

GENERAL CERTIFICATE OF SECONDARY EDUCATION
GATEWAY SCIENCE
SCIENCE B

Unit 2 Modules B2 C2 P2 (Foundation Tier)

TUESDAY 17 JUNE 2008

Morning
Time: 1 hour

Candidates answer on the question paper.

Additional materials (enclosed):

None

Calculators may be used.

Additional materials: Pencil
Ruler (cm/mm)



Candidate
Forename

Candidate
Surname

Centre
Number

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Candidate
Number

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INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **60**.
- A list of physics equations is printed on page two.
- The Periodic Table is printed on the back page.

FOR EXAMINER'S USE

Section	Max.	Mark
A	20	
B	20	
C	20	
TOTAL	60	

This document consists of **20** printed pages.

2

EQUATIONS

$$\text{efficiency} = \frac{\text{useful energy output}}{\text{total energy input}}$$

$$\text{wave speed} = \text{frequency} \times \text{wavelength}$$

$$\text{power} = \text{voltage} \times \text{current}$$

$$\text{energy (kilowatt hours)} = \text{power (kW)} \times \text{time (h)}$$

Answer **all** the questions.

Section A – Module B2

1 Some ecosystems occur naturally, while other ecosystems are artificial.

(a) Look at the list of ecosystems.

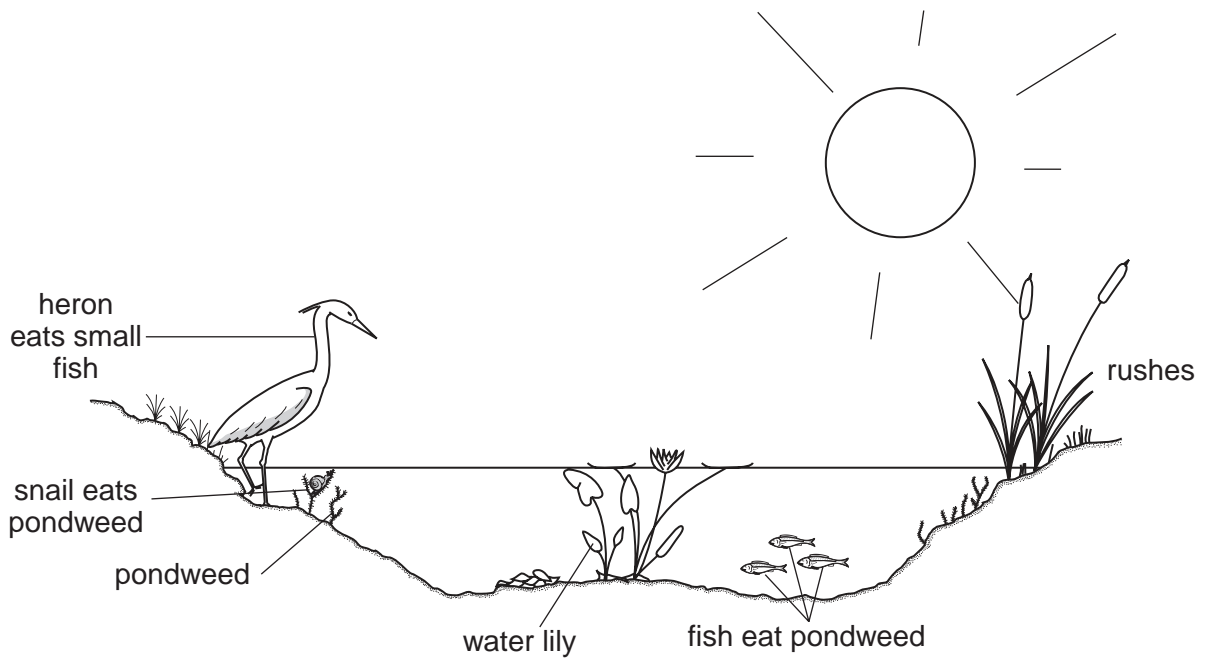
Put a tick (✓) in the box next to the **artificial** ecosystem.

- desert
- fish farm
- lake
- woodland

[1]

(b) Look at the picture.

It shows animals and plants in a pond ecosystem.



(i) Write down the name of **one predator** found in the pond ecosystem.

.....[1]

(ii) The pondweed and water lily compete for space.

Write down **one other** thing they compete for.

.....[1]

(c) The plants in the pond photosynthesise.

Look at the list.

Put a **ring** around **two** substances that plants need for photosynthesis.

carbon dioxide

cellulose

nitrogen

oxygen

water

[2]

(d) During photosynthesis, plants make glucose.

This glucose can be used for different things.

Write about how plants use glucose.

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

(e) The plants photosynthesise faster in the summer than in the winter.

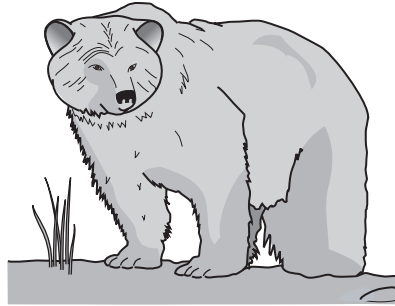
Explain why.

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

[Total: 8]

2 Look at the picture of a brown bear.

Bears are predators.



(a) Bears have eyes at the front of the head.

This helps bears catch prey.

Explain how.

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

(b) Suggest **one other** way bears are adapted to catch prey.

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

(c) Brown bears are **not** adapted to live in cold conditions in the Arctic.

Polar bears have adaptations so they can live in very cold conditions.

Describe **one** of these adaptations.

.....
.....

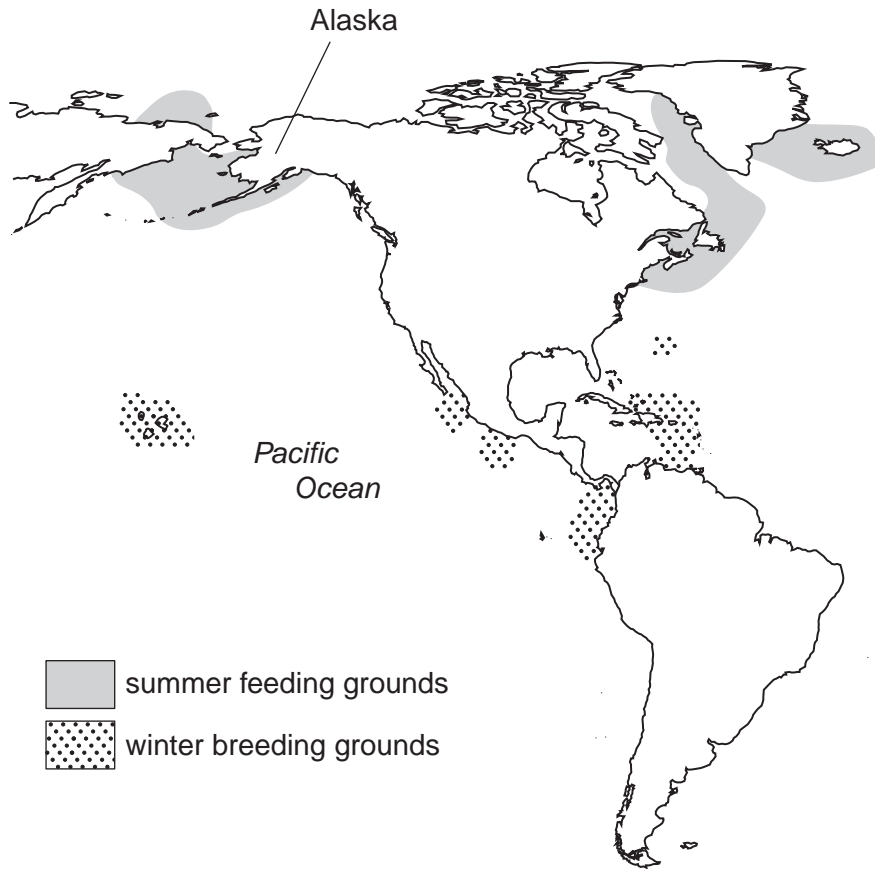
Explain how the adaptation you have chosen helps the polar bear.

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

[Total: 4]

3 Look at the map.

It shows the parts of the world where humpback whales feed and breed.



(a) Humpback whales spend the summer in the sea near Alaska.

Suggest **one** reason why.

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

(b) Humpback whales move far away from the coast of Alaska to breed.

Suggest **one** reason why.

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

(c) Some countries wish to hunt whales for food.

They believe the whales could be a sustainable resource.

What is meant by a **sustainable resource**?

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

(d) Some whales are kept in captivity.

Suggest **one** argument for and **one** argument against keeping whales in captivity.

for

.....

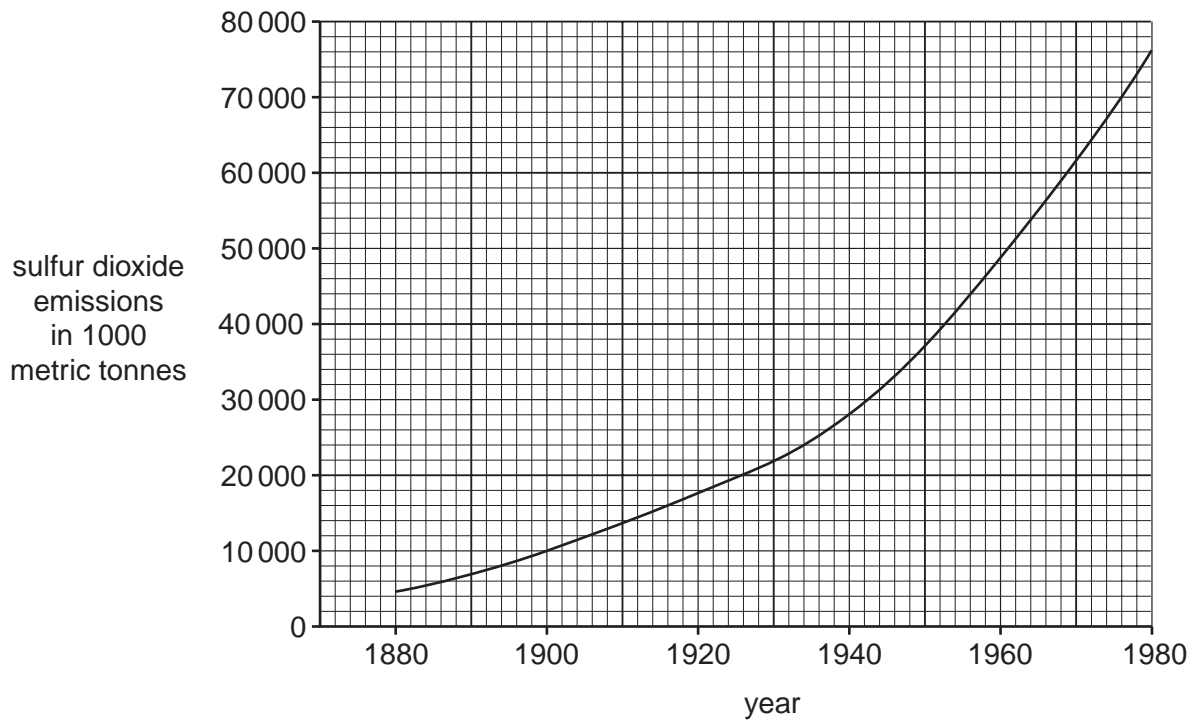
against

.....[2]

[Total: 5]

4 Look at the graph.

It shows world sulfur dioxide emissions between 1880 and 1980.



(a) (i) Describe the change in sulfur dioxide emissions between **1880** and **1980**.

.....[1]

(ii) Suggest **one** reason for this change.

.....[1]

(b) The change in sulfur dioxide levels is causing problems in the environment.

Write down **one** of these problems.

.....[1]

[Total: 3]

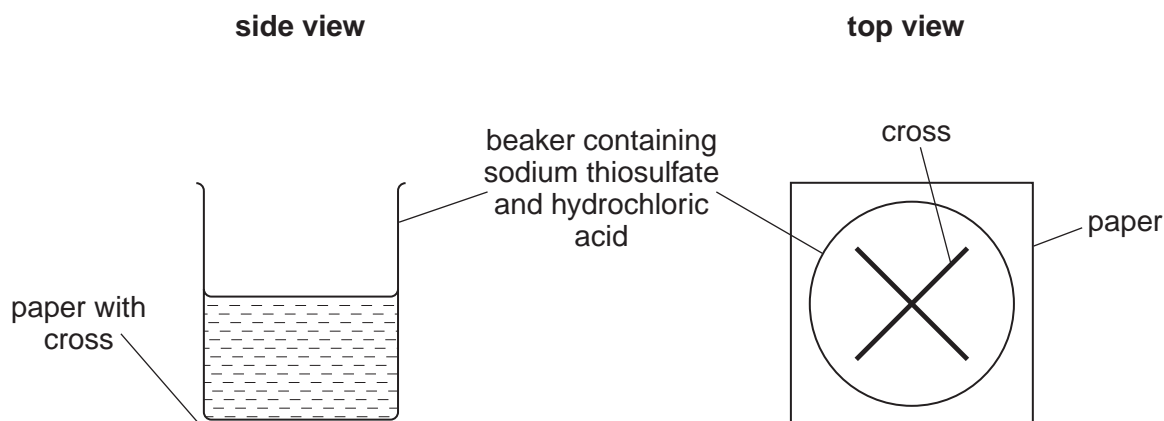
[Turn over

Section B – Module C2

5 Rob and Catherine investigate the reaction between sodium thiosulfate and hydrochloric acid.

A yellow solid is made during the reaction.

Look at the diagram. It shows the apparatus they use.



Rob and Catherine look down at the cross. A yellow solid is made. The liquid in the beaker gets cloudy.

After a time they cannot see the cross.

Rob and Catherine measure this reaction time.

They do the experiment four times.

They use four different concentrations of sodium thiosulfate solution, **A**, **B**, **C** and **D**.

They do all the experiments at 20 °C.

Look at their results.

concentration of sodium thiosulfate	reaction time in seconds
A	41
B	74
C	135
D	67

(a) (i) Which concentration of sodium thiosulfate gave the **fastest** reaction?

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

answer

[1]

(ii) Which is the **least** concentrated solution of sodium thiosulfate?

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

answer

[1]

(b) Changing the concentration changes the rate of the reaction.

Write about **other** ways of changing the rate of reaction.

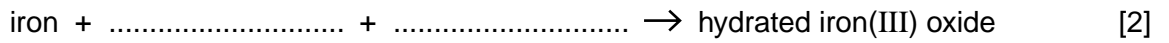
.....
.....
.....[2]

(c) The reaction between sodium thiosulfate and hydrochloric acid happens quite slowly.

Rusting is another slow reaction.

(i) Two substances react with iron to make rust (hydrated iron(III) oxide).

Complete the word equation to show these two substances.



(ii) Iron objects rust more quickly in areas near to the sea.

Suggest why.

.....[1]

[Total: 7]

6 This question is about the air.

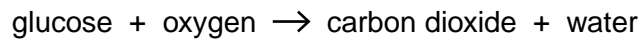
Look at the table. It shows some of the gases in clean, dry air.

gas	percentage in clean, dry air
oxygen	21
.....	78
carbon dioxide	0.035

(a) Complete the table. [1]

(b) Respiration happens in living things.

Look at the word equation for respiration.



Complete the sentence. Use the word equation to help you.

During respiration, the level of carbon dioxide in the air and
 the level of in the air decreases. [2]

(c) Carbon monoxide is a pollutant found in air.

Carbon monoxide, CO, burns in oxygen, O₂.

Carbon dioxide, CO₂, is made.

Write a balanced **symbol** equation for this reaction.

.....[2]

[Total: 5]

7 This question is about construction materials.

Look at the photograph. It shows some buildings.



© iStockphoto.com / Malcolm Romain

(a) Rocks such as granite, limestone and marble are used to construct buildings.

Write down the names of **two** other construction materials.

Use the photograph to help you.

1

2[2]

(b) Limestone and marble have the chemical formula CaCO_3 .

(i) What is the chemical name of limestone and marble?

.....[1]

(ii) How many **carbon** atoms are there in the formula CaCO_3 ?

answer [1]

[Total: 4]

8 This question is about paints.

Paints are made up of three materials.

They are a **solvent**, a **binding medium** and a **pigment**.

(a) Match each **material** to **its job in the paint**.

One has been done for you.

material	its job in the paint
solvent	helps to stick the paint to a surface
binding medium	gives the paint its colour
pigment	thins the paint making it easier to use

[1]

(b) Pigments give the paint its colour.

Some pigments are **thermochromic**.

What is meant by a thermochromic pigment?

.....[1]

(c) Paints are **colloids**.

Look at the sentences about colloids.

Which sentences about colloids are correct?

Put ticks (✓) in the boxes next to the correct sentences.

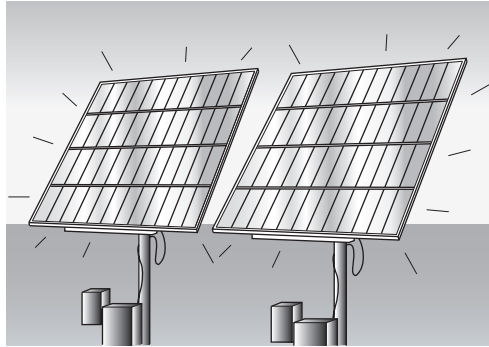
- Particles are mixed and dispersed through a liquid.
- Solid particles dissolve in the liquid.
- A colloid is a single compound.
- Solid particles are suspended in a liquid.

[2]

[Total: 4]

Section C – Module P2

- 9 This question is about photocells. The diagram shows some photocells.



Look at the statements about photocells.

Three of these statements are correct.

Put ticks (✓) in the boxes next to the **three** correct statements.

Photocells transfer light into electricity.

Photocells produce direct current.

Photocells produce alternating current.

Photocells don't need power cables.

Photocells pollute the environment.

Photocells use energy from the Sun.

[3]

[Total: 3]

10 This question is about generation of electricity and the cost of using it.

(a) Batteries produce **direct** current.

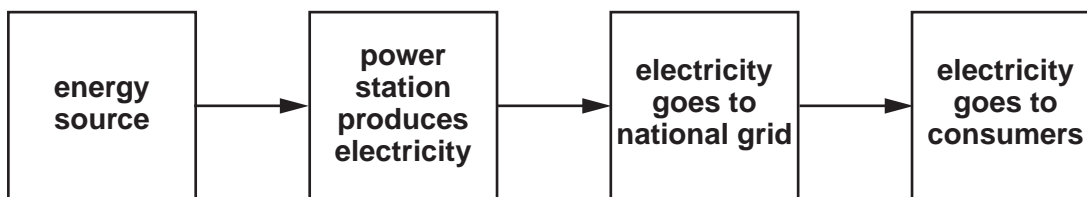
A **generator** is part of a **power station**.

What type of current does a generator in a power station produce?

.....[1]

(b) Power stations are part of the electricity supply system.

The diagram shows the main stages in the production of electricity in a power station.



(i) What energy source (fuel) could be used at the start?

.....[1]

(ii) What is the **national grid**?

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

(iii) People in **houses** are one type of consumer.

Write down the name of another type of **consumer**.

.....[1]

(c) The electrical appliances in Robert's house use electricity.

In one week, the electrical appliances in Robert's house

- use 12 kilowatts of power
- are on for a total of 8 hours.

(i) Calculate the total number of units of electrical energy used by Robert's appliances in one week.

The equations on page 2 may help you.

.....
.....

answer units of electrical energy [2]

(ii) The cost of a unit of electricity is 10 pence.

Calculate the cost of the electricity used in Robert's house in one week.

.....
.....

answer pence

[1]

[Total: 7]

11 This question is about **nuclear** radiation.

(a) Pardeep knows that there are **three** types of nuclear radiation.

Beta is one type.

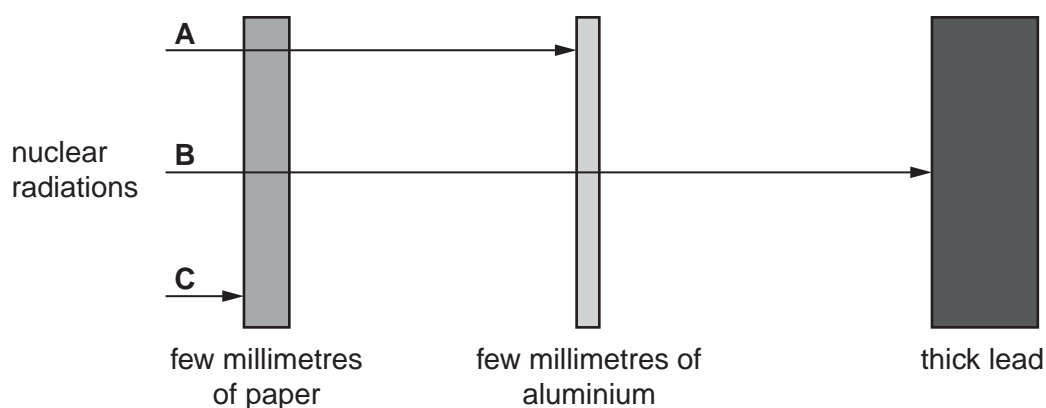
Name **one** other type of nuclear radiation.

.....[1]

(b) In a physics lesson, Pardeep's class are learning about nuclear radiation.

The teacher tells the class about how nuclear radiations penetrate substances.

The teacher does an experiment. The diagram shows the results.



Pardeep thinks that nuclear radiation **A** is **beta** radiation.

He does not think that **B** or **C** can be beta radiation.

Explain why he is correct.

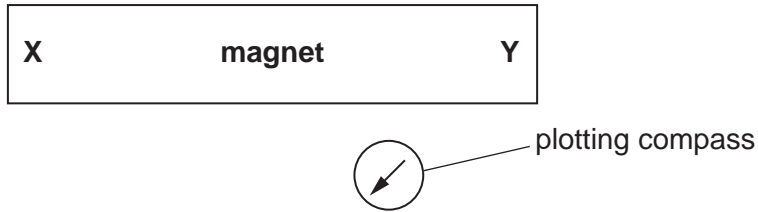
.....

[3]

[Total: 4]

12 Kate is investigating magnetism.

(a) She places a plotting compass near a magnet.



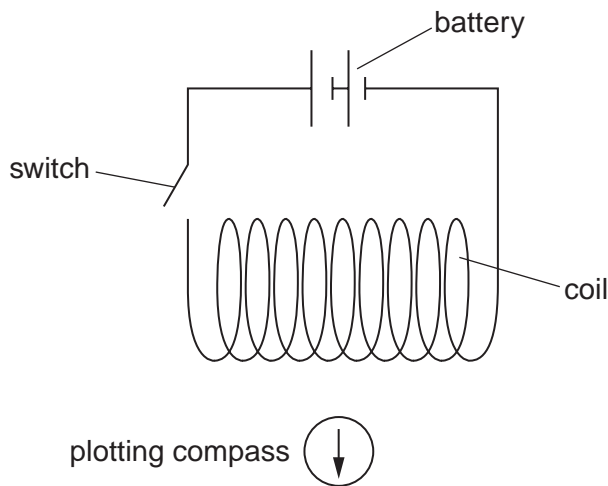
Complete these sentences about Kate's investigation.

The ends of the magnet **X** and **Y** are the north and south of the magnet.

The plotting compass shows the of the magnetic field. [2]

(b) Kate then does a different investigation using a coil.

The coil is connected to a switch and a battery.



When the switch is closed, the plotting compass moves.

What has been created around the coil to cause the plotting compass to move?

.....[1]

[Total: 3]

13 This question is about the Universe.

The **Big Bang** theory describes how the Universe began.

Complete the sentences about the start of the Universe.

Choose from the list.

explosion gas life rock size water

The Universe started with an enormous

Stars in the Universe started as a huge cloud of

Stars have a finite

[3]

[Total: 3]

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE

Copyright Acknowledgements:

Q.3 data Adapted from L.K. Winn and H.E. Winn, *Wings in the Sea: Humpback Whale*, University Press of New England, 1985.
Q.7 photo © iStockphoto.com / Malcolm Romain

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The Periodic Table of the Elements

	1	2	3	4	5	6	7	0										
	7 Li lithium 3	9 Be beryllium 4	11 Na sodium 11	12 Mg magnesium 12	13 Al aluminium 13	14 Si silicon 14	15 P phosphorus 15	16 S sulfur 16	17 Cl chlorine 17	18 Ar argon 18								
	19 K potassium 19	20 Ca calcium 20	21 Sc scandium 21	22 Ti titanium 22	23 V vanadium 23	24 Cr chromium 24	25 Mn manganese 25	26 Fe iron 26	27 Co cobalt 27	28 Ni nickel 28	29 Cu copper 29	30 Zn zinc 30	31 Ga gallium 31	32 Ge germanium 32	33 As arsenic 33	34 Se selenium 34	35 Br bromine 35	36 Kr krypton 36
	37 Rb rubidium 37	38 Sr strontium 38	39 Y yttrium 39	40 Zr zirconium 40	41 Nb niobium 41	42 Mo molybdenum 42	[98] Tc technetium 43	44 Ru ruthenium 44	45 Rh rhodium 45	46 Pd palladium 46	47 Ag silver 47	48 Cd cadmium 48	49 In indium 49	50 Sn tin 50	51 Sb antimony 51	52 Te tellurium 52	53 I iodine 53	54 Xe xenon 54
	55 Cs caesium 55	56 Ba barium 56	57 La* lanthanum 57	72 Hf hafnium 72	73 Ta tantalum 73	74 W tungsten 74	75 Re rhenium 75	76 Os osmium 76	77 Ir iridium 77	78 Pt platinum 78	79 Au gold 79	80 Hg mercury 80	81 Tl thallium 81	82 Pb lead 82	83 Bi bismuth 83	84 Po polonium 84	85 At astatine 85	[222] Rn radon 86
	[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[261] Rf rutherfordium 104	[262] Db dubnium 105	[266] Sg seaborgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt meitnerium 109	[271] Ds darmstadtium 110	[272] Rg roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

1 H hydrogen 1

relative atomic mass atomic symbol name atomic (proton) number

Key

* The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.