Class: Grade 2 Science

Lesson Title: Particle Party (Gas, Liquid, Solids)

Class Size: **20**
Time: **50 mins**

Curriculum Outcomes:
2.5.2 Students will be expected to compare properties of familiar liquids and solids and investigate how they interact.

Learning Objectives:
1. Students will be able to demonstrate an understanding of the differences between gases, liquids and solids on a molecular level.
2. Students will gain a basic understanding of the relationship between energy and state of matter.

Materials:
- Music (three different speeds: slow, medium, fast; try to pick music that is popular)
  - Suggestions: "I know I'm not the only one" – Sam Smith (Slow-Solid), "Roar" – Katy Perry (Medium-Liquid), "Happy" – Pharell Williams/ "Shake it Off" – Taylor Swift (Fast-Gas)

Preparation beforehand:
- Make sure a large space is cleared for the activity (a gym area is preferable)

Introduction:
1. Introduce the topic. Possible prompt questions include:
   a. What do you know about particles? Atoms?
   b. Are there smaller parts in each atom? What are they called?
   c. What do particles do? What do they make up?
   d. Possible analogy to Minecraft (use smaller pieces to build something bigger – like atoms make up all matter).

2. Explain what a kinulation is (broken up into kinesthetic and simulation). Tell them that these are used to help students learn difficult concepts that are otherwise difficult to picture. It allows students to become part of the demonstration, and therefore easier to remember and learn. Ask students if they would like to try one.

Particle Party (solid, liquid, gas, high pressure gas)
1. Let students know that they will be acting as particles at a party. We will have 4 different types of parties: solid, liquid, gas, and a high pressure gas in small container party.
2. It is up to students to predict how the particles will behave at each of the parties.

Activity #1: Solid to a Liquid
1. Ask students how the molecules of a solid would look or behave (packed together closely). Ask how much "energy" they would have if they were a solid particle/molecule.
2. Get students to become molecules of the solid, and as the music plays (slow), they can mimic the actions of the molecules (not moving very much, very still and in one place).
3. Now ask students to tell you what the molecules of a liquid might look like (more spread out, moving a little faster). When the music plays (medium) they should try to act like molecules of a liquid.
4. Sit down with the students and ask them what was different between being a solid and a liquid.

Activity #2: Liquid to a Gas
1. Ask students how the molecules of a gas might look if it's allowed to use the whole room as the container (more spread out, moving faster).
2. Turn on the music (fast) and tell students to simulate what the particles of a gas might look like.
3. Sit down with students and discuss how the particles of a gas were different.

Activity #3: High Pressure Gas
1. Confine students (still acting as molecules/particles of gas) to a small area (perhaps the circle in the middle of the gym).

2. Tell them that they should still act as particles of gas, but they CANNOT leave the confined space.
3. Play the music again, and allow them to simulate a confined gas. You may wish to instruct them to confine their space even more, or allow them a little more room to move.
4. After you've changed the space they are allowed to move in, you can let them leave (or release them) to the open space.
5. Sit down and talk to the students about how they felt as molecules of gas confined to the space (was there a lot more bumping into each other? No room to move?). This will bring up the notion of pressure on a gas, and how we can force a gas to stay in a confined space, but it will try to push back.

Conclusion – Possible wrap-up questions:

1. Is there energy involved in changing states of matter?
2. Do you think we could apply pressure to liquids and solids the same as we did to gases?
3. Are all particles in a gas moving at high speeds, or are some less active than others?
4. Do you know any real life examples of going from a solid to liquid to gas?