

Science Fair LogBook

Dec 7:

Today the teacher introduced science fair and we needed to look for different projects

Project Ideas:

Which ice cream melts fastest?

Something to do with soccer and air pressure

What material melts ice the fastest, salt, sand etc

Which brand melts ice the fastest

Dec 12- 16

Big Question: **What brand of ice melt melts ice the fastest?**

We then came up with some research questions to help us with our project

Research:

- What type of ice melt is used at school, at home and on our roads and why?
- When and how is ice melt used?
- What substances are scientifically proven to melt ice well and why?
- What is freezing point depression?
- What substances that melt ice are pet friendly and good for the environment?
- Which ice melt is the most cost effective?
- Why is salt, sand, and gravel used on roads and sidewalks?

Why does salt melt ice?

When salt is put on ice, it does not melt the ice

Water is a liquid, Water molecules are made up of one oxygen atom bonded to two hydrogen atoms. When water is cooled to 0°C or lower, the water molecules get together and form a crystalized structure known as ice. Ice is a solid.

Salt is a natural mineral found in the earth. It is an ionic compound (Sodium Chloride, NaCl).

When salt hits ice it separates into sodium and chloride ions. These ions break up the crystalized structure of ice by pushing the water molecules apart. This prevents them from forming a solid.


When salt is added to ice, even if the temperature is below freezing it breaks up the water molecule structures and the solid turns into a liquid. Salt lowers the freezing point of water–this is called **freezing point depression**. Salt melts ice when the temperature is as cold as -9.4°C . Salt (NaCl) doesn't melt ice when it is below freezing.

<https://www.youtube.com/watch?v=JkhWV2uaHaA>


We then decided to ask people what they use so we went around and asked the caretaker what brand they use at school, we asked our dad and finally we looked at what the city of calgary uses on the roads.

Everyone used a different product so we set out to research the different products and the benefits and drawbacks of each.


Alaskan Pet Friendly Ice Melter

Manufacturer's Product Description	<ul style="list-style-type: none"> Developed in collaboration with a veterinarian Gentle on your pet's paws Gentle on vegetation and grass Safe on concrete (if used as directed) No residue that can be tracked into the home Works effectively at temperatures as low as -26°C Removes ice 2x faster compared to the previous Alaskan® Pet Friendly Ice Melter formulation 	
Crystal/pellet description	<ul style="list-style-type: none"> 1-2 mm smooth pellets Light brown/tan opaque pellets 	
Ingredients	<ul style="list-style-type: none"> Blend of calcium chloride, sodium chloride and a hydrating agent 	
Retail Price	<ul style="list-style-type: none"> 4.5 kg Jug for \$18.99 	

Paw Thaw Ice Melter

Manufacturer Product Description	<ul style="list-style-type: none"> Fast acting: works fast to break down the bond between ice and the surface below Protects pet paws: Because it doesn't contain rock salt or calcium chloride like other melters Paw Thaw won't cause your pet's paws to dry out and crack. Prevents slips and falls Safe for concrete and patios Safe for grass and pets. The non-hygroscopic formula is water soluble and odorless, so it's less harmful to grass, trees and other vegetation. Effective to -18°C The time-released formula stays on the surface area longer to control the freeze-thaw cycle, and there's no sticky residue to adhere to paws, footwear, or carpets. 	
Crystal/pellet description	<ul style="list-style-type: none"> 1-1.5 mm rounded and smooth crystals Light blue transparent crystals 	
Ingredients	<ul style="list-style-type: none"> CMA (Calcium Magnesium Acetate) Anti-corrosion spray Anti-caking agent/ph adjuster Sodium chloride Dye 	
Retail Price	\$18.89 per 5.5 kg	
Price per 100 g		

Yardworks EnviroSAFE Ice Melter Enhanced with CMA (calcium magnesium acetate)

Product Description	<ul style="list-style-type: none"> Less harmful for surfaces and pets Fast acting and long lasting formula works immediately upon contact and stays on surfaces longer for added protection Advanced anti corrosive formula When used as directed it will no harm grass, wood, concrete, metals or vegetables Safer for pets, children and the environment 	
Crystal/pellet description	<ul style="list-style-type: none"> 1-1.5 sharp crystals Light blue (translucent), grey and dark blue (opaque) crystals 	
Ingredients	<ul style="list-style-type: none"> Magnesium Chloride Calcium Magnesium acetate 	
Retail Price	<ul style="list-style-type: none"> \$10.99 per 10 kg 	
Price per 100 g		

Sifro Safe Step Ice Salt

Product Description	<ul style="list-style-type: none"> Melts ice to -15°C 5°F Unique screening process for improved spreading and more effective melting Our most economical ice melter Do not use on poor quality concrete less than a year old Apply early to prevent ice build up and bonding 	
Product Description	<ul style="list-style-type: none"> 2-3 mm sharp edged crystals Off white and grey transparent crystal 	
Ingredients	<ul style="list-style-type: none"> Sodium Chloride 	
Retail Price	\$7.99 Per 20 kg	
Price		

Heavenly sources fine himalayan pink salt

Manufacturer Product Description	<ul style="list-style-type: none"> SEA SALT- Iodized Sea Salt 1 Kg. by Heavenly Spice Sea Salt is more <u>nutritious</u> than regular table salt. It's the choice of cu
Crystal/pellet description	<ul style="list-style-type: none"> Sodium Chloride Magnisum Chloride Calcium Magnesium acetate)
Product Description	<ul style="list-style-type: none"> Tiny powdery crystals Smooth fine light and bright pink grains
Ingredients	<ul style="list-style-type: none"> Himalayan rock salt Potassium Iodide
Retail Price	\$1.25 per 450 g
https://www.youtube.com/watch?v=JkhWV2uaHaA	

Kirkland Sea Salt

Manufacturer Product Description	<ul style="list-style-type: none"> The finest restaurants and chefs worldwide recognize Sea Salts for its distinctive quality
Crystal/pellet description	<ul style="list-style-type: none"> Sodium Chloride Magnisum Chloride Calcium Magnesium acetate)
Product Description	<ul style="list-style-type: none"> Sharp edged crystals 0.2 mm translucent white crystals
Ingredients	<ul style="list-style-type: none"> Seasalt Potassium Iodide
Retail Price	\$
Price	

Heavenly Spices Sea Salt

Manufacturer Product Description	<ul style="list-style-type: none"> SEA SALT- Iodized Sea Salt 1 Kg. by Heavenly Spice Sea Salt is more <u>nutritious</u> than regular table salt. It's the choice of cu
Crystal/pellet description	<ul style="list-style-type: none"> Sodium Chloride Magnisum Chloride Calcium Magnesium acetate)
Product Description	<ul style="list-style-type: none"> Tiny powdery crystals Smooth fine white rounded grains
Ingredients	<ul style="list-style-type: none"> Sea salt Potassium Iodide
Retail Price	\$1.00 per 1kg
Price	



We then looked at which of these products would be environmentally friendly

What makes ice melt pet friendly?

Many ice melt brands contain different types of chlorides which can harm and potentially kill pets and animals.

Chloride can cause severe skin reactions, kidney failure, stomach upset and gastrointestinal issues in pets.

The shape of the ice melt substance/chips can also affect animals. Some ice melt chips or crystals are sharp and damage the skin or paws of animals.

<https://safepaw.com/product/safe-paw/#data-sheets>

What to look for in a ice melt product

After researching and testing we recommend that if you are looking for an ice melt you don't only need to look for the product that melts ice the fastest.

You should look for products that contain Calcium Magnesium Acetate (CMA) because its pet and environmentally friendly.

While sodium chloride melts ice quickly, large amounts are not good environment and wildlife. CMA products are fast acting.

Look for products that have smooth and round crystals and are translucent blue and grey. These products are not only fast acting and efficient they are better in the long run.

What is calcium magnesium acetate

Calcium Magnesium Acetate (CMA)

Calcium Magnesium Acetate is a common ingredient in a lot of ice melts. It is an environmentally friendly de-icing and anti-icing compound. CMA works by preventing snow and ice from sticking to surfaces. It is chloride free and biodegradable making it less harmful to plants. It is also pet and animal friendly. It also has less residue than other compounds that melt ice such as salt. It may not be as effective in really cold temperatures as some chloride products and can melt ice slower.

<https://ninjadeicer.com/blogs/resources/calcium-chloride-vs-calcium-magnesium-acetate-which-should-you-choose#:~:text=Pros%20of%20Calcium%20Magnesium%20Acetate%20for%20Ice%20Melting&text=Pet%20and%20wildlife%20friendly%3A%20CMA,compounds%2C%20resulting%20in%20cleaner%20surfaces.>

Dec 14

At school we learned about variable and then had to apply it to our experiment. We learned that the independent variable is the one you change and the dependent is what happens. We also learned about control variables.

The variables for our experiment are:

Independent: Brand of ice melt

Dependent: How fast the ice melts amount of liquid in mL

Control:

- Temperature of air (3°C) in the refrigerator
- Shape and size of ice cubes
- Amount of ice (50 grams)
- Amount of substance added (10 g)
- Time ice and ice melt is out of the refrigerator
- Spread of the ice melt on ice
- Size, shape and material of beakers

Dec 16: We learned about creating a hypothesis as an If...then statement

We each wrote our own hypothesis

georges hypothesis: i think the yardworks ice melter will melt the ice the fastest because of the magnesium choride. magnesium chloride melts the ice at cooler temperures

jack hypothesis: i think paw thaw wiill melt the ice the fastest because of the mix of sodium and magnesium acetate

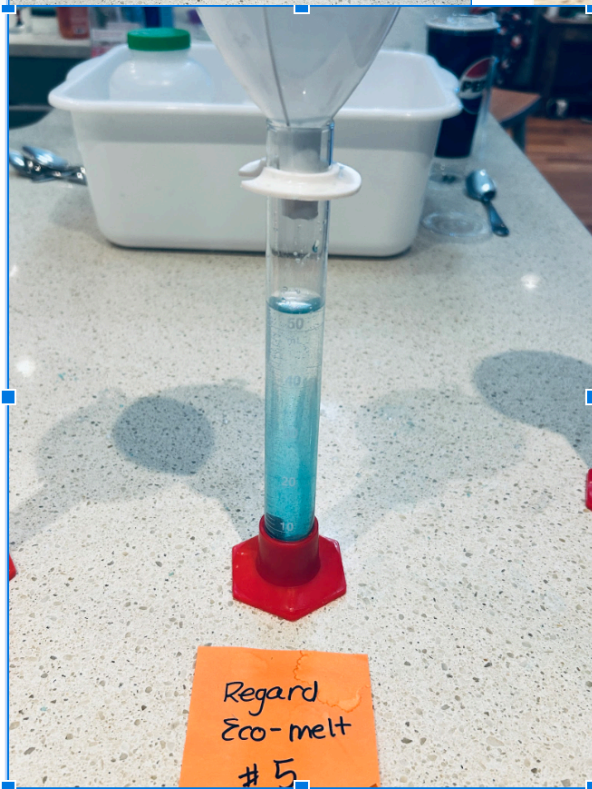
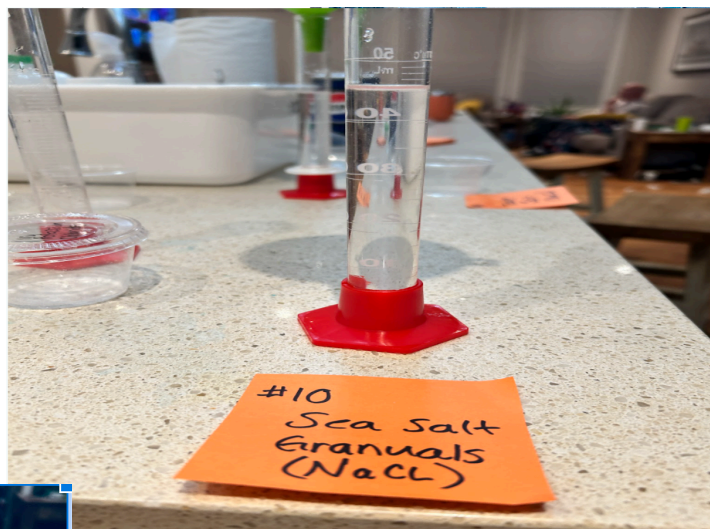
Dec 18:

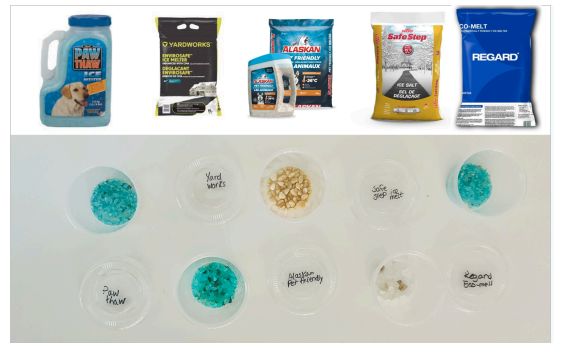
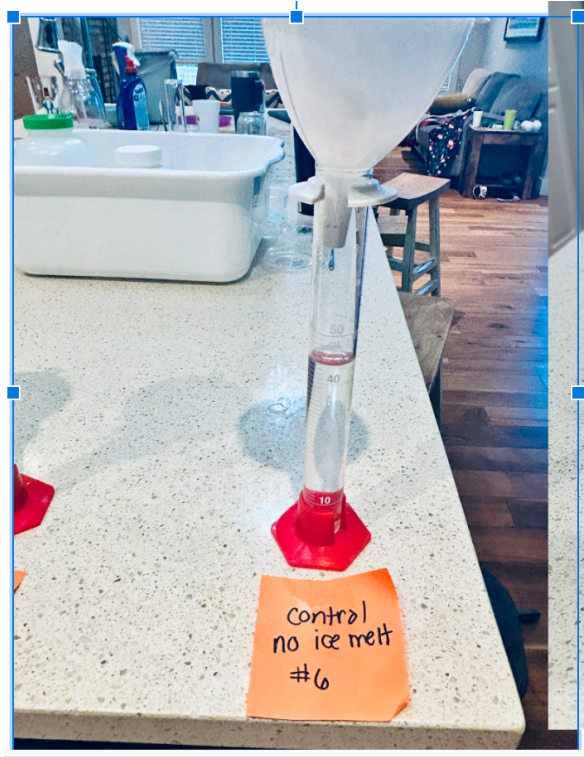
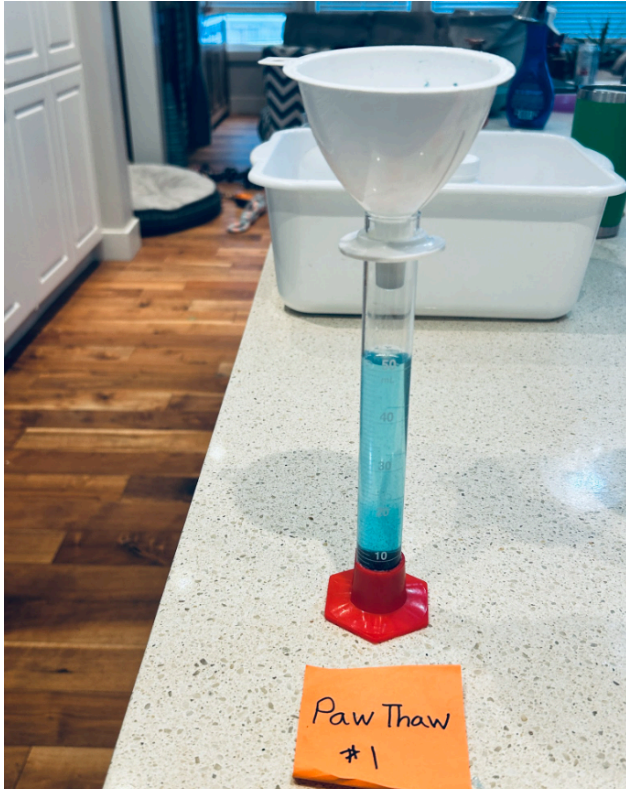
We wrote out our procedure for our experiment

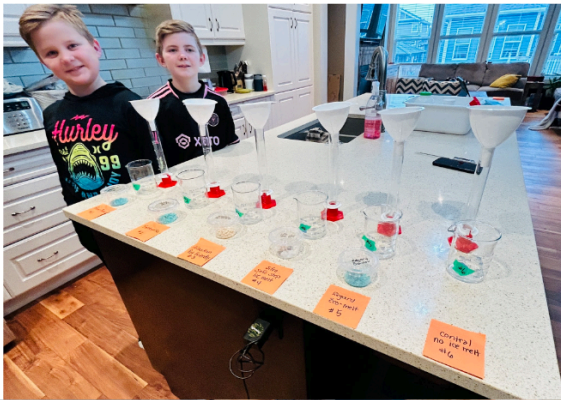
Dec 18

We had to go out and buy the different ice melts for our experiment

January 14 We did our experiment







We recorded our results in a chart as we went and made a nice table in google slides

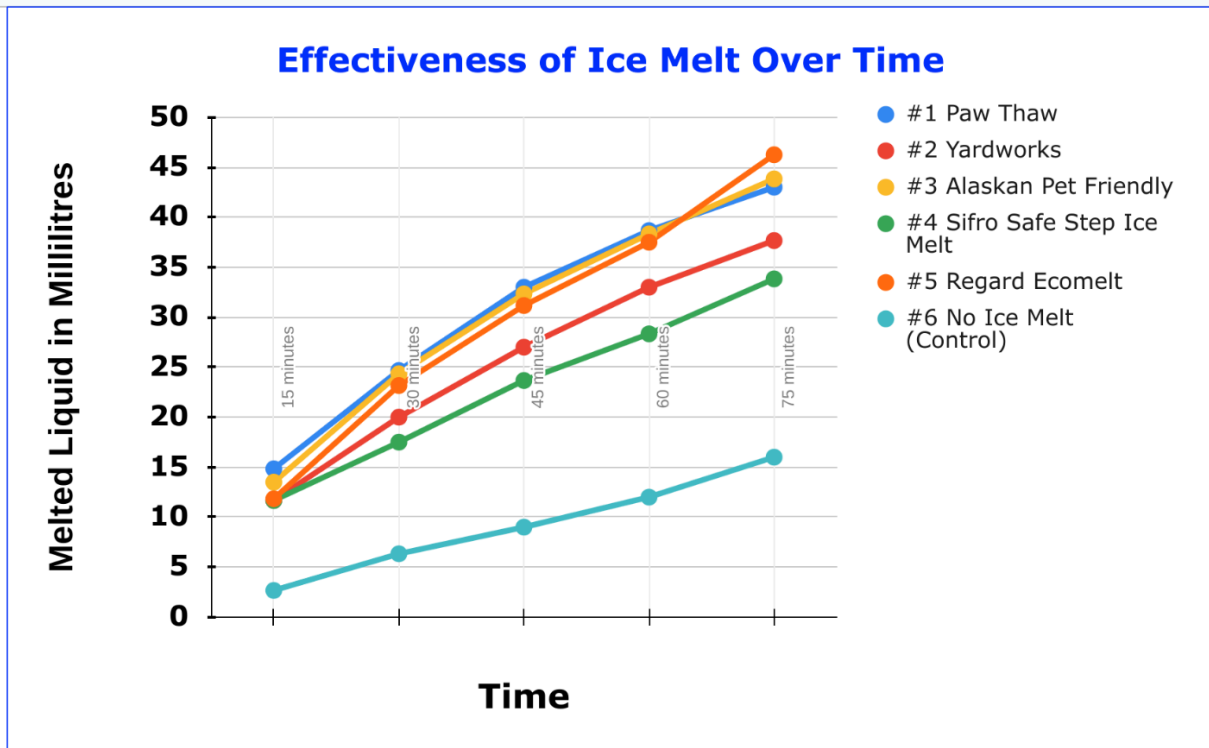
Test 1 Ice Melt Over Time					
Ice Melt Brand	15 minutes	30 minutes	45 minutes	60 minutes	75 minutes
#1 Paw Thaw	13 ml	24 ml	33 ml	40 ml	44 ml
#2 Yardworks	12 ml	21 ml	30 ml	37 ml	42ml
#3 Alaskan Pet Friendly	10.5 ml	20 ml	28 ml	33 ml	38 ml
#4 Sifro Safe Step Ice Melt	5 ml	15 ml	21 ml	25 ml	30.5 ml
#5 Regard Ecomelt	13 ml	25 ml	32.5 ml	39.5 ml	45 ml
#6 No ice melt control	1 ml	4 ml	6 ml	10ml	14 ml

Test 2 Ice Melt Over Time					
Ice Melt Brand	15 minutes	30 minutes	45 minutes	60 minutes	75 minutes
#1 Paw Thaw	19 ml	29 ml	38 ml	43 ml	47 ml
#2 Yardworks	10 ml	17 ml	23 ml	28 ml	33 ml
#3 Alaskan Pet Friendly	14 ml	25 ml	34 ml	41 ml	47 ml
#4 Sifro Safe Step Ice Melt	15 ml	15.5 ml	23 ml	29 ml	34 ml
#5 Regard Ecomelt	13.5 ml	27.5 ml	36 ml	42 ml	47.5 ml
#6 No ice melt control	5 ml	10 ml	14 ml	15 ml	18 ml

Test 3 Ice Melt Over Time					
Ice Melt Brand	15 minutes	30 minutes	45 minutes	60 minutes	75 minutes
#1 Paw Thaw	12.5 ml	21 ml	28 ml	33 ml	38 ml
#2 Yardworks	13 ml	22 ml	28 ml	34 ml	38 ml
#3 Alaskan Pet Friendly	16 ml	28 ml	35 ml	41 ml	46.5 ml
#4 Sifro Safe Step Ice Melt	15 ml	22 ml	27 ml	31 ml	34 ml
#5 Regard Ecomelt	9 ml	17 ml	25 ml	31 ml	39 ml
#6 No ice melt control	2 ml	5 ml	7 ml	11 ml	16 ml

Ice Melt Over Time Averages					
	15 minutes	30 minutes	45 minutes	60 minutes	75 minutes
#1 Paw Thaw	14.8 ml	24.7 ml	33.0 ml	38.7 ml	43.0 ml
#2 Yardworks	11.7 ml	20.0 ml	27.0 ml	33.0 ml	37.7 ml
#3 Alaskan Pet Friendly	13.5 ml	24.3 ml	32.3 ml	38.3 ml	43.8 ml
#4 Sifro Safe Step Ice Melt	11.7 ml	17.5 ml	23.7 ml	28.3 ml	33.8 ml
#5 Regard Ecomelt	11.8 ml	23.2 ml	31.2 ml	37.5 ml	46.3 ml
#6 No ice melt control	2.7 ml	6.3 ml	9.0 ml	12.0 ml	16.0 ml

We made some graphs



Then we looked at the chemicals in each of the liquids

Finally we wrote our conclusion and then started working on our tri fold

January 21-February 4

Working on the trifold and practicing our presentation

February 8: School Science Fair.