

Atom, Element, Table: Words That Fit Together

Learning target: I can explain how the words atom, element, matter, atomic mass, periodic table, group, period, chemical symbol, criteria, constraint and scale relate to one another, and use each one correctly in a new situation.

Vocabulary in action

About 30 min

Individual

MS-PS1-1 · supports

MS-ETS1-1 · practice

independent practice

writing

Name _____

Date _____

Period _____

Directions

This is not a matching sheet. Every item asks you to think about how two or more words connect. Read the word bank first. Then complete the concept map, sort the examples, and apply the terms to new situations. When an item asks you to explain, write in complete sentences and use the vocabulary word in your answer.

You will need: This worksheet, Pencil

matter

Anything that has mass and takes up space: solids, liquids and gases, including air you cannot see. Light and sound are not matter.

atom

One single particle of an element. It is far too small to see, even with a magnifying glass or a light microscope.

element

A substance made of only one kind of atom. Iron, neon, carbon and oxygen are elements. Fewer than one hundred kinds occur in nature.

atomic mass

How much mass one atom of an element has, given in daltons (Da). The number on the periodic table is an average for that element's atoms.

periodic table

A chart of all known elements arranged so that elements with similar properties line up in the same column.

group

A vertical column of the periodic table. Elements in one group tend to behave alike.

period

A horizontal row of the periodic table. Atomic mass generally increases from left to right along a row.

chemical symbol

A one- or two-letter shorthand for an element's name, used by scientists in every country. The first letter is always a capital.

criteria

The things a design must do to count as a success (for example, 'must show single atoms').

constraint

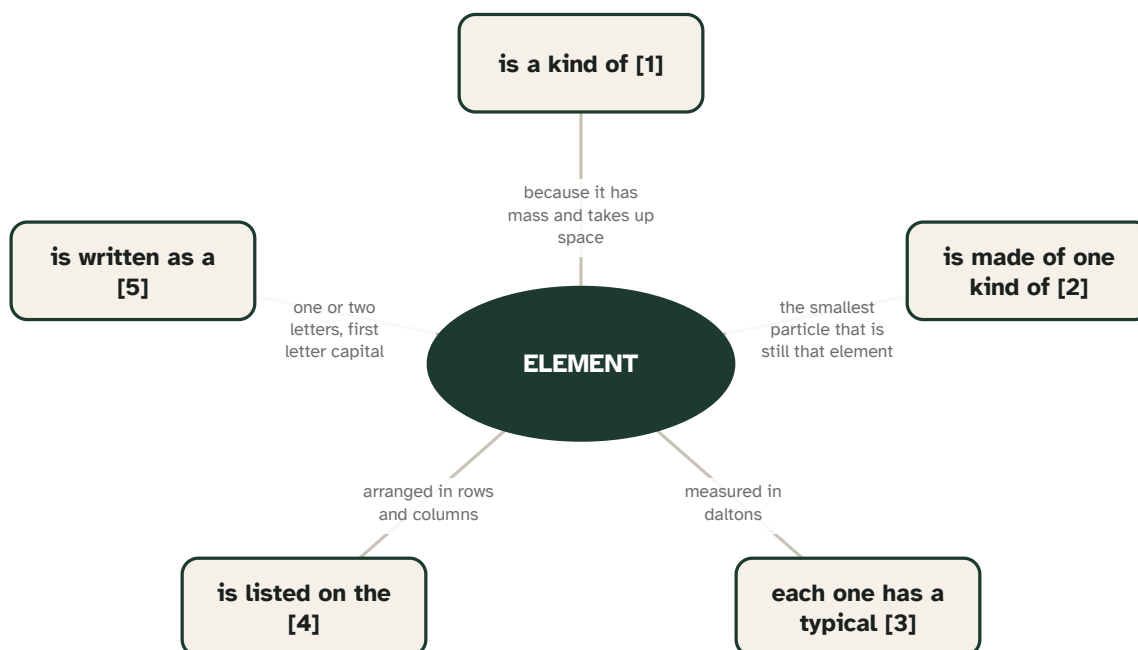
A limit that a design has to work inside (for example, time, money, available technology, or the need to avoid vibration).

scale

A size range. Things on the same scale are roughly the same size and are measured with the same units; atoms live on the atomic scale, measured in picometers.

Part A: Complete the concept map

How the words connect



Five boxes are missing a word. Each missing word is in the word bank. The hub is already filled in.

1. Write the five missing words: [1] _____ [2] _____ [3] _____ [4] _____ [5] _____

2. Two more words from the bank, **group** and **period**, could be attached to box [4]. Write one sentence that connects all three words correctly.

Part B: Sort the examples

For each example below, decide which **one** vocabulary word it best illustrates. Some words are used more than once; some are not used at all. Write the word on the line.

3. The column that holds helium, neon and argon: _____

4. The invisible air that makes a pumped basketball heavier: _____

5. 'The microscope must show details as small as 100 picometers': _____

6. 'The lab can only use parts that already exist, and must measure at night to avoid vibrations': _____

7. Fe, which stands for iron: _____

8. The single smallest piece of gold you could ever cut from a ring: _____

9. The row that begins with lithium and ends with neon: _____

10. Measuring a hair's width in micrometers but an atom's width in picometers: _____

Part C: Apply the terms

11. A classmate says, 'A diamond is one element, so a diamond is one atom.' Use the words **atom** and **element** to explain what is right and what is wrong in that sentence.

12. Sodium has an atomic mass of 23 Da and sits in the same group as potassium (39 Da) and lithium (7 Da). Use the words **group** and **atomic mass** to say one thing these three elements share and one way they differ.

13. A team is designing a drone that must carry a 2 kg package for 20 minutes, must cost less than \$400 to build, and must be finished in three weeks. Label each of the three requirements as a **criterion** or a **constraint**, and explain your choice for one of them.

14. Is the red glow of a neon sign **matter**? Is the neon gas inside the tube matter? Explain both answers using the definition of matter.

15. Why do scientists bother with a special **scale** and unit for atoms instead of just writing their size in meters? Give the unit's name in your answer.

Two-word test

When two words feel the same (atom and element, group and period, criteria and constraint), write them side by side and ask: 'Which one is the thing, and which one is the collection or the rule?' An atom is a single thing; an element is the substance made of that kind of thing. A group is a column; a period is a row. Criteria describe success; constraints describe limits. Check each Part B answer against this test before moving on.

Write the missing definition

The word bank does not include **picometer** or **dalton**. Write your own one-sentence definition for each in the style of the word bank, then write one sentence that uses both words correctly to describe a single atom of oxygen (atomic mass 16 Da, width roughly 150 pm). Finally, explain why neither unit would be useful for describing a basketball.