



Cambridge IGCSE™

PHYSICAL SCIENCE

0652/12

Paper 1 Multiple Choice (Core)

October/November 2023

45 minutes

You must answer on the multiple choice answer sheet.



You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

INSTRUCTIONS

- 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 multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

This document has **16** pages. Any blank pages are indicated.

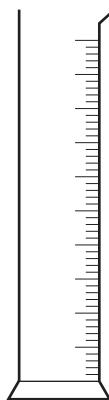
1 Some statements about particles in solids, liquids and gases are listed.

- 1 Particles in gases are closer together than particles in solids.
- 2 Particles in solids are more ordered than particles in liquids.
- 3 Particles in solids diffuse because they are in fixed positions.
- 4 Particles in liquids move slower than particles in gases.

Which statements are correct?

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

2 The diagram shows a piece of apparatus.



What is measured using this apparatus?

A mass
B temperature
C time
D volume

3 Which process is a chemical change?

A boiling water
B burning methane in air
C melting ice
D separating coloured dyes by chromatography

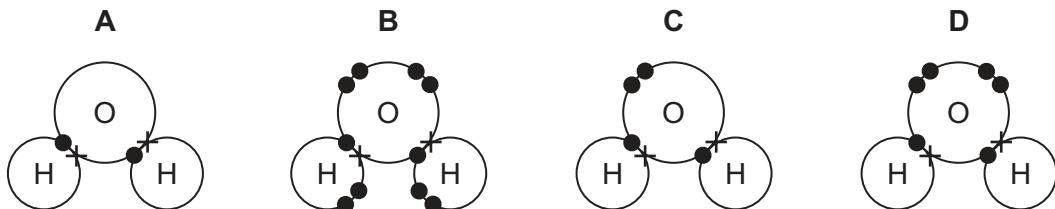
4 An isotope of sodium is represented as $^{23}_{11}\text{Na}$.

Which row represents a different isotope of sodium?

	electrons	neutrons	protons
A	11	13	11
B	12	12	12
C	13	12	13
D	23	12	23

5 Water, H_2O , is a covalent molecule made up of hydrogen and oxygen.

Which dot-and-cross diagram represents a water molecule?



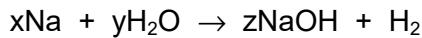
6 Three statements about diamond and graphite are listed.

- 1 They are different solid forms of the same element.
- 2 They each conduct electricity.
- 3 They have atoms that form four equally strong bonds.

Which statements are correct?

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

7 An equation for the reaction of sodium with water is shown.

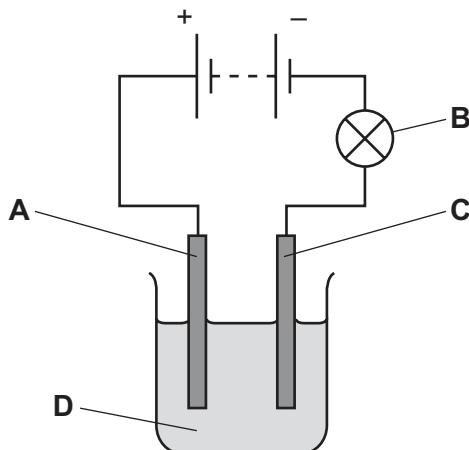


Which values of x, y and z balance the equation?

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

8 The apparatus used for electrolysis is shown.

Which label identifies the electrolyte?



9 The rate of reaction between marble chips and hydrochloric acid is investigated.

The equation is shown.

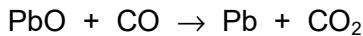


Which conditions give the fastest rate of production of carbon dioxide gas?

	concentration of hydrochloric acid	size of marble chips	hydrochloric acid temperature / °C
A	high	small	30
B	high	medium	25
C	low	large	30
D	low	small	20

10 Lead is extracted from its ore using carbon monoxide.

The equation is shown.



Which statement explains what happens to the lead atoms and carbon atoms in the reactants?

- A** Lead and carbon are oxidised.
- B** Lead and carbon are reduced.
- C** Lead is oxidised and carbon is reduced.
- D** Lead is reduced and carbon is oxidised.

11 Sulfuric acid is reacted with magnesium.

Which row identifies the products of this reaction?

	magnesium sulfate	water	hydrogen
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✓

12 Which oxide is basic?

A Cl_2O_7 **B** P_4O_{10} **C** Rb_2O **D** SO_2

13 A solution containing substance Z is tested.

The results of the tests are shown.

test	result
dilute sodium hydroxide solution added	white precipitate dissolves in excess
acidified barium nitrate solution added	white precipitate

What is Z?

A ammonium chloride
B ammonium sulfate
C zinc chloride
D zinc sulfate

14 Part of the Periodic Table is shown.

The letters are **not** the correct symbols for the elements.

A 10x10 grid with several labeled regions:

- Region V: A 2x2 square in the top-left corner.
- Region W: A 3x3 square in the top-right corner.
- Region X: A 2x1 column on the far left.
- Region Y: A 2x1 column on the far right.
- Region Z: A 2x1 column in the bottom-center.
- Unlabeled Regions: The remaining 6x6 central area and the 2x2 squares in the top and bottom corners.

Which elements are non-metals?

A V, X and Z **B** V and X only **C** W, Y and Z **D** W and Y only

15 Which row describes a transition element?

	melting point	often acts as a catalyst	conduction of electricity
A	high	no	good
B	high	yes	good
C	high	yes	poor
D	low	no	poor

16 Magnalium is a substance used to make strong, lightweight ladders. It is made from a mixture of magnesium and aluminium.

Which type of substance is magnalium?

- A** an alloy
- B** a compound
- C** an element
- D** a pure metal

17 Which row shows a correct order of reactivity of metals?

	least reactive	→		most reactive
A	copper	calcium		magnesium
B	copper	magnesium		calcium
C	iron	magnesium		zinc
D	zinc	iron		calcium

18 Gas X is a carbon-containing greenhouse gas which has no effect on limewater.

Which statement about gas X is correct?

- A** It is a gas formed during respiration.
- B** It is the main constituent of clean air.
- C** It is the main constituent of natural gas.
- D** It relights a glowing splint.

19 What are the products of the complete combustion of methane?

- A** carbon monoxide and hydrogen
- B** carbon dioxide, carbon monoxide and water
- C** carbon dioxide and water only
- D** carbon monoxide and water only

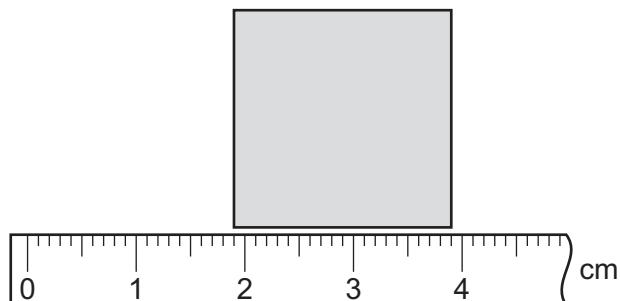
20 Liquid X has the properties shown.

- It is colourless.
- It is flammable.
- It can be made by the reaction of ethene with steam.
- The complete combustion of X produces carbon dioxide and water.

What is X?

- A** ethanol
- B** methane
- C** petrol
- D** poly(ethene)

21 The diagram shows a ruler used to measure the length of one side of a square.

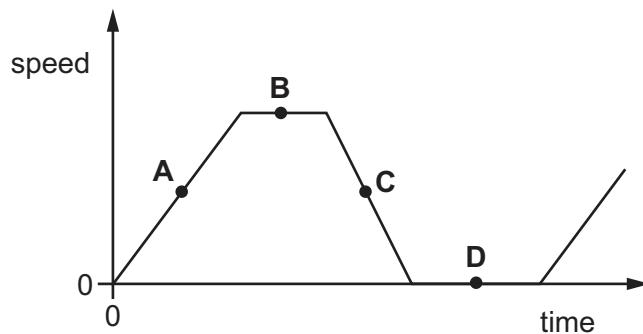


What is the length of the side?

A 1.9 cm B 2.0 cm C 2.1 cm D 3.9 cm

22 The diagram shows a speed–time graph for a bus.

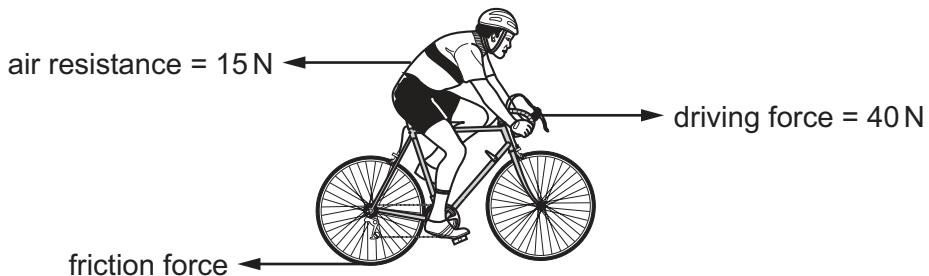
At which labelled point is the bus moving with constant speed?



23 What is meant by the weight of an object?

A the amount of matter in the object
B the density of the object
C the gravitational force on the object
D the mass of the object

24 A cyclist travels along a horizontal road at constant speed in a straight line. The diagram shows all the horizontal forces acting.



What is the magnitude of the friction force?

A 15 N **B** 25 N **C** 40 N **D** 55 N

25 Which energy source is a store of gravitational potential energy?

A coal
B geothermal
C hydroelectric
D nuclear

26 A solid, a liquid and a gas all have the same volume. They are all heated through the same temperature increase and they all expand.

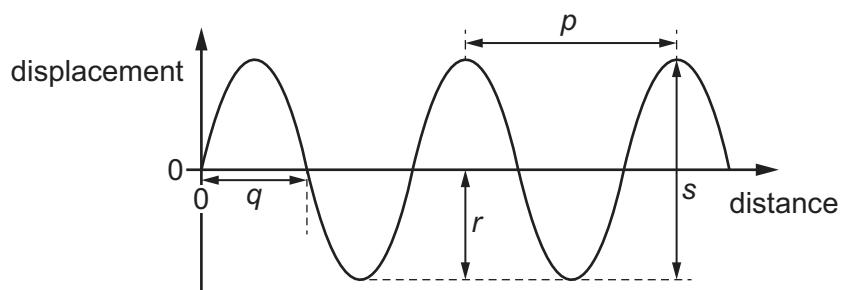
Which state of matter expands the least and which state of matter expands the most?

	expands the least	expands the most
A	gas	solid
B	liquid	gas
C	solid	gas
D	solid	liquid

27 How is heat transferred through a vacuum?

A by conduction only
B by convection only
C by radiation only
D by conduction and radiation

28 The diagram represents a wave.

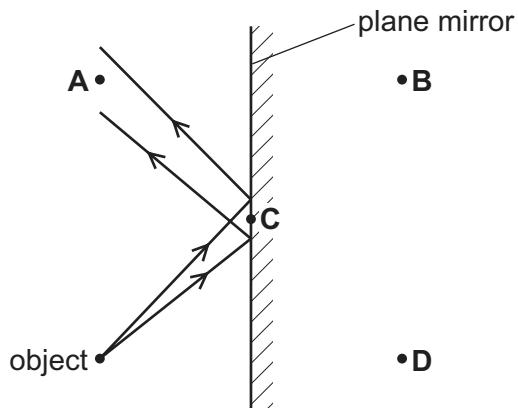


Which arrows represent the amplitude and the wavelength of the wave?

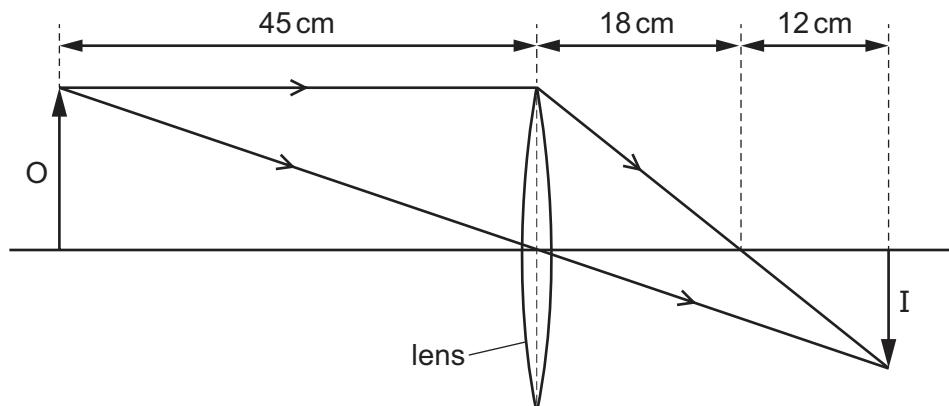
	amplitude	wavelength
A	r	p
B	r	q
C	s	p
D	s	q

29 Two rays from an object are reflected by a plane mirror, as shown in the diagram.

At which labelled point does the image appear to be formed?



30 The diagram shows light from an object O passing through a converging lens to form an image I.



What is the focal length of the lens?

A 18 cm B 30 cm C 45 cm D 75 cm

31 Radio waves, visible light and X-rays are all travelling in a vacuum.

Which statement about the speeds of these waves is correct?

A Radio waves are the fastest.
 B Visible light waves are the fastest.
 C X-rays are the fastest.
 D They all travel at the same speed.

32 A vibrating object produces waves of different frequencies in air.

Which frequency is that of a sound wave that a human with normal hearing can hear?

A 2.5 Hz B 1000 Hz C 25 000 Hz D 100 000 Hz

33 Which metal is used to make the core of an electromagnet and what is a property of an electromagnet?

	metal used for core	property of electromagnet
A	soft iron	it can be switched on and off
B	soft iron	it is a permanent magnet
C	steel	it can be switched on and off
D	steel	it is a permanent magnet

34 An uncharged plastic rod is rubbed with an uncharged cotton cloth.

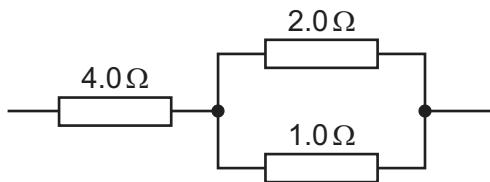
What happens to the rod and what happens to the cloth?

- A The cloth becomes charged but the rod does not.
- B The rod becomes charged but the cloth does not.
- C The rod and the cloth become charged with like charges.
- D The rod and the cloth become charged with opposite charges.

35 Which quantities can be measured using only a voltmeter?

- A current and electromotive force (e.m.f.)
- B current and resistance
- C electromotive force (e.m.f.) and potential difference (p.d.)
- D potential difference (p.d.) and resistance

36 The diagram shows an arrangement of three resistors.



What is the combined resistance of the arrangement?

- A less than 4.0 Ω
- B between 4.0 Ω and 5.0 Ω
- C between 5.0 Ω and 6.0 Ω
- D greater than 6.0 Ω

37 A lamp is in a circuit that is protected by a 1A fuse. The lamp is switched on and it lights normally.

The 1A fuse is now replaced with a 5A fuse.

What happens when the lamp is switched on?

- A The lamp lights normally.
- B The fuse blows so the lamp does not light.
- C The lamp lights less brightly.
- D The lamp lights more brightly.

38 One isotope of iodine can be written as $^{131}_{53}\text{I}$.

Which row describes a different isotope of iodine?

	atomic number	mass number
A	52	131
B	52	132
C	53	131
D	53	132

39 Which row describes the nature of alpha-emission, beta-emission and gamma-emission?

	alpha-emission	beta-emission	gamma-emission
A	electromagnetic wave	electromagnetic wave	helium nucleus
B	electromagnetic wave	electron	electromagnetic wave
C	helium nucleus	electromagnetic wave	helium nucleus
D	helium nucleus	electron	electromagnetic wave

40 A sample contains 240 mg of a radioactive isotope.

Which mass of the isotope remains when three half-lives have passed?

A 30 mg **B** 40 mg **C** 60 mg **D** 80 mg

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The Periodic Table of Elements

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3	Li	4	Be	5	Li	6	Be	7	Li	8	Be	9	Li	10	Be	11	Li	12	Be	13	Li	14	Be	15	Li	16	Be	17	Li	18	Be	19	Li	20	Be	21	Li	22	Be	23	Li	24	Be	25	Li	26	Be	27	Li	28	Be	29	Li	30	Be	31	Li	32	Be	33	Li	34	Be	35	Li	36	Be	37	Li	38	Be	39	Li	40	Be	41	Li	42	Be	43	Li	44	Be	45	Li	46	Be	47	Li	48	Be	49	Li	50	Be	51	Li	52	Be	53	Li	54	Be	55	Li	56	Be	57	Li	58	Be	59	Li	60	Be	61	Li	62	Be	63	Li	64	Be	65	Li	66	Be	67	Li	68	Be	69	Li	70	Be	71	Li	72	Be	73	Li	74	Be	75	Li	76	Be	77	Li	78	Be	79	Li	80	Be	81	Li	82	Be	83	Li	84	Be	85	Li	86	Be	87	Li	88	Be	89	Li	90	Be	91	Li	92	Be	93	Li	94	Be	95	Li	96	Be	97	Li	98	Be	99	Li	100	Be	101	Li	102	Be	103	Li	104	Be	105	Li	106	Be	107	Li	108	Be	109	Li	110	Be	111	Li	112	Be	113	Li	114	Be	115	Li	116	Be	117	Li	118	Be	119	Li	120	Be	121	Li	122	Be	123	Li	124	Be	125	Li	126	Be	127	Li	128	Be	129	Li	130	Be	131	Li	132	Be	133	Li	134	Be	135	Li	136	Be	137	Li	138	Be	139	Li	140	Be	141	Li	142	Be	143	Li	144	Be	145	Li	146	Be	147	Li	148	Be	149	Li	150	Be	151	Li	152	Be	153	Li	154	Be	155	Li	156	Be	157	Li	158	Be	159	Li	160	Be	161	Li	162	Be	163	Li	164	Be	165	Li	166	Be	167	Li	168	Be	169	Li	170	Be	171	Li	172	Be	173	Li	174	Be	175	Li	176	Be	177	Li	178	Be	179	Li	180	Be	181	Li	182	Be	183	Li	184	Be	185	Li	186	Be	187	Li	188	Be	189	Li	190	Be	191	Li	192	Be	193	Li	194	Be	195	Li	196	Be	197	Li	198	Be	199	Li	200	Be	201	Li	202	Be	203	Li	204	Be	205	Li	206	Be	207	Li	208	Be	209	Li	210	Be	211	Li	212	Be	213	Li	214	Be	215	Li	216	Be	217	Li	218	Be	219	Li	220	Be	221	Li	222	Be	223	Li	224	Be	225	Li	226	Be	227	Li	228	Be	229	Li	230	Be	231	Li	232	Be	233	Li	234	Be	235	Li	236	Be	237	Li	238	Be	239	Li	240	Be	241	Li	242	Be	243	Li	244	Be	245	Li	246	Be	247	Li	248	Be	249	Li	250	Be	251	Li	252	Be	253	Li	254	Be	255	Li	256	Be	257	Li	258	Be	259	Li	260	Be	261	Li	262	Be	263	Li	264	Be	265	Li	266	Be	267	Li	268	Be	269	Li	270	Be	271	Li	272	Be	273	Li	274	Be	275	Li	276	Be	277	Li	278	Be	279	Li	280	Be	281	Li	282	Be	283	Li	284	Be	285	Li	286	Be	287	Li	288	Be	289	Li	290	Be	291	Li	292	Be	293	Li	294	Be	295	Li	296	Be	297	Li	298	Be	299	Li	300	Be	301	Li	302	Be	303	Li	304	Be	305	Li	306	Be	307	Li	308	Be	309	Li	310	Be	311	Li	312	Be	313	Li	314	Be	315	Li	316	Be	317	Li	318	Be	319	Li	320	Be	321	Li	322	Be	323	Li	324	Be	325	Li	326	Be	327	Li	328	Be	329	Li	330	Be	331	Li	332	Be	333	Li	334	Be	335	Li	336	Be	337	Li	338	Be	339	Li	340	Be	341	Li	342	Be	343	Li	344	Be	345	Li	346	Be	347	Li	348	Be	349	Li	350	Be	351	Li	352	Be	353	Li	354	Be	355	Li	356	Be	357	Li	358	Be	359	Li	360	Be	361	Li	362	Be	363	Li	364	Be	365	Li	366	Be	367	Li	368	Be	369	Li	370	Be	371	Li	372	Be	373	Li	374	Be	375	Li	376	Be	377	Li	378	Be	379	Li	380	Be	381	Li	382	Be	383	Li	384	Be	385	Li	386	Be	387	Li	388	Be	389	Li	390	Be	391	Li	392	Be	393	Li	394	Be	395	Li	396	Be	397	Li	398	Be	399	Li	400	Be	401	Li	402	Be	403	Li	404	Be	405	Li	406	Be	407	Li	408	Be	409	Li	410	Be	411	Li	412	Be	413	Li	414	Be	415	Li	416	Be	417	Li	418	Be	419	Li	420	Be	421	Li	422	Be	423	Li	424	Be	425	Li	426	Be	427	Li	428	Be	429	Li	430	Be	431	Li	432	Be	433	Li	434	Be	435	Li	436	Be	437	Li	438	Be	439	Li	440	Be	441	Li	442	Be	443	Li	444	Be	445	Li	446	Be	447	Li	448	Be	449	Li	450	Be	451	Li	452	Be	453	Li	454	Be	455	Li	456	Be	457	Li	458	Be	459	Li	460	Be	461	Li	462	Be	463	Li	464	Be	465	Li	466	Be	467	Li	468	Be	469	Li	470	Be	471	Li	472	Be	473	Li	474	Be	475	Li	476	Be	477	Li	478	Be	479	Li	480	Be	481	Li	482	Be	483	Li	484	Be	485	Li	486	Be	487	Li	488	Be	489	Li	490	Be	491	Li	492	Be	493	Li	494	Be	495	Li	496	Be	497	Li	498	Be	499	Li	500	Be	501	Li	502	Be	503	Li	504	Be	505	Li	506	Be	507	Li	508	Be	509	Li	510	Be	511	Li	512	Be	513	Li	514	Be	515	Li	516	Be	517	Li	518	Be	519	Li	520	Be	521	Li	522	Be	523	Li	524	Be	525	Li	526	Be	527	Li	528	Be	529	Li	530	Be	531	Li	532	Be	533	Li	534	Be	535	Li	536	Be	537	Li	538	Be	539	Li	540	Be	541	Li	542	Be	543	Li	544	Be	545	Li	546	Be	547	Li	548	Be	549	Li	550	Be	551	Li	552	Be	553	Li	554	Be	555	Li	556	Be	557	Li	558	Be	559	Li	560	Be	561	Li	562	Be	563	Li	564	Be	565	Li	566	Be	567	Li	568	Be	569	Li	570	Be	571	Li	572	Be	573	Li	574	Be	575	Li	576	Be	577	Li	578	Be	579	Li	580	Be	581	Li	582	Be	583	Li	584	Be	585	Li	586	Be	587	Li	588	Be	589	Li	590	Be	591	Li	592	Be	593	Li	594	Be	595	Li	596	Be	597	Li	598	Be	599	Li	600	Be	601	Li	602	Be	603	Li	604	Be	605	Li	606	Be	607	Li	608	Be	609	Li	610	Be	611	Li	612	Be	613	Li	614	Be	615	Li	616	Be	617	Li	618	Be	619	Li	620	Be	621	Li	622	Be	623	Li	624	Be	625	Li	626	Be	627	Li	628	Be	629	Li	630	Be	631	Li	632	Be	633	Li	634	Be	635	Li	636	Be	637	Li	638	Be	639	Li	640	Be	641	Li	642	Be	643	Li	644	Be	645	Li	646	Be	647	Li	648	Be	649	Li	650	Be	651	Li	652	Be	653	Li	654	Be	655	Li	656	Be	657	Li	658	Be	659	Li	660	Be	661	Li	662	Be	663	Li	664	Be	665	Li	666	Be	667	Li	668	Be	669	Li	670	Be	671	Li	672	Be	673	Li	674	Be	675	Li	676	Be	677	Li	678	Be	679	Li	680	Be	681	Li	682	Be	683	Li	684