



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

COMBINED SCIENCE

0653/11

Paper 1 Multiple Choice

May/June 2011

45 minutes

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

* 9 2 5 5 0 1 9 2 0 8 *

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.

Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

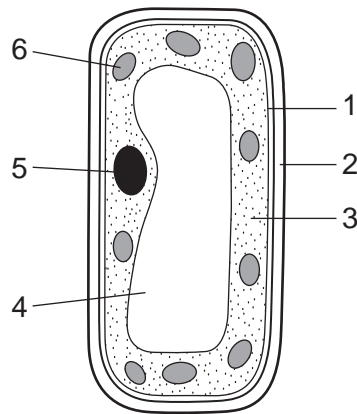
A copy of the Periodic Table is printed on page 16.

This document consists of **15** printed pages and **1** blank page.



2

1 The diagram shows a palisade cell.



Which parts are found in plant cells and **not** in animal cells?

	1	2	3	4	5	6
A	✓	x	✓	✓	x	x
B	✓	x	✓	x	✓	x
C	x	✓	x	✓	x	✓
D	x	✓	x	x	✓	✓

key

✓ = found in plant cells only

x = not found in plant cells only

2 Which list shows substances each of which can diffuse into and out of cells?

- A** amino acids, glucose and oxygen
- B** carbon dioxide, cellulose and glucose
- C** carbon dioxide, oxygen and starch
- D** carbon monoxide, oxygen and protein

3 Where does most of the water enter a plant?

- A** guard cells
- B** mesophyll cells
- C** root hair cells
- D** xylem vessels

4 Which breakdown processes occur inside cells, and which occur outside cells?

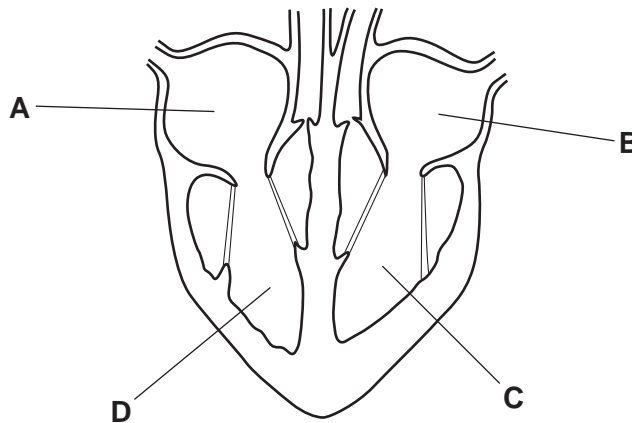
	large molecules to small molecules for absorption	breakdown of glucose to release energy
A	inside	inside
B	inside	outside
C	outside	inside
D	outside	outside

5 Which health problems may result from smoking cigarettes?

	bronchitis	emphysema	lung cancer	
A	✓	✓	✓	key ✓ = yes x = no
B	✓	x	x	
C	x	✓	✓	
D	x	✓	x	

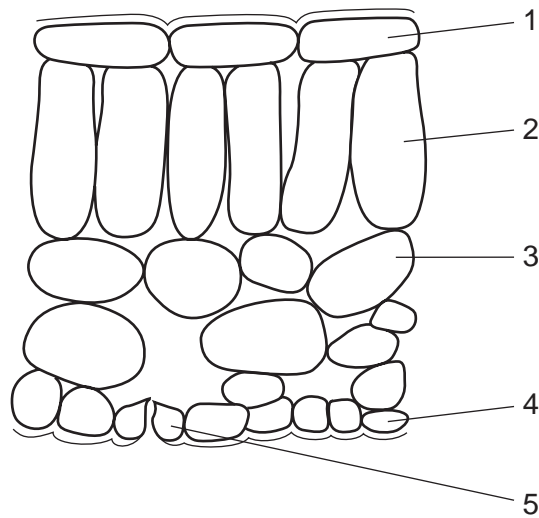
6 The diagram shows the human heart in section.

Which chamber of the heart pumps blood the greatest distance?



4

- 7 The diagram shows the arrangement of cells in a vertical section of a leaf of a green plant. The cell contents are shown.



In which cells is light energy turned into chemical energy?

- A** 1, 2 and 4 **B** 1, 3 and 4 **C** 2, 3 and 5 **D** 2, 4 and 5
- 8 The statements describe events that occur when glucose is absorbed from the alimentary canal.
- 1 Blood sugar level falls.
 - 2 Blood sugar level rises.
 - 3 Insulin is released.
 - 4 Liver removes glucose from the blood.

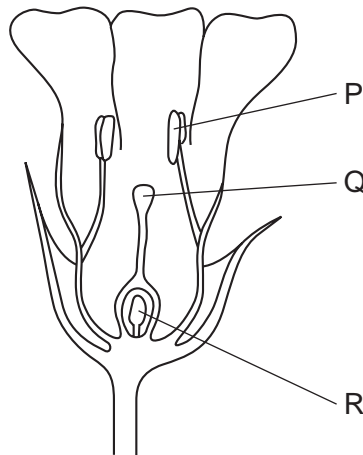
Which is the correct order of events?

- A** 2 → 3 → 4 → 1
B 2 → 4 → 3 → 1
C 3 → 2 → 4 → 1
D 4 → 1 → 3 → 2
- 9 What does the intra-uterine device (IUD) prevent?
- A** fertilisation of the egg
B implantation of the zygote
C release of eggs from the ovary
D sperms entering the uterus

10 Which feature **must** all members of the same clone of a plant have in common?

- A They all grow at the same rate.
- B They all grow from seeds.
- C They all have fruits of the same size.
- D They all have the same alleles.

11 The diagram shows a section through a flower.



Where are the male gametes made and where are the female gametes made?

	male gametes	female gametes
A	P	Q
B	P	R
C	Q	P
D	Q	R

12 Which type or types of variation in organisms can be inherited?

	variation caused by genes	variation caused by the environment
A	✓	✓
B	✓	x
C	x	✓
D	x	x

key

✓ = yes

x = no

- 13 Deforestation in tropical rain forests can lead to
- A decreased carbon dioxide in the air.
 - B decreased species diversity.
 - C increased number of habitats.
 - D increased oxygen in the air.

14 An atom is represented by the symbol ${}^{19}_9\text{X}$.

How many electrons, neutrons and protons are in this atom?

	electrons	neutrons	protons
A	9	9	9
B	9	10	9
C	10	10	9
D	19	9	10

15 Element X reacts with element Y to form compound XY. It also reacts with element Z to form compound XZ.

Compound XY is an electrolyte and compound XZ is a non-electrolyte.

Which row correctly shows whether elements X, Y and Z are metals or non-metals?

	metals	non-metals
A	X	Y, Z
B	X, Z	Y
C	Y	X, Z
D	Y, Z	X

16 The diagrams show four different mixtures of gases.

Which diagram represents a mixture containing **only** elements?

A

B

C

D

key

-
-
- ⊗
- ⊘
-
- ⊙

different types of atom

17 Which equation is correctly balanced and shows the correct formulae?

- A $H_2 + Cl_2 \rightarrow H_2Cl_2$
 B $H_2 + Cl_2 \rightarrow 2HCl$
 C $2H + 2Cl_2 \rightarrow H_2Cl_2$
 D $2H + Cl_2 \rightarrow 2HCl_2$

18 The position in the Periodic Table of an element Q is shown.

Which description of Q is correct?

- A It is green and has diatomic molecules.
 B It is soft and a good electrical conductor.
 C It is very dense and has a high melting point.
 D It reacts violently with cold water.
- 19 A new alloy is resistant to corrosion. It costs about the same as aluminium but it is slightly poisonous.

Its density compared with stainless steel and aluminium is shown.

	aluminium	new alloy	stainless steel
density/g/cm ³	2.7	2.8	7.9

What could this new alloy be used to make?

- A aircraft frames
 B cutlery
 C electrical insulators
 D food containers

20 Carbon monoxide gas is present in car exhausts.

Why is this gas a pollutant?

- A It causes acid rain.
- B It causes asthma.
- C It damages buildings.
- D It is poisonous.

21 Metal X reacts vigorously with dilute hydrochloric acid.

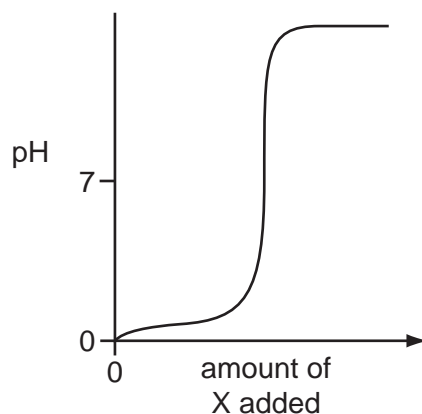
Salts of metal X give a red colour in a flame test.

What is X?

- A calcium
- B copper
- C potassium
- D sodium

22 Substance X is added to dilute sulfuric acid until reaction is complete.

The graph shows how the pH changes during the reaction.



Which type of substance is X?

- A base
- B catalyst
- C indicator
- D salt

23 Which chemical equation represents a thermal decomposition reaction?

- A $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
 B $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
 C $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$
 D $\text{MgCO}_3 \rightarrow \text{MgO} + \text{CO}_2$

24 Element X is non-metallic.

It is used in the purification of water.

It is made by electrolysis of one of its salts.

At which electrode is it formed and what is its colour?

	electrode	colour
A	anode	red
B	anode	yellow-green
C	cathode	red
D	cathode	yellow-green

25 Many industrial reactions use a catalyst.

What are the advantages of using a catalyst?

	they are not used up in the reaction	they increase speed of the reaction	they increase the amount of product
A	✓	✓	x
B	✓	x	x
C	x	✓	✓
D	x	✓	x

key

✓ = true

x = not true

26 Kerosene is a hydrocarbon fuel obtained from crude oil.

Which statement is correct?

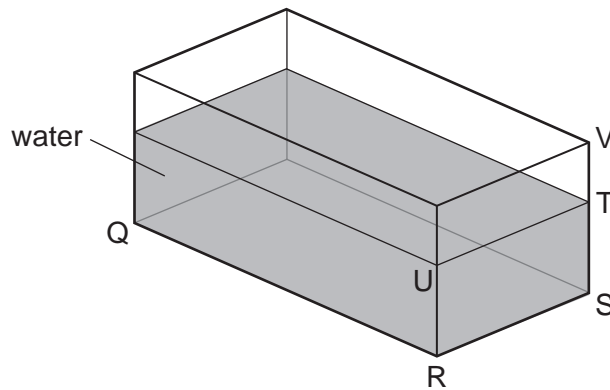
- A Kerosene burns to form carbon dioxide and water.
 B Kerosene contains the elements carbon, hydrogen and oxygen.
 C Kerosene is used as a fuel for cars.
 D The combustion of kerosene is an endothermic reaction.

27 Plastics are used as substitutes for natural materials.

Which statement about the manufacture of plastics is correct?

- A Plastics are made by breaking long-chain molecules into shorter chain ones.
- B Plastics are made by joining polymers together.
- C Plastics are made by fractional distillation of crude oil (petroleum).
- D Plastics are made by joining short-chain molecules together.

28 A glass tank contains some water.



The length QR and the width RS of the tank are known.

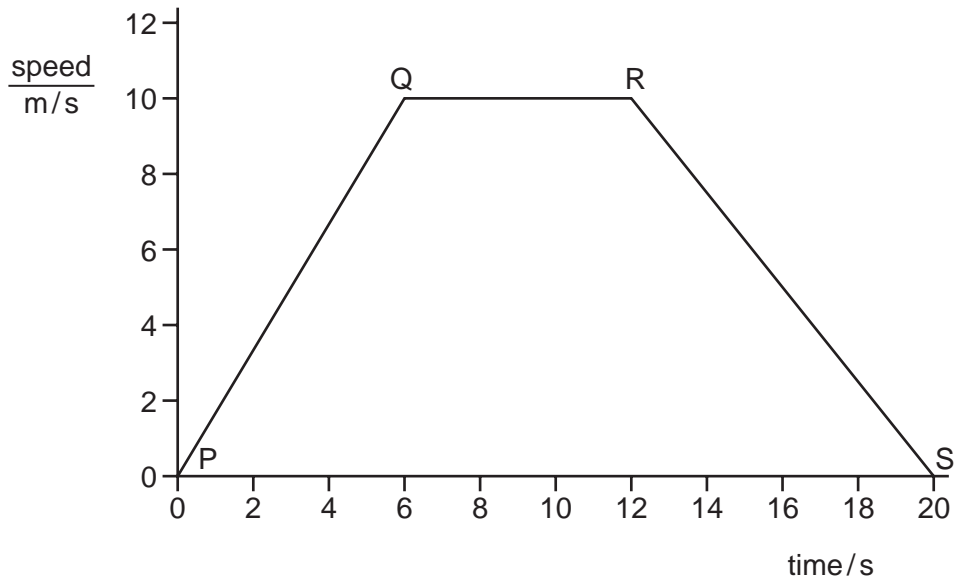
What other distance needs to be known in order to be able to calculate the volume of the water?

- A ST
- B SV
- C TU
- D TV

29 Which is the unit for force and which is the unit for weight?

	force	weight
A	kg	kg
B	kg	N
C	N	kg
D	N	N

30 The graph shows how the speed of a car changes with time.



Between which points on the graph is the acceleration zero?

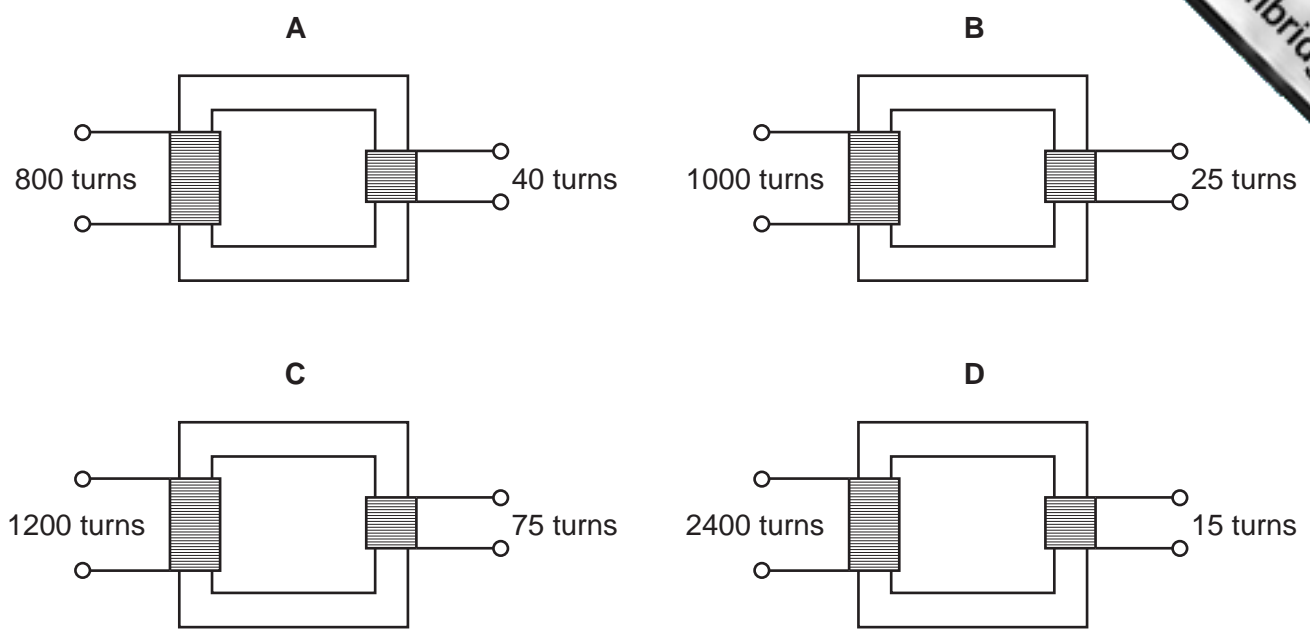
- A** PQ only **B** QR only **C** RS only **D** PQ and RS

31 A car takes 30 minutes to travel a distance of 60 km.

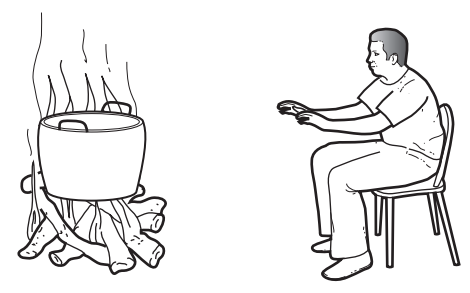
What is the average speed of the car?

- A** 2.0 km/hour
B 30 km/hour
C 120 km/hour
D 1800 km/hour

32 Which transformer would change a 240V a.c. input into a 15V a.c. output?



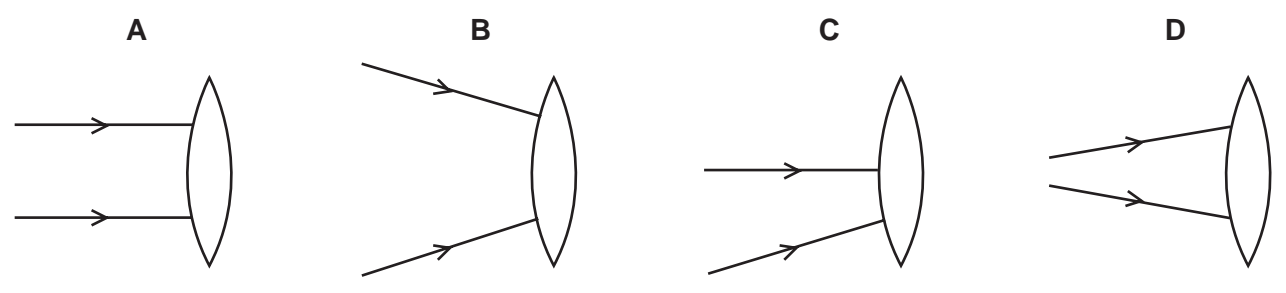
33 A man warms himself by a fire.



Which method of heat transfer supplies the **most** heat energy to him?

- A conduction through the air
- B convection by moving air
- C evaporation by moving water vapour
- D infra-red radiation

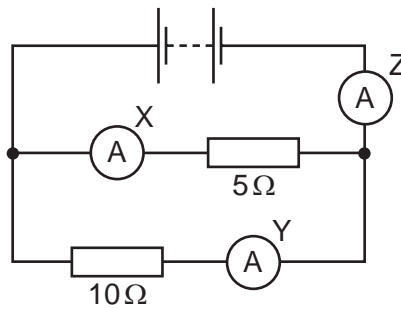
34 In which diagram will the two light rays shown both pass through the principal focus (focal point) of the lens after passing through the lens?



35 Which row shows the input energy and the output energy for a microphone?

	input energy	output energy
A	electrical	potential
B	electrical	sound
C	sound	electrical
D	sound	potential

36 The diagram shows a circuit with three ammeters, X, Y and Z.

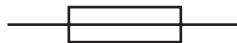


The ammeter readings are 1 A, 2 A and 3 A.

Which ammeter has which reading?

	X	Y	Z
A	1 A	2 A	3 A
B	3 A	2 A	1 A
C	2 A	3 A	1 A
D	2 A	1 A	3 A

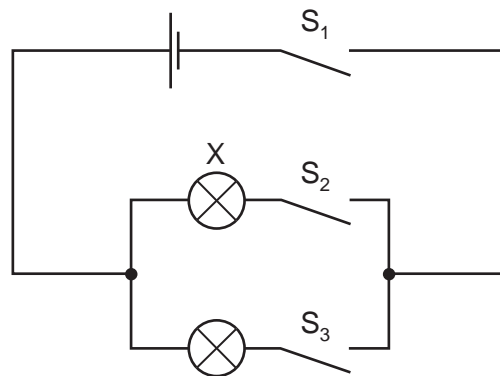
37 A circuit diagram contains the following symbol.



What does this symbol represent?

- A** a fixed resistor
- B** a fuse
- C** a relay
- D** a variable resistor

38 The diagram shows an electric circuit.



Which switches will have to be closed so that **only** bulb X will light?

- A S₁, S₂ and S₃
- B S₁ and S₂ only
- C S₁ and S₃ only
- D S₂ and S₃ only

39 A student copies a diagram of the electromagnetic spectrum but makes a mistake.

radio waves	micro-waves	infra-red waves	visible light	X-rays	ultraviolet waves	gamma rays
large wavelength				small wavelength		

Which **two** names should be interchanged so that the order is correct?

- A infra-red waves and ultraviolet waves
- B radio waves and infra-red waves
- C radio waves and visible light
- D X-rays and ultraviolet waves

40 Which type of radiation has the greatest ionising effect, and which is the most penetrating?

	greatest ionising effect	most penetrating
A	alpha-particles	alpha-particles
B	alpha-particles	gamma-rays
C	gamma-rays	alpha-particles
D	gamma-rays	gamma-rays

DATA SHEET
The Periodic Table of the Elements

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7 Li Lithium 3	9 Be Beryllium 4	1 H Hydrogen 1	11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10	23 Na Sodium 11	24 Mg Magnesium 12	27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18	39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36	85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	101 Ru Ruthenium 44	106 Pd Palladium 46	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	131 Xe Xenon 54	133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 At Astatine 85	226 Ra Radium 88	227 Ac Actinium 89	227 Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89	232 Th Thorium 90	232 Pa Protactinium 91	238 U Uranium 92	238 Np Neptunium 93	238 Pu Plutonium 94	238 Am Americium 95	238 Cm Curium 96	238 Bk Berkelium 97	238 Cf Californium 98	238 Es Einsteinium 99	238 Fm Fermium 100	238 Md Mendelevium 101	238 No Nobelium 102	238 Lr Lawrencium 103	238 Lu Lutetium 71	238 Yb Ytterbium 70	238 Er Erbium 68	238 Tm Thulium 69	238 Dy Dysprosium 66	238 Ho Holmium 67	238 Er Erbium 68	238 Ho Holmium 67	238 Dy Dysprosium 66	238 Lu Lutetium 71	238 Yb Ytterbium 70	238 Lu Lutetium 71	238 Er Erbium 68	238 Tm Thulium 69	238 Dy Dysprosium 66	238 Ho Holmium 67	238 Er Erbium 68	238 Lu Lutetium 71	238 Yb Ytterbium 70	238 Lu Lutetium 71	238 Er Erbium 68	238 Tm Thulium 69	238 Dy Dysprosium 66	238 Ho Holmium 67	238 Er Erbium 68	238 Lu Lutetium 71	238 Yb Ytterbium 70	238 Lu Lutetium 71	238 Er Erbium 68	238 Tm Thulium 69	238 Dy Dysprosium 66	238 Ho Holmium 67	238 Er Erbium 68	238 Lu Lutetium 71	238 Yb Ytterbium 70	238 Lu Lutetium 71	238 Er Erbium 68	238 Tm Thulium 69	238 Dy Dysprosium 66	238 Ho Holmium 67	238 Er Erbium 68	238 Lu Lutetium 71	238 Yb Ytterbium 70	238 Lu Lutetium 71	238 Er Erbium 68	238 Tm Thulium 69	238 Dy Dysprosium 66	238 Ho Holmium 67	238 Er Erbium 68	238 Lu Lutetium 71	238 Yb Ytterbium 70	238 Lu Lutetium 71	238 Er Erbium 68	238 Tm Thulium 69	238 Dy Dysprosium 66	238 Ho Holmium 67	238 Er Erbium 68	238 Lu Lutetium 71	238 Yb Ytterbium 70	238 Lu Lutetium 71	238 Er Erbium 68	238 Tm Thulium 69	238 Dy Dysprosium 66	238 Ho Holmium 67	238 Er Erbium 68	238 Lu Lutetium 71	238 Yb Ytterbium 70	238 Lu Lutetium 71	238 Er Erbium 68	238 Tm Thulium 69	238 Dy Dysprosium 66	238 Ho Holmium 67	238 Er Erbium 68	238 Lu Lutetium 71	238 Yb Ytterbium 70	238 Lu Lutetium 71	238 Er Erbium 68	238 Tm Thulium 69	238 Dy Dysprosium 66	238 Ho Holmium 67	238 Er Erbium 68	238 Lu Lutetium 71	238 Yb 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Thulium 69	238 Dy Dysprosium 66	238 Ho Holmium 67	238 Er Erbium 68	238 Lu Lutetium 71	238 Yb Ytterbium 70	238 Lu Lutetium 71	238 Er Erbium 68	238 Tm Thulium 69	238 Dy Dysprosium 66	238 Ho Holmium 67	238 Er Erbium 68	238 Lu Lutetium 71	238 Yb Ytterbium 70	238 Lu Lutetium 71	238 Er Erbium 68	238 Tm Thulium 69	238 Dy Dysprosium 66	238 Ho Holmium 67	238 Er Erbium 68	238 Lu Lutetium 71	238 Yb Ytterbium 70	238 Lu Lutetium 71	238 Er Erbium 68	238 Tm Thulium 69	238 Dy Dysprosium 66	238 Ho Holmium 67	238 Er Erbium 68	238 Lu Lutetium 71	238 Yb Ytterbium 70	238 Lu Lutetium 71	238 Er Erbium 68	238 Tm Thulium 69	238 Dy Dysprosium 66	238 Ho Holmium 67	238 Er Erbium 68	238 Lu Lutetium 71	238 Yb Ytterbium 70	238 Lu Lutetium 71	238 Er Erbium 68	238 Tm Thulium 69	238 Dy Dysprosium 66	238 Ho Holmium 67	238 Er Erbium 68	238 Lu Lutetium 71	238 Yb Ytterbium 70	238 Lu Lutetium 71	238 Er Erbium 68	238 Tm Thulium 69	238 Dy Dysprosium 66	238 Ho Holmium 67	238 Er Erbium 68	238 Lu Lutetium 71	238 Yb Ytterbium 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Erbium 68	238 Lu Lutetium 71	238 Yb Ytterbium 70	238 Lu Lutetium 71	238 Er Erbium 68	238 Tm Thulium 69	238 Dy Dysprosium 66	238 Ho Holmium 67	238 Er Erbium 68	238 Lu Lutetium 71	238 Yb Ytterbium 70	238 Lu Lutetium 71	238 Er Erbium 68	238 Tm Thulium 69	238 Dy Dysprosium 66	238 Ho Holmium 67	238 Er Erbium 68	238 Lu Lutetium 71	238 Yb Ytterbium 70	238 Lu Lutetium 71	238 Er Erbium 68	238 Tm Thulium 69	238 Dy Dysprosium 66	238 Ho Holmium 67	238 Er Erbium 68	238 Lu Lutetium 71	238 Yb Ytterbium 70	238 Lu Lutetium 71	238 Er Erbium 68	238 Tm Thulium 69	238 Dy Dysprosium 66	238 Ho Holmium 67	238 Er Erbium 68	238 Lu Lutetium 71	238 Yb Ytterbium 70	238 Lu Lutetium 71	238 Er Erbium 68	238 Tm Thulium 69	238 Dy Dysprosium 66	238 Ho Holmium 67	238 Er Erbium 68	238 Lu Lutetium 71	238 Yb Ytterbium 70	238 Lu Lutetium 71	238 Er Erbium 68	238 Tm Thulium 69	238 Dy Dysprosium 66	238 Ho Holmium 67	238 Er Erbium 68	238 Lu Lutetium 71	238 Yb Ytterbium 70	238 Lu Lutetium 71	238 Er Erbium 68	238 Tm Thulium 69	238 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