Periodicity Cards

How do we know that our present periodic table is correct and complete? After all, throughout history people have thought they've found the "correct" answer. But we're confident that our modern periodic table has ALL of the elements in the correct order.

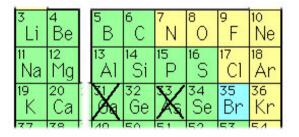
Print and cut out the cards, perhaps 4 or 6 sets for a class.

There are two versions of the cards – the coloured ones (for metals/non-metals/inert gases) make it easier if necessary.

Ask pupils to arrange the cards in a line, in order of atomic mass. That's what Dimitri Mendeleev did at first. Note that the argon, potassium and calcium cards have slightly wrong atomic masses to make this work for students.

Then look for patterns in the cards, e.g. read the Lithium card, then look along the line until you find another element that does similar things. Keep going with this idea until they realise that we can move the cards into 3 rows of 8, with each column containing elements that behave in similar ways. At some stage you could give them the blank grid to help if needed.

The result should be pretty close to the first 3 rows of the modern periodic table without the transition metals. Gallium and Astatine are also missing (I couldn't think of any helpful properties to include, so I left them as gaps to be noticed.



Point out that we have done this by <u>spotting patterns</u> in the properties of the elements – in this case, a <u>periodicity of 8</u>. Also point out that there are 2 gaps where we can see there ought to be elements.

Our cards have 3 of the alkali metals – what should the next alkali metal (rubidium) be like?

The modern periodic table has no gaps, and is arranged in order of atomic number rather than atomic mass, but it gives a very similar result. It has elements with similar properties grouped together, and now that we know more about what's inside atoms we know that this table is a good way to arrange

From

Beryllium	Boron	Carbon	Nitrogen	Oxygen	Fluorine	Neon
Metal	Non-metal	Non-metal	Non-metal	Non-metal	Non-metal, extremely	Colourless, odourless gas,
	Solid at room temperature	Not a very good conductor of electricity	A gas at room temperature	A gas at room temperature	reactive A gas at room temperature	doesn't react with anything
Atomic mass: 9	Atomic mass: 10	Atomic mass: 12	Atomic mass: 14	Atomic mass: 16	Atomic mass: 19	Atomic mass: 20
Magnesium	Aluminium	Silicon	Phosphorus	Sulphur	Chlorine	Argon
silvery metal Burns with a bright white flame	Light, easily- worked metal	Non-metal Not a very good conductor of electricity – a semiconductor	Non-metal, solid at room temperature. Very reactive, burns vigorously	Non-metal, yellow solid at room temperature.	Non-metal, gas at room temperature. Very reactive.	Colourless, odourless gas, doesn't react with anything
Atomic mass: 24	Atomic mass: 27	Atomic mass: 28	Atomic mass: 31	Atomic mass: 32	Atomic mass: 35.5	Atomic mass: 39
Calcium		Germanium		Selenium	Bromine	Krypton
Grey silvery metal	A mysterious gap in the table	Non-metal Not a very good conductor of electricity – a semiconductor	A mysterious gap in the table	Non-metal, solid at room temperature. Conducts electricity when light is shone onto it.	Non-metal, liquid at room temperature. Reactive.	Colourless, odourless gas, doesn't react with anything
	Metal Atomic mass: 9 Magnesium silvery metal Burns with a bright white flame Atomic mass: 24 Calcium	MetalNon-metalMetalSolid at room temperatureAtomic mass: 9Atomic mass: 10MagnesiumAluminiumsilvery metalLight, easily- worked metalBurns with a bright white flameAtomic mass: 27Atomic mass: 24Atomic mass: 27Grey silvery metalAnysterious gap in the	MetalNon-metalNon-metalSolid at room temperatureNot a very good conductor of electricityAtomic mass: 9Atomic mass: 10Atomic mass: 12MagnesiumAluminiumSiliconsilvery metalLight, easily- worked metalNot a very good conductor of electricity - aBurns with a bright white flameAtomic mass: 27Non-metalAtomic mass: 24Atomic mass: 27GermaniumGrey silvery metalA mysterious gap in the tableNon-metal	MetalNon-metalNon-metalNon-metalSolid at room temperatureNot a very good conductor of electricityA gas at room temperatureAtomic mass: 9Atomic mass: 10Atomic mass: 12Atomic mass: 14MagnesiumAluminiumSiliconPhosphorussilvery metalLight, easily- worked metalNon-metal Not a very good conductor of electricity - aNon-metal, solid at room temperature. Very reactive, burns vigorouslyAtomic mass: 24Atomic mass: 27Atomic mass: 28Atomic mass: 31Calcium Grey silvery metalA mysterious gap in the tableSermanium Non-metal Non-metal Non-metal Non-metal semiconductor of electricity - aA mysterious gap in the table	MetalNon-metalNon-metalNon-metalNon-metalMetalSolid at room temperatureNot a very good conductor of electricityA gas at room temperatureA gas at room temperatureAtomic mass: 9Atomic mass: 10Atomic mass: 12Atomic mass: 14A domic mass: 16Magnesium silvery metal bright white flameAluminiumSilicon Non-metal Non-metalPhosphorus tomor temperature.SulphurNon-metal bright white flameLight, easily- worked metalNon-metal Non-metal Not a very good conductor of electricity - a semiconductorNon-metal, solid at room temperature.Non-metal, yellow solid at room temperature.Atomic mass: 24Atomic mass: 27Atomic mass: 28Atomic mass: 31Atomic mass: 32Calcium Grey silvery metal gap in the tableA mysterious gap in the tableGermanium Non-metal Not a very good conductor of electricity - a semiconductorA mysterious gap in the tableSelenium non-metal non-metal gap in the tableNon-metal non-metal gap in the tableA mysterious remperature. Conducts electricity - a semiconductorMon-metal at non tableNon-metal, solid at room table	MetalNon-metalNon-metalNon-metalNon-metalNon-metalNon-metalNon-metalSolid at room temperatureSolid at room temperatureA gas at room temperatureA domic mass: 19MagnesiumAtomic mass: 10A tomic mass: 12A tomic mass: 14A tomic mass: 16A tomic mass: 19Silvery metalLight, easily- worked metalNon-metal Non-metal Not a very good conductor of electricity - a semiconductorNon-metal, solid at room temperature. Very reactive, burns vigorouslyNon-metal, yellow solid at room temperature. Very reactive, burns vigorouslyNon-metal, golid at room temperature. Very reactive, burns vigorouslyNon-metal, solid at room temperature. Very reactive, burns vigorouslyA tomic mass: 32A tomic mass: 35.5Calcium Grey silvery metal gap in the tableA mysterious semiconductorA mysterious gap in the tableA mysterious gap in the tableNon-metal metal A mysterious gap in the tableNon-metal tableNon-metal temperature.Non-metal ight is shone ontoNon-metal temperature.Non-metal temperature. conductsNon-metal, sol

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Page

Lithium	Beryllium	Boron	Carbon	Nitrogen	Oxygen	Fluorine	Neon
Soft silvery metal	Metal	Non-metal	Non-metal	Non-metal	Non-metal	Non-metal, extremely	Colourless, odourless gas,
When put in water it fizzes and gives off hydrogen gas.		Solid at room temperature	Not a very good conductor of electricity	A gas at room temperature	A gas at room temperature	reactive A gas at room temperature	doesn't react with anything
Atomic mass: 7	Atomic mass: 9	Atomic ma <i>ss</i> : 10	Atomic mass: 12	Atomic mass: 14	Atomic mass: 16	Atomic mass: 19	Atomic mass: 20
Sodium	Magnesium	Aluminium	Silicon	Phosphorus	Sulphur	Chlorine	Argon
Soft silvery metal When put in water it fizzes strongly and gives off hydrogen gas.	silvery metal Burns with a bright white flame	Light, easily- worked metal	Non-metal Not a very good conductor of electricity - a semiconductor	Non-metal, solid at room temperature. Very reactive, burns vigorously	Non-metal, yellow solid at room temperature.	Non-metal, gas at room temperature. Very reactive.	Colourless, odourless gas, doesn't react with anything
Atomic mass: 23	Atomic mass: 24	Atomic mass: 27	Atomic mass: 28	Atomic mass: 31	Atomic mass: 32	Atomic mass: 35.5	Atomic mass: 39
Potassium	Calcium	A mysterious	Germanium	A mysterious	Selenium	Bromine	Krypton
Soft silvery metal When put in water it fizzes violently and gives off hydrogen gas. Atomic mass: 40	Grey silvery metal Atomic mass: 41	gap in the table	Non-metal Not a very good conductor of electricity – a semiconductor Atomic mass: 73	gap in the table	Non-metal, solid at room temperature. Conducts electricity when light is shone onto it. Atomic mass: 79	Non-metal, liquid at room temperature. Reactive. Atomic mass: 80	Colourless, odourless gas, doesn't react with anything Atomic mass: 84

From

Page