



Periodicity Investigator

Discover periodic trends from evidence instead of memorizing arrows. Compare measured classroom values across periods and groups, graph patterns, and make predictions.

NGSS: HS-PS1-1 - Use the periodic table as a model to predict the relative properties of elements based on patterns of electrons in the outermost energy level.

Name: _____

Class / Period: _____

Date: _____

Part A - Explore the Table

Open the **Periodicity Investigator**. Click several elements and observe atomic number, period, group, category, covalent radius, first ionization energy, and electronegativity.

Element	Period	Group	Covalent radius (pm)	1st ionization energy (eV)	Electronegativity
Li					
F					
Na					
Cl					

1. What similarities do you notice between elements in the same group?

Part B - Across a Period

Select **Period 2**. Graph and inspect each property from Li through F.

Property	General change Li -> F	One piece of numerical evidence
Covalent radius		
1st ionization energy		
Electronegativity		

2. Which trend is most consistent across Period 2? Which property shows an exception or irregularity? Use the graph/data.

Part C - Down a Group

Select **Group 1**, then repeat for **Group 17**. Focus on radius, ionization energy, and electronegativity.

Property	General trend down Group 1	General trend down Group 17
Covalent radius		
1st ionization energy		
Electronegativity		

Explain the Trends

3. Atomic radius generally decreases across a period. Explain this using increasing nuclear charge and electrons being added to the same main energy level.

4. Atomic radius generally increases down a group. Explain this using additional occupied energy levels and electron shielding.

5. Why does ionization energy generally change in the opposite direction from atomic radius?

Part D - Prediction Challenge

Use the model's prediction challenges. Record three predictions before revealing/checking the evidence.

Challenge / pair	Your prediction	Evidence after checking	Correct?
1			
2			
3			

Use the Periodic Table as a Model

6. Without looking up a value, predict which has the **larger radius**: Mg or Ca. Explain from periodic position.

7. Predict which has the **higher electronegativity**: S or Cl. Explain from periodic position.

8. Predict which has the **higher first ionization energy**: Li or Na. Explain from periodic position.

9. Why is it more scientifically accurate to describe these as **general trends** rather than rules with no exceptions?
