

Science

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

Keywords: internal, conditions, external, optimum, regulation

b
Name three things that are controlled by homeostasis.
1. _____
2. _____
3. _____

Choose the correct answer:
Homeostasis is a voluntary/involuntary control system that involves nervous or chemical responses.

All control systems include receptors, effectors and coordination centres. Add examples of the parts of the body that carry out these roles in the space in the boxes.

Keywords: brain, specialised cells, muscles, spinal cord, glands, pancreas

receptors	Bring about responses to restore optimum levels.
coordination centres	Detect stimuli.
effectors	Receive and process information.

Draw one line from each box to connect it to its role.

d
What is the role of the nervous system?
To react to the _____.
To _____ our behaviour.

What does CNS stand for?

Which two organs make up the CNS?

e
What is the function of the nerve cell?
To carry _____ rapidly around the body.

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

Next to each adaptation of the nerve cell write the part of the cell that is referring to. Use the labels on the diagram to help you.



It can make lots of connections to other nerve cells.

It's very long to carry the nerve impulse a long way.

It's insulated so the impulses travel rapidly.

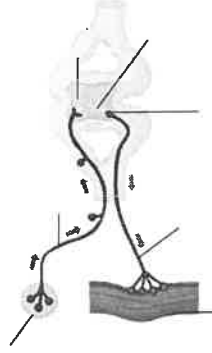
It has lots of mitochondria to transfer the energy needed to make transmitter chemicals.

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



h
Why are reflexes important?
Reflexes happen r _____ and _____
a _____, you don't have to _____
about them. This helps you to avoid d _____/h _____
Bodily functions like _____ and _____
_____ happen via reflexes.

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



Organise the steps of a reflex arc below into the correct order by numbering each box from 1-8.

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

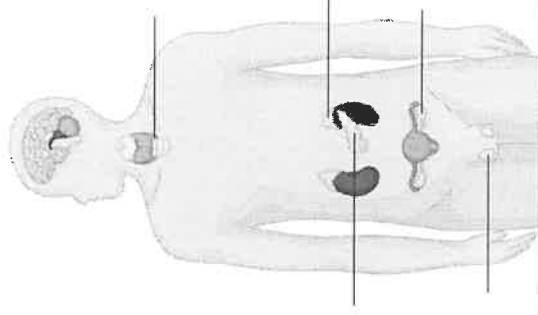
j
Complete the paragraphs using the keywords: hormones, chemical, blood stream, slower, organs, blood, receptors, longer, glands.

The endocrine system produces a _____ response to a stimulus. The _____ of the endocrine system secrete _____ into the _____.

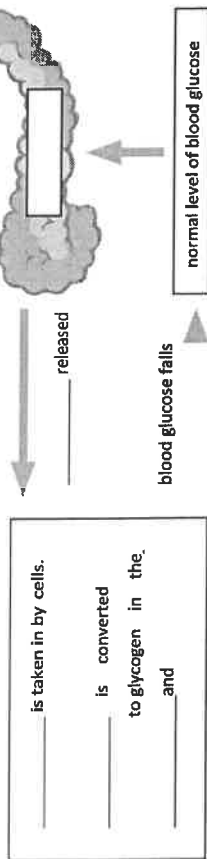
The _____ carries _____ to target _____ which have _____ to pick up the hormone. Hormonal effects are _____ than the nervous system but last for _____.

Label the main endocrine glands shown in the diagram

k using the following keywords: thyroid, pituitary gland, testes, adrenal gland, pancreas, ovaries.



Complete the boxes to show how insulin controls blood glucose levels.
Keywords: glycogen, liver, glucose, pancreas, insulin, muscles.



What causes type 1 diabetes?

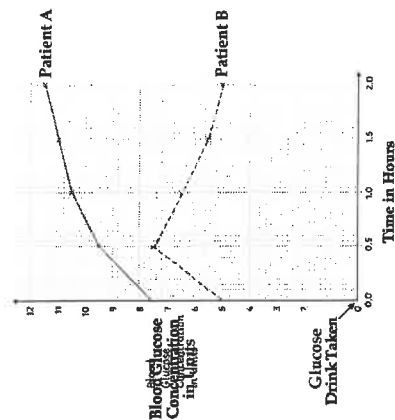
The _____ does not make enough _____ so blood glucose isn't controlled and it gets very _____ after eating a meal.

When does type 1 diabetes usually start?

How is type 1 diabetes treated?

Which patient has diabetes?

How do you know?



a

Draw one line from each hormone to the role it plays in menstruation. One role will be connected to two hormones.

follicle stimulating hormone (FSH)

Maintains the uterus lining.

lutelising hormone (LH)

Stimulates the release of an egg.

oestrogen

progesterone

Causes maturation of an egg in the ovary.

Write the number of each of the following methods of contraception next to the way that they work:

- oral contraceptive
- barrier methods (condoms or diaphragms)
- abstinence
- surgical methods
- intrauterine devices
- progesterone (via implant, injection or skin patch)
- spermicidal agents

Contains hormones that inhibit FSH production so that no eggs mature.

Inhibits the maturation and release for a number of months or years.

Prevents the sperm reaching an egg.

Prevent the implantation of the embryo or releases a hormone.

Kill or disable sperm.

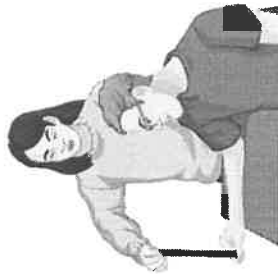
Avoids intercourse when an egg might be in the oviduct.

Sterilise the male or female by cutting or tying tubes to prevent the egg or sperm reaching their target area.

2

The following is a method for measuring reaction time.

- Person 1 sits upright on the chair with eyes focussing across the room.
- Person 1 puts the forearm of their dominant arm across the table with their hand hanging over the edge.
- Person 2 holds a ruler vertically with the bottom end of the ruler between person 1's finger and thumb. Person 1 mustn't be hold the ruler.
- Person 1 tells person 2 to be prepared to catch the ruler.
- Person 2 lets go of the ruler and person 1 catches the ruler with their thumb and first finger as quickly as possible as it drops.
- The number on the ruler that is level with person 1's thumb is recorded.
- Both people have a rest and then the test is repeated several times.



What is the dependent variable in this investigation?

The average distance before person 1 catches the ruler is 14cm. They swap roles and person 2 catches the ruler, their average distance before catching it is 12cm.

Who has the fastest reaction time?

How do you know?

Biology 5: Homeostasis and Response

Section 1: Key Terms

Homeostasis	Regulating internal conditions to keep them at an optimum , despite internal and external changes . Maintains optimum conditions for enzymes .
Negative feedback (HT)	Negative feedback ensures that changes are reversed and returned back to the optimum level .

Section 2a: Nerve Reflexes Key Terms

Central nervous system (CNS)	The brain and spinal cord together. Co-ordinates the response of effectors .
Reflex action	A fast, automatic reaction. Does not involve thinking parts of the brain.
Coordination Centre	Receives and processes information from receptors e.g. CNS, pancreas.
Synapse	The gap between two neurons . Allows many different neurons to connect.
Myelin sheath	Some neurons are surrounded by myelin. Myelin insulates the neuron and speeds up the transmission of electrical impulses .

Section 2b: The Reflex Arc

7 Stimulus – a **change in the environment**

8 Receptor – **detects a stimulus**

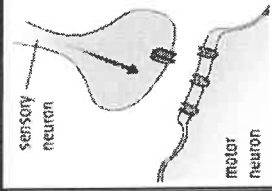
9 Sensory neurone – **transmits electrical impulse travels to the CNS**

10 Relay neurone – in the **spinal cord**. Transmits electrical impulses **from the sensory to the motor neuron**

11 Motor neurone – transmits impulses from **CNS to effector**

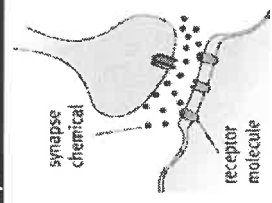
12 Effector – produces a **response**. Can be a **muscle or gland**

13 Response – the **change** in response to the stimulus



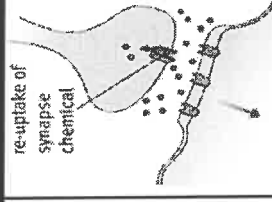
14

An **electrical impulse** arrives at the synapse.



15

Neurotransmitter molecules are released and diffuse across the synapse.



16

Neurotransmitter molecules fill receptors and cause an electrical impulse in the next neuron.

Section 2c: The Synapse

Section 3: Hormonal Control Key Terms

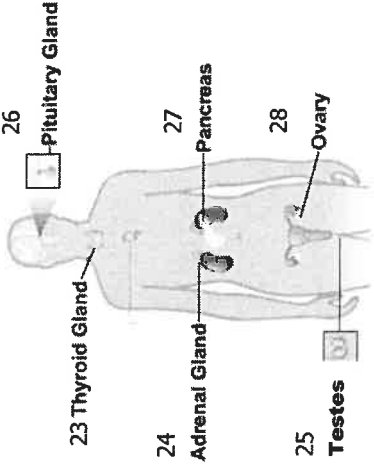
17 Endocrine System	The system of glands that secrete hormones .
18 Hormone	A chemical secreted by a gland that travels in the blood and has an effect on a target organ . The effects are slower and longer-lasting than responses from the nervous system.
19 Pituitary Gland	A gland that secretes several hormones into the blood. These hormones in turn act on other glands to stimulate other hormones to be released to bring about effects.
20 Testosterone	Male hormone produced by testes . Stimulates sperm production .
21 Adrenaline (HT)	Hormone produced by the adrenal glands in times of fear/ stress . It increases the heart rate and boosts the delivery of oxygen and glucose to the brain and muscles , preparing the body for 'flight or fight'.
22 Thyroxine (HT)	Hormone produced by the thyroid gland . Thyroxine stimulates the metabolic rate . Important in growth and development .

Section 5: Blood Glucose Control Key Terms

29 Pancreas	The gland that monitors and controls blood glucose concentration .
30 Insulin	A hormone produced when blood glucose concentration is too high . Causes glucose to move from the blood into the cells . In liver and muscle cells excess glucose is converted to glycogen .
31 Glucagon (HT)	A hormone produced when blood glucose concentration is too low . Causes glycogen to be converted into glucose and released into the blood .
32 Glycogen	A storage molecule made from many glucose molecules bonded together . Found in liver and muscle cells .
33 Type I Diabetes	Disorder in which the pancreas fails to produce enough insulin . Causes uncontrolled high blood glucose levels. Treated with insulin injections .
34 Type II Diabetes	Body cells no longer respond to insulin produced by the pancreas . A carbohydrate controlled diet and exercise are common treatments. Obesity is a risk factor .

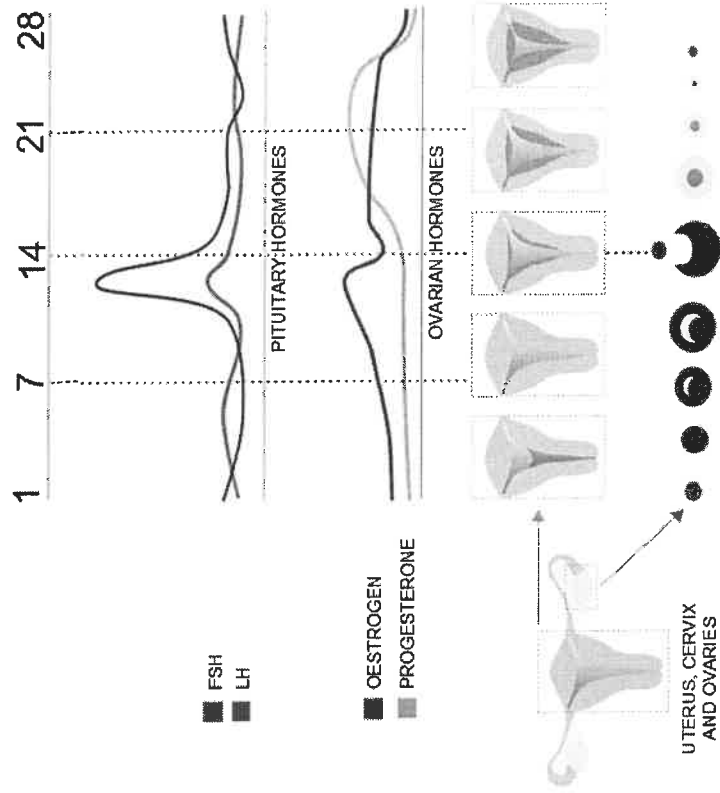
Section 4: Location of Endocrine Glands

23 Thyroid Gland	
24 Adrenal Gland	
25 Testes	
26 Pituitary Gland	
27 Pancreas	
28 Ovary	



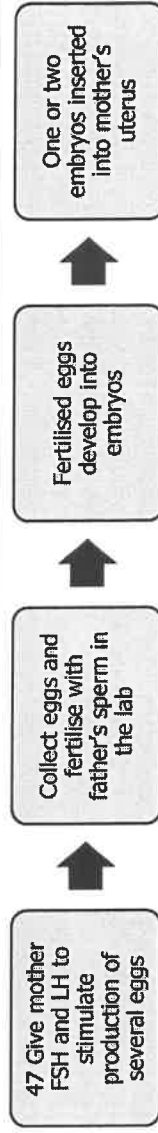
Section 6: Menstrual Cycle (Some HT)	
5 Ovulation	The release of an egg cell. Occurs approximately every 28 days.
6 FSH	Produced by the pituitary gland. A hormone that causes an egg to mature in the ovary. Causes oestrogen to be produced.
7 Oestrogen	Produced by the ovaries. Causes blood lining of uterus to develop. Stops FSH being produced. Stimulates release of LH.
8 LH	Produced by the pituitary gland. A hormone that causes ovulation.
9 Progesterone	Produced by the ovary. Maintains blood lining in uterus. Stops production of LH and FSH.

Section 7: Changes in the Menstrual Cycle (HT)



Section 8: Methods of Contraception		
Method	How it works	Pros (+) and Cons (-)
40 Oral contraceptives	The contraceptive pill. Contain hormones to inhibit FSH production so eggs do not mature.	+ 99% effective + Reduces risk of some cancers - Can cause side effects e.g. nausea + Fewer side effects than pill. + Doesn't need to be taken daily so less likely to be forgotten - Less effective than pill
41 Progesterone	Injection, implant or skin patch of slow-release progesterone to stop eggs maturing and being released.	+ 98% effective (when used correctly) + Prevent STIs - Can break or be used incorrectly + Increases effectiveness of some barriers - Can't be used on its own
42 Barrier methods	Condom or diaphragm. Prevents sperm reaching the egg.	- High risk of becoming pregnant + Permanently stops pregnancy - Risks from surgery - Expensive to reverse and may not work
43 Spermicide	Kills or disables sperm. Used with diaphragms to make them more effective.	+ Long lasting but can be reversed - Small risk of infection or uterus damage when IUD is implanted
44 Avoiding intercourse	Avoiding intercourse when an egg might be in an oviduct.	
45 Sterilisation	Undergoing surgery to stop sperm or eggs being able to fertilise.	
46 Intra-uterine device (IUD)	An implant into the uterus that prevent fertilised eggs implanting into the wall of the uterus or release hormones.	

Section 9: IVF (HT)



Section 9a: IVF Disadvantages

- 48 Emotionally and physically stressful.
- 49 Success rates are low.
- 50 Can lead to multiple births which are risky for mother and babies

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.

Keywords: internal, conditions, external, optimum, regulation

b

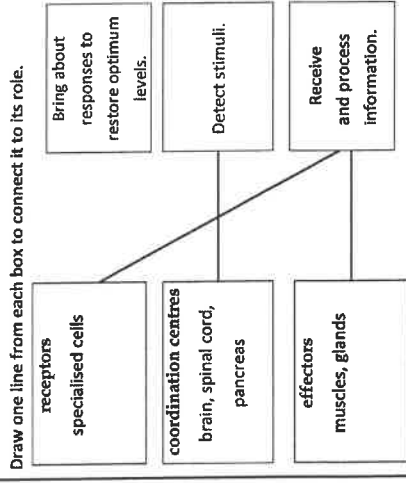
Name three things that are controlled by homeostasis.

1. blood glucose concentration
2. body temperature
3. water levels

Choose the correct answer:
Homeostasis is a **involuntary** control system that involves nervous or chemical responses.

All control systems include receptors, effectors and coordination centres. Add examples of the parts of the body that carry out these roles in the space in the boxes.

Keywords: brain, specialised cells, muscles, spinal cord, glands, pancreas



d

What is the role of the nervous system?
To react to the surroundings.

To **coordinate** our behaviour.

What does CNS stand for?
central nervous system

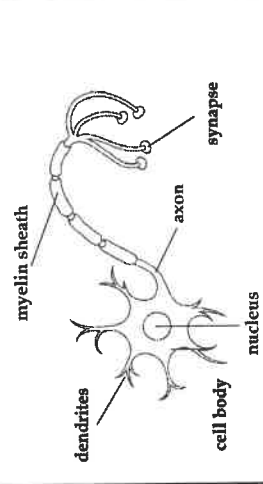
Which two organs make up the CNS?
brain and spinal cord

e

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

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

Next to each adaptation of the nerve cell write the part of the cell that it's referring to. Use the labels on the diagram to help you.



It can make lots of connections to other nerve cells.
dendrites

It's very long to carry the nerve impulse a long way.
axon

It's insulated so the impulses travel rapidly.
axon

It has lots of mitochondria to transfer the energy needed to make transmitter chemicals.
cell body (specifically, cytoplasm)

g

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

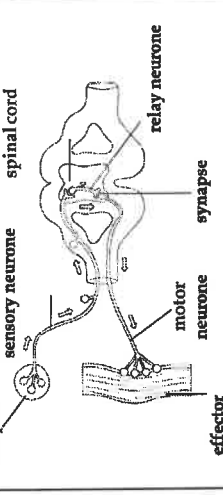
stimulus → **receptor** → **CNS** → **effector** → **response**

h

Why are reflexes important?
Reflexes happen rapidly and automatically, you don't have to **think** about them. This helps you to avoid **danger/harm**. Bodily functions like **breathing** and **food digestion** happen via reflexes.

i

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



Organise the steps of a reflex arc below into the correct order by numbering each box from 1-8.

At the synapse a chemical is released, it diffuses across the synapse.	3
The impulse reaches the effector which is stimulated to respond.	7
The receptor is stimulated.	1
When the impulse reaches the next synapse, a chemical is released which travels across the synapse.	5
This triggers an electrical impulse in the relay neurone.	4
An electrical impulse travels along the sensory neurone to the CNS.	2
This triggers an electrical impulse in the motor neurone.	6

Complete the paragraphs using the keywords:

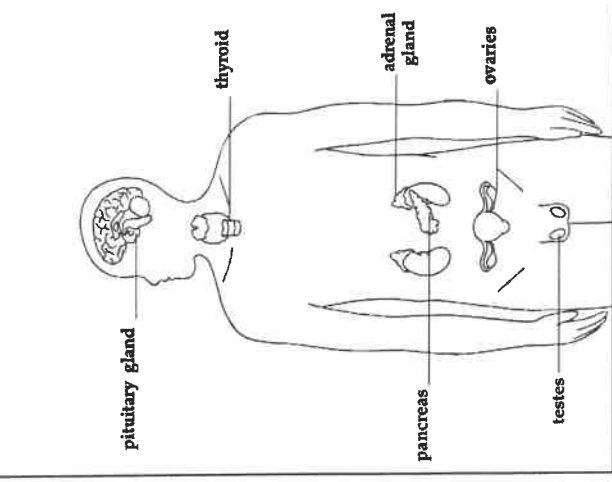
j hormones, chemical, blood stream, slower, organs, blood, receptors, longer, glands.

The endocrine system produces a **chemical** response to a stimulus. The **glands** of the endocrine system secrete **hormones** into the **blood stream**.

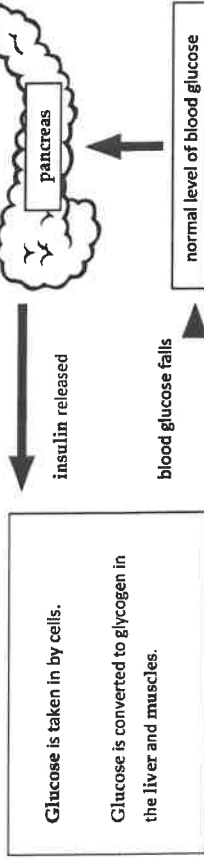
The **blood** carries **hormones** to target organs which have **receptors** to pick up the hormone. Hormonal effects are **slower** than the nervous system but last for **longer**.

k

Label the main endocrine glands shown in the diagram using the following keywords: thyroid, pituitary gland, testes, adrenal gland, pancreas, ovaries.



Complete the boxes to show how insulin controls blood glucose levels.
Keywords: glycogen, liver, glucose, pancreas, insulin, muscles.



a

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.

b

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

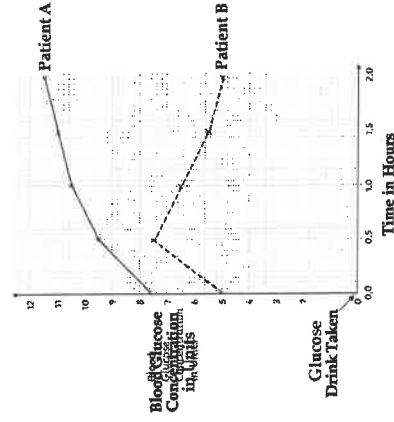
What are the risk factors for type 2 diabetes?
Obesity and lack of exercise.

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

c

Which patient has diabetes?
patient A

How do you know?
Their blood glucose concentration continues to rise after they have the drink, while patient B's returns to normal.



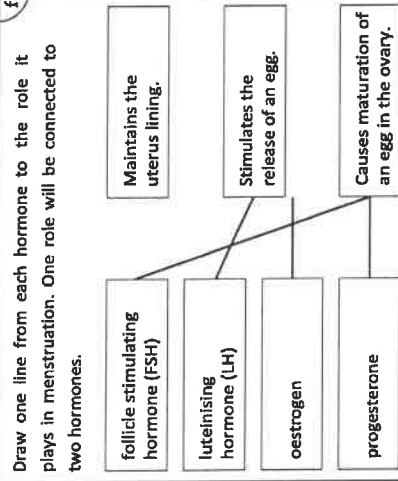
d

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.



e

Draw one line from each hormone to the role it plays in menstruation. One role will be connected to two hormones.

follicle stimulating hormone (FSH) Maintains the uterus lining.

lutalising hormone (LH) Stimulates the release of an egg.

oestrogen Causes maturation of an egg in the ovary.

progesterone

f

Write the number of each of the following methods of contraception next to the way that they work:

- oral contraceptive
- barrier methods (condoms or diaphragms)
- abstinence
- surgical methods
- intrauterine devices
- progesterone (via implant, injection or skin patch)
- spermicidal agents

Contains hormones that inhibit FSH production so that no eggs mature. 1

Inhibits the maturation and release for a number of months or years. 6

Prevents the sperm reaching an egg. 2

Prevent the implantation of the embryo or releases a hormone. 5

Kill or disable sperm. 7

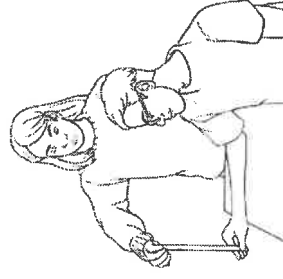
Avoids intercourse when an egg might be in the oviduct. 3

Sterilise the male or female by cutting or tying tubes to prevent the egg or sperm reaching their target area. 4

g

The following is a method for measuring reaction time.

- Person 1 sits upright on the chair with eyes focussing across the room.
- Person 1 puts the forearm of their dominant arm across the table with their hand hanging over the edge.
- Person 2 holds a ruler vertically with the bottom end of the ruler between person 1's finger and thumb. Person 1 mustn't be hold the ruler.
- Person 1 tells person 2 to be prepared to catch the ruler.
- Person 2 lets go of the ruler and person 1 catches the ruler with their thumb and first finger as quickly as possible as it drops.
- The number on the ruler that is level with person 1's thumb is recorded.
- Both people have a rest and then the test is repeated several times.



h

What is the dependent variable in this investigation?
The distance on the ruler before person 1 catches it.

The average distance before person 1 catches the ruler is 14cm. They swap roles and person 2 catches the ruler, their average distance before catching it is 12cm.

Who has the fastest reaction time?
person 2

How do you know?
They caught the ruler in the least amount of time, because less of the ruler had passed through their finger and thumb before they caught it.

