

Line	Speaker	Transcript
1	Teacher	Wait wait one at a time. Ben.
2	Ben	Um, I don't think they, like, they don't enlarge just because of heat, they just get farther apart 'cuz, it's not like they're getting smaller with the- when it turns into ice. They're just getting more tightly packed together. Like in a water bottle, if you freeze it, it blows up, instead of getting-
3	DC	It just expands.
4	Ben	That's what I meant by blowing up.
5	DC	But, blowing up and expands are different things.
6	Ben	DC,
7	Teacher	Good job DC.
8	Ben	OK, now it blow-
9	Student	it expands til watch it explodes
10	Ben	It it blows up as in-
11	DC	It breaks open, it doesn't like- Booom!
12	Ben	It blows up as in the plastic blows out. It makes it bigger.
13	Jack A	It's not a grenade, it's just because-
14	Armando	OK guys!
15	Teacher	Shhh Armando.
16	Jack A	Have you- if you've noticed, like, if you put the water bottle in the freezer or something, how it just, gets expanding, like, 'cause you said that they freeze and they get all packed together so wouldn't packed together mean smaller?
17	DC	No.
18	Jack A	In an occasion(?)
19	DC	Packing together means-
20	Jack A	'cause you know how you should- you could drink a little bit or pour a little bit out because if you just put it in, and freeze it the pop could get all off and the water bottle could get damaged
21	DC	Well, Jack,
22	Jack A	because it expands.
23	DC	Well, connecting, everything, will make it bigger. Say, we were a class and we just huddle in like a giant ball of circle, and we would be- we would be a giant.
24	Jack A	No, we're giant right- if we all went- like huddled together then we'd be smaller.
25	DC	No.
26	Ben	But yeah-
27	Jack A	Like if there's two guys and they're standing right here, but if they weren't together then y'know-
28	Ben	Like if we had kids all around the classroom, and, say, each kid represented a water molecule, and and it's hot water 'cause we're all around the classroom, if we were all packed together like on the rug over there,
29	DC	We'd be big.
30	Ben	We would be big, but we wouldn't have to make the classroom, expand.
31	DC	We would just be expanding ourselves. Well, in the water bot-
32	Teacher	So why does that happen Jack?
33	Jack A	If we're spread out, wouldn't that mean spread out and not packed together-
34	DC	Well Jack,
35	Jack A	A pool of water is expanded more than an ice cube, isn't it?
36	DC	Well Jack, it expands because it's forming into ice, and then the ice expands the cup, which, well the classic bottle- which makes it crack open.

37	Jack A	Yeah, that's what I'm saying. Basically that's what I just said at the beginning and now you're just coming all the way back to it.
38	DC	Yes.
39	Jack A	OK.
40	Teacher	Did we come to some agreement on that coz I heard- I- I- sorry I'm dealing with /??/
41	Jack A	What he did is he went all the way through the stuff and then he just came back to what I said originally, which was if you didn't pour a little bit out of the water bottle or drink a little bit before you put it into the freezer, it would crack open because it expands.
42	Teacher	So how does that go with our theory that I've heard people saying as water molecules, as the water heats up, they start moving, you guys have been saying,
43	Jack A	I know, so-
44	Teacher	And they go so when we co-, when we get cold, it slows down and comes together. That's what you guys've been saying, right?
45	Student	Yeah, that's what the book said so,
46	Jack A	Well what I was saying is a pool of water is more expanding than an ice cube, so-
47	Teacher	so then what happens when it freezes then- because now you're saying, in your words it blows up, right?
48	Student	Well how big is the pool of water and how big is the ice cube?
49	Jack A	Exactly, it could be like a whole pool.
50	Ben	yeah, they like, it become one molecule that's bigger, they can- they get bigger when they merge together, and then they become hard.
51	DC	I agree with you, coz like water would be all like this. This is the water without cold. This is the water when it's cold. And then, when it freezes, it expands.
52	DC	Ben Yeah, coz the-
53	Jack B	But how does it expand?
54	Ben	when it's freezing, the molecules are coming closer and closer together, and, the molecules when they merge and become one, and become ice, they get bigger because they merge and make one big one, that turns into ice.
55	DC	Yeah. I agree with you.
56	Teacher	So you said 'Yeah,' DC, I- I'm not- do we- are we all following that?
57	Jack B	But how does it expand?
58	DC	It expands, 'cause, 'cause it's a solid.
59	Teacher	I'm still confused at that point where we're gettin smaller and smaller and then bbcht. Out.
60	DC	Solids can get bigger.
61	Ben	'Cause when they get smaller and smaller it's when they're merging together,
62	DC	Depending on the /??/
63	Ben	and then when they finally get together,
64	DC	It forms an ice cube.
65	Ben	then it forms a- they can get bigger because they're already one, so the thing merges with other ones and gets bigger.
66	Teacher	But if we all squished ourselves together, if we all squished ourselves together, I don't think we all of a sudden are bigger.
67	April	No I think he's saying like, when they get together, and then they- more come or something. Because we can't, like we can't connect to each other because, like we can't like actually become one like if two of us like-
68	Teacher	So how does that explain that it gets bigger?
69	DC	Miss, well Miss Filner-
70	Jack A	Like if it's a- like let's say-
71	Teacher	Shh, Jonathan, I want to hear from Jonathan. You- you're nodding your head-

72	Jonathan	I- I'm not really following what you guys are sayin-
73	DC	Well Miss Filner-
74	Jack A	Well, here, like, here's what I'm saying.
75	Teacher	All right.
76	Jack A	Here's what I'm saying. If it's like, if it's like, so let's say there's all these molecules between DC, me, Ms. Filner, and Inger. We're spread apart but we're all this big piece of water, but if we pack up in an ice cube, then we're smaller than what we are like in a big thing, so.
77	DC	I actually had froze water.
78	Jack B	But then how does it expand like what you're saying?
79	Jack A	Yeah, exactly, that's the point.
80	DC	But Ms. Filner-
81	Jack B	But how does it expaaand? Do you have a theory?
82	Student	No.
83	Aaron	What Ben's saying-
84	Teacher	Shhh I wanna listen to Aaron. Shh.
85	Teacher	Armando, sit please.
86	Aaron	What Ben's saying is that the water molecules, it like comes together and then when they're like close together, close enough, and then (gestures)
87	DC	I've seen water expand, like I froze things for certain reasons.
88	Ben	I need two pieces of paper.
89	DC	But-
90	Ben	Here, so like-
91	DC	It's like-
92	Teacher	Wait wait wait can DC finish his thought first, Ben?
93	Ben	OK.
94	DC	Well we froze things for certain kinds of reasons. Um, so I froze water with some like in the water but then I took it out because it wasn't freezing, but when I froze it, my cup broke-
95	Teacher	So you have had experience where you frozen things and you've seen that it gets bigger.
96	DC	Yeah
97	Teacher	OK
98	Ben	So, like- pretend there- there's a metaphorical water bottle around this. Aaand, the water molecules, when they merge together like that, then, they go like, thaaat-uckgh it's hard to do this-and made something big like that, and when they merge- and make something big like that, then the molecules just fill inside of it, and then pack together, and become-
99	Teacher	hum-me, I'm- I'm- trying to figure this out-
100	Jack B	I'm not really understanding /??/
101	Teacher	I agree, we've all seen water freeze and get bigger.
102	Jack B	But I don't get this.
103	Teacher	We've also been talking about how, when the water molecules get heated up they get- they start hitting each other more and we talked about them flying off and getting released as the water vapor, that was the original theory.
104	Ben	So, yeah, it's like this. First they merge together, then they go like=
105	DC	And then they expand
106	Ben	then they expand like that
107	Student	How do they expand?
108	Jack B	But Ben-
109	Student	Why do they expand?
110	Jack B	When you did that test for evaporation in the freezer, did the cup break?
111	Ben	It didn't break, but it expanded

112	Teacher	Jack, Inger has a question, so make sure you're not talking over someone before you start. Inger.
113	Inger	It's not a question, but like maybe when like they go together, they like like, you know how like when they when they get heated up, the mol- the molecules go faster. Maybe when they get colder, they move faster and then, it causes them to like get bigger, and freeze, and then, so-
114	Ben	Do we have a microscope?
115	Teacher	I-I kinda, Ben's- Ben's- Y'know it seems silly but his composition notebooks have kind of been helping me think about this, because when he does that thing it's kind of like little spaces, and I'm wondering if, there are some empty spaces or sump'n
116	DC	There are-
117	Teacher	And then it's like /??/ gets bigger to me
118	DC	Miss Filner-
119	Teacher	you know what we are saying about molecules /??/ I'm not sure.
120	DC	When I froze it, like there were these little gaps when I ope- when like it cracked open so I ripped open the rest of the bottle, and so when I looked at it I saw these little pockets of air=
121	Ben	Yeah.
122	DC	inside the ice cube.
123	Ben	It's like they come together and then when they're all together, they can stretch out like- Like what I was doing before.
124	Jack B	But how do they expand?
125	Inger	If like you had a water bottle with like, somehow you had no air in it, if it would still like do it. If there's air caught- if-
126	Teacher	So if we could fill that water bottle to the very very very top-
127	Inger	It would probably explode because it would need to expand but it couldn't.
128	Jack B	But how does it expand?
129	Teacher	So is there air in water?
130	Many students	Yeah, yes, yes.
131	Teacher	Oh! we really could never take the air out then.
132	Student	There's oxygen!
133	Jack A	You know how there's bubbles, you know how there's bubbles in water?
134	Ben	There's oxygen in it.
135	Teacher	Aahhh!! Anybody know what H ₂ O stands for?
136	Ben	Hydrogen and two- there's one hydrogen molecule and then two oxygen molecules.
137	Student	There's one hydrogen and two oxygen.
138	Teacher	Two hydrogen- H ₂ O is two hydrogen molecules and one oxygen molecule=
139	Student	Oh whatever
140	Ben	OK, well I had it reversed but yeah.
141	Teacher	=in a water molecule. So that- see now that I'm thinking about that, /??/ on that little example, I'm like, well maybe that kinda explains it that little water in there kind of, or that air, /??/ around.
142	Ben	yey!
143	Teacher	I wanna go back to Gabe though cause Gabe's been waiting really patiently up here.
144	Gabe	Well, what we were saying before like, you guys were saying like um well we were talking about like two small molecules, like, you were talking about if something, if two, two, like let's just say two water molecules like, OK, say you spilt your cup of water, and you're just looking at the little droplets, have you ever seen like them clump together and make one bigger?
145	Students	Yes, Yeah.

146	Gabe	That's sorta w- that's sort of this, like see, smaller smaller- smaller plus smaller equals bigger.
147	Jack A	That's just going like all the way back to the-
148	Inger	Yeah but if this was for ice, would it still, it wouldn't-
149	Gabe	One plus one equals two.
150	DC	Yeah, and then they come to bind and they get bigger.
151	Inger	Yeah but if it was for ice, it would still be like-
152	Jack B	I'm still wondering- I'm still wondering how do they get bigger? I'm still wondering how does it get bigger.
153	DC	Ice can't combine. Ice can't combine.
154	Teacher	Jack, can you say your question really loud for everybody?
155	Jack B	I'm still wondering how does the water get bigger, 'cause when they're packed together they get smaller.
156	Teacher	I think we're all still kinda wondering about that.
157	Ben	well Jack Jack Jack, like we said-
158	Teacher	We've got some ideas based on Ben's, notebooks there.
159	Ben	Yes, the notebooks tell all. Jack. JACK! Jack. Just, listen. So, the molecules, they come together, and then they make one molecule. And then, once, they're all one big one, they spread apart like that. And then they become bigger when they spread apart. That's why, in ice cubes, there are little, pockets of air.
160	Student	That's why they're bigger cause the air made 'em-
161	DC	Well Jack, there's- water's different than ice. Ice can expand but ice can't clump together. Water can clump together, but ice can't.
162	Ben	Cause water's a liquid.
163	DC	'Cause it's a solid and a solid. Solids can't go like pfft! And combine. It hurts. Ow.
164	Ben	Exactly. They didn't combine. So, liquids, they can combine. I dunno what he's getting on, but-
165	DC	If we took this lunch box, I'm sorry can I use this? This water bottle, do you think that, will these combine?
166	Jack B	How can you be so sure that um ice cubes are hollow?
167	Ben	Because I've bitten into one
168	DC	If you use glue they can but- it's hard.
169	Ben	They're not completely- Jack, ice cubes aren't completely hollow. They just have little pockets of air.
170	Student	Little tiny-
171	Student	That aren't like visible.
172	Ben	Tiny, tiny, pockets of air.
173	DC	Do you guys know when you put your cup full of water, and then you put ice cubes in it and they crack, the ice crack? That's the- that's the um air pockets opening.
174	Student	That's just like the hot and the cold...mixing.
175	Student	That's the cold meeting with the hot.
176	Jack A	Well like, going back to the ice thing, if, if this piece of paper was just like a puddle, and I don't want to crinkle it up, but if you would crinkle this up, it'd be like this one ball, so it can just /??/
177	Student	Oh yeah that's a good example.
178	Jack A	Yeah, like, let's say, let's say,
179	Ben	Here you can use this.
180	DC	Hey that's mine!

181	Jack A	this, or whatever this is. Anyways, it has some cool drawing on it um. If you had this flat piece of paper, I'll make it flat as possible, this is a puddle. When it freezes, it goes into a state where it's getting- all of them are going together, but there could be like, pockets of air inside of this because, when they're forming together there's air around it so it can just go wwhwhhh.
182	Ben	Yeah wait! I can expand on that. Let me see the paper.
183	Student	Get it, expand?
184	Ben	Yeah haha. OK, so when they come together like that, then, they can expand like that and they pull apart, and expands, and become bigger, and just leave little pockets of air in between.
185	Teacher	Hmm. I'm not completely convinced yet, Jack, but it's given me some think- some things that I can think about. I- like I said, now that I've seen that, and we've talked about, "k there's water in there." K I need to do some more thinking about this. Maybe we can propose some experiments what we can do with freezing water.