

ARCHBISHOP ILSLEY CATHOLIC SCHOOL

Justus et Tenax Propositi - Just and Firm of Purpose

AQA CS/Triple GCSE **Biology**

B5 Homeostasis and Response

Part 2

Lessons 11-16 Knowledge and Mastery Book



Do not write in this booklet

ALL answers to be written in your exercise book



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Lesson 11 The Kidneys TRIPLE ONLY

The kidneys make urine by filtering the blood as it passes through, and extracts the waste products. This process is **Filtration** and allows for glucose, some ions and enough water to pass back into the blood, and anything extra / unneeded is retained to make urine. This process is **Selective Reabsorption**. Some examples of the substances removed from the body at this point are:

| Substance | Reason for removal |
|-----------|--|
| Urea | Excess protein cannot be stored, so is converted to fats and carbohydrates to |
| | be stored. This leaves Ammonia behind, which is toxic, so is converted to urea |
| | in the liver. Urea is then excreted in the urine. |
| Ions | An imbalance of ions can cause issues with the body as it relies on a precise |
| | balance to allow osmosis to happen properly, an imbalance could mean too much |
| | fluid loss or retention (keeping). Some ions are lost in sweat, but it is the |
| | kidneys job to regulate what is left. |
| Water | Similarly to ions, too much or too little water can mess with the osmotic |
| | balance of the body. More or less water can be reabsorbed depending on the |
| | conc. of blood. |

Hormones control the amount of water taken back into the body. ADH (Anti-diuretic hormone) regulates this; high levels of ADH encourage **more** water to be reabsorbed, and low levels of ADH encourage **less** water to be reabsorbed.



Lesson 11 Mastery Questions TRIPLE ONLY

- 1. What process do kidneys do that removes waste products?
- 2. What is taken out of the blood during this process?
- 3. What is the name of the process by which some products are reabsorbed?
- 4. What is reabsorbed into the blood during this process?
- 5. Can protein be stored?
- 6. What is done with protein to allow it to be stored?
- 7. What does this leave behind?
- 8. How is this removed from the body?
- 9. What can an imbalance of ions cause?
- 10. What can too much or too little water cause?
- 11. What is the name of the hormone that controls water concentration?
- 12. What does high levels of this hormone cause?
- 13. What do low levels of this hormone cause?
- 14. Which endocrine gland releases this hormone?
- 15. When water levels change, a response occurs that corrects this change and brings it back to normal. What is the name of this process? (There are 2 names)

Lesson 11 Exam Questions TRIPLE ONLY

Q1.

The kidneys filter the blood.

The diagram shows the site of filtration in the kidney.



(a) Use information from the diagram to answer this question.

Write down every substance that will pass through the filter from the blood plasma into the filtrate.

Glucose Urea Water Sodium Ions Protein

(2)

- (b) Proteins and glucose are not present in the urine of a healthy person.
 - (i) Use information from the diagram to explain why protein is not found in the urine of a healthy person.

(ii) Complete the sentence using one of the words in brackets:

After filtration, all the glucose is (Reabsorbed/Released/Respired)

(c) An athlete trained on a hot day and on a cold day. On each day, he did the same amount of exercise and drank the same volume of water.

Complete the sentences by drawing a ring around the correct answer.

- (i) On the hot day, the athlete would produce (Less/More/The same amount of) urine
- (ii) This is because he would produce (Less/More/The same amount of) sweat

(1)

(1)

(1)

(Total 6 marks)

Q2.

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

Homeostasis keeps conditions in the body relatively constant.

The amount of water in the body is controlled by homeostasis.

Kidney function is controlled by a gland in the brain.

Describe how the water content of the blood is controlled.

(Total 6 marks)

Lesson 12 Water Balance Treatments TRIPLE ONLY

<u>Kidney Failure</u>

The kidneys filter out excess and toxic substances from the blood and remove them from the body. If the kidneys are unable to function, these substances can build up in the body and cause harm (see Lesson 11).

<u>Kidney Fixes</u>

Dialysis machines can act to replace the functions of a kidney. In this machine, the patients blood flows between partially permeable membranes surrounded by dialysis fluid, allowing ions and waste substances through but keeping big molecules in-just like the kidney's membranes allow. This fluid has the same concentration of dissolved ions and glucose as healthy blood, meaning that when only the excess ions and water, and waste substances are lost. The waste-free blood then circulate back into the body.

Pro's and Con's

An advantage of this is that even with kidney failure, this does not have to be done continuously- 3 visits to a hospital per week are enough to keep the kidney failure from killing a person. It does take 3-4 hours though, so is not the most convenient method for long periods of time and can cause strain on the heart, as well as being unpleasant and expensive, and increase risk of blood clots or infection.

Kidney Transplants

A kidney transplant is an alternative method of treating kidney failure. It replaces the non-working kidney (although the old kidney is often left in!). This is the only complete cure for kidney failure- any other method only keeps you alive with a failed kidney. **Pro's and Con's**

It is a complete cure and the person will be able to function without dialysis. It is also one of the few organs that can be donated from a living person. However, there is a risk of rejection as the white blood cells in your body identify the foreign organ as foreign and attack it. The risk of this can be mitigated with immunosuppressants, drugs that suppress the immune system, but these drugs can lead to an increased chance of infection due to a weakened immune system.

Lesson 12 Mastery Questions TRIPLE ONLY

- 1. What do your kidneys do?
- 2. What process can filter someone's blood during kidney failure?
- 3. What type of membrane is in a dialysis machine?
- 4. What is removed in a dialysis machine?
- 5. Describe the concentration of the fluid in a dialysis machine.
- 6. How often and for how long must dialysis be conducted?
- 7. What are the advantages of dialysis?
- 8. What are the disadvantages of dialysis?
- 9. What is a kidney transplant?
- 10. Can a living person donate a kidney?
- 11. What are the advantages and disadvantages of a kidneys transplants?

Lesson 12 Exam Questions TRIPLE ONLY

Q1.

The diagram shows some of the organs of the human body.



(a) Which organ labelled on the diagram:

| (i) | produces urine |
|-----|----------------|
| (i) | produces urine |

(ii) stores urine

- (iii) produces urea
- (iv) gets rid of carbon dioxide
- (v) helps to control body temperature?

(1)

(1)

(1)

(1)

(1)

(b) **Bar chart 1** shows the volume of water the human body gains each day.



Bar chart 2 shows the volume of water lost each day by breathing out, in sweat and in faeces.



(ii) Calculate the total volume of water lost each day by breathing out, in sweat and in faeces.

(2)

(iii) The volume of water the body loses must balance the volume of water the body gains.

Use your answers to part (b)(i) and part (b)(ii) to calculate the volume of water lost in urine.

- (1)
- (iv) After taking some types of recreational drugs, the kidneys produce very little urine.

What happens to the body cells if the kidneys produce very little urine?

(1) (Total 11 marks)

Q2.

The diagram shows the amount of water lost by an adult in one day.

The width of the arrows shows how much water is lost in each way.



(a) Work out from the diagram the water loss for urine, skin and lungs and write the correct figures in the spaces on the diagram.

(b) When it is hot, much more water is lost from the skin. Which other method of water loss would also change significantly?

Explain your answer.

(3) (Total 7 marks)

(4)

Lesson 13 Hormones in Reproduction

There are two main reproductive hormones- testosterone and oestrogen. These hormones are responsible for the secondary sexual characteristics in males and females, testosterone in males and oestrogen in females. Examples of secondary sexual characteristics include hair growth in males and females, facial hair in males, breasts in women, and any other characteristics that are associated with puberty. Testosterone is also responsible for stimulating the production of testosterone in males, and oestrogen for stimulating the release of eggs in females and starting the menstrual cycle.

The Menstrual Cycle



Stage 1: The lining of the uterus breaks down and is shed through the vagina- the **period**. Stage 2: The lining of the uterus builds up, controlled by the hormone **oestrogen** Stage 3: The egg is released, also known as **Ovulation**. Luteinizing hormone causes the release of the egg at day 14, but

Stage 4: The uterine lining is maintained at it's current thickness. This lasts from roughly day 14 to day 28, and is controlled by **Progesterone**.



Figure 1: Levels of hormones at various stages of the menstrual cycle

- The cycle starts with menstruation. The lining is shed because oestrogen and progesterone levels are low. At the same time FSH (follicle stimulating hormone) begins to rise slightly, triggering a new egg cell to begin developing inside the follicle.
- FSH also stimulates oestrogen production, so oestrogen levels begin to rise, and the lining of the uterus begins to thicken.
- Oestrogen also stimulates LH to be released. The rise in LH releases the egg cell from the follicle in the ovary and into the fallopian tube.



- Once the egg has been released progesterone is released by the empty follicle left behind in the ovary. Progesterone and oestrogen rise to maintain the lining of the uterus. If the egg is fertilised it will embed in the lining and progesterone and oestrogen will remain high.
- Oestrogen and progesterone inhibit FSH. This prevents a second egg being released during the 9 months of a gestation. If the egg is not fertilised then progesterone drops, and menstruation happens. The cycle then repeats.

Lesson 13 Mastery Questions

- 1. What are the two main reproductive hormones?
- 2. What does the male reproductive hormone cause in males?
- 3. What does the female reproductive hormone cause in females?
- 4. Compare the secondary sexual characteristics of males and females (a Venn diagram may be useful)
- 5. Describe stage one of the menstrual cycle.
- 6. Describe stage 2 of the menstrual cycle.
- 7. Describe stage 3 of the menstrual cycle.
- 8. Describe stage 4 of the menstrual cycle.
- 9. Which hormone is responsible for thickening the lining of the uterus?a. What evidence from figure 1 is there to support this?
- 10. Which hormone is responsible for releasing the egg around day 14?
 - a. What evidence from figure 1 is there to support this?
- 11. Which hormone is responsible for maintaining the uterine lining?
- a. What evidence from figure 1 is there to support this?
- 12. Which hormone is responsible for developing the egg?
 - a. What evidence from figure 1 is there to support this?

Lesson 13 Exam Questions

Q1.

This question is about hormones.

- (a) Match each hormone to it's function.
 Hormone Function
 Matures an egg
 Follicle stimulating hormone (FSH)
 Reduces blood glucose concentration
 Testosterone
 Stimulates sperm production
- (b) In one menstrual cycle, an egg is released on day 13.

Which chemical causes the egg to be released?

Pick one from:

Cholesterol Insulin Lipase Leutenising hormone

(1)

(2)



Q2.

Hormones can have effects on the body far from the gland that releases the hormone.

(a) Name the system in the body that releases hormones.

The diagram shows part of the hormonal control of the menstrual cycle.



- (b) Describe how FSH and LH travel from the pituitary gland to the ovaries.
- (c) Explain how the body regulates the production of oestrogen and progesterone for most of the menstrual cycle.

Use the information shown in the diagram above.

(d) A woman is most fertile at about day 15 of the menstrual cycle.

(1)

(1)

(3)

From day 12 to day 14 of the menstrual cycle, the negative feedback shown in the figure above stops.

Explain what happens when the negative feedback stops.

(e) A contraceptive injection contains progestin.

Progestin is a synthetic form of progesterone.

Explain how the progestin injection prevents pregnancy.

(4) (Total 12 marks)

(3)

Lesson 14 Artificial Control of Fertility

It is hard to think of a world before contraception was available. Before contraception, every time a man and woman had sex there was a significant chance a baby would be conceived. Condoms have also helped to stop the spread of sexually transmitted diseases like syphilis, gonorrhoea, and HIV. Types of contraception broadly fall into two main categories.

Hormonal:

Contain oestrogen and/or progesterone to inhibit FSH and prevent egg maturing. The balance of each hormone in an individual is **similar** but not **identical**. This means that pharmaceutical companies make a variety of mixtures of the hormones. The aim is to find a version which work for the woman without **side effects**.

Oral contraceptive pill: Take pill every day at the same time.

Contraceptive implant: Inserted with small procedure, lasts 3-5 years.

Contraceptive injection: Given by health professional, lasts around 3 months.

Contraceptive patch: Change patch weekly.

Non-hormonal:

These are a broad range of very different strategies. Some only prevent pregnancy, others also provide protection from STI's.

Barrier methods: i.e., condom, diaphragm, female condom. Provide a physical barrier that prevents sperm entering the uterus. Condom is the ONLY contraception to prevents STD's.

Intrauterine devices (IUD): Often called 'the coil' they are tiny plastic or metal devices that are inserted into the uterus.

Spermicidal gels: These kill sperm on contact.

Abstinence: No sex! 100% effective against pregnancy and STD's.

Natural methods: Avoid sex when there is greater chance of pregnancy.

Surgical sterilisation: Surgery which prevents sperm travelling through sperm duct or egg travelling down oviduct. Permanent and non-reversible.

Controlling Fertility: Fertility Treatments HIGHER ONLY

It is a cruel twist of irony that while some people spend a lot of time ensuring they cannot fall pregnant during sex; others spend years desperately trying to have child and not succeeding. About 60,000 of the 755,000 babies born last year were conceived via IVF. Infertility can occur for a couple for known or unknown reasons. If a couple fails to conceive naturally modern reproductive technologies may be used to assist them.

- Giving FSH and LH in a 'fertility drug' to a woman. She may then become pregnant in the normal way.
- In Vitro Fertilisation (IVF)

It is a vital service for some couples, but it is not without its risks:

- it is very emotionally and physically stressful.
- the success rates are not high.
- it can lead to multiple births which are a risk to both the babies and the mother. **IVF Steps**
- Give women FSH and LH to stimulate the maturation of several eggs.
- The eggs are collected from the mother and fertilised by sperm from the father in the laboratory.
- 3. The fertilised eggs develop into embryos.
- At the stage when they are tiny balls of cells, one or two embryos are inserted into the mother's uterus (womb).







Embryos are monitored using microscopes. An earlystage embryo having a few cells removed to be genetically tested before implantation into uterus. Depending on the reason for IVF there may be a period during which the embryos are stored. Because some embryos go unused, and unused embryos are destroyed, some people take issue with this due to their potential as human life.

Lesson 14 Mastery Questions

- 1. What hormones do the hormonal methods contain?
- 2. State 4 hormonal methods of contraception
- 3. Explain a barrier method of contraception
- 4. Give 2 examples of barrier methods of contraception
- 5. State 4 other methods of contraception
- 6. What is an IUD?
- 7. What tube is severed in male sterilisation?
- 8. What tube is severed in female sterilisation?

HIGHER TIER ONLY

- 1. What hormones can be given to increase a woman's fertility?
- 2. What does IVF stand for?
- 3. Why are FSH and LH given at the start of IVF?
- 4. What happens to the sperm from the father and egg from the mother during IVF?
- 5. Once you have produced fertilised embryos, what happens to the eggs?
- 6. When are the embryos implanted?
- 7. Why do some people have an issue with the use of IVF?

Lesson 14 Exam Questions

Q1.

There are several methods of contraception.

(a) Match the method of contraception to how the method works



(b) When a new oral contraceptive is tested on volunteers, the contraceptive is first given at a low dose. Later, the dose is increased.

Why are new drugs given at low doses at first?

(c) The table below shows information about three methods of contraception.

| | Condom | Oral contraceptive | Hormone skin patch | |
|-------------------------------------|--|--|--------------------------------------|--|
| Percentage (%) effectiveness | 98.0 | 99.7 | 99.8 | |
| How contraception is obtained | From shops or sexual health clinic | From doctor or sexual health clinic | | |
| Possible side effects | No serious side effects | Headaches, nausea, high blood pressure | Headaches, nausea, blood clots | |

Evaluate the use of these contraceptive methods.

(6) (Total 9 marks)

(1)

Q2.

A couple wanted to have a baby, but after several years of trying the woman did not become pregnant. Their doctor suggested IVF treatment.

(a) Describe the main stages in IVF treatment.

(b) As women get older they become less fertile. Eventually the ovaries stop releasing eggs, so a woman cannot become pregnant.

IVF treatment means it is now possible for women in their 50s and 60s to have children, but not everyone thinks this is a good idea.

Suggest reasons for **and** against women in their 50s and 60s having IVF treatment to have children.

Lesson 15 Plant Hormones TRIPLE ONLY

<u>Auxins</u>

Auxin is a plant hormone that controls growth near the tips of shoots and roots. It controls two responses,

| Stimulus | Name of response | Definition | Positive response | Negative response |
|----------|---|--|---|--|
| Gravity | Gravitropism (sometimes called geotropism) | Growth towards or away from gravitational pull | Growth towards gravity (eg. roots) | Growth away from gravity (eg. shoots) |
| Light | Phototropism | Growth towards or away from source of light | Growth towards light (eg. shoots) | Growth away from light (eg.roots) |

Phototropism in Shoots

Auxins are produced in the tip and moves backwards to stimulate cell elongation, which occurs just behind the tips in shoots. If the tip is removed, no auxin is available, and the shoot may stop growing. Extra auxins encourage shoot growth but inhibit growth in roots. An even amount of light on each side will cause growth straight up.





These are not the only plant hormones, some others include:

| Plant hormone | Function | Commercial use |
|---------------|---------------------------|--|
| Gibberellins | Initiate seed germination | Keeping seeds dormant, causing flowering, growing larger fruit |
| Ethene | Stimulates fruit ripening | Speed up ripening, delaying ripening by blocking ethene |
| Auxins | Controlling plant growth | Weed killer, growing from cuttings, growing cells in tissue culture (next topic) |

Lesson 15 Mastery Questions TRIPLE ONLY

- 1. What hormone controls cell elongation in plants?
- 2. What are the two responses that this hormone controls?
- 3. What is phototropism?
- 4. Describe positive and negative phototropism.
- 5. Which area of a plant would be positively phototropic?
- 6. Which area of a plant would be negatively geotropic?
- 7. What is geotropism?
- 8. Describe positive and negative geotropism.
- 9. What area of a plant would be positively geotropic?
- 10. What area of a plant would be negatively geotropic?
- 11. How do auxins move in response to light in shoots?
- 12. What do they cause when they are in this position?
- 13. How do auxins move in response to gravity in roots?
- 14. What do they cause when they are in this position?
- 15. What happens if there is an even amount of light on both sides of a plant shoot?

Lesson 15 Exam Questions TRIPLE ONLY

Q1.

Some students investigated phototropism in plant seedlings.

This is the method used.

- 1. Measure the lengths of the shoots of 20 seedlings.
- 2. Set up four groups of seedlings as follows:
 - A bottom of shoot covered in aluminium foil
 - **B** tip covered in aluminium foil
 - C tip removed
 - **D** no changes.
- 3. Put the seedlings in a cardboard box.
- 4. Use a lamp to shine a light into the box through a hole in one side.
- 5. After one day, re-measure the lengths of the shoots.
- 6. Make a drawing of the appearance of one seedling from each group.

Figure 1 shows the appearance of one seedling in each group at the start of the investigation.



Figure 1

(a) Which **two** conditions should the students have kept constant for each group of seedlings?

Pick two of the following:

Root length Number of seedlings per group Temperature

Aluminium foil thickness Volume of water added to the soil

(b) What is the purpose of the aluminium foil?

Pick one of the of the following:

Stop light reaching the shoot Keep shoot warm Remove gravity's effect

(1)

(2)

- Suggest how the students measured the lengths of the curved shoots of seedlings A and (C) **D** at the end of the investigation.
 - The students concluded that the tip of the shoot is needed for the plant to respond to light. (d) Give evidence for this conclusion from Figure 2.
- (e) A hormone stimulates growth Key: in shoots. Light XX x x = Molecules of Which distribution of the hormone hormone would cause the × × А results seen in shoot D? × × Pick one of the options to the × right. × Light (1) (Total 8 marks) × × X X В × × × × × × × × Light × × х С × × ×



Figure 2





Light



(2)

- Q2.
 - (a) When a seed starts to grow, the young root grows downwards towards gravity. The young shoot grows upwards, away from gravity.
 - (i) Name this type of plant response to gravity.
 - (ii) Give two reasons why it is useful for a young root to grow towards gravity.
 - (iii) The root grows towards gravity due to the unequal distribution of a substance in the root.

Pick one of the following:

| Auxin | Chlorophyll | Sugar | |
|-------|-------------|-------|--|
| | | | |

(b) The drawings show some apparatus and materials.



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

Describe how the students could use some or all of the apparatus and materials shown in the drawings to investigate the growth response of maize seedlings to light shining from one side.

You should include a description of the results you would expect.

(6) (Total 10 marks)

(1)

(2)

(1)

Some students investigated geotropism in the roots of bean seedlings.

Figure 1 shows the apparatus used.



This is the method used.

- 1. Measure the length of the root of each of 10 bean seedlings.
- 2. Pin 5 seedlings to the cork mat in apparatus **A**.
- 3. Pin 5 seedlings to the cork mat in apparatus **B**.
- 4. Leave **A** and **B** in a dark cupboard for 2 days.
- 5. After the 2 days:
 - make a drawing to show the appearance of each seedling
 - measure the length of the root of each seedling.
- (a) Why did the students surround the seedlings with damp blotting paper?

Pick one of the following:

Prevent light affecting the direction of root growth

Prevent photosynthesis taking place in the roots

Prevent the growth of mould on the roots

Prevent water affecting the direction of root growth

Apparatus **B** is a control.

Apparatus **B** rotates slowly.

(b) How does apparatus **B** act as a control?

(1)

(1)

The table below shows the students' results.

| | Apparatus A | | | | Apparatus B | | | | | |
|---------------------------------|-------------|----------|----|----|-------------|----|----|----|----|----|
| Seedling number | 1 | 2 | 3 | 4 | 5 | 1 | 2 | 3 | 4 | 5 |
| Length at start in mm | 35 | 41 | 32 | 33 | 39 | 30 | 33 | 29 | 28 | 31 |
| Length after 2 days in mm | 49 | 57 | 43 | 45 | 54 | 45 | 45 | 44 | 29 | 44 |
| Length change in mm | 14 | 16 | 11 | 12 | 15 | 15 | 12 | 15 | 1 | 13 |
| Mean length change in mm | | <u>.</u> | 14 | | | | | 11 | | |

(c) One student stated:

'The mean length change for the seedlings in apparatus **B** is **not** valid.'

Suggest the reason for the student's statement.

(d) Suggest **one** improvement the students could make to obtain a more valid mean length change for the seedlings in apparatus **B**.

(1)

(1)

(e) Figure 2 shows the students' drawings of two seedlings at the end of the 2 days.





Seedling from Apparatus A



Seedling from Apparatus B

A plant hormone is made in the root tip.

The hormone diffuses from the tip into the tissues of the root.

Explain how the hormone causes the appearance of the seedlings in **Figure 2** to be different.

You should refer to **both** seedlings in your answer.

(3)

(f) In horticulture plant hormones are used for controlling plant growth.

Match the plant hormone with its use.



(3) (Total 10 marks)

Lesson 16 RP: Effect of Auxins on Growth TRIPLE ONLY

- 1. Put cotton wool into three petri dishes and add the same volume of water to each dish.
- 2. Add ten seeds to each dish and place them in a warm place where they won't be disturbed.
- 3. Allow the seeds to germinate and add more water if the cotton wool dries out.
- 4. Once the seeds have germinated, ensure the petri dishes each contain the same number of seeds, and remove any extra seeds if necessary.
- 5. One petri dish will sit in full light on a windowsill, the second will be in a dark cupboard, and the final dish will be placed in partial light.
- 6. Every day for one week, measure the height of each seedling and record the results in a table. You must record the height of the individual seedlings on each day.
- 7. Calculate the mean of the seedlings each day, and compare the mean heights in the three different locations.



Lesson 16 Mastery Questions TRIPLE ONLY

- 1. What was the independent variable in this investigation?
- 2. What was the dependent variable in this investigation?
- 3. What are the control variables in this investigation?
- 4. What can you conclude from this investigation?
- 5. Outline a method for this investigation

Lesson 16 Exam Questions

Q1.

Phototropism is a growth response by part of a plant to light.

(a) Name **one** other tropism.

Give the stimulus the plant responds to in the tropism you have named.

Tropism

Stimulus

(2)

(b) Plan an investigation to show the effect of light from one direction on the growth of plant seedlings.

Include details of any controls needed.

You may use some of the equipment shown in **Figure 1** and any other laboratory apparatus.



(c) Explain how phototropism in a plant shoot helps the plant to survive.

Q2.

Students investigated the response of plant shoots to one-sided light.

Figure 1 shows how the students set up three experiments.





(d) Name the type of response shown by the seedling in experiment **A**.

Auxin is a plant hormone. Auxin is made in the shoot tip.

experiment A.

(2)

(2)

(2)

(1)

Scientists investigated the role of auxin in the response of shoot tips to light.

This is the method used.

- 1. Grow four seedlings in the dark for a few days.
- 2. Cut the tip off the shoot of each seedling.
- 3. Place each shoot tip on a small block of agar jelly.
- 4. Place the shoot tips and agar in different conditions as shown in Figure 2.
- 5. After 24 hours, measure the mass of auxin in the agar blocks.



The numbers under each block show the mass of auxin that diffused into the blocks from the shoot tips.

The mass of auxin is given in arbitrary units.

(e) A scientist made a hypothesis:

'Light causes auxin to move from the side of the shoot nearest to the light to the side furthest from the light.'

Describe the evidence from Figure 2 which supports the hypothesis.

(3)

(f) Another scientist made a different hypothesis:

'Light causes the breakdown of auxin.'

Give the evidence from Figure 2 that shows that auxin is not broken down by light.

(1) (Total 11 marks)