1. In some areas of southern Africa, elephants are very important for ecotourism.

i. Explain what is meant by the term **ecotourism**.

[2]

ii. In ecotourism areas, elephant numbers are increasing.

This is causing problems as the elephants are eating crops.

Scientists therefore want to control the population size.

They have used three main ways to do this:

- **Culling** – a certain number of elephants from each population are killed.
- **Relocation** – elephants are moved to a country where their numbers have dropped.
- **Contraception** – female elephants are treated to reduce their fertility.

Suggest **one** disadvantage for each of these methods.

Culling

Relocation

Contraception

[3]

iii. Scientists are using a new method of contraception to try and restrict the numbers of elephants.

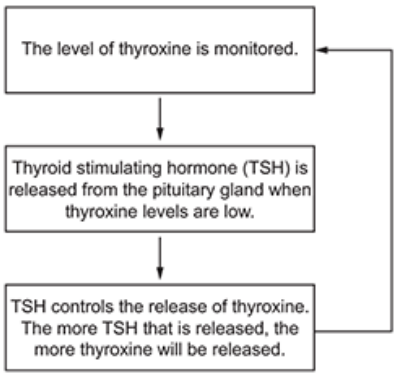
This involves injecting antibodies which block the sperm receptor sites on eggs.

Describe **one** way that this method is different to the contraceptive pill used by female humans.

[1]

2(a). Thyroxine is a hormone that regulates metabolism.

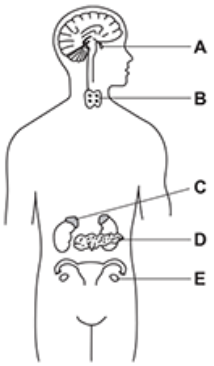
The diagram outlines how the release of thyroxine is controlled by the body.



Explain the processes involved in negative feedback and how they are used in the control of thyroxine.

[3]

(b). This diagram shows the position of different endocrine glands in the body.



Identify the letter on the diagram that shows the position of:

- the pituitary gland .....
- the gland that produces thyroxine ..... .

[2]

(c). Describe how hormones are transported around the body to their targeted organs.

[2]

3. Glucose is often found in the urine of people who have diabetes.

Benedict's solution is used to detect glucose in the urine.

It is also used to give a measure of the concentration of glucose in a sample.

Describe how the results of the Benedict's test can give a measure of the concentration of glucose in a sample.

[3]

4(a). Plant hormones control many processes in plants.

Complete these sentences by writing the correct plant hormones in the gaps.

Each hormone can be used more than once.

Flowers are sometimes sprayed with ..... to produce fruits without seeds.

After fruits are picked, they can be exposed to ..... to make them ripen.

Flowers are stimulated to open, and seeds made to break dormancy by the hormone ..... .

Selective weedkillers and rooting powders usually contain ..... .

[4]

(b). Plant hormones have a variety of effects on plants.

Some plant hormones are responsible for controlling the growth of stems.

Describe how cells are produced to allow stems to grow.

[2]

5. Which hormones are used in the female contraceptive pill?

A FSH and LH
B LH only
C Oestrogen only
D Progesterone and oestrogen

Your answer ☐ **[1]**

6(a). IVF is a fertility treatment which involves egg cells being fertilised by sperm in a laboratory before transferring embryos into a female's uterus.

In this procedure a female's natural menstrual cycle is controlled using hormones.

Four hormones are used:

- GnRHα – a hormone that prevents the development of eggs
- hCG – a hormone that triggers the final stage of egg development
- FSH
- progesterone.

Complete the table to identify the hormone that should be used at each stage of this procedure.
One has been filled in for you.

Stage in IVF procedure	Hormone to be used
A hormone is used to stop a female's natural cycle.	
The female is then stimulated to produce a large number of immature eggs.	
The eggs produced by the female are matured 12 hours before they are collected.	hCG
The female's uterus lining is maintained for 14 days after egg collection.	

[2]

(b). In IVF, the number of egg cells collected from each female differs.

This table shows the number of eggs collected from 10 females.

Female	Number of eggs collected
1	3
2	8
3	9
4	12
5	24
6	8
7	10
8	10
9	8
10	11

i. Write down **two** conclusions about the number of eggs produced by females in this process.

1 _____

_____

2 _____

_____ **[2]**

ii. Only 60–80% of the eggs collected from a female will be mature and therefore able to be used for IVF.

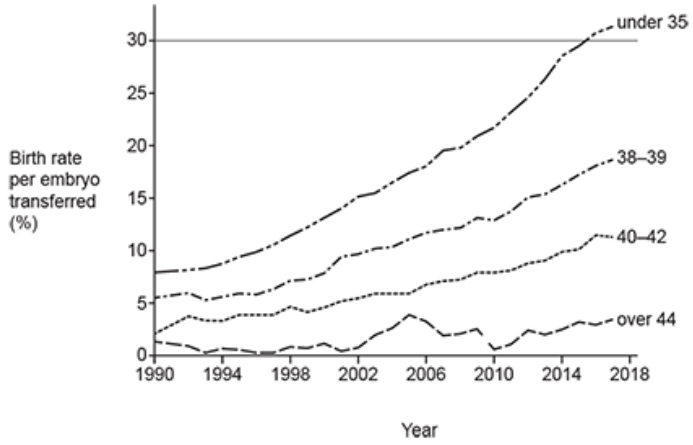
Of the mature eggs collected, only 70–80% will be fertilised.

Calculate the **maximum** number of eggs that can be fertilised if a female produces 10 eggs in one cycle.

Give your answer to the nearest whole number.

Maximum number of eggs = ... **[2]**

(c). The graph shows the birth rate per embryo transferred for some different age groups of females between 1990 and 2017.



Give **two** conclusions that can be made from the graph.

Conclusion 1 _____

_____

Conclusion 2 _____

_____ **[2]**

7(a). Hormones are released when an athlete is preparing for and running a marathon.

Complete the sentences below to describe the hormones involved before and during the race.

Use the words from the list.

adrenaline	**digestive**	**endocrine**	**glucagon**	**glucose**
glycogen	**insulin**	**nervous**	**thyroxine**	

Before the race, the athlete's body needs to prepare for action. The body responds by

secreting the hormone ..... .

This hormone causes blood to be diverted from the ..... system to the muscles.

During the race, blood sugar levels will decrease, so another hormone called..... will be released.

This results in stores of ..... being used to maintain the blood sugar levels allowing the athlete to complete the marathon.

[4]

(b). Hormones are part of the endocrine system.

Describe **two** differences between the endocrine system and the nervous system.

1 ---

---

2 ---

---

[2]

8. Which hormone can be used as a selective weedkiller?

A Auxin
B Ethene
C Gibberellin
D Thyroxine

Your answer ☐ **[1]**

9. The table shows some different treatments for cardiovascular disease.

Which treatments for cardiovascular disease work by directly reducing blood pressure?

Treatment	Main method of action
antiplatelets	reduce the action of platelets
beta blockers	block the effects of adrenaline
nitrates	widen blood vessels
statins	reduce cholesterol levels in the blood

A Antiplatelets and beta blockers
B Beta blockers and nitrates
C Nitrates and antiplatelets
D Statins and nitrates

Your answer ☐ **[1]**

10. Amyloidosis is a group of inherited conditions that affect people's health.

The most common type of amyloidosis is caused by a dominant allele (**A**) of a gene.

Allele **(A)** codes for the production of a protein called amyloid.
Amyloid can block the blood vessels that leave the pancreas and the thyroid gland, preventing the release of hormones.

Complete the sentences to explain the symptoms that might be shown by person **2** in **(a)**.

Symptoms of person **2** can include:

- Being unable to control blood ..... due to a lack of the hormones ..... and ..... .
- Being unable to ..... control rate due to a lack of the hormone ..... .

[4]

11. A student describes the structure and function of xylem to another student.

'Xylem vessels are made up of dead cells joined together end to end. The vessels are made of a waterproof material and transport sugars up and down the plant.'

They have made **two** mistakes in their description.

Write down the **two** mistakes they have made.

1 _____

2 _____

[2]

12(a). Hypothyroidism occurs when the body has an underactive thyroid gland.

The UK population is 68 million.
It is estimated that 2% of the UK population has hypothyroidism.

Calculate how many million people in the UK have hypothyroidism.

Number of people = ... million**[2]**

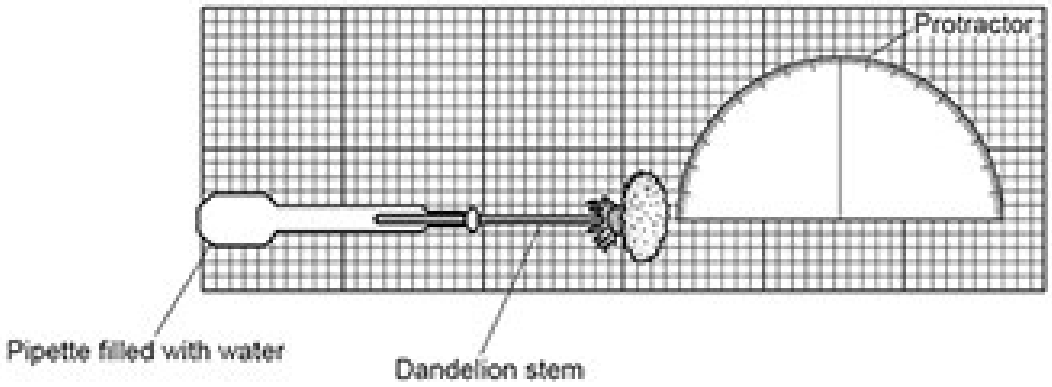
(b). Thyroxine can cause changes in heart rate and breathing rate.

Name another hormone that causes an increase in heart rate and breathing rate.

_____**[1]**

13(a). A student investigates the effect of gravity on dandelion stems.

The diagram shows the equipment they use.



- The student places the equipment in a dark room.
- The dandelion stem is horizontal at the start of the investigation.
- During the investigation the stem moves upwards.
- Each hour the student uses a protractor to measure the upward movement of the dandelion stem.

Their results are shown in the table.

Time (hours)	Amount of upward movement (°)
0	0
1	10
2	27
3	45
4	59
5	74
6	90

Describe and explain the results of this experiment.

Use ideas about hormones.

[4]

(b). The student is asked how long it took for the stem to reach an angle of 90°.

Their answer was 6 hours.

How could the student alter their investigation to provide a more accurate answer?

_____

_____

[2]

(c). Give **one** effect of the hormone gibberellin in plants.

_____

[1]

14. Farmers can control a cow's menstrual cycle using hormones.
Hormones controlling the menstrual cycle of a cow are the same as those in humans.

Which hormone would a farmer use to stimulate egg production?

A FSH
B LH
C Oestrogen
D Progesterone

Your answer ☐ **[1]**

15. Which hormone should be used to ripen fruit?

A Ethene
B FSH
C Gibberellins
D Thyroxine

Your answer ☐ **[1]**

END OF QUESTION PAPER