**🎯 Activity 4: 🔎 Compare the Visuals – “Spot the Difference”**

**🎙️ Activity Introduction 🎤**  
"Time to become an electron detective! Look closely at the atom diagrams. Each dot or cross shows an electron. The outermost ring tells you how reactive an atom is. Ready to spot the key differences?"

**👨‍💻 Developer Guide Instructions**

* **Structure:**
  + Display two side-by-side dot-and-cross diagrams with labelled shells.
  + Pose one multiple-choice question with 3 or 4 options for each comparison.
  + Add **Check Answer** button.
  + If the answer is wrong, highlight the correct shell with animation.
* **Interactions:**
  + Highlight selected shells when hovered or clicked.
  + Optional pop-up hint on the outer shell: *“This is the valence shell!”*
* **Media Assets:**
  + Diagrams for: Sodium (2.8.1), Magnesium (2.8.2), Aluminium (2.8.3), Fluorine (2.7), Neon (2.8), Chlorine (2.8.7).

**📋 Learner Instructions (On-Screen)**

1. Look at the two diagrams carefully.
2. Focus on the outermost shell — this is the valence shell.
3. Read the question below the diagrams.
4. Choose the correct option that answers the question.
5. Click **Check Answer** to see feedback.

**💡 Hint Panel (On-Screen)**

**Key Reminders:**

* The valence shell is the outermost electron shell.
* Atoms with 1–3 valence electrons usually lose them during bonding.
* Atoms with 5–7 valence electrons usually gain electrons to fill their shell.
* A full outer shell (e.g., 2.8 or 2.8.8) means the atom is stable and not reactive.

**🧪 Activity Content with Specific Facilitative Feedback**

**Scenario 1: Sodium (2.8.1) vs Magnesium (2.8.2)**

**Question:** Which atom has more electrons in its outer shell?

|  |  |  |
| --- | --- | --- |
| **Choice** | **Correct/Incorrect** | **Facilitative Feedback** |
| Sodium | ❌ Incorrect | Sodium’s last shell contains 1 electron, not more than magnesium. Check the second ring on both diagrams. |
| Magnesium | ✅ Correct | Magnesium has 2 electrons in the outermost shell. Sodium has only 1. |
| Both have the same | ❌ Incorrect | Sodium has 1, magnesium has 2 in the outermost shell — they are not the same. |

**Scenario 2: Magnesium (2.8.2) vs Aluminium (2.8.3)**

**Question:** Which element is more likely to lose 3 electrons during bonding?

|  |  |  |
| --- | --- | --- |
| **Choice** | **Correct/Incorrect** | **Facilitative Feedback** |
| Magnesium | ❌ Incorrect | Magnesium has 2 outer electrons and typically loses only 2, not 3. |
| Aluminium | ✅ Correct | Aluminium has 3 outer electrons and tends to lose all three to become stable. |
| Neither | ❌ Incorrect | One of them — aluminium — is highly likely to lose 3 electrons. Look at the third shell. |

**Scenario 3: Fluorine (2.7) vs Neon (2.8)**

**Question:** Which atom is more chemically reactive?

|  |  |  |
| --- | --- | --- |
| **Choice** | **Correct/Incorrect** | **Facilitative Feedback** |
| Fluorine | ✅ Correct | Fluorine needs just 1 more electron to complete its shell, making it highly reactive. |
| Neon | ❌ Incorrect | Neon already has a full outer shell with 8 electrons. It is very stable and does not easily react. |
| Both | ❌ Incorrect | Only fluorine is reactive — neon is a noble gas, stable and inert. |

**Scenario 4: Sodium (2.8.1) vs Chlorine (2.8.7)**

**Question:** Which atom is more likely to lose an electron?

|  |  |  |
| --- | --- | --- |
| **Choice** | **Correct/Incorrect** | **Facilitative Feedback** |
| Sodium | ✅ Correct | Sodium has 1 valence electron and easily loses it to become stable. |
| Chlorine | ❌ Incorrect | Chlorine tends to gain 1 electron to complete its shell — not lose. |
| Neither | ❌ Incorrect | Sodium often loses its single outer electron. Review the electron arrangement. |

**🎙️ Activity Conclusion**   
"Well done comparing valence electrons! The number in the outer shell tells us whether an atom will lose or gain electrons. This is key in predicting how it reacts with other elements."

**✅ Key Takeaways:**

* Elements are classified by **electron arrangement** and **physical/chemical properties**.
* **Metals:** 1–3 valence electrons (e.g., Na = 2.8.1, Mg = 2.8.2).
* **Non-metals:** 5–8 valence electrons (e.g., O = 2.6, Cl = 2.8.7).
* **Metalloids:** 4 valence electrons, showing both metal and non-metal properties (e.g., Si, B).
* **Exceptions:** Hydrogen, Helium, Boron, and Silicon have special cases.