# Reading the Periodic Table Map

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|---|---|---|---|
| **Teacher** | | **Class** | Year 9 |
| **Subject** | Science | **Topic** | The periodic table |
| **Date** | | **Room** | |
| **Lesson length** | 60 minutes | **Country** | United Kingdom |

Students learn to find periods and groups and to sort metals from non-metals. They colour-code a blank table so the patterns stand out.

## Curriculum links

- The periodic table provides chemists with a structured organisation of the known chemical elements from which they can make sense of their physical and chemical properties [1]
- The arrangement of elements in the modern periodic table can be explained in terms of atomic structure [1]

## Learning objectives

- Students will find the period and group of any element from its row and column.
- Students will classify elements as metal or non-metal using the zigzag divide.
- Students will explain why organisation helps predict physical and chemical properties.

## Success criteria

- I can give the period and group for an element from its position.
- I can sort elements into metal or non-metal using the zigzag line.
- I can explain why organising elements helps us predict patterns.

## What students already know

Show a small table section. Ask: what do you already know about rows, columns, shiny metals or dull non-metals?

## Key words

| | |
|---|---|
| **period** | a row running across the table [5] |
| **group** | a column running down the table [5] |
| **atomic number** | the count that decides an element's place in order [4] |
| **metal** | shiny, bendy material that carries heat well [6] |
| **non-metal** | dull, breakable substance that carries heat poorly [6] |

## Materials

- Blank periodic tables, one per pair
- Coloured pencils, rulers and wall periodic table
- Half-coloured support tables with Group 1 and zigzag already marked
- Slides 2-9 and 11, Video clip 1 and Video clip 3
- Worksheet Task C matching slips, one per student

## Before the lesson

- Print blank periodic tables and half-coloured support tables for Task on Slide 8
- Print Worksheet Task C matching slips and test Slide 5 and Slide 7 videos with sound
- Set out coloured pencils, rulers and wall table where all can see

## Lesson outline

**0–5 min** **Starter** 5 min · Whole class

*To spark interest in colour-coding and check what pupils know about table layout.*

**YOU DO**

1. Show Slide 4 and read the vote options: metal areas, period rows and group columns.
2. Ask for hands-up votes on what to colour first if the table is a map.
3. Hold up a grey blank table and give the hook for the main task.
4. Link votes to lesson goal: colour and label metals, non-metals and key groups.

**STUDENTS DO**

1. Vote and give a reason for metal areas, period rows or group columns.
2. Look at the grey table and spot that it has no colour key yet.

**Say:** This looks like a grey puzzle. Let's colour it so the patterns jump out. By the end you will colour and label metals, non-metals and key groups on your own table. First vote: what should our key show?

**Ask:** If the table is a map, what would colour help us see first? (Where metals and non-metals sit and where rows and columns repeat.) · What do you already know about a shiny metal or a dull non-metal? (Metals are shiny and bendy, non-metals are dull and brittle.)

**Check understanding:** Hands-up vote plus cold-call two reasons. If unsure, point to Slide 4 options and model one reason.

**Support:** Show a mini coloured key so pupils can point instead of explaining. **Stretch:** Ask what pattern colour blocks might reveal about reactivity or electron shells [6].

Use: Slide 4

5–15 min **Teaching - Periods and Groups** 10 min · Whole class

*To teach pupils to read any position as a period and a group.*

**YOU DO**

1. Show Slide 2 and trace Row 3 across for period 3 and Column 2 down for group 2.
2. Show Slide 3 and explain each element has a count that decides its place.
3. Play Slide 5 Video clip 1 and ask pupils to watch across for periods and down for groups.
4. Model reading sodium from the wall table and check with hinge question.

**STUDENTS DO**

1. Track across and down on fingers while teacher models.
2. Watch the video and whisper one way to find any element fast.
3. Show period and group for sodium on mini whiteboards.

**Say:** The table consists of rows called periods and columns called groups [5]. The table lists the elements in order of increasing atomic number [4]. So across tells you the period and down tells you the group.

**Worked example:** Sodium: atomic number 11 [3]. Find 11 on the wall table. It sits in the row running across as Row 3, so period 3. It sits in the column running down as Column 1, so group 1. Say: period 3, group 1.

**Ask:** What does the row across tell you and what does the column down tell you? (The row across is the period and the column down is the group [5].) · How are modern elements ordered on the table? (In order of increasing atomic number [4].)

**Check understanding:** Whiteboards: show period and group for magnesium (period 3, group 2). Reteach across versus down if mixed.

**Support:** Give a printed section showing neighbours in order of increasing atomic number to copy the pattern from [4]. **Stretch:** Ask what pattern might link position to electrons in energy levels [1].

Use: Slides 2-3, Slide 5, Video clip 1 (0:00–3:04)

15–25 min **Teaching - Metals and Non-metals** 10 min · Whole class

*To teach where metals and non-metals sit and why the divide matters.*

**YOU DO**

1. Show Slide 6 cards for shiny, bendy metals and dull, brittle non-metals.
2. Point out metals sit left and non-metals sit right with a zigzag divide.
3. Play Slide 7 Video clip 3 to spot layout and everyday uses.
4. Model sorting two samples by observed properties.

**STUDENTS DO**

1. Call out shiny or dull for each sample card shown.
2. Watch the video and note one metal use and one non-metal use.
3. Sort two photo cards into metal or non-metal piles with a reason.

**Say:** Metals are shiny, bendy and carry heat well. Non-metals are dull, brittle and do not carry well. Metals sit left and non-metals sit right of the zigzag line between metals and non-metals, often found between Groups 13-16 [5]. The table gives a structured organisation to make sense of physical and chemical properties [1].

**Worked example:** Magnesium pot: shiny, hard, carries heat well, sits left of the zigzag, so metal. Sulphur pot: dull yellow powder, crumbly, does not carry well, sits right of the zigzag, so non-metal. Both placed by grouping shared physical and chemical properties [6].

**Ask:** Where do metals and non-metals sit? (Metals sit left, non-metals sit right of the zigzag line [5].) · Why did chemists organise elements this way? (To make sense of their physical and chemical properties and spot patterns [1].)

**Check understanding:** Thumbs up for metal left, thumbs down for non-metal right on four quick cards. Re-point to zigzag if errors.

**Support:** Offer a word bank: shiny, dull, bendy, brittle, carries heat, does not carry. **Stretch:** Ask pupils to place each group roughly on a mini table using the zigzag line [5].

Use: Slide 6, Slide 7, Video clip 3 (0:00–4:31)

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25–50 min **Main Activity - Colour-Code** 25 min · Pairs

*To colour and label periods, groups, metals and non-metals accurately.*

**YOU DO**

1. Show Slide 8 task and hand out blank tables, coloured pencils and rulers.
2. Model: draw Rows 2-3, label Groups 1, 2, 13-18, shade Group 1 alkali metals and mark the zigzag divide.
3. Send pairs to colour-code using different colours for different groups [5], with key and one example per colour.
4. Circulate, check keys and prompt explanation of metal side versus non-metal side.

**STUDENTS DO**

1. Draw rows, label groups, shade Group 1 and mark the zigzag divide.
2. Finish the key and label one example from each colour with period, group and type.
3. Check partner tables for correct rows as periods and columns as groups [5].

**Say:** In pairs, colour-code your table so the patterns jump out. Draw Rows 2-3 and label Groups 1, 2, 13-18. Shade Group 1 and mark the zigzag divide. Add a key with one example from each colour.

**Worked example:** Key: yellow = Group 1 alkali metals [5], e.g. sodium period 3 group 1. Grey = metals left of zigzag. Blue = non-metals right of zigzag, e.g. neon period 2 group 18. Green line = metalloids along the zigzag between Groups 13-16 [5]. Lanthanides 57-71 and actinides 89-103 shown below [5].

**Ask:** Show me Group 1 and the zigzag. Where are metals and non-metals? (Group 1 down the left; metals left, non-metals right of the zigzag [5].) · Give period, group and type for your labelled example? (For example, neon: period 2, group 18, non-metal on the right.)

**Check understanding:** Gallery check of keys and one labelled example per pair. If rows or zigzag misplaced, model again on visualiser.

**Support:** Provide a half-coloured table where Group 1 and the zigzag line are already marked to copy from [5].
**Stretch:** Ask them to add a note on how colour blocks could reveal patterns in reactivity or number of electron shells [6].

Use: Slide 8

50–60 min **Plenary** 10 min · Whole class

*To check recall of periods, groups and metal types and link to properties.*

**YOU DO**

1. Hand out Worksheet Task C and give 2 minutes to match period, group, atomic number and metal.
2. Show Slides 9-10 and run think, pair, share on salt from a soft metal and sharp-smelling gas.
3. Show Slide 11 quiz and cold-call period, group and type for neon.

**STUDENTS DO**

1. Complete Worksheet Task C matching on their own, then compare in pairs.
2. Discuss Slide 10 in pairs and share one sentence on different groups.
3. Answer Slide 11 quiz on whiteboards.

**Say:** You have two minutes to match each term to its correct meaning. Then we will test your map. Table salt comes from a soft metal and a sharp-smelling gas. Why are they in different groups? Neon is Row 2, Column 18. Give period, group and type.

**Worked example:** Task C check: period = row across, group = column down [5]. Neon: Row 2 is period 2, Column 18 is group 18, right of zigzag so non-metal. Salt pair: sodium is soft metal in group 1, chlorine is sharp-smelling gas non-metal in group 17, so different groups hold elements with different properties [1].

**Ask:** Why are the soft metal and the gas in salt in different groups? (Groups hold elements with similar properties; a metal and a non-metal differ so sit apart [1].) · Neon is Row 2, Column 18 on the right. Period, group and type? (Period 2, group 18, non-metal, ordered by increasing atomic number [4][5].)

**Check understanding:** Exit whiteboards for neon plus Task C slips collected. If group and period swapped, re-trace across versus down.

**Support:** Let pupils keep open a table that lists elements in order of increasing atomic number during the quiz [4]. **Stretch:** Ask them to debate whether arrangement linked to electrons in energy levels is more useful than alphabetical order [1].

Use: Slides 9-11, Worksheet Task C

## Common mistakes

| Mistake | How to spot it | How to fix it |
|---|---|---|
| Mixing up period and group | Says period 1, group 3 for an element in Row 3, Column 1 | Retrace: rows that run across are periods, columns that run down are groups [5]. Point and say across then down. |
| Thinking metals are on the right | Labels sulphur or neon as metal because they are on the right | Point to zigzag line between metals and non-metals [5]. Left is mainly metals, right is non-metals. |
| Thinking order is by mass or alphabet | Looks for element by first letter instead of count | Remind that the table lists elements in order of increasing atomic number [4] and practise finding 11 then 12. |

## Support

- Half-coloured tables with Group 1 and zigzag pre-marked plus word bank for shiny, dull, bendy and brittle
- Printed table sections showing neighbours in atomic-number order to copy the pattern

## Stretch

- Add pattern notes on reactivity or number of electron shells shared in a group [6]
- Predict links between position and electrons in energy levels for confident pairs [1]

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## For the LSE or teaching assistant

Sit near pairs with support tables in main task. Prompt across for period, down for group and left or right of zigzag for type. Check Task C matches.

## Check for understanding

| Question | Answer |
|---|---|
| Chlorine sits in Row 3, Column 17 on the right of the zigzag. Give period, group and type. | Period 3, group 17, non-metal. |
| How are modern elements ordered on the periodic table? | In order of increasing atomic number [4]. |
| Why do chemists organise elements into periods and groups? | To make sense of their physical and chemical properties and spot patterns [1]. |

## Homework

Finish your colour key and label one metal and one non-metal with period and group.

## Sources


1. Subject: Year 9 Atomic Structure and the Periodic Table · ravenswood.bromley.sch.uk · https://www.ravenswood.bromley.sch.uk/assets/Documents/Curriculum/Provision-Maps/Science/Year-9/Year-9-Science-C.1-Atomic-Structure-and-Periodic-Table-.pdf
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