



Lewis Dot Structures

Companion worksheet — use the interactive tool to complete each part. Draw dots directly on the blank templates below.

Name: _____ Date: _____

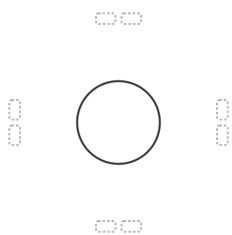
Key idea

A Lewis dot structure shows an atom's valence electrons as dots around its symbol. Fill one dot on each side first (top, right, bottom, left) — only start pairing them up once all four sides have one.

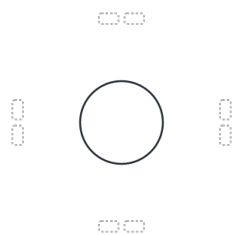
Tip: An atom with a full octet (8 dots, all 4 sides paired) is especially stable — that's why noble gases barely react with anything.

Part A — Explore & record

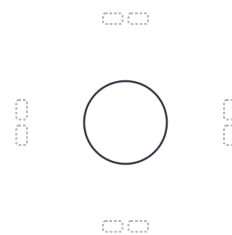
Use Explore mode to check yourself. Write the element symbol in the center circle, then draw its valence electrons as dots on the correct sides.



Boron (B)



Sulfur (S)



Argon (Ar)

For each, write the valence electron count below its diagram: B: _____ S: _____ Ar: _____

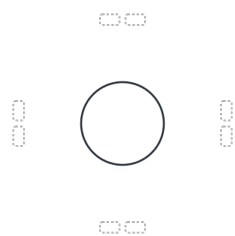
Which of the three has a full octet? What does that tell you about how reactive it is?

Show your work:

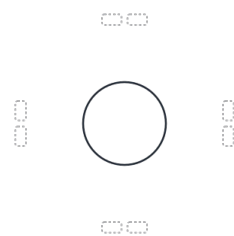


Part B — Practice by hand

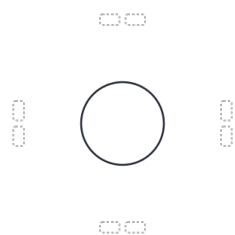
Draw each dot structure from memory first — figure out the valence electron count from the group number, or from what you remember from Electron Configuration. Then check with the tool.



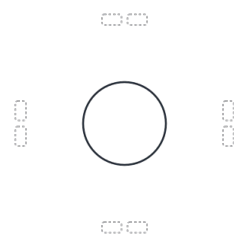
Lithium (Li)



Carbon (C)



Phosphorus (P)



Chlorine (Cl)

Valence electrons — Li: _____ C: _____ P: _____ Cl: _____

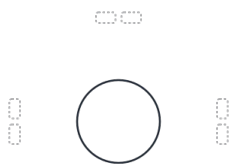
Quick check

Chlorine needs just 1 more electron to reach a full octet. Based on this, would you expect Chlorine to react easily with other elements, or barely react at all? Explain.



Part C — Group patterns

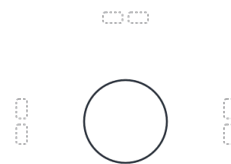
Use the "Compare a group" toggle in Explore mode. Draw the Lewis dot structure for all three Group 2 elements below.



Beryllium (Be)



Magnesium (Mg)



Calcium (Ca)

What do you notice about all three diagrams? Why does this happen?

Show your work:

Predict without checking the tool: how many valence electrons would Strontium (Sr) have, and what would its Lewis dot structure look like? (Sr is also in Group 2.)

Show your work:



Reflection

How does an element's Lewis dot structure connect to its electron configuration and valence electron count from the Electron Configuration Explorer? Why do you think elements in the same group always have matching Lewis dot patterns?

Vocabulary check

Term	In your own words
Lewis dot structure	
Octet rule	



TEACHER ANSWER KEY — remove or skip this page before printing for students

Part A

Boron (B): 3 valence e^- — single dots on top, right, bottom; left side empty.

Sulfur (S): 6 valence e^- — paired dots on top and right; single dots on bottom and left.

Argon (Ar): 8 valence e^- — all 4 sides paired. Full octet — very stable, essentially unreactive.

Part B

Lithium (Li): 1 valence e^- — single dot on top only.

Carbon (C): 4 valence e^- — single dots on all 4 sides, no pairs.

Phosphorus (P): 5 valence e^- — paired dot on top; single dots on right, bottom, left.

Chlorine (Cl): 7 valence e^- — paired dots on top, right, bottom; single dot on left.

Chlorine would be expected to react readily — it's very close to a full octet, so it strongly "wants" one more electron, making it highly reactive (this is why halogens are among the most reactive elements).

Part C

Be, Mg, and Ca all show the identical pattern: 2 valence electrons, single dots on top and right. This happens because all Group 2 elements have the same outer-shell electron configuration (ns^2), just at increasing shell numbers.

Strontium (Sr): also 2 valence electrons, same pattern as Be/Mg/Ca — single dots on top and right.

Reflection — sample answer

The number of dots in a Lewis structure is exactly the valence electron count from the electron configuration's outermost shell (ns and np electrons). Elements in the same group have the same number of valence electrons because they have the same outer-shell configuration pattern — just at a different principal energy level — so their Lewis structures (and much of their chemical behavior) look the same.

Teaching notes

- This worksheet intentionally reuses elements from the Electron Configuration worksheet (O/Si/K/I are absent here, new set used) to keep both feeling distinct while reinforcing the same valence-electron concept from a different angle.
- Part C is the key conceptual payoff of this worksheet — seeing 3 different elements produce an identical dot pattern is often the moment group-based periodic trends really click for students.
- Consider pairing this worksheet with a brief follow-up discussion on why elements with 1, 2, or 3 valence electrons (metals) behave so differently from elements with 6, 7 (nonmetals) — sets up future bonding lessons well.