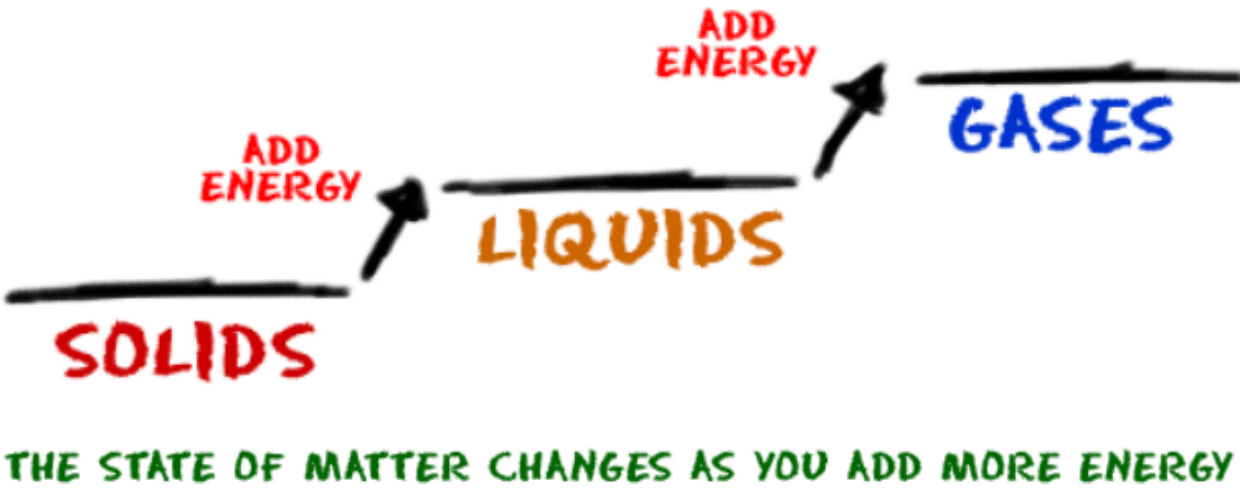
Drawing Movement of Energy Name:

Period:

You've been learning about how adding or removing energy can cause something to change its state of matter. For example, you know that adding energy to solid ice will make it change into liquid water. Keep adding energy, and the liquid water changes from liquid to steam and gas as it boils away. These facts are shown in the diagram below.



Use the diagram and your brain to follow the directions and answer the questions below.

For something to go from a solid to a liquid (like ice to water) what needs to be added? _____

When you add energy to ice, does all of the ice turn into water instantly? _____

It takes time for all the parts of a solid to turn into liquid. This time is represented on the diagram by a horizontal line.

This bit of information will now let us put axes on our diagram. On the left side of the diagram, draw an arrow pointing straight up, and label this y-axis ENERGY ☐. Under the diagram, draw a horizontal arrow (the x-axis) from the bottom left to the bottom right, and label it TIME ☐ .

Now let's think about the axes. As you move up the diagram, are you adding or removing energy?

_____

As you move down the diagram, the opposite is true. So as you move down the diagram, are you adding or removing energy?

_____

As you move from the left to the right side of the diagram, time is passing. That means that it takes a while for all the parts of something to change from one state to another. Remember that this is represented by a horizontal line on the diagram.

When you add energy to water, does all of the water boil and turn into steam and gas instantly? _____

The graph also works the opposite way. If you put a liquid like water into the freezer, the freezer removes energy, turning the liquid into a solid (ice). With this idea in mind, if you want to turn a gas into a liquid, should you add energy or remove energy?

_____

turn over for more

Practice: 15 points diagram adapted from http://www.chem4kids.com/files/matter_states.html

Drawing Movement of Energy

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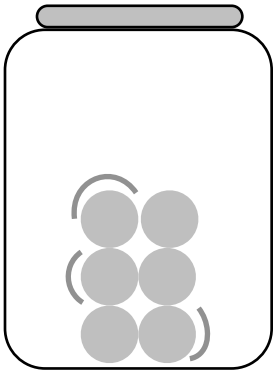
Now for a closer look at what happens when states of matter change.

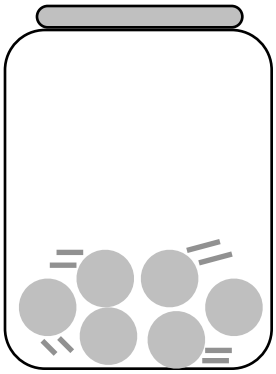
If you drink a Monster Drink or Red Bull, does that give you more energy or less energy? _____

With _____ energy, you then move around a lot more. The same thing is true for the particles that make up solids, liquids, and gases. These particles are called atoms. When atoms are stuck together, they make what are called molecules. For the diagrams below, assume that the particles shown in grey can represent either atoms or molecules. They would both move the same way.



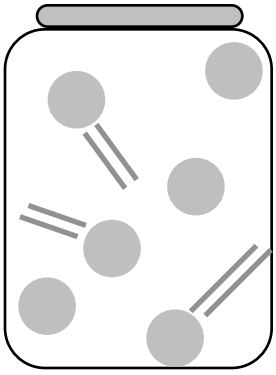
SOLID

In a solid, these particles are very close together and touching, but still moving a bit. The particles act like students in assigned seats in their classroom. They are in one spot, but still squirming. Draw some stick figures sitting in the classroom to the right. Show that they are moving a little bit with small curved motion lines.



LIQUID

In a liquid, these particles are still close together and touching, but are moving a bit more. The particles act like students during passing period, going from one class to another. They are moving around, but not too quickly. Draw some stick figures walking in the hallway to the right. Show that they are moving around with short straight motion lines.



GAS

In a gas, these particles are moving all over the place. The particles act like students in PE. They are everywhere, moving quickly. Draw some stick figures running around during PE in the field to the right. Show that they are moving a lot with long straight motion lines.

Practice: 15 points