

Chapters:

1. healthy eating
2. coordination and control
3. medicine and drugs
4. adaptation for survival
5. energy in biomass
6. variation, reproduction and new technology
7. evolution

Chapter 1 (healthy eating)- learn chapter 1 by doing these questions first-

1. What makes a healthy diet?
2. Who needs more energy and why?
3. What does metabolic rate mean?
4. Who has a higher metabolic rate?
5. What does malnourished mean?
6. How can someone lose weight?
7. What is cholesterol?
8. What is an infectious disease?
9. Name four microorganisms.
10. What is a bad microorganism called?
11. What did Ignaz Semmelweis discover?
12. What are our bodies natural defences?
13. What is the function of white blood cells?
14. What are antibiotics?
15. What does antibiotic resistance mean?
16. How can we grow microorganisms?
17. What is MRSA?
18. What do these words mean?
19. What is a vaccination?

18. Endemic- disease that exists permanently in a particular region or population, e.g. malaria is constantly there in Africa.
- Epidemic- An outbreak of disease that attacks many people at about the same time and may spread through one or several communities
- Pandemic- When an epidemic spreads throughout the world.
- B. kill toxins (poisons) produced by some pathogens.
- carried around the body in a protein. There are two types of antibodies:
15. 16. On agar plates- these contain nutrients. It is also known as a 'culture medium'
19. Vaccination is a dead or weak microorganism that is injected into a patient to give them immunity from a particular disease. This is because as soon as the microorganism enters the body, the white blood cells produce antibodies against it. So if it ever comes again, your body will recognise and kills it (hopefully anyway) before you even get any symptoms!
- cholesterol increase. Eating too much cholesterol increases the risk of heart disease.

Important: Learn this:

- You need to know what antibiotic resistance is- when a bacteria/virus/protozoa or fungi (i.e. A microorganism) mutates (changes its genetic material), it becomes a **NEW STRAIN**. Therefore, it is no longer recognised and killed by the same antibiotic. Therefore, the bacteria is now **RESISTANT** to the antibiotic. **MRSA** is a bacteria that is resistant to an antibiotic called methicillin. So it no longer dies when we try and kill it with this medicine called methicillin. So the bacteria survive and reproduce and make a whole new population of **RESISTANT STRAINS**. This process is called **NATURAL SELECTION**. It is a real problem in hospitals.

Energy is obtained from both aerobic and anaerobic respiration during exercise.

(a) Give three differences between aerobic and anaerobic respiration.

1 oxygen used in aerobic respiration

2 more energy from aerobic respiration

3 carbon dioxide and water are end products of aerobic respiration

Another answer:
lactic acid is end product of anaerobic respiration

(3)

	Group 1 Low-carbohydrate diet	Group 2 Low-fat diet
Proportion of volunteers who completed the trial	76%	57%
Mean change in body mass	-12.9%	-6.7%
Mean change in body fat mass	-9.4 kg	-4.8 kg
Mean change in blood HDL concentration	+55 mg per litre	-16 mg per litre
Mean change in blood LDL concentration	+16 mg per litre	-74 mg per litre

(a) What was the independent variable in this investigation?

Type of diet

(1)

Regular exercise is important, as it helps to maintain an efficient supply of blood to the muscles, the heart and the lungs. This is helped by an increase in the heart rate during exercise.

Explain why it is necessary for the heart rate to increase during exercise.

any four from:

more energy / respiration required

accept it prevents / reduces anaerobic

respiration **or** less / no lactic acid

reference to increase must be made,

but only needed once, provided

inference is clear for remainder of points.

accept 'delivered more quickly' for 'increase'

increase oxygen uptake into blood (in lungs)

increase oxygen delivery to muscles

increase glucose delivery to muscles

increase removal of heat from muscles **or** increase delivery of heat to skin

increase removal of carbon dioxide from muscles

increase removal of carbon dioxide from blood (in lungs)

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



(3)

I remember it by:

Respiration: GO \rightarrow WEC (glucose/sugar + oxygen \rightarrow water + energy + carbon dioxide)

The equation for photosynthesis is the opposite:

Photosynthesis: WEC \rightarrow GO (water + energy from the sun + carbon dioxide \rightarrow glucose and oxygen)

- (a) Explain, as fully as you can, why respiration has to take place more rapidly during exercise.

Respiration generates energy.
The more we respire, the more energy we will generate.
During exercise, we need more energy to work (e.g. Move), therefore, we need to respire more!

(2)

- (b) Antibiotics are now used in hospitals.

What is an antibiotic, and what does it do?

1 mark: medicine / drug

1 mark: that kills bacteria

(2)

- (c) MRSA is causing problems in hospitals.

Give **one** reason why.

... resistant to / not killed by antibiotics

(1)

- (d) How can the work of Semmelweiss help to reduce the problems caused by MRSA?

Semmelweiss showed that infection could be passed on via touch and so hand washing by doctors / nurses / patients / visitors reduces the risk of infection

...

Many diseases are caused by viruses. Children are given vaccines to protect them against viral disease.

(a) Complete the following sentences.

It is difficult to kill viruses inside the body because

viruses live inside cells

A vaccine contains an inactive form of the virus.

The vaccine stimulates the white blood cells to produce antibodies

(3)

Read the passage about the use of antibiotics in food production.

People do not always agree about the use of antibiotics in food production.

Some farmers put low doses of antibiotics in feed for animals such as cattle and sheep. Antibiotics help to keep animals disease-free. Antibiotics also help animals to grow.

The use of antibiotics in livestock feed means that there is a higher risk of antibiotic-resistant bacteria developing. These could be dangerous to human health.

- (a) Explain how a population of antibiotic-resistant bacteria might develop from non-resistant bacteria.

1 mark: idea that bacteria mutate **or** that there is variation in bacteria

1 mark: leading to bacteria /resistant cells that survive antibiotic

1 mark: these bacteria (resistant cells) go on to breed

(3)

Chapter 2- control and coordination

1. What is the central nervous system made up of?
2. What is a sense organ?
3. What is a stimuli detector?
4. Is this the right order: stimulus → receptor → sense organ → motor neurone → effector?
5. What receptors are found in the skin?
6. What is another name for a receptor?
7. What four hormones control growth?
8. How long is the menstrual cycle?
9. Where is the pituitary gland located?
10. What is a gland?
11. Is the ovary a gland?
12. What is a hormone?
13. How do hormones travel?
14. What two ways do cells communicate with each other?
15. What is the function of a contraceptive pill?
16. What is the purpose of fertility treatment?
17. What is homeostasis?
18. Name things we have to keep constant in our bodies.
19. What is phototropism and gravitropism?
20. What is auxin?

2. Something that detects stimuli
Nose, eye

3. A stimulus

4. Yes...this is just a guess.
So if I want to move towards light my skin will detect it and send a message to the brain and then I will move. It may involve the brain or it may not. For example a flying ball approaching me or hot water etc...will trigger the same response.

20. Auxin is a plant hormone. It controls PHOTOTROPISM AND GRAVITROPISM. In the light, auxin always increases on the dark side, so the plant cells start to reproduce more on the dark side and so that's why the plant bends towards the light.

In gravitropism, wherever there is LEAST auxin, that is where the plant cells reproduce most and so that is why a root bends towards gravity- i.e.

Downwards...the best way to understand this is through bitesize or even better, read page 13 of your revision guide..the diagram..carefully!

into the female. It doesn't always work though.

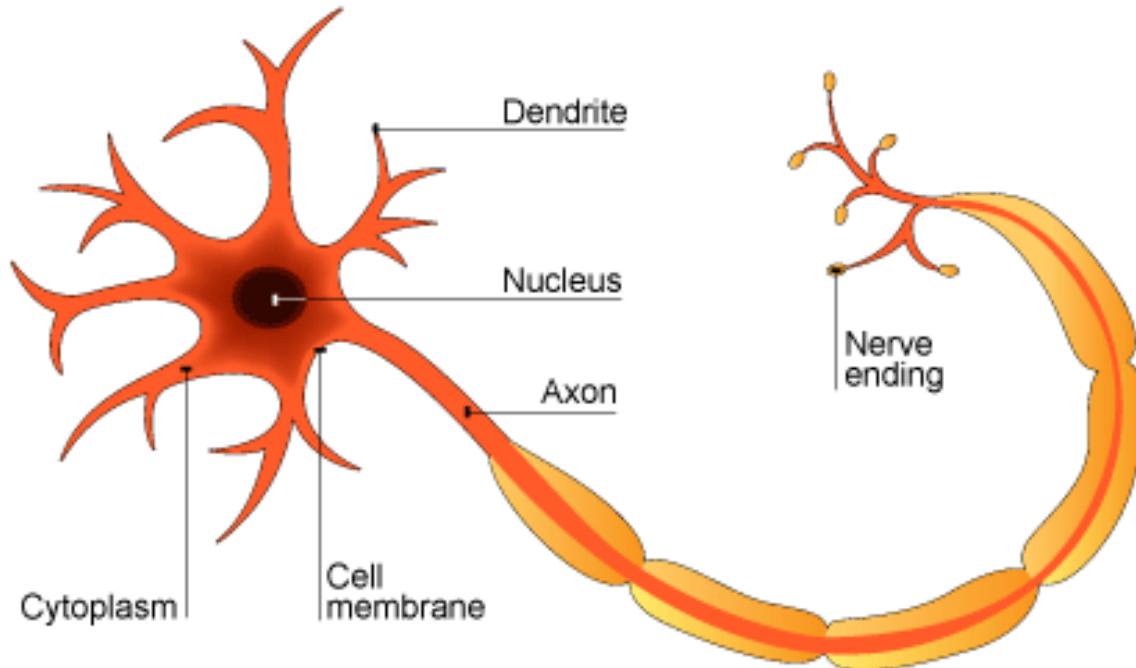
We are **made up of cells**. Cells need to **communicate** with each other.

They can communicate in two ways:

1. By hormones (chemical messengers)
2. By electrical signals (the nervous system).

Today, we are going to learn about the **nervous system**- it uses electrical impulses to send messages around the body. It is **very fast**, but **short-lived**. It consists of the brain, spinal cord and neurones.

A nerve cell is also called a neurone.



Receptors are groups of specialised cells. They can detect changes in the environment, called stimuli, and turn them into electrical impulses. Receptors are often located in the sense organs such as the ear, eye and skin.

Effectors are parts of the body that produce a response. Here are three examples:
a muscle contracting to move an arm
a muscle squeezing saliva from the salivary gland
a gland releasing a hormone into the blood

The nervous system- this is all you need to know! The rest you will learn from doing questions!!

- the central nervous system consists of the brain and **spinal cord**.
- Sometimes, sending messages has to be really quick, and it has no time to go to our brain- so we don't even think about it. This is called a reflex action.
- Please look at this animation to learn really fast:

http://www.bbc.co.uk/schools/gcsebitesize/science/21c_pre_2011/evolution/evolutionhormonenervousrev4.shtml

The hormonal system.

Hormone (the chemical messenger)	What the hormone does	Gland (where it is produced)
Insulin	Lowers our blood sugar level	Pancreas
Glucagon	Increases our blood sugar level	Pancreas
Oestrogen	Has three jobs: -Stops FSH from being produced -Maintains the uterus/womb lining -Stimulates LH to be produced	Ovaries
Testosterone	-Hormone that stimulates puberty etc.	Testes
FSH	-Causes an egg in the ovaries to mature	Pituitary gland
LH	-Causes ovulation to occur- an egg to be released from the ovaries	Pituitary gland

The menstrual cycle- i.e. The period cycle

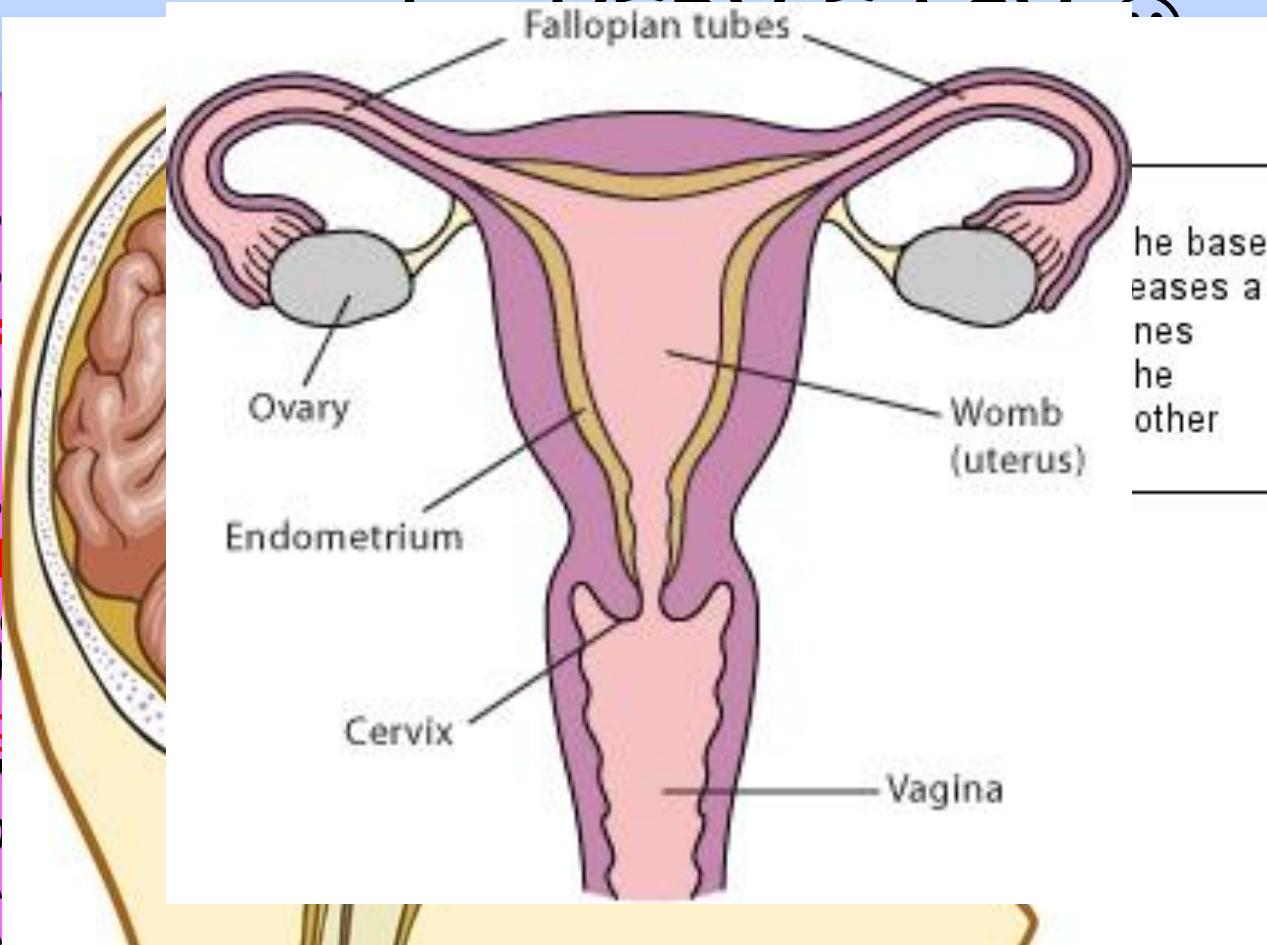
- It is controlled by hormones because it is a slow process- it takes on average 28 days.
- It is controlled by FOUR hormones: FSH and LH (you don't need to know the full names) which are made in the pituitary gland in the brain AND oestrogen and progesterone (which are made in the ovaries).
- NOTE: another name for the uterus is the womb!

Contraceptives vs fertility drugs

- **Contraceptives**- STOP a female from getting pregnant. They contain OESTROGEN AND PROGESTERONE as they STOP FSH from being produced. Remember- FSH matures an egg, so if you don't want to get pregnant, you don't want a mature egg!
- **Fertility treatment 1**- if a woman CANT mature eggs, she can be given FSH and LH hormones so an egg can mature and then be released from her ovary by LH hormone!!
- **Fertility treatment 2**: a female can also have IVF (in vitro fertilisation)- this is when an egg and sperm are fertilised OUTSIDE OF THE BODY and then the embryo is placed in the uterus to grow hopefully into a baby ☺

The menstrual cycle- i.e. The period

1. F
- S
- S
2. Oes
- S
- B
- S
3. LH
- C
- t
4. Prog
- N
- IF NO
- A
- A



jobs:

go down

WEEN EGG
KS DOWN

Homeostasis: maintaining our bodies internal environment

- **Temperature:** We need to stay at 37 degrees C- so if we get hot, we sweat (so we lose heat) and if we get cold, we shiver to get warm.
- **Sugar levels:** We need to have constant amount of glucose/sugar in our blood. So after eating, sugar levels go down because our pancreas (a gland) produces insulin which brings it down. And after fasting (when our sugar levels are down), we produce glucagon which brings our sugar levels in our blood UP again ☺ how amazing!!!
- **Water levels:** We need to keep constant amount of water in our bodies. Our kidneys produce urine. If we don't have a lot of water in our body, we produce little urine. If we have more water in our body, our kidneys produce more urine.

Plants- glorious plants

- Plants:

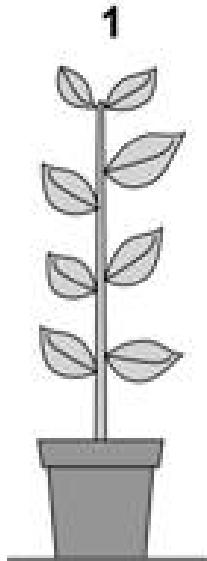
Sensitive to:

- Light- grow towards light- this is called phototropism
- Gravity- grow DOWN towards gravity- this is called gravitropism
- Moisture- roots grow towards water.
- **AUXIN is a hormone that CONTROLS phototropism and gravitropism.**
- **Plant growth hormones can be used as:**
 - 1. Weed killers**
 - 2. To stimulate a plant to grow**

A student grew a plant in an upright pot.

She then put the pot in a horizontal position and left the plant in the dark for two days.

Diagram 3 shows the potted plant after two days in the dark.



Plant growing
upright

2

gravity
accept gravitropism / geotropism

1

caused redistribution of auxin / hormone to
lower side of stem

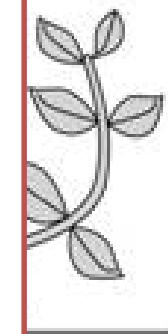
1

these hormones stimulate growth of cells on
the lower side of the stem only

1

so the stem grows upwards

3



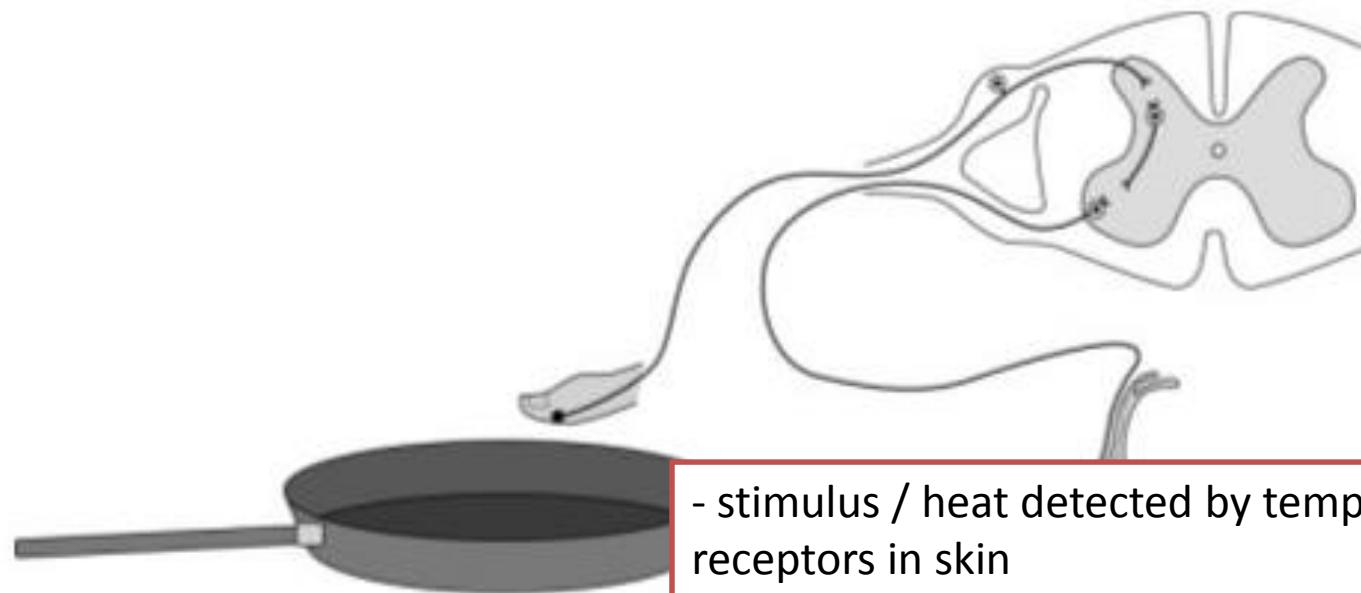
after 2 days
in the dark

Explain fully why the plant responded in this way.

A person accidentally touches a hot pan.

Her hand automatically moves away from the pan.

The diagram shows the structures involved in this action.



(a) Describe fully how the structures shown

- stimulus / heat detected by temperature receptors in skin
- impulses travel along sensory neurone to spinal cord / CNS
- chemical transmission across synapse
- via relay neurone
- impulses to muscle / effector via motor neurone
- muscle / effector contracts, moving the hand away

The photograph shows a girl waiting to cross a road.



© Lionel Lassman

- (a) Name **two** different sense organs she would use to detect when it is safe to cross the road.

1
..... eye / sight / eyesight
either order

2
..... ear / hearing
ignore light

(2)

Reflex actions are rapid and automatic.

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

(i) The structure that detects the stimulus.

receptor

(1)

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

sensory (neurone)

(1)

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

motor (neurone)

(1)

(iv) The structure that brings about the response.

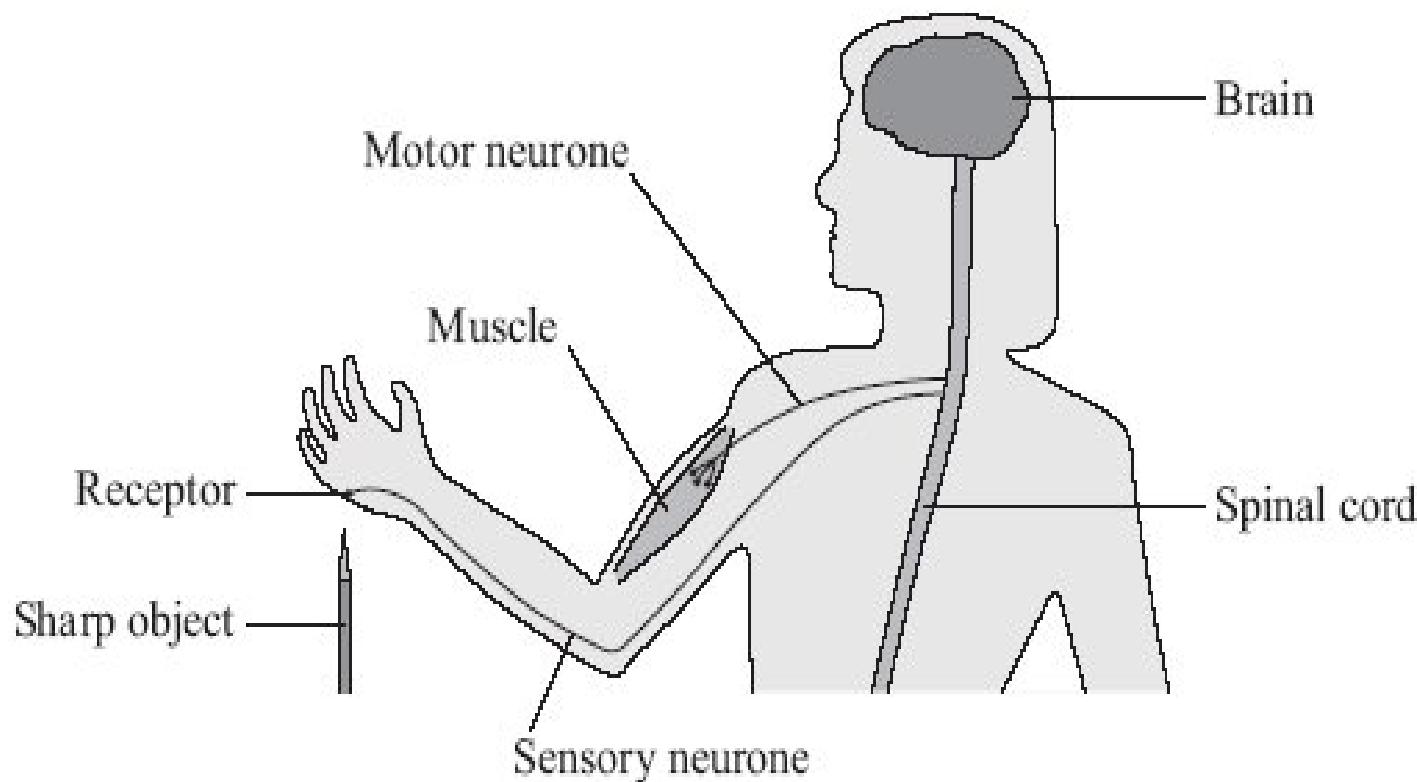
effector / muscle / gland / named

(1)

A student accidentally touches a sharp object.

Her hand is immediately pulled away from the object.

The diagram shows the structures involved in this response.



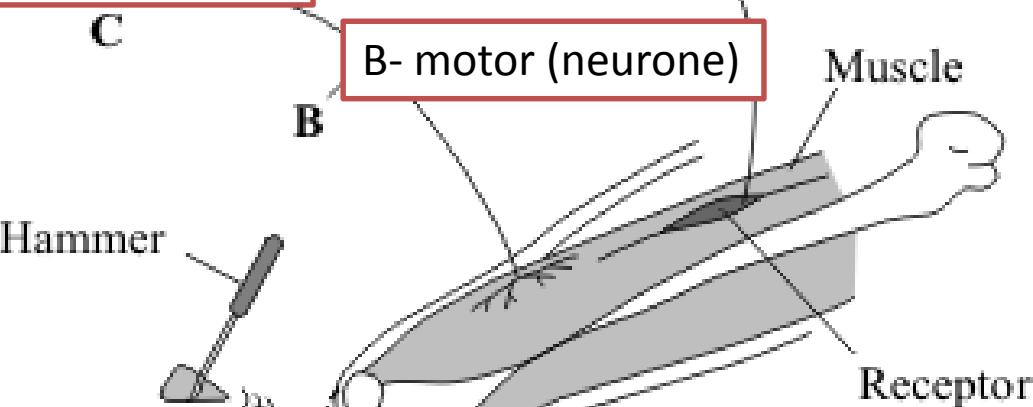
(a) Use the correct word or phrase **from the diagram** to complete each sentence.

(i) The stimulus is detected by the i) receptor

(1)

C- spinal cord / central nervous system / grey matter

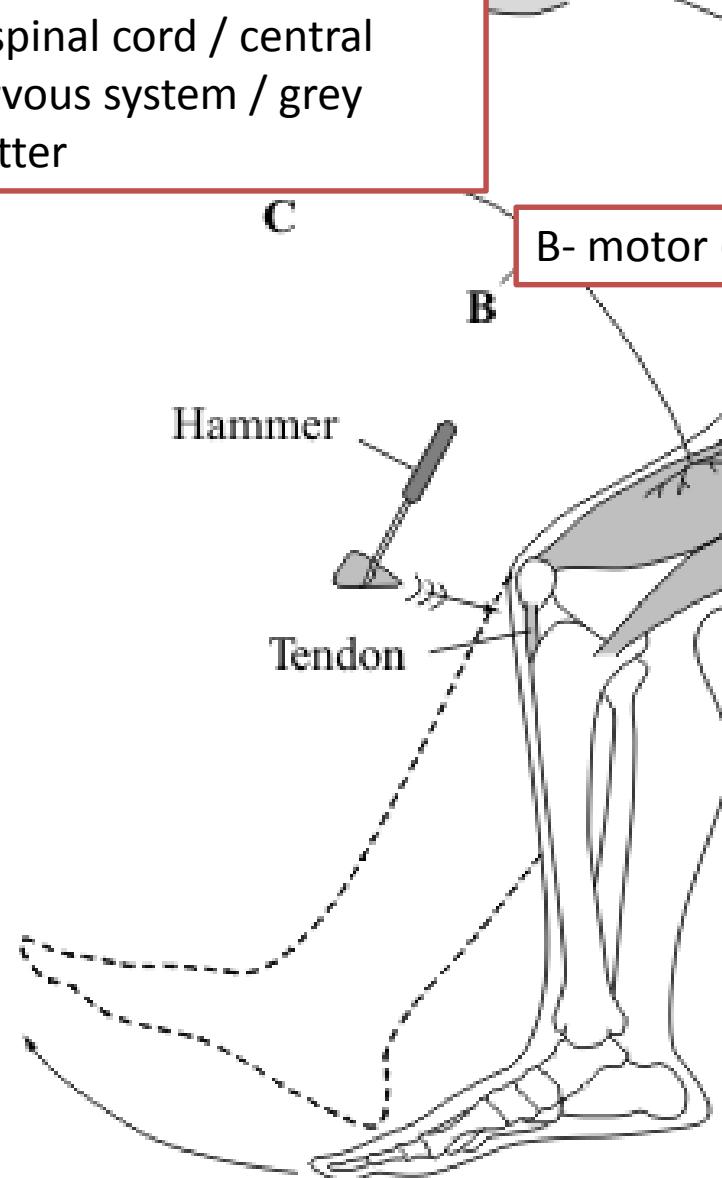
A A- sensory (neurone)



Tendon

Receptor

Muscle



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

The drawing shows a group of people in a café.



(a) Use words from the box to answer the questions.

brain	eye	nose	skin	tongue
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Which organ contains receptors that allow a person to:

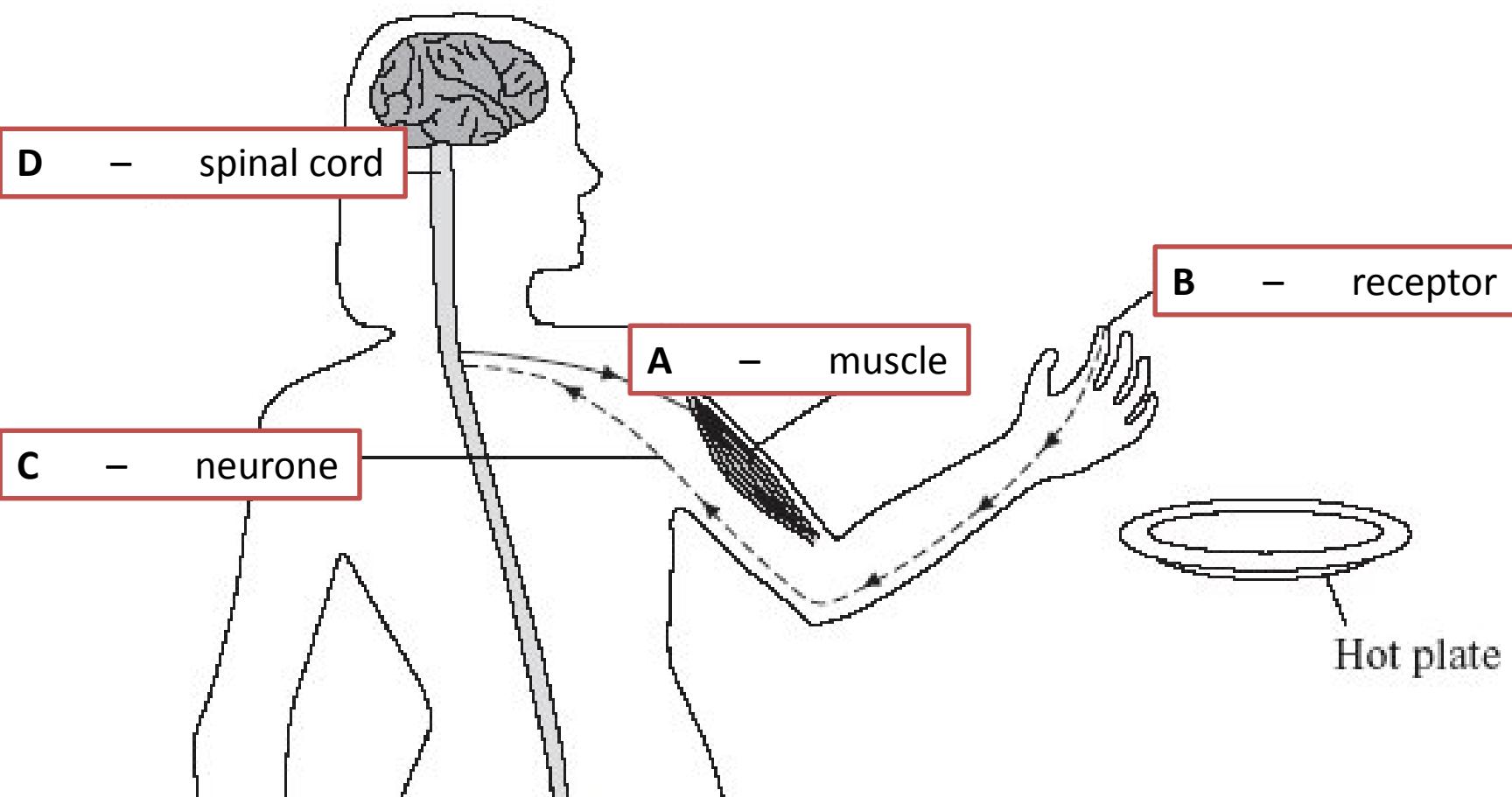
(i) read the newspaper **eye**

(1)

(ii) smell the coffee **nose**

(1)

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**.

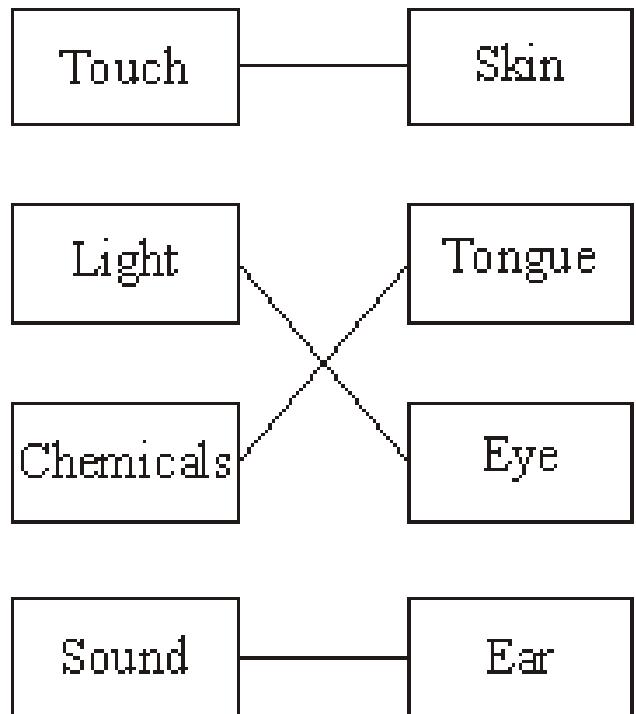
brain	gland	muscle	neurone	receptor	spinal cord
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(a) List A gives the names of four stimuli. List B gives four parts of the human body.

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.

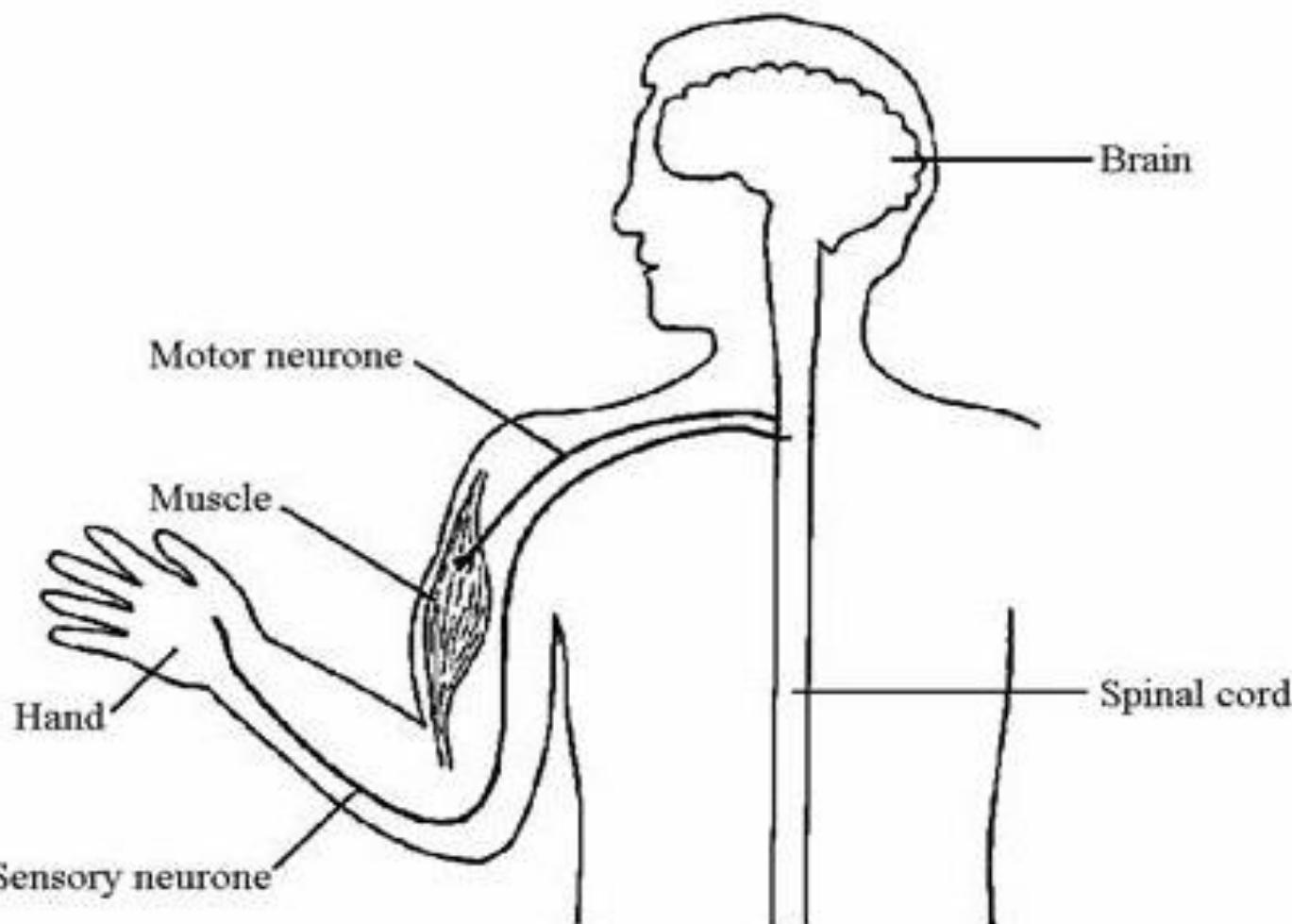
(One has been done for you.)

(a) **Stimulus** **Part of the body**



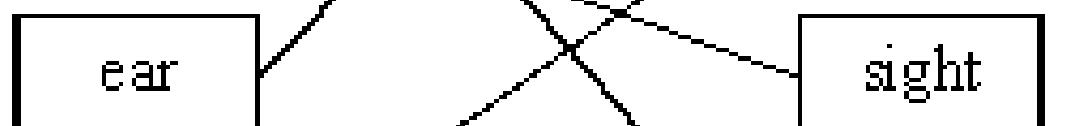
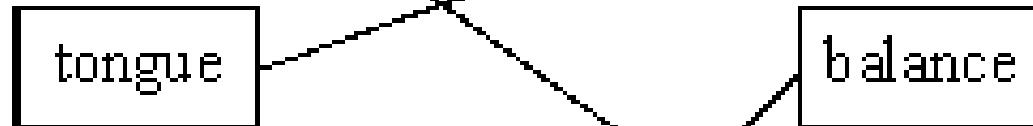
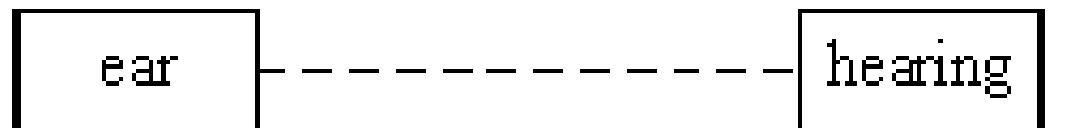
(3)

The diagram shows a reflex pathway in a human.

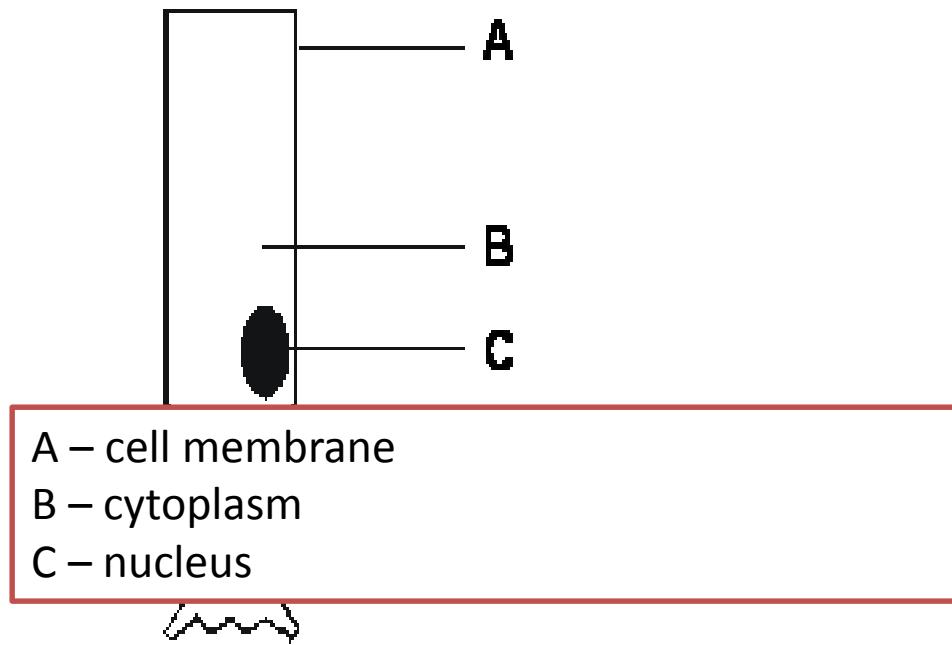


- (a) Label the receptor on the diagram.

label drawn to the hand
may be labelled as 'a'



The drawing below shows a light-sensitive (receptor) cell from the eye. The structures labelled A, B and C, can be found in most animal cells.



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

A

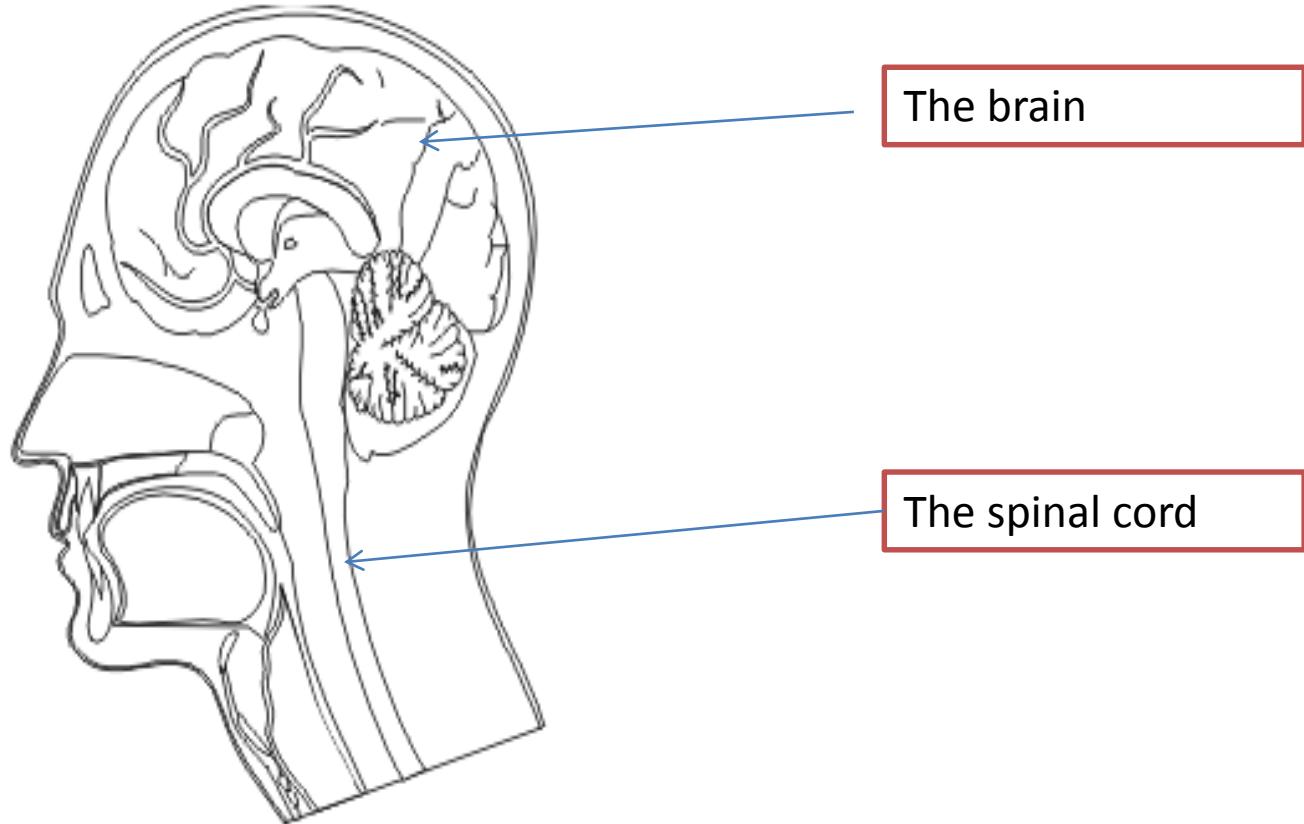
.....

B

.....

C

(3)



(a) On the diagram, use guidelines to label:

- 1 the brain;
- 2 the spinal cord.

brain correctly labelled spine correctly labelled
for 1 mark each

(2)

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

1 light/eye

2 smell/nose

3 taste/chemical/tongue

(3)

- (b) Whilst observing mouse behaviour, a student drops a pen near the mouse's cage. The mouse jumps at the noise.

Describe, as fully as you can, the processes by which the mouse responds to the stimulus of the dropped pen.

6 of e.g.

- receptors in ear detect sound waves/vibrations
- impulses/electrical signals are sent
- to the brain
- brain co-ordinates response
- impulses sent along nerves
- to muscles/effectors which contract to bring about response

In the exam, they could give you any scenario but they want an answer like this! So learn this answer!

The doctor is testing the child's nervous system by tapping the tendon just below the knee.

This pulls cells which are sensitive to stretching.



- (a) What are cells which are sensitive to stimuli called?

receptors

(1)

(b) These cells send information to the spinal cord.

In what form is this information sent?

electrical/nerve
signals/impulses

(2)

(c) The healthy response to the stimulus is the straightening of the leg.

What is the effector in this response?

muscle

(1)

(d) This response is one example of a reflex action.

Describe **one other** example of a reflex action in terms of:

stimulus → receptor → coordinator → effector → response

correct description of:

stimulus- hot water

receptor- on skin to detect temperature

co-ordinator- spinal cord

effector- muscle

response- move hand away

(5)

(Total 9 marks)

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.

- eyes as sense organs/detector/receptors in eye,
- electrical signals (impulses),
- to co-ordinator,
- then to leg muscles/effectors

(4)

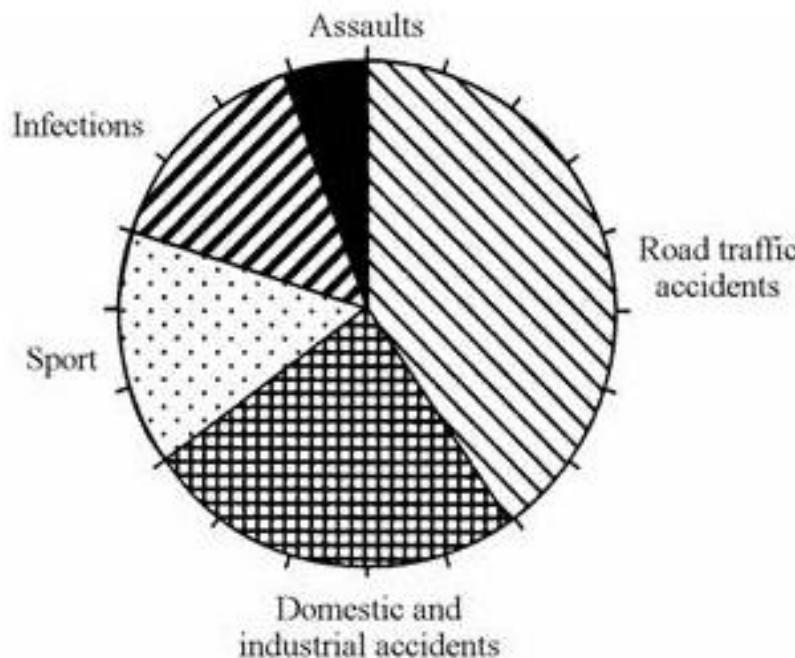
(ii) Explain why alcohol consumption would affect the driver's response.

It slows them down because alcohol is a DEPRESSANT

(1)

(Total 5 marks)

- (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?

(a) (i) road traffic accidents
for one mark

(1)

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

(ii) $15\% / 0.15 / \frac{3}{20} / 3:17$

for one mark

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

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)

(Total 5 marks)

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

RECEPTORS IN THE	SENSITIVE TO
Eyes	Light
Skin	Any of: pressure / temperature / hot / cold / touch / pain
ear	Sound
Tongue	Any of: chemicals / taste / named taste e.g. salt <i>(reject skin receptors e.g. hot, cold)</i>

(3)

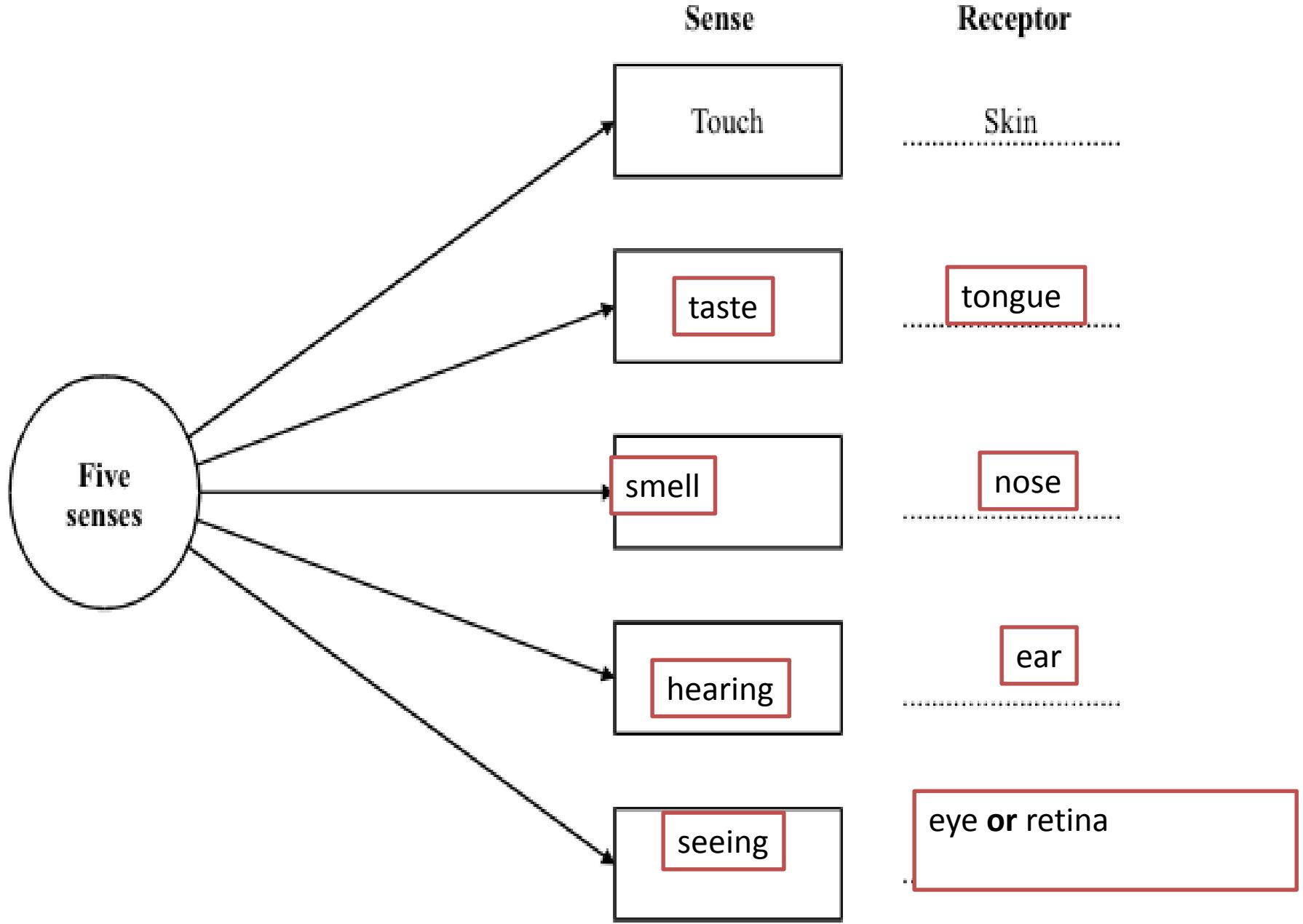
(b) Describe, in as much detail as you can, how information is transmitted from light receptors in the retina to the brain.

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)

Can you see- this is the SAME question
time and time again, just another
scenario



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

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

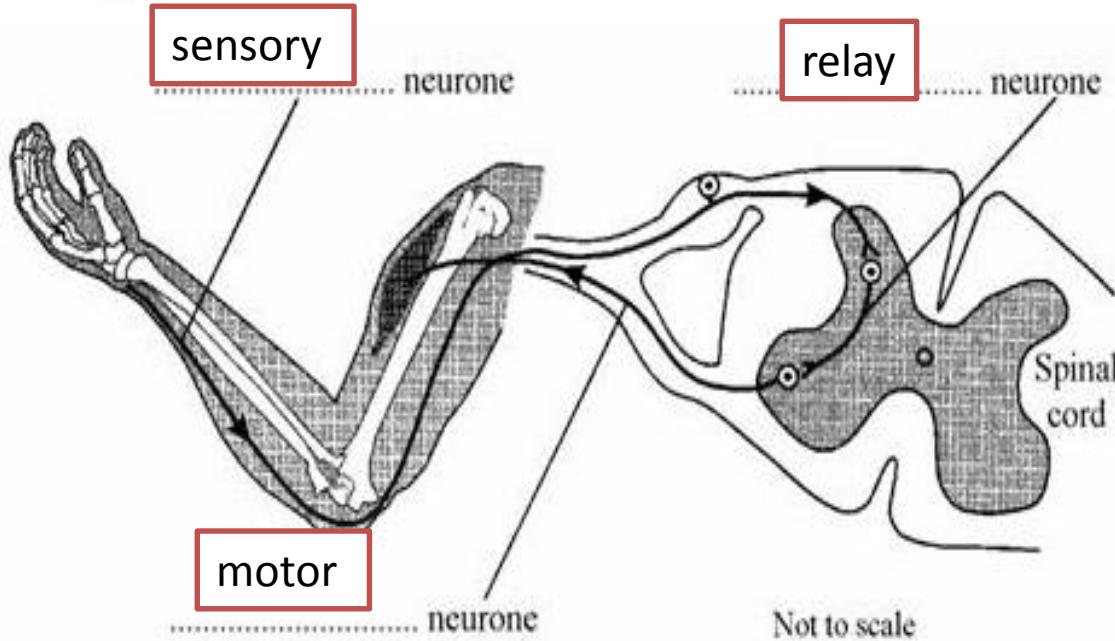
(Total 3 marks)

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

brain

(1)

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



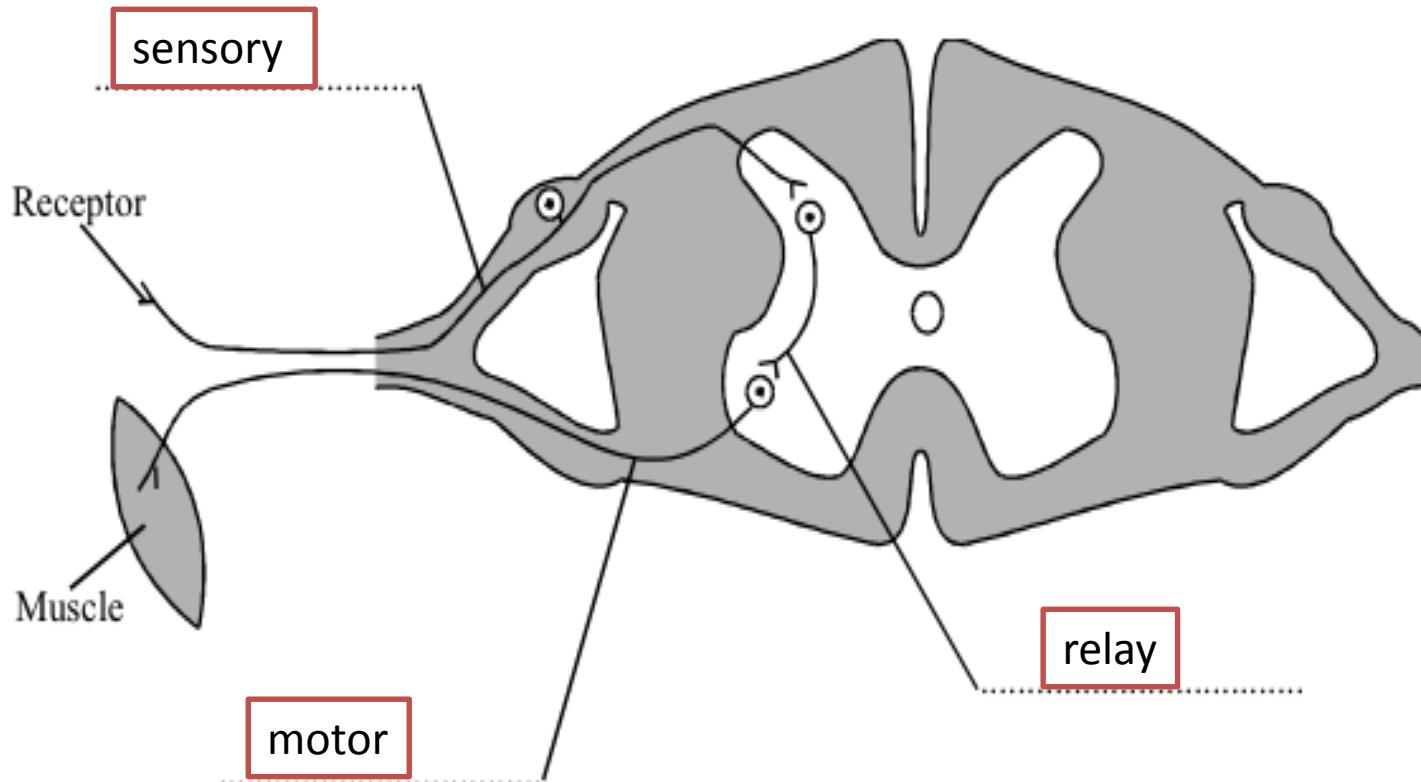
(3)

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

- Your eyes dilating or constricting depending on the amount of light in the room.
- Moving your head away from a flying object

Information is also passed by impulses in the nervous system. Neurones carry impulses very rapidly. The diagram shows a reflex arc.

Label the diagram by adding the names of the neurones.



(Total 3 marks)

Hormones regulate the functions of many organs.

Complete the following sentences.

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

woman's ovary

(1)

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

womb / uterus

(1)

(c) Hormones given to women to stimulate the release of eggs

are called fertility drugs.

(1)

(Total 3 marks)

Read the information about the trialling of the first contraceptive pill.

The Pill was developed by a team of scientists led by Gregory Pincus. The team needed to carry out large scale trials on humans.

In the summer of 1955, Pincus visited the island of Puerto Rico. Puerto Rico is one of the most densely populated areas in the world. Officials supported birth control as a form of population control. The women in Puerto Rico were mainly poor and uneducated.

The scientists selected a pill with a high dose of hormones. The Pill was found to be 100 % effective when taken properly. But 17 % of the women in the study complained of side effects.

The women in the trial had been told only that they were taking a drug that prevented pregnancy. They had not been told that the Pill was experimental or that

argued evaluation

- large scale trial gave better results
- chose uneducated women so that if these women could use it correctly, women elsewhere would be able to
- uneducated women unlikely to give informed consent
- no placebo
- used pill with high dose of hormone / should have tried a range of doses / results not valid for other populations
- women not told pill was experimental / pill might have side effects / should have done pre-trial to check for side effects

In-vitro fertilisation (IVF) is used to help infertile women to have babies.

The table gives statistics from one clinic that gives IVF treatment.

	Age of women given IVF treatment			
	Under 35 years	35 – 37 years	38 – 39 years	40 – 42 years
Number of women treated	425	208	106	53
Number of single births	90	44	17	1
Number of sets of twins	24	8	4	1
Number of sets of triplets	1	0	0	0

Use data from the table to help you to answer these questions.

- (a) How many of the women aged 38 – 39 had babies?

(a) 21

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

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

(a) any **three** from

if oestrogen **or** progesterone used = max 2

if both oestrogen **and** progesterone used =
max 1

- FSH used / given / injected
- LH used / given / injected
- FSH causes eggs to mature
- LH stimulates egg release

ignore effects of oestrogen and progesterone

(3)

b) max **two** pros for IVM / it from:

allow max **two** cons for IVF

- cheaper
- less hormones used
- ovarian hyperstimulation **or** the syndrome less likely

allow 'it's safer for the mother'

ignore 'more risks' unqualified

- IVM treatment shorter

2

con for IVM

allow max **one** pro for IVF

- small risk of abnormal sex chromosomes / birth defects /

baby cancer

allow 'more risk to baby'

ignore 'more risks' unqualified

1

evaluation

eg IVM better because less risk to mother outweighs small risk to baby

or

IVF better because no risk to baby and a small risk to mother

must include an appreciation that there are two sides to the argument

Remember to give a conclusion to your evaluation.

The pancreas is involved in digestion and controlling the internal conditions of the body.

(a) Name **two** digestive enzymes produced by the pancreas.

(a) any **two** from:

- 1 ... • amylase / carbohydrase
- 2 ... • protease
- allow trypsin
- lipase

(2)

(b) Diabetes may be caused by a lack of insulin.

Part of the treatment for someone with diabetes is to pay careful attention to the diet.

(i) Give **one** symptom of diabetes.

(b) (i) high / above normal blood sugar

or cannot control blood sugar

allow other symptoms

eg frequent / plentiful urination or sugar in urine or thirst or weight loss or
coma

(ii) ignore ... (ii) any **one** from:

- small / regular meals

- low sugar (meals) or low GI / GL or

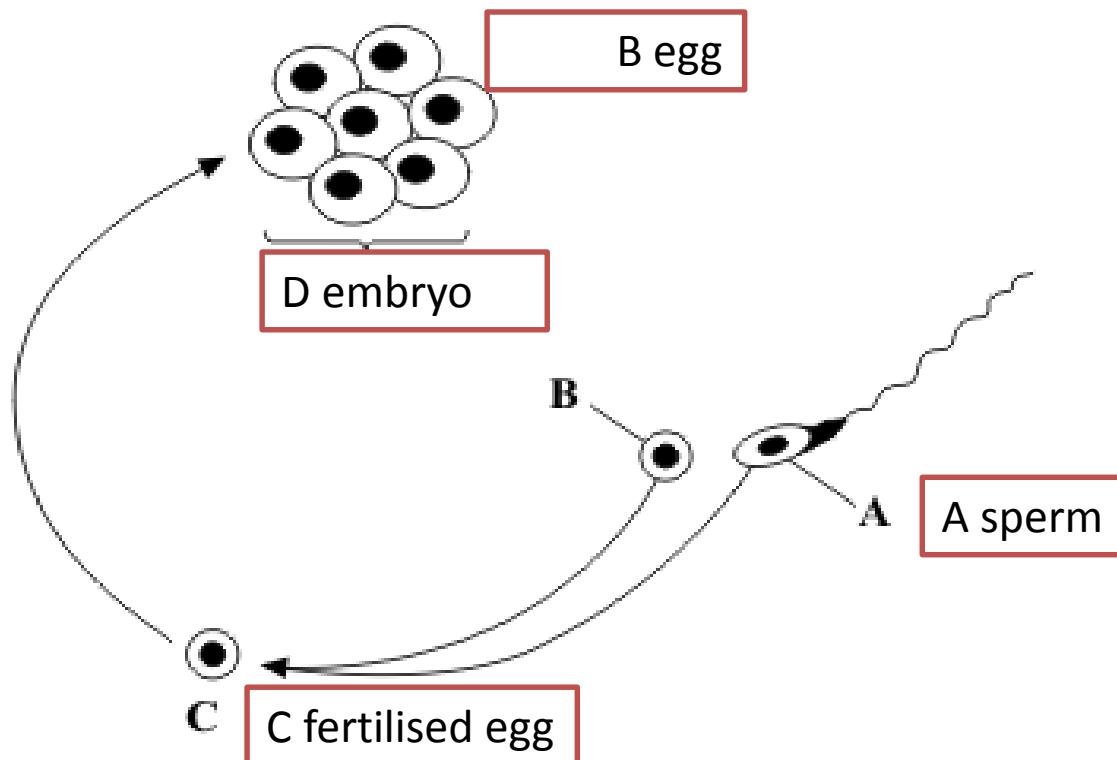
carbohydrates as starch

allow high fibre

ignore reference to low carbohydrate

on / glaucoma /

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

The hormone insulin is a protein. Insulin is produced in the pancreas and controls blood glucose concentration.

(a) Which organ in the body monitors blood glucose concentration?

a) pancreas

(1)

Hormones are used in contraceptive pills.

(a) Explain how a contraceptive pill works.

a) inhibits FSH (production / secretion)

1

(therefore) no eggs mature / released

if no other marks gained allow 1
mark for no eggs produced

1

or

effect of FSH on ovary described
references to LH are neutral

(2)

(b) Read the information about the trialling of the first contraceptive pill.

(b)

maximum 4 marks if no conclusion

Pros max 2marks from 4 marks e.g.

- large scale trial gave better results
- chose uneducated women so that if these women could use it correctly, women elsewhere would be able to cons max 3 marks from 4 marks e.g.
- used pill with high dose of hormone – **either** so results not valid for general use of hormone **or** dangerous

- side effects ignored
- women not told pill was experimental / pill might have side effects
- no placebo
- should have tried a range of doses
- should have done pre-trial to check for side effects

4

conclusion 1 mark e.g.

trials flawed therefore cons outweigh pros

accept reverse e.g. trials flawed but pros outweigh cons

Evaluate the methods used by Pincus in trialling the contraceptive pill.

(a) We control many conditions inside our bodies.

Name **three** conditions which are controlled inside our bodies.

any **three** from:

1.
 - water
 - allow breathing / oxygen / carbon dioxide
2.
 - ions / minerals / salts
 - allow sodium / chloride, other ions neutral
3.
 - temperature
 - allow heat
 - blood sugar

(b) Hormones
• heart rate
• blood pressure

Use ignore urea

(3)

antibiotic	contraceptive drug	fertility drug	vaccine
------------	--------------------	----------------	---------

A woman can prevent pregnancy by taking a **contraceptive drug**

A woman can be helped to become pregnant by taking a **fertility drug**

(2)

A woman's fertility can be controlled by using hormones.

- (a) Some contraceptive pills contain oestrogen.

Name the gland which produces oestrogen.

(a) ovary or ovaries

(1)

Hormones are sometimes used to regulate human reproduction.

(a) (i) What is a hormone?

(i) any **one** from:

- chemical messenger
- chemical / substance released in one part to have effect elsewhere in body

(1)

(ii) How are hormones transported around the body?

(ii) in blood / circulatory system / any named part including plasma

extra wrong answer would cancel example
not red blood cells

(1)

(b) Describe the benefits and possible problems that may result from the use of hormones to regulate human reproduction. You should refer to fertility drugs and contraceptives in your answer.

any **three** from:

To gain
into a se

Oral contraceptives:

(benefit)

- prevent (unwanted) pregnancy **or** prevent egg release
- regulate menstrual cycle / periods

(problems)

- prolonged use may prevent later ovulation / cause infertility
- named side-effect on female body

e.g. circulatory problems / weight gain / nausea / headache / breast cancer / mood swings

- increased promiscuity / increase in STD's / STI's
- named side-effect on environment

e.g. feminisation of fish **or** lowered sperm count in human males

Fertility drugs:

(benefit)

- can enable woman to have children **or** to become pregnant
- stimulates egg release

(problem)

- multiple births

for full marks must score at least **one** re contraceptives **and** at least **one** re fertility drugs

if unclear which type of hormone maximum **2** marks from 3

(4)
arks)

Oestrogen, luteinising hormone (LH) and follicle stimulating hormone (FSH) work together to coordinate the menstrual cycle. A woman will be infertile if her pituitary gland does not release enough follicle stimulating hormone (FSH).

Explain how injections of FSH could increase her chances of having a baby.

any **three** from:

FSH stimulates growth / maturing of follicle(s) / eggs

FSH stimulates oestrogen release

oestrogen stimulates development of uterus lining

oestrogen stimulates LH release / production

LH stimulates ovulation / egg release

(Total 3 marks)

(a) (i) Where are hormones produced?

endocrine glands **or** endocrine system
allow a specific named gland

(1)

(ii) How do hormones move around the body?

in the blood(stream)

(1)

(b) Insulin is a hormone.

(i) Where is insulin produced?

pancreas **or** islets of Langerhans

(1)

(ii) Explain the role of insulin in controlling blood sugar levels.

(ii) (it **or** insulin) lowers blood sugar level [1]

(by) (speeding up **or** increasing)

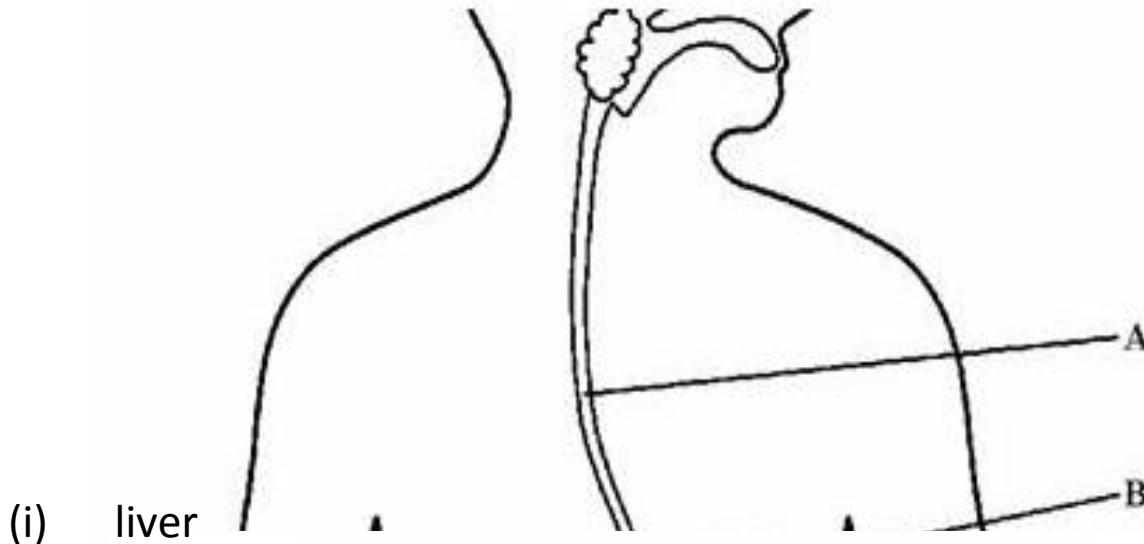
conversion of glucose to glycogen [1]

in the liver [1]

(and) speeding up **or** increasing uptake of
glucose by body cells [1]

(4)

(Total 7 marks)



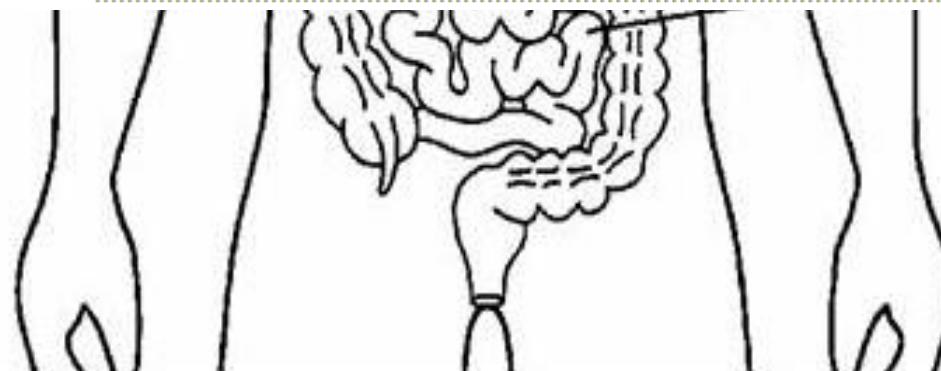
(i) liver

1 (i) Name part **B**.

(ii) liver **or** B stores glycogen
or pancreas **or** D makes insulin

1 (ii) Describe the role of **B** and **D** in reducing blood sugar levels.

clear description of link



- Diet A - High carbohydrate diet, started after several days of eating a diet without carbohydrate.
- Diet B - High carbohydrate diet, started after normal mixed diet.
- Diet C - Normal mixed diet.

What advice would you give the athlete about the best diet preparation for a long race? Explain why you would give this advice.

Diet ... follow diet A

Explanation

because it gives the highest proportion of stored sugar in the muscles
for 1 mark each

(Total 2 marks)

(a) Describe, as fully as you can, how a human foetus gets rid of the carbon dioxide produced during respiration.

(a) moves from foetal blood to mothers
blood via placenta

(3)

(a) Many diabetics need to take insulin.

(i) Explain why.

(a) (i) blood sugar rises because insufficient insulin secreted by body for 1 mark each

(2)

(ii) Explain why there is too little sugar in the blood if too much insulin is taken.

(ii) increase in rate of conversion of glucose to glycogen in liver

(3)

(iii) Explain why there is too little sugar in the blood if the person exercises more than usual.

(iii) muscles use more glucose from blood in respiration to release energy needed for exercise

High levels of oestrogen inhibit the production of FSH by the pituitary gland.

(i) Explain how this is an example of negative feedback.

(i) reduction in FSH levels will lead to reduction of oestrogen production, therefore oestrogen production is negatively affected by high oestrogen levels

(2)

(i) What is a hormone?

idea that chemical / substance that controls / co-ordinates bodily process

(1)

(ii) How are hormones transported around the body?

(ii) in the blood

(1)

The monthly cycle of women is controlled by hormones.

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

1 pituitary (gland)

2 ovaries

(2)

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

1
1. idea of stimulating release of eggs
preventing release of eggs
allow FSH increases fertility
accept contraception / contraceptive pill
/ morning after pill
2
2. 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

(2)

4 marks)

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

ovaries

They also control the thickness of the lining of her

womb
accept uterus

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

fertility

drugs.

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

oral

contraceptive(s)

(Total 4 marks)

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

- (a) any **two** for one mark each
1 answers should relate to the ideas in the list
birth control pills are 99 % effective in preventing pregnancy
the hormones in the pills give protection
2 against some women's diseases
condom (neutral)
the woman's monthly periods become more regular

(2)

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

- (b) any **two** for one mark each
1 answers should relate to the ideas in the list
the hormones in the pills have some rare but serious side effects
2 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)

(Total 4 marks)

Information is passed to target organs in the body by hormones.

(a) (i) How do hormones travel around the body?

in blood **or** the circulation system **or** plasma

(1)

(ii) What name is given to the organs that secrete hormones?

glands

accept endocrine glands **or** endocrine

do not accept a named gland

(1)

(b) Explain the cause of diabetes and how it is controlled.

(b) the pancreas

any **one** from

does not produce (sufficient) insulin

(blood) sugar is not (properly) controlled

1

insulin injections **or** inhalers

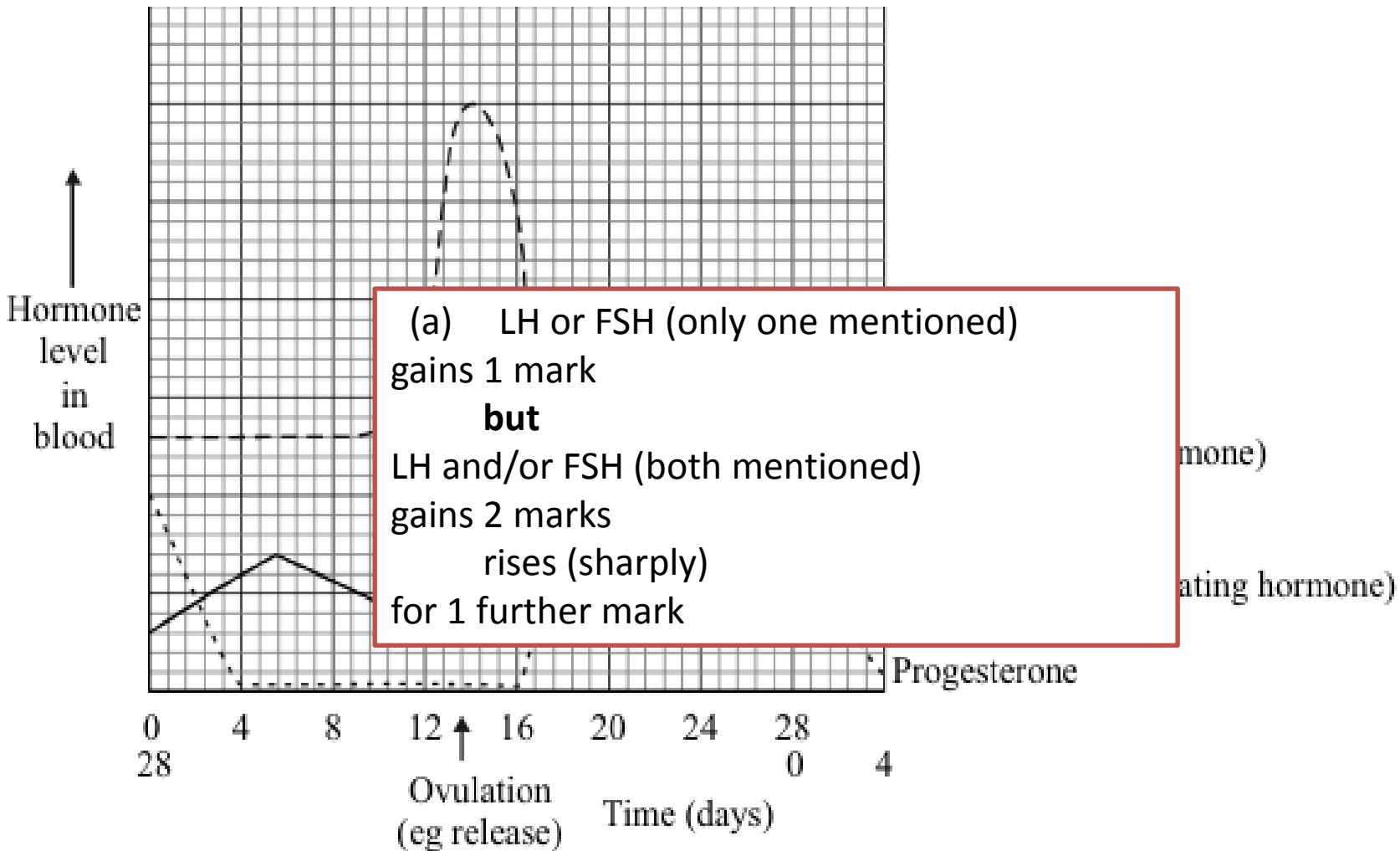
accept diet **or** tablets to make the

pancreas produce insulin

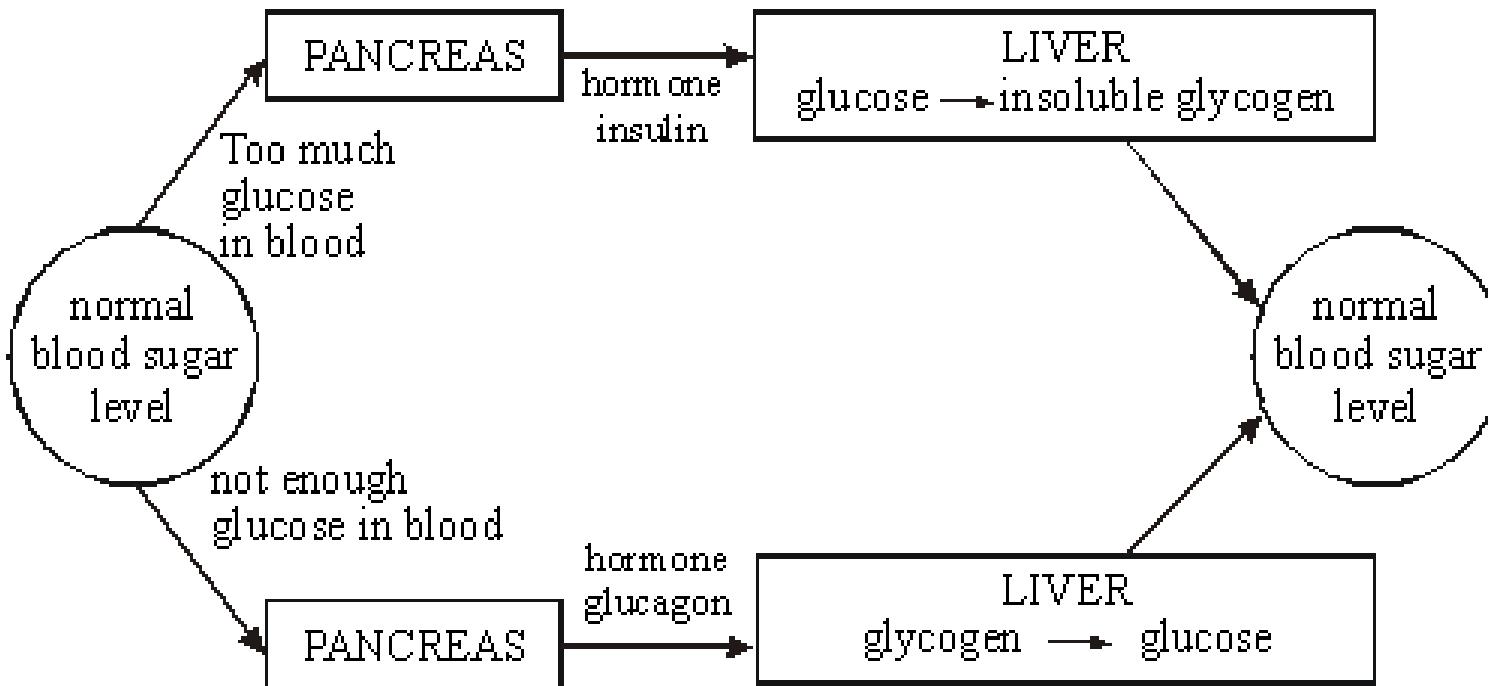
(3)

(Total 5 marks)

The graph shows changes in the levels of three hormones in a menstrual cycle.



- (a) What does the graph suggest the stimuli might be which cause the egg to be released?



The diagram shows how the blood sugar level is controlled in the body.

Explain fully what would happen if someone ate a meal of sweets.

- glucose level rises
- pancreas releases insulin
- glucose → glycogen (in liver)/removes xs glucose
- glucose level falls/returns to normal

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.

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

(Total 4 marks)

Chapter 3- medicine and drugs

This is an easy topic, so I am not going to give you many notes on it.

Double-blind trials are used to test new drugs. In a double-blind trial, neither the doctor nor the patient knows who is given the drug so that of taking it there is no biased opinion. A double-blind trial is where neither the doctor or the patient knows who is given the drug so that there is no biased opinion. Having a placebo on the person, who has the dummy pill too.

Chapter 3- medicine and drugs

1. What is a drug?
2. What is an illegal drug a
3. How long does it take (re
4. What is thalidomide?
5. What is thalidomide bei
6. What are statins?
7. What is a clinical trial, pl
8. What is St.Johns wort?
9. What is a recreational d
10. Give examples of a withdr
11. What is a hard drug?
12. What is the whole debate
13. What is a performance-en
14. Why are very strong pain kill
15. What is a steroid?

1. A drug is a substance that changes the way our body works. It can be legal or illegal.

2. An illegal drug is one that is banned by law. It can be dangerous and can cause harm.

3. Recovery time is the time it takes for the body to return to normal after an injury or illness.

4. Thalidomide is a drug that was used to treat morning sickness in pregnant women. It caused birth defects in many babies.

5. Thalidomide became illegal because it caused birth defects.

6. Statins are drugs that help to lower cholesterol levels in the blood.

7. A clinical trial is a study to test a new treatment or drug. It is usually done on a small group of people first.

8. St. John's Wort is a herbal remedy that is used to treat depression and other conditions.

9. Recreational drugs are drugs that are taken for fun or pleasure, not for medical reasons.

10. Examples of withdrawal symptoms include nausea, sweating, and tremors.

11. Heroin and cocaine are illegal drugs that are very addictive.

12. Some people who are seriously hurt but 'feels' better because they have taken painkillers, then they might start training again and damage themselves more. That is why they are banned in sports.

13. Some of these drugs are banned by law. Others are legal and available on prescription or even in some medicines available from the pharmacy. However, the use of performance enhancing drugs is widely seen as unfair. They may also damage the athlete's body.

14. Sporting regulations ban the use of performance enhancing drugs, and athletes are regularly tested to make sure they are not using them.

Many people use recreational drugs.

(a) Give **one** example of:

(i) a legal recreational drug

tobacco / nicotine / alcohol
accept solvent / glue / caffeine
ignore cigarettes / coffee

(1)

(ii) an illegal recreational drug.

cannabis / heroin / cocaine
allow eg crack / weed / ecstasy / LSD /
amphetamine / speed / steroids / GHB

(1)

(b) Some recreational drugs are addictive.

(i) Give **one** example of a recreational drug that is very addictive.

heroin / cocaine / tobacco / nicotine
ignore alcohol / cigarettes / cannabis / caffeine
/ coffee

(1)

(ii) Explain how the action of a drug makes a person become addicted to it.

alters body chemistry
ignore withdrawal symptoms / craving
ignore non-chemical effects on nervous system

Many people use drugs recreationally.

(a) (i) What is meant by the recreational use of drugs?

using drugs for pleasure / to make you feel good / to reduce stress

(1)

(ii) Explain why a person might become addicted to a recreational drug.

any **two** from:

- drug contains addictive chemical / names
- drugs alter body chemistry
- cause withdrawal symptoms owtte ignore craving
- uses drug frequently
or uses a lot of the drug
or needs more drugs

(2)

Six 'teenage' rats were given a small dose of THC – the active chemical in cannabis – every equivalent of human

any **five** from:

maximum **4** marks if no conclusion

The amount of THC in a cannabis 'joint' etc.

pros eg

maximum **three** pros

- used 'teenage rats' as equivalent to human teenagers
- THC dose typical of human cannabis smoking habits
- used control group
- rats allowed to choose amount of heroin

cons eg

- sample size small / only used 12 rats

ignore cruelty

- heroin administration very different from human situation
- conclusions
- rats given THC / cannabis took more heroin
- (this) is evidence for a link between THC / cannabis and heroin
- (but) rat behaviour / physiology not necessarily same as human

behaviour / physiology

- does not prove link in humans
- allow results not reliable for humans

Evaluate this investigation into heroin addiction in teenagers

and

Remember to include

It is legal in the UK to use certain recreational drugs but illegal to use others.

- (a) Tobacco is a legal drug. Pregnant women are strongly advised not to smoke.

Explain how a fetus may be affected if the mother smokes tobacco.

.....

.....

.....

- (a) any **two** from:

- birth mass / growth reduced
 - smoke contains carbon monoxide
ignore references to poison
 - blood carries less oxygen / fetus receives less oxygen
- do **not** accept harder for fetus to breathe

(2)

(a) We control many conditions inside our bodies.

Name **three** conditions which are controlled inside our bodies.

1. any **three** from:

- water
- 2. allow breathing / oxygen / carbon dioxide
- ions / minerals / salts
- 3. allow sodium / chloride, other ions neutral
- temperature

(b) Hormone
allow heat

Use
 blood sugar
• heart rate
• blood pressure

drug

vaccine

A woman can prevent pregnancy by taking a contraceptive drug

A woman can be helped to become pregnant by taking a fertility drug

(c) Some drugs are addictive.

(i) Name **one** addictive drug.

eg nicotine, alcohol, cocaine, heroin,
painkillers, tranquilisers, LSD
allow cannabis / weed or other alternative
names
allow tobacco
ignore smoking / ecstasy

(3)

(2)

Name **two** drugs which may harm the human body.

1.
e.g. tobacco;
alcohol (allow any drug)

2.

(Total 2 marks)

Chapter 4- adaptations

This is an easy topic too so I am not going to write a lot.

An adaptation is a special feature that allows a plant or animal to live in a certain place. E.g. Polar bears have thick fur SO they can survive in the cold.

YOU MUST SAY: WHAT THE ADAPTATION IS ANDDDD WHY IT IS BENEFICIAL:

E.G. BIRDS HAVE WINGS (ADAPTATION) SO THEY CAN FLY (BENEFIT)
DOLPHINS ARE STREAMLINED (ADAPTATION) SO THEY CAN SWIM FASTER

Finally- animals in cold places have a small surface area to volume ratio (adaptation) to keep heat in (benefit) and

- Animals in hot places have large surface areas (adaptation) to lose heat (benefit)

Chapter 4- adaptations

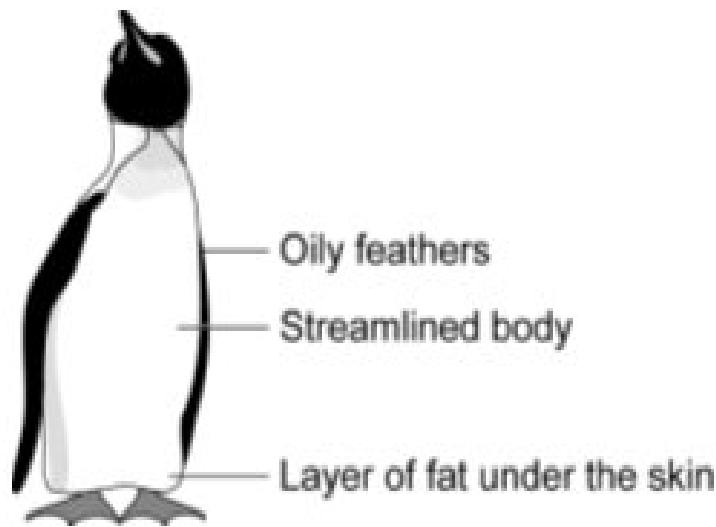
1. What is an adaptation?
2. Why do animals have to move?
3. What is competition?
4. Why do animals have to compete?
5. What do plants compete for?
6. What do animals compete for?
7. what does small surface area mean?
8. What does large surface area mean?
9. What does territory mean?
10. How do plants conserve water?
11. What is an extremophile?
12. What is a species?
13. What is an indicator species?
14. What things have an effect on the types of animals/plants in a certain place?
15. Stomata are like little holes in leaves where water is lost from. In dry conditions, a plant doesn't want to lose all its water, so its stomata can close.
- leafy lichens can survive a small amount of air pollution
- crusty lichens can survive in more polluted air.
- In places where no lichens are growing it is often a sign that the air is heavily polluted with sulfur dioxide.
- Some plants have spines which have a small surface area to lose less water, some plants have waxy layers so water isn't lost, some plants have poisonous chemicals to warn other creatures away from them.

Competition

- To survive, you have to compete with your species!!!

Plants compete for:		Animals compete for:
Light		Space/territory
Space		Mates (to reproduce)
Water/minerals		Food

Emperor penguins have adaptations that help them to survive in very cold antarctic conditions.



Emperor penguins catch fish in the sea.

Use this information and information f
adapted to survive in the antarctic.

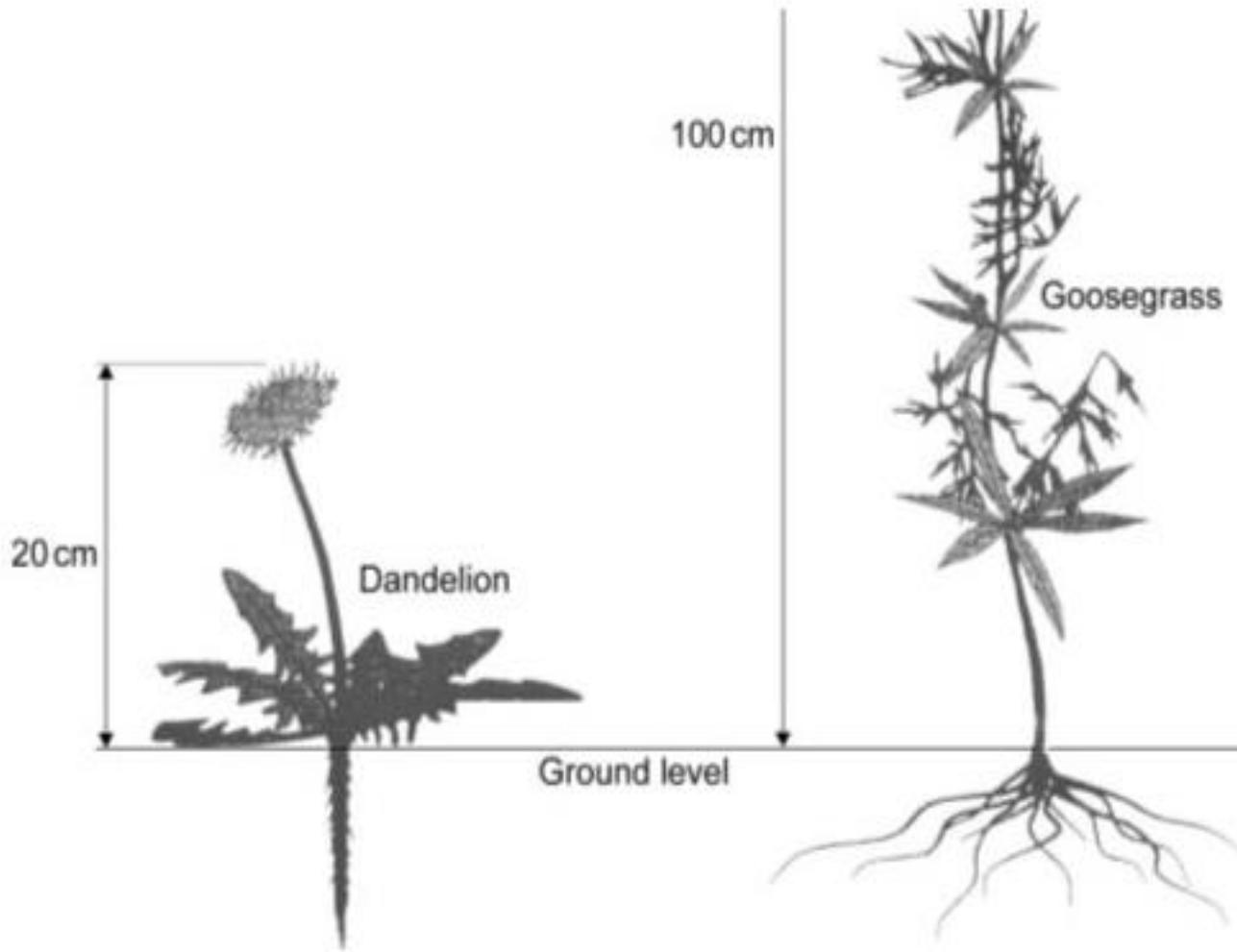
(the layer of fat under the skin) insulates the penguin

1

(the streamlined body) reduces resistance from water, enabling the penguin to swim faster to catch fish

1

(the oily feathers) prevent cold water reaching skin



Use the information in the drawings to answer the questions.

- (a) Explain **one** way in which dandelions animals feed.

- (a) most leaves lie close / flat on the ground
1
therefore the leaves are less likely to be eaten / mown



protection / defence

ignore insulation **or** rolls into a ball

ignore camouflage

1

from predators / from being attacked /
from being eaten

The echidna has pointed spines on its back.

Explain how these spines might help the echidna to survive.

Swallows and swifts migrate between Britain and South Africa every year.

- (a) **Photograph 1** shows a swallow.

Photograph 1



streamlined / aerodynamic / swept-back /
arrow-shaped / dart-shaped
wings / tail

allow pointed / curved wings
ignore pointed tail / beak

OR

large / long wings

Swallows can fly very quickly.
ignore large tail

Use information from the photograph to give one way in which the swallow is adapted for flying very quickly.

The drawing shows a poison-dart frog.



- (a) The poison-dart frog moves mainly by jumping.

Use information from the drawing to suggest one way in which this frog is adapted for jumping.

long hind legs / muscular hind legs / bent hind legs

accept powerful hind legs

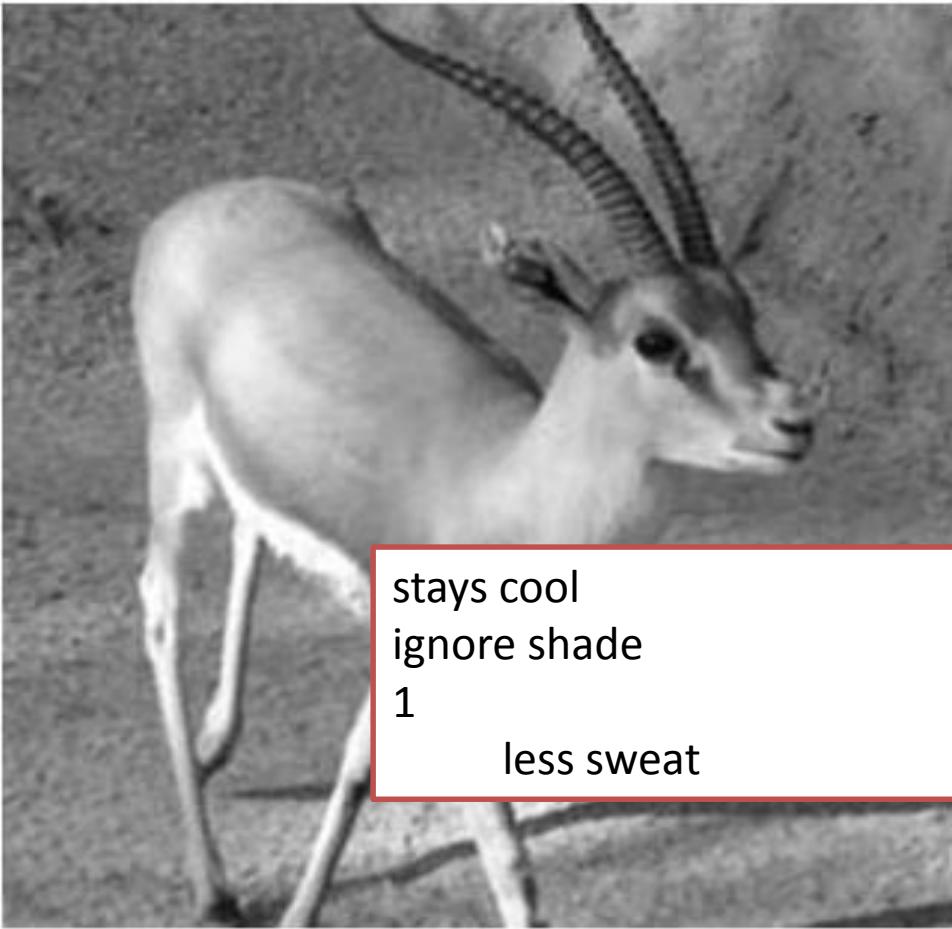
accept back legs act as spring

(1)

- (b) Use the information below to suggest how the poison-dart frog is adapted for survival.

- This poison-dart frog is bright blue in colour.
- Animals that eat poison-dart frogs become very sick.

colour / markings warns predators not to eat it



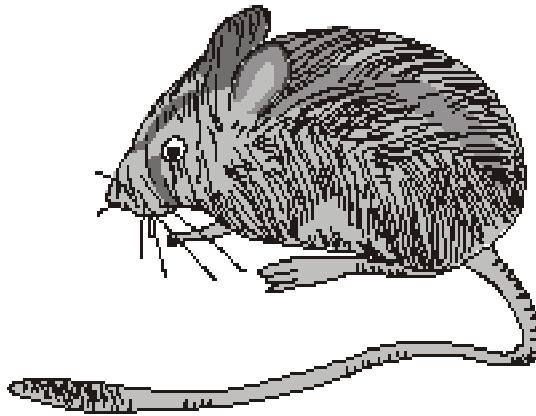
stays cool
ignore shade
1
less sweat

The sand gazelle lives in the Arabian Desert where temperatures often reach 45 °C.

- (a) The sand gazelle feeds only at dawn and at dusk. At other times it stays in the shade.
Suggest how this helps the animal to conserve water.

The drawing shows a kangaroo rat.

This rat lives in hot, dry deserts.



(a) Explain how each of the following features helps the kangaroo rat to survive in a hot, dry desert.

(i) It does not produce urine.

conserves water owtte

(1)

(ii) It lives in a burrow during the day, but comes out at night to search for food.

prevents overheating / keeps cool
allow cooler at night
allow safety from predators

Organisms have adaptations that enable them to survive in extreme conditions.

(a) The photograph shows an arctic fox.



1 mark for each adaptation and **1** mark for its correct linked advantage

- long / thick hair / fur (1)
for insulation (1)
allow keeps warm
- small ears (1)
for reduced heat loss (1)
- small feet (1)
for reduced heat loss (1)
ignore wide feet
ignore prevent sinking
- white fur / coat (1)
for camouflage / poor emitter (1)
- small SA/V ratio (1)
reduces heat loss (1)
- thick layer of fat (1)
insulates / keeps warm (1)

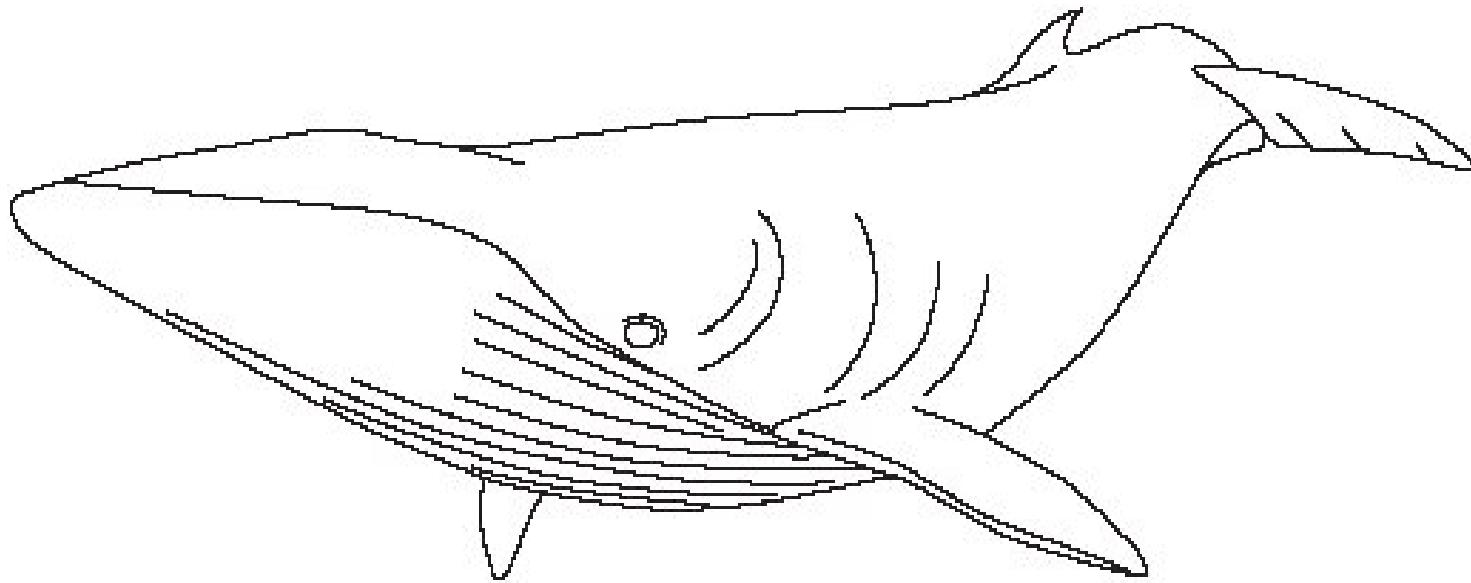
This fox lives in

Suggest **two** ways

Explain how each adaptation helps the arctic fox to survive in very cold conditions.

(a) **Figure 1** shows a minke whale. Whales live in the sea.

Figure 1



Write down **two** ways in which the body of the whale is adapted for swimming.

1

any **two** from:

- streamlined / shape reduces friction / long and thin / smooth surface

OWTTE

2

- fins / flippers / tail / paddle

do **not** accept 'arms' or 'legs'

- structures that push against water

Animals and plants are adapted in different ways in order to survive.

(a) Plants may have to compete with other plants.

(i) Name two things for which plants compete.

1

(a) (i) any **two** from:

list principle

2

ignore oxygen / food / sun

- light

- water

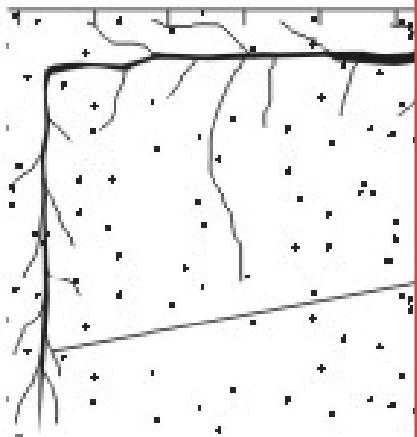
- space

- nutrients / ions / minerals / named

- carbon dioxide / CO₂

(2)

The drawing shows a bean caper plant.



adaptation and linked advantage eg
max 2 for 3 adaptations

2

- roots widespread / long (1)
to collect water from large area (1)

ignore large roots

accept to collect more water

- some roots deep / long (1)
to collect water from deep down (1)

ignore large roots

accept to collect more water

- absence of leaves(1)

reduces water loss (1)

- swollen stem (1)

to store water (1)

- roots near surface (1)

to absorb rainwater (1)

- roots widespread (1)

support in sandy soil (1)

2

o leaves

The bean caper plant

Explain two ways in w

Adaptation 1

How this adaptation he

The table compares some features of a polar bear and the Malayan sun bear. The polar bear lives in the Arctic where the climate is cold. The Malayan sun bear lives in warm tropical forests.

	Polar bear has	un bear
Colour of fur	white fur - camouflage or not seen by prey	
Thickness of fur	1 thick(er) fur - insulation or keeps heat in	
Thickness of fat	<u>number must be comparative</u> numbers given must be explained	
Surface area of body	do not accept keeps warm / keeps out the cold 1 thicker fat - insulation or keeps heat in	
Use information about the sun bear for survival	1 energy reserve or can release	ted than the Malayan
To gain full marks, answer in a sensible order and show your working	heat 1 lower S.A - slower / less heat loss (re body size)	lish. Put them into a

Animals and plants are adapted to live in their environment.

(a) Explain how these adaptations help animals keep warm in cold conditions.

(i) A thick fur coat

(a) (i) traps air
note 'keeps warm' is stem
1
(increases) insulation effect **or** retains
body heat or prevents heat loss
accept air is a poor (thermal) conductor
do **not** credit acts as a barrier unless qualified
by a prevention of heat loss

(2)

(ii) A thick layer of fat

increases insulation
do **not** accept keep warm

(2)

(iii) A large body

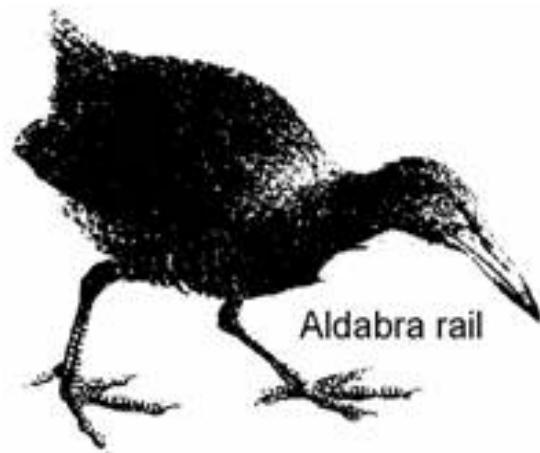
less **or** smaller surface area (per unit
mass or volume)
accept uses more glucose **or** respires more
do **not** credit small surface area

and

less heat loss (for its mass)
or explanation of this idea
generates more heat

(2)

Flightless birds called Rails once inhabited 20 islands in the Pacific Ocean. During the last two centuries they have disappeared from 15 of these islands. The Aldabra Rail, shown below, is one of the few survivors. The island which it lives on is very remote.



Suggest **three** reasons why Rails have disappeared from 15 of the 20 islands they once inhabited.

1.

3 of e.g.

new predators

2.

new diseases

new competitors

3.

environmental changes (initiated by Man)

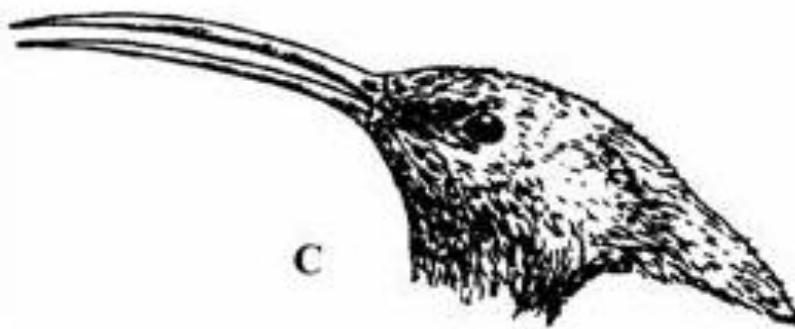
each for 1 mark



A



B



C



D

Which of the birds, A, B, C or D, is best adapted for:

1. tearing flesh
2. finding insects in cracks in the ground
3. crushing fruit
4. sieving small animals from mud?

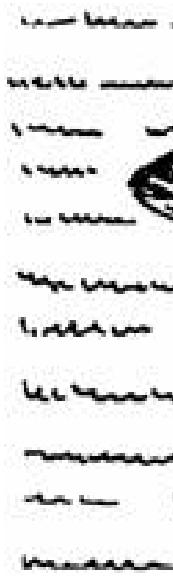
A

C

B

D

Wild salmon hatch from eggs laid in rivers. The small salmon then swim downstream to the sea. After 3-4 years they return to breed, usually in the same river in which they were hatched. If fish return to a different river they do not breed as successfully as those returning to the same one. This means that each river has its own breeding population of salmon. Each breeding population is slightly different.

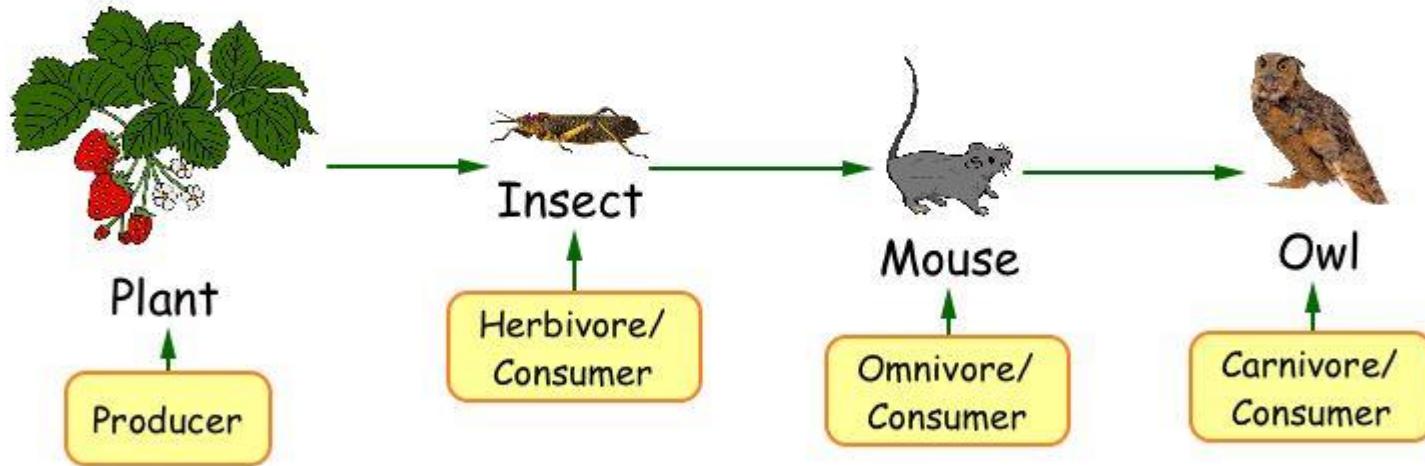


- variations / mutations / differences in genes / alleles (in wild salmon population)
 - adapted to own river
 - any appropriate difference between rivers
 - e.g. flow rate, waterfalls, pH, temperature, food supply, disease predators, competitors
 - homing instinct for 1 mark each
 - survive to breed
 - gains 1 mark
 - but**
- Use the idea of natural selection to explain how salmon pass on genes to offspring. This gains 2 marks.

breeding population.

Arrow means 'eaten by'...say it in your mind
for this food chain below!

The Food Chain Of An Owl



A food chain shows the path of energy from one living thing to another.
Decomposers like bacteria, are necessary for all food chains.

Chapter 5- energy in biomass

- 1 what does biomass mean?
2. What does the arrow on a food chain mean?
3. What does producer mean?
4. What do green plants do?
5. What is the equation for respiration?
6. What is the opposite of photosynthesis?
7. How is energy lost?
8. What does decay mean?
9. How is an organism decayed?
10. Explain what the carbon cycle is.
11. What is 'organic waste'?
12. What does combustion mean?
13. What is a pyramid of biomass?

1 1. Biomass is the amount of living material in an area. It's measured in tonnes per hectare.
2 2. An arrow on a food chain means energy is transferred from one thing to another. Energy is lost at each stage.
3 3. A producer is an organism that makes its own food using light energy. Plants are producers.
4 4. Green plants use light energy to make their own food. They do this through photosynthesis.
5 5. Respiration is the process by which organisms break down glucose to release energy. This energy is used for all the processes in the body.
6 6. The opposite of photosynthesis is respiration. In respiration, glucose is broken down to release energy.
7 7. Energy is lost at each stage of a food chain. This is because some energy is lost as heat and some is used for movement and growth.
8 8. Decay is the breakdown of dead organisms by decomposers like bacteria and fungi.
9 9. An organism is decayed when it is broken down into smaller pieces by decomposers.
10 10. The carbon cycle is the way that carbon moves between the atmosphere and living things. It involves plants taking in carbon dioxide and using it to make glucose, and animals breathing out carbon dioxide.
11 11. Organic waste is dead or decaying plant or animal material. It can be composted to produce compost, which is a mixture of dead things like leaves etc which is full of nutrients so is wonderful if you want to grow things in it.
12 12. Burning things. etc. It can be broken down to produce compost. Compost
13 13. It shows how biomass is transferred from one thing to the next in a food chain. Each time, energy is lost (due to urine, faeces and movement). Therefore, the best pyramids of biomass for humans are the shorter ones, not the ones with lots of trophic levels. A pyramid of numbers shows the numbers of each organism.
14 14. environment etc etc etc! You need to look at a carbon cycle diagram and know what is happening!

Producing food for humans affects the environment.

- (a) Increasing the efficiency of human food production will help to feed an increasing world population.

Give **three** ways

For each of the

1

1 reduce the number of stages in food chain

1

because there are energy losses at each stage

in a food chain

1

.....
2 keep animals indoors

1

so that less energy is used in maintaining body

temperature

1

.....
3 restricting movement of animals

1

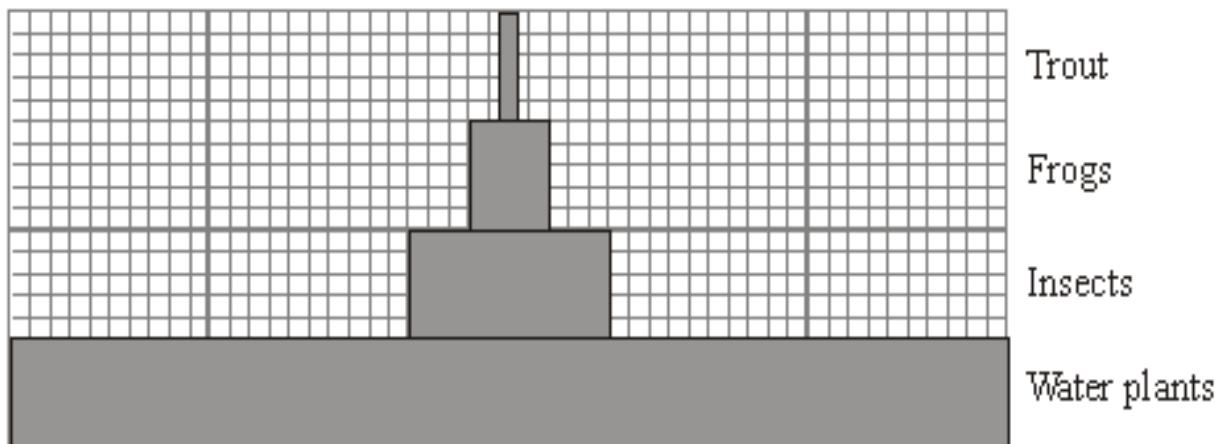
so that less energy is used in movement

3

.....
n be increased.

.....
is increased.

The diagram shows a pyramid of biomass drawn to scale.



- (a) What is the source of energy for the water plants?

the sun / light / sunshine / solar

(1)

- (b) The ratio of the biomass of water plants to the biomass of insects is 5 : 1.

Calculate the ratio of the biomass of insects to the biomass of frogs.

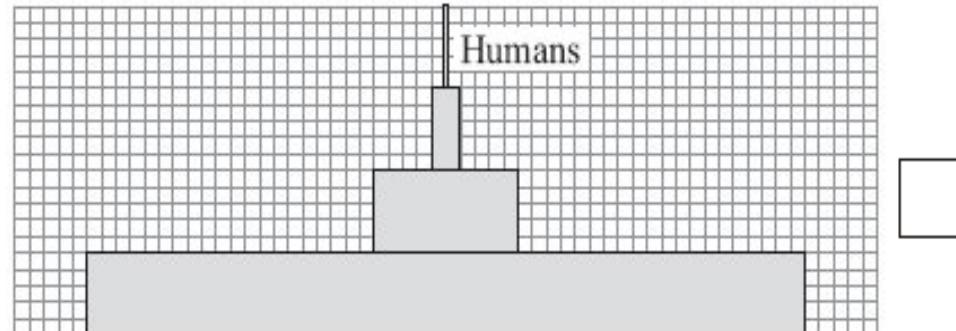
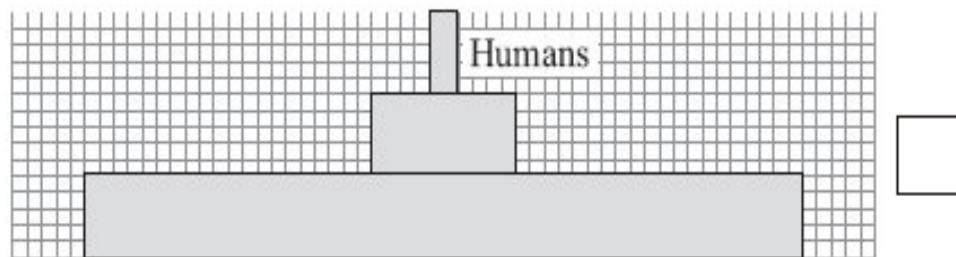
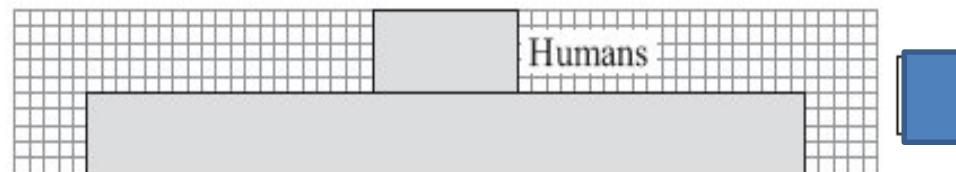
Show clearly how you work out your answer.

2.5 (:1)

(a) The diagrams show three pyramids of biomass.

(i) Which pyramid would be the most efficient in providing food for humans?

Tick () **one** box.



- (ii) Gardeners are advised to put waste materials into special compost bins.
These bins have holes in their sides.



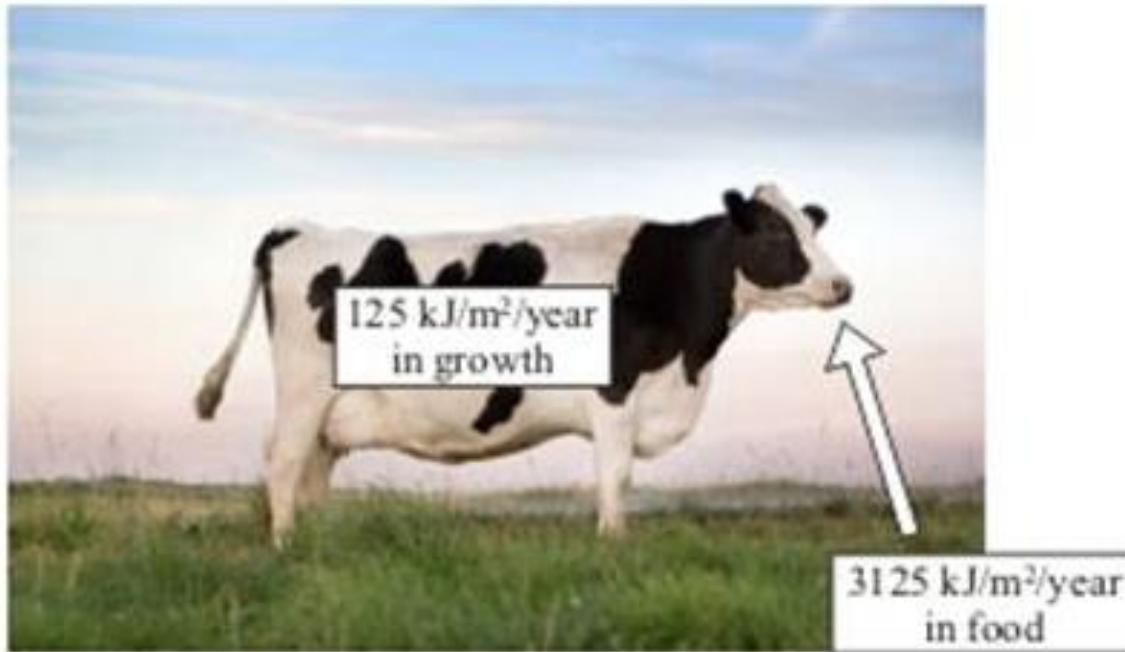
Holes in the sides

Explain why.

- (ii) any two from:
- oxygen / air (in)
do **not** accept lets oxygen / air out
ignore reference to other substances / light
passing in or out ignore microorganisms
passing in
 - for microorganisms / bacteria / microbes
/ fungi /
decomposers
ignore worms / germs / bugs
 - (for aerobic) respiration
 - let heat out
ignore heat in

faster.

The photograph shows what happens to some of the energy in the food that a cow eats.



- (a) Calculate the percentage of the energy in the cow's food that is transferred into new growth.

Show clearly how you work out your answer.

4

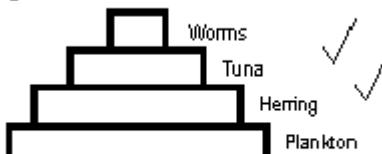
award **both** marks for correct answer,
irrespective of working.

allow $125/3125 \times 100$ or 0.04 for **1** mark

(a) Tuna fish are carnivores. In the wild they feed on smaller fish called herring. Herring feed on plankton. Tuna can be attacked by parasitic worms which feed on their flesh.

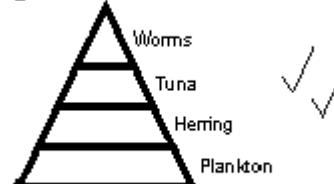
(i) In the space chain.

eg



Do not forget:

eg



od

(2)

(ii) If a tuna eats 1 kg of herring it gains about 65 g in mass

Give two reasons why the tuna does not gain all the mass of

any two from:

- waste / excreted / urine / faeces / CO₂ (from tuna)
- from / of tuna not required but do not accept if of / from other organisms
- respiration (of tuna)
- ignore used in reproduction
- movement (of tuna) / hunting
- if a mark is not awarded for respiration / movement / heat allow 1 mark for energy (unqualified)
- used for heat (production) (of tuna)
- not digested / absorbed

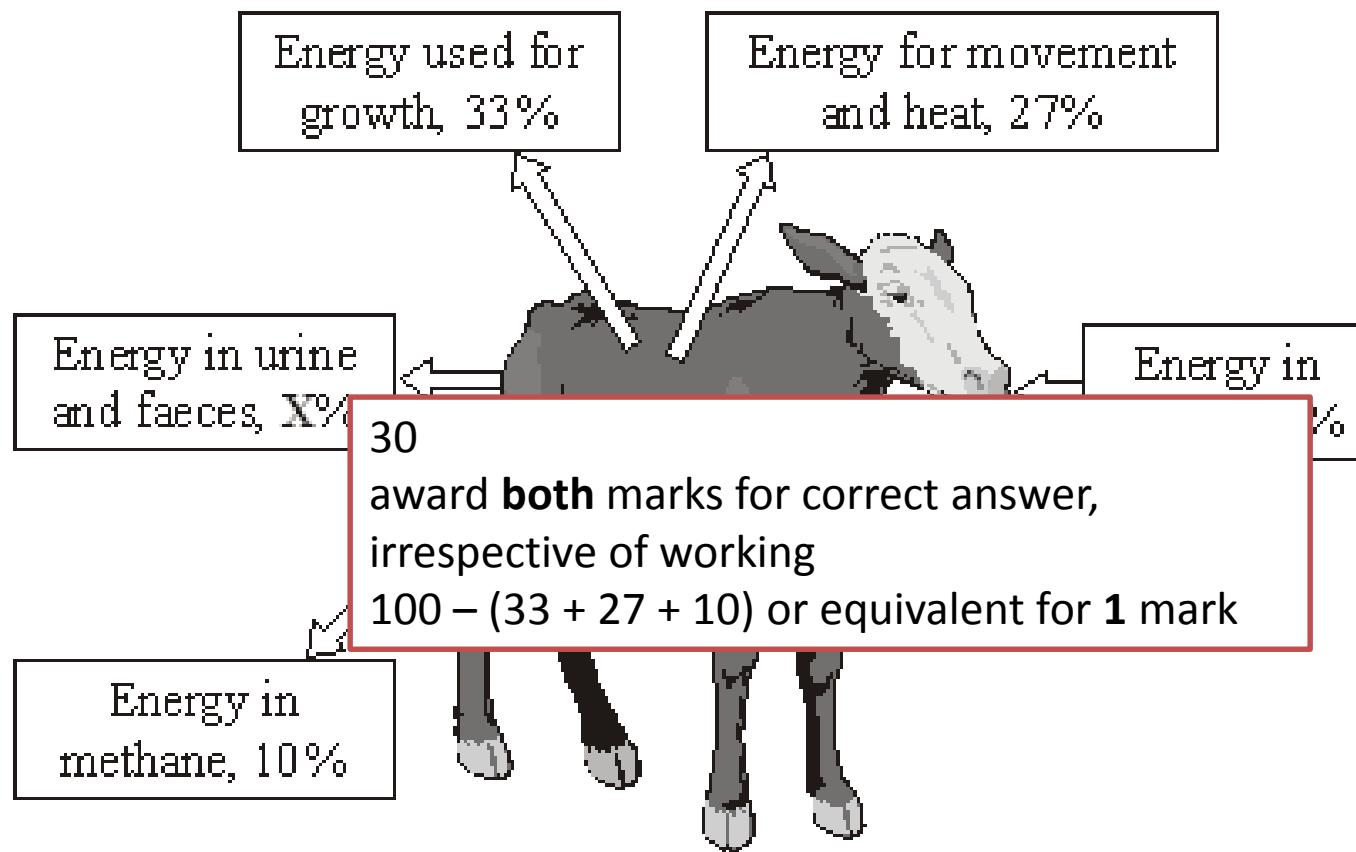
mass of

1

2

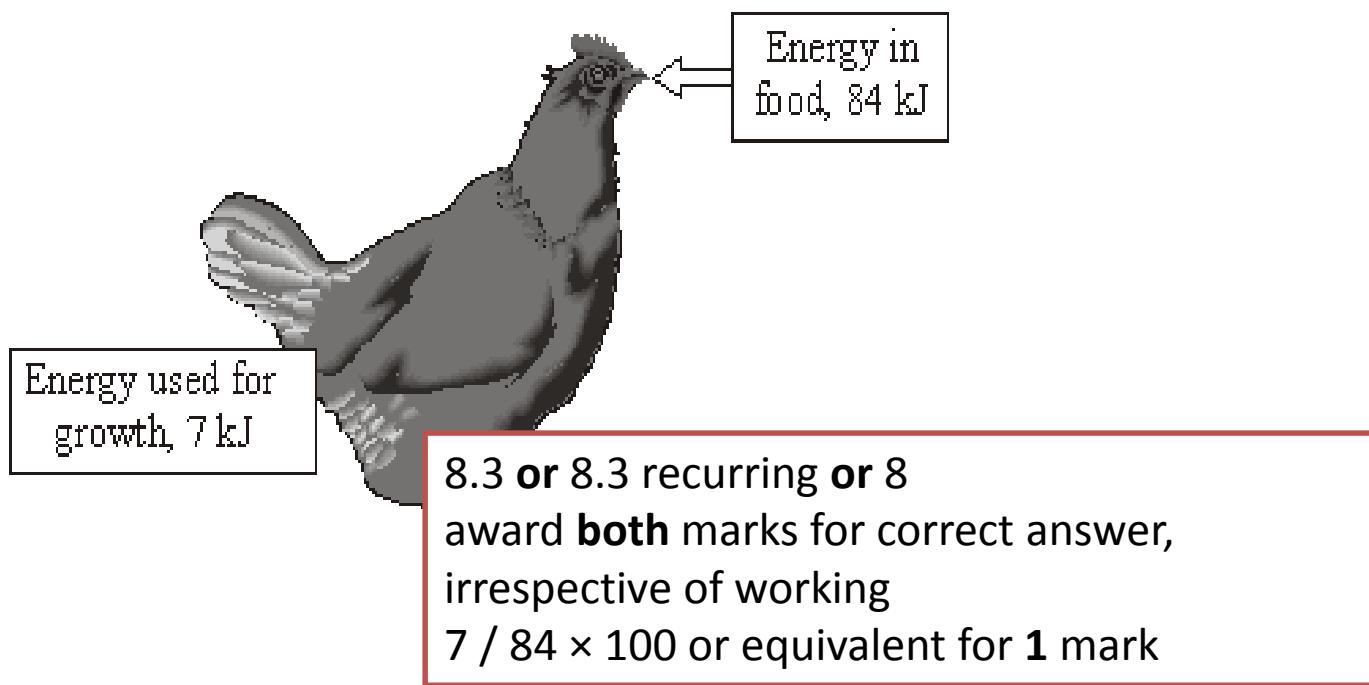
(2)

The diagram shows what happens to the energy in the food that a calf eats.



- (a) Calculate the % energy lost as urine and faeces (X).
Show clearly how you work out your answer.

The diagram shows what happens to some of the energy in the food that a chicken eats.



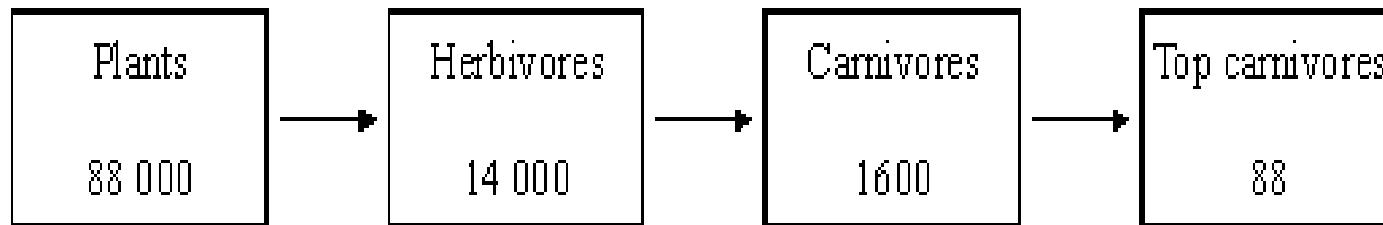
- (a) Calculate the percentage of energy used for growth.

Show clearly how you work out your answer.

Energy used for growth = %

(2)

The diagram shows a food chain in a pond. The figures show the amounts of energy in each type of organism, in kilojoules per m² of pond per year.



- (a) Calculate the percentage of the energy in the plants that is passed to the top carnivores. Show clearly how you work out your final answer.

a) 0.1

ignore working or lack of working

for 1 mark

$$\frac{88 \times 100}{88000}$$

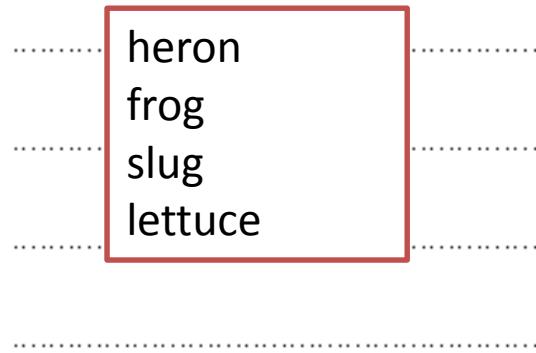
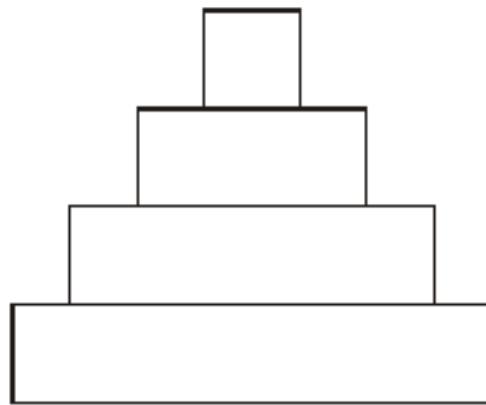
Answer %

(2)

This is a simple food chain.

Lettuce plant → Slug → Frog → Heron

The diagram shows a pyramid of biomass for this food chain.



- (a) Write the names of the organisms in the food chain on the correct lines next to the pyramid of biomass.
- (b) (i) The slug obtains its energy from the lettuce plant. What is the source of energy for the lettuce plant?

light / sun

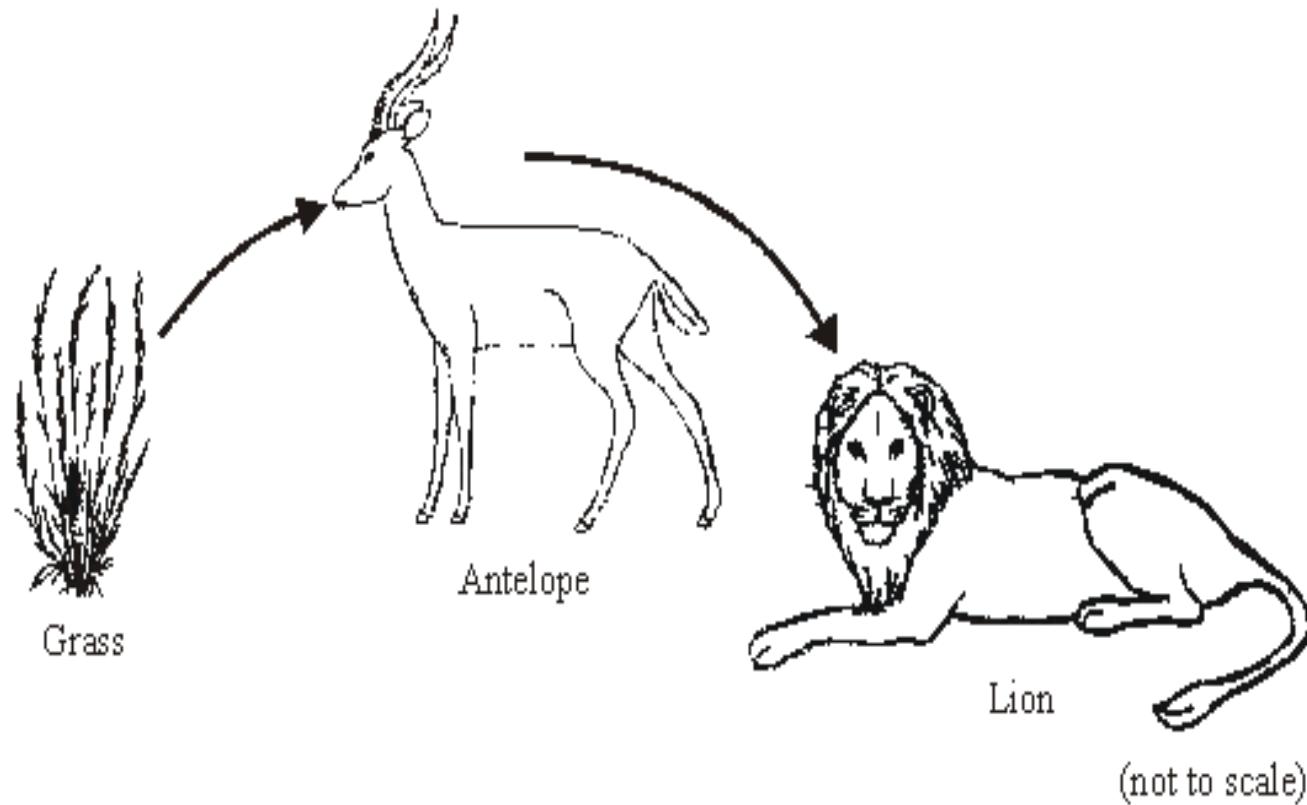


Figure 1

(a) (i) In this food chain, name:

the predator: lion

the prey: antelope

(2)

(a) One food chain in the wood is:

Hazel tree nuts → squirrels → owls

(i) What does this food chain tell us?

squirrels eat nuts;
owls eat squirrels

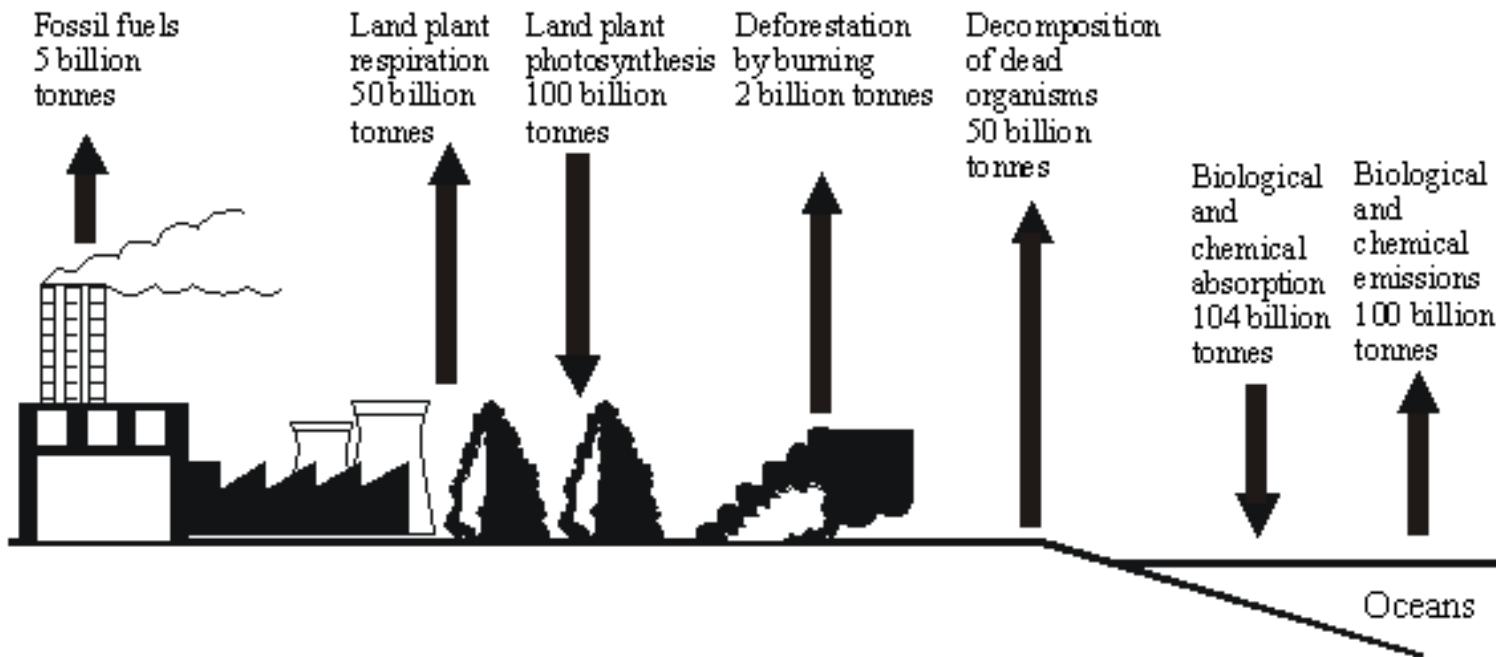
(2)

(ii) Which **one** of the organisms in the food chain is a producer?

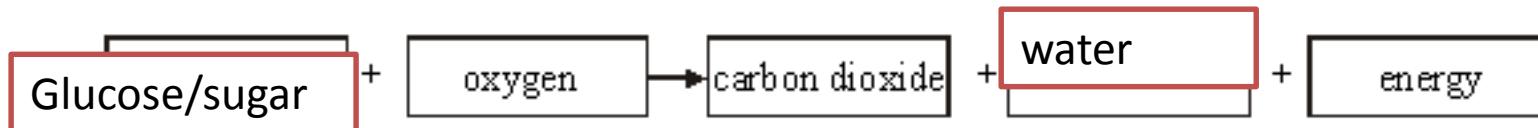
hazel tree

(1)

The diagram below shows the mass of carbon involved each year in some of the processes in the carbon cycle.



(a) Complete the equation for plant respiration.



(2)

- (b) Gardeners put plant material onto compost heaps so that it will decay. They then put the decayed compost onto soil where they are growing their plants.

Give **three** conditions which are needed for plant material to decay rapidly.

1

warm
moist
oxygen

2

3

(3)

(Total 5 marks)

A food chain has four organisms, A, B, C and D.

Organism
A
B
C
D

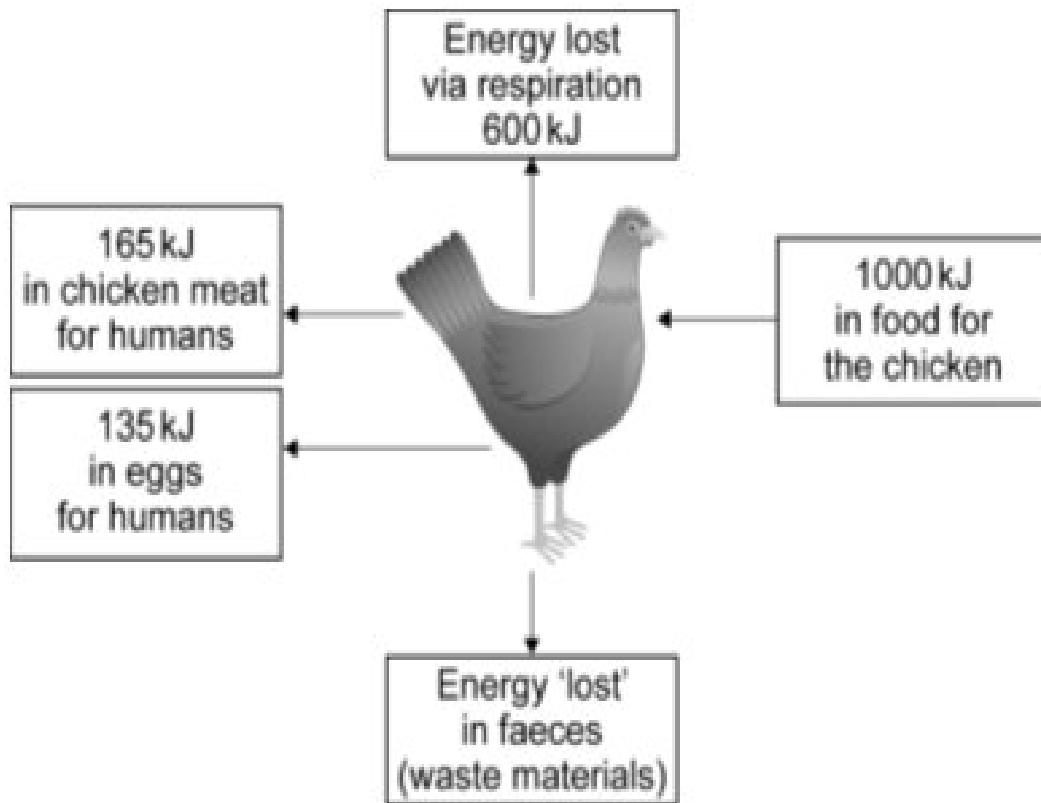
The table shows the amount of energy transferred between four organisms.

any five from:

- the amount of energy (in the biomass of organisms) is reduced at each successive stage in a food chain
- all of prey organism is not consumed
- energy is 'lost' as the organisms' waste materials
- energy is transferred / lost during respiration
- energy is transferred / lost as movement (kinetic energy)
- energy is transferred / lost as heat (thermal energy)
- energy is transferred / lost to the surroundings
- the only energy transferred to a higher level is that which the organisms have used in growing

Explain, as fully as you can, how less energy is transferred to organism A.

The diagram shows how energy supplied in food to a chicken is transferred.



- (a) How much energy is transferred by the chicken into food for humans?

Amount of energy transferred to humans $165 + 135 = 300 \text{ kJ}$

(1)

- (b) Calculate the amount of energy 'lost' in faeces?

$1000 - 600 - 165 - 135 = 100 \text{ kJ}$

Chapter 6: variation, reproduction and new technology

- **Cells**- the basic unit of life (we are made up of cells)
- **Nucleus**- contains the genetic information
- **Genetic information**- in the form of chromosomes
- **Chromosomes**- MADE of DNA, CONTAIN genes
- **Genes**- code for our characteristics
- **Alleles**- different forms of the SAME gene- e.g. Eye colour.



Chapter 6: variation, reproduction and new technology

1. What does inheritance mean?
2. What is a chromosome?
3. What is a gamete?
4. What is another name for a homologous pair?
5. Why does a sperm cell need to be small?
6. What do genes do?
7. What is the difference between identical and fraternal twins?
8. If we want to make clones, what do we need?
9. How do we get variation?
10. Name two methods of cloning plants.
11. Name two methods of cloning animals.
12. What is genetic engineering?
13. What are the advantages and disadvantages of cloning?
14. What are the dangers of cloning?

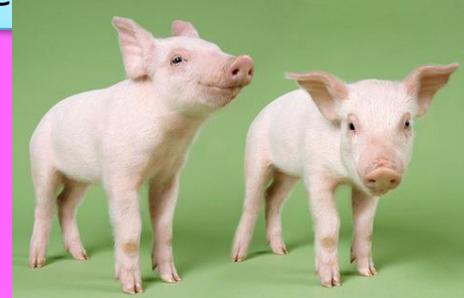
Reproduction

- One of the **SEVEN** life processes.
- **PASSING GENETIC INFORMATION FROM PARENT(S) TO CHILD (ALSO KNOWN AS OFFSPRING)**

SEXUAL:
-2 parents
-Variation (genetic information from two parents)
-Gametes (sex cells) fuse to form the child/offspring



ASEXUAL:
-One parent
-Gives rise to clones



Nature vs nurture

- Nature- due to genetics (last slide)
- Nurture- due to the environment



Cloning

- Making identical copies to your parents.
- In plants there are two ways- cuttings (cheap but doesn't always work) and tissue culture (expensive but can make thousands)
- In animals there are two ways of cloning- embryo cloning AND adult cell cloning.

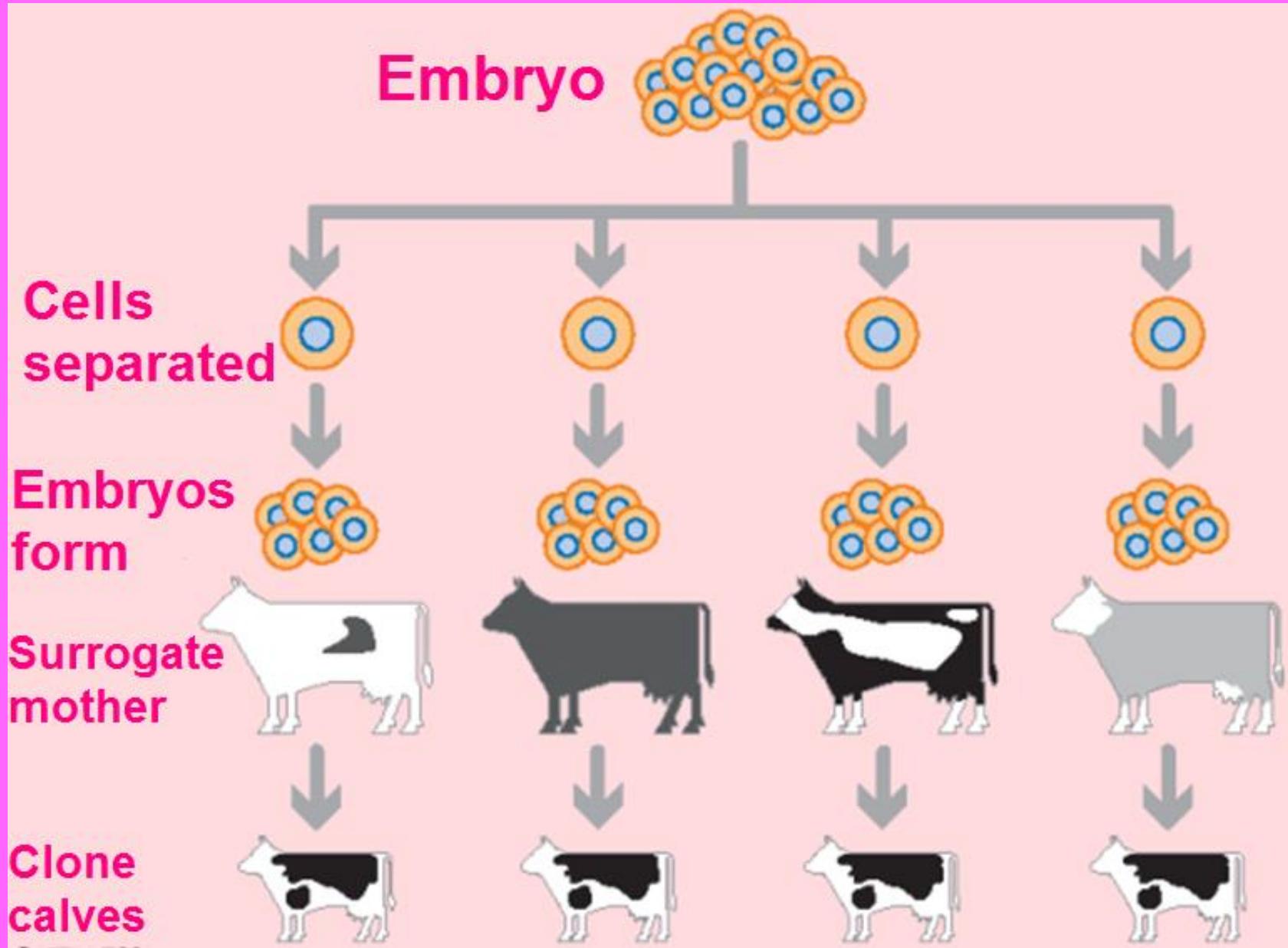
Embryo transplants

- A fertilised egg begins dividing, the cells are split before they become specialised
- The cells are implanted into surrogateshosts



- Cattle farmers use embryo transplants to produce calves with characteristics of the best bull and best cow - all the calves produced are clones of each other
- Cattle with high milk yield or lots of meat can be bred where they are needed (poorer countries)

Embryo transplants



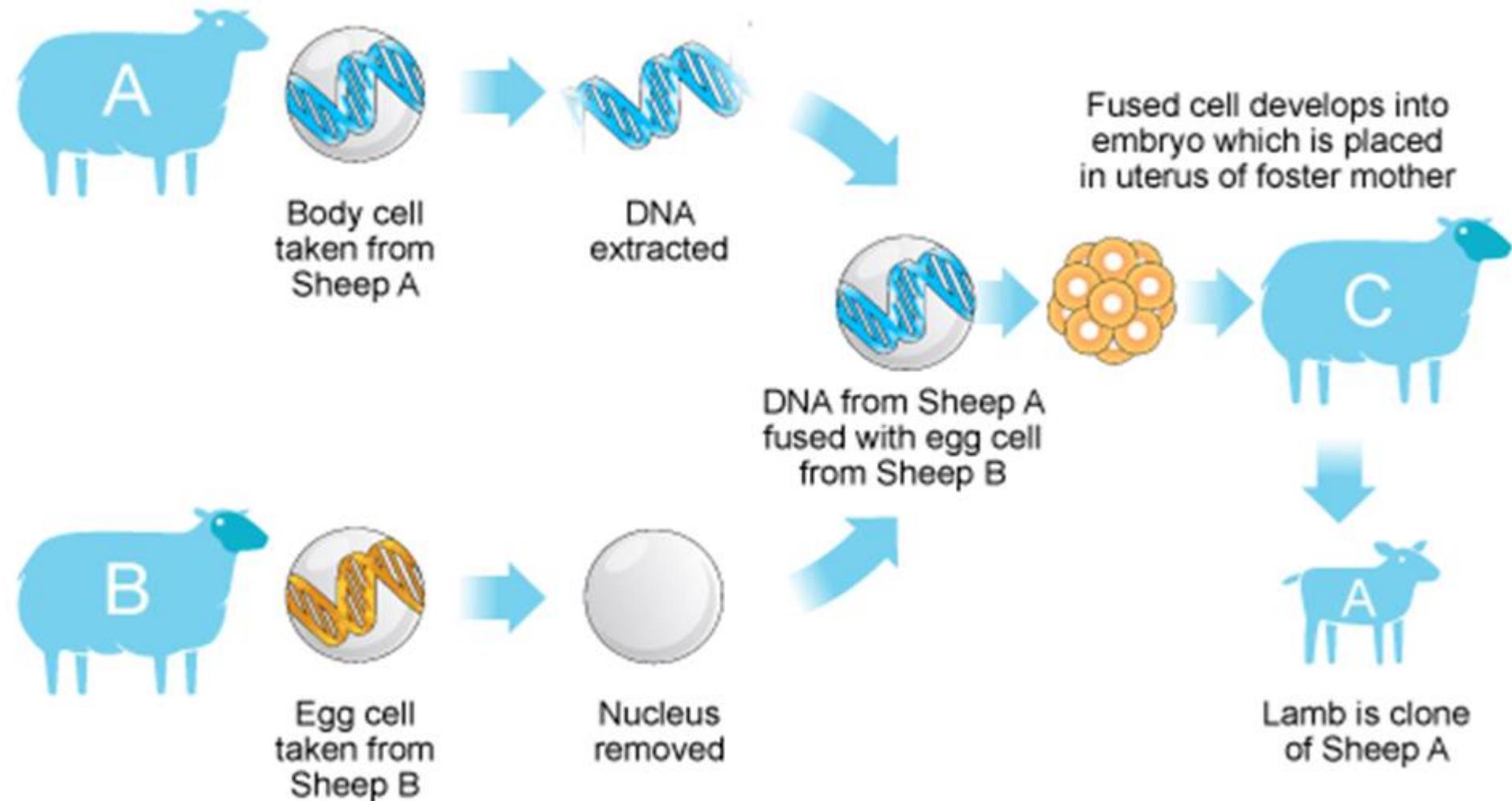
Adult cell cloning

- The genetic material of an **adult** is used to make a clone of that adult
- The genetic material is put into an empty egg (from a different adult)
- The cell starts dividing and becomes an embryo
- Dolly the sheep was the first mammal to be cloned from the DNA of an adult

Dolly and her
first born lamb,
Bonnie



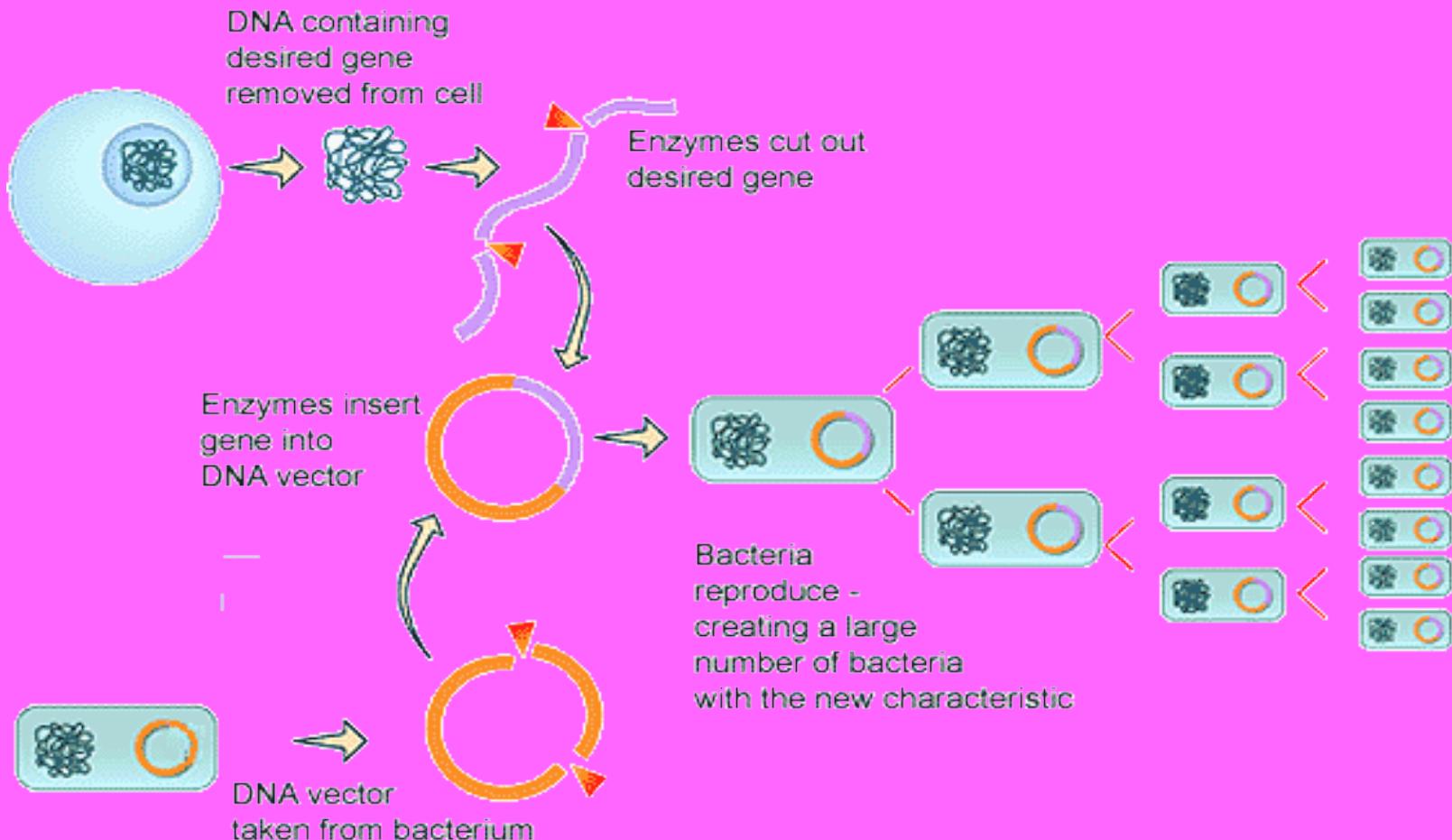
Dolly the sheep



The advantages and disadvantages of animal cloning

✓	✗
1. Can quickly make copies with useful characteristics	1. Short life spans
2. The original animal can make eggs all year round	2. Immoral
3. Extinct or endangered species can be repopulated through cloning.	3. Many eggs may be needed to make one clone – takes time and money

Genetic engineering- whole point (basically) is to make more of something we want

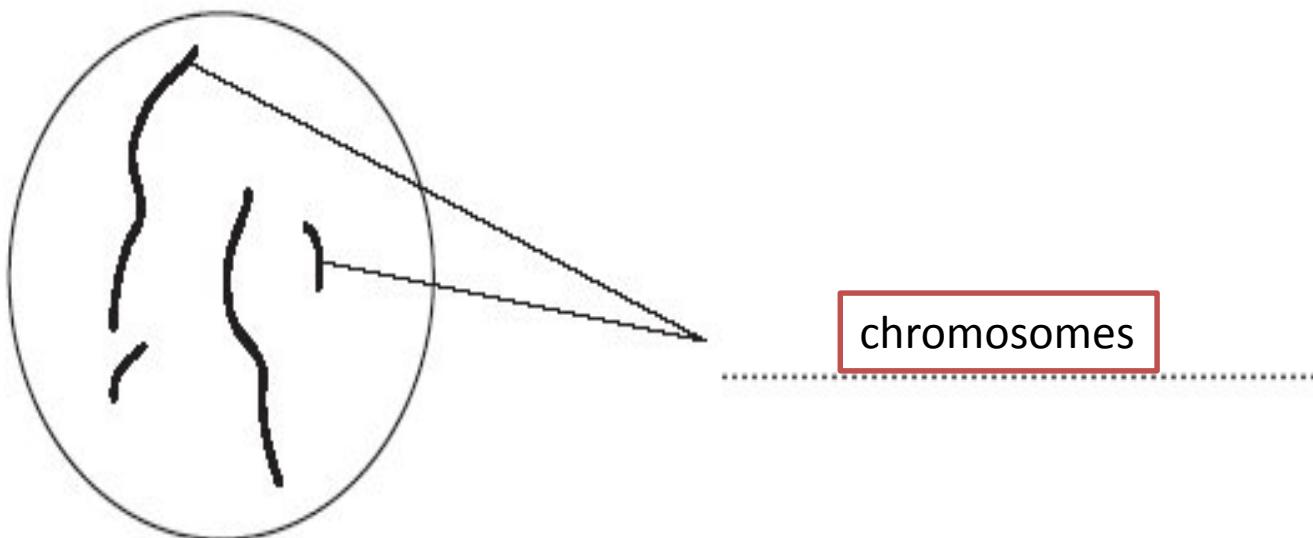


Genetic engineering- animation

http://www.bbc.co.uk/schools/gcsebitesize/science/aqa_pre_2011/evolution/reproductionrev6.shtml

Diagram 1 shows the nucleus of a body cell as it begins to divide by mitosis.

Diagram 1



- (a) Use a word from the box to label **Diagram 1**.

alleles

chromosomes

gametes

(1)

Diagram 1 shows the nucleus of a cell at the start of meiosis.

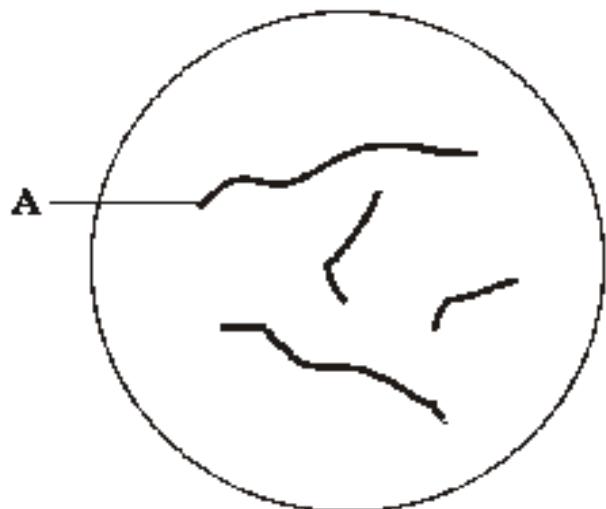


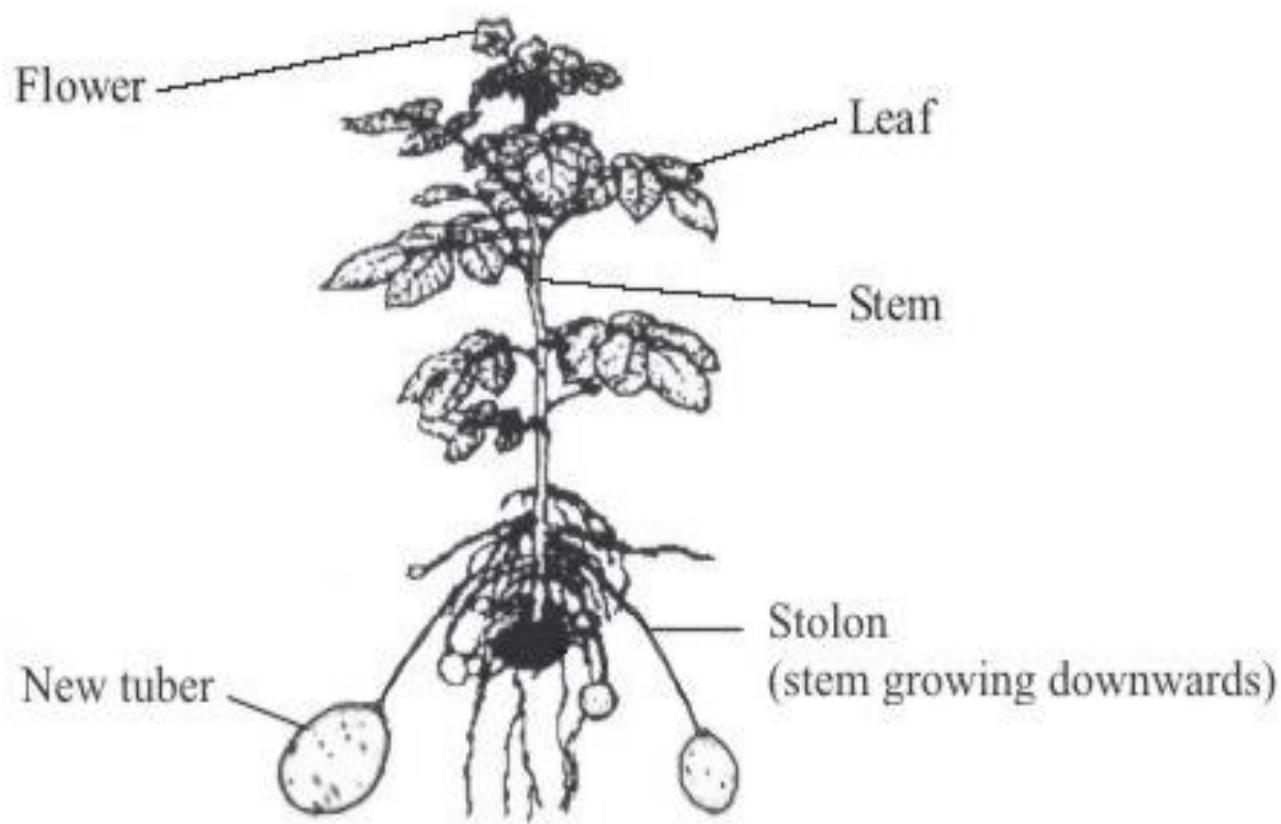
Diagram 1

chromosome

- (a) Name structure A.....

(1)

The drawing shows a potato plant producing new tubers (potatoes). Buds on the stem of the parent plant produce stolons. The new tubers are formed at the ends of the stolons (stems that grow downwards).



- (a) Explain why the new tubers are genetically identical to each other.

Asexual reproduction- i.e.
No sexual reproduction

You may use each word once or not at all.

asexual	eggs	gametes	fertilisation	inheritance
ovaries	sexual	sperms	testes	variation

The genetic information from the mother is carried in the **eggs**

which are made in the **ovaries**

The genetic information from the father is carried in the **sperms**

which are made in the **testes**

In **sexual** reproduction, offspring are produced that are genetically different from either parent.

This happens because genetic information from each parent is carried in the

..... **gametes** and joined together during **fertilisation**

to develop into a fetus.

These are all dogs. They are *in the same species*.

Type:	Great Dane	Yorkshire Terrier	Standard Dachshund
Weight:	54 kg	3.5 kg	9 kg
Height to shoulder:	57 cm	25 cm	20 cm



- (a) What does it mean to be *in the same species*?

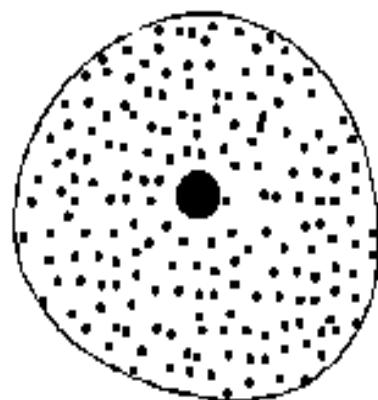
.....

.....

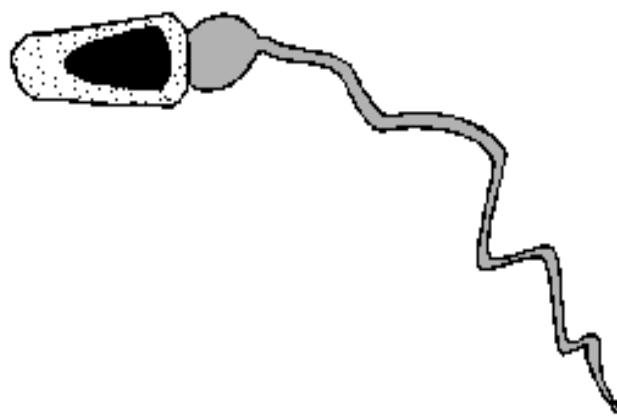
breed (together)
accept have same number of chromosomes

(2)

Men and women produce different gametes (sex cells).



Female gamete



Male gamete

Not to scale

- (a) In sexual reproduction the male and female gametes join together.

What is the name for this process?

Fertilisation

(1)

(1)

(b) Complete the sentences about sex cells.

(i) Male gametes are called sperm

They are produced in the testes

(2)

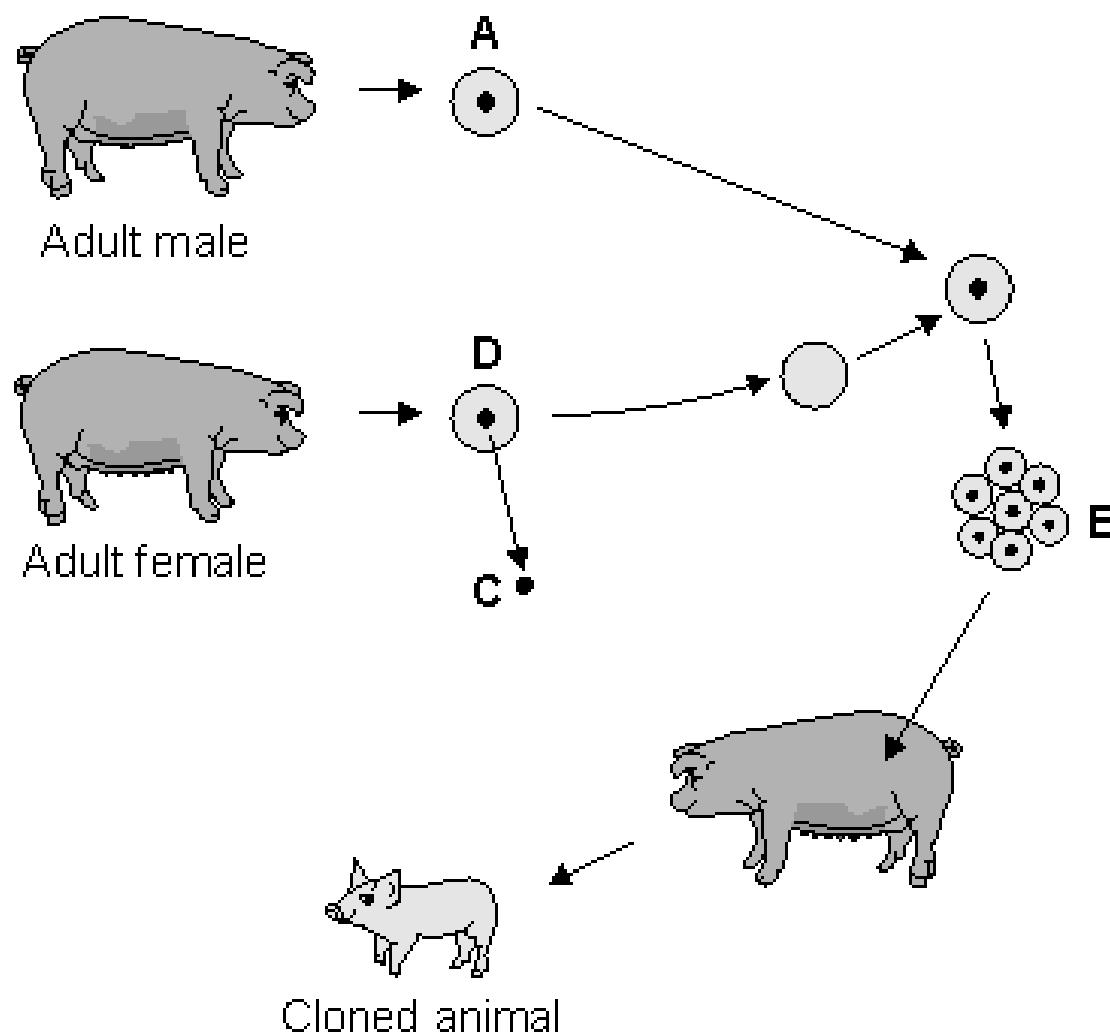
(ii) Female gametes are called Egg/ovum

They are produced in the ovaries

(2)

(Total 5 marks)

(a) The diagram shows how pigs can be cloned.



Which structure, A, B, C or D is:

- (i) an egg cell

D

- (ii) a nucleus

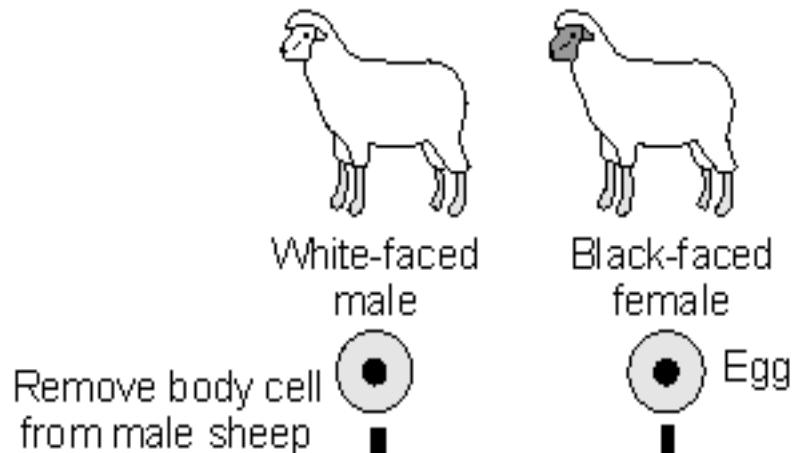
C

- (iii) an embryo?

B

For each question write the correct letter in the box.

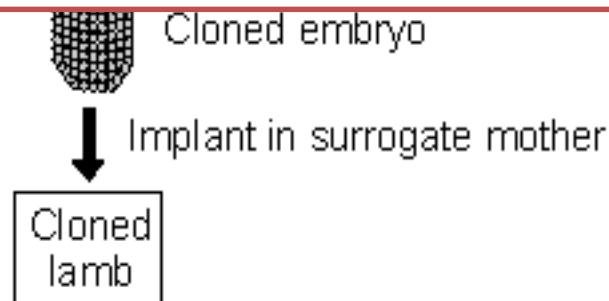
THIS IS ADULT CELL CLONING!



there was no mixing of genes / genetic material

1

because the nucleus was removed from the egg cell before fusion



- (a) The fusion of the body cell from the male sheep and the egg from the female sheep is an example of asexual reproduction.



Zorse



- (a) Draw a ring around the correct answer to complete the sentence.

The zorse was produced by

cloning
asexual repro
sexual repro

- (b) Explain the appearance of the zorse.

Use **both** words from the box in your explanation

gametes genes

any **three** from:

- coat colour inherited / controlled by genes
- it has horse and zebra features
- gets gametes from both parents
- genes / DNA / chromosomes / genetic information in gametes
- zorse receives genes / DNA / chromosomes / genetic information from parents

Scientists have produced many different types of GM (genetically modified) food crops.

- (a) Use words from the box to complete the sentence about genetic engineering.

clones

chromosomes

embryos

genes

genes

GM crops are produced by cutting out of the

Chromosomes

..... of one plant and inserting them into the cells of a crop plant.

(2)

Chapt

1. How long ago do species originate?
2. What is evolution?
3. How does evolution occur?
4. What was Jean-Baptiste Lamarck's theory?
5. What was Charles Darwin's theory?
6. What observations did Darwin make during his voyage on the HMS Beagle?
7. what is an evolutionary tree?
8. What is an evolutionary relationship?
9. What is natural classification?

5. Darwin's theory:

- A giraffe with a longer neck can reach food high up
- The giraffe is more likely to get enough food to survive and to reproduce
- The giraffe's offspring inherit its long neck

3. Natural selection

From these Darwin decided that all **organisms struggle for survival** and so have to produce many offspring to ensure that some do survive.

He also concluded that for a species to survive, the best (or

most fit) individuals will survive and pass on their characteristics to the next generation.

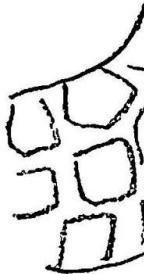
9. Finding out similarities and differences between organisms so that you can put them into different 'classification' groups.

particular organism

Within a species there is a **wide range of features**, due to different alleles

Some variations are passed on and **inherited** by the offspring

St
+
Then the
NATURAL
food, the
and voila.
EVOLVED



The
size

Sometimes
genetic mat

an FINISH!!!!!!

breed, and pass on this change to their offspring. MUTATIONS ARE
RANDOM- they can just happen.



The original species,
now extinct,
probably ate
insects and nectar



The akiapola'au
forages for insects,
often under bark



The 'Apapane
feeds on insects
and ohia nectar



The iiwi
feeds on nectar
from ohia flowers



The Maui parrotbill
tears back bark in
search of beetles



The Nihoa finch
uses its heavy bill
to crush seeds



The Amakihi
is a nectar-feeder,
like the iiwi

AQUIRED
velop during
evolution

EORY OF
things, like
reproducing,
over time, we

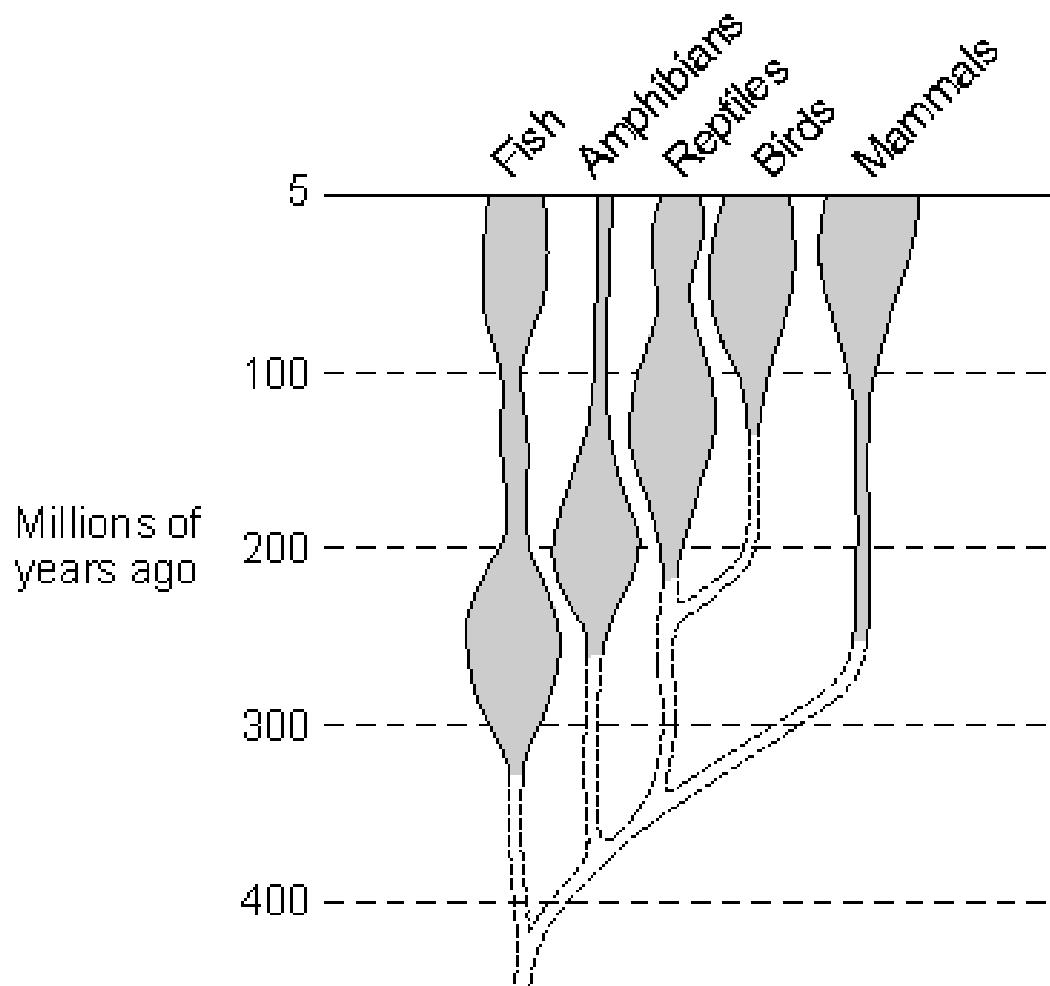
it need to

TOGETHER

a number of

in the
organism,

The wider a block is, the more species there are.



- (a) Which group had most species 200 million years ago?

amphibians

The theory of evolution via natural selection was proposed by Darwin.

(a) Explain how evolution occurs via natural selection.

organisms within species may show variation

1

because mutation(s) occur in individuals

1

this results in the individuals with characteristics most suited to the environment being more likely to survive / to breed

1

as a consequence the genes that have enabled these individuals to survive are passed on to the next generation

any **two** from

- the theory undermined the idea that God made all the animals and plants that live on earth
- there was insufficient evidence at the time
- the mechanism of inheritance / variation was not yet known

(4)

(b) In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

Describe the different causes of the extinction of organisms.

Your description should include possible reasons for the mass extinctions shown on the graph.

examples of biology points made in the response:

- changes to the environment / named changes
- new competitors
- new diseases
- new predators
- volcanic eruptions
- collisions with asteroids

There is a large amount of evidence that evolution is taking place.

- (a) Scientists are uncertain about how life started on Earth.

Explain why.

there is a lack of valid / reliable evidence

1

because the early organisms were soft bodied
or because remains were
destroyed by geological action

(2)

(a) Explain, as fully as you can, how natural selection leads to evolution.

variation / mutation

1

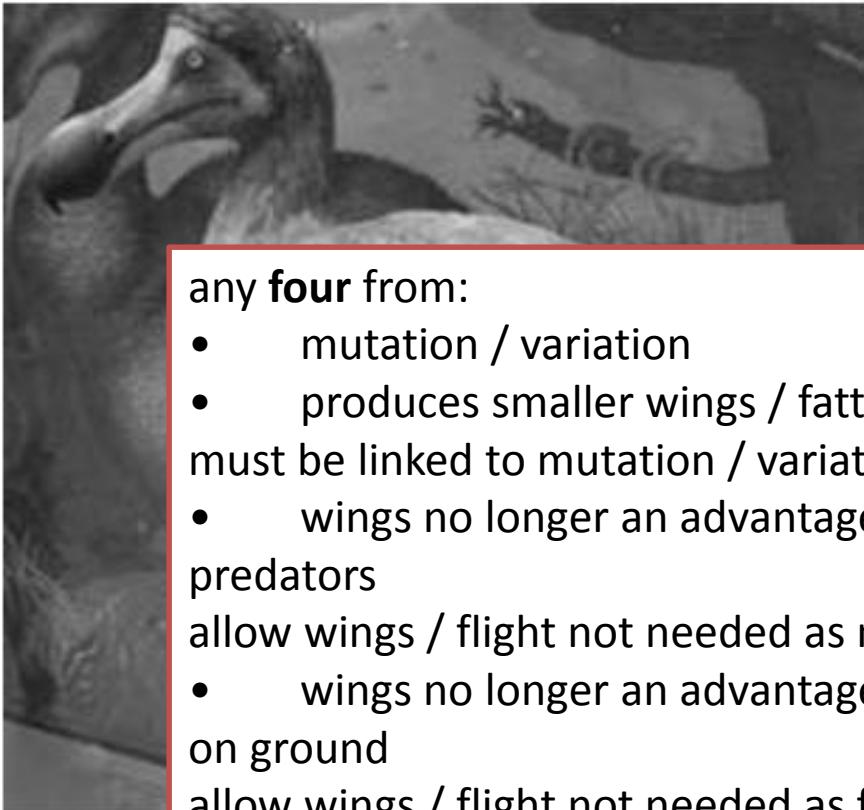
individuals with characteristics most suited to environment
survive

allow survival of the fittest

1

genes passed to next generation **or** these individuals reproduce

(3)



any four from:

- mutation / variation
 - produces smaller wings / fatter body
- must be linked to mutation / variation
- wings no longer an advantage since no predators
- allow wings / flight not needed as no predators
- wings no longer an advantage since food on ground
- allow wings / flight not needed as food on ground
- fatter body can store more energy when fruit scarce
 - successful birds breed / pass on genes

The dodo lived on a small island. Its ancestors were pigeons which flew to the island. There was a lot of fruit on the trees. Gradually, the birds became much heavier.

Ancestors were pigeon-like birds which flew to the island. There was a lot of fruit on the trees. Gradually, the birds became much heavier.

(a) Suggest an explanation for the evolution of the pigeon-like ancestor into the flightless dodo.

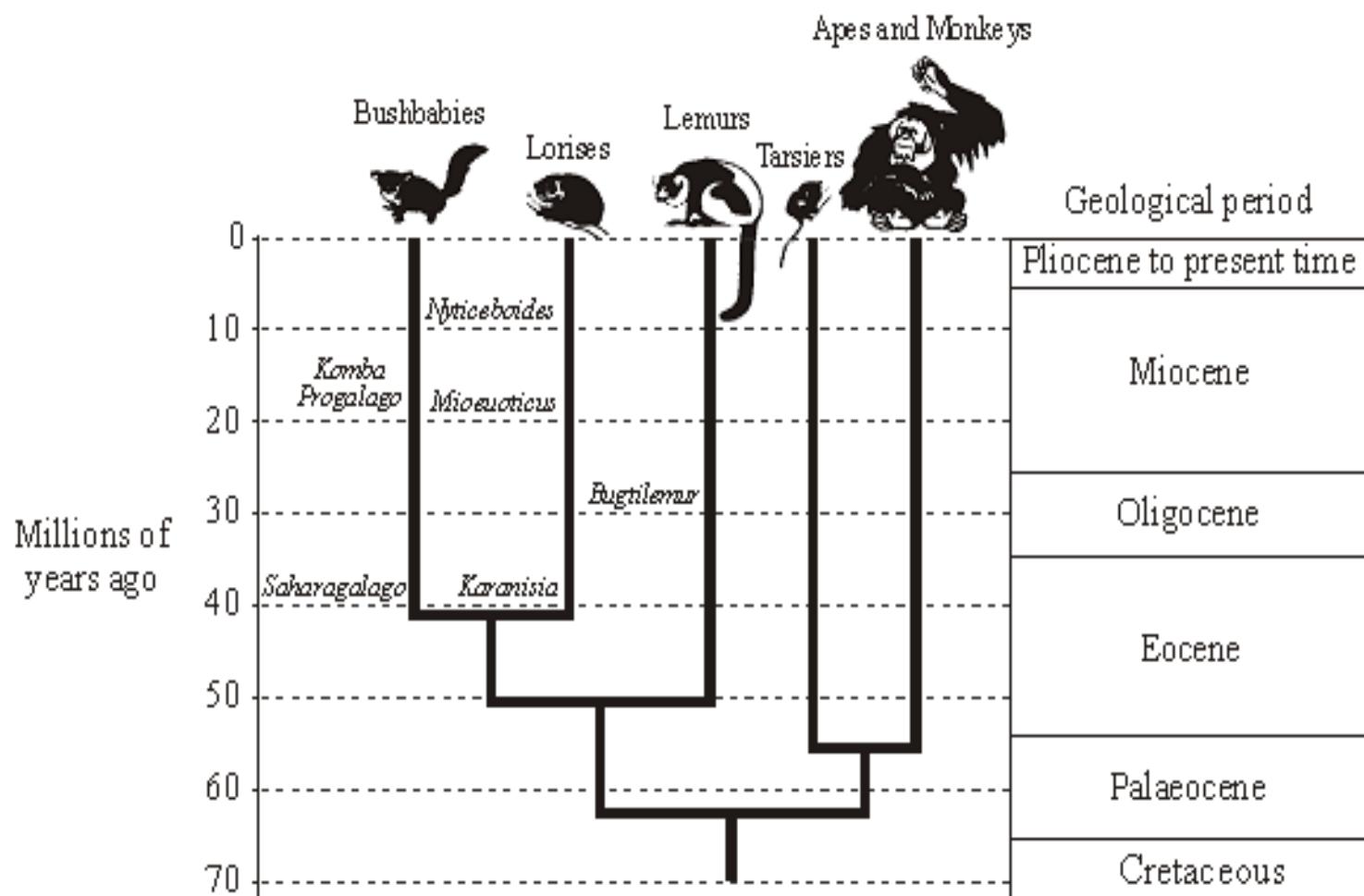


Illustration by Lucrezia Beerli-Bieler

- (a) (i) How many million years ago did *Karanisia* first appear?

40 – 42

..... millions of years ago.

(a) What does the theory of evolution state?

present day organisms have evolved from simpler organisms
ignore answers in terms of natural selection over long periods of time
or millions / billions of years

(2)

(b) *Daphnia* are microscopic water fleas. Midge larvae prey on *Daphnia*. The midge larvae release a hormone into the water. *Daphnia* respond to these hormones by growing larger protective 'helmet'-like structures

Scientists were surprised to observe that the offspring of *Daphnia* females who had been exposed to these hormones always had larger helmets than offspring whose mothers had never been exposed to the hormones. The offspring with the large helmets went on to produce offspring with large helmets.

Explain why the scientists'

(natural selection operates on successful) characteristics produced by chance / (random) mutation

1

in this experiment caused by hormones / environment