



Nerves and Hormones

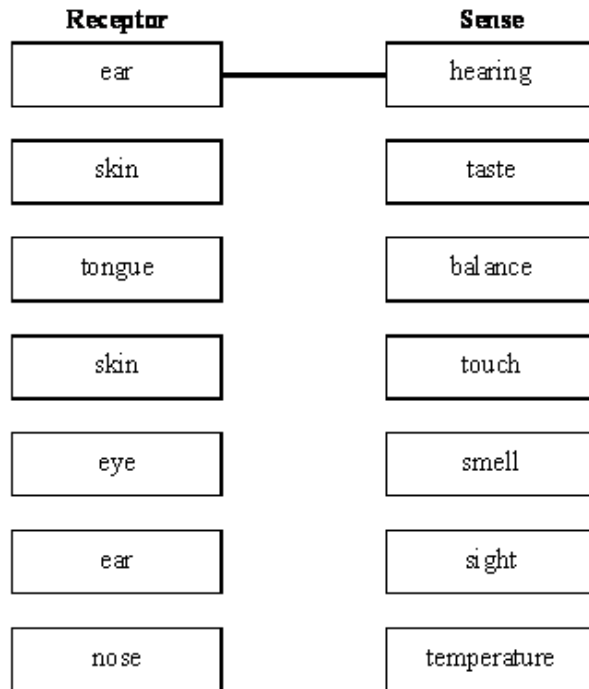


108 minutes



108 marks

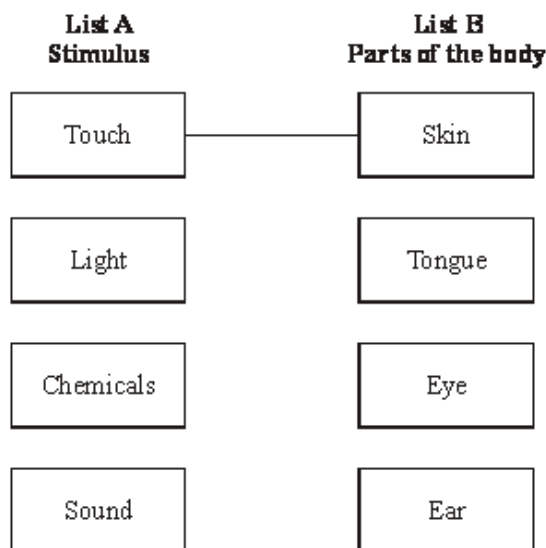
Q1. Humans use receptors to help them to respond to stimuli in the environment. Match up each receptor with the correct sense. One has been done for you.



(Total 5 marks)

Q2. (a) List **A** gives the names of four stimuli. List **B** gives four parts of the human body.

Draw a straight line from each stimulus in List **A** to the part of the body in List **B** which has receptors for that stimulus.
(One has been done for you.)



(3)

(b) Complete the following sentence by choosing the correct words from the box.

brain glands motor sensory

To make us aware of a stimulus, impulses are sent along a neurone
to the

(2)
(Total 5 marks)

Q3. Reflex actions are rapid and automatic.

(a) Name the following structures in a reflex action.

(i) The structure that detects the stimulus.

.....

(1)

(ii) The neurone that carries impulses to the central nervous system.

.....

(1)

(iii) The neurone that carries impulses away from the central nervous system.

.....

(1)

(iv) The structure that brings about the response.

.....

(1)

(b) Describe what happens at a synapse when an impulse arrives.

.....

.....

.....

.....

.....

(2)

(c) Some people have a condition in which information from the skin does not reach the brain.

Explain why this is dangerous for the person.

.....
.....
.....
.....
.....

(2)
(Total 8 marks)

Q4. The body controls internal conditions.

(a) Use words from the box to complete the sentences about water loss from the body.

kidneys	liver	lungs	skin
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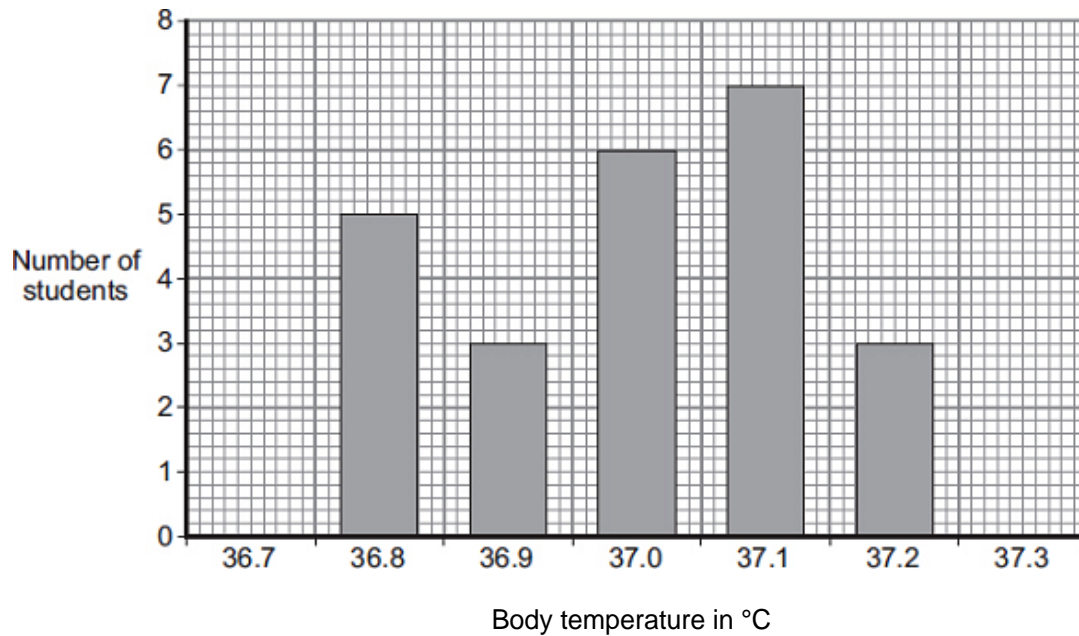
(i) Water is lost in sweat via the (1)

(ii) Water is lost in urine via the (1)

(iii) Water is lost in the breath via the (1)

(b) Students investigated body temperature in the class.

The bar chart shows the results.



(i) One student used the bar chart to calculate the mean body temperature of the class.

The student calculated the mean body temperature as 37.0 °C.

How did the student use the bar chart to calculate the mean?

.....

.....

.....

.....

(2)

(ii) How many students had a body temperature higher than the mean of 37.0 °C

.....

(1)

(iii) Body temperature must be kept within a narrow range.

Why?

.....

.....

(1)

(Total 7 marks)

Q5. A dog runs across the road in front of a car. The driver slams her foot on the brakes.

(i) Explain how the nervous system brings about this response.

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.....
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.....
.....
.....
.....

(4)

(ii) Explain why alcohol consumption would affect the driver's response.

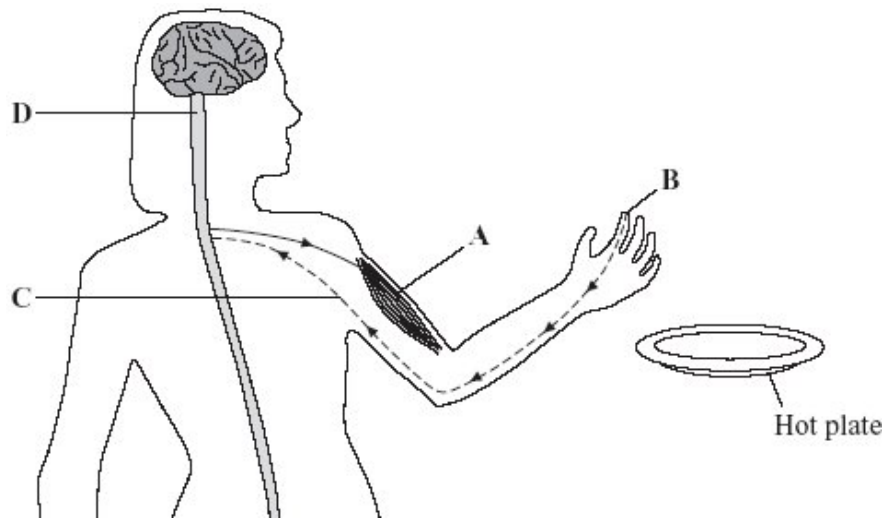
.....
.....

(1)

(Total 5 marks)

Q6. A girl picks up a hot plate. A reflex action causes her to drop it.

The diagram shows some of the structures involved in this reflex action.



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

brain	gland	muscle	neurone	receptor	spinal cord
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A

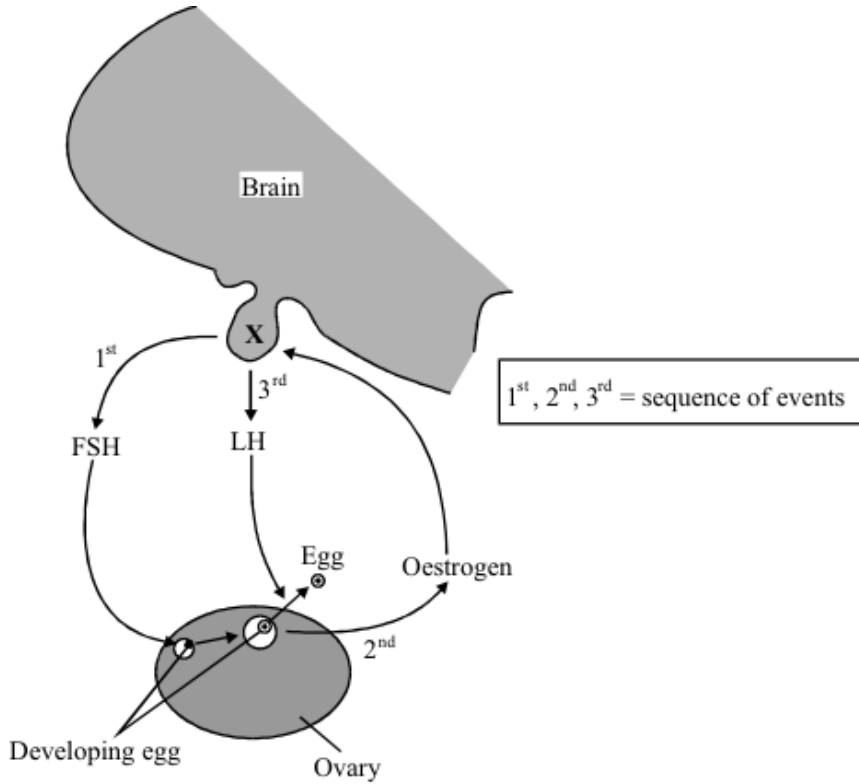
B

C

D

(Total 4 marks)

Q7. The diagram shows how three hormones, FSH, LH and oestrogen, work together in a woman's body.



(a) Name the part of the brain labelled **X**.

.....

(1)

(b) Use information from the diagram and your own knowledge to explain why some oral contraceptive pills contain oestrogen.

.....

(3)

(Total 4 marks)

Q8. A woman wants to have a baby. She has been told that her body is not making and releasing eggs. However she has thousands of cells which could develop into them. A possible treatment is to give her a hormone called FSH. This hormone will start the development of these cells.

Once the eggs have developed, explain what causes their release.

.....

.....

.....

.....

.....

.....

(Total 4 marks)

Q9. Describe how the brain is informed of the image detected by the retina.

.....

.....

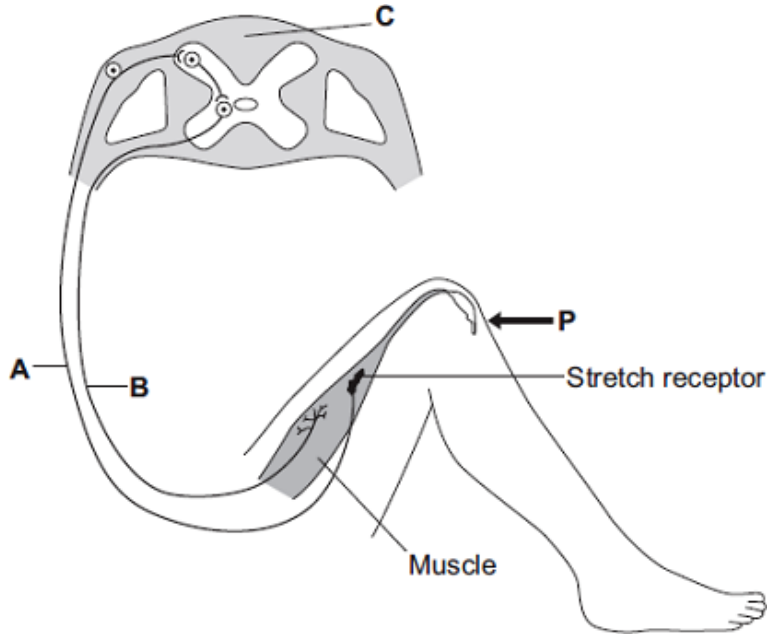
.....

.....

.....

(Total 3 marks)

Q10. The diagram shows the structures involved in the knee-jerk reflex. When the person is hit at point **P**, the lower leg is suddenly raised.



(a) Name the structures labelled **A**, **B** and **C**.

A

B

C

(3)

(b) How is information passed across a synapse?

.....

(1)

(c) What is the effector in this response?

.....

(1)

(Total 5 marks)

Q11. Hormones regulate the functions of many organs.

Complete the following sentences.

(a) Hormones control the monthly release of an egg from the woman's

(1)

(b) Hormones also control the thickness of the lining of her

(1)

(c) Hormones given to women to stimulate the release of eggs
are called drugs.

(1)
(Total 3 marks)

Q12. The *Invocell* device below is used in a new IVF (in-vitro fertilisation) treatment. Sperm and eggs are placed in the device which is then placed in the woman's vagina.



The table compares standard IVF treatment with *Invocell* IVF treatment.

	Standard IVF treatment	<i>Invocell</i> IVF treatment
Success rate	29.6 %	19.7 %
Cost	£2500	£900
Laboratory equipment needed	Extra equipment needed	None
Fertility problems that can be treated	100 %	50 %
Hormone treatment needed	Yes	Yes
When the embryos can be seen	Within hours	After 3 days

Using **only** the information given in the table, answer these questions.

(a) Give **two** advantages of *Invocell* IVF treatment compared with standard IVF treatment.

- 1
-
- 2
-

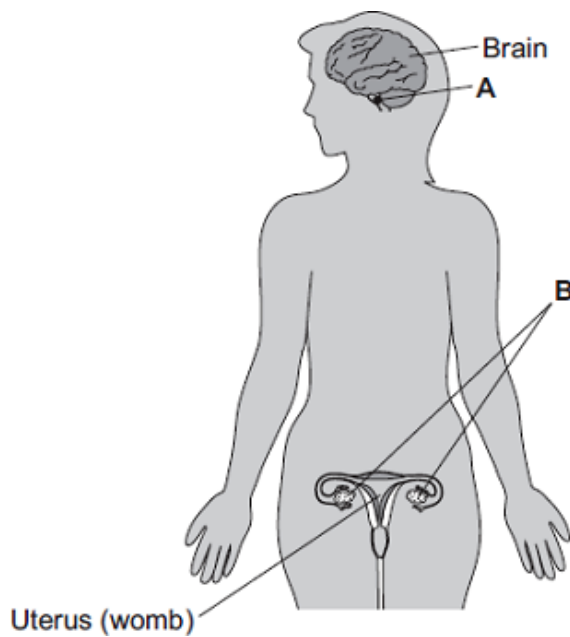
(2)

(b) Give **two** disadvantages of *Invozell* IVF treatment compared with standard IVF treatment.

- 1
-
- 2
-

(2)
(Total 4 marks)

Q13. The diagram shows the position of two glands, **A** and **B**, in a woman.



(a) (i) Name glands **A** and **B**.

A

B

(2)

(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)

- (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)

- (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.

.....
.....
.....
.....
.....
.....

(3)

- (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)

- (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

- (i) Compare the success rates of the two clinics in 2007.

.....

(1)

- (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**.

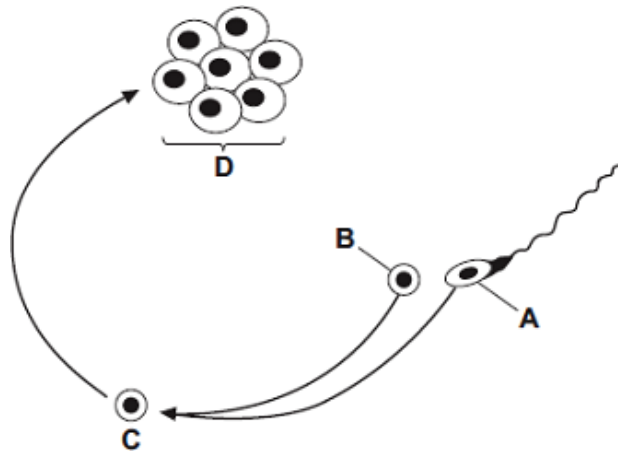
Suggest why.

.....

(2)

(Total 11 marks)

Q14. 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
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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)

Q15. The human body produces many hormones.

(a) (i) What is a *hormone*?

.....

.....

(1)

(ii) Name an organ that produces a hormone.

.....

(1)

(iii) How are hormones transported to their target organs?

.....

(1)

(b) Describe how the hormones FSH, oestrogen and LH are involved in the control of the menstrual cycle.

.....
.....
.....
.....
.....
.....
.....
.....

(3)

(Total 6 marks)

Q16. 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

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

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

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

Helps the baby to hold on to the mother

Prevents the baby from choking

Helps to protect some of the baby's receptors

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)

Q17. In-vitro fertilisation (IVF) is used to help some women get pregnant.

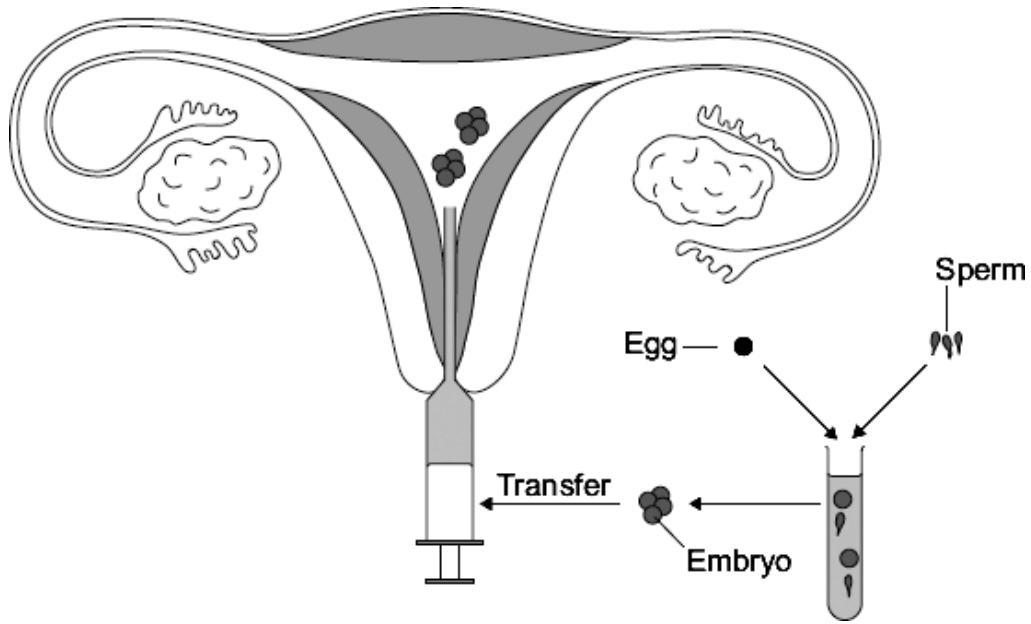
(a) Name the **two** hormones used in IVF treatment.

1

2

(2)

(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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.....

.....

.....

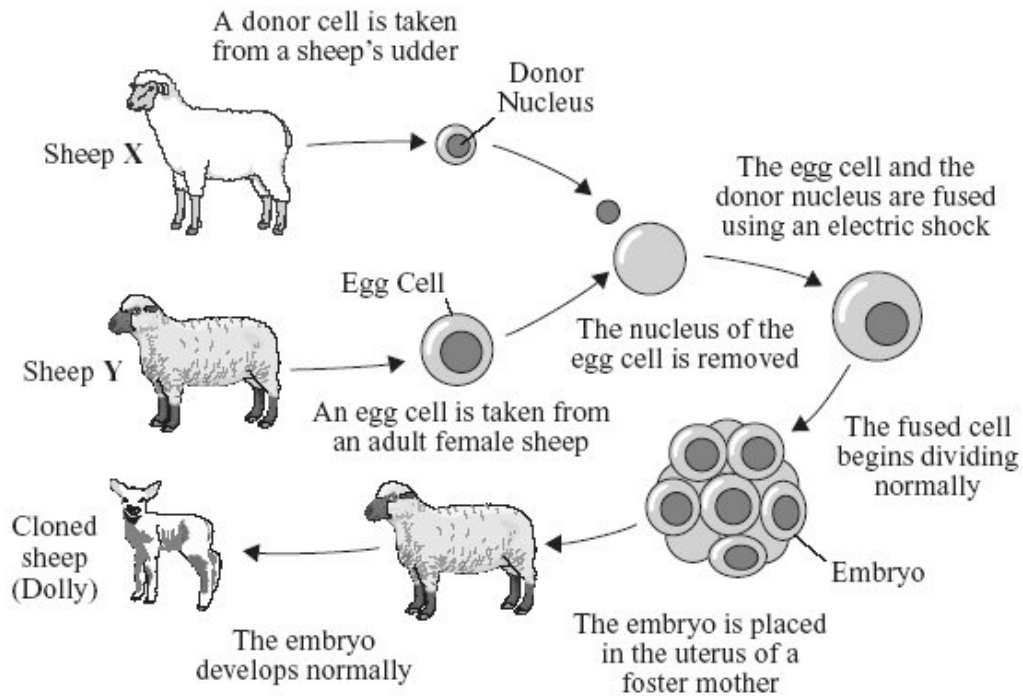
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.....

.....

(4)
(Total 6 marks)

Q18. The diagram shows how Dolly the sheep was cloned.

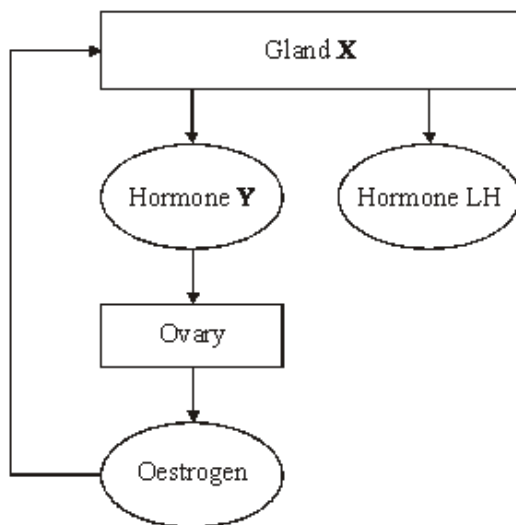


(a) Name the type of cell division that occurs:

- (i) as the egg cell is produced;
- (ii) as the fused cell begins to divide normally.

(2)

(c) The diagram below shows the relationships between the glands and hormones that control the menstrual cycle of a woman.



- (i) Name:
gland X;
- hormone Y.

(2)

(ii) Give **two** effects of the hormone oestrogen on gland **X**.

1

.....

2

.....

(2)
(Total 6 marks)

Q19. 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)

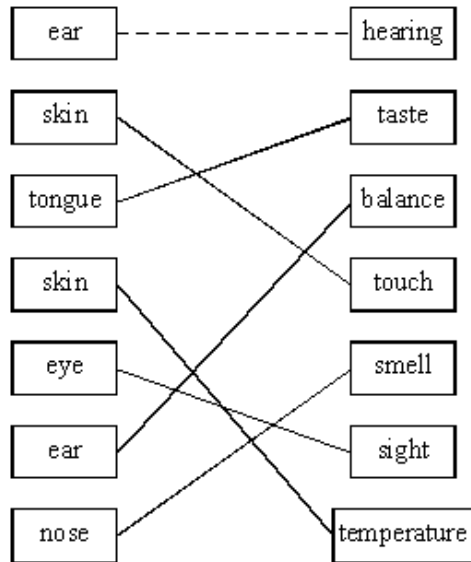
- (c) Information from sense organ **A** is passed along nerve cells.
The information is coordinated to produce a response.

Which organ in the body coordinates the information?

.....

(1)
(Total 6 marks)

M1.

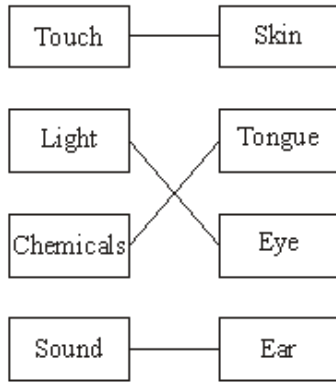


one correct **1** mark
two correct **2** marks
three correct **3** marks
four correct **4** marks
five or six correct **5** marks
(• for 6th correct mark)

both skin boxes can be connected to either touch or temperature
do **not** credit where more than one link goes to or from any box
(except for skin, touch and temperature)

[5]

M2. (a) Stimulus Part of the body



1 mark for each correct line
if 2 lines to **one** box, CANCEL mark

max 3

(b) in correct sequence:

sensory

1

brain

1

[5]

M3. (a) (i) receptor

allow named receptor eg light receptor

ignore sensory neurone

allow sense organ / named sensory organ eg skin / eye

1

(ii) sensory (neurone)

allow afferent

1

(iii) motor (neurone)

allow efferent

1

(iv) effector / muscle / gland / named

1

- (b) any **two** from:
- impulse / information passes from one neurone to another
or impulse / information passes across gap
 - chemical / transmitter involved
 - diffusion (across gap)
- 2
- (c) brain / person not aware of pain / stimulus / can't feel
allow brain/ person doesn't know / realise / unable to coordinate
ignore reflex
ignore information
- 1
- possibility of (permanent / serious) damage / eg burning
ignore danger
- 1
- [8]**

- M4.** (a) (i) skin
- 1
- (ii) kidneys
accept kidney
- 1
- (iii) lungs
accept lung
- 1
- (b) (i) multiply temperature by number of students at that temperature and add them up
allow $(36.8 \times 5) + (36.9 \times 3) + (37.0 \times 6) + (37.1 \times 7) + (37.2 \times 3)$
allow 888
- 1
- divide by number of students
allow divide by 24
- 1
- (ii) 10 / ten
- 1
- (iii) so enzymes work (well)
ignore death / overheating / hypothermia
allow body reactions work (well)
- 1
- [7]**

- M5.** (i) eyes as sense organs/detector/receptors in eye,
 electrical signals (impulses),
 to co-ordinator,
 then to leg muscles/effector
for 1 mark each 4
- (ii) affects the nervous system and slows down the reactions
for 1 mark 1
- [5]

- M6.** A – muscle 1
- B – receptor 1
- C – neurone 1
- D – spinal cord 1
- [4]

- M7.** (a) pituitary (gland / body) 1
- (b) oestrogen inhibits the release of FSH
ignore references to LH 1
- FSH stimulates follicle development / causes egg to develop
or no follicle / egg development if high oestrogen
accept growth / maturing / ripening for development 1
- no ovulation / no egg release
*do **not** accept no egg to be fertilised* 1
- [4]

M8. oestrogen produced
gains 1 mark

but N.B. sequence important here
oestrogen produced by ovary
gains 2 marks

LH produced
gains 1 mark

but
LH produced by pituitary
gains 2 marks

LH causes egg release
for 1 mark

[4]

M9. an impulse **or** electrical signal
accept electrical pulse do not credit message

1

in receptor **or** neurone of retina
*accept nerve **or** rod **or** cone*

1

sent along optic nerve
do not credit inverts the image

1

[3]

M10. (a) **A** sensory (neurone)
ignore nerve

1

B motor (neurone)
ignore nerve

1

C spinal cord / central nervous system / white matter
accept grey matter

1

(b) by chemical / substance
allow transmitter

1

	(c) muscle			
		<i>allow extensor</i>		
		<i>ignore muscle names</i>		
			1	
				[5]
M11.	(a) ovary		1	
	(b) womb / uterus		1	
	(c) fertility		1	
				[3]
M12.	(a) costs less		1	
	no / less equipment needed		1	
	(b) any two from:			
	• lower success rate / only 19.7% success rate			
	• not all cases can be treated			
	or			
	only 50% of cases can be treated			
	• embryo can't be seen until third day		2	
				[4]
M13.	(a) (i) A – pituitary			
		<i>allow hypothalamus</i>		
			1	
		B – ovary / ovaries		
			1	
	(ii) in blood (stream)			
		<i>accept in plasma</i>		
		<i>ignore dissolved</i>		
			1	
	(b) (i) FSH and Luteinising Hormone (LH)		1	

	(ii) fertilised OR reference to sperm	1
	form embryos / ball of cells or cell division	1
	(embryo) inserted into mother's womb / uterus <i>allow (fertilised egg) is inserted into mother's womb / uterus</i>	1
	(iii) any one from: <ul style="list-style-type: none"> • multiple births lead to low birth weight • multiple births cause possible harm to mother / fetus / embryo / baby / miscarriages <i>allow premature</i> <i>ignore reference to cost / ethics / population</i> 	1
(c)	(i) any one from: <ul style="list-style-type: none"> • almost identical <i>allow S (slightly) more successful</i> • both approximately 20% 	1
	(ii) larger numbers (in clinic R) (in 2007) <i>allow <u>only</u> 98 (in S) (compared to 1004 (in R))</i>	1
	results likely to be more repeatable (in 2008) <i>allow more reliable</i> <i>do not accept more reproducible / accurate / precise</i>	1
		[11]
M14.	(a) A sperm	1
	B egg	1
	C fertilised egg	1
	D embryo	1
	(b) insert into mother <i>ignore fertilise / check fertilisation / check viability</i>	1

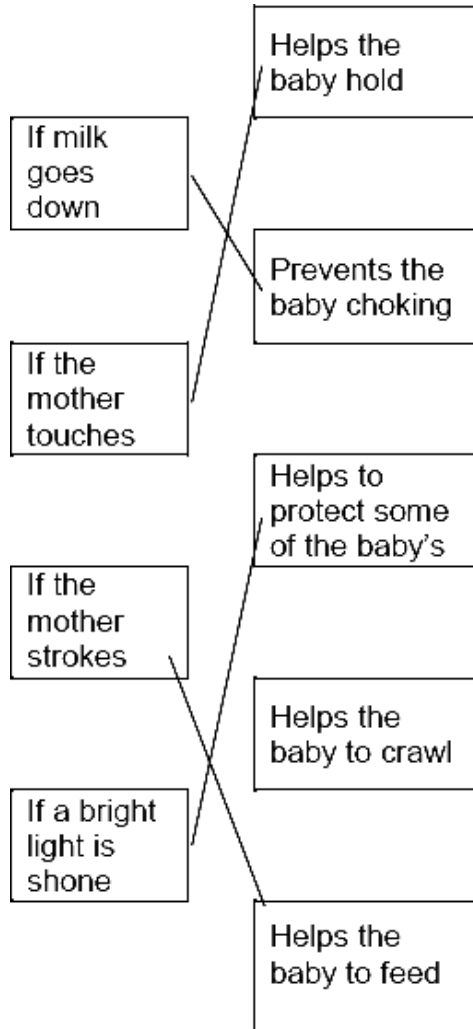
	womb / uterus		1
(c)	(i) one quarter		1
	(ii) no / little chance of success over 42		1
	reference to table of only two women in the age bracket 40-42 years became pregnant <i>the statement 'only 2 out of 53 40-42 year old women became pregnant / had babies' gains 2 marks</i>		1
	(iii) so fewer twins / multiple births or multiple births more dangerous		1
			[10]
M15.	(a) (i) any one from:		
	• chemical messenger / message <i>allow substance / material which is a messenger</i>		
	• chemical / substance produced by a gland <i>allow material produced by a gland</i>		
	• chemical / substance transported to / acting on a <u>target</u> organ		
	• chemical / substance that <u>controls</u> <u>body</u> <u>functions</u>		1
	(ii) gland / named endocrine gland <i>brain alone is insufficient</i> <i>allow phonetic spelling</i>		1
	(iii) in blood / plasma or circulatory system or bloodstream <i>accept blood vessels / named</i> <i>do not accept blood cells / named</i>		1
	(b) <i>each hormone must be linked to correct action</i> <i>apply list principle</i> <i>ignore the gland producing hormone</i>		
	FSH stimulates oestrogen (production) / egg maturation / egg ripening <i>ignore production / development of egg</i>		1
	oestrogen inhibits FSH <i>allow oestrogen stimulates LH / build up of uterine <u>lining</u></i>		1

LH stimulates egg / ovum release / ovulation
accept LH inhibits oestrogen
accept LH controls / stimulates
growth of corpus luteum
ignore production of egg

1

[6]

M16. (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]

M17. (a) FSH / follicle stimulating hormone

*allow FHS
either order*

1

LH / luteinizing hormone

1

(b) any **four** from:

- egg(s) collected from ovary
- (eggs) mixed with sperm **or** fertilisation occurs
allow eggs and sperm put into tube
- fertilised egg divides
- embryo formed
- (embryos) inserted into womb / uterus
ignore references to vagina
- FSH matures egg **and** LH releases eggs

4

[6]

M18. (a) (i) meiosis

1

(ii) mitosis

1

- (c) (i) **X** pituitary 1
- Y** FSH 1
- (ii) stimulates LH production 1
- inhibits FSH production / production of **Y** 1

[6]

- M19.**
- (a) a stimulus 1
 - (b) (i) **A** 1
 - (ii) **C**
either order 1
 - D** 1
 - (iii) **E** 1
 - (c) brain 1
allow spinal cord / CNS / central nervous system
*do **not** allow spine*

[6]

