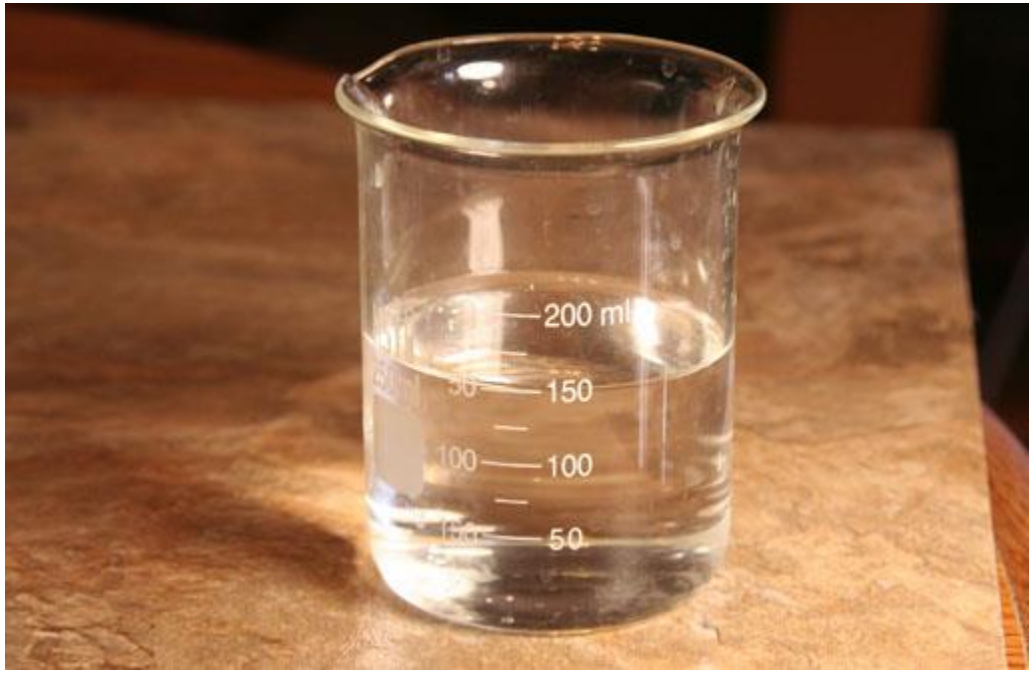
Topic	Internal energy	**Level**	Key Stage 4 (or any course for students aged 14-16)
Outcomes	1. To understand that internal energy is the total kinetic energy and potential energy of all the particles (atoms and molecules) that make up a system 2. To understand that temperature is a measure of the average kinetic energy of particles in a system 3. To describe what happens to kinetic energy and potential energy stores when you heat a substance		
Information for teachers	This activity is designed as an introduction to the concept of internal energy. Students should already have a sound understanding of the particle model and state changes before this lesson. For the demonstration you will need a beaker of crushed ice, thermometer and heat source.		

This beaker is at 60 ^{o}C



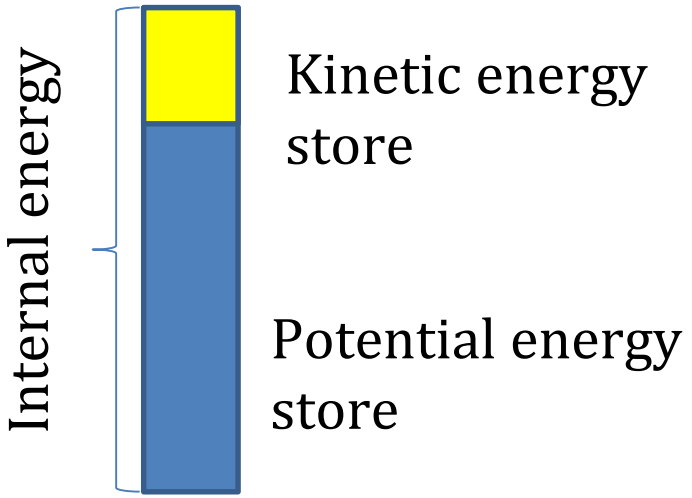
1. Describe the motion and arrangement of the water molecules inside the beaker.

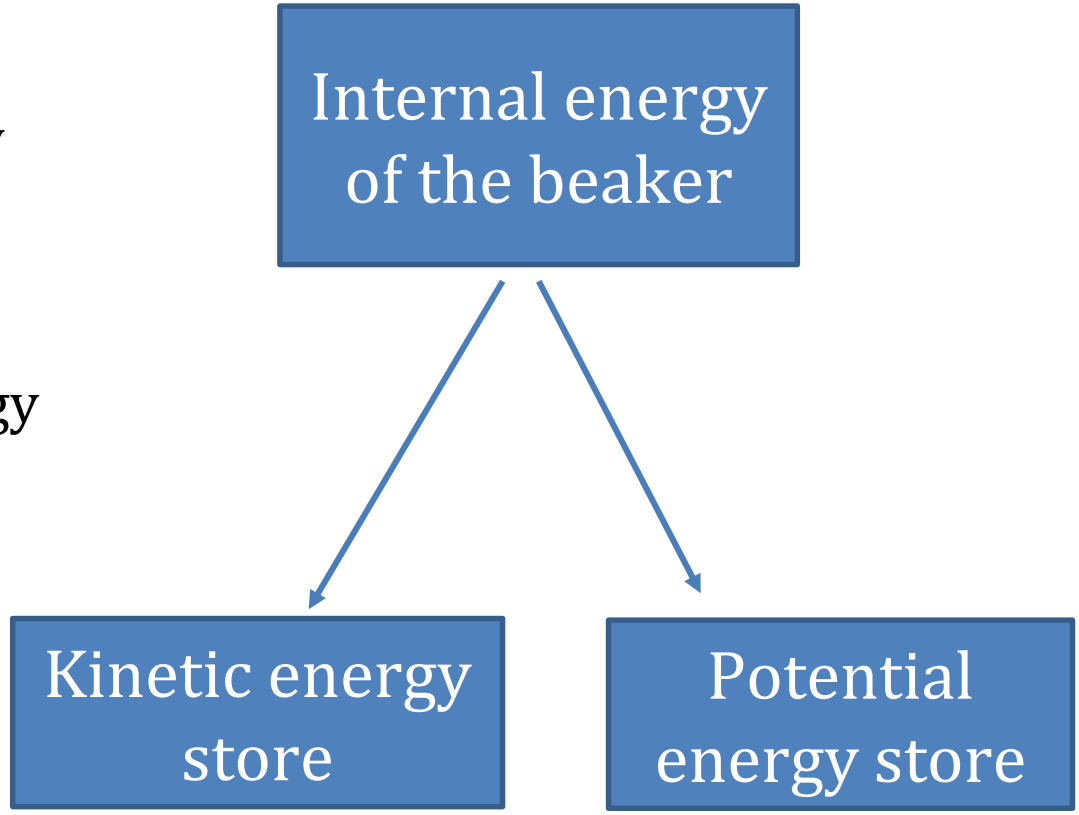
2. Draw a picture to represent the motion and arrangement of the particles.

3. What energy is stored inside this beaker?

4. What happens to this energy store if we heat the beaker?

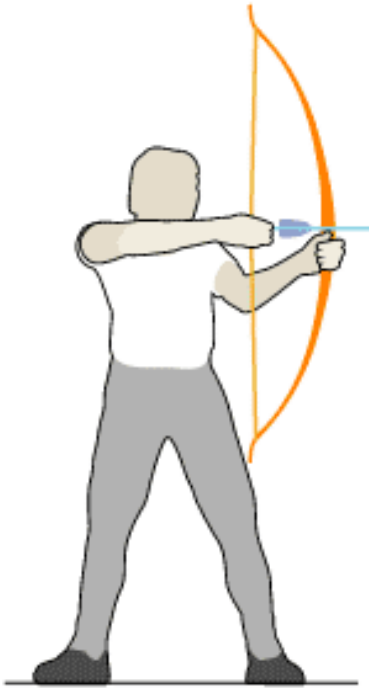
This beaker is at 60 °C



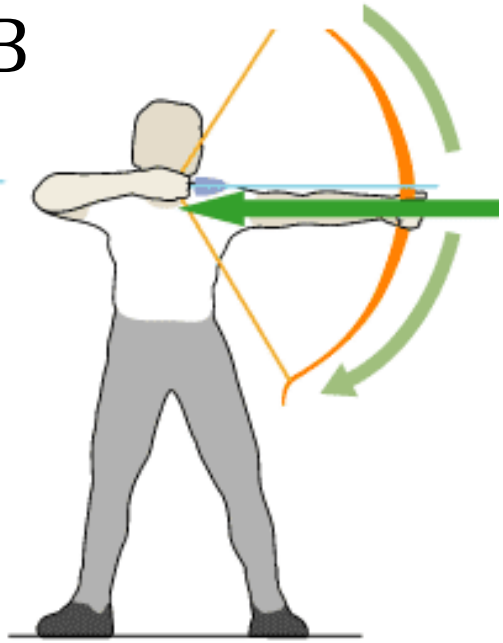


Think, Pair, Share

A

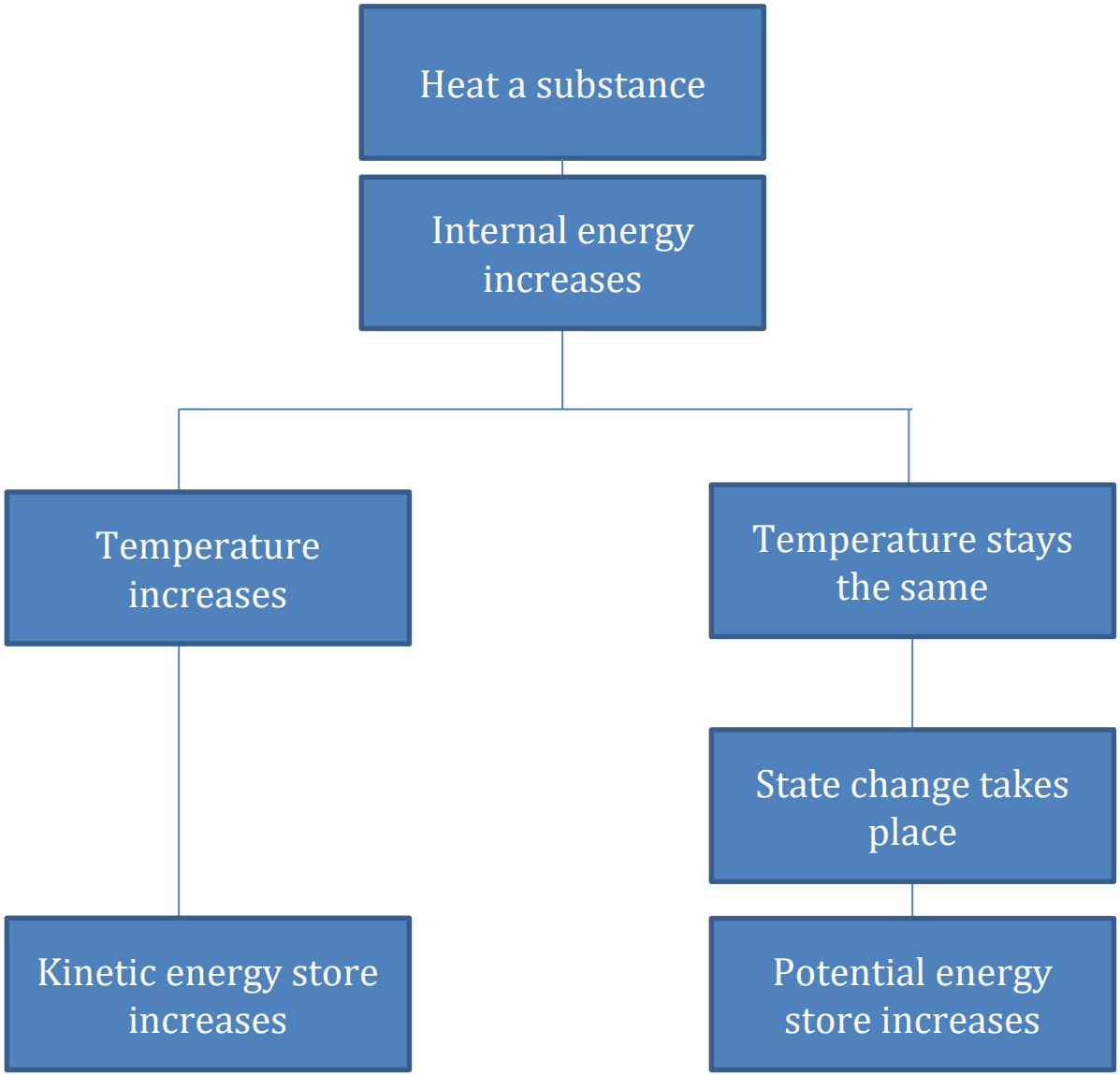


B

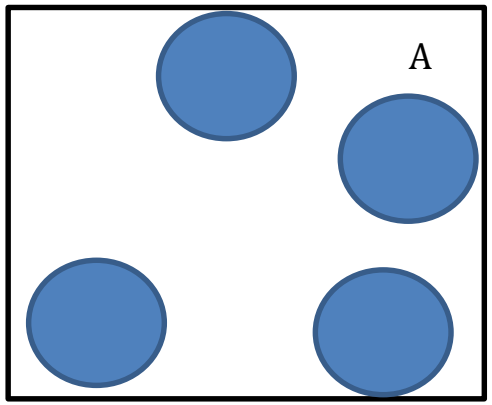


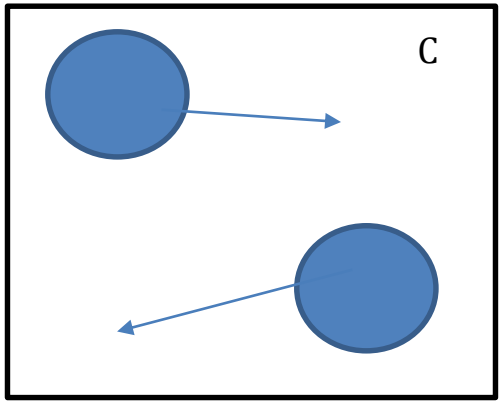
When does the bow have the most potential energy? In picture A or B and explain.

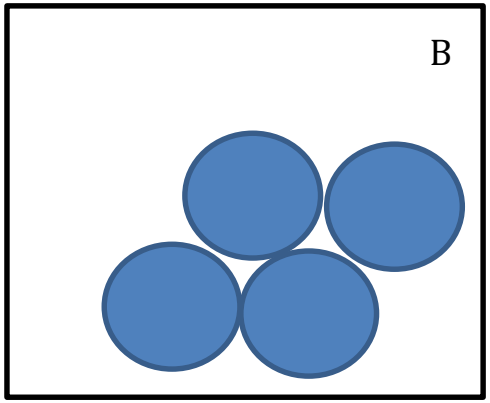
What happens when we heat a substance?

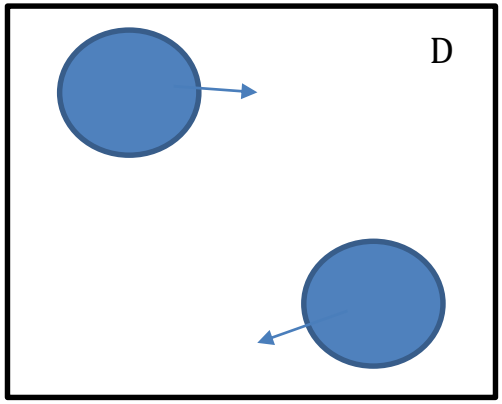


Explain the difference between potential and kinetic energy stores using the pictures below.









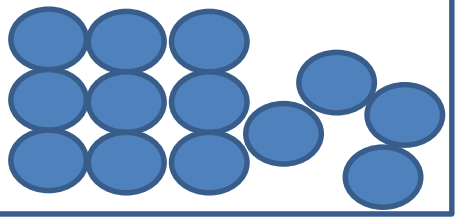
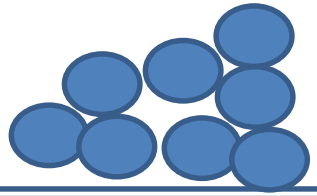
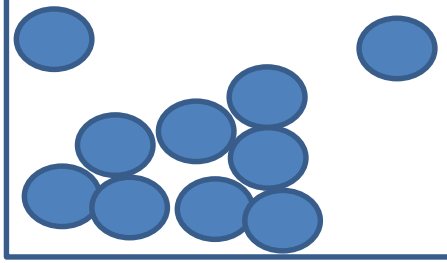
What happens to the internal energy when we heat ice?

DEMONSTRATION: What happens to the internal energy when we heat a beaker of crushed ice?

melting ice	warming water	boiling water
Temperature change: a) increase b) decrease c) remain constant	Temperature change: a) increase b) decrease c) remain constant	Temperature change: a) increase b) decrease c) remain constant
Particle picture	Particle picture	Particle picture
What is happening to the kinetic energy store? a) increases b) decreases c) remains constant	What is happening to the kinetic energy store? a) increases b) decreases c) remains constant	What is happening to the kinetic energy store? a) increases b) decreases c) remains constant
What is happening to the potential energy store and why?	What is happening to the potential energy store and why?	What is happening to the potential energy store and why?

time (min)

What happens to the internal energy when we heat a beaker of crushed ice?

melting ice	warming water	boiling water
Temperature change: a) increase b) decrease c) remains constant	Temperature change: a) increase b) decrease c) remains constant	Temperature change: a) increase b) decrease c) remains constant
Particle picture 	Particle picture 	Particle picture 
What is happening to the kinetic energy store? a) increases b) decreases c) remains constant	What is happening to the kinetic energy store? a) increases b) decreases c) remains constant	What is happening to the kinetic energy store? a) increases b) decreases c) remains constant
What is happening to the potential energy store and why? It is increasing because the substance is changing from a solid to a liquid.	What is happening to the potential energy store and why? It remains constant as there are no state changes.	What is happening to the potential energy store and why? It is increasing because the substance is changing from a solid to a liquid

time (min)