



PHYSICAL SCIENCE

0652/22

Paper 2 Multiple Choice

October/November 2017

45 minutes

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

* 2 3 1 4 4 2 2 3 4 1 *

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, 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.

DO NOT WRITE IN ANY BARCODES.

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.

Electronic calculators may be used.

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

1 What is the name of the process by which gas particles move to occupy all the available space?

- A boiling
- B condensation
- C diffusion
- D evaporation

2 An atom of sodium contains 11 protons, 11 electrons and 12 neutrons.

What is the nucleon number of the atom?

- A 11 B 12 C 22 D 23

3 Which statement describes the formation of the bonds in magnesium chloride?

- A Chlorine atoms transfer electrons to magnesium atoms forming an ionic bond.
- B Magnesium atoms and chlorine atoms share a pair of electrons forming a covalent bond.
- C Magnesium atoms transfer electrons to chlorine atoms forming a covalent bond.
- D Magnesium atoms transfer electrons to chlorine atoms forming an ionic bond.

4 Which statement explains why graphite conducts electricity?

- A All of the electrons in graphite are free to move through its structure.
- B Each carbon atom has three covalent bonds and one electron free to move through the structure.
- C Graphite is a metal and the outer shell electrons are free to move.
- D The electrons in the covalent bonds are free to move through the structure.

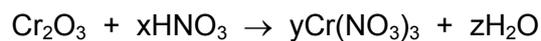
5 The formula of a gallium ion is Ga^{3+} .

The formula of a sulfate ion is SO_4^{2-} .

What is the formula of gallium sulfate?

- A GaSO_4 B Ga_2SO_3 C $\text{Ga}_2(\text{SO}_4)_3$ D $\text{Ga}_3(\text{SO}_4)_2$

- 6 Chromium(III) oxide reacts with dilute nitric acid to give chromium(III) nitrate and water.



Which values of x, y and z balance the equation?

	x	y	z
A	3	1	3
B	3	2	6
C	6	2	3
D	6	2	6

- 7 Which compound has the largest relative molecular mass, M_r ?

A CO_2 **B** NO_2 **C** SiO_2 **D** SO_2

- 8 The diagram shows wood burning in air.

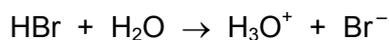


Which two words describe what happens to the wood and the type of reaction taking place?

	wood is	type of reaction
A	oxidised	endothermic
B	oxidised	exothermic
C	reduced	endothermic
D	reduced	exothermic

- 9 Hydrogen bromide gas reacts with water to produce an acidic solution.

The equation for the reaction is



Which statement describes what happens during the reaction?

- A** Bromine accepts an electron from the water.
B Hydrogen bromide accepts a proton from the water.
C Hydrogen bromide donates a proton to the water.
D Hydrogen bromide loses an electron to the water.
- 10 Four methods of preparing salts are shown.
- 1 adding an excess of an insoluble carbonate to a dilute acid and removing the excess by filtration
 - 2 adding an excess of an insoluble metal oxide to a dilute acid and removing the excess by filtration
 - 3 precipitation
 - 4 titration using an acid and an alkali

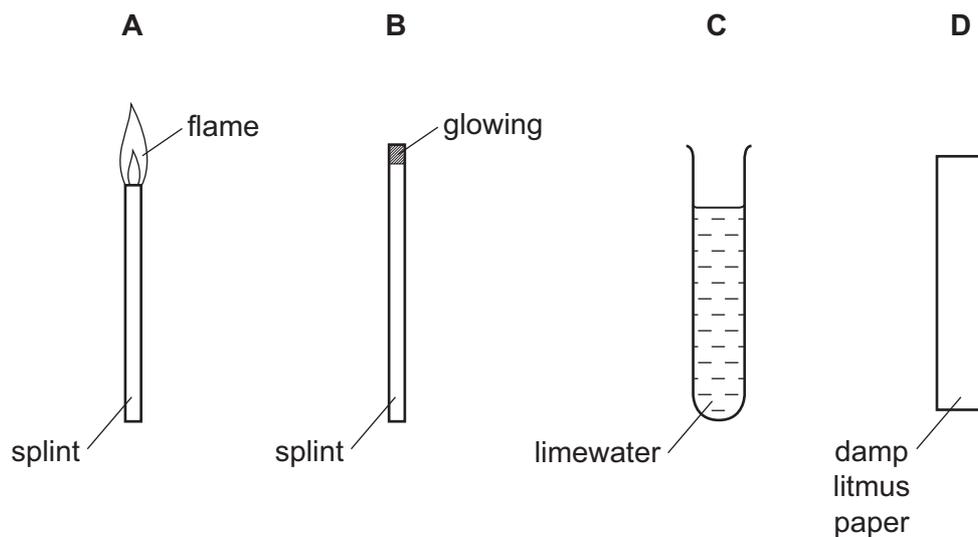
The solubility of some lead compounds is shown.

compound	solubility
lead carbonate	insoluble
lead hydroxide	insoluble
lead oxide	insoluble
lead nitrate	soluble
lead sulfate	insoluble

Which methods could be used to make lead nitrate?

- A** 1 and 2 **B** 1 and 4 **C** 3 only **D** 4 only

11 Which test is used to show that a gas is ammonia?



12 An element Z has the electronic structure 2,8,5.

In which group in the Periodic Table is Z placed?

A 2

B 3

C 5

D 8

13 The elements in Group VI of the Periodic Table show the same trends as the elements in Group VII.

Which row describes the trend in melting point and density of the Group VI elements as the group is descended?

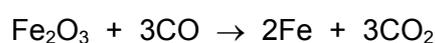
	melting point	density
A	decrease	decrease
B	decrease	increase
C	increase	decrease
D	increase	increase

14 Bauxite and haematite are important ores.

Which metals do the ores contain?

	bauxite	haematite
A	Al	Cu
B	Al	Fe
C	Cu	Al
D	Fe	Cu

15 One of the reactions that occurs in a blast furnace is shown.



Which substance is the reducing agent?

- A** CO **B** CO₂ **C** Fe **D** Fe₂O₃

16 Which property of a metal makes it **not** suitable for aircraft bodies?

- A** high density
B high malleability
C high strength
D low reactivity

17 Nitrogen oxides are produced in a car engine.

Which process describes how the nitrogen oxides are catalytically removed in the exhaust fumes?

- A** combustion
B oxidation
C reduction
D thermal decomposition

18 Which row describes compounds in the same homologous series?

	chemical properties	functional group
A	different	different
B	different	the same
C	similar	different
D	similar	the same

19 When decane is heated over a catalyst, it breaks down to make octane and ethene.

Which name is given to this process?

- A** cracking
- B** distilling
- C** polymerising
- D** reducing

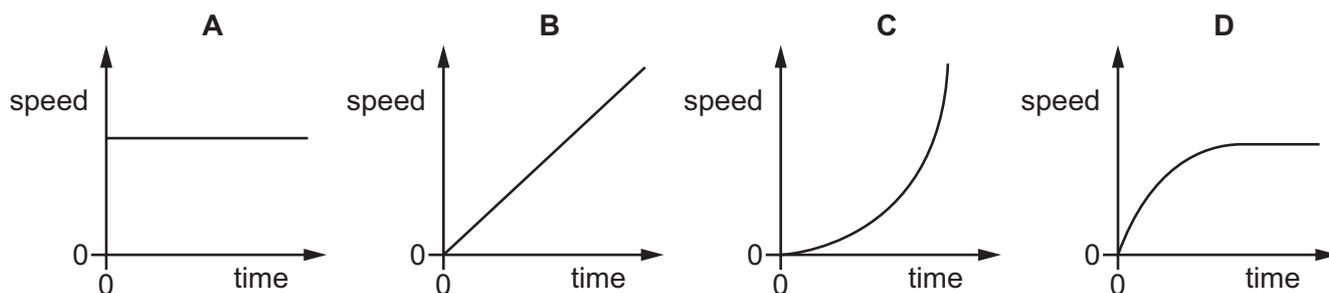
20 Limonene is a colourless, unsaturated hydrocarbon found in lemons.

Which row describes the colour change when a few drops of limonene are shaken with bromine?

	colour of bromine at the start of experiment	colour of bromine after mixing with limonene
A	colourless	colourless
B	colourless	orange
C	orange	colourless
D	orange	orange

21 An object falls vertically in air, from rest, through a large distance. Air resistance acts on the object.

Which speed-time graph represents the motion of the object?



22 A student does work by pulling a case across a horizontal floor.

She now pulls a second case along the same floor.

Which row indicates that the student is now doing twice as much work?

	force used to pull case	distance the case is pulled
A	is doubled	is doubled
B	is doubled	is halved
C	stays the same	is doubled
D	stays the same	is halved

23 A metal container has a mass of 200 kg.

The container is filled with 1.00 m^3 of a liquid. The total mass is now 1000 kg.

What is the density of the liquid?

A 0.00125 kg/m^3

B 0.00500 kg/m^3

C 800 kg/m^3

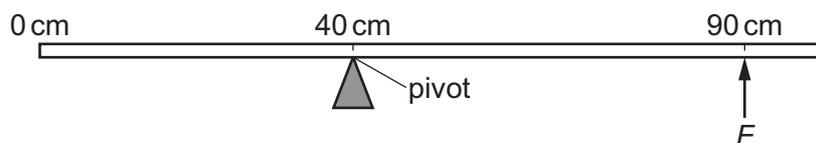
D 1000 kg/m^3

24 Which row correctly describes iron and lead?

	iron	lead
A	ferrous	ferrous
B	ferrous	non-ferrous
C	non-ferrous	ferrous
D	non-ferrous	non-ferrous

25 A uniform metre rule of weight 2.0 N is pivoted at the 40 cm mark.

The rule is held in equilibrium by force F acting at the 90 cm mark.



What is F ?

- A 0.22 N B 0.40 N C 0.89 N D 1.6 N

26 An object of mass m moving with velocity v has kinetic energy E .

What is the kinetic energy of an object of mass $4.0m$ moving with velocity $2.0v$?

- A $2.0E$ B $4.0E$ C $8.0E$ D $16.0E$

27 A power station uses nuclear fission to obtain energy.

In this process, nuclear energy is **first** transferred to

- A chemical energy.
 B electrical energy.
 C gravitational energy.
 D thermal (heat) energy.

28 A student has two mercury-in-glass thermometers P and Q. They contain equal volumes of mercury.

Thermometer Q has a longer stem and a wider capillary bore than thermometer P.

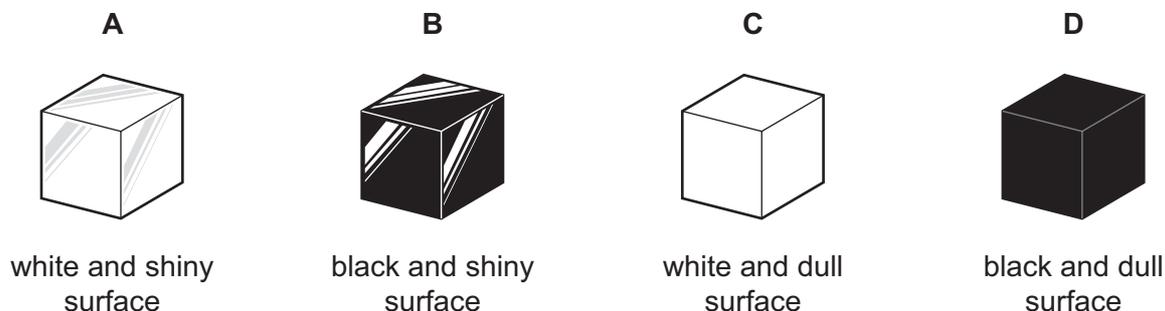
Which row compares the range and the sensitivity of thermometer Q with those of thermometer P?

	range of Q compared with P	sensitivity of Q compared with P
A	greater	greater
B	greater	smaller
C	smaller	greater
D	smaller	smaller

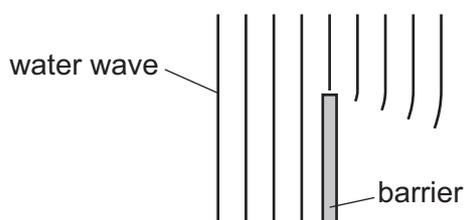
- 29 The diagram shows four identical copper blocks. The blocks have been painted so that their surfaces are different.

All four blocks are heated to the same temperature, in the same room.

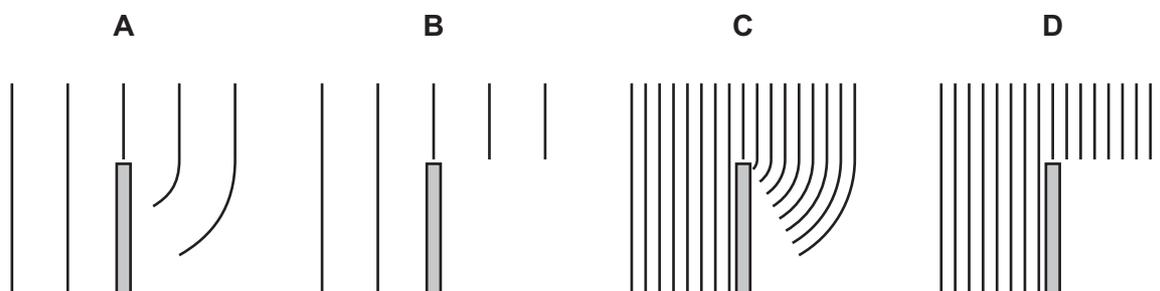
Which block cools the most slowly?



- 30 The diagram shows a water wave being diffracted at the edge of a barrier.



Which diagram shows water waves of half the frequency being diffracted at the edge of the same barrier?

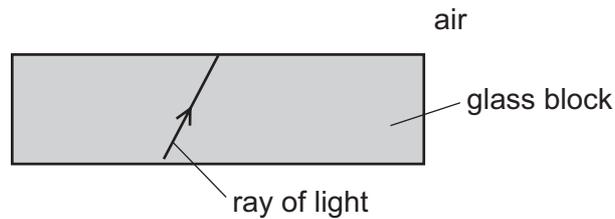


- 31 The table gives information about the approximate speed and range of wavelengths of waves.

Which row describes monochromatic microwaves in a vacuum?

	approximate speed	wavelengths
A	300 m/s	all the same
B	300 m/s	a range of different values
C	300 000 km/s	all the same
D	300 000 km/s	a range of different values

- 32 A ray of light in a glass block strikes the edge of the block. The angle of incidence is much smaller than the critical angle.

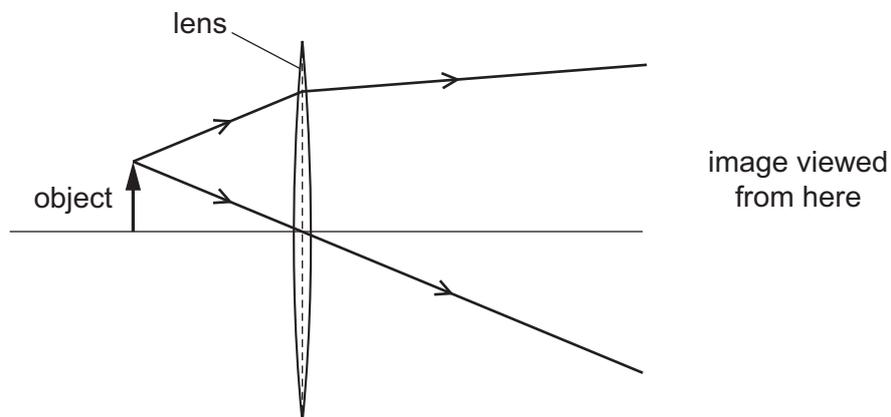


What happens to this ray?

- A It is completely reflected.
 - B It is completely refracted.
 - C It is partially reflected and partially refracted.
 - D It is refracted at an angle of refraction of 90° .
- 33 The diagram shows the paths of two rays from the top of an object.

The rays pass through a thin converging lens.

The image produced is viewed from the position shown.



What type of image is seen?

- A a real image that is larger than the object
- B a real image that is smaller than the object
- C a virtual image that is larger than the object
- D a virtual image that is smaller than the object

- 34 Three objects, P, Q and R, vibrate with the frequencies shown and produce longitudinal waves in the air.

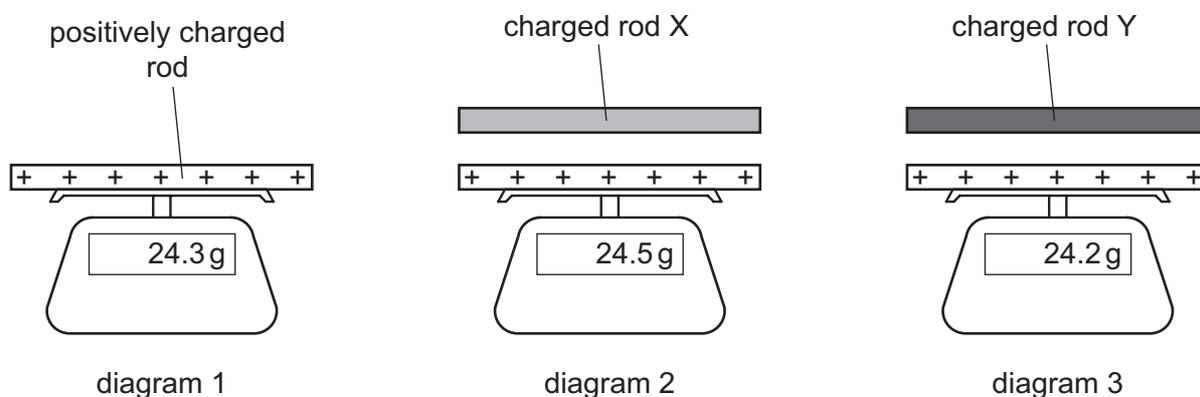
object	frequency/Hz
P	25
Q	1000
R	15000

Which of these waves can be heard by a human with normal hearing?

- A** P, Q and R
B P and Q only
C P and R only
D Q and R only
- 35 A positively charged insulating rod is placed on a balance. The reading on the balance is shown in diagram 1.

Two charged rods X and Y are now brought close to the positively charged rod in turn.

Diagram 2 and diagram 3 show the new reading on the balance in each case.



Which row gives the charges on rod X and rod Y?

	rod X	rod Y
A	negative	negative
B	negative	positive
C	positive	negative
D	positive	positive

- 36 A charger for a mobile phone (cell phone) supplies 50 mA of current to the phone battery for 30 minutes.

How much charge passes through the battery?

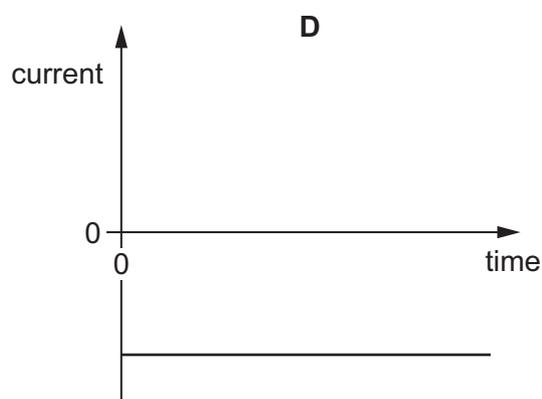
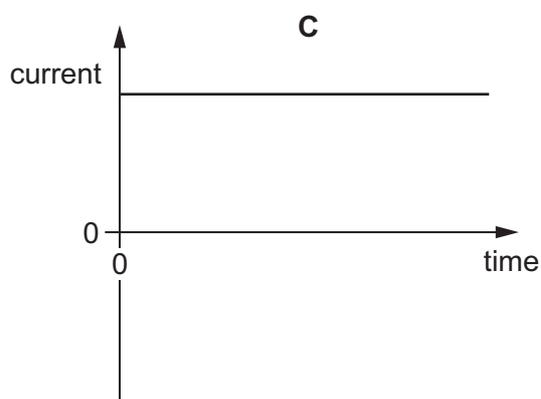
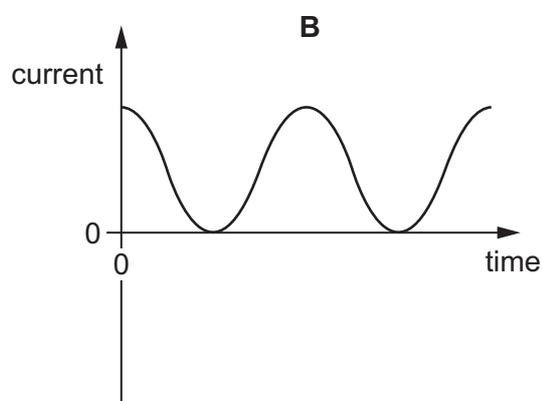
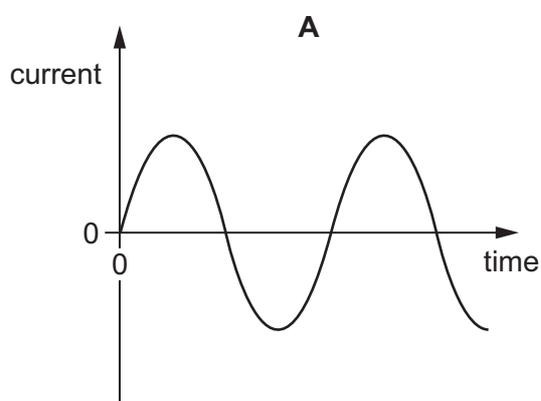
- A 1.5 C B 90 C C 1500 C D 90000 C

- 37 There is a current of 3.0 A in a resistor. The energy converted in the resistor is 540 J in 60 s.

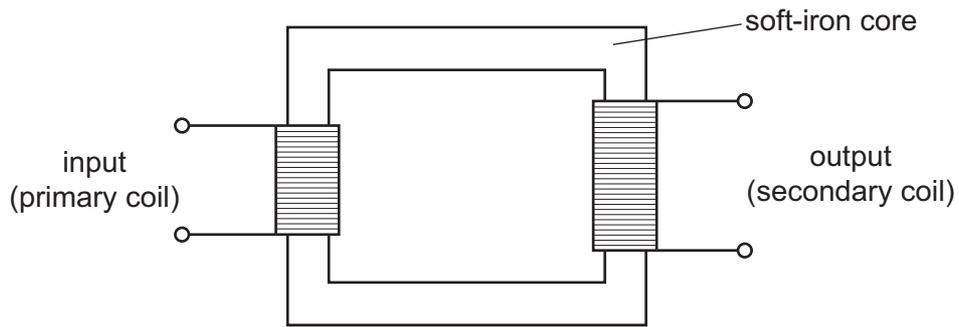
What is the potential difference across the resistor?

- A 1.0 V B 3.0 V C 9.0 V D 180 V

- 38 Which graph represents an alternating current?



39 The diagram represents a transformer.



Why is there an induced electromotive force (e.m.f.) across the secondary coil?

- A There is a changing magnetic field in the soft-iron core.
- B There is a direct current in the primary coil.
- C There is a direct current in the soft-iron core.
- D There is a steady magnetic field in the soft-iron core.

40 The emissions from a radioactive source pass through a sheet of lead, 10 mm thick.

Which row describes other properties of these emissions?

	ionising effect	deflection in an electric field
A	strong	from positive to negative
B	strong	no deflection
C	weak	from positive to negative
D	weak	no deflection

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cie.org.uk after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

The Periodic Table of Elements

Group																																																																																																																																																																																																																																																																																																																																																																																							
I	II	III						IV	V	VI	VII	VIII																																																																																																																																																																																																																																																																																																																																																																											
3 Li lithium 7	4 Be beryllium 9	<div style="border: 1px solid black; padding: 5px; text-align: center;"> Key atomic number atomic symbol name relative atomic mass </div>										2 He helium 4																																																																																																																																																																																																																																																																																																																																																																											
11 Na sodium 23	12 Mg magnesium 24											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20																																																																																																																																																																																																																																																																																																																																																																						
19 K potassium 39	20 Ca calcium 40	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	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84																																																																																																																																																																																																																																																																																																																																																																												
37 Rb rubidium 85	38 Sr strontium 88	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	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	83 Bi bismuth 209	84 Po polonium —	85 At astatine —	86 Rn radon —																																																																																																																																																																																																																																																																																																																																																																	
55 Cs caesium 133	56 Ba barium 137	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	83 Bi bismuth 209	84 Po polonium —	85 At astatine —	86 Rn radon —																																																																																																																																																																																																																																																																																																																																																									
87 Fr francium —	88 Ra radium —	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 —	111 Rg roentgenium —	112 Cn copernicium —	113 Nh nihonium —	114 Fl flerovium —	115 Mc moscovium —	116 Lv livermorium —	117 Ts tennessine —	118 Og oganesson —	119 Uu unbinilium —	120 Uub unbinilium —	121 Uut unbinilium —	122 Uuq unbinilium —	123 Uub unbinilium —	124 Uut unbinilium —	125 Uuq unbinilium —	126 Uub unbinilium —	127 Uut unbinilium —	128 Uuq unbinilium —	129 Uub unbinilium —	130 Uut unbinilium —	131 Uuq unbinilium —	132 Uub unbinilium —	133 Uut unbinilium —	134 Uuq unbinilium —	135 Uub unbinilium —	136 Uut unbinilium —	137 Uuq unbinilium —	138 Uub unbinilium —	139 Uut unbinilium —	140 Uuq unbinilium —	141 Uub unbinilium —	142 Uut unbinilium —	143 Uuq unbinilium —	144 Uub unbinilium —	145 Uut unbinilium —	146 Uuq unbinilium —	147 Uub unbinilium —	148 Uut unbinilium —	149 Uuq unbinilium —	150 Uub unbinilium —	151 Uut unbinilium —	152 Uuq unbinilium —	153 Uub unbinilium —	154 Uut unbinilium —	155 Uuq unbinilium —	156 Uub unbinilium —	157 Uut unbinilium —	158 Uuq unbinilium —	159 Uub unbinilium —	160 Uut unbinilium —	161 Uuq unbinilium —	162 Uub unbinilium —	163 Uut unbinilium —	164 Uuq unbinilium —	165 Uub unbinilium —	166 Uut unbinilium —	167 Uuq unbinilium —	168 Uub unbinilium —	169 Uut unbinilium —	170 Uuq unbinilium —	171 Uub unbinilium —	172 Uut unbinilium —	173 Uuq unbinilium —	174 Uub unbinilium —	175 Uut unbinilium —	176 Uuq unbinilium —	177 Uub unbinilium —	178 Uut unbinilium —	179 Uuq unbinilium —	180 Uub unbinilium —	181 Uut unbinilium —	182 Uuq unbinilium —	183 Uub unbinilium —	184 Uut unbinilium —	185 Uuq unbinilium —	186 Uub unbinilium —	187 Uut unbinilium —	188 Uuq unbinilium —	189 Uub unbinilium —	190 Uut unbinilium —	191 Uuq unbinilium —	192 Uub unbinilium —	193 Uut unbinilium —	194 Uuq unbinilium —	195 Uub unbinilium —	196 Uut unbinilium —	197 Uuq unbinilium —	198 Uub unbinilium —	199 Uut unbinilium —	200 Uuq unbinilium —	201 Uub unbinilium —	202 Uut unbinilium —	203 Uuq unbinilium —	204 Uub unbinilium —	205 Uut unbinilium —	206 Uuq unbinilium —	207 Uub unbinilium —	208 Uut unbinilium —	209 Uuq unbinilium —	210 Uub unbinilium —	211 Uut unbinilium —	212 Uuq unbinilium —	213 Uub unbinilium —	214 Uut unbinilium —	215 Uuq unbinilium —	216 Uub unbinilium —	217 Uut unbinilium —	218 Uuq unbinilium —	219 Uub unbinilium —	220 Uut unbinilium —	221 Uuq unbinilium —	222 Uub unbinilium —	223 Uut unbinilium —	224 Uuq unbinilium —	225 Uub unbinilium —	226 Uut unbinilium —	227 Uuq unbinilium —	228 Uub unbinilium —	229 Uut unbinilium —	230 Uuq unbinilium —	231 Uub unbinilium —	232 Uut unbinilium —	233 Uuq unbinilium —	234 Uub unbinilium —	235 Uut unbinilium —	236 Uuq unbinilium —	237 Uub unbinilium —	238 Uut unbinilium —	239 Uuq unbinilium —	240 Uub unbinilium —	241 Uut unbinilium —	242 Uuq unbinilium —	243 Uub unbinilium —	244 Uut unbinilium —	245 Uuq unbinilium —	246 Uub unbinilium —	247 Uut unbinilium —	248 Uuq unbinilium —	249 Uub unbinilium —	250 Uut unbinilium —	251 Uuq unbinilium —	252 Uub unbinilium —	253 Uut unbinilium —	254 Uuq unbinilium —	255 Uub unbinilium —	256 Uut unbinilium —	257 Uuq unbinilium —	258 Uub unbinilium —	259 Uut unbinilium —	260 Uuq unbinilium —	261 Uub unbinilium —	262 Uut unbinilium —	263 Uuq unbinilium —	264 Uub unbinilium —	265 Uut unbinilium —	266 Uuq unbinilium —	267 Uub unbinilium —	268 Uut unbinilium —	269 Uuq unbinilium —	270 Uub unbinilium —	271 Uut unbinilium —	272 Uuq unbinilium —	273 Uub unbinilium —	274 Uut unbinilium —	275 Uuq unbinilium —	276 Uub unbinilium —	277 Uut unbinilium —	278 Uuq unbinilium —	279 Uub unbinilium —	280 Uut unbinilium —	281 Uuq unbinilium —	282 Uub unbinilium —	283 Uut unbinilium —	284 Uuq unbinilium —	285 Uub unbinilium —	286 Uut unbinilium —	287 Uuq unbinilium —	288 Uub unbinilium —	289 Uut unbinilium —	290 Uuq unbinilium —	291 Uub unbinilium —	292 Uut unbinilium —	293 Uuq unbinilium —	294 Uub unbinilium —	295 Uut unbinilium —	296 Uuq unbinilium —	297 Uub unbinilium —	298 Uut unbinilium —	299 Uuq unbinilium —	300 Uub unbinilium —	301 Uut unbinilium —	302 Uuq unbinilium —	303 Uub unbinilium —	304 Uut unbinilium —	305 Uuq unbinilium —	306 Uub unbinilium —	307 Uut unbinilium —	308 Uuq unbinilium —	309 Uub unbinilium —	310 Uut unbinilium —	311 Uuq unbinilium —	312 Uub unbinilium —	313 Uut unbinilium —	314 Uuq unbinilium —	315 Uub unbinilium —	316 Uut unbinilium —	317 Uuq unbinilium —	318 Uub unbinilium —	319 Uut unbinilium —	320 Uuq unbinilium —	321 Uub unbinilium —	322 Uut unbinilium —	323 Uuq unbinilium —	324 Uub unbinilium —	325 Uut unbinilium —	326 Uuq unbinilium —	327 Uub unbinilium —	328 Uut unbinilium —	329 Uuq unbinilium —	330 Uub unbinilium —	331 Uut unbinilium —	332 Uuq unbinilium —	333 Uub unbinilium —	334 Uut unbinilium —	335 Uuq unbinilium —	336 Uub unbinilium —	337 Uut unbinilium —	338 Uuq unbinilium —	339 Uub unbinilium —	340 Uut unbinilium —	341 Uuq unbinilium —	342 Uub unbinilium —	343 Uut unbinilium —	344 Uuq unbinilium —	345 Uub unbinilium —	346 Uut unbinilium —	347 Uuq unbinilium —	348 Uub unbinilium —	349 Uut unbinilium —	350 Uuq unbinilium —	351 Uub unbinilium —	352 Uut unbinilium —	353 Uuq unbinilium —	354 Uub unbinilium —	355 Uut unbinilium —	356 Uuq unbinilium —	357 Uub unbinilium —	358 Uut unbinilium —	359 Uuq unbinilium —	360 Uub unbinilium —	361 Uut unbinilium —	362 Uuq unbinilium —	363 Uub unbinilium —	364 Uut unbinilium —	365 Uuq unbinilium —	366 Uub unbinilium —	367 Uut unbinilium —	368 Uuq unbinilium —	369 Uub unbinilium —	370 Uut unbinilium —	371 Uuq unbinilium —	372 Uub unbinilium —	373 Uut unbinilium —	374 Uuq unbinilium —	375 Uub unbinilium —	376 Uut unbinilium —	377 Uuq unbinilium —	378 Uub unbinilium —	379 Uut unbinilium —	380 Uuq unbinilium —	381 Uub unbinilium —	382 Uut unbinilium —	383 Uuq unbinilium —	384 Uub unbinilium —	385 Uut unbinilium —	386 Uuq unbinilium —	387 Uub unbinilium —	388 Uut unbinilium —	389 Uuq unbinilium —	390 Uub unbinilium —	391 Uut unbinilium —	392 Uuq unbinilium —	393 Uub unbinilium —	394 Uut unbinilium —	395 Uuq unbinilium —	396 Uub unbinilium —	397 Uut unbinilium —	398 Uuq unbinilium —	399 Uub unbinilium —	400 Uut unbinilium —	401 Uuq unbinilium —	402 Uub unbinilium —	403 Uut unbinilium —	404 Uuq unbinilium —	405 Uub unbinilium —	406 Uut unbinilium —	407 Uuq unbinilium —	408 Uub unbinilium —	409 Uut unbinilium —	410 Uuq unbinilium —	411 Uub unbinilium —	412 Uut unbinilium —	413 Uuq unbinilium —	414 Uub unbinilium —	415 Uut unbinilium —	416 Uuq unbinilium —	417 Uub unbinilium —	418 Uut unbinilium —	419 Uuq unbinilium —	420 Uub unbinilium —	421 Uut unbinilium —	422 Uuq unbinilium —	423 Uub unbinilium —	424 Uut unbinilium —	425 Uuq unbinilium —	426 Uub unbinilium —	427 Uut unbinilium —	428 Uuq unbinilium —	429 Uub unbinilium —	430 Uut unbinilium —	431 Uuq unbinilium —	432 Uub unbinilium —	433 Uut unbinilium —	434 Uuq unbinilium —	435 Uub unbinilium —	436 Uut unbinilium —	437 Uuq unbinilium —	438 Uub unbinilium —	439 Uut unbinilium —	440 Uuq unbinilium —	441 Uub unbinilium —	442 Uut unbinilium —	443 Uuq unbinilium —	444 Uub unbinilium —	445 Uut unbinilium —	446 Uuq unbinilium —	447 Uub unbinilium —	448 Uut unbinilium —	449 Uuq unbinilium —	450 Uub unbinilium —	451 Uut unbinilium —	452 Uuq unbinilium —	453 Uub unbinilium —	454 Uut unbinilium —	455 Uuq unbinilium —	456 Uub unbinilium —	457 Uut unbinilium —	458 Uuq unbinilium —	459 Uub unbinilium —	460 Uut unbinilium —	461 Uuq unbinilium —	462 Uub unbinilium —	463 Uut unbinilium —	464 Uuq unbinilium —	465 Uub unbinilium —	466 Uut unbinilium —	467 Uuq unbinilium —	468 Uub unbinilium —</