一张纸托起了十二个砝码

十月二十一日 星期二 晴

今天的科学课一开始就不一样。上课铃刚响，王老师抱着一只大纸箱走进来，说每人先别动，材料按小组发。我们四人组依次领到：一张A4纸、四个一样的纸杯、一小盒砝码。王老师在黑板上写下任务：只用这张纸和四个杯子搭一座桥，桥面不能碰桌子，看谁的桥托得住最多的砝码。全班嗡的一声，有人说一张纸能托什么呀，纸那么软。

我们组先吵了一小架。李想说要直接把纸架在杯子上，我觉得那样一放就塌。组长周舟说别争了，一人试一种。李想先试，纸平铺在两个杯子上，第一个砝码放上去，桥就弯了，第二个放上去，纸滑下杯子，掉在桌上。我们笑了一下，不是笑他，是那个掉下来的声音太干脆了。

轮到我。我把纸对折了一次再架上去，撑到第三个砝码，纸从折痕那里对折塌下去。周舟拿出他的办法，把纸折成波浪形，一道一道像手风琴的风箱，架上去以后，第五个砝码没塌，第六个也没塌。我们四个脑袋全凑过去，屏着气。第七个，桥身抖了一下，坐在最边上的陈晨伸手想扶，被周舟一把拉住：别碰！陈晨的手停在半空，半天没放下来。

第八、第九、第十个，桥还在。我们组的声音开始压不住，旁边组回头看我们。第十一个放上去，纸的边缘已经陷下去了，我盯着那道波浪，心里数数。第十二个，我手抖着放上去，桥晃了两下，稳住了。十二个！我们四个先后跳起来，在桌子中间击了一串掌，手都拍红了也不觉得疼。

最后全班测下来，我们组的十二个排第二，第一名那组把纸折成了空心管子，托了十五个。王老师让我们两组上台讲为什么，周舟讲波浪，那组讲管子。我忽然明白纸还是那张纸，软不软是形状说了算。

放学路上我一直在想那半秒钟：陈晨的手停在半空，谁都没碰桥，桥却撑住了十二个砝码。一个人做的时候我早就去扶了，是四个人一起，才忍住了那只手。

One Sheet of Paper Held Twelve Weights

Tuesday, October 21. Sunny.

Today's science class felt different from the first minute. Right after the bell, Mr. Wang walked in carrying a big cardboard box and told us nobody move yet, materials would be handed out by group. Our group of four received, one by one: one sheet of A4 paper, four identical paper cups, and a small box of weights. He wrote the task on the blackboard: build a bridge using only this paper and these cups, the bridge deck may not touch the desk, and see whose bridge can hold the most weights. The whole class buzzed. Someone said, what can one sheet of paper hold? Paper is so soft.

Our group argued a little first. Li Xiang said just lay the paper flat across the cups. I said that would collapse the moment we placed anything. Our group leader Zhou Zhou said stop arguing, each of us tries one way. Li Xiang went first: paper flat on two cups, the first weight bent the bridge, the second made the paper slide off the cups and fall on the desk with a crisp sound. We laughed, not at him, but because that falling sound was so final.

Then it was my turn. I folded the paper once and laid it up; it held three weights before it collapsed along the crease. Zhou Zhou brought out his idea: he folded the paper into waves, pleat after pleat like the bellows of an accordion. Once it was on the cups, the fifth weight did not break it, nor the sixth. All four of our heads leaned in, holding our breath. At the seventh, the bridge trembled, and Chen Chen, sitting at the edge, reached out to steady it. Zhou Zhou grabbed his arm: Do not touch! Chen Chen's hand hung in midair and did not come down for a long moment.

Eighth, ninth, tenth, and the bridge still stood. Our voices started bubbling over, and neighboring groups turned to look. With the eleventh weight, the paper's edges were already sinking, and I stared at the wave line, counting in my head. The twelfth I placed with shaking fingers. The bridge swayed twice, then settled. Twelve! The four of us jumped up one after another and clapped a chain of high-fives across the table. Our palms were red and it did not even hurt.

In the end, our twelve weights ranked second in the class. The winning group had folded their paper into a hollow tube and held fifteen. Mr. Wang asked both groups to come up and explain why. Zhou Zhou explained waves; they explained tubes. It hit me then: the paper was still that same paper. Whether it is soft or strong is decided by its shape.

On the way home I kept returning to that half second: Chen Chen's hand frozen in midair, nobody touching the bridge, and the bridge holding twelve weights anyway. If I had been alone, I would have steadied it. It took four people together to hold that hand back.

小苏打和白醋，把气球吹起来了

十一月十二日 星期三 小雨

今天科学课，林老师推着一辆小推车进教室，车上摆着一排排材料袋。她说今天做气球自己吹起来的实验，材料每组一份：一个透明塑料瓶、半杯白醋、两勺小苏打、一个没吹过的气球。我们组五个人围着桌子看材料，赵一凡把气球拿起来对着嘴就要吹，被林老师一把按住：先别吹，今天不许用嘴。

实验步骤老师写在黑板上：先把白醋倒进瓶子，再把小苏打装进气球，然后把气球口小心地套在瓶口上，最后把气球竖起来，让里面的小苏打倒进瓶子。听起来顺，做起来全是岔子。装小苏打的时候，漏斗太小，一半洒在桌上；套气球的时候，孙磊手笨，气球口撑不开，我们轮流帮他撑，好不容易套上，他手一抖，气球又弹掉，白醋溅出来一点，闻着呛鼻子。

第一次竖气球，小苏打哗地倒进瓶子，瓶里立刻咕嘟咕嘟响，白沫往上涌，可是气球口没套严，气从缝里跑，吱吱地叫，气球只鼓了半个脑袋就蔫了。我们组集体唉了一声。我检查了一下，把气球口往外翻过去扣紧瓶颈，又捏了捏接口。林老师路过看了一眼说，检查是对的，再来。

第二次，我把气球慢慢竖起来，小苏打一点点滑进白醋里。瓶子先是安静，然后从瓶底升起一大团气泡，咕嘟咕嘟越冒越急，白沫涨到瓶脖子。就在这时，气球自己动了，先是鼓起一个包，然后圆滚滚地站直，越胀越大，摸上去硬邦邦的。气球吹起来了！它是我们组五个人一起看着它吹起来的。孙磊喊得最响，隔壁组的人全围过来，连林老师都走过来，站在我们桌边看那个气球，说这组第二次修好了接口，这就是实验。

下课的时候气球还鼓着，我们把它放在讲台边上，它慢慢瘪下去，瓶子里的水一停一停地响。我把今天记进日记：失败的那一次不是白失败的，它教会我们检查接口。还有，气球不用嘴吹也能起来，瓶子里那两个东西见面，就有一口气从它们中间生出来。

Baking Soda and Vinegar Blew Up the Balloon

Wednesday, November 12. Light rain.

In science class today, Ms. Lin pushed a small cart into the room, lined with bags of materials. She said we would do the experiment where a balloon inflates itself, one set per group: a clear plastic bottle, half a cup of white vinegar, two spoons of baking soda, and an uninflated balloon. The five of us gathered around the table to look. Zhao Yifan picked up the balloon and raised it to his mouth to blow, and Ms. Lin caught his hand: not yet, no mouths allowed today.

The steps were on the blackboard: pour the vinegar into the bottle, put the baking soda into the balloon, carefully stretch the balloon's mouth over the bottle's neck, then lift the balloon upright so the powder slides into the bottle. It sounded smooth; doing it was all bumps. The funnel was too small, and half the baking soda spilled on the table. Sun Lei could not stretch the balloon's mouth open, so we took turns helping him. We finally got it on, his hand slipped, the balloon snapped off, and a splash of vinegar flew out, stinging our noses.

The first time we lifted the balloon, the powder poured in, the bottle began to gurgle, white foam rising, but the seal was not tight. Air hissed out of the gap, and the balloon swelled halfway and then wilted. Our whole group groaned together. I checked the joint, folded the balloon's mouth outward over the neck of the bottle,

and pinched it tight. Ms. Lin passed by, took one look, and said: checking is right, do it again.

The second time, I raised the balloon slowly, and the baking soda slid little by little into the vinegar. At first the bottle was quiet, then a great cloud of bubbles rose from the bottom, gurgling faster and faster, the foam climbing to the neck. Just then the balloon moved on its own: first a bump, then it stood up round and fat, growing bigger and bigger, hard when touched. The balloon inflated! Five of us watched it inflate together. Sun Lei shouted the loudest. Groups from next door crowded over, and even Ms. Lin came and stood at our table looking at that balloon. She said this group fixed the seal on the second try, and that is what an experiment is.

At the end of class the balloon was still round. We set it on the edge of the lectern, and it slowly softened, the liquid in the bottle ticking now and then. I wrote today into my diary: the failed attempt was not wasted; it taught us to check the joint. And a balloon can rise without a mouth. When those two things in the bottle meet, a breath of air is born right between them.

我们的缝衣针，认出了北方

十二月八日 星期一 晴转多云

今天科学课，吴老师拎着一个铁盒进来，说今天每组做一只自己的指南针，不许用现成的。铁盒打开，材料一样一样传过来：一根缝衣针，一块条形磁铁，一小片泡沫，一个装了水的浅盆，还有一小截蜡烛。我们组四个人传着看，针细得反光，谁捏着都怕扎手。吴老师在黑板上画了步骤：用磁铁的一极，顺着针尖的方向磨，只能单向磨，磨三十下，然后把针横放在泡沫片上，泡沫片放进水盆，别碰它。

我们组分工：我数数，方苗苗磨针，罗小川放泡沫，何一诺负责把手从盆边拿开，因为他总想扶。方苗苗捏着磁铁在针上蹭，蹭到第十下来回蹭了，我喊停，重来。她嘟囔着说来回蹭不是更匀吗，吴老师听见了，走过来只说了一句：磁体里的队伍要朝一个方向排队，来回蹭，队伍就乱了。方苗苗重新从针尾往针尖蹭，我数到三十，声音都不敢大。

第一次放进水盆，泡沫片歪着，针转了半圈，停停走走，就是不肯指一个方向。我们组四个人围着盆，何一诺的手又伸出去，被我用胳膊肘顶回来。罗小川说是不是针不够磁，我想起磁铁只蹭了一面，就说换另一极再磨三十下。第二次，方苗苗磨的时候我们三个全盯着她的手，一下都不能少。

泡沫片第二次漂进盆里，针慢慢转，像有人在水底下轻轻拨它。转了大半圈，它停了，针尖指着窗户那一边。吴老师拿出手机指南针放在盆旁边比对，针尖和手机上的北差不了几度。我们

组先是没出声，四个人围着水盆，看那根针稳稳地钉在北方。然后不知道谁先喊了一声，四个人一起跳，盆里的水被桌子震得晃，针又转了，我们又屏住气等它指回去。

下课好多人围着我们的盆看。吴老师说，那根针里排好了队，所以它认得北。我把今天写进日记，还写了一句我自己的：我们组第一次也是来回蹭乱了队，跟平时讨论题各说各的差不多。第二次都听一个方向，针就指北了。原来排队这件事，针要排，人也要排。

Our Sewing Needle Found North

Monday, December 8. Sunny turning cloudy.

In science class today Ms. Wu came in carrying a tin box and announced that each group would make its own compass, with no store-bought ones allowed. The box opened and materials passed down the rows: one sewing needle, one bar magnet, a small raft of foam, a shallow basin of water, and a stub of candle. The four of us in my group passed them around. The needle was thin and flashing, and everyone who held it feared the prick. On the blackboard Ms. Wu drew the steps: with one pole of the magnet, stroke the needle from tail toward point, in one direction only, thirty strokes; then lay the needle across the foam raft and set the raft in the water, and do not touch it.

We split the work: I counted, Fang Miaomiao stroked the needle, Luo Xiaochuan placed the raft, and He Yinuo was in charge of keeping his hands off the basin, because he always wanted to steady it. Fang Miaomiao rubbed the magnet along the needle, and at stroke ten she started going back and forth. I called stop and we restarted. She muttered, is not back and forth more even? Ms. Wu heard her, walked over, and said one thing: inside a magnet the little troops must all face one direction; rub back and forth and the ranks fall into chaos. Fang Miaomiao started again from tail to point, and I counted to thirty, barely above a whisper.

The first time the raft went into the basin, it sat crooked, the needle spun halfway around, stopping and starting, refusing to point anywhere. The four of us circled the basin. He Yinuo's hand drifted out again, and I nudged it back with my elbow. Luo Xiaochuan said maybe the needle was not magnetic enough. I remembered we had used only one pole, so I suggested switching poles and stroking thirty more. The second time, all three of us watched Fang Miaomiao's hand while she stroked, not allowing a single stroke to go missing.

The raft floated in for the second time. The needle turned slowly, as if someone under the water were gently turning it. After most of a circle, it stopped, its point aimed at the window side. Ms. Wu held her phone compass next to the basin and compared: our needle's point was within a few degrees of north on the screen. For a

moment our group made no sound at all, four of us around the basin, watching that needle stand firm in the north. Then someone shouted first, and all four of us jumped, the water in the basin rippling from the shaking table, the needle spinning again, and we held our breath once more waiting for it to find north a second time.

After class a crowd gathered around our basin. Ms. Wu said the troops inside that needle had fallen into rank, so it knows north. I wrote today into my diary and added one line of my own: our first attempt failed because back-and-forth rubbing broke the ranks, which is a lot like how we usually argue in group discussions, everyone talking at once. The second time we all followed one direction, and the needle pointed north. So falling into rank is something needles must learn, and people too.