AQA GCSE Biology | 8461

SPECIFICATION POINT 4.5.3.6

The use of hormones to treat infertility (HT only)

Past-paper questions

Tier	**Higher**
Question groups	**20**
Available paper years	**2007–2024**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 01

January 2007 | BLY1H | Original Q7 | Legacy

7 Read the passage about IVF (in-vitro fertilisation) and embryo-splitting.

> "IVF is not as successful as we would like it," says scientist Michael Tucker. "On average, only one in five or one in six of all the embryos that we generate in the IVF lab will develop as far as full-term delivery as a baby."
>
> "There is a way to perhaps double those odds. A new, identical embryo is split off from the original embryo made in the IVF lab."
>
> "What we are really doing is creating an identical twin," says scientist Dr Hilton Kort.
>
> "And that's what happens in nature every day. Cloning is creating a replica of a person or an animal."

(a) Explain why the two embryos will develop into identical twins.

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(2 marks)

(b) Explain why the embryos are **not** clones of their parents.

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(2 marks)

(c) The scientists want to develop this technique, but are afraid to do so because public opinion might be against the technique.

Suggest an explanation for this.

.....

.....

(1 mark)

5

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 02

June 2007 | BLY1A | Original Q2 | Legacy

QUESTION TWO

Hormones are involved in the menstrual cycle.

Match hormones, **A**, **B**, **C** and **D**, with the numbers **1–4** in the table.

A FSH

B FSH and LH

C LH

D oestrogen

	Function
1	stimulates egg release only
2	stimulates and inhibits production of hormones by the pituitary gland
3	stimulates the ovary to produce hormones and stimulates eggs to mature in the ovaries
4	the usual hormone treatment used in IVF treatment

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 03

March 2008 | BLY1AP | Original Q8 | Legacy

QUESTION EIGHT

This question is about hormones that control the menstrual cycle.

8A The hormone which stimulates an egg to mature is produced by the . . .

1 blood.

2 ovary.

3 pituitary gland.

4 womb.

8B Some contraceptive pills contain high levels of oestrogen.

How do these contraceptives work?

1 They stop the lining of the womb from becoming thick.

2 They inhibit LH production.

3 They cause the lining of the womb to break down.

4 They inhibit FSH production.

8C Fertility drugs . . .

1 stimulate oestrogen production.

2 stimulate FSH production.

3 stimulate LH production.

4 stimulate the pituitary gland.

8D Some couples need IVF treatment in order to have children.

Which one of the following is an ethical problem that may occur as a result of IVF?

1 The treatment is suitable only for certain types of women.

2 The treatment is very expensive.

3 There is a high failure rate.

4 Unused embryos are destroyed.

4.5.3.6 The use of hormones to treat infertility (HT only)

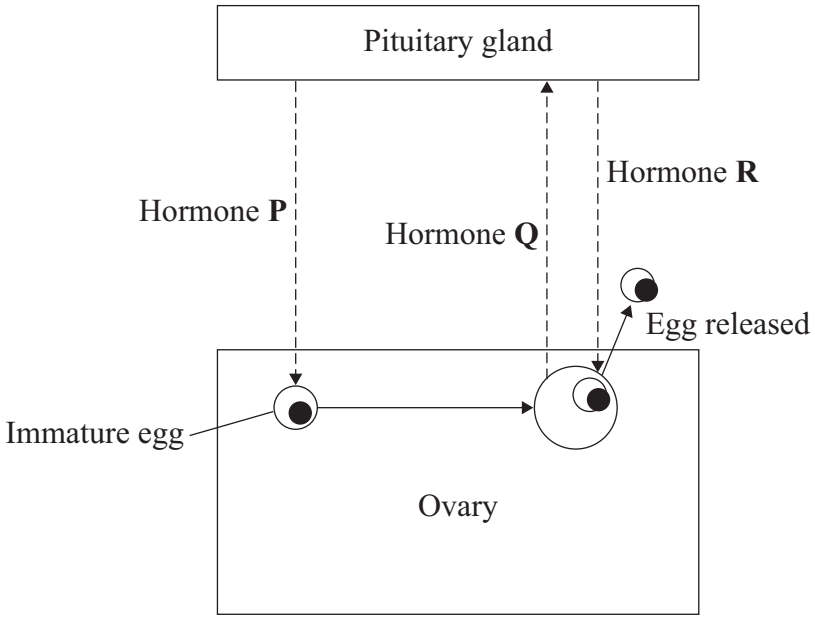
Question 04

June 2008 | BLY1AP | Original Q7 | Legacy

QUESTION SEVEN

Hormones produced in the body control the menstrual cycle.

The diagram shows how some hormones are involved in controlling the menstrual cycle.



7A Which line correctly identifies hormones **P**, **Q**, and **R**?

	P	**Q**	**R**
1	FSH	oestrogen	LH
2	LH	oestrogen	FSH
3	FSH	LH	oestrogen
4	oestrogen	FSH	LH

7B Oral contraceptives contain hormones that . . .

1 inhibit FSH production.

2 stimulate LH production.

3 prevent sperm cells from fertilising.

4 stimulate the pituitary gland to release more oestrogen.

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 04 · continued June 2008 | BLY1AP | Original Q7 | Legacy

7C Fertility drugs involve the use of . . .

1 FSH to stimulate eggs to mature.

2 LH to stimulate oestrogen production.

3 FSH to stimulate the release of eggs.

4 oestrogen to stimulate LH production.

7D IVF treatment usually involves giving a woman . . .

1 FSH only.

2 oestrogen only.

3 LH and oestrogen.

4 FSH and LH.

Turn over for the next question

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 05

November 2008 | BLY1AP | Original Q9 | Legacy

QUESTION NINE

This question is about hormones.

9A Which row in the table shows the sites of production of FSH, LH and oestrogen?

	FSH	LH	Oestrogen
1	pituitary gland	ovary	ovary
2	pituitary gland	ovary	pituitary gland
3	ovary	pituitary gland	pituitary gland
4	pituitary gland	pituitary gland	ovary

9B Which row in the table shows the effect of oestrogen on the production of FSH and LH?

	FSH production	LH production
1	stimulated	inhibited
2	inhibited	inhibited
3	stimulated	stimulated
4	inhibited	stimulated

9C IVF (in vitro fertilisation) treatment can be used to help childless couples have children.

This treatment usually involves giving the woman . . .

1 FSH only.

2 FSH and LH.

3 oestrogen and FSH.

4 oestrogen and LH.

4.5.3.6 The use of hormones to treat infertility (HT only)

9D Hormones are used during IVF treatment.

Which of the following is an ethical issue associated with IVF treatment?

1 Children born following IVF treatment will not have a father.

2 There may be more embryos produced than can be used.

3 The mother may produce many eggs during the treatment.

4 The mother will not be able to have more than one child.

END OF TEST

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 06

March 2009 | BLY1AP | Original Q9 | Legacy

QUESTION NINE

In vitro fertilisation (IVF) is used to help women who have difficulty conceiving.

9A Which hormone treatment is given to a woman during IVF?

1 FSH is given to stimulate eggs to mature.

2 LH is given to stimulate eggs to mature.

3 Oestrogen is given to stimulate the thickening of the lining of the womb.

4 FSH is given to stimulate the release of eggs.

9B Which statement correctly describes one stage in IVF treatment?

1 Sperm cells are inserted into the mother's womb when eggs are released from the ovary.

2 Fertilised eggs develop into embryos outside the mother's body.

3 Eggs are collected from the mother after every menstrual period.

4 Fertilisation takes place inside the woman's body.

The table shows the effectiveness of IVF treatment in a fertility clinic in 2004 and 2005.

	2004				**2005**			
Age of woman	Under 35	35–37	38–40	Over 40	Under 35	35–37	38–40	Over 40
Number of IVF treatments	130	100	29	20	142	62	33	11
Average number of embryos transferred	2.6	2.8	3.3	3.6	2.5	2.8	3.0	3.2
Percentage of successful pregnancies	43	30	21	13	43	48	30	27

4.5.3.6 The use of hormones to treat infertility (HT only)

9C What conclusion can be drawn from the data?

1 The more embryos transferred, the greater the chance of a successful pregnancy.

2 There were more multiple births in 2005 than in 2004.

3 Older women are less likely to have a successful pregnancy by IVF.

4 More women were given IVF treatment in 2005 than in 2004.

9D Many people oppose the use of IVF.

What information from the table could be used by people campaigning against IVF on ethical grounds?

1 A high proportion of women in the country are being treated with IVF.

2 High doses of hormones cause side effects in many women.

3 Many embryos die in IVF treatment.

4 IVF treatment is too expensive for most women.

END OF TEST

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 07

June 2009 | BLY1H | Original Q7 | Legacy

7 Two types of fertility treatment are in-vitro fertilisation (IVF) and in-vitro maturation (IVM).

7 (a) Describe the role of hormones in IVF treatment.

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(3 marks)

(Extra space) .....

.....

7 (b) Read the passage about fertility treatment.

During normal IVF, a woman undergoes several weeks of hormone injections. The treatment can lead to a condition called ovarian hyperstimulation syndrome resulting in a build-up of fluid in the lungs. Very rarely, it can cause death. The syndrome occurs in about 1 % of standard IVF cycles, but in about 10 % of the IVF cycles of some women. An IVF cycle may cost up to £4300.

In IVM, hormone treatment lasts for less than 7 days. Eggs are then collected from the ovaries while they are still immature. Each egg is then matured in a laboratory for up to 48 hours before being injected with a single sperm. A few days after fertilisation, the embryos are implanted into the mother's womb. The cost of each IVM cycle is £1700.

An IVM expert says: "In IVM treatment there's a small risk of abnormalities in the sex chromosomes and also of birth deformities and cancer in the babies. These risks are not massive but they are greater than in IVF."

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 07 · continued

for mark

7 (b) Evaluate the use of IVM rather than IVF in treating infertility.

Remember to give a conclusion to your evaluation.

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(4 marks)

(Extra space) .....

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7

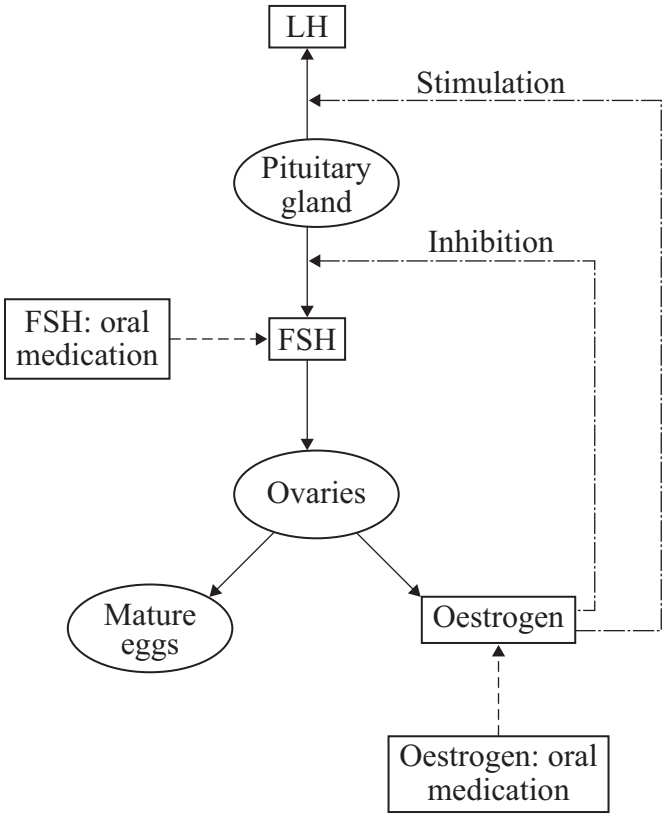
4.5.3.6 The use of hormones to treat infertility (HT only)

Question 08

November 2009 | BLY1AP | Original Q9 | Legacy

QUESTION NINE

The diagram shows hormones involved in the control of the menstrual cycle and fertility.



9A A woman takes pills containing oestrogen.

The effect of this will be to . . .

1 encourage the production of more oestrogen by the ovaries.

2 increase the likelihood of pregnancy by encouraging the production of LH.

3 inhibit FSH production and stimulate eggs to mature.

4 inhibit FSH production and so inhibit the maturation of eggs.

4.5.3.6 The use of hormones to treat infertility (HT only)

9B A woman takes pills containing FSH.

The effect of this will be to . . .

1 stimulate the maturation of eggs.

2 inhibit the maturation of eggs.

3 reduce oestrogen production.

4 reduce LH production.

9C To assist the release of several eggs, a woman should be treated with medication containing . . .

1 FSH only.

2 FSH and LH.

3 oestrogen only.

4 oestrogen and FSH.

9D Which one of the following is based on scientific rather than ethical considerations in relation to IVF procedures?

1 Unused but fertile eggs should be destroyed.

2 The number of eggs collected should give the best chance of success.

3 The sex of the embryo which is to be implanted should be chosen by parents.

4 Single mothers should be offered IVF treatment.

END OF TEST

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 09

March 2010 | BLY1AP | Original Q7 | Legacy

QUESTION SEVEN

The success of in vitro fertilisation (IVF) treatment depends on several factors.

7A During IVF, a woman is usually treated with . . .

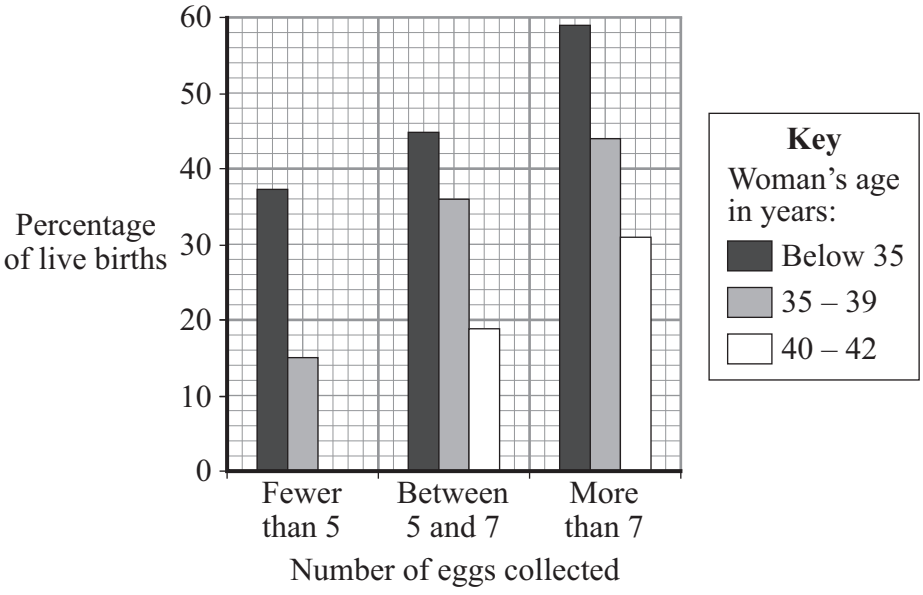
1 FSH only.

2 FSH and LH.

3 oestrogen.

4 LH and oestrogen.

The bar chart shows how a woman's age and the number of eggs collected from her affect the percentage of live births.



7B The highest IVF success rate occurs with women aged . . .

1 below 35.

2 35–39.

3 40–42.

4 over 42.

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 09 · continued March 2010 | BLY1AP | Original Q7 | Legacy

7C Which conclusion can be drawn from the data in the bar chart?

1 The number of eggs collected is directly proportional to the age of the woman.

2 Collecting more than seven eggs for fertilisation is certain to lead to a successful pregnancy.

3 Women aged over 42 cannot become pregnant by IVF treatment.

4 At least five eggs must be collected from a woman between 40 and 42 years old for her to have a chance of a live birth.

7D An IVF procedure may result in the production of 'spare' fertilised eggs.

Which one of the following can be decided using only scientific considerations?

1 whether spare eggs should be sold to another clinic

2 whether to destroy the spare eggs

3 how best to store the spare eggs if required

4 whether to give the spare eggs to another woman needing IVF treatment

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 10

June 2010 | BLY1AP | Original Q9 | Legacy

QUESTION NINE

IVF (in vitro fertilisation) treatment helps women to become pregnant.

9A The hormone which stimulates the monthly release of the egg is secreted by the . . .

1 ovary.

2 brain.

3 pituitary gland.

4 womb.

9B Which hormone treatment is usually used in IVF?

1 oestrogen only

2 FSH followed by LH

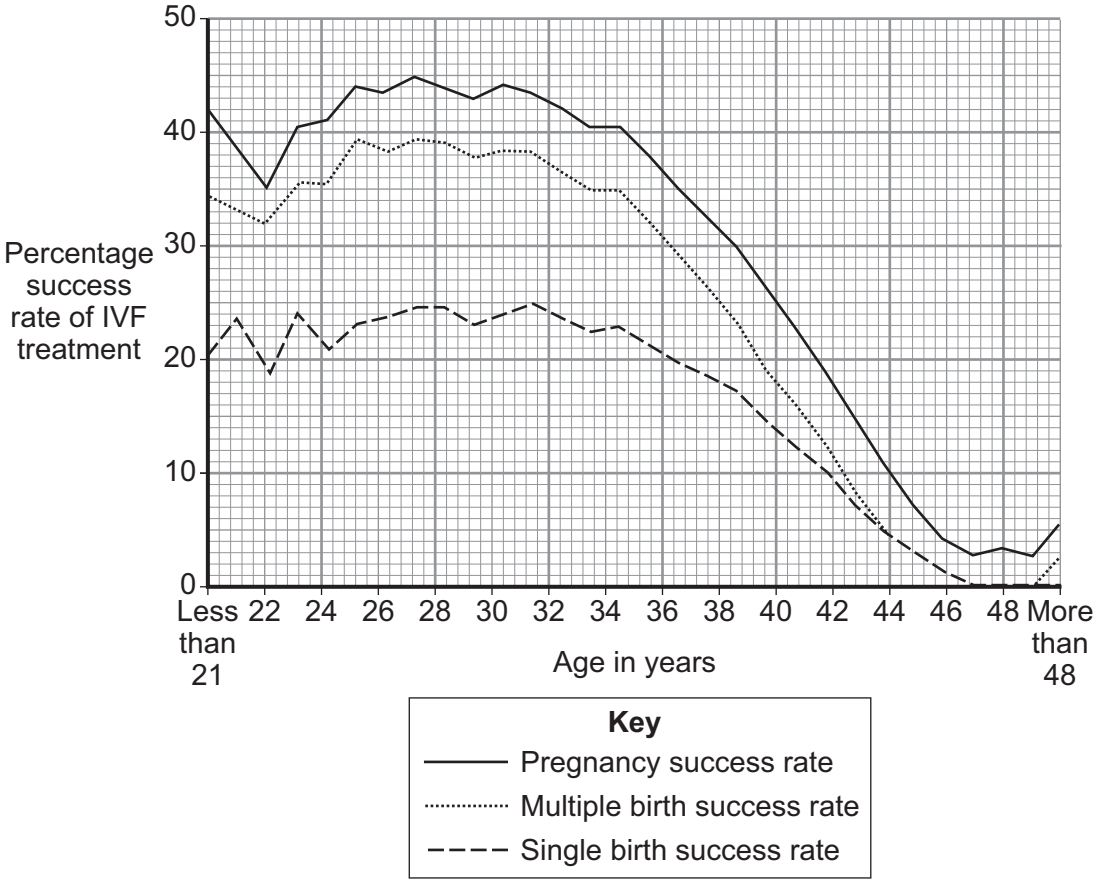
3 FSH only

4 LH followed by FSH

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 10 · continued June 2010 | BLY1AP | Original Q9 | Legacy

The graph shows the percentage success rates of IVF treatments for women of different ages.



9C Which conclusion can be drawn from this data?

1 Only single babies were born to women over 45.

2 IVF should not be given to women over 45.

3 The pregnancy success rate falls significantly after the age of 34.

4 The pregnancy success rate is independent of the age of the woman.

9D Which pattern is shown by the data?

1 The single birth success rate is always less than the multiple birth success rate.

2 The multiple birth success rate is never less than 20%.

3 Women of all ages produce multiple births.

4 After the age of 34 the proportion of multiple births compared with single births decreases with the age of the mother.

END OF TEST

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 11

January 2011 | BLY1H | Original Q3 | Legacy

3 In-vitro fertilisation (IVF) is used to help some women get pregnant.

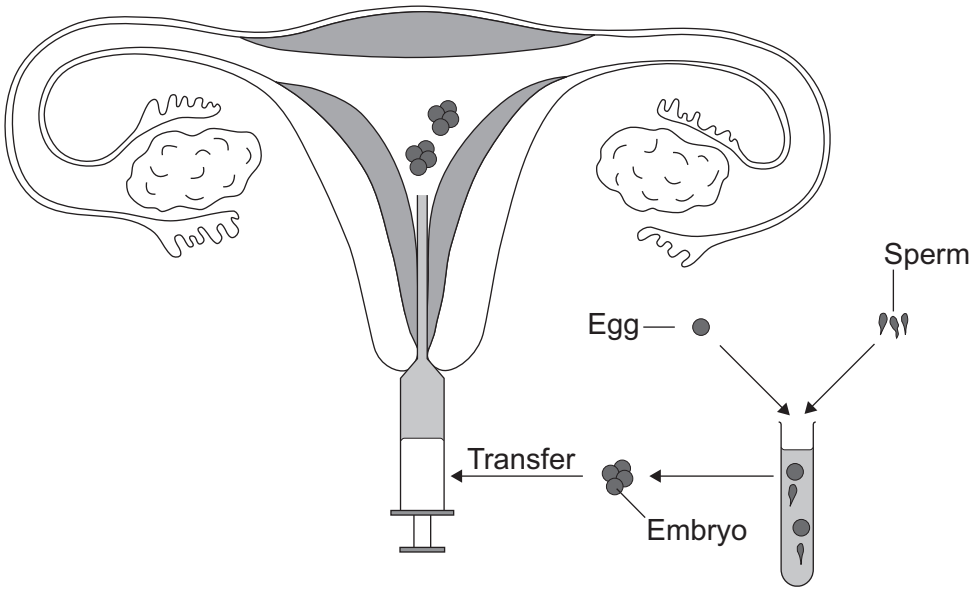
3 (a) Name the **two** hormones used in IVF treatment.

1 .....

2 .....

(2 marks)

3 (b) The diagram shows the process of IVF.



Describe the process of IVF. Use information from the diagram to help you.

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(4 marks)

6

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 12

March 2011 | BLY1AP | Original Q9 | Legacy

QUESTION NINE

There are several ways of helping infertile women to become pregnant.

These include:

- IVF (in vitro fertilisation)
- FET – implanting frozen embryos from previous IVF treatments into the womb
- COH/IUI – treating the woman with 'fertility drugs' to release several eggs, then introducing sperm into the womb.

9A What is the main difference between COH/IUI and IVF?

1 Fertilisation takes place inside the woman in COH/IUI.

2 'Fertility drugs' are not used in IVF.

3 Sperm are not used in IVF.

4 Embryos are not formed in COH/IUI.

9B Which hormones are normally used as 'fertility drugs'?

1 FSH only

2 FSH and oestrogen

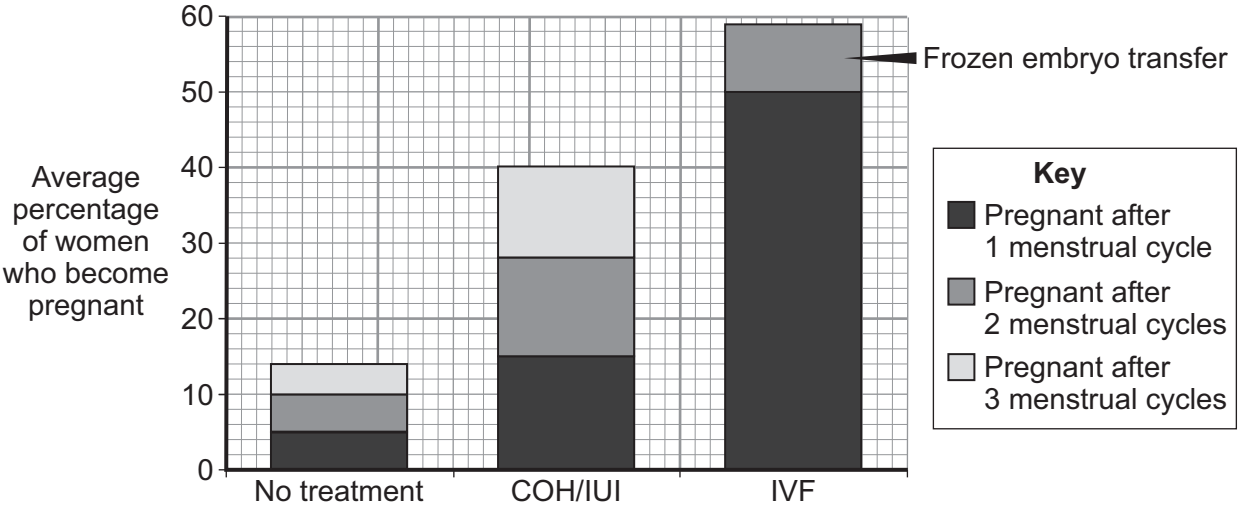
3 FSH and LH

4 LH and oestrogen

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 12 · continued

The graph shows the average percentage of women who become pregnant after one, two and three menstrual cycles.



9C IVF treatment increases the chance of getting pregnant after one menstrual cycle.

By how much does IVF treatment increase the chance?

1 4 times

2 5 times

3 10 times

4 60 times

9D What is the most likely reason for the higher success rate of IVF over COH/IUI?

1 More 'fertility drugs' are used in IVF.

2 Doctors can select the best embryos to use.

3 More eggs are produced in IVF.

4 Doctors can examine the sperm before they are used.

END OF TEST

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 13

November 2011 | BLY1AP | Original Q7 | Legacy

QUESTION SEVEN

In vitro fertilisation (IVF) is used to treat infertility.

7A IVF involves using . . .

1 FSH to stimulate the maturation of eggs and LH to stimulate egg release.

2 LH to stimulate the maturation of eggs and FSH to stimulate egg release.

3 FSH to stimulate the maturation of eggs and oestrogen to stimulate egg release.

4 LH to stimulate the maturation of eggs and oestrogen to stimulate egg release.

The table shows the percentage success rate of fertility treatment and the percentage of multiple births in relation to the age of the woman.

	Age of woman				
	Younger than 35	35–37	38–39	40–42	42+
Percentage of fertility treatments resulting in live births	28.2	23.6	18.3	10.6	3.2
Multiple births as a percentage of these live births	28.4	23.1	18.5	12.4	3.7

7B 16 000 women aged below 35 were given fertility treatment.

How many multiple births were recorded from these women?

1 451

2 454

3 1281

4 4512

7C The evidence in the table is from survey results from 85 clinics from all over England.

The evidence should be given as results from individual clinics because . . .

1 individual clinics may not have recorded some of their failures.

2 it is important to identify the more successful clinics.

3 older people tend to have fewer multiple births.

4 the success rate falls with increased age of the mother.

4.5.3.6 The use of hormones to treat infertility (HT only)

7D The National Institute for Clinical Excellence has suggested rules for deciding who should be allowed fertility treatment.

Which of the following is an acceptable reason to refuse a woman fertility treatment?

1 The couple have been trying to start a family for only three years.

2 The woman has already had one unsuccessful attempt at treatment.

3 The woman is 48 years old.

4 The couple are not married.

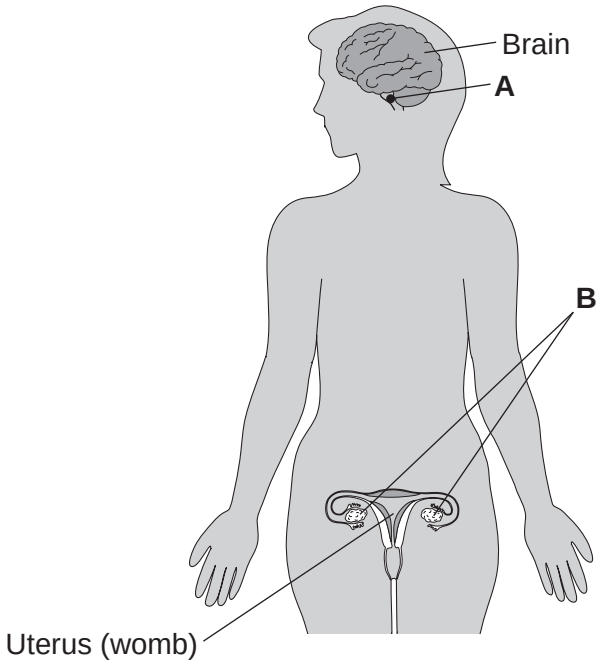
Turn over for the next question

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 14

January 2013 | BL1HP | Original Q2 | Legacy

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**?

.....

(1 mark)

Question 2 continues on the next page

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 14 · continued

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.

.....

.....

(1 mark)

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 14 · continued

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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.....

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.....

(2 marks)

11

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 15

June 2014 | BL2HP | Original Q6 | Legacy

6 Phenylketonuria (PKU) is an inherited condition. PKU makes people ill.

6 (a) PKU is caused by a recessive allele.

6 (a) (i) What is an allele?

[1 mark]

.....

.....

6 (a) (ii) What is meant by recessive?

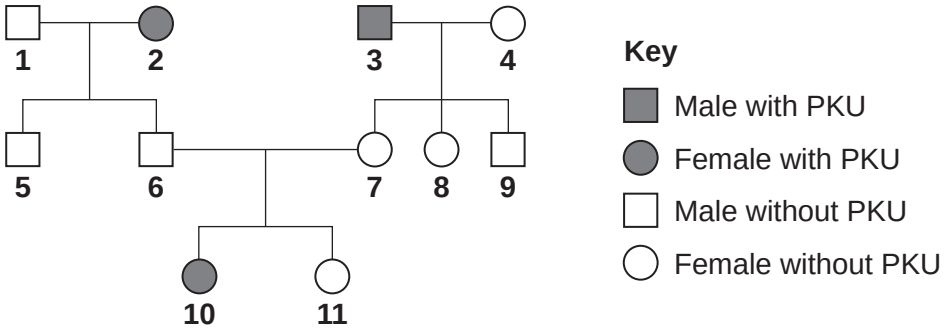
[1 mark]

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6 (b) **Figure 8** shows the inheritance of PKU in one family.

Figure 8



6 (b) (i) Give **one** piece of evidence from **Figure 8** that PKU is caused by a recessive allele.

[1 mark]

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.....

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 15 · continued

6 (b) (ii) Persons **6** and **7** are planning to have another child.
Use a genetic diagram to find the probability that the new child will have PKU.

Use the following symbols in your answer:

N = the dominant allele for **not** having PKU
n = the recessive allele for PKU.

[4 marks]

Probability = ...

6 (c) Persons **6** and **7** wish to avoid having another child with PKU.

A genetic counsellor advises that they could produce several embryos by IVF treatment.

6 (c) (i) During IVF treatment, each fertilised egg cell forms an embryo by cell division.

Name this type of cell division.

[1 mark]

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6 (c) (ii) An embryo screening technique could be used to find the genotype of each embryo.

An unaffected embryo could then be placed in person **7**'s uterus.

The screening technique is carried out on a cell from an embryo after just three cell divisions of the fertilised egg.

How many cells will there be in an embryo after the fertilised egg has

divided three times? ☐

[1 mark]

Question 6 continues on the next page

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 15 · continued

6 (c) (iii) During embryo screening, a technician tests the genetic material of the embryo to find out which alleles are present.

The genetic material is made up of large molecules of a chemical substance.

Name this chemical substance.

[1 mark]

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6 (d) Some people have ethical objections to embryo screening.

6 (d) (i) Give **one** ethical objection to embryo screening.

[1 mark]

.....

6 (d) (ii) Give **one** reason in favour of embryo screening.

[1 mark]

.....

12

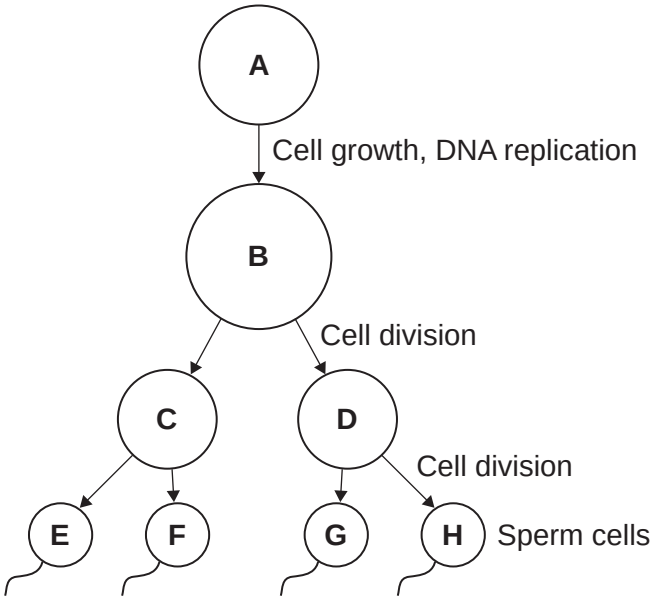
4.5.3.6 The use of hormones to treat infertility (HT only)

Question 16

June 2016 | BL2HP | Original Q5 | Legacy

5 **Figure 4** shows the production of human sperm cells.

Figure 4



5 (a) Name the organ where the processes shown in **Figure 4** take place.

[1 mark]

_____

5 (b) (i) Not every cell in **Figure 4** contains the same amount of DNA.

Cell **A** contains 6.6 picograms of DNA (1 picogram = 10^{-12} grams).

How much DNA is there in each of the following cells?

[2 marks]

Cell **B** _____ picograms

Cell **C** _____ picograms

Cell **E** _____ picograms

5 (b) (ii) How much DNA would there be in a fertilised egg cell?

[1 mark]

_____ picograms

5 (b) (iii) A fertilised egg cell divides many times to form an embryo.

Name this type of cell division.

[1 mark]

_____

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 16 · continued

5 (c) After a baby is born, stem cells may be collected from the umbilical cord. These can be frozen and stored for possible use in the future.

5 (c) (i) What are stem cells?

[2 marks]

5 (c) (ii) Suggest why it is ethically more acceptable to take stem cells from an umbilical cord instead of using stem cells from a 4-day-old embryo produced by In Vitro Fertilisation (IVF).

[1 mark]

5 (c) (iii) Stem cells taken from a child's umbilical cord could be used to treat a condition later in that child's life.

Give **one** advantage of using the child's own umbilical cord stem cells instead of using stem cells donated from another person.

[1 mark]

5 (c) (iv) Why would it **not** be possible to treat a genetic disorder in a child using his own umbilical cord stem cells?

[1 mark]

10

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 17

June 2017 | BL2HP | Original Q6 | Legacy

6 Alkaptonuria (AKU) is a rare, inherited condition. A person with AKU produces brownish-black urine. Further health problems develop later in life.

6 (a) The allele that causes AKU is on chromosome number 3.
The allele is recessive.

6 (a) (i) How many chromosomes are there in most human cells?

[1 mark]

_____

6 (a) (ii) What are alleles?

[1 mark]

_____

_____

6 (a) (iii) What does recessive mean?

[1 mark]

_____

_____

Question 6 continues on the next page

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 17 · continued June 2017 | BL2HP | Original Q6 | Legacy

6 (b) Two parents, who do **not** have AKU, have a child with AKU.

These two parents are heterozygous.

6 (b) (i) What does heterozygous mean?

[1 mark]

_____

_____

6 (b) (ii) Draw a genetic diagram to find the probability that the parents' next child will have AKU.

[4 marks]

You should identify in your diagram any children with AKU.

Use the following symbols: **N** = allele for **not** having AKU (non-AKU)
n = allele for AKU

Probability of having a child with AKU = _____

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 17 · continued

6 (c) The parents do not want to have another child with AKU.

A genetic counsellor tells the parents that this would be possible if they use IVF followed by embryo screening.

The procedure is:

1. several eggs from the woman are fertilised in a glass dish using sperm cells from the man (IVF)
2. each fertilised egg divides to form an embryo
3. at the 16-cell stage, one cell is removed from each embryo and the cell's DNA is tested (embryo screening)
4. one embryo, which does not have the recessive allele for AKU, is placed in the woman's uterus to develop into a baby
5. some of the other embryos may be frozen and stored.

In **Steps 2** and **3**, a 16-cell embryo is produced by cell division of the original fertilised egg cell.

6 (c) (i) Name the type of cell division in **Step 2**.

[1 mark]

_____

6 (c) (ii) How many cell divisions are needed to make 16 cells from one cell?

[1 mark]

_____

6 (d) Some people have ethical objections to embryo screening.

6 (d) (i) Suggest **one** ethical objection to embryo screening.

[1 mark]

_____

_____

6 (d) (ii) Suggest **one** reason in favour of embryo screening.

[1 mark]

_____

_____

12

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 18

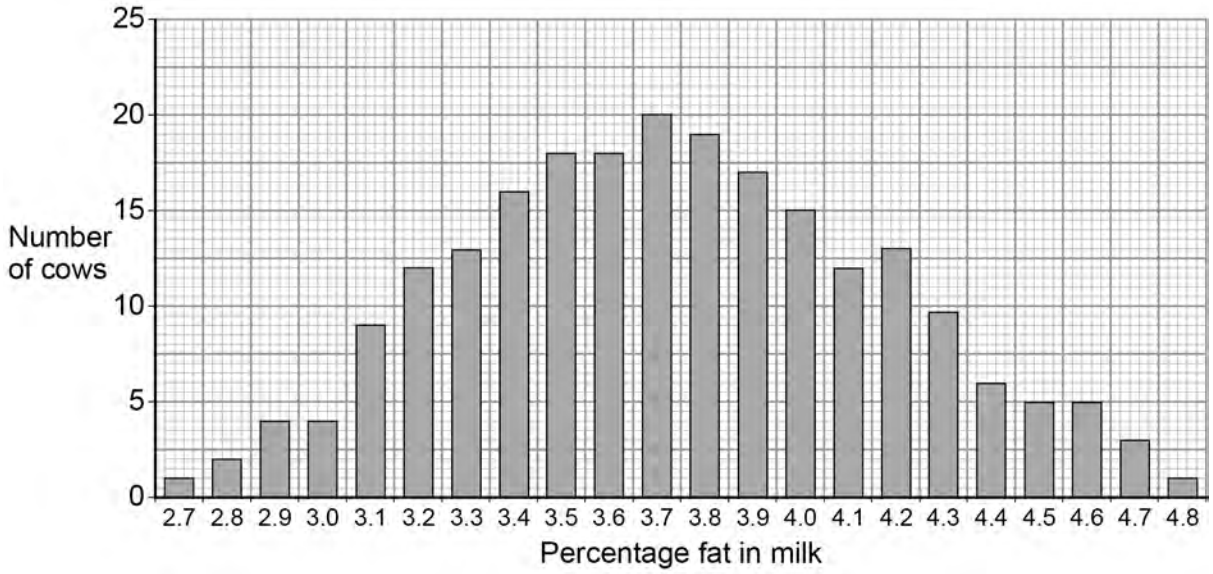
June 2018 | 8461/2H | Original Q8

0 8 Scientists want to breed cows that produce milk with a low concentration of fat.

Figure 10 shows information about the milk in one group of cows.

The cows were all the same type.

Figure 10



0 8 . 1 In **Figure 10** the mean percentage of fat in the milk is equal to the modal value.

Give the mean percentage of fat in the milk of these cows.

[1 mark]

Mean percentage = _____

0 8 . 2 A student suggested:

'The percentage of fat in milk is controlled by one dominant allele and one recessive allele.'

How many different phenotypes would this produce?

[1 mark]

Tick **one** box.

2		3		22		46	

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 18 · continued

0 8 . 3 Give the evidence from **Figure 10** which shows the percentage of fat in the milk is controlled by several genes.

[1 mark]

0 8 . 4 One of the genes codes for an enzyme used in fat metabolism.

A mutation in this gene causes a reduction in milk fat.

The mutation changes one amino acid in the enzyme molecule.

Explain how a change in one amino acid in an enzyme molecule could stop the enzyme working.

[3 marks]

Question 8 continues on the next page

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 18 · continued

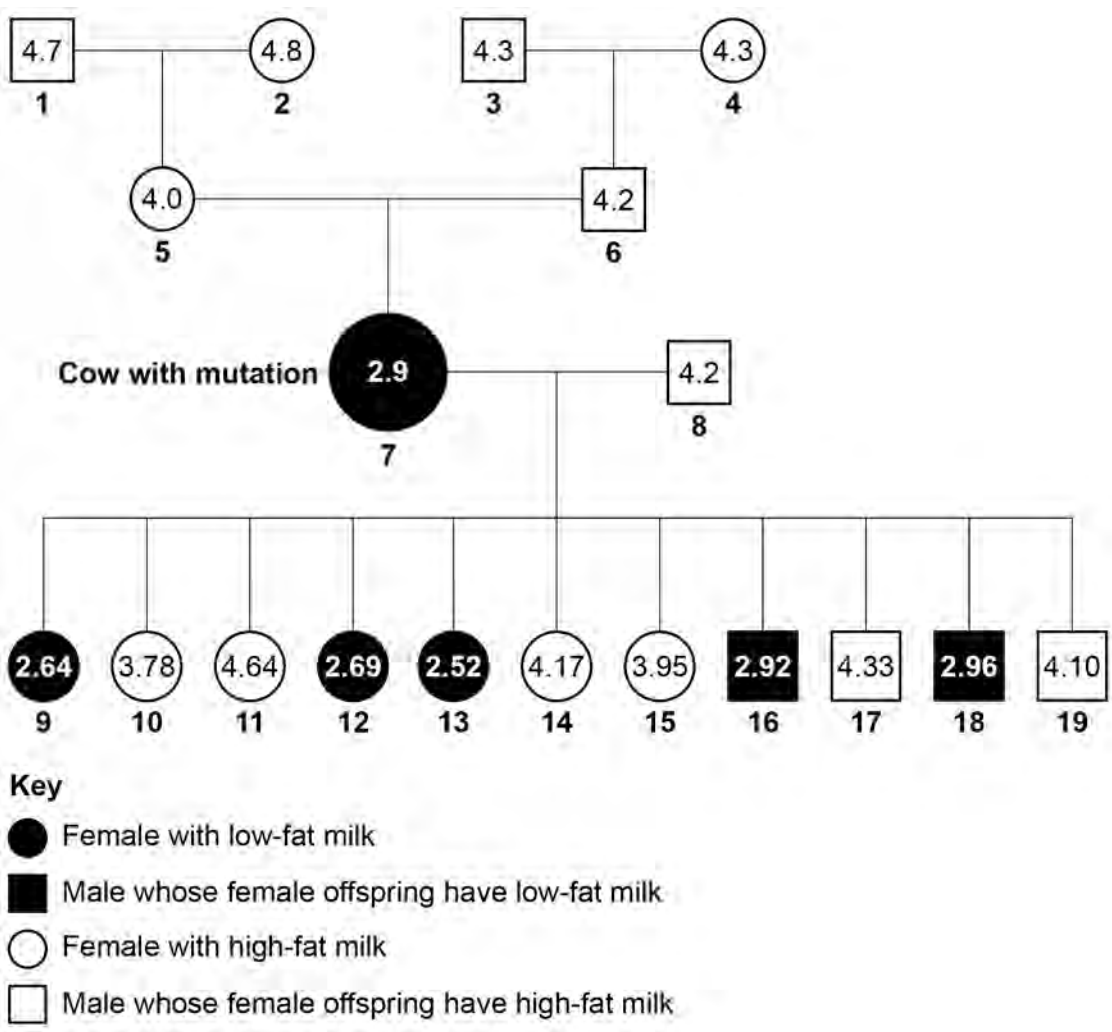
The scientists found one cow with a mutation.

The cow's milk contained only 2.9% fat.

Figure 11 shows the percentage of fat in the milk of cattle related to the cow with the mutation.

The values for male cattle are the mean values of their female offspring.

Figure 11



4.5.3.6 The use of hormones to treat infertility (HT only)

Question 18 · continued

0 8 . 5 Animal **8** is homozygous.

The mutation in animal **7** produced a dominant allele for making low-fat milk.

Give evidence from **Figure 11** that animal **7** is heterozygous.

[1 mark]

0 8 . 6 Animals **7** and **8** produced 11 offspring. These offspring were produced by in vitro fertilisation (IVF).

The embryos from IVF were transferred into 11 other cows.

Suggest why IVF and embryo transfer were used rather than allowing animals **7** and **8** to mate naturally.

[1 mark]

0 8 . 7 Draw a Punnett square diagram to show a cross between animals **7** and **8**.

Identify which offspring produce low-fat milk and which offspring produce high-fat milk.

[4 marks]

Use the following symbols:

D = dominant allele for making low-fat milk

d = recessive allele for making high-fat milk

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 18 · continued

0 8 . 8 The scientists want to produce a type of cattle that makes large volumes of low-fat milk.

The scientists will selectively breed some of the animals shown in **Figure 11**.

Describe how the scientists would do this.

[4 marks]

16

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 19

June 2023 | 8461/2H | Original Q7

0 7 Hormones are important for regulating the menstrual cycle.

During the menstrual cycle, eggs mature inside follicles in the ovaries.

A 27-year-old woman was infertile.

A doctor tested a sample of the woman's blood.

The test did **not** detect any follicle stimulating hormone (FSH) in the woman's blood.

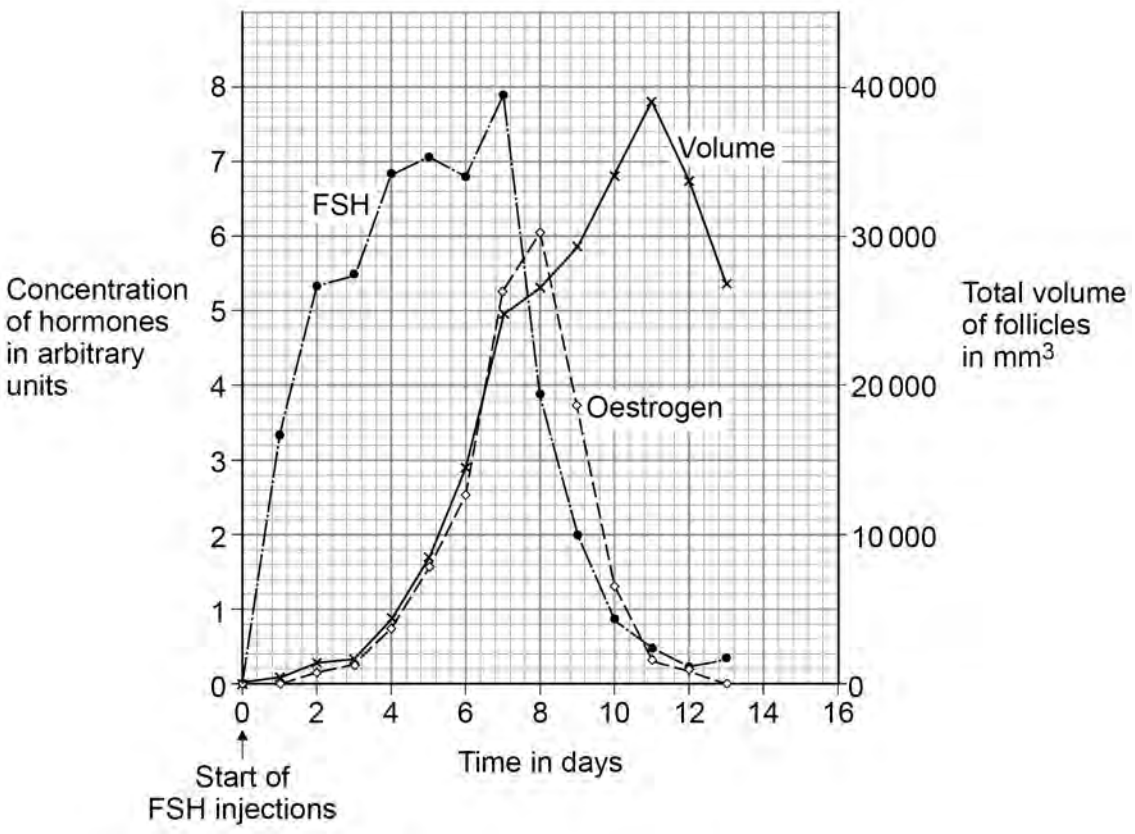
The doctor gave the woman daily injections of FSH for 7 days.

The doctor measured:

- the concentration of FSH in the woman's blood
- the concentration of oestrogen in the woman's blood
- the volumes of developing follicles in the ovaries.

Figure 12 shows the results.

Figure 12



4.5.3.6 The use of hormones to treat infertility (HT only)

Question 19 · continued

0 7 . 1 Give evidence from **Figure 12** that the follicles in the ovaries release oestrogen.

[1 mark]

0 7 . 2 Injection of FSH caused the development of a number of follicles.

The mean diameter of the follicles on day 11 was 22 millimetres.

Calculate the number of follicles in the woman's ovaries on day 11.

Assume each follicle is a sphere.

Volume of a sphere = $\frac{4}{3}\pi r^3$

r = radius

π = 3.14

Give your answer to the nearest whole number.

[5 marks]

Number of follicles (to the nearest whole number) = _____

Question 7 continues on the next page

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 19 · continued

0 7 . 3 Before treatment with FSH, the woman had underdeveloped breasts.

Explain why the lack of FSH in the woman's blood caused underdeveloped breasts.

[2 marks]

0 7 . 4 Usually males and females both produce FSH.

The woman had inherited a faulty gene for FSH production from each of her parents.

The woman's parents both produce FSH.

Show how the **woman's parents** could have a child that does **not** produce FSH.

You should:

- draw a Punnett square diagram
- identify the phenotype of each offspring genotype
- use the symbols below:

  H = allele for making FSH

  h = allele for **not** making FSH

[3 marks]

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 19 · continued

0 7 . 5 The woman continues to have injections of FSH.

The woman has a child with a man who is heterozygous for the FSH gene.

Explain why the probability that the child will be able to produce FSH is 0.5.

[3 marks]

14

Turn over for the next question

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 20

June 2024 | 8461/2H | Original Q5

0 5 The human body has two coordination systems:

- the nervous system
- the endocrine system.

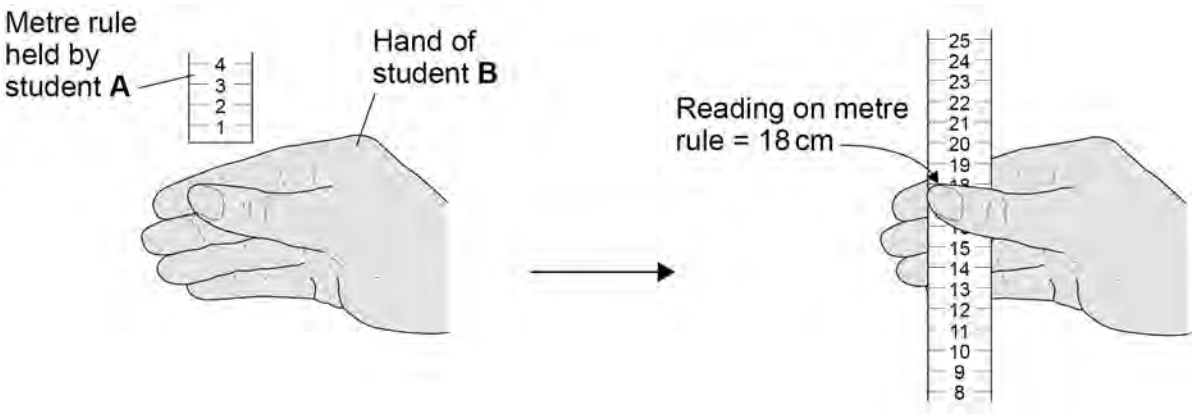
0 5 . 1 Two students investigated human reaction time.

Student **A** held a metre rule above student **B**'s hand.

Student **A** then released the metre rule and student **B** caught the rule as quickly as possible.

Figure 8 shows the method used.

Figure 8



Suggest **two** ways to improve the students' method for measuring human reaction time.

[2 marks]

1 _____

_____

2 _____

_____

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 20 · continued

0 5 . 2 Student **B**'s reaction is coordinated by the nervous system.

Give **two** ways that coordination by the endocrine system is different from coordination by the nervous system.

[2 marks]

1 _____

_____

2 _____

_____

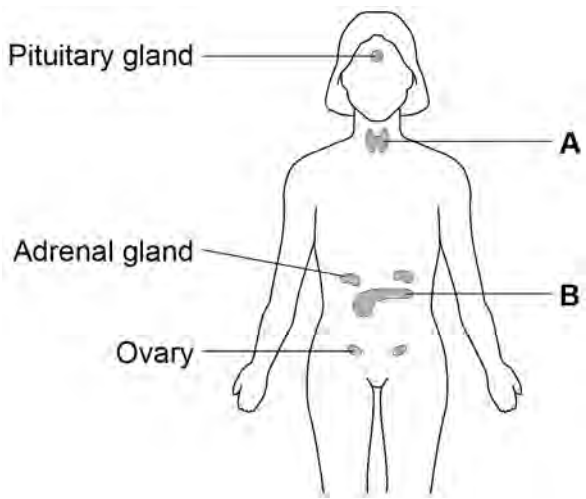
Question 5 continues on the next page

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 20 · continued

Figure 9 shows endocrine glands in a female.

Figure 9



0 5 . 3 Name **one** hormone produced by gland **A**.

[1 mark]

0 5 . 4 Name **one** hormone produced by gland **B**.

[1 mark]

0 5 . 5 The adrenal gland produces the hormone adrenaline.

Describe **two** effects of adrenaline on the human body.

[2 marks]

1

2

4.5.3.6 The use of hormones to treat infertility (HT only)

Question 20 · continued June 2024 | 8461/2H | Original Q5

0 5 . 6 Hormones can be used for controlling human reproduction.

Explain the use of hormones in:

- contraception
- the treatment of infertility.

[6 marks]

14