

Biology Paper 2

Model Exam Question Booklet

Essential Content for the Higher Trilogy Science Exam (KSP/CPA)

This booklet is split into 3 parts.

Biology Paper 2	
Topics in the Paper:	
B11	Hormonal Coordination
B17	Organising an Ecosystem
B18	Biodiversity
RP7	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!

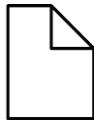
Part 2

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

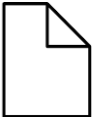


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1. What is the endocrine system?
2. How does the hormonal system compare to the nervous system?
3. What is the pituitary gland?
4. Why is the pituitary gland known as a master gland?
5. What is blood glucose concentration monitored and controlled by?
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 happens during puberty?
14. What is ovulation?
15. What is testosterone?
16. What is the role of follicle stimulating hormone?
17. What is the role of luteinising hormone?
18. What is the role of oestrogen and progesterone?
19. What happens in IVF?
20. What are the problems of IVF?
21. What does adrenaline do?

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. Reproductive hormones cause the development of secondary sex characteristics.
14. The release of an egg.
15. The main male reproductive hormone produced by the testes and it stimulates sperm production.
16. Causes maturation of an egg in the ovary.
17. Stimulates the release of an egg.
18. Maintain the uterus lining.
19. The mother is given FSH and LH to mature several egg, these eggs are collected and fertilised before one or two embryos are inserted into the mother's womb.
20. It is emotionally and physically stressful, the success rate is not high and it can lead to multiple births.
21. It is produced by the adrenal glands in times of fear or stress. It increases the heart rate preparing the body for fight or flight.

B17: Organising an Ecosystem

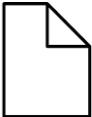


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1. What are producers?
2. What are examples of producers?
3. How can feeding relationships within a community be represented?
4. What are primary consumers?
5. What are secondary consumers?
6. What are consumers?
7. What are predators?
8. What are 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?

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.

B18: Biodiversity and Ecosystems



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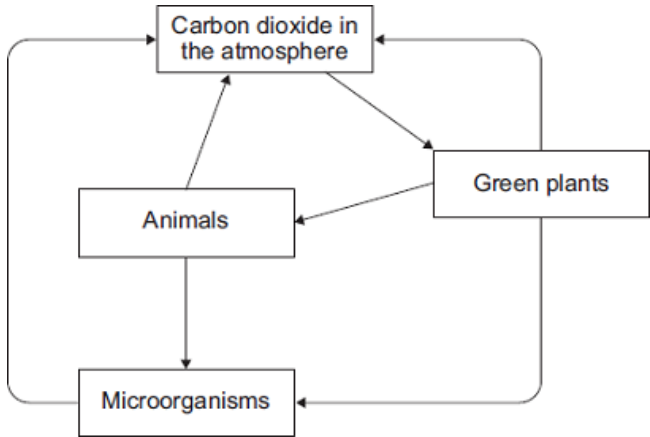
1. What is biodiversity?
2. Why is biodiversity important?
3. Why are we producing more waste?
4. What are examples of pollution in water?
5. What are examples of pollution in air?
6. Which gas in the air causes acid rain?
7. What are examples of pollution on land?
8. What are the problems of waste?
9. What are the consequences of global warming?
10. What is contributing to global warming?
11. What human activities can increase the greenhouse gases in the atmosphere?
12. What are the problems of melting ice caps?
13. What are the consequences of habitat destruction?
14. What are the problems caused by an increase in extreme weather?
15. What are the problems caused by changes to migratory patterns of animals?

1. The variety of all the different species of organisms on earth, or within an ecosystem.
2. It ensures the stability of ecosystems by reducing dependence on one species.
3. Rapid growth in the human population and an increase in the standard of living.
4. In water from sewage fertiliser or toxic chemicals.
5. Smoke and acidic gases.
6. Sulfur Dioxide
7. Landfill and toxic chemicals.
8. It kills plants and animals reducing biodiversity.
9. Loss of habitats, changes in distribution in animals, changes in migration patterns, reduced biodiversity.
10. Increasing levels of carbon dioxide and methane.
11. Burning fuels, cutting down forests and farming livestock.
12. Sea levels will rise and more flooding.
13. Extinction and reduction in biodiversity.
14. Water shortages, changes to yields of crops and food shortages.
15. A change in species distribution which will cause changes in food webs.

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	<p>Explain what happens when blood glucose levels rise.</p> <p>Explain the cause of diabetes and how it is controlled.</p> <p>People with diabetes may be asked to control their diet. Explain how this can help to reduce the risk of developing health problems.</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 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>
Model Answer	<p>Explain the cause of diabetes and how it is controlled.</p> <p><i>Diabetes occurs when the pancreas does not produce insulin and so blood sugar is not properly controlled. Insulin injections and a controlled diet can both be used to control diabetes.</i></p>
Model Answer	<p>People with diabetes may be asked to control their diet. Explain how this can help to reduce the risk of developing health problems.</p> <p><i>People with diabetes will be advised to reduce carbohydrates in their diet. This diet prevents blood sugar levels from rising as much. This will help the person manage their diabetes and reduce their risk of heart disease.</i></p>
Practice	<p>1. Learn and practice the model answers above.</p>

Topic	B11 Hormonal Coordination
Qu	<p>Hormones are used in IVF treatment. Explain how different hormones are used to help a woman become pregnant.</p> <p>Describe the process of IVF.</p> <p>Adrenaline causes changes in the body to prepare for a ‘fight or flight’ response. What changes does it cause in the body?</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>Hormones are used in IVF treatment. Explain how different hormones are used to help a woman become pregnant.</p> <p><i>FSH is given to stimulate the maturation of an egg, while LH is given to stimulate ovulation. This causes the release of more eggs which increases the chance of fertilisation.</i></p>
Model Answer	<p>Describe the process of IVF</p> <p><i>The woman is given FSH and LH. The FSH causes eggs to mature while the LH stimulates these eggs to be released. The higher levels of hormones increases the number of mature eggs that can be collected. The eggs are fertilised and given time to develop into small balls of cells. Some of these eggs are then transferred into the woman’s uterus to be implanted.</i></p>
Model Answer	<p>Adrenaline causes changes in the body to prepare for a ‘fight or flight’ response. What changes does it cause in the body?</p> <p><i>It increases the supply of oxygen and glucose to the brain and muscles. It also increases heart rate, blood pressure and breathing rate. All of these changes prepare the body for fight or flight.</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.

Topic	B18 Biodiversity and Ecosystems
Qu	<p>Explain why when fertiliser goes into a river, the concentration of oxygen dissolved in the water decreases.</p> <p>Explain the possible consequences of a future increase in carbon dioxide emissions.</p> <p>Explain how a rise in carbon dioxide concentration in the atmosphere can decrease biodiversity.</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 why when fertiliser goes into a river, the concentration of oxygen dissolved in the water decreases.</p> <p><i>The fertiliser causes growth of algae. The algae blocks light which causes death. Microorganisms break down the dead matter and respire aerobically. Aerobic respiration uses oxygen and so oxygen levels decrease.</i></p>
Model Answer	<p>Explain the possible consequences of a future increase in carbon dioxide emissions.</p> <p><i>Carbon dioxide is a greenhouse gas that absorbs radiation. This causes an increase in temperature which will lead to global warming and climate change. This could mean that ice caps will melt causing sea levels to rise and flooding. It will also cause habitat destruction which can lead to extinction reducing biodiversity.</i></p>
Model Answer	<p>Explain how a rise in carbon dioxide concentration in the atmosphere can decrease biodiversity.</p> <p><i>A rise in carbon dioxide will lead to global warming. This can cause sea levels to rise, a change in rainfall, an increase in droughts and storms. These can all damage habitats which can lead to extinction. It can also cause a change in the distribution of plants and animals and disrupt food chains.</i></p>
Practice	1. Learn and practice the model answers above.

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.



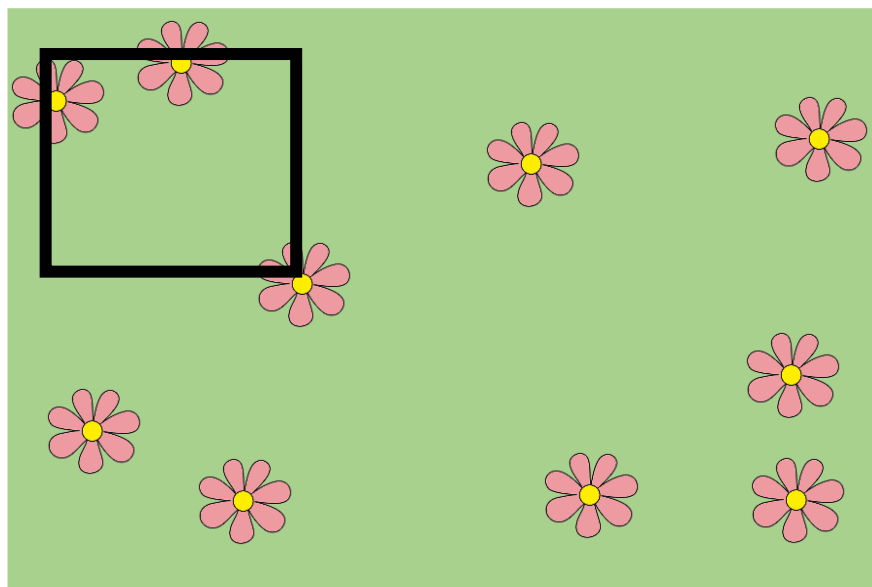
4.

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.



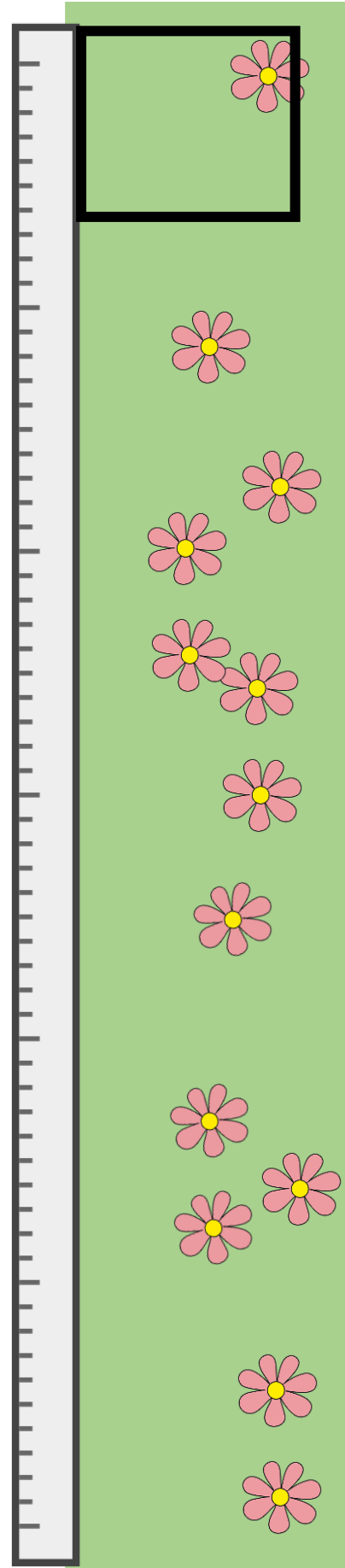
4.

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



5.

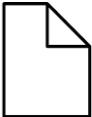
Repeat these steps with 4 more transects.



Practical Video




RP7: 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	RP7 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	RP7 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	RP7 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.