POP SCIENCE!

A Sweet Temperature Experiment

Introduction

Science time has been full of sweet discoveries this year! Our 2nd & 5th grade buddy classes enjoyed working together while having a fun treat— the Tootsie Pop! While we were licking our pops, we started asking: how many licks does it *really* take to get to the center of a Tootsie Roll Tootsie Pop?

Then we got even more curious. We wondered about summer temperatures versus winter temperatures. On a super hot day, does a lollipop take fewer licks to get to the center? Does the freezing cold make it last longer? Or could it actually be the other way around?

That's when our big science question was born! Could temperature change how many licks it takes to reach the center? Our second grade class is put this sweet mystery to the test with the help of our fifth grade buddies! We are investigating how many licks it takes to reach the Tootsie Roll center of a Tootsie Pop — and whether temperature makes a difference!

Question

Does the temperature of a Tootsie Roll Tootsie Pop affect how many licks it takes to reach the center?

Research

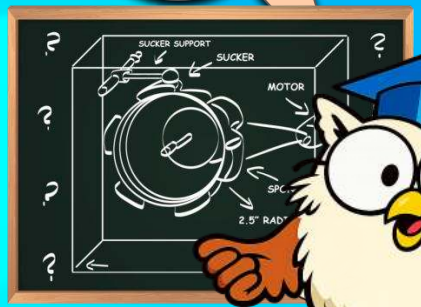
Tootsie pops are mostly made of sugar.

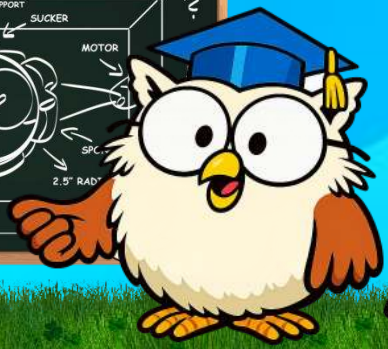
Sugar dissolves in liquid. Our tongue transfers liquid to the lollipop.

Hot liquid melts sugar faster than cold liquid.

Fun fact:
In 2015, a group of Purdue University students used a licking machine to try to answer the licks (without temperature) question.

We know our tongues are pretty hot – about 98° F!





Hypothesis

If we lick both room temperature Tootsie Pops and frozen Tootsie Pops to test the age-old question (how many licks does it take to get to the center?), then:

25 of our classmates think it will take more licks to get to the center of the frozen Tootsie Pop.

23 of our classmates think it will take more licks to get to the center of the room temperature Tootsie Pop.

Procedures

1. **Prepare the Tootsie Pops**
   - Put half (24) of the Tootsie Pops in the **freezer** for at least 1 hour and leave the other half at **room temperature** .

2. **Pair Up Students**
   - Each **2nd grader** will be paired with a **5th grade buddy** .
   - One student will lick a frozen pop and one will lick a room temperature pop.
   - Both will record the number of licks on their own data sheet.

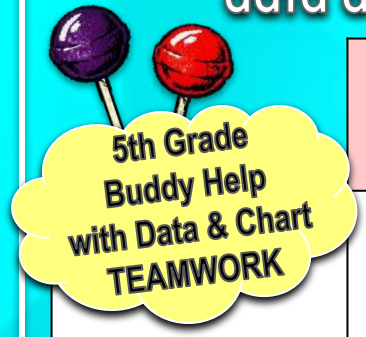
3. **Explain the Rules**
   - Only **lick** the Tootsie Pop—no biting or chewing.
   - Count **every lick** carefully and stop licking when the **center of the Tootsie Pop can be seen or felt.**

4. **Conduct the Experiment**
   - Give the student a Tootsie Pop from either the frozen or room-temperature group.
   - Both students lick their pops while counting/recording each lick.
   - Record the total **number of licks** on the data sheet.

Materials

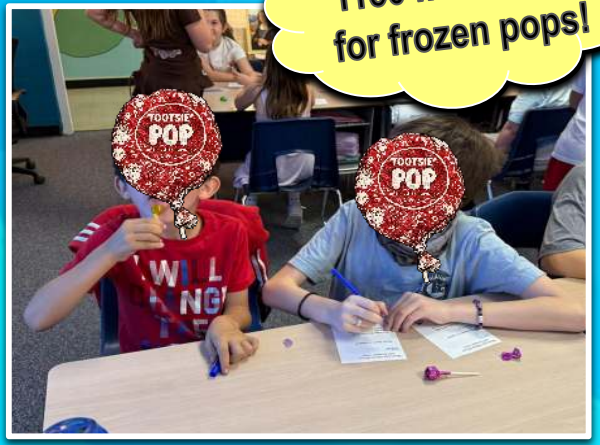
- 48 participants (2 buddy classes)
- 48 same size Mini Tootsie Roll Tootsie Pops
- Freezer
- Data recording sheets
- Pencils

Even though our experiment was about temperature (and not color), we broke our data down into groups by color due to the amount of data points.

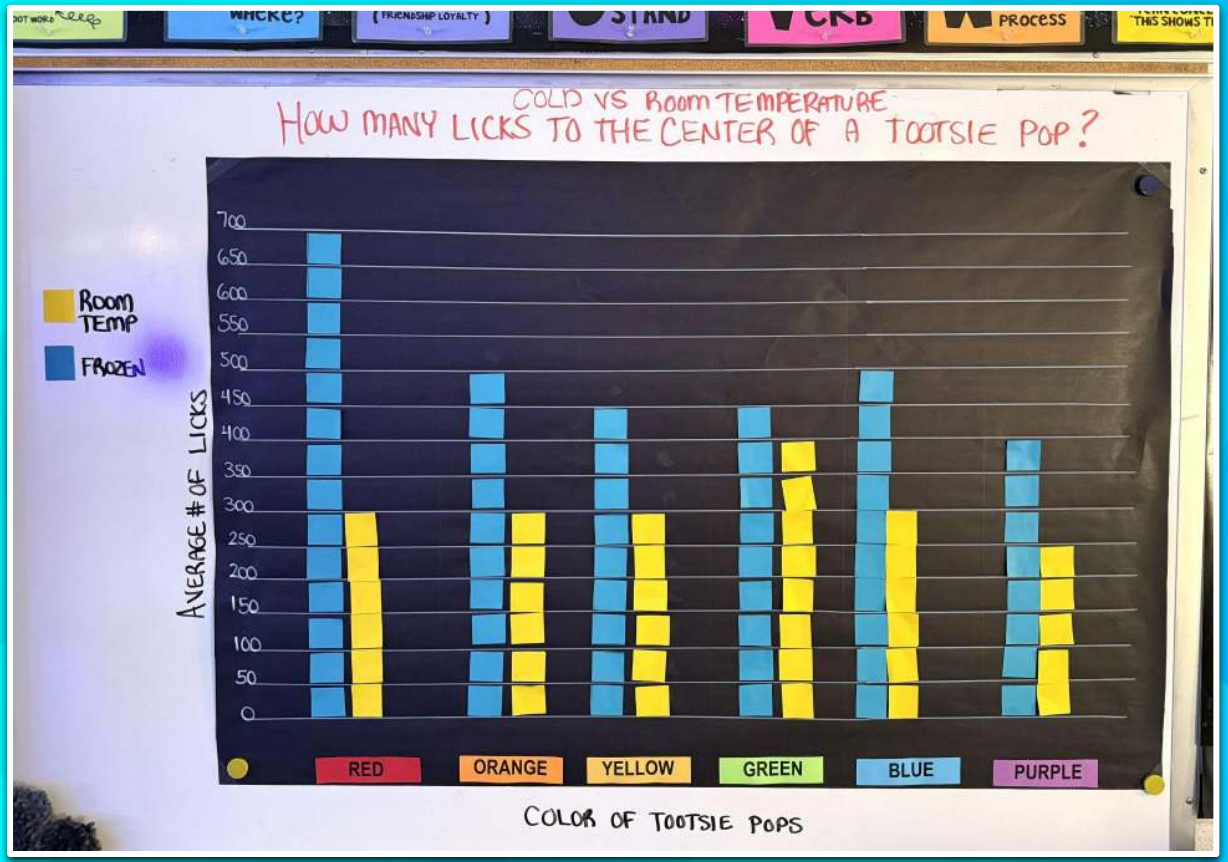


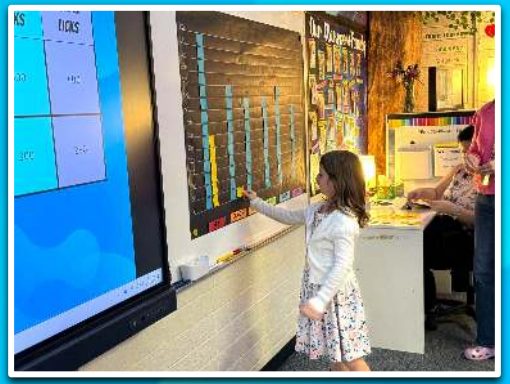
	Red Licks	Orange Licks	Yellow Licks	Green Licks	Blue Licks	Purple Licks	Total # Of Licks
Frozen Tootsie Pops	[1] 980 [2] 564 [3] 580 [4] 600 **2724**	[1] 474 [2] 560 [3] 465 [4] 553 **2052**	[1] 150 [2] 554 [3] 644 [4] 570 **1918**	[1] 730 [2] 249 [3] 411 [4] 418 **1808**	[1] 450 [2] 628 [3] 354 [4] 632 **2064**	[1] 350 [2] 380 [3] 550 [4] 280 **1560**	**12,126 FROZEN LICKS**
Average	681	513	471	452	516	390	**505**
Room Temperatur e Tootsie Pops	[1] 407 [2] 345 [3] 367 [4] 145 **1264**	[1] 330 [2] 275 [3] 210 [4] 413 **1228**	[1] 385 [2] 425 [3] 200 [4] 174 **1184**	[1] 526 [2] 500 [3] 331 [4] 195 **1552**	[1] 347 [2] 280 [3] 265 [4] 300 **1192**	[1] 365 [2] 282 [3] 159 [4] 254 **1060**	**7,480 REGULAR LICKS**
Average	316	307	296	388	298	265	**312**

	Red Licks	Orang e Licks	Yellow Licks	Green Licks	Blue Licks	Purple Licks	TOTAL
Frozen *Rounded* Average	700	500	450	450	500	400	**3000**
Room Temp *Rounded* Average	300	300	300	400	300	250	**1850**



1150 more licks for frozen pops!





Teacher: *What do you notice now that your bar graph is complete?*
Students: *Whoa! Frozen Tootsie Pops take so many more licks!*

2nd graders created a bar graph of their results with the help of their buddies.

Student Discussion

How many more licks did it take to get to the center of a frozen lollipop?

Buddy Help: It took 1150 more licks to get to the center of the frozen ones!

Why do you think it takes longer to get to the center when the lollipop is frozen?

Maybe, because it is so cold, we have to wait until our tongue unfreezes it.

How does the bar graph help you understand your data?

We can easily see the taller bars which tell us the frozen pops took more licks.

Did you have fun?

Yeah!! Can We Do More Science?

Conclusion

In this experiment, we tested whether the temperature of Tootsie Pop lollipops affects how long it takes to get to the center. We did this experiment because the cold weather made us want to find out if frozen or room temperature lollipops take more licks to reach the center. Our hypotheses were mixed, but more of us thought that frozen Tootsie Pops would take more licks to get to the center.

Based on the experiment, frozen Tootsie Pops take more licks to get to the center than room temperature Tootsie Pops. This supports our majority class hypothesis that frozen Tootsie Pops would take more licks. The data shows that after licking 48 mini pops, it took 1,150 more total licks to reach the center of the frozen lollipops, which is about 24 more licks on average per frozen Tootsie Pop.

One possible problem with the procedures was that everyone has different tongue sizes and licking styles, which might have changed the number of licks. We tried to minimize this by having many students participate to average the results. After conducting this experiment, new questions we have are whether larger Tootsie Pops would also take longer to reach the center when they are frozen and if other candy styles vary in different temperatures.

Research Sources

Scientific American: Make Mouthwatering Candy Melt, July 6, 2017
https://www.scientificamerican.com/article/make-mouthwatering-candy-melt/?utm_source=chatgpt.com

Tootsie Pops Ingredients & Scientific Studies
https://tootsie.com/products/tootsie-pops/?utm_source=chatgpt.com

Thank You

Thank you for helping us with our science experiment 5th grade, from your 2nd grade buddies!

Thank you to our teachers for letting us eat Tootsie Pops in class!