

GCSE

SCIENCE B

Science B Unit 2 Modules B2, C2, P2

Specimen Paper

Candidates answer on the question paper:

Additional materials: ruler (cm/mm), calculator

H **B622/02**

60 mins

Candidate
Name

--

Centre
Number

--	--	--	--	--

Candidate
Number

--	--	--	--

TIME 60 mins

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above.
- Answer **all** the questions.
- Write your answers on the dotted lines unless the question says otherwise.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- There is a space after most questions. Use it to do your working. In many questions marks will be given for a correct method even if the answer is incorrect.
- Do not write in the bar code. Do not write in the grey area between the pages.
- **DO NOT WRITE IN THE AREA OUTSIDE THE BOX BORDERING EACH PAGE. ANY WRITING IN THIS AREA WILL NOT BE MARKED.**

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **60**.

This specimen paper consists of 26 printed pages.

BLANK PAGE

Answer all questions

Section 1

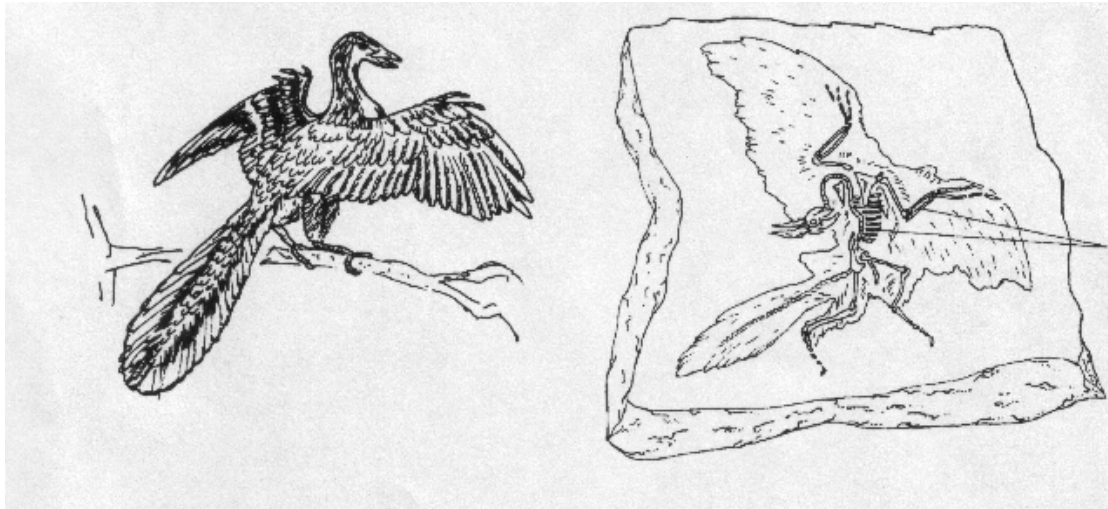
1. Picture **A** shows an animal that lived millions of years ago.

Now it is extinct.

Picture **B** shows a fossil of the animal.

Picture A
(This is what the scientist think the animal looked like)

Picture B
(a fossil of the animal)



The fossil was found in rock.

Look at picture **B**.

(a) (i) Some internal body parts of the animal have been fossilised.

What type of internal body parts have been fossilised?

.....[1]

(ii) Scientists think that the animal had feathers.

What evidence is there that the animal had feathers?

.....
.....[1]

(b) Fossils cannot show us exactly what extinct animals looked like.

Write down **one** reason why.

.....
.....[1]

(c) Scientists think that birds and reptiles evolved from the same ancestor.

The fossil is evidence that this might have happened.

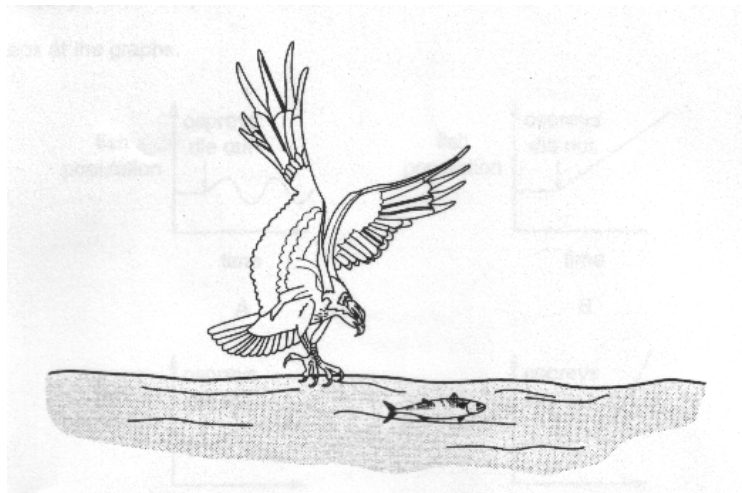
We cannot be **sure** that birds and reptiles had the same ancestor.

Write down **one** reason why we cannot be sure.

.....
.....[1]

[Total: 4]

2. Ospreys are birds that survive by hunting fish.



The number of ospreys in Britain is low.

This has been partly because of:

- hunting,
- egg collecting,
- poisoning by pesticides.

(a) Some ospreys have been poisoned by pesticides that farmers have put on their crops.
The ospreys take in pesticides from the fish they eat.
How could the pesticides get into the river?

.....
.....[1]

(b) Ospreys are now protected from hunters and egg collectors.
Suggest **two** ways they are protected.

1
.....
2
.....[2]

(c) When pesticides such as DDT were used, they harmed ospreys.
The ospreys were unable to breed successfully.
The concentration of DDT was much higher in ospreys than in the fish they ate.
Explain why the concentration of DDT was higher in the ospreys

.....
.....
.....
.....[2]

[Total: 5]

3. Mike and Linda estimate how many bluebell plants are in a wood.
They use quadrats to collect the data.
Each quadrat covers 1 m^2 .

- (a) Describe how a quadrat is used to collect **reliable** data.

.....

[2]

The table shows their results.

	Mike's results	Linda's results
total area of wood	5000 m^2	5000 m^2
number of quadrats	20	10
average number of bluebells in each 1 m^2 quadrat	9	20
estimated number of bluebells in the wood	45 000	

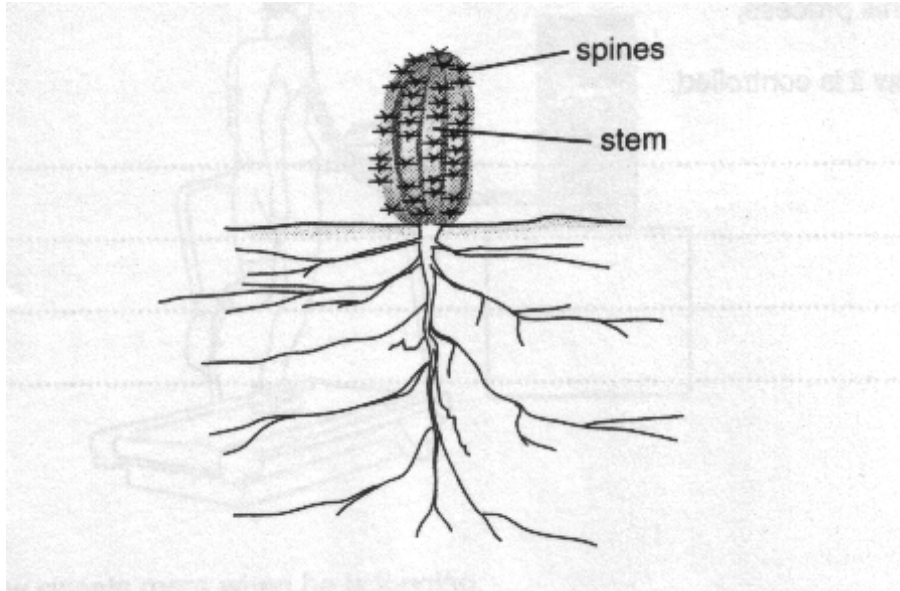
- (b) Look at the table.

Work out the estimated number of bluebells using Linda's results.

Estimated number of bluebells =[1]

[Total: 3]

4. The drawing shows a cactus plant.
This cactus plant lives in a hot, dry desert.
The leaves have evolved to become spines.
The stem is green.



- (a) Plants have roots to take in water.
This cactus plant has very long roots.
Suggest how very long roots help cactus plants to survive in dry desert conditions.

.....
.....[1]

- (b) The spines (leaves) of a cactus plant are **not** very efficient at photosynthesis.
Explain why.

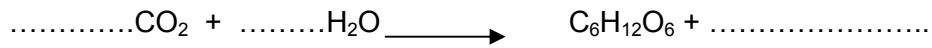
.....
.....
.....
.....[2]

[Total 3]

5. Plants make food by the process of photosynthesis.

(a) Complete and balance the equation for photosynthesis.

(Light energy)



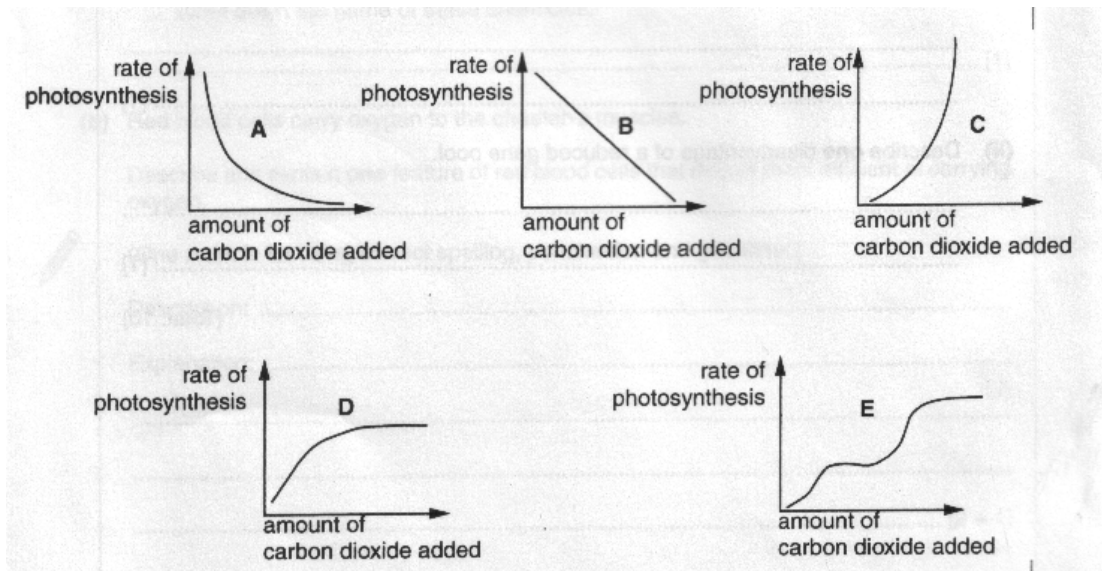
(chlorophyll)

[2]

(b) Kate grows tomatoes in a glasshouse.

She adds carbon dioxide to the air inside the glasshouse.

Look at the graphs.



Which graph shows what happens to the rate of photosynthesis when Kate adds carbon dioxide?

Choose from **A, B, C, D** or **E**.

.....[1]

(c) Explain why the food made by photosynthesis is stored as starch.

.....
.....[2]

[Total: 5]

Section 2

6. Petrol is a fuel. It is used in the engines of motor cars.

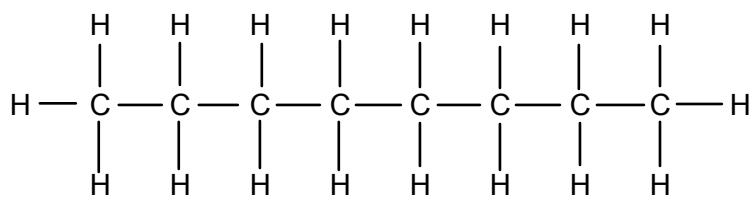


(a) Petrol is a mixture of substances.

One of the substances is heptane. It has the molecular formula C_7H_{16} .

Another substance in petrol is octane.

Look at the displayed formula of octane.



Write down the **molecular formula** for octane.

.....[1]

(b) Look at the table.

It shows what is found in the exhaust gases of a car.

The car has a petrol engine.

gas in the exhaust	percentage of gas in exhaust
carbon dioxide	8
carbon monoxide	5
hydrogen	2
oxygen	4
nitric oxide	0.3
nitrogen	71
water vapour	9

(i) Some incomplete combustion takes place in the petrol engine of a car.
What evidence is there in the table to show this?

.....
.....[1]

(ii) Many cars have a catalytic converter fitted.
A catalytic converter removes some of the gases from the exhaust.
Write down the name of one gas removed by a catalytic converter.

.....[1]

(c) Petrol is a **fossil** fuel.
More and more fossil fuels are being burnt each year.
This may change the composition of air.

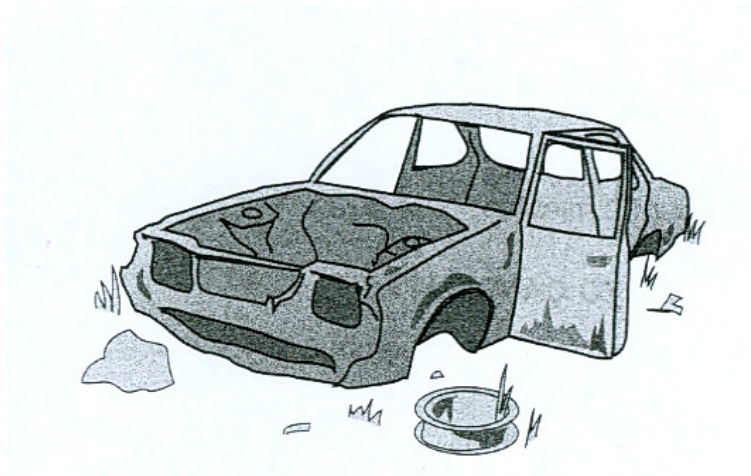
Describe and explain possible changes in the composition of air.

.....
.....
.....
.....
.....
.....[4]

[Total: 7]

7. Car bodies made from iron and steel will rust.

The picture shows a rusty car body.



- (a) Oxygen and water are needed for the iron parts in a car to rust.

The chemical name for rust is hydrated iron (III) oxide.

Write the word equation for the rusting of iron.

.....[1]

- (b) Nowadays some car bodies are made from aluminium.

Write down **one** advantage of using aluminium instead of iron.

.....
.....[1]

(c) This question is about ideas and evidence in science.

Sam is a research scientist.

He has just discovered a new alloy.

This alloy is suitable for making car bodies.

Sam decides to tell other scientists around the world about his discovery.

Describe how, **and** explain why Sam should tell other scientists.

.....

.....

.....

.....

.....[2]

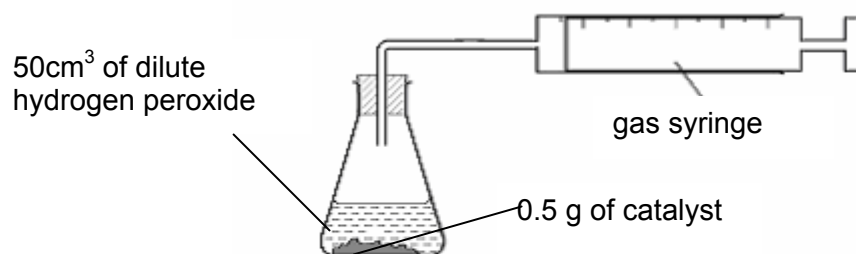
[Total: 4]

8. Dilute hydrogen peroxide is used to make oxygen in a laboratory.
Hydrogen peroxide decomposes to make water and oxygen.

(a) Write the word equation for this decomposition reaction.

.....[1]

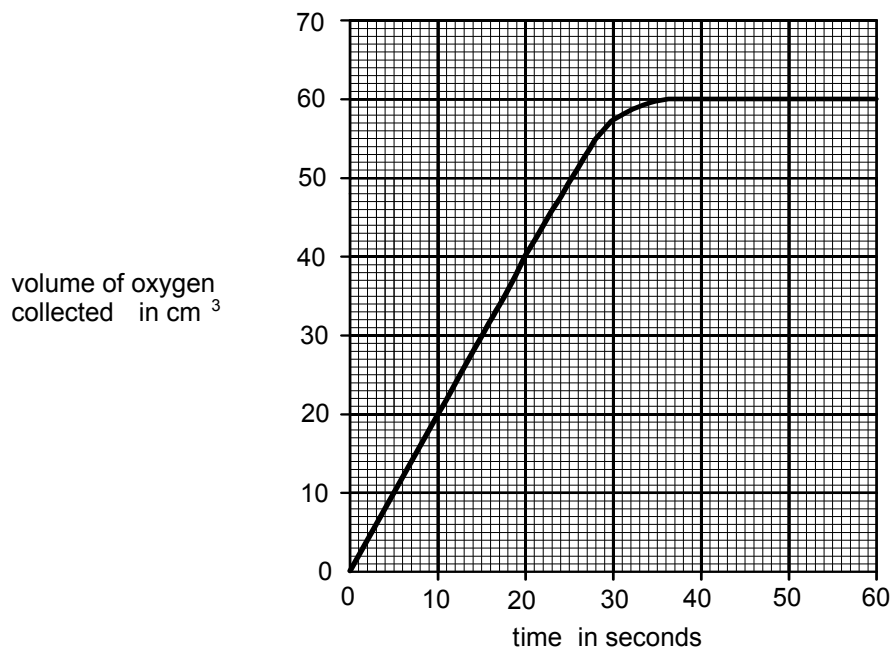
(b) Laura investigates the decomposition of dilute hydrogen peroxide at room temperature.
Look at the apparatus she uses.



Laura uses 50 cm³ of dilute hydrogen peroxide and 0.5 g of a catalyst.

Laura records the volume of oxygen collected every 10 seconds.

This is a graph of Laura's results.



Look at the graph.

The reaction stops when all the hydrogen peroxide has been used up.

How long does it take for all the hydrogen peroxide to react?

..... seconds [1]

(c) Laura uses 0.5 g of a catalyst.

How much of the catalyst remains at the end of the reaction?

Choose from

more than 0.5 g

0.5 g

less than 0.5 g

Answer[1]

(d) Laura wants to make the decomposition reaction of hydrogen peroxide faster.

She still wants to use

- 0.5 g of the catalyst
- 50 cm³ of hydrogen peroxide solution.

(i) Laura decides to use hotter hydrogen peroxide.

The decomposition reaction is faster.

Explain why?

Use ideas about collisions between particles.

.....
.....
.....
.....[2]

(ii) Laura also knows the reaction will go faster if she uses more concentrated hydrogen peroxide.

Explain why.

Use ideas about collisions between particles.

.....
.....
.....
.....[2]

[Total: 7]

9. Cement, sand and water are used make concrete.

Reinforced concrete is a composite material.

A road bridge is made using reinforced concrete.

Explain why reinforcing concrete with steel makes it a better construction material.

.....

.....

.....

..... [2]

[Total: 2]

Section 3

10. Adrian visits a South American village, near to the equator that wants to produce electricity. The villagers could use a photocell to collect energy from the Sun.

(a) One advantage of using the Sun is that it is a **renewable energy source**.

What does **renewable energy source** mean?

.....
.....[1]

(b) State one other **advantage** and one **disadvantage** of using photocells to produce electricity.

Advantage

Disadvantage[2]

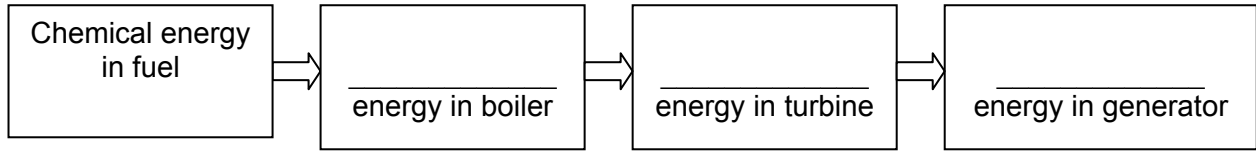
(c) When light shines onto a photocell, electricity is produced.

Use your ideas about electrons to describe how electricity is produced in a photocell.

.....
.....
.....
.....[2]

[Total: 5]

- 11.** Coal fired power stations are the main method of producing electricity in the UK.
Starting with the Chemical energy in the fuel, complete the useful energy transfers in the power station.



[3]

- (b)** For every 45 MJ of coal burnt only 20 MJ of electrical energy are generated.

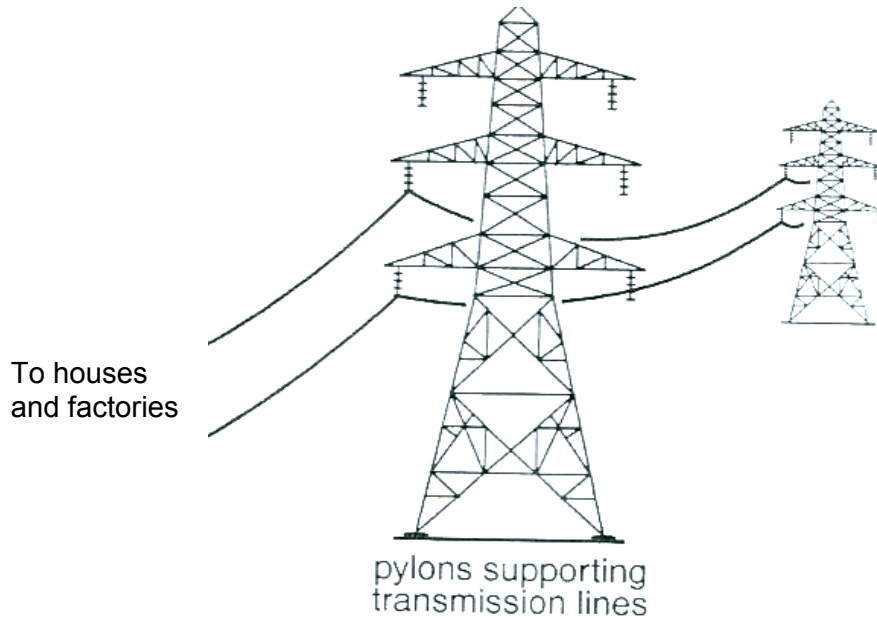
- (i)** State the formula for efficiency in terms of total energy input and useful energy output

.....
[1]

- (ii)** Find the efficiency of the power station from the data given. You are advised to show all of your working out.

Answer[2]

- (c) To distribute the electricity to house and factories a series of wires called the National Grid are used. During this distribution some energy is lost from the wires to the environment.



Increasing the voltage in the wires reduces the amount of energy lost.

Describe one other change to the transmission lines which reduces the amount of energy lost

.....
.....
.....
.....[2]

[Total: 8]

12. Nearly all of the energy we use on earth comes from the Sun.

Explain how this is true for the energy stored in coal.

.....
.....
.....
.....
.....
.....[3]

[Total: 3]

13. A new Nuclear power station is to be built in your local area. Suggest **two** ways that scientists could tell people about the advantages and disadvantages of the project.

.....
.....
.....
.....[2]

[Total: 2]

14. In 2004 the President of the USA suggested a manned mission to the Planet Mars this is what he said

“Our first goal is to complete the International Space Station by 2010. We will finish what we have started...We will focus our future research aboard the station on the long-term effects of space travel on human biology. The environment of space is hostile to human beings. Research on board the station and here on Earth will help us better understand and overcome the obstacles that limit exploration. Through these efforts we will develop the skills and techniques necessary to sustain further space exploration.”

Describe some of the “obstacles that limit exploration”.

.....
.....
.....
.....
.....[2]

BLANK PAGE

GCSE

SCIENCE B

Science B Unit 2 Modules B2, C2, P2

Specimen Mark Scheme

Maximum mark for this paper is 60

H **B622/02**

60 mins

This specimen mark scheme consists of 4 printed pages.

Question Number	Answer	Max Mark
<p>Section 1</p> <p>1(a)i</p> <p>1(a)ii</p> <p>1(b)</p> <p>1(c)</p> <p style="text-align: right;">Total marks</p>	<p>Bones;</p> <p>imprint in rock around fossil;</p> <p>Any one from:</p> <p>parts of the body are lost; fossil incomplete;</p> <p>not all of the body parts are fossilised;</p> <p>fossil record not complete;</p> <p>Others show similar features;</p>	<p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[1]</p> <p>[4]</p>
<p>2(a)</p> <p>2(b)</p> <p>2(c)</p> <p style="text-align: right;">Total marks</p>	<p>Pesticides land on the soil then the rain leaches the pesticides through the soil into the water;</p> <p>Any two from:</p> <p>Laws have been passed to prevent people hunting the osprey; removing eggs from nests; destroying their habitats;</p> <p>Public education programmes make people more aware of the problem;</p> <p>Their habitats become conservation areas to reduce damage to habitat;</p> <p>Fish take in pesticides from the water / osprey eat fish / DDT stays in ospreys body / osprey eat more fish / have build up (or words to that effect)</p>	<p>[1]</p> <p>[2]</p> <p>[2]</p> <p>[5]</p>
<p>3(a)</p> <p>3(b)</p> <p style="text-align: right;">Total marks</p>	<p>Any two from:</p> <p>Random placing of quadrat and count plants inside;</p> <p>if plant is touching the frame include it in your count if more than half of it is inside the quadrat;</p> <p>Repeat procedure at least 5 times;</p> <p>calculate average number of plants per square metre in field;</p> <p>$10 \times 20 = 200$</p> <p>$5000 \div 10 = 500$</p> <p>$500 \times 200 = 100\ 000$;</p> <p>1 mark for correct method/answer</p>	<p>[2]</p> <p>[1]</p> <p>[3]</p>
<p>4(a)i</p> <p>4(b)</p> <p style="text-align: right;">Total marks</p>	<p>able to absorb water from a larger area;</p> <p>Any two from:</p> <p>small surface area so less sunlight absorbed;</p> <p>very few stomata for absorbing carbon dioxide;</p> <p>very few chloroplasts containing chlorophyll to absorb sunlight;</p>	<p>[1]</p> <p>[2]</p> <p>[3]</p>

5(a)	6(CO ₂) + 6(H ₂ O); 6O ₂ ;	[2]
5(b)i	D	[1]
5(c)	Any two from: soluble to insoluble (key point) glucose (food) made in photosynthesis is soluble; converted to starch as insoluble; storage needs to be insoluble/ OWTTE	[2]
Total marks		[5]
Section 2		
6(a)	C ₈ H ₁₈ ;	[1]
6(b)i	Presence of carbon monoxide / presence of hydrogen;	[1]
6(b)ii	Carbon monoxide / nitric oxide / nitrogen dioxide / oxides of nitrogen;	[1]
6(c)	Any four from: More sulphur dioxide because more fossil fuels containing sulphur or sulphur compounds are being burnt; More nitric oxide /oxides of nitrogen formed by reaction between nitrogen and oxygen at high temperature; More carbon dioxide because of combustion of fuel; Idea that burning releases carbon dioxide that is trapped within a fuel or plant; Less oxygen because it is used up in combustion ; More water vapour produced during combustion;	[4]
Total marks		[7]
7(a)	Iron + water + oxygen → hydrated iron(III) oxide;	[1]
7(b)	Aluminium does not rust / aluminium has a lower density / same car body will weigh less;	[1]
7(c)	Any two from: Means of communication e.g. phone, conference, internet, book, journal, meeting To get work evaluated / aw; So no other scientist could take credit; So other scientists could develop the work / aw;	[2]
Total marks		[4]
8(a)	Hydrogen peroxide → oxygen + water;	[1]
8(b)	44-48 (seconds);	[1]
8(c)	0.5 (g);	[1]
8(d)i	Particles move faster / particles have more energy / more collisions per second more successful collisions / more energetic collisions;	[2]
8(d)ii	More crowded particles; More collisions per second / greater collision frequency;	[2]
Total marks		[7]

9	<p>Any two from: Steel provided extra strength; Steel provides extra flexibility; Concrete makes it hard;</p> <p style="text-align: right;">Total marks</p>	<p>[2] [2]</p>
<p>Section 3 10(a) 10(b) 10(c)</p>	<p>Idea of being replaced quickly; Idea of no chemical pollution/no fuel costs; Expensive to set up/only works in the day/ Energy is absorbed; Electrons are knocked loose;</p> <p style="text-align: right;">Total marks</p>	<p>[1] [1] [1] [1] [5]</p>
<p>11(a) 11(b)i 11(b)ii 11(c)</p>	<p>Heat energy in Boiler; Kinetic energy in turbine; Electrical energy in Generator Efficiency = Useful energy out/total energy in 20 / 45 44.4 Change diameter; <u>Increase</u> diameter</p> <p style="text-align: right;">Total marks</p>	<p>[1] [1] [1] [1] [1] [1] [1] [8]</p>
12	<p>Plants crushed to make coal; Plants store energy; Plants get energy from sun by photosynthesis;</p> <p style="text-align: right;">Total marks</p>	<p>[1] [1] [1] [3]</p>
13	<p>Any two from: Public meeting/local newspaper/local news program/talk in school</p> <p style="text-align: right;">Total marks</p>	<p>[2] [2]</p>
14	<p>Any two from: Radiation effects humans/ Huge costs of space flight/ enough fuel keeping warm/having enough oxygen/time required/providing enough food</p> <p style="text-align: right;">Total marks Overall marks</p>	<p>[1] [1] [2] [60]</p>