

Biology Paper 2

Model Exam Question Booklet

Essential Content for
the Higher Separate
Science Exam
(PBT/FKI)

This booklet is split into 3 parts.

Biology Paper 2	
Topics in the Paper:	
B11	Hormonal Coordination
B12	Homeostasis in Action
B13	Reproduction
B17	Organising an Ecosystem
RP8	Effect of light on seeds.
RP9	Measuring Population Sizes

Part 1

The first part is a selection of short response questions and answers that are likely to come in your Biology exams this summer. Spend time learning the answers to these questions, for example you could produce flash cards. You should self quiz yourself on these questions regularly!

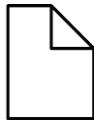
Part 2

Selection of extended response questions (4 to 6 marks) that are likely to be on your paper this year, either because they have not been assessed in the last couple of years, or because they come up most years in exams. Prepare and practice your responses to these questions.

Part 3

Required practical section. In this section you will find step by step guidance for each practical. This is followed by a page of short response questions and answers to learn for each of the practicals. There are also some extended response questions (4 to 6 marks) that are very likely to be on the exam paper this year.

B11: Hormonal Coordination

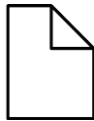


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1. What is the endocrine system?
2. How does the hormonal system compare to the nervous system?
3. What is the pituitary gland?
4. Why is the pituitary gland known as a master gland?
5. What is blood glucose concentration monitored and controlled by?
6. What happens if blood glucose is too high?
7. What happens if blood glucose is too low? (HT)
8. What is type 1 diabetes?
9. How is type 1 diabetes treated?
10. What is type 2 diabetes?
11. How is type 2 diabetes treated?
12. What is a risk factor of type 2 diabetes?
13. What are plants able to respond to?
14. What is a plants response to light known as?
15. What is a plants response to gravity known as?
16. Why is it useful for roots to grow towards gravity?
17. What causes unequal growth rates in plant roots and shoots?
18. How does auxin affect growth in shoots?
19. How does auxin affect growth in roots?

1. It is a system composed of glands which secrete chemicals called hormones directly into the blood stream.
2. It is much slower and involves the blood stream rather than nerves to produce an effect.
3. It is a master gland which secretes several hormones into the blood.
4. Its releases hormones that stimulate other hormones to be released from other glands.
5. The pancreas.
6. Insulin is released that moves glucose into muscle and liver cells and converts it into glycogen for storage.
7. The pancreas releases glucagon that converts glycogen into glucose and releases it into the blood.
8. A disorder in which the pancreas fails to make enough insulin. It causes uncontrolled high blood glucose levels.
9. Insulin injections.
10. A disorder in which the body cells no longer respond to insulin produced by the pancreas.
11. A carbohydrate-controlled diet and an exercise regime.
12. Obesity
13. Light and gravity.
14. Phototropism
15. Gravitropism or geotropism.
16. Anchorage, takes in more water/nutrients
17. Unequal distribution of auxin.
18. Promotes growth
19. Inhibits growth

B12: Homeostasis in Action

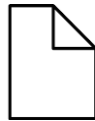


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1. How is body temperature monitored and controlled?
2. What are receptors in the thermoregulatory centre sensitive to?
3. What receptors do the skin contain?
4. What happens if body temperature is too high?
5. What is vasodilation?
6. What happens in body temperature is too low?
7. What is vasoconstriction?
8. What do muscles do to cause us to shiver?
9. Which muscles are involved with shivering?
10. How is water lost from the body?
11. How are ions and urea lost from the body?
12. How are excess water, ions and urea removed from the body?
13. Where is ammonia made in the body?
14. What is ammonia immediately turned into?
15. What is the function of the kidneys?
16. What hormone controls water levels?
17. What does ADH do?
18. Which gland releases ADH?
19. What happens if blood concentration becomes too concentrated?
20. What are possible treatments for kidney failure?

1. Thermoregulatory centre.
2. The temperature of the blood.
3. Temperature receptors
4. Blood vessels dilate and sweat is produced from sweat glands. This causes a transfer of energy from the skin to the environment.
5. When blood vessels dilate.
6. Blood vessels constrict, sweating stops and skeletal muscles contract.
7. When blood vessels constrict.
8. Contract
9. Skeletal muscles
10. Urine, sweat and breath.
11. Sweat and urine.
12. Via the kidneys through urine.
13. Liver
14. Urea
15. Produce urine by filtration of the blood and selective reabsorption of useful substances such as glucose, some ions and water.
16. ADH
17. It makes the kidney tubules more permeable.
18. Pituitary
19. ADH is released by the pituitary gland which causes more water to be reabsorbed back into the blood from the kidney tubules.
20. A transplant or dialysis.

B13: Reproduction

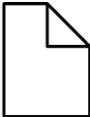


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1. What cell division forms non identical cells?
2. What type of cell division forms identical cells?
3. What is a gamete?
4. What are examples of animal gametes?
5. What are examples of plant gametes?
6. What is fertilisation?
7. What causes variety during sexual reproduction?
8. How are sex cells (gametes) formed?
9. How many parents in asexual reproduction?
10. Why is there no variation between offspring produced through asexual reproduction?
11. What is a clone?
12. What type of cell division is involved during asexual reproduction?
13. How do gametes form through meiosis?
14. What is DNA?
15. What is DNA contained within?
16. What is a gene?
17. What is the genome?
18. Why is knowledge of the genome important?
19. What are the 4 bases in DNA? (B only)
20. What does a nucleotide consist of? (B only)
21. How many bases code for an amino acid? (B)
22. What base binds to C? (B)
23. What base binds to A? (B)
24. How are proteins made? (B)
25. What characteristics are controlled by one gene?
26. What is an allele?
27. What is a dominant allele?
28. What is a recessive allele?
29. What is phenotype?
30. What does it mean if an organism is homozygous for a trait?
31. What does it mean if an organism is heterozygous for a trait?
32. What is polydactyly?
33. What is cystic fibrosis?
34. How many chromosomes does a normal body cell contain?

1. Meiosis
2. Mitosis
3. Sex cell
4. Sperm and egg cell
5. Pollen and egg cell
6. When a male and female sex cell fuse together.
7. Mixing of generic material.
8. Meiosis
9. 1
10. No mixing of genetic material and no fusion of gametes.
11. Organisms that are genetically identical
12. Mitosis
13. Copies of genetic information are made, the cell divides twice to make 4 gametes, each with a single set of chromosomes.
14. A polymer made up of two strands forming a double helix.
15. Chromosomes
16. Section of DNA that codes for a specific protein.
17. The entire genetic material of that organisms.
18. Helps us understand and treat inherited disorders and trace human migration patterns from the past.
19. A, C, G and T
20. A common sugar, a phosphate group and a base.
21. 3
22. G
23. T
24. At the ribosome, according to a template. Carrier molecules bring amino acids to add to the protein chain.
25. Fur colour in mice and red-green colour blindness in humans
26. A variation of a gene.
27. An allele that is always expressed, even if only one copy is present.
28. An allele that is only expressed if there are two copies present.
29. The characteristic that presents because of the genotype.
30. The organism has two of the same alleles for the trait.
31. The organism has two different alleles for the trait.
32. A disorder that causes extra fingers or toes. It is caused by a dominant allele.
33. A disorder of the cell membranes that is caused by a recessive allele.
34. 23 pairs.

B17: Organising an Ecosystem



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1. What are producers?
2. What are examples of producers?
3. How can feeding relationships within a community be represented?
4. What are primary consumers?
5. What are secondary consumers?
6. What are consumers?
7. What are predators?
8. What are prey?
9. Why is it important that materials are cycled?
10. What is the carbon cycle?
11. What are some of the processes that cycle carbon?
12. What is the word equation for photosynthesis?
13. What is the word equation for respiration?
14. What is the word equation for combustion?
15. How is carbon returned to the environment when an organism dies?
16. What happens during the water cycle?
17. How does temperature affect the rate of decay?
18. How does water affect the rate of decay?
19. How does the availability of oxygen affect the rate of decay?
20. What is compost?
21. What happens during the decay cycle?
22. What type of decay produces methane?

1. Photosynthetic organisms that are the producers of biomass. They are the start of a food chain.
2. A green plant or alga.
3. Food chains.
4. Organisms that eat producers.
5. Organisms that eat primary consumers.
6. An animal that eats.
7. Consumers that kill and eat other animals
8. Consumers that are hunted and killed by other animals.
9. To provide the building blocks for future organisms.
10. It is the way that carbon is returned from organisms to the atmosphere as carbon dioxide to then be use by plants in photosynthesis.
11. Photosynthesis, respiration, combustion
12. Carbon Dioxide + Water → Glucose + Oxygen
13. Glucose + Oxygen → Carbon Dioxide + Water
14. Fuel + Oxygen → Carbon Dioxide + Water
15. Microorganisms such as bacteria feed on the organic compounds in the dead material and respire releasing carbon dioxide.
16. It provides fresh water for plants and animals on land before draining into the sea. The water is continuously evaporated and precipitated.

Separate Science Only

17. Increased temperature increases the rate of decay. Decay stops if temperature is too hot as enzymes denature.
18. Damp conditions increase the rate of decay.
19. Increased availability increases the rate of decay.
20. A natural fertiliser used by gardeners used to help grow garden plants or crops.
21. Detritus feeders feed on the material breaking it down into smaller parts in their own waste. Bacteria and fungi digest all of this. They release carbon dioxide, water and mineral ions as waste products.
22. Anaerobic decay

Topic	B11 Hormonal Coordination
Qu	Explain what happens when blood glucose levels ____.
Info	<p>You could be asked this question for blood glucose rising after eating a meal or if you are sitting the Higher exam you could also be asked how the body responds to low blood glucose levels due to not eating in a while.</p> <p>To answer either of these questions you will need to do the following:</p> <ol style="list-style-type: none"> 1. Identify what detects the change in glucose levels. 2. Identify what the response is which would mean you need to identify the hormone released and from where. 3. Describe what this hormone does. 4. Describe what this response does to blood glucose levels.
Top Tip	Be prepared in your exams that there could be links made to diabetes or cell transport. The examiner has asked in the past why insulin continues to be released for someone who has type 2 diabetes (answer glucose is not removed from the blood and so more insulin is released). The examiner has also asked in the past what could happen to cells if blood glucose is high (answer water leaves cells) or too low (answer water enters cells)
Model Answer	<p>Explain what happens when blood glucose levels rise.</p> <p><i>When blood glucose levels rise this is detected by the pancreas. In response the pancreas secretes insulin. This insulin causes glucose to be enter muscle and liver cells where it is converted into glycogen. The glycogen is stored by the cells and the blood glucose levels fall.</i></p>
Practice	<ol style="list-style-type: none"> 1. Learn and practice the model answer above. 2. HT Only: Prepare and learn model answers to explain what happens when blood glucose levels fall.

Topic	B11 Hormonal Coordination
Qu	Describe and explain how _____ affects the growth of roots/shoots.
Info	<p>You could be asked this question for:</p> <ul style="list-style-type: none"> • Gravity and how it affects the growth of roots/shoots • Moisture and how it affects the growth of roots • Light and how it affects the growth of shoots/roots. <p>To answer either of these questions you will need to do the following:</p> <ol style="list-style-type: none"> 1. Identify the plants response. 2. Describe how this happens referring to auxin. 3. Explain how this response is an advantage to the plant.
Top Tip	When referring to areas of growth on the plant the examiner will be looking for either “roots” or “shoots”. When talking about growth towards light you must use the key term shoot, using other terms such as leaf and stem are not awarded marks.
Model Answer	<p>Describe and explain how gravity affects the growth of plants.</p> <p><i>The shoots grow against the direction of gravity while the roots grow towards gravity. This is due to the unequal distribution of auxin. Auxin accumulates on the lower side of shoot and roots. Auxin promotes growth in shoots and inhibits growth in roots. This means that shoots grow away from gravity while roots grow towards it. By doing so the shoots will grow out of the soil getting more sunlight and the roots will grow into the soil where they can provide anchorage and obtain nutrients/water.</i></p>
Practice	<ol style="list-style-type: none"> 1. Learn and practice the model answer above. 2. Prepare and learn model answers to explain how moisture and light affects the growth of roots and shoots.

Topic	B11 Hormonal Coordination
Qu	<p>Explain how phototropism in a plant shoot helps the plant to survive.</p> <p>Explain how gravitropism in a plants root helps the plant to survive.</p> <p>Predict and explain the results obtained from this experiment</p>
Info	At least one of these questions is likely to come up. The examiner is going to be looking for a clear answer written in a logical sequence.
Top Tip	Be careful that you use key words/phrases accurately (these are in bold in your model answers below).
Model Answer	<p>Explain how phototropism in a plant shoot helps the plant to survive.</p> <p><i>By growing towards the light plants leaves absorb more light. This means that there is more photosynthesis and so the plants make more glucose.</i></p>
Model Answer	<p>Explain how gravitropism in a plants root helps the plant to survive.</p> <p><i>By growing towards gravity the roots are more likely to grow into the earth. This means that the roots will provide anchorage to the plant and will also be able to absorb more minerals and water.</i></p>
Model Answer	<p>Predict and explain the results obtained from this experiment</p> <p><i>Shoot A will grow towards the light, because auxin will move to the shaded side leading to an uneven distribution. There will be more growth on the shaded side causing the shoot to bend towards the light. B will do the same. This is because auxin is produced in the tips of shoots and so will be unaffected by the black plastic. C will grow straight up. This is because the auxin is in the tip of the shoot and covered by the plastic. This will mean that the shoot will be unable to respond to the direction of light.</i></p> <div data-bbox="247 1466 1339 1754"> <p>The diagram illustrates three experimental setups for plant growth. Each setup is in a rectangular box with a horizontal line at the bottom representing the soil level. Three horizontal arrows on the right side of each box point to the right, labeled 'Direction of light'. Setup A: A single plant shoot, labeled 'Plant shoot', is shown growing straight up from the soil. It is slightly curved to the right. Setup B: A plant shoot is shown, but its lower portion is covered by a black rectangular block labeled 'Black plastic'. The shoot is bent to the right. Setup C: A plant shoot is shown, but its entire upper portion (the tip) is covered by a black rectangular block labeled 'Black plastic'. The shoot is growing straight up.</p> </div>
Practice	1. Learn and practice the model answers above.

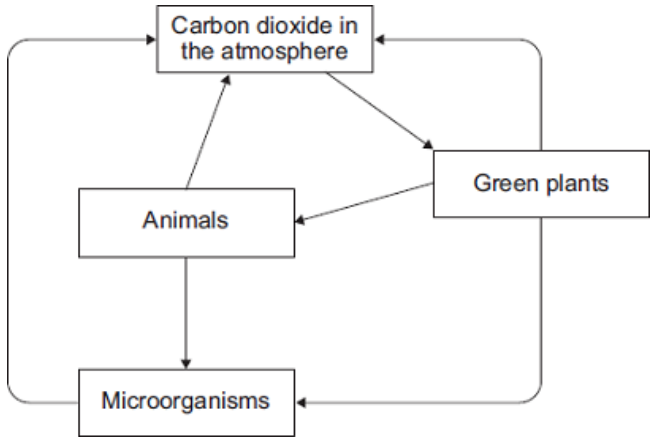
Topic	B12 Homeostasis in Action
Qu	Explain what happens when temperature rises/falls
Info	<p>You could be asked this question to test for:</p> <ul style="list-style-type: none"> • A rise in body temperature • A fall in body temperature <p>To answer either of these questions you will need to do the following:</p> <ol style="list-style-type: none"> 1. Identify what detects the change. 2. Describe what the response is. 3. Describe what this response does to restore conditions to normal.
Top Tip	Key words for temperature control include thermoregulatory centre, vasoconstriction, vasodilation, sweat, shivering.
Model Answer	<p>Explain what happens when body temperature rises.</p> <p><i>The rise in body temperature is detected by receptors in the thermoregulatory centre which are sensitive to the changes of the temperature of blood. In response the body begins produce sweat from the sweat glands. The evaporation of this sweat from the skin has a cooling effect. The blood vessels dilate.. Vasodilation causes the blood vessels to get closer to the surface of the skin. This means that more energy is lost to the surroundings helping the body to cool down.</i></p>
Practice	<ol style="list-style-type: none"> 1. Learn and practice the model answer above. 2. Prepare and learn a model answer to explain what happens when body temperature falls.

Topic	B12 Homeostasis in Action
Qu	Explain what happens when blood concentration rises/falls
Info	<p>You could be asked this question to test for:</p> <ul style="list-style-type: none"> • A rise in blood concentration (low water in the body) • A fall in blood concentration (lots of water in body) <p>To answer either of these questions you will need to do the following:</p> <ol style="list-style-type: none"> 1. Identify what detects the change. 2. Describe what the response is, 3. Describe what this response does to restore conditions to normal.
Top Tip	Key words for water control include: Pituitary Gland, ADH, Kidney Tubules, Concentrated Urine, Dilute Urine
Model Answer	<p>Explain what happens when blood plasma becomes too concentrated (low water).</p> <p><i>The concentrated blood plasma is detected by receptor cells in the brain. In response the pituitary gland releases the hormone ADH. This hormone causes the kidney tubules to become more permeable which means that more water is reabsorbed by the body. This causes a small volume of concentrated urine to be produced and so water loss from the body is less. This response causes the bodies blood plasma to return to a normal concentration.</i></p>
Practice	<ol style="list-style-type: none"> 1. Learn and practice the model answer above. 2. Prepare and learn model answers to explain what happens when blood plasma becomes too dilute.

Topic	B12 Homeostasis in Action
Qu	Describe the role of blood vessels in the control of body temperature. Explain why sweating is not as effective in humid conditions. Explain why people appear red when they are hot.
Info	At least one of these questions is likely to come up. The examiner is going to be looking for a clear answer written in a logical sequence.
Top Tip	Be careful that you use key words/phrases accurately (these are in bold in your model answers below).
Model Answer	<p>Describe the role of blood vessels in the control of body temperature.</p> <p><i>When body temperature is too high vessels supplying the skin dilate and so blood flows closer to the skins surface which causes ore heat to be lost to the surroundings. If body temperature is too blow blood vessels supplying the skin narrow and so blood does not flow as close to the skins surface and so less heat is lost.</i></p>
Model Answer	<p>Explain why sweating is not as effective in humid conditions.</p> <p><i>Sweat that is released in humid conditions does not evaporate due to the higher water content in the air. This means that less heat is lost from the body as it is the process of sweat evaporating which causes a cooling effect.</i></p>
Model Answer	<p>Explain why people appear red when they are hot.</p> <p><i>When someone is hot their blood vessels that supply their skin dilate and so the wider blood vessels are closer to the surface of the skin. The flow of blood closer to the skins surface gives the skin a redder appearance.</i></p>
Practice	1. Learn and practice the model answers above.

Topic	B13 Reproduction
Qu	Evaluate the use of embryo screening.
Info	<p>You could be asked this question for any genetically inherited disease at all. Genetic diseases that have come up in the GCSE exams in the past include:</p> <ul style="list-style-type: none"> • Cystic Fibrosis • Polydactyly • CRAM • PKU • Breast Cancer <p>Apart from cystic fibrosis and polydactyly you are not expected to have any prior knowledge about the disease, but you may be expected to interpret information</p> <p>To answer this question you will need to do the following:</p> <ol style="list-style-type: none"> 1. Describe the advantages of screening 2. Describe the disadvantages of screening 3. State a conclusion 4. Give at least 1 statement to support your conclusion
Top Tip	If they give you information in the exam question interpret it and discuss it, but make sure that you use your own knowledge as well. This is important as you won't get many marks (if any) by just repeating what they have given you in the question.
Model Answer	<p>Evaluate the use of embryo screening during pregnancy.</p> <p><i>Advantages of embryo screening include that you can find out if the child will have a genetic disorder. This means that parents are able to plan and make decisions. For example, they may choose to not have the child if they choose to continue with the pregnancy they can start to prepare financially and emotionally. If the parents find out that the child does not have a genetic disorder this can lead to reassurance for the parents. However, the disadvantages of embryo screening include that the procedure for genetic testing has a risk which can cause miscarriage, there is risk of infection, the procedure can be expensive and can lead to false positive/negative results. As well as this there are ethical implications because some people may choose to abort the pregnancy. In conclusion I think that _____ because _____</i></p>
Practice	<ol style="list-style-type: none"> 1. Construct your own conclusion for this model answer. 2. Learn and practice the model answer above.

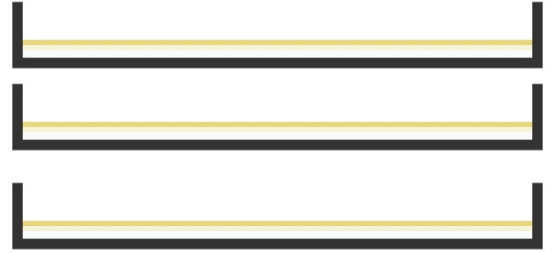
Topic	B13 Reproduction
Qu	Describe the structure of a nucleotide. What are mutations and are they all harmful? Describe how proteins are made.
Info	At least one of these questions is likely to come up. The examiner is going to be looking for a clear answer written in a logical sequence.
Top Tip	Be careful that you use key words/phrases accurately (these are in bold in your model answers below).
Model Answer	<p>Describe the structure of a nucleotide.</p> <p><i>A nucleotide is a phosphate attached to a sugar. This sugar is attached to a base. Bases are A,C,G and T.</i></p>
Model Answer	<p>What are mutations and are they all harmful?</p> <p><i>A mutation is a genetic change which results in the formation of a new gene. Mutations can sometimes cause the cell to not divide and die as it should which results in cancer. However, some mutations are neutral and have no harmful effect, for example getting an extra digit. Some mutations can also be an advantage, for example, having resistance to a disease.</i></p>
Model Answer	<p>Describe how proteins are made.</p> <p><i>Proteins are made at ribosomes. Proteins are made up of amino acids which are in a particular sequence. DNA bases form a code and work in triplets. Each 3 bases code for a specific amino acid.</i></p>
Practice	1. Learn and practice the model answers above.

Topic	B17 Organising an Ecosystem
Qu	Explain how _____ is cycled in the environment.
Info	<p>You could be asked how the following is cycled in the environment:</p> <ul style="list-style-type: none"> • Carbon • Water • Nutrients (if you are doing separate science) <p>To answer this question you will need to do the following:</p> <ol style="list-style-type: none"> 1. Identify all the different ways in which the substance is moving from one place to another. 2. Describe these processes
Top Tip	<p>For these questions you will often be given a diagram to help you structure your answer. For example, this is a diagram given for a carbon cycle question. Before you begin label your diagram with key words that describe how the substance is moving from one place to another.</p>  <pre> graph TD A[Carbon dioxide in the atmosphere] --> B[Green plants] B --> A B --> C[Animals] C --> A C --> D[Microorganisms] D --> A D --> B </pre>
Model Answer	<p>Explain how carbon is cycled in the environment.</p> <p><i>Green plants remove carbon dioxide from the atmosphere by photosynthesis, they also release carbon dioxide into the atmosphere when they respire. When plants are eaten by animals the carbon is transferred from the plant to the animal. When the animal respire carbon dioxide is released into the environment. When both plants and animals die, they are broken down by microorganisms. These microorganisms also respire and release carbon dioxide back into the atmosphere. Finally if plants are burned then carbon dioxide can be released back into the atmosphere in this way also.</i></p>
Practice	<ol style="list-style-type: none"> 1. Learn and practice the model answer above. 2. Prepare and learn model answers to explain how water is cycled in the environment and how nutrients are cycled in the environment through decay.

Topic	B17 Organising an Ecosystem
Qu	<p>Gardeners put waste in bins with holes in. Explain why.</p> <p>Describe the ideal conditions for decay.</p> <p>An airtight compost heap causes anaerobic decay. Explain why a gardener may not wish to compost like this.</p>
Info	At least one of these questions is likely to come up. The examiner is going to be looking for a clear answer written in a logical sequence.
Top Tip	Be careful that you use key words/phrases accurately (these are in bold in your model answers below).
Model Answer	<p>Gardeners put waste in bins with holes in. Explain why.</p> <p><i>The holes in the bin allow for oxygen to enter the bin. This oxygen is used by decomposers such as bacteria for respiration. The holes also allow for the heat produced to be released to the surroundings.</i></p>
Model Answer	<p>Describe the ideal conditions for decay.</p> <p><i>The ideal conditions for decay include warm, moist and a rich supply of oxygen.</i></p>
Model Answer	<p>An airtight compost heap causes anaerobic decay. Explain why a gardener may not wish to compost like this.</p> <p><i>During anaerobic decay methane is produced. This methane can cause global warming and lead to climate change.</i></p>
Practice	1. Learn and practice the model answers above.

Effect of Light on the Growth of Newly Germinated Seedlings.**1.**

Set up 3 petri dishes with some damp cotton wool at the bottom.

**2.**

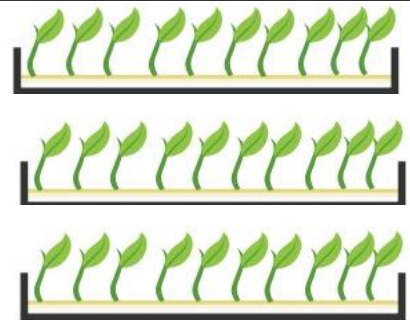
Add 10 seeds to each petri dish.

**x10****3.**

Place the petri dishes in a warm place and allow to germinate. Water equal amounts if they get dry.

4.

Once the seeds have germinated make sure the number of seeds on each plate is the same.

**5.**

Place dishes in position. One on windowsill, one in cupboard and one in partial light.

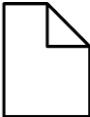
**6.**

Measure the height of the seedlings each day for 7 days calculating a daily average for each location.

**7.**

Plot your results in a graph of mean height against time for each location.

RP8: Growth of Seedlings



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1. What are the control variables when investigating the growth of seedlings?
2. What is the dependent variable when investigating the growth of seedlings?
3. Which tropism causes seedlings to grow towards light?
4. Which hormone causes plants to grow towards the light.
5. How could you measure the length of a curved seedling?
6. How could you grow seedlings in one directional light?
7. What piece of equipment should you use to handle seedlings?
8. What piece of equipment should you use to measure length?
9. If you were investigating one directional light and the effect it has on growth, what could you compare this with?
10. How could you ensure your results are valid?

1. Amount seedlings are watered, frequency seedlings are measured, type of seed use, number of seedlings in petri dish, kept in same temperature, seedlings have the same initial height.
2. Height of seedling.
3. Phototropism
4. Auxin
5. Use a piece of thread and measure the length of this or use a flexible ruler.
6. Put them in a box with one side cut out.
7. Forceps
8. Ruler
9. Plants grown in darkness (no light) or plants grown in light from all sides.
10. Do repeats, discard outliers and calculate averages.

Topic	RP8 Effect of Light On Seeds
Qu	Plan an investigation to show the effect of light on growth of seeds.
Info	<p>You could be asked this question investigate:</p> <ul style="list-style-type: none"> • The effect of light in general on the growth of seeds • The effect of one directional light on the growth of seeds. <p>To answer either of these questions you will need to do the following:</p> <ol style="list-style-type: none"> 1. Describe how to set up your equipment. 2. Identify what you will measure 3. Describe how you will obtain valid results. (Repeats and control variables)
Top Tip	Be careful if you need to investigate one directional light. You will need to compare this with light from all directions and no light. A common mistake is to compare growth the growth of seeds in a box without a lid and in another box with the lid on and one side cut out. These are both examples of one directional light!
Model Answer	<p>Plan an investigation to show the effect of light on growth of seeds.</p> <ul style="list-style-type: none"> • <i>Set up 3 petri dishes with some damp cotton wool in and 10 mustard seeds.</i> • <i>Leave these dishes to allow the seeds to germinate watering equally if required.</i> • <i>Once seeds have germinated check that each dish has the same number of germinated seeds. Place one dish in full light on a window, one in a dark cupboard and the other in a shady area of the room.</i> • <i>Each day for a week measure the height of each seedling.</i> • <i>Calculate a daily average for each location.</i> • <i>Plot a graph of growth against time for each location.</i> <p><i>Control variables include the same type of seed used, the same number of seeds in each dish and the amount the dishes are watered.</i></p>
Practice	<ol style="list-style-type: none"> 1. Learn and practice the model answer above. 2. Prepare and learn a model answer to plan an investigation to show the effect of one directional light on the growth of seeds.

Quadrats

1.

Place 5 quadrats randomly in an area in which conditions of a particular factor are similar. For example, quadrats are placed in high light intensity.



2.

Count the number of the organism growing within that quadrat.



3.

Identify outliers and calculate an average.



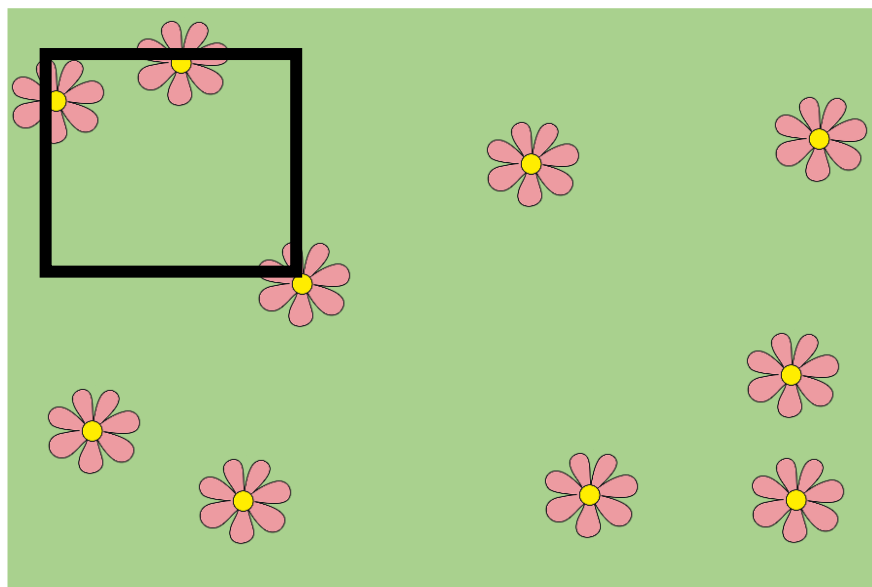
4.

Repeat by placing 5 quadrats in contrasting conditions. For example, quadrats are placed in an area of low light intensity.



5.

Compare data from the different environments.



Practical Video



Transects

1.

Place a tape measure the length of the area being investigated.



2.

Put the quadrat at the 0cm mark and count how many of that organism are within the transect.



3.

Record the abiotic conditions.



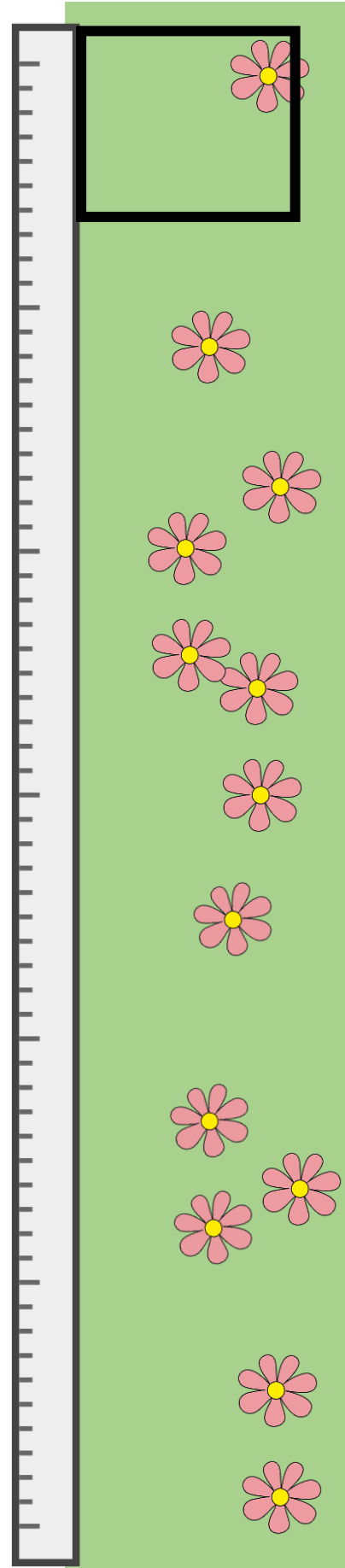
4.

Place a quadrat every 5m and count the number of organisms within the quadrat.
Record the abiotic factors.



5.

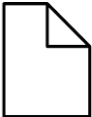
Repeat these steps with 4 more transects.



Practical Video




RP9: Sampling



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1. Why should quadrats be placed in random positions?
2. How could you position a quadrat randomly?
3. When investigating distribution using quadrats how could you ensure results are valid?
4. When using a transect how could you ensure results are valid?
5. How could you estimate % cover using a quadrat?
6. How would you calculate the area of a rectangular field?
7. What piece of equipment would you use to measure distance?
8. How could you estimate the number of organisms in a field.
9. What is a transect?
10. When would you use a transect?
11. What sampling technique would you use to approximate the number of plants in a habitat?

1. To avoid bias.
2. Throw over shoulder or with eyes shut or use a random number generator to create coordinates.
3. Repeat using more quadrats.
4. Repeat using a transect line in a different position
5. Count the number of squares within the quadrat more than 50% covered, divide by the total number of squares in the grid and multiply by 100.
6. Measure the length and width and multiply these together.
7. Measuring tape.
8. Find the area of the field and the number of organisms found in 1m². Multiply these numbers together.
9. A line across a habitat.
10. To investigate a gradual change in a habitat.
11. Random placement of a quadrat.

Topic	RP9 Sampling
Qu	Plan an investigation to estimate the number of _____growing/living in _____
Info	<p>You could be asked this question to estimate the number of different plants/animals or insects in different habitats. Examples that have been assessed in the past include:</p> <ul style="list-style-type: none"> • Number of ragwort in a field. • Dandelions in a field • Number of daphnia in a pond. <p>To answer either of these questions you will need to do the following:</p> <ol style="list-style-type: none"> 1. Describe how to find the area of the habitat. 2. Describe how you will use a quadrat to find the number of organisms in a given area. 3. Explain how you will use your results to estimate the population in the entire area.
Top Tip	Make sure that you include in your method how you will collect valid data. For sampling using quadrats this is lots of repeats, calculating an average and a description of how the quadrat will be placed randomly
Model Answer	<p>Plan an investigation to estimate the number of dandelions growing in a square field.</p> <ol style="list-style-type: none"> 1. Determine the area of a field. To do this measure the length by the width and multiply these numbers together. 2. Place 10 <u>1m²</u> quadrats randomly in the field and count the number of dandelions in the quadrat. 3. Calculate an average. 4. Multiply the average in 1m² by the total area of the field to find an estimate. 5. To place the quadrat randomly I will split the field into a grid and use a random number generator to create random coordinates.
Practice	<ol style="list-style-type: none"> 1. Learn and practice the model answer above. 2. Prepare and learn a model answer to estimate the number of daisies in a field with the following shape. 

Topic	RP9 Sampling
Qu	Plan an investigation to compare the number of _____growing/living in _____ and _____
Info	<p>You could be asked this question to compare the distribution of an organisms in different habitats/conditions within that habitat. Examples that have been assessed in the past include:</p> <ul style="list-style-type: none"> • Bluebells growing in fields/woodland • Limpets living in a sheltered bay and non sheltered bay. • Dandelions growing in full sunlight and in shade. <p>To answer either of these questions you will need to do the following:</p> <ol style="list-style-type: none"> 1. Describe how you will use a quadrat to find the abundance in each location 2. Describe what you will do with your results.
Top Tip	Make sure that you include in your method how you will collect valid data. For sampling using quadrats this is lots of repeats, calculating an average and a description of how the quadrat will be placed randomly.
Model Answer	<p>Plan an investigation to compare the number of dandelions growing in full sunlight and in a shady woodland.</p> <ol style="list-style-type: none"> 1. Place 10 <u>1m²</u> quadrats randomly in the field and count the number of dandelions in the quadrat. 2. Repeat this in the shaded area 3. Calculate an average for each each area. 4. Compare the averages from the field in full sunlight and shady woodland to form a conclusion 5. To place the quadrat randomly I will split the sample areas into a grid and use a random number generator to create random coordinates.
Practice	<ol style="list-style-type: none"> 1. Learn and practice the model answer above. 2. Prepare and learn a model answer to compare the number of limpets on a sheltered shoreline and an exposed shoreline.

Topic	RP9 Sampling
Qu	Plan an investigation to investigate the distribution of _____ using a transect line.
Info	<p>In this question you could be to investigate the distribution of different organisms in different habitats using transects. Examples that have been assessed in the past include:</p> <ul style="list-style-type: none"> • Seaweed along a seashore. • Plants growing along a stream. • Dandelion distribution. • Plants growing along a lake. <p>To answer either of these questions you will need to do the following:</p> <ol style="list-style-type: none"> 1. Identify where the transect will be placed. 2. Describe the placement of the quadrats. 3. Identify what you will be recording. 4. Identify repeats that you will do in different locations.
Top Tip	When placing quadrats along a transect you will use regular intervals. This is so that you will get data for the position of the organism you are investigating at different distances along the varying conditions of the habitat.
Model Answer	<p>Investigate the distribution of seaweed from the sea up to the rocks.</p> <ol style="list-style-type: none"> 1. Place a transect line at a right angle from the sea. 2. Place the quadrat at the point closest to the sea. 3. Record the abundance of different seaweeds. 4. Repeat placing the quadrat at regular intervals up the shoreline. 5. Repeat placing the transect several more times at different positions along the shore.
Practice	<ol style="list-style-type: none"> 1. Learn and practice the model answer above. 2. Prepare and learn a model answer to investigate the abundance of plants along a stream, from the shore of a lake and the abundance of dandelions from the edge of a woodland.