Cambridge Assessment International Education

Cambridge Lower Secondary Checkpoint

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

6492731132

SCIENCE **0893/02**

Paper 2 **April 2023**

45 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should show all your working in the booklet.
- You may use a calculator.

INFORMATION

- The total mark for this paper is 50.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.

1 This question is about a small mammal called a shrew.

(a) Look at the picture of two shrews from the same species.

Each shrew has a different fur colour.

Fur colour is controlled by genes.

Write down the name of the chemical that makes up genes.

..... [1]

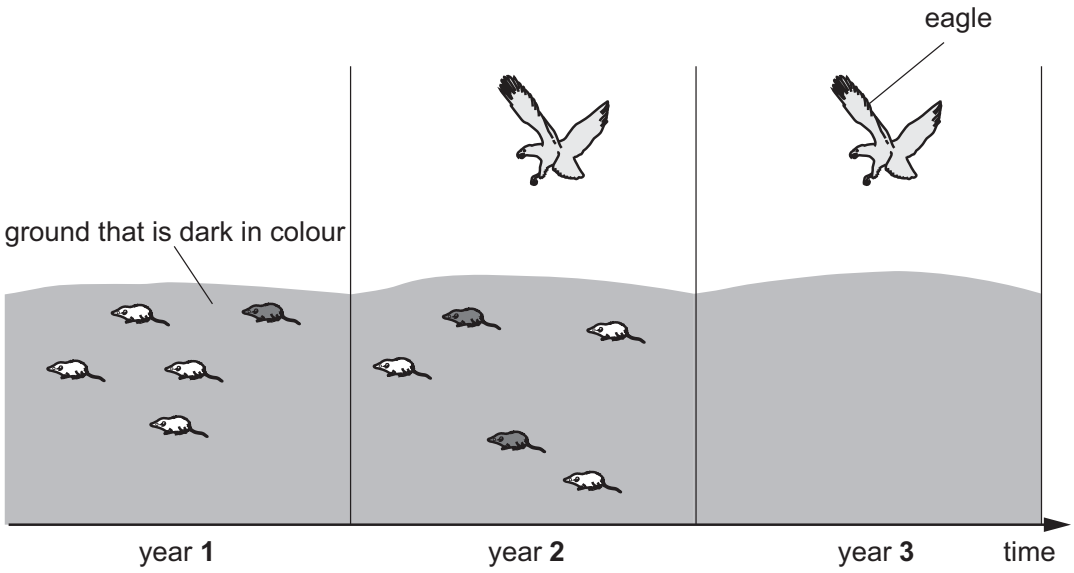
(b) Eagles feed on shrews.

Scientists sample the population of the shrews living on ground that is dark in colour.

The diagram shows the population of shrews over two years.

The population of shrews for year **3** is **not** shown.

An eagle feeds on the shrews during years **2** and **3**.



(i) The total population size of the shrews is the same during all three years.

Predict the numbers of white shrews and grey shrews in year **3**.

Write your prediction in the table.

fur colour	number in population in year 3
	.....
	.....

[1]

(ii) Describe how natural selection explains the changes in the numbers of white and grey shrews.

.....

.....

.....

..... [3]

(iii) The scientists had to trap and release the shrews to get their results.

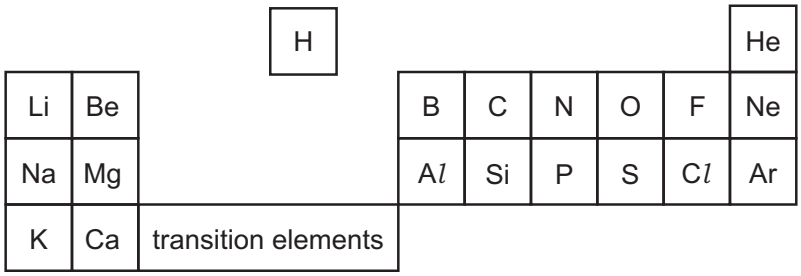
Write down **two** safety precautions the scientists took when trapping and releasing the shrews.

1 .....

2 .....

[2]

2 Look at the diagram showing part of the Periodic Table.



(a) The electronic structure of lithium is 2.1.

Write down the electronic structure of chlorine.

.....

[1]

(b) Write down the **symbol** for the atom which has 12 protons in its nucleus.

.....

[1]

(c) Neon is in Group 8 of the Periodic Table.

Neon is an unreactive gas at room temperature.

Argon is also in Group 8.

Suggest **one** property of argon.

.....

[1]

3 Water moves through a plant.

(a) The table shows information about the pathway of water into and out of a plant.

Number **1** is the part where water enters the plant.

Number **5** is the part where water is lost from the plant.

Complete the table by writing the numbers **1**, **2**, **3**, **4** and **5** to show the pathway of water into and out of a plant.

One has been done for you.

part of plant	order of pathway
leaf	5
leaf xylem	.....
root hair cell	.....
root xylem	.....
stem xylem	.....

[1]

(b) Plants lose water from the surface of their leaves.

Write down the name of this process.

..... [1]

(c) A desert plant grows well due to its very waxy leaves.

High carbon dioxide levels reduce wax production in these plants.

Cars produce carbon dioxide.

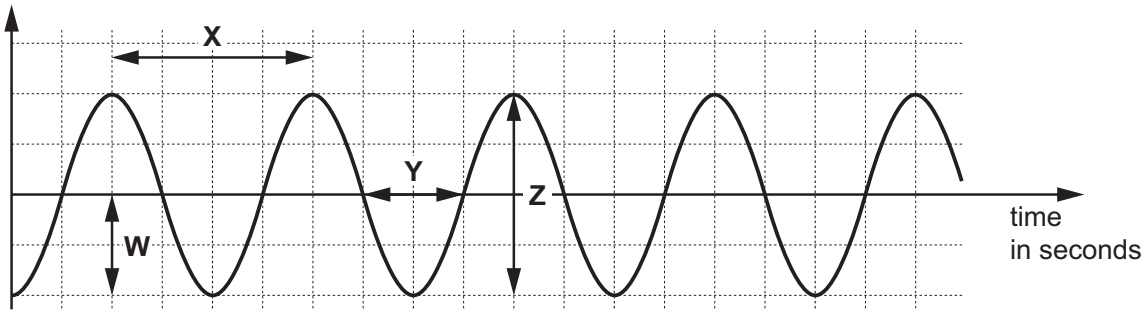
Suggest what happens to the population of these desert plants growing near a new road.

.....

..... [1]

4 This question is about waveforms.

(a) Look at the diagram of the waveform of a sound.

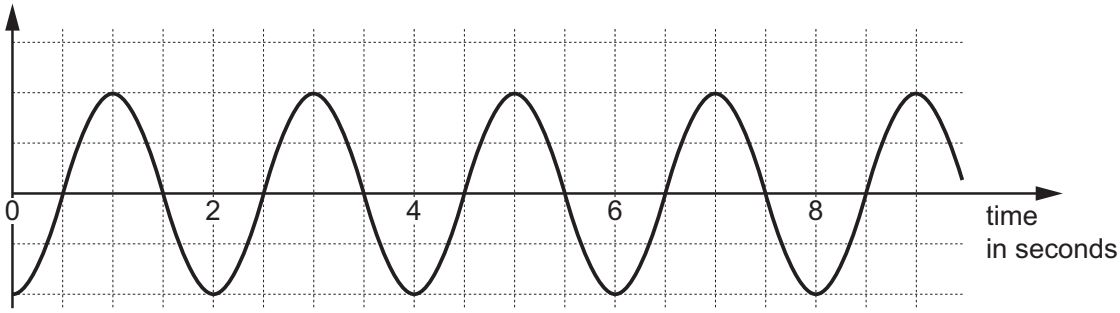


Which letter shows the amplitude of the sound wave?

Circle the correct answer.

W **X** **Y** **Z** [1]

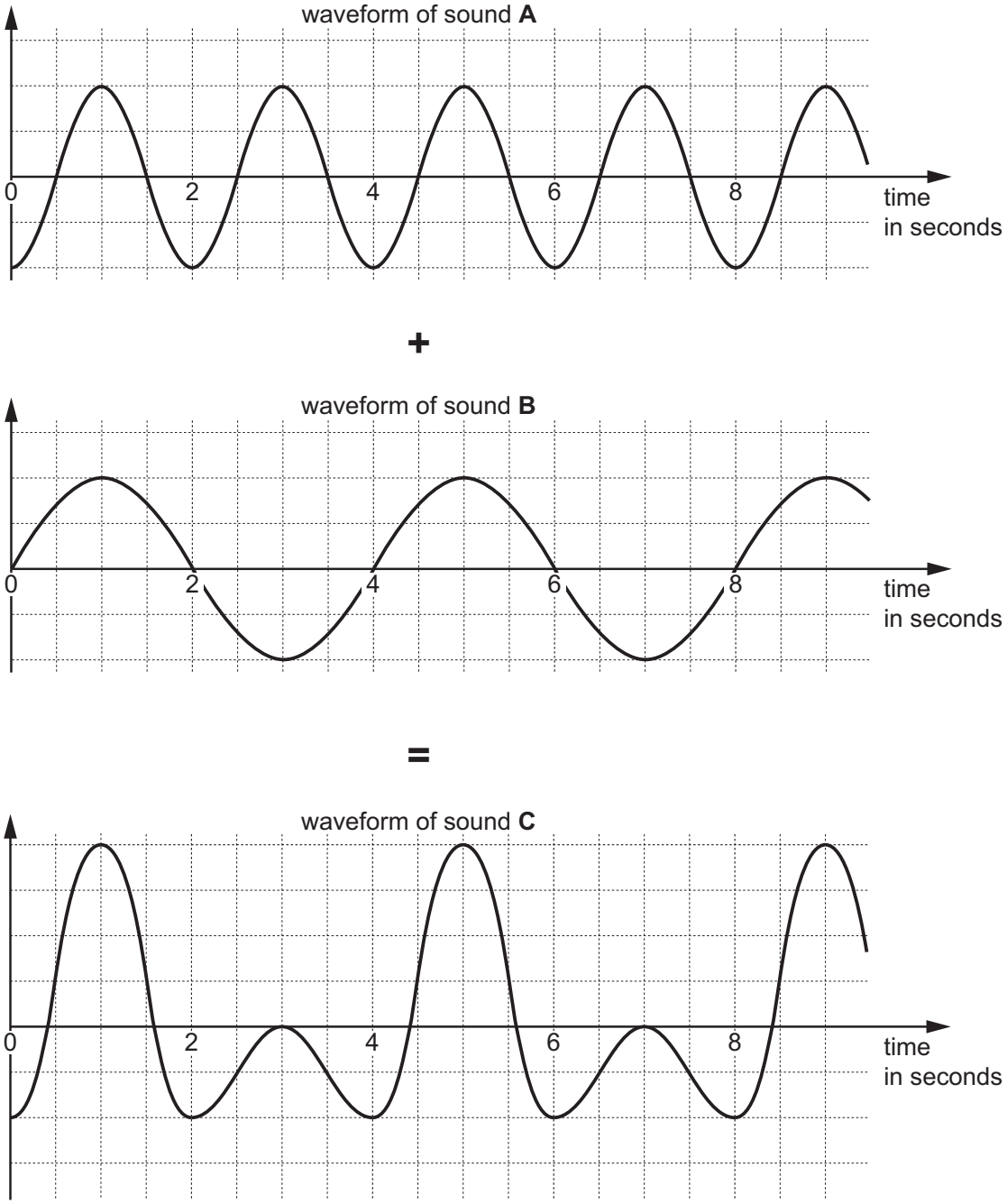
(b) The waveform for the sound shows several waves.



How many **complete** waves are there in 8 seconds of the waveform?

number of waves ..... [1]

(c) The diagrams show how sound **A** interacts with sound **B** to make sound **C**.



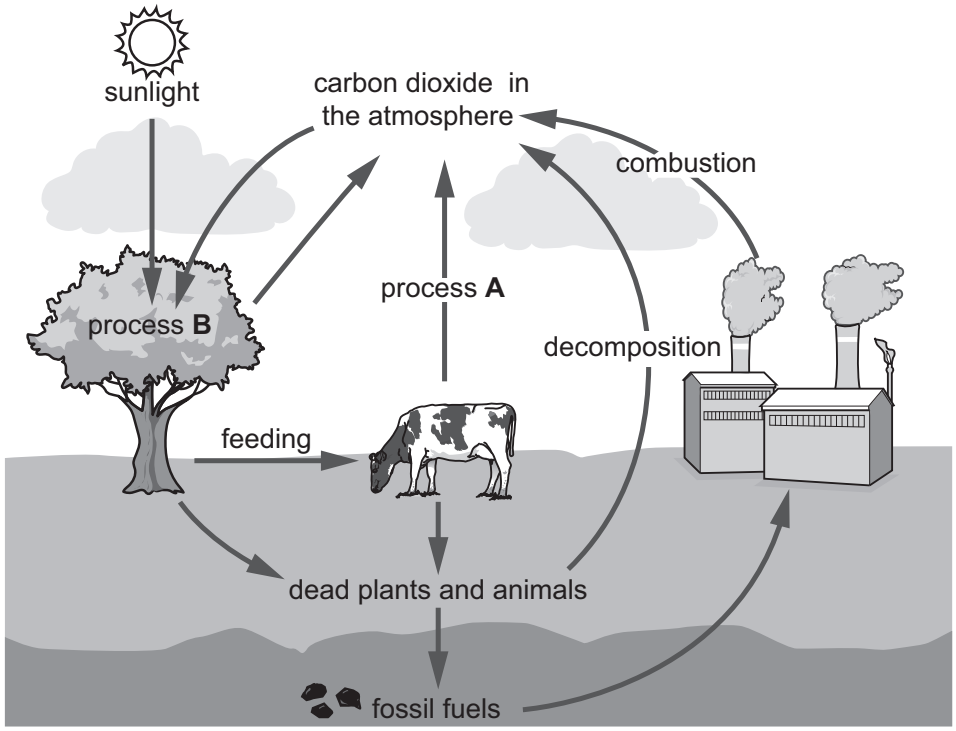
Describe how the waveform of sound **A** and waveform of sound **B** interact at:

time = 1 second .....

time = 3 seconds .....

[2]

5 Look at the diagram of the carbon cycle.



(a) Write down the name of process **A**.

.....

[1]

(b) Write down the name of process **B**.

.....

[1]

(c) Write down **one similarity** between combustion and decomposition.

.....

[1]

(d) Scientists believe that too much carbon dioxide in the atmosphere causes climate change.

Describe **two** possible effects of climate change.

1 .....

.....

2 .....

.....

[2]

6 Look at the data about some Group 1 elements.

element	melting point in °C	atomic radius in pm
lithium	181	145
sodium	98	180
potassium	64	220
rubidium		235

(a) Describe the trend in atomic radius as you go down Group 1.

.....

..... [1]

(b) Predict the melting point of rubidium.

The melting point of rubidium is ..... °C. [1]

(c) Sodium reacts with chlorine to make an ionic solid called sodium chloride.

Sodium chloride has a melting point of 808 °C.

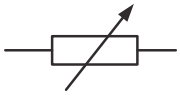
Sodium chloride has a structure.

Name this type of structure.

..... [1]

7 Write down the names of these electrical symbols.

.....



.....

[2]

8 Here are some sentences about the collision theory for the formation of the Moon.

A	The less dense rocks eventually merged together to form the Moon.
B	This caused very high temperatures and the Earth's outer layer melted.
C	A collision occurred between the Earth and a small planet.
D	The less dense rocks were ejected and cooled.
E	The dense iron from the cores of both planets merged to create the Earth.
F	The less dense rocks were captured by the Earth's gravitational field.

(a) Put these sentences in the correct order to describe the collision theory.

Two have been done for you.

		E		**F**	

[3]

(b) In 1969, astronauts went to the Moon and collected rock samples.

Describe how these Moon rock samples provide evidence to support the collision theory.

.....

..... [1]

(c) Suggest why the density of the Earth is greater than the density of the Moon.

Use ideas from the collision theory in your answer.

.....

..... [1]

9 Scientists estimate one million species of plants and animals are at risk of extinction.

(a) Which factors cause a species to become extinct?

Tick (✓) the **two** correct factors.

changes in seasons	☐
changes to the environment over time	☐
increased reproduction	☐
new diseases	☐
new food sources	☐

[2]

(b) Explain what is meant by the statement:

'An animal is at risk of extinction.'

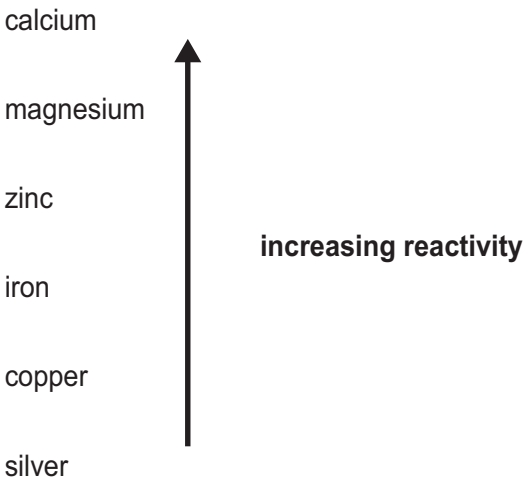
Use ideas about death rate and reproduction rate.

.....

..... [1]

10 Look at the list of metals in order of reactivity.

The most reactive metal is at the top.



A piece of copper is dipped into silver nitrate solution.

Silver is made.

A blue solution of copper nitrate is also made.

(a) What is the name of this **type** of reaction?

Circle the correct answer.

crystallisation **decomposition** **displacement**

filtration **neutralisation**

[1]

(b) Write the word equation for this reaction.

.....

[1]

(c) Look at the list of metals and solutions.

Tick (✓) to show if the metal reacts with the solution.

copper + iron nitrate	☐
magnesium + zinc nitrate	☐
silver + magnesium nitrate	☐
iron + zinc nitrate	☐

Explain your answer.

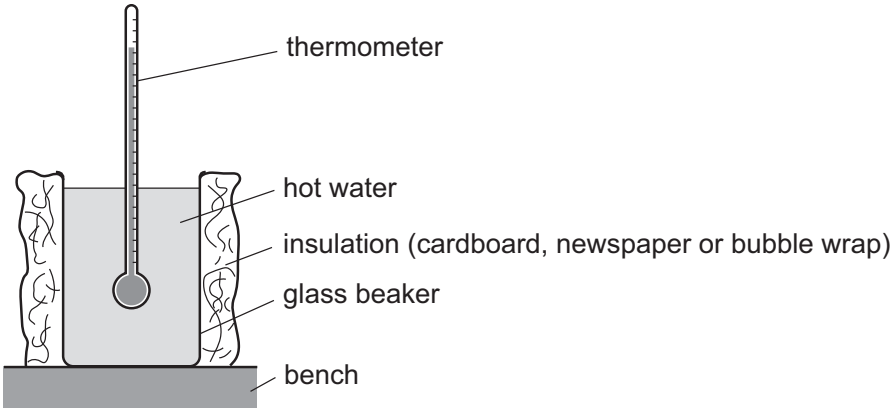
.....

.....

..... [2]

11 Lily investigates which type of insulation is best at reducing the transfer of thermal energy from hot water.

Look at the diagram of Lily's experiment.



Look at her results.

cardboard		**newspaper**		**bubble wrap**	
time in seconds	temperature	time in seconds	temperature	time in seconds	temperature
0	83	0	85	0	85
60	67	60	81	60	81
120	75	120	79	120	79
180	71	180	76	180	77
240	68	240	72	240	75
300	65	300	68	300	73

(a) The unit of temperature is missing from the tables.

Write down the unit of temperature.

..... [1]

(b) Calculate the decrease in temperature in the 300 seconds for each beaker.

cardboard .....

newspaper .....

bubble wrap .....

[1]

(c) Before the investigation, Lily predicts,

'Bubble wrap is the best insulator.'

Is her prediction correct? .....

Explain your answer.

.....

[1]

(d) In one of Lily's results tables, there is an anomalous result.

Circle the anomalous result in the table.

Give a reason for your answer.

.....

..... [2]

(e) Lily improves her investigation.

Suggest **two** improvements Lily makes to her investigation.

1 .....

.....

2 .....

.....

[2]

12 Mike investigates the reaction between magnesium and dilute hydrochloric acid.

Look at part of the equipment he uses.

(a) Write down the name of the equipment Mike uses to **collect** the gas and **measure** the volume of the gas.

.....

[1]

(b) Mike measures the volume of gas made every 30 seconds until the reaction stops.

Describe how Mike makes his results more reliable.

.....

.....

[1]

(c) Mike writes a risk assessment for his investigation.

Write down **one** safety risk and describe how Mike reduces this risk.

safety risk .....

how Mike reduces this risk .....

.....

[2]

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The Periodic Table of Elements

Group																	
1	2											3	4	5	6	7	8
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
11 Na sodium 23	12 Mg magnesium 24											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium –	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium –	85 At astatine –	86 Rn radon –
87 Fr francium –	88 Ra radium –	89–103 actinoids	104 Rf rutherfordium –	105 Db dubnium –	106 Sg seaborgium –	107 Bh bohrium –	108 Hs hassium –	109 Mt meitnerium –	110 Ds darmstadtium –	111 Rg roentgenium –	112 Cn copernicium –	113 Nh nihonium –	114 Fl flerovium –	115 Mc moscovium –	116 Lv livermorium –	117 Ts tennessine –	118 Og oganesson –

Key

atomic number
atomic symbol
name
relative atomic mass

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium –	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	89 Ac actinium –	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium –	94 Pu plutonium –	95 Am americium –	96 Cm curium –	97 Bk berkelium –	98 Cf californium –	99 Es einsteinium –	100 Fm fermium –	101 Md mendelevium –	102 No nobelium –	103 Lr lawrencium –