Intermolecular forces (IMFs) are attractive or repulsive forces that act between two or more particles (molecules or ions). From physics: unlike charge attract and like charge repel. In order to identify the type of IMF present, the particles should be classified into three categories: ion, polar molecule, non-polar molecule. Ions have full charges, either positive or negative. An atom in a polar molecule will have either a partial positive or partial negative charge while another atom will have the opposite partial charge. In this activity we will focus on attractive forces between particles in representations of solids and liquids. You will work with a neighbor.

Partner 1: Using the pen provided, label the arrows with these seven types of particle interactions:

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| * ionic bond | * dipole-dipole | * hydrogen bond | * ion-dipole |
| * ion-induced dipole | * dipole-induced dipole | * London dispersion forces |  |

Partner 2: Using the pen provided, label two rectangles with each of these four particle types:

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| * ion | * non-polar molecule |
| * polar molecule | * molecule with F–H, O–H or N–H bond (FON for short) |

**Activity 1 – Interactions between particles in pure substances:**

1. Select two rectangular tiles of the same particle type. (ex. ion and ion)
2. Place an arrow representing the appropriate particle interaction between the two particle tiles.
3. Repeat with the other three particle types.
4. Sketch your representations as in the example shown below. Include charges (either full or partial) and appropriate alignments in your sketches.

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**Activity 2 – Interactions between particles in a mixture**

1. Select two rectangular tiles representing different particle types. (ex. ion and polar molecule)
2. Place an arrow representing the appropriate particle interaction between the two particle tiles.
3. Repeat for all of the 6 possible combinations of particles.
4. Sketch your representations. Include charges (either full or partial) and appropriate alignments in your sketches.

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**Activity 3 – Interactions between real molecules**

1. Draw the Lewis structures for potassium bromide (KBr), ethane (C2H6), ethanol (CH3CH2OH) and dimethyl ether (CH3OCH3). Identify where the partial positive charge and partial negative charge are located.
2. Label two rectangles with the formula of each of these substances. For KBr, separate the ions, placing the cation, K+, at one at one end of the tile and the anion, Br–, other at the other end.
3. Place arrows representing the appropriate particle interaction between particles in all four of the pure substances.
4. Sketch your representations. Include charges (either full or partial) and appropriate alignments in your sketches.

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1. Select two rectangular tiles representing different substances. (ex. ethane and ethanol)
2. Place an arrow representing the appropriate particle interaction between the two substances.
3. Repeat for all of the 6 possible combinations of particles.
4. Sketch your representations. Include charges (either full or partial) and appropriate alignments in your sketches.

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