

1

- (a) During respiration, sugar is oxidised to release energy. Complete the equation for respiration.

Sugar + _____ = _____ + _____ + energy

(3)

- (b) The photograph below shows an athlete using an exercise machine. The machine can be adjusted to vary the rate at which the athlete is required to work.

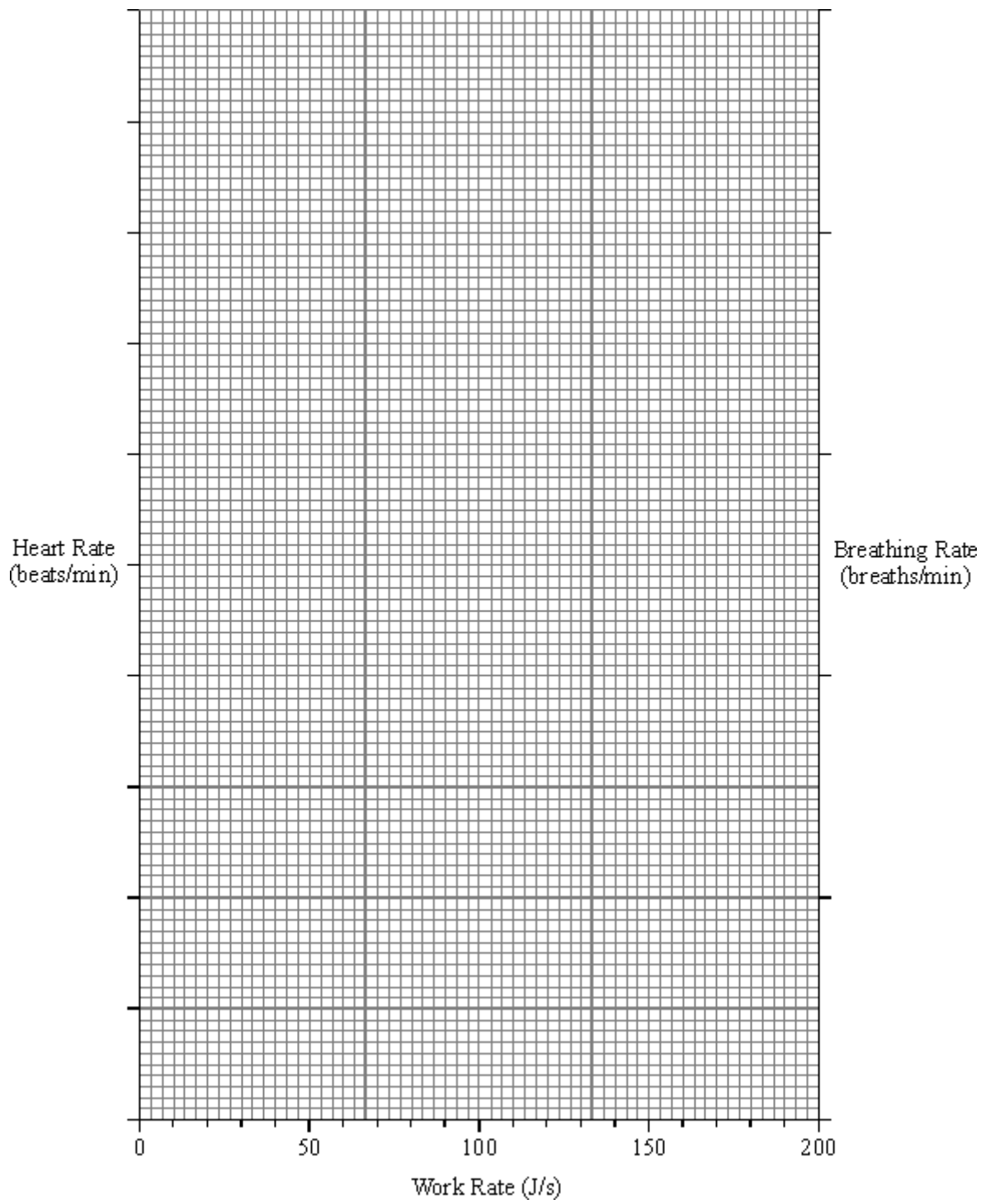


The athlete's heart rate and breathing rate were measured at different work rates.

The table below shows the results which were obtained.

WORK RATE (J/s)	HEART RATE (beats/min.)	BREATHING RATE (breaths/min.)
0	86	9.6
60	106	10.0
80	112	10.4
100	122	10.4
120	135	11.4
140	143	14.5
160	156	15.8
200	174	30.5

Plot the data on the graph paper below.



(3)

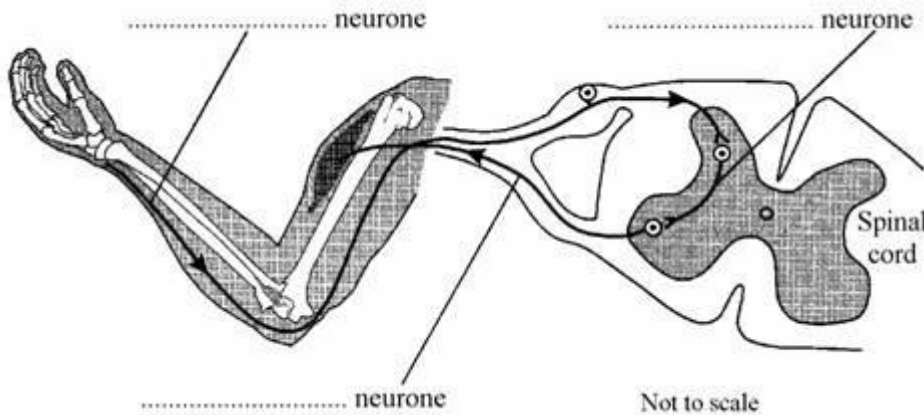
2 Describe how the brain is informed of the image detected by the retina.

(Total 3 marks)

3 (a) What is the name of the organ which controls the nervous system?

(1)

(b) The diagram shows a reflex arc. Label the **three** neurones.



(3)

(c) Snatching your hand from a hot object is an example of a reflex action. Give **one** other example of a reflex action.

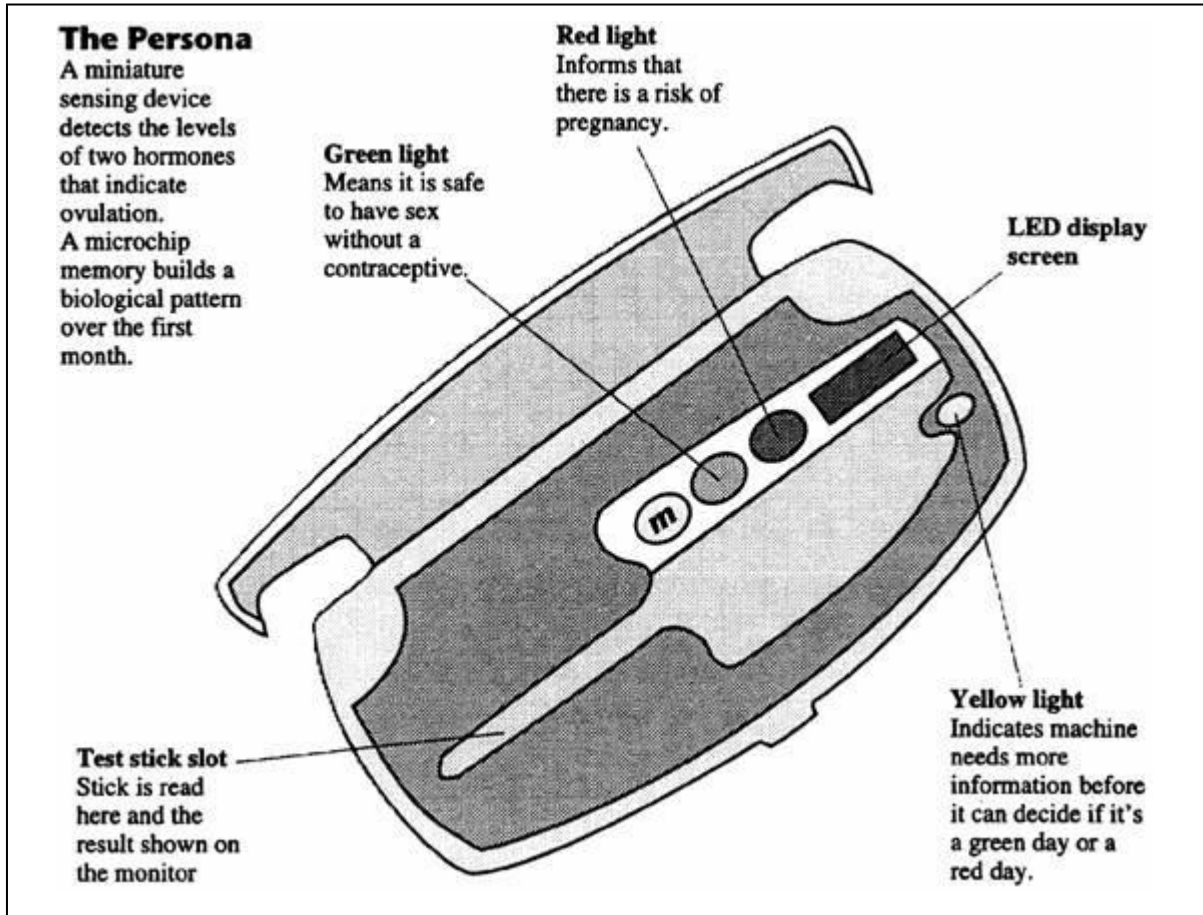
(1)

(d) Describe the stages that happen in a reflex action.

(3)

(Total 8 marks)

- 4 In women, two hormones control ovulation (the release of eggs from the ovaries). The drawing shows a monitoring machine which women can use to measure the amounts of the two hormones. A test stick is dipped in the woman's urine each morning, then placed in a slot in the machine.



(a) The machine monitors the levels of two hormones.

(i) What is a hormone?

(1)

(ii) How are hormones transported around the body?

(1)

(b) A woman is unlikely to become pregnant if she has sex on the days when the machine shows a green light during the test. Use information from the drawing to suggest why.

(1)

(Total 3 marks)

5

The picture shows some birth control (contraceptive) pills for women.



These are some facts about using the birth control pills:

- birth control pills are 99 per cent effective in preventing pregnancy
- the hormones in the pills have some rare but serious side effects
- this method of birth control gives no protection against sexually transmitted diseases
- the hormones in the pills give protection against some women's diseases
- the woman has to remember to take the pill every day
- the woman's monthly periods become more regular.

Use the information above to answer these questions.

(a) Give **two** advantages of using birth control pills.

1. _____

2. _____

(2)

(b) Give **two** disadvantages of using birth control pills.

1. _____

2. _____

(2)
(Total 4 marks)

6

This question is about the hormones that control the monthly cycle in women.

Complete the sentences.

Hormones control the monthly release of an egg from a woman's _____.

They also control the thickness of the lining of her _____.

Hormones that are given to women to stimulate the release of eggs are called

_____ drugs.

Hormones that are given to women to prevent the release of eggs are called

oral _____.

(Total 4 marks)

7

The monthly cycle of women is controlled by hormones.

(a) Name the **two** glands that secrete these hormones.

1. _____
2. _____

(2)

(b) Describe **two** ways in which fertility in women can be controlled by giving hormones.

1. _____

2. _____

(2)
(Total 4 marks)

8

(a) Fill in the table about receptors. The first answer has been done for you.

RECEPTORS IN THE	SENSITIVE TO
Eyes	Light
Skin	
	Sound
Tongue	

(3)

(b) Describe, in as much detail as you can, how information is transmitted from light receptors in the retina to the brain.

(3)

(Total 6 marks)

9

(a) Give **three** receptors which a mouse might use to detect food under natural conditions.

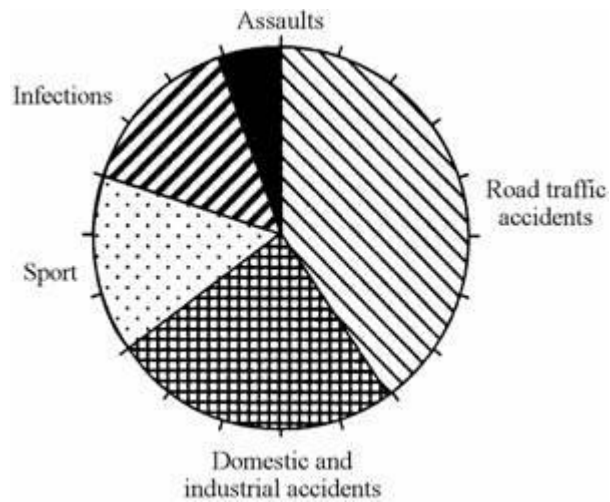
1. _____

2. _____

3. _____

(3)

(a) The pie chart shows the causes of damage to the spinal cord.



(i) Which is the commonest cause of damage to the spinal cord?

(1)

(ii) Calculate the proportion of injuries to the spinal cord caused by sport.

Proportion _____

(1)

(b) Explain why a man with a damaged spinal cord cannot feel a pin stuck in his toe.

(3)

(Total 5 marks)

Mark schemes

- 1 (a) oxygen;)
carbon dioxide;) *allow symbols*
water)
each for 1 mark

3

- (b) graph with reasonable vertical scales;
accurate plotting of all points (ignore lines) and labelling lines
histogram – must be coded
gains 3 marks

3

- (c) 6 of:
during exercise the level of CO₂ (in the blood) rises;
increased breathing to remove excess CO₂;
increased oxygen supply to muscles;
or increased breathing takes in more O₂
or increased heart rate takes more O₂ to muscles;
increased supply of sugar to muscles;
increased respiration rate;
enable faster rate of energy release;
reference to lactic acid (allow even though not on syllabus)/O₂ debt;
to avoid cramp;
anaerobic reference;
reference to removal of 'heat';

6

- (d) high carbon dioxide concentration;
brain/central nervous system;
heart muscles (both)

3

[15]

- 2 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]

- 3** (a) brain 1
- (b) receptor **or** sensory **or** afferent 3
connector or relay
- effector **or** motor **or** efferent
- (c) any **one** from
 blink (of eye)
accept a violent movement of a limb from pain or sharp object
- knee jerk
*do not credit snatch from cold object or any temperature reference
 e.g. boiling water*
*accept sneezing, coughing, choking, vomitting, pupil closing or
 reflex* 1
- (d) danger **or** a signal detected (by nerve)
or impulse sent 1
- goes to **or** through spine
*accept impulse by-passes the brain
 do not award mark if brain mentioned
 do not credit message to spine* 1
- a very rapid response occurs **or** then to
 effector **or** muscle **or** motor
accept no thinking time is needed 1

[8]

- 4** (a) (i) *idea that chemical / substance that controls / co-ordinates bodily process*
for 1 mark
*reject chemical messenger unless qualified as above, - reject ref.
 to one hormone only* 1
- (ii) in the blood
for 1 mark 1
- (b) *idea that*
 device indicates / detects low levels / no hormones / relevant hormone
for 1 mark 1

[3]

5	(a) any two for one mark each <i>answers should relate to the ideas in the list</i>		
	birth control pills are 99 % effective in preventing pregnancy		
	the hormones in the pills give protection against some women's diseases		
	<i>condom (neutral)</i>		
	the woman's monthly periods become more regular	2	
	(b) any two for one mark each <i>answers should relate to the ideas in the list</i>		
	the hormones in the pills have some rare but serious side effects		
	only 99% effective		
	this method of birth control provides no protection against sexually transmitted disease		
	a woman has to remember to take a pill every day	2	
			[4]
6	ovaries <i>accept ovary</i>	1	
	womb <i>accept uterus</i>	1	
	fertility <i>accept FSH</i> <i>do not accept fertilisation</i>	1	
	contraceptive(s) <i>allow birth control</i> <i>accept oestrogen or progesterone</i> <i>do not accept pill alone</i>	1	
			[4]
7	(a) pituitary (gland)	1	
	ovaries <i>allow corpus luteum</i>	1	

(b) idea of stimulating release of eggs

1

preventing release of eggs

*allow FSH increases fertility
accept contraception / contraceptive pill
/ morning after pill
allow oestrogen decreases fertility
accept progesterone affects uterus lining
do **not** credit simply 'a hormone to
increase fertility **or** a hormone to
decrease fertility'
do **not** credit 'pill' unqualified
or injections
do **not** accept just FSH **or** oestrogen
or IVF with no effect stated*

1

[4]

8

(a) pressure / temperature / hot / cold / touch / pain
ear / cochlea
chemicals / taste / named taste e.g. salt
(*reject* skin receptors e.g. hot, cold)

for 1 mark each

3

(b) impulses / electrical pulse / electrical signal
(*reject* information, message, pulse, signal)
via sensory neurones (*ignore* relay neurone, synapse)
(in) optic nerve
(*allow 1 mark for via nerves or neurone if neither second nor third mark scored, reference
to spinal cord disqualified route mark*)

for 1 mark each

3

[6]

9

(a) light/eye
smell/nose
taste/chemical/tongue

for 1 mark each

3

(b) 6 of e.g.
receptors in ear detect sound waves/vibrations
impulses/electrical signals to brain
brain co-ordinates response
impulses sent along nerves
to muscles/effectors which contract to bring about response

any 6 for 1 mark each

6

[9]

- 10 (a) (i) road traffic accidents
for one mark 1
- (ii) 15% / 0.15 / $\frac{3}{20}$ / 3:17
for one mark 1
- (b) *ideas that*
receptors (detect pain) involved initially
information (*or impulses / messages / signals*)
unable to pass along (nerves) cord idea
(to brain where pain is felt) brain involved at the end 3
each for 1 mark

[5]