Chemistry
Chapter 4, 5, and 6 Jeopardy

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Round 1 – Chapters 4 and 5

Atoms	Discoveries and Subatomic Particles	Isotopes	Periodic Table	Shorthand and Average Atomic Mass	Atomic Models
100	100	100	100	100	100
200	200	200	200	200	200
300	300	300	300	300	300
400	400	400	400	400	400
500	500	500	500	500	500

Round 2 – Chapters 5 and 6

Click to go to Round 2

Atoms 100

Can we actually see atoms? What instrument can help us visualize an atom?

NO! We cannot see atoms. Scanning tunneling microscopes can help us observe atoms.

Atoms 200

What is the difference in atomic number and mass number?

The atomic number is the number of protons.
The mass number is the number of protons and neutrons.

Atoms 300

What is an atom and why is it neutral?

An atom is the smallest particle that retains the property of an element.

Atoms are neutral because they have equal numbers of protons and electrons.

Atoms 400

How many neutrons are in calcium-44?

24

Atoms 500

How did Democritus characterize atoms?

Democritus described atoms as indestructible and indivisible.

Discoveries and Subatomic Particles 100

According to Dalton's Atomic Theory, is it possible to convert atoms of one element into atoms of another element?

No

Discoveries and Subatomic Particles 200

What is the nucleus and what is its charge?

The nucleus is the dense, **positive** core of an atom that consists of protons and neutron.

Discoveries and Subatomic Particles 300

Fill in the following chart. NO PARTIAL CREDIT IN JEOPARDY!

Particle	Charge	Location	Relative Mass
Proton	+1	nucleus	1
Neutron	0	nucleus	1
Electron	-1	electron cloud	1/1836

Discoveries and Subatomic Particles 400

Who discovered the proton, neutron, and electron?

electron = J.J. Thomson
proton = Eugen Goldstein
neutron = James Chadwick

Discoveries and Subatomic Particles 500

What instrument was used to discover the proton and electron?

cathode ray tube

Isotopes 100

What does amu stand for?

Atomic mass unit

Isotopes 200

What is an isotope?

Atoms of the same element that contain different numbers of neutrons.

Isotopes 300

Would isotopes has different atomic numbers of mass numbers?

mass numbers

Isotopes 400

Elements are identified by their number of _____.

protons

Isotopes 500

Why are isotopes of the same element chemically alike?

They only differ in the number of neutrons. They still have the same number of protons and electrons.

Periodic Table 100

How is the modern periodic table arranged?

in order of increasing atomic number

Periodic Table 200

What are the columns on the periodic table called?

groups

Periodic Table 300

What are the horizontal rows on the periodic table called?

periods

Periodic Table 400

Elements in the same group have _____.

similar physical and chemical properties

Periodic Table 500

What are two elements with similar properties to potassium?

hydrogen, lithium, sodium, rubidium, cesium, and francium

Shorthand and Average Atomic Mass 100

In the shorthand $^{24}_{12}Mg$, what do the 24 and the 12 represent?

The 24 is the mass number, and the 12 is the atomic number.

Shorthand and Average Atomic Mass 200

How many neutrons are in $^{7}_{3}Li$?

4 neutrons

Shorthand and Average Atomic Mass 300

The atomic mass of copper is 63.54 amu. Which of copper's two isotopes is more abundant:

copper – 63 or copper – 65?

copper – 63

Shorthand and Average Atomic Mass 400

Bromine has two isotopes. One isotope has a mass of 78.92amu and an abundance of 50.69%. The other isotope has a mass of 80.92 amu and an abundance of 49.31%. What is the average atomic mass?

79.91 amu

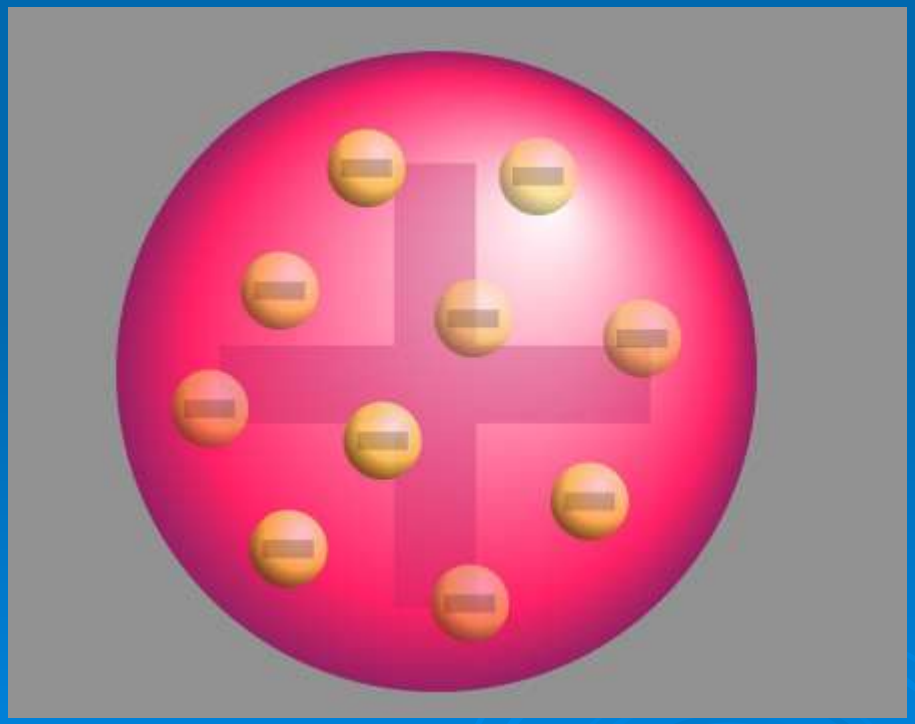
Shorthand and Average Atomic Mass 500

Element X has two isotopes. One isotope has a mass of 10.012 amu and an abundance of 19.91%. The other isotope has a mass of 11.009 amu and an abundance of 80.09%. What is the average atomic mass, and what is element X?

10.81 amu, boron

Atomic Models 100

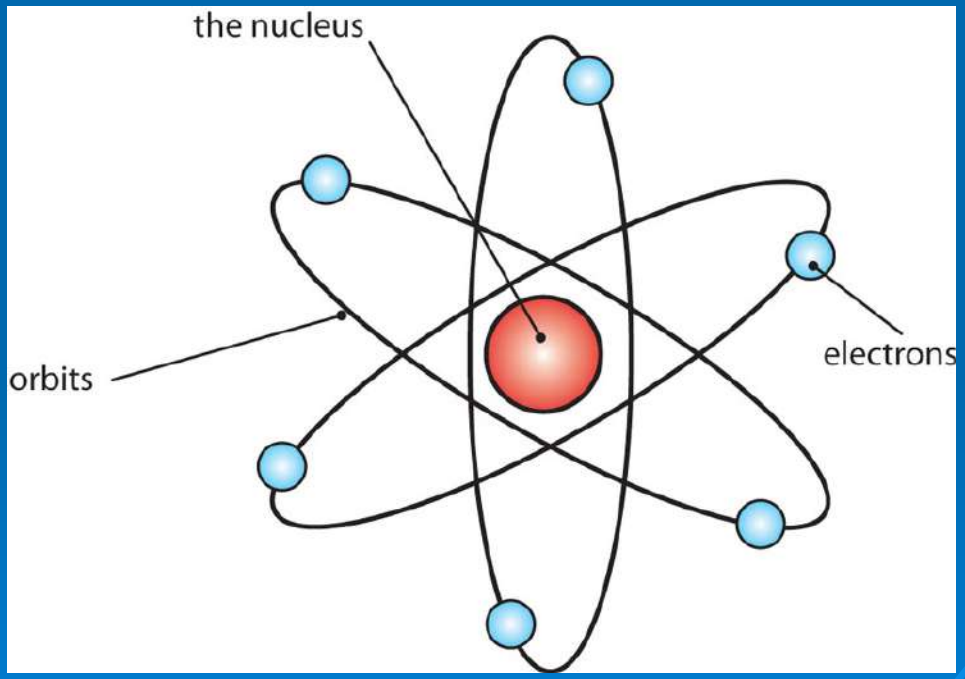
Draw the plum pudding model and list the scientist that created it.



J.J. Thomson

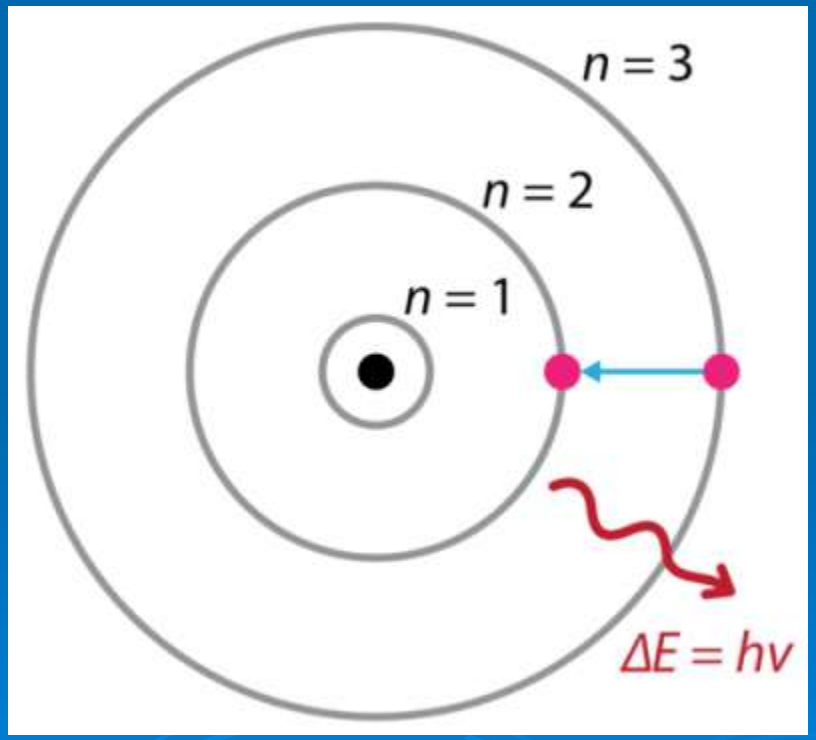
Atomic Models 200

Draw Rutherford's model of the atom.



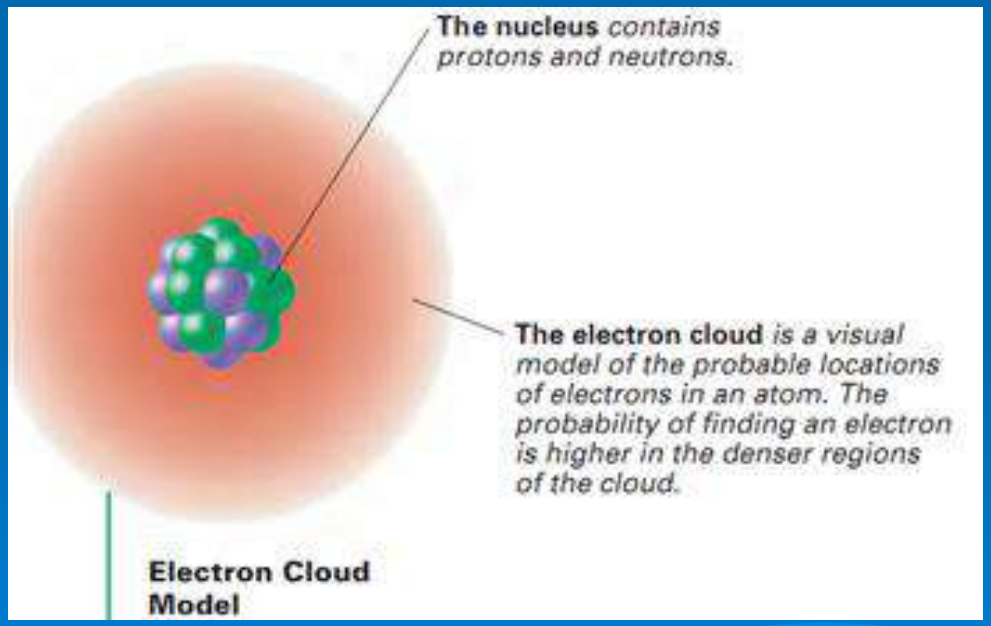
Atomic Models 300

Draw Bohr's model of the atom.



Atomic Models 400

Draw the quantum mechanical model of the atom.



90% chance of finding an electron in the border

Atomic Models 500

What were Rutherford's 2 conclusions from his gold foil experiment?

1. There is a dense positive core which he called the nucleus.
2. Most of the atom is empty space.

Definitions	Electron Configuration	Atoms and Ions	Ionization Energy	Electro-negativity	Periodic Table
200	200	200	200	200	200
400	400	400	400	400	400
600	600	600	600	600	600
800	800	800	800	800	800
1000	1000	1000	1000	1000	1000

Definitions 200

What is an atomic emission spectrum?

An atomic emission spectrum is the different wavelengths of light that are released when an excited electron falls to ground state. It is different for each element.

Definitions 400

What does Aufbau's principle state?

Aufbau's principle states that electrons fill the energy levels from lowest to highest energy.

Definitions 600

What does Hund's rule state?

Hund's rule states that electrons are in a sublevel with multiple orbitals, then the electrons would rather be separate than paired.

Definitions 800

What does the Pauli exclusion principle state? (2 parts)

The Pauli exclusion principle states that orbitals can only hold up to 2 electrons. It also states that if an orbital holds two electrons, then they will have opposite spins.

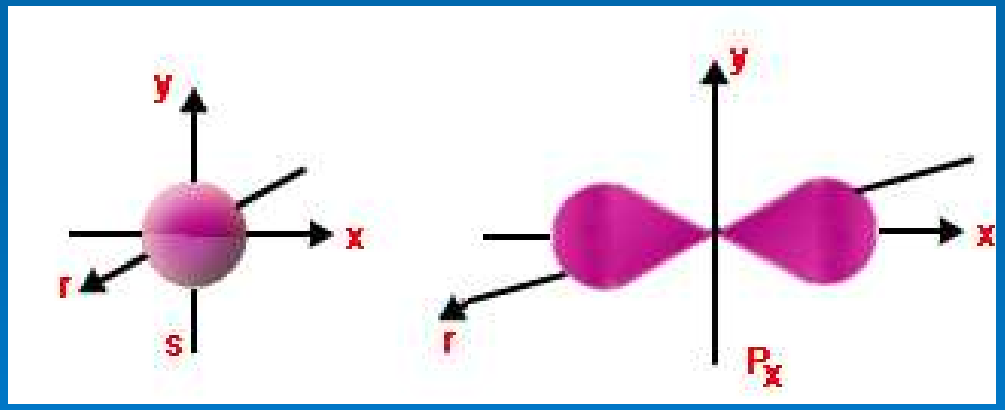
Definitions 1000

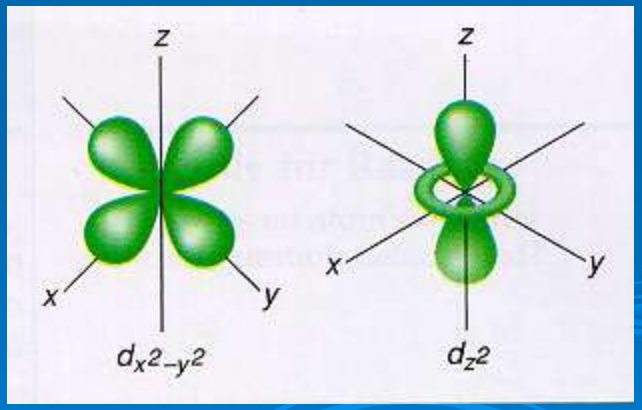
How do atoms emit light? Make sure to use the terms ground state and excited state in your answer.

An electron gains energy and jumps from ground state to excited state. When the electron falls back down to ground state, it releases the energy in the form of light.

Electron Configuration 200

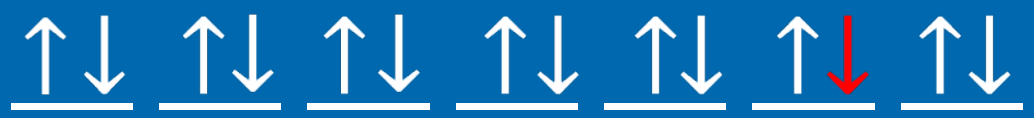
Draw the shape of an s sublevel p sublevel, and d sublevel. (2 shapes for d)





Electron Configuration 400

(H) Write the quantum numbers for the following electron.



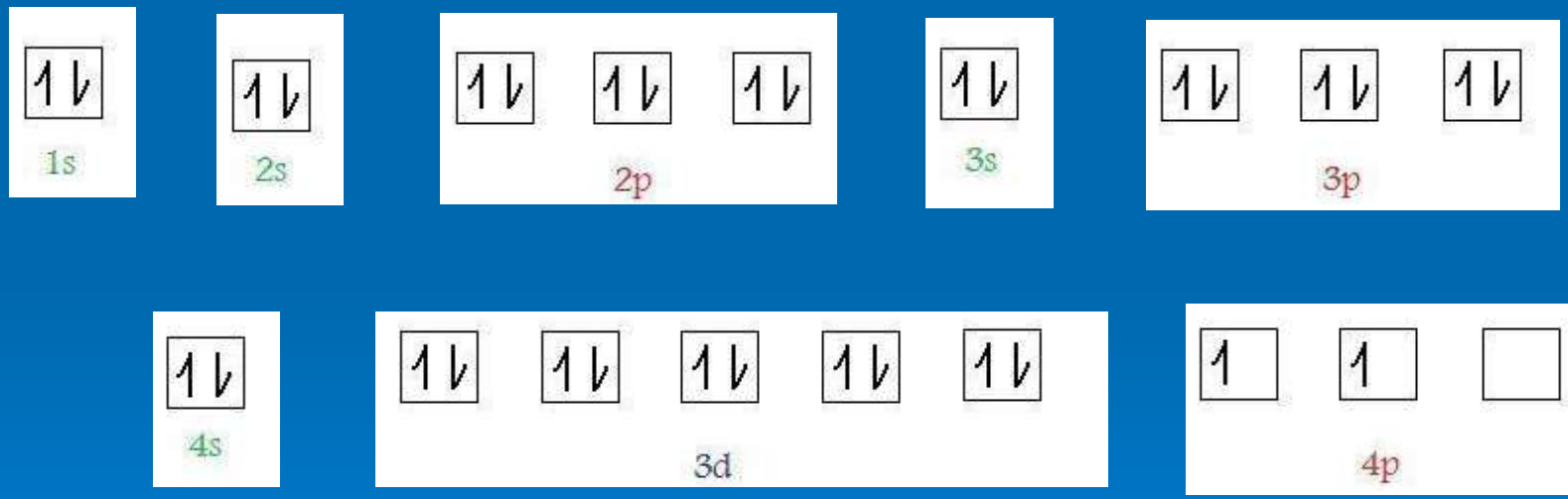
4, 3, 2, -1/2 4f

(R) Write the standard electron configuration for sulfur.

$1s^2 2s^2 2p^6 3s^2 3p^4$

Electron Configuration 600

Write the arrow electron configuration for Germanium (Ge).



Electron Configuration 800

Write the standard electron configuration for chromium (Cr).

$1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^1$

Electron Configuration 1000

(H) Write the noble gas configuration for Fm.

[Rn] $5f^{11}6d^{1}7s^{2}$

(R) Write the standard configuration for Cs.

$1s^{2}2s^{2}2p^{6}3s^{2}3p^{6}3d^{10}4s^{2}4p^{6}4d^{10}5s^{2}5p^{6}6s^{1}$

Atoms and Ions 200

Which atom is bigger silicon or chlorine?

silicon

Atoms and Ions 400

Which ion is larger O^{-2} or O?

O^{-2}

Atoms and Ions 600

Compare the size of a cation and an anion to the size of the original atom?

A cation is smaller than the original atom.
An anion is larger than the original atom.

Atoms and Ions 800

Explain the atomic radius trend as you move down a group.

Atomic size increases as you move down a group because larger energy levels are added each time you move down.

Atoms and Ions 1000

Explain the trend of atomic radius as you move across a period.

Atomic radius decreases slightly as you move across a period because electrons are added to the same energy level but the protons added to the nucleus pull the electrons in closer.

Ionization Energy 200

Define cation and anion.

A cation is a positively charged ion that has lost electrons.
An anion is a negatively charged ion that has gained electrons.

Ionization Energy 400

Define ionization energy.

Ionization energy is the energy required to remove one electrons from an atom.

Ionization Energy 600

Order the following elements from smallest to largest ionization energy: sodium, sulfur, and aluminum.

sodium, aluminum, and sulfur

Ionization Energy 800

Explain the trend of ionization energy as you move down a group.

Ionization energy decreases as you move down a group because the energy levels get father from the nucleus so it takes less energy to remove an electron.

Ionization Energy 1000

Explain the ionization energy trend as you move across a period.

Ionization energy increases as you move across a period because the electrons are about the same distance from the nucleus but the nucleus is stronger, so it takes more energy to remove an electron.

Electronegativity 200

Why do elements in the same group have similar properties?

Elements in the same group have similar properties because they have similar endings in their electron configurations.

Electronegativity 400

Define electronegativity.

Electronegativity is the ability of an atom to attract another electron.

Electronegativity 600

Which element has the higher electronegativity hydrogen or oxygen?

oxygen

Electronegativity 800

Explain the trend in electronegativity when you move down a group.

Electronegativity decreases as you move down a group because larger energy levels are added, so electrons are farther from the nucleus. This distance makes the ability to attract more electrons lower.

Electronegativity 1000

Explain the trend in electronegativity when you move across a period.

Electronegativity increases as you move across a period because the electrons are about the same distance from the nucleus, but the stronger nucleus has more ability to attract electrons.

Periodic Table 200

Who created the first periodic table and how was it arranged?

Mendeleev created the first useful periodic table and it was arranged by increasing atomic mass.

Periodic Table 400

How is the modern periodic table arranged?

The modern periodic table is arranged by increasing atomic number.

Periodic Table 600

Is bromine a metal, nonmetal, or metalloid and is it a solid, liquid, or a gas?

nonmetal/liquid

Periodic Table 800

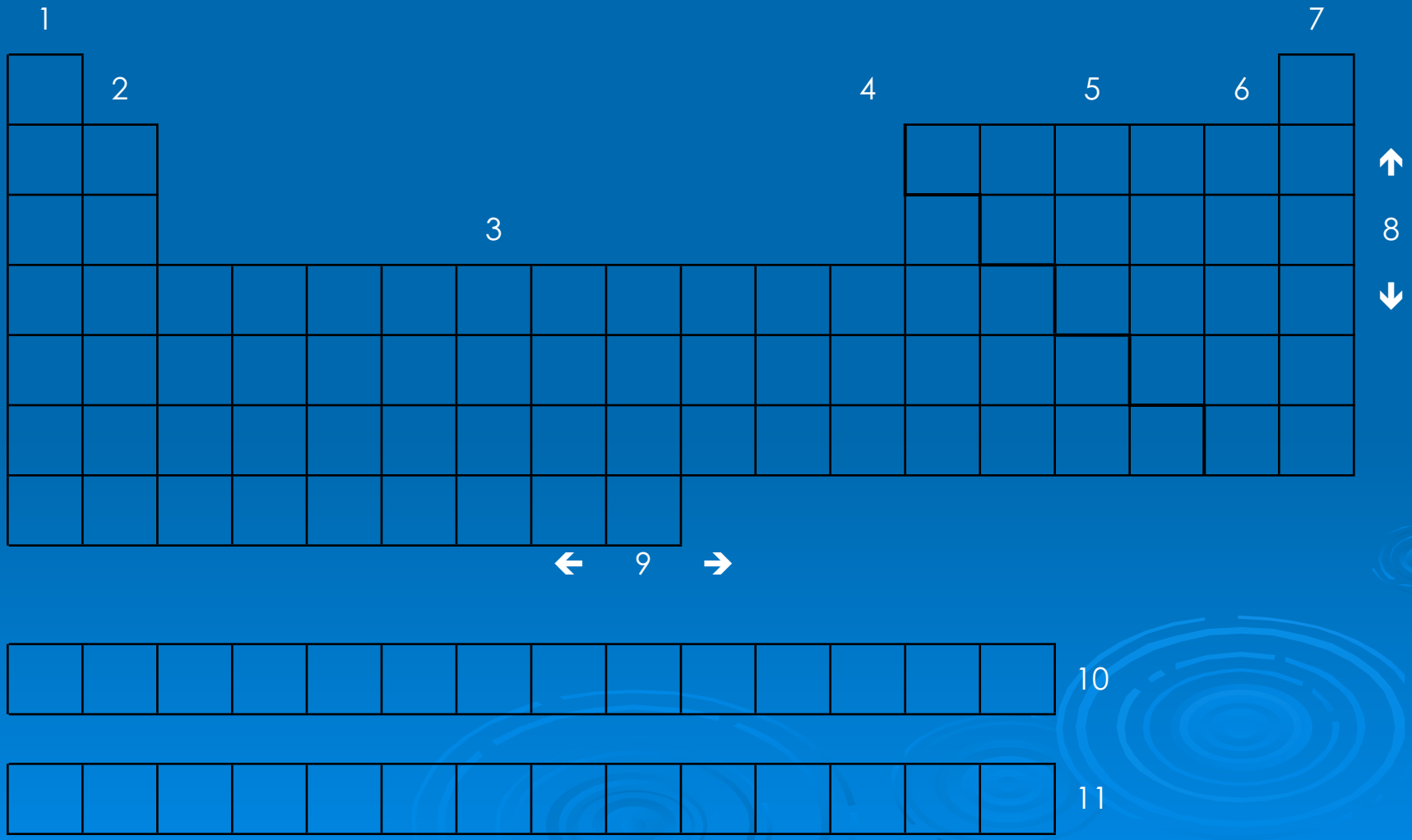
List the 5 characteristics of metals and the 4 characteristic of nonmetals.

METALS: solid (except mercury), good conductors, malleable, ductile, and shiny.

NONMETALS: tend to be gases, poor conductors, brittle, and dull.

Periodic Table 1000

Label all 11 groups on the periodic table.



Periodic Table 1000

1. Alkali Metals
2. Alkaline Earth Metals
3. Transition Metals
4. Metalloids
5. Nonmetals
6. Halogens
7. Noble Gases
8. Groups
9. Periods
10. Lanthanides
11. Actinides