S100: Science: a foundation course
S100/05: Science Course Unit 5

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Clip transcript: A simulation of the movement of molecules in a melting solid.

Alan Walton:
But what happens if I increase the kinetic energy? Would the solid array perhaps melt? Now I'm not going to try and do this with my fingers. We need a lot of balls and I don't happen to have enough fingers. So I built myself a sort of tray where I could vibrate a large number of balls at once.

Here's the tray. It's been shaken randomly by a motor. We've given the tray irregular edges as we're trying to simulate things on an atomic scale. If I pour ball bearings onto the stationary tray they will eventually crystallise out into the kind of lattice we've seen before. Now I'll speed up the tray. I'm increasing the kinetic energy of the simulated atoms. Apart from a small amount of evaporation at the edges, the material remains solid. Watch what happens as I continue to give the bearings more kinetic energy. In other words, as I raise the temperature. The regular crystal structure breaks down. We've evidently gone past the melting point. I repeat the melting experiment but this time I've added a single white bearing to make it easier for you to see what's happening. There's clearly more space available for atomic movement. Just how much more free space can best be seen by comparing photographs of our simulated liquid and solid.