

1 Diabetes is a disease in which the concentration of glucose in a person's blood may rise to fatally high levels.
Insulin controls the concentration of glucose in the blood.

(a) Where is insulin produced?

Draw a ring around **one** answer.

gall bladder

liver

pancreas

(1)

(b) People with diabetes may control their blood glucose by injecting insulin.

(i) If insulin is taken by mouth, it is digested in the stomach.

What type of substance is insulin?

Draw a ring around **one** answer.

carbohydrate

fat

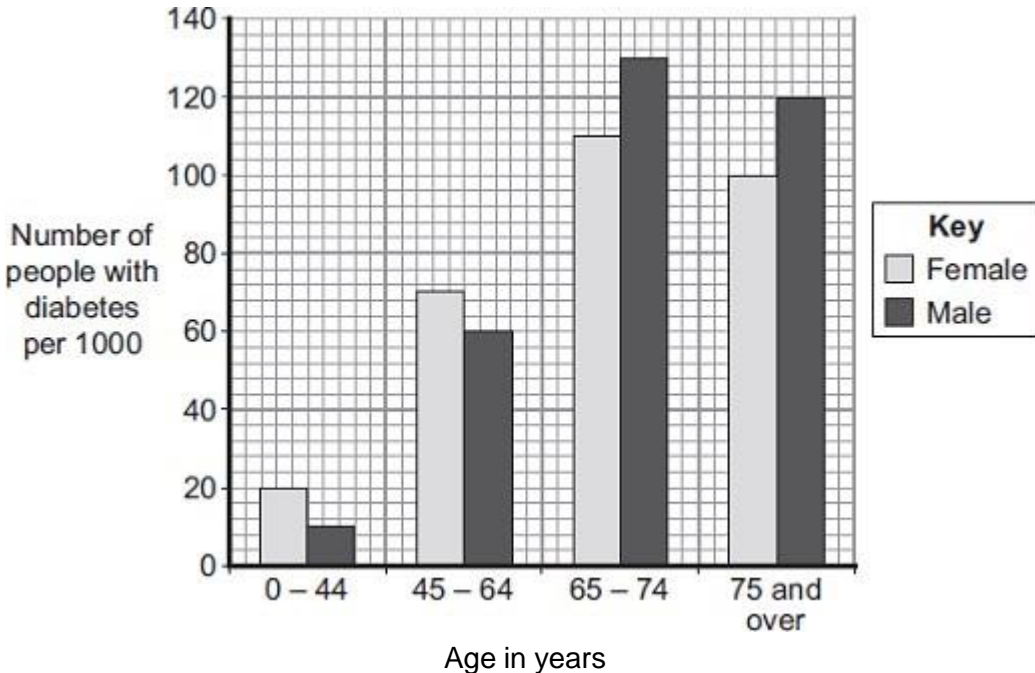
protein

(1)

(ii) Apart from using insulin, give **one** other way people with diabetes may reduce their blood glucose.

(1)

(c) The bar chart shows the number of people with diabetes in different age groups in the UK.



(i) Describe how the number of males with diabetes changes between the ages of 0 - 44 years and 75 years and over.

(3)

(ii) Compare the number of males and females with diabetes:

between the ages of 0 and 64 years

over the age of 65 years.

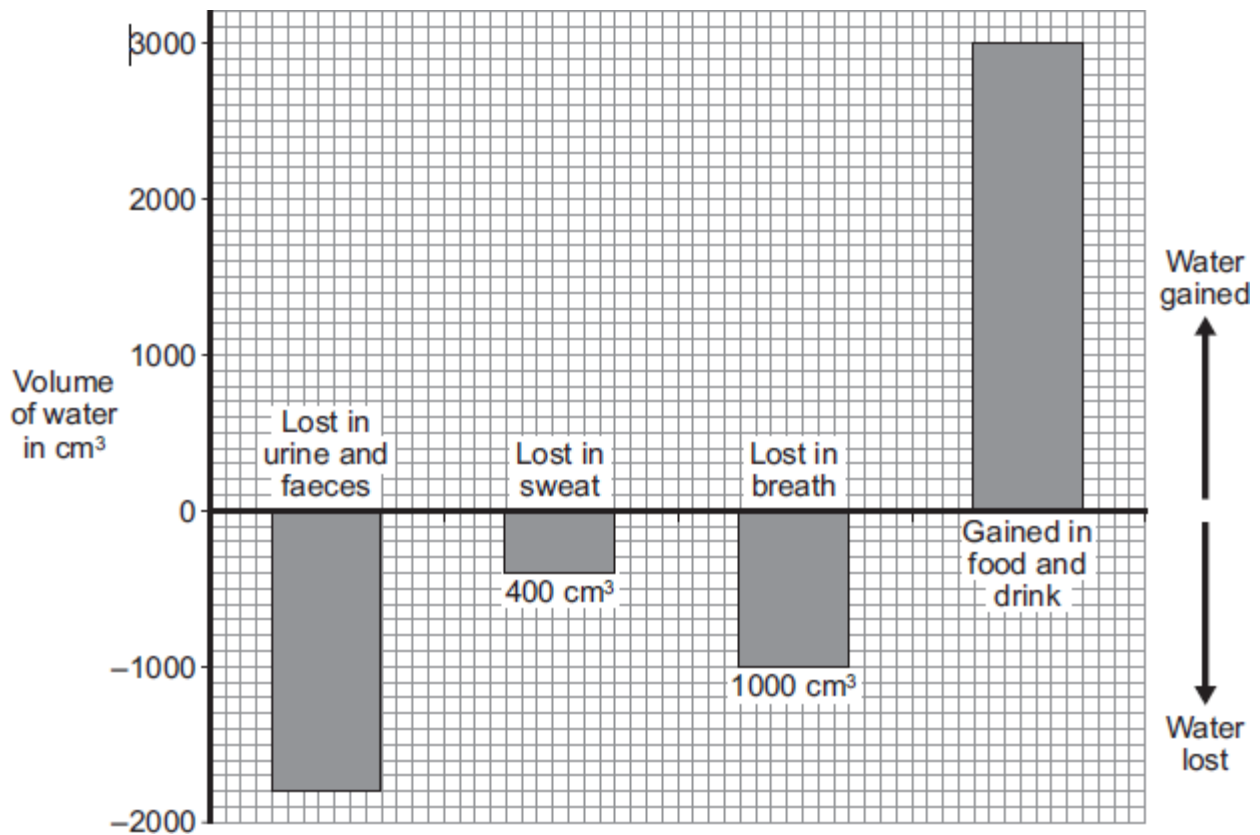
(2)

(Total 8 marks)

2

The bar chart shows different ways in which water is lost from and gained by the body on one day.

The volumes of water lost in the sweat and in the breath are labelled on the bars.



(a) How much water was lost in the urine and faeces? _____ cm³

(1)

(b) Water is lost from the body in urine, faeces, sweat and breath.

What was the total volume of water lost from the body on this day?

Show clearly how you work out your answer.

Answer = _____ cm³

(2)

(c) The volume of water lost should balance the volume of water gained.

What should the person do to balance the water gained with the water lost?

(2)

(Total 5 marks)

3

Diabetes is a disease in which blood glucose (sugar) concentration may rise more than normal.

(a) Which organ in the body monitors this rise in blood sugar?

Draw a ring around your answer.

liver

pancreas

stomach

(1)

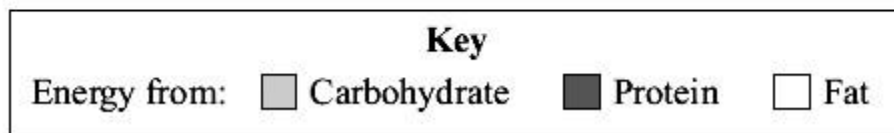
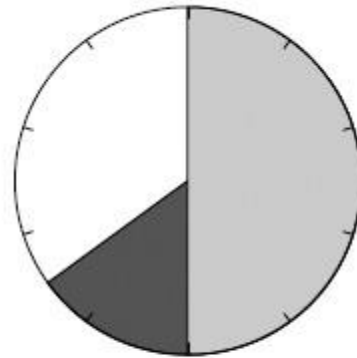
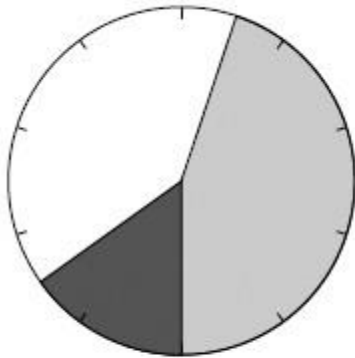
(b) One way of treating diabetes is by careful attention to diet.

Chart 1 shows the recommended diet for a person with diabetes.

Chart 2 shows a diet for a person without diabetes.

Chart 1 Person with diabetes

Chart 2 Person without diabetes



How is the recommended diet of a person with diabetes different from the diet of a person without diabetes?

Use information from the charts.

Tick (✓) **two** box.

The diabetic should get more energy from fat.

The diabetic should get more energy from protein.

The diabetic should get less energy from carbohydrate.

The diabetic should get less energy from protein.

(2)

(c) Other than diet, give **one** way in which diabetes may be treated.

(1)

(Total 4 marks)

4 Our bodies control the concentration of glucose in the blood.

Draw a ring around the correct answer to complete each sentence.

(a) The concentration of glucose in the blood is controlled by a

hormone called

| |
|---------------|
| carbohydrase. |
| insulin. |
| protease. |

(1)

(b) This hormone is produced by the

| |
|------------|
| intestine. |
| stomach. |
| pancreas. |

(1)

(c) If the body does not produce enough of this hormone,

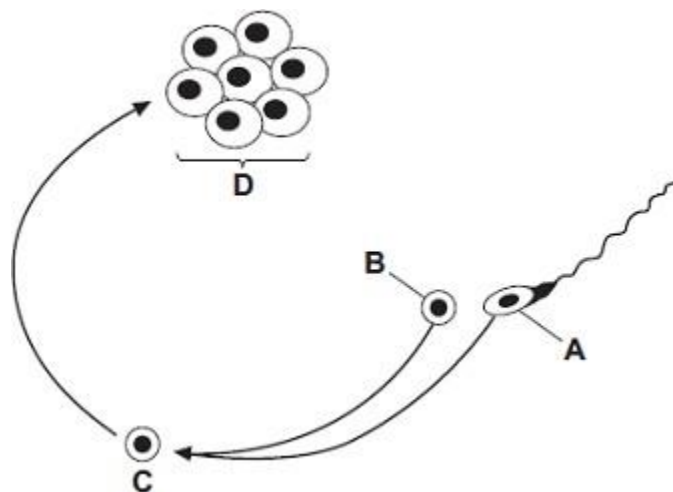
the person develops

| |
|-----------------------|
| diabetes. |
| cystic fibrosis. |
| Huntington's disease. |

(1)

(Total 3 marks)

5 The diagram shows some of the stages in IVF (in vitro fertilisation).



(a) Use words from the box to name structures **A**, **B**, **C** and **D**.

| | | | | |
|------------|---------------|-----------------------|--------------|--------------|
| egg | embryo | fertilised egg | ovary | sperm |
|------------|---------------|-----------------------|--------------|--------------|

Structure **A** _____

Structure **B** _____

Structure **C** _____

Structure **D** _____

(4)

(b) What do doctors do next with structure **D**?

(2)

(c) The table gives statistics for an IVF clinic.

| | Age of women treated | | | |
|---------------------------------------|----------------------|---------------|---------------|---------------|
| | Below 35 years | 35 – 37 years | 38 – 39 years | 40 – 42 years |
| Number of women treated | 414 | 207 | 106 | 53 |
| Number of women who produced one baby | 90 | 43 | 17 | 1 |
| Number of women who produced twins | 24 | 8 | 4 | 1 |
| Number of women who produced triplets | 1 | 0 | 0 | 0 |

(i) About what proportion of the treated women aged 35 – 37 years produced one or more babies?

Draw a ring around your answer.

one quarter **one third** **half**

(1)

(ii) This clinic does **not** give IVF treatment to women over 42 years of age.

Use data from the table to explain why.

(2)

(iii) The committee which regulates IVF treatment now advises that only one embryo is used in each treatment.

Suggest **one** reason for this.

(1)

(Total 10 marks)

6

The photograph shows a new-born baby.



By SCA Svenska Cellulosa Aktiebolaget [CC-BY-2.0], via Wikimedia Commons

(a) New-born babies have reflex actions. The reflex actions help new-born babies to survive.

Draw a line from each reflex action to the way in which it helps the baby to survive.

Reflex action

How the reflex action helps the baby

If milk goes down the baby's windpipe the baby coughs

Helps the baby to hold on to the mother

If the mother touches the palm of the baby's hand, the baby clenches its fist.

Prevents the baby from choking

If the mother strokes the baby's mouth, the baby begins to suck.

Helps to protect some of the baby's receptors

If a bright light shines on the baby, the baby's eyes shut.

Helps the baby to crawl

Helps the baby to feed

(4)

(b) Which **two** of the following may be effectors in reflex actions?

Tick (✓) **two** boxes.

- Brain
- Glands
- Motor neurones
- Muscles
- Sensory neurones

(2)
(Total 6 marks)

7

Hormones control the menstrual cycle.

(a) Name **two** of the hormones involved in the menstrual cycle.

- 1. _____
- 2. _____

(2)

(b) Hormones are used in some types of contraception.

Complete the sentence.

When used as contraceptives, hormones stop _____ becoming mature.

(1)

(c) There are several ways of using hormones as contraceptives.

These include:

- taking a contraceptive pill each day for 21 days of the menstrual cycle
- using a contraceptive implant.

The contraceptive implant is put under the skin of a woman's arm.

The implant releases contraceptive hormones for three years before the implant needs to be replaced.

(i) Suggest **one** advantage of using this implant rather than taking contraceptive pills.

(1)

(ii) Suggest **one** disadvantage of using this implant rather than taking contraceptive pills.

(1)

(Total 5 marks)

8

(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 |
|-----------------------|--|
| FSH | Used in some contraceptive pills to stop eggs maturing |
| LH | Used as a fertility drug to make eggs mature |
| Oestrogen | Causes the lining of the womb to break down |
| | 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)

9

Type 1 diabetes develops when the body does not produce enough insulin.

(a) Which organ produces insulin?

(1)

(b) One treatment for diabetes is to inject insulin.

The table gives the properties of four different types of insulin, **A**, **B**, **C** and **D**.

| Type of insulin | Time taken for the insulin to begin to work in minutes | Time taken for insulin to reach maximum concentration in the blood in minutes | Time when insulin is no longer effective in hours |
|-----------------|--|---|---|
| A | 15-20 | 30-90 | 3-4 |
| B | 30-60 | 80-120 | 4-6 |
| C | 120-240 | 360-600 | 14-16 |
| D | 240-360 | 600-960 | 18-20 |

(i) Some people with diabetes need to inject insulin just before a meal to stop a big increase in blood sugar concentration.

Which type of insulin, **A**, **B**, **C** or **D**, should these people with diabetes inject just before a meal?

Give the reason for your answer.

(2)

- (ii) A person with diabetes is told to inject type **B** insulin immediately after breakfast at 09.00.
The person with diabetes is told to then inject a second type of insulin at lunchtime at 12.00.
The second type of insulin should keep the blood sugar level under control for the rest of the 24 hours.

Which type of insulin, **A**, **C** or **D**, should this person with diabetes inject at lunchtime?

Give the reason for your answer.

(2)

- (iii) Apart from injecting insulin, give **one** other way in which Type 1 diabetes can be controlled.

(1)

(Total 6 marks)

10

The nervous system allows humans to react to their surroundings.

- (a) Sense organs have receptors. Receptors detect *changes in the environment*.

Which word describes *a change in the environment*?

Draw a ring around **one** answer.

an effector **a neurone** **a stimulus**

(1)

- (b) The photograph shows a baby.
Labels **A**, **B**, **C**, **D** and **E** show some of the baby's sense organs.

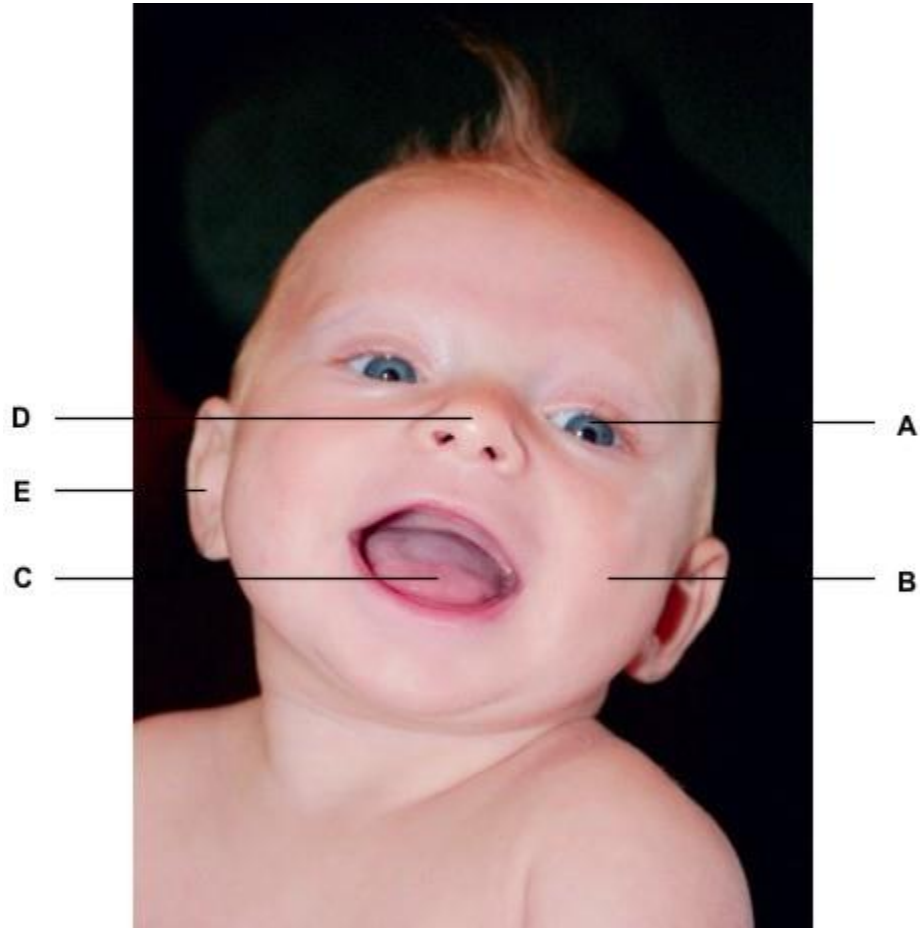


Photo by D. Sharon Pruitt [CC-BY-2.0], via Wikimedia Commons

Answer each question by writing **one** letter, **A**, **B**, **C**, **D** or **E**, in each box.

- (i) Which sense organ has receptors sensitive to light?

(1)

- (ii) Which **two** sense organs have receptors sensitive to chemicals?

 and

(2)

- (iii) Which sense organ has receptors sensitive to changes in the baby's position?

(1)

- (c) Information from sense organ **A** is passed along nerve cells.
The information is coordinated to produce a response.

Which organ in the body coordinates the information?

(1)

(Total 6 marks)

Mark schemes

- 1** (a) pancreas
apply list principle 1
- (b) (i) protein
apply list principle 1
- (ii) any **one** from:
- (controlling / changing) diet
accept sugar(y foods) / named eg
ignore references to starch / fat / protein / fibre
 - exercise
accept example, eg go for a run
 - pancreas transplant
accept named drug eg metformin 1
- (c) (i) increase
ignore reference to women 1
- then fall 1
- relevant data quote (for male)
*eg max at ages 65–74 **or** starts at 10 (per thousand) **or** max at 130 (per thousand) **or** ends at 120 (per thousand)*
accept a difference between any pairs of numbers in data set
*accept quotes from scale eg '130' or '130 per thousand' but **not** '130 thousand'; to within accuracy of +/- 2 (per thousand)* 1
- (ii) (between 0 and 64) more females (than males) **or** less males (than females)
ignore numbers
allow eg females more diabetic than males 1
- (over 65) more males (than females) or less females (than males)
allow eg males more diabetic than females 1
- 2** (a) 1800
allow - / minus 1800 1

[8]

(b) 3200

award both marks for correct answer irrespective of working

allow - / minus 3200

award 2 marks for 200 or -200 irrespective of working

allow ecf from part (a) for both routes to 2 marks

*if no answer **or** incorrect answer then indication of addition of 1800*

***or** their (a), 1000 and 400 gains 1 mark*

2

(c) drink more / take in more from food & drink

*allow ecf from (b), ie if answer to (b) is less than 3000 then accept
drink less*

if answer to (b) is exactly 3000 accept do nothing

1

200 (cm³)

*accept ecf from (b) answer should be difference between (b) and
3000 if answer to (b) is 3000 accept they are the same*

NB *drink / take in 3200 (cm³) of water = 1 mark*

drink / take in 200 (cm³) of water = 2 marks

ignore references to exercise / sweat

1

[5]

3

(a) pancreas

1

(b) the diabetic should get more energy from fat

1

the diabetic should get less energy from carbohydrate

1

(c) (use) insulin

allow pancreas / stem cell transplant

*do **not** allow injection / transplant / stem cells / tablets alone*

ignore exercise

1

[4]

4

(a) insulin

extra ring drawn cancels the mark

1

(b) pancreas

extra ring drawn cancels the mark

1

(c) diabetes

extra ring drawn cancels the mark

1

[3]

5

(a) A sperm

1

B egg

1

C fertilised egg

1

D embryo

1

(b) insert into mother

ignore fertilise / check fertilisation / check viability

1

womb / uterus

1

(c) (i) one quarter

1

(ii) no / little chance of success over 42

1

reference to table of only two women in the age bracket 40-42 years became pregnant

the statement 'only 2 out of 53 40-42 year old women became pregnant / had babies' gains 2 marks

1

(iii) so fewer twins / multiple births

or

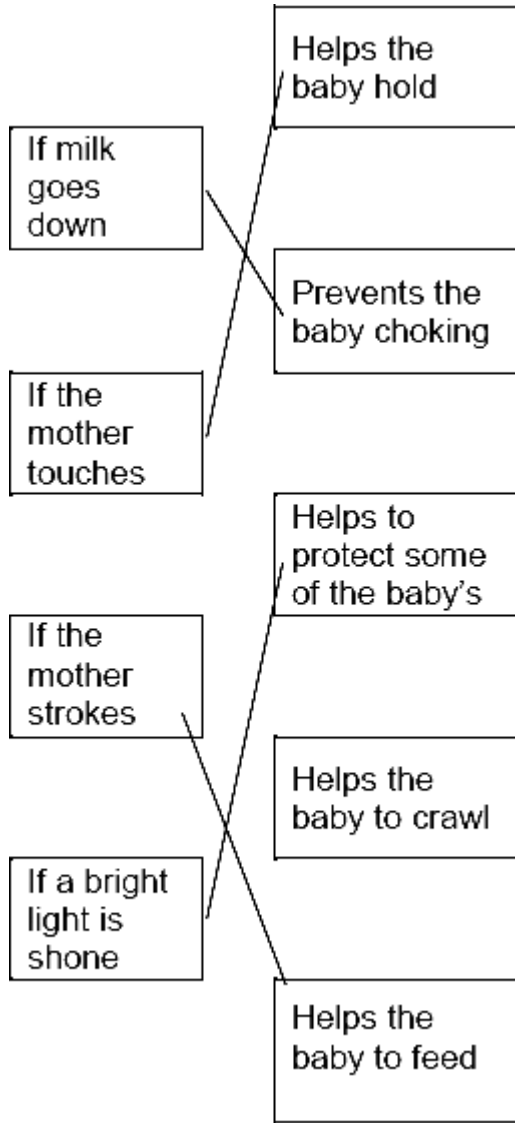
multiple births more dangerous

1

[10]

6

(a)



all four correct = 4 marks

three correct = 3 marks

two correct = 2 marks

one correct = 1 mark

extra line from a statement cancels the mark

4

(b) glands

1

muscles

1 mark for each correct tick

each extra box ticked cancels 1 mark

1

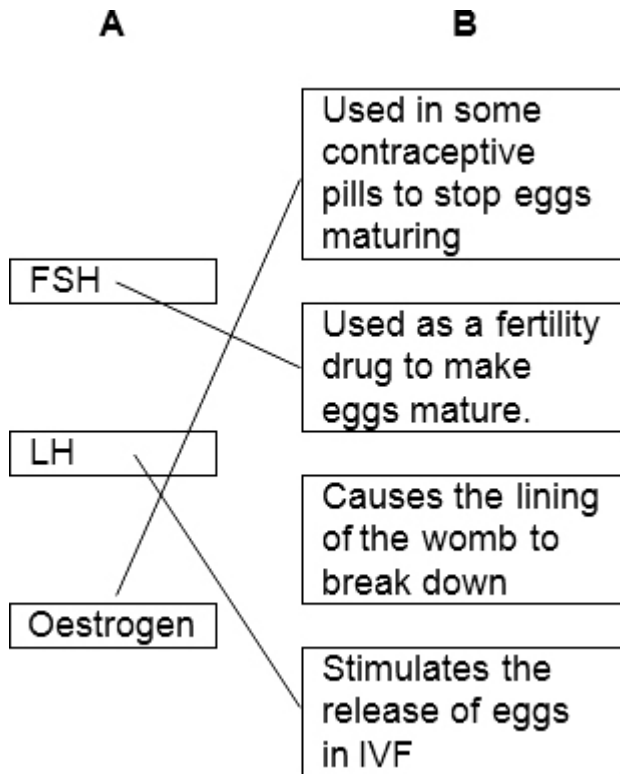
[6]

- 7** (a) any **two** from:
- FSH
do not accept FHS
 - LH
do not accept LSH
 - oestrogen
allow progesterone as alternative to any hormone
- 2
- (b) egg(s) / egg cell(s) / ova
do not accept ovaries
do not accept fertilised eggs
- 1
- (c) (i) any **one** from:
ignore faster
- don't have to take (pill) every day
ignore side effects
- can't forget to take
ignore cost
 - more reliable
 - lasts 3 years / lasts longer
 - hormone level in blood more constant
- 1
- (ii) any **one** from:
ignore cost
- eg painful (to insert) / uncomfortable / causes rash
ignore side effects unqualified
 - woman can't take it out
 - more difficult to stop treatment
 - needs to be removed if woman decides to become pregnant
allow have to wait three years to become pregnant
- 1

[5]

8

(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]

9 (a) pancreas

allow phonetic spelling

1

(b) (i) A

shortest / quicker time (to work)

1

1

(ii) D

acts for longest time

mark dependent on D

allow D will last until 09.00 / breakfast / 24 hours

1

1

(iii) diet / exercise

if 'diet' is qualified, then will need correct qualification, e.g. 'less carbohydrate / sugar'

accept pancreas transplant / stem cell treatment

1

[6]

10 (a) a stimulus

1

(b) (i) A

1

(ii) C

either order

1

D

1

(iii) E

1

(c) brain

*allow spinal cord / CNS / central nervous system
do **not** allow spine*

1

[6]