maturation of several eggs.**
- **The eggs are collected and fertilised by the father's sperm in the laboratory.**
- **The fertilised eggs develop into embryos.**
- **One or two embryos are inserted into the mother's uterus while they are still tiny balls of cells.**

Give three disadvantages of IVF.

1. **It is emotionally and physically stressful.**
2. **The success rates are not high.**
3. **It can lead to multiple births which are a risk to both the babies and the mother.**