Snow Day Radar™

FREE CLASSROOM KIT · WINTER 2026-27 · TEACHER GUIDE

Snow Day Science

Real snow, real storms and real school closures, turned into three missions, four labs and a game your class will beg to play.

Mission 1 · Grades 3-5
Snow Detective

Mission 2 · Grades 6-8
Odds Master

Mission 3 · Grades 6-8
4 AM Commander

4 hands-on labs
Snow Day Labs

Take-home
Snow Spotter

Game, posters, certificate
All winter long

Real data · No accounts · No student information · No ads

by Ryan Hall, Y'all

TEACHER GUIDE · WINTER 2026-27

Welcome to Snow Day Science

Everything in the kit, and where to start.

Every winter, kids ask the same question the night before a storm: *Will there be school tomorrow?* Snow Day Science turns that question into real science and math. Students graph real snow records, play a forecasting game on real school mornings, test a real forecast's track record and make the superintendent's call on a real ice storm.

WHAT'S INSIDE

- **3 missions, 11 worksheets.** Each one a case file built on real data. Color and low-ink versions.
- **4 Snow Day Labs.** Kitchen materials: salt, ice, cans, cups. Plus a paper lab on a real ice storm.
- **Call It! game.** 22 real Kentucky school mornings as fold-over cards, with an answer key.
- **Slides.** A deck for each mission and a Call It! game deck, with speaker notes.
- **Posters.** Snow from Space, How to Read the Odds, Measure Snow Like a Pro.
- **Badges and certificate.** A sticker sheet of mission badges, the Snow Day Tracker and a certificate.
- **Low-ink versions.** Every worksheet, lab and card set with white headers, for black-and-white printers.
- **Dial images.** The Snow Day Radar dial at every step and a smartboard background, for your own slides.

PICK YOUR PATH

Grades 3-5	Mission 1, then Labs 1 and 2. Send the Snow Spotter page home before the next snow. Lab 4 on a snow day (grades 4-5).
Grades 6-8	Mission 2 and Mission 3, with Lab 3 between them. Call It! works any day as a bell ringer.
High school	Mission 2's scorecard and Mission 3's challenge questions, plus Lab 3. The teacher notes go deeper.
Storm's coming	Call It! as a warm-up, then start the Snow Day Tracker on your board and check the odds together each afternoon.

HOW IT WORKS

- Each mission takes 45 to 50 minutes and stands on its own.
- Print the pages, project the slides. Answer keys are in this guide.
- Students earn a badge for each mission, lab and the Snow Spotter page. Earn three badges and they're a Certified Snow Day Forecaster.

THE DATA IS REAL

Snow records from NOAA. School closures from the Kentucky Department of Education, 2009 to 2026. A real storm's radar, satellite pictures and airport reports. Snow Day Radar's own track record, misses included. Sources are on every page and at the end of this guide.

ODDS, NOT ANNOUNCEMENTS

Snow Day Radar gives school districts their chance of no in-person school for the next school day, in steps from 20 to 80%, never 100%, with the reason in plain words. Only your district makes the call. That idea runs through every mission.

MISSION 1 · GRADES 3-5 · 45 MINUTES

Snow Detective

The Case of the 2-Inch Snow Day.

BIG IDEA

Whether snow closes school depends on more than the snow: how often it happens there, the roads, the buses, the hills. Students use real data to explain it like scientists.

YOU NEED

- Mission 1 pages A, B and C, one per student (D goes home)
- Crayons or colored pencils
- For the take-home: a ruler or yardstick (a Y'all-O-Meter snow stick works too)

45 MINUTES

5 min **Hook.** *Would 2 inches of snow close our school?* Quick vote, then one student from each side says why.

13 min **Case file A.** Find each city on the map, then graph the table. One square is one day; Atlanta and Nashville get a thin line.

12 min **The Kentucky Twins.** Read the satellite picture first: both districts were white. Then the 12-winter table and the three clue cards.

12 min **Case report.** Claim, evidence, reasoning. Then each student picks a design solution and defends it.

3 min **Wrap up.** Hand out the Snow Detective badge. Send the Snow Spotter page home for the next snow.

STANDARDS

3-ESS2-1 · 3-ESS2-2 · 3-ESS3-1 · 3.MD.B.3 · 3.MD.B.4

ANSWER KEY · CASE FILE A

1. Bars: Atlanta and Nashville a thin line, Lexington 2, Columbus 4, Boston 8, Denver 9, Grand Rapids 14, Buffalo 15.

2. Buffalo (about 15 days a winter).

3. 9 − 2 = **7** more days.

ANSWER KEY · THE KENTUCKY TWINS

1. 12 of 12. Pike County had more snow days every single winter.

2. 2013-14 (13 days in Lexington, 26 in Pike County).

3. Mountain roads are steep and curvy, buses can't stop on icy hills, and long rides on back roads take longer to clear. Same snow, harder trip.

CASE REPORT AND TAKE-HOME

CER. Strong claims name more than snow: how often snow comes, roads, hills, buses. Evidence should quote numbers from A or B.

Solution. Any choice works if the reasoning fits: salt and brine for main roads, chains for hilly routes, a learning day at home when roads can't be made safe.

Spotter. Line plot to the nearest quarter inch. Mode and range from the class data.

TEACHER NOTE

Lexington averages 4.5 weather days a winter and Pike County 11.25, counting only winters when neither district used virtual (NTI) days, because NTI days also cover illness.

MISSION 2 · GRADES 6-8 · 45 MINUTES

Odds Master

Does 30% Really Mean 30%?

BIG IDEA

A probability is a promise about many nights, not one. Students play a forecasting game scored the way real forecasters are scored, then check a real forecast against 15 winters of real school mornings.

YOU NEED

- Mission 2 pages A, B and C, one per student
- Call It! cards (one deck per group, on cardstock) or the Call It! slides
- Page D (Bust the Myth) for homework or extension

45 MINUTES

5 min **Hook.** *Snow Day Radar says 30%. Will there be school?* Most say yes. Ask what 30% actually promises.

15 min **Call It!** Ten rounds from the cards or the game slides. Students write a chance of no school, 0 to 100%, then flip and score Snow Points. Honest chances beat bold guesses.

13 min **The scorecard.** Fill the three blank rows and plot every row. Points above the dashed line: schools closed more often than the odds said.

12 min **Probability lab.** Give each student a row of digits. Tally, then pool the class total on the board.

3 min **Wrap up.** One night is luck; many nights show the probability. Bust the Myth makes a great homework or sub plan.

STANDARDS

7.SP.C.5 · 7.SP.C.6 · 7.SP.C.7a · MS-ESS2-5

ANSWER KEY · CALL IT!

Cards. Each card's answer and Snow Day Radar's Snow Points are on the first page of the Call It! cards. Scores vary; the talk is the point.

1-2. Saying 0% or 100% scores 0 when wrong. If you really think 30%, saying 30% scores best on average (Snow Points is the Brier score, a proper score). On these hand-picked cards a class can beat the Radar; over 19,888 real mornings it averaged 88 points a morning, and always saying 50% gets 75.

ANSWER KEY · THE SCORECARD

1. 30%: 449 ÷ 1,219 = **0.368**, about 37%; 50%: 463 ÷ 817 = **0.567**, about 57%; 70%: 623 ÷ 882 = **0.706**, about 71%.

3. Almost every point sits above the line: when Snow Day Radar said a number, schools closed a bit more often than that. It's cautious. Good news for kids.

4. Using 60%: 0.6 × 50 = **30**. Using the track record (527 ÷ 827 = 0.64): about **32**.

ANSWER KEY · PROBABILITY LAB

1-3. Rows vary from about 2 to 10 out of 20. If every row is tallied once, the class total is 59 no-school nights out of 200: **0.295**.

4. Usually the class. More nights means luck evens out (long-run relative frequency).

ANSWER KEY · BUST THE MYTH

1-3. Answers vary. Look for a clear if-then claim, a count over many nights and a comparison group.

4. 3 nights is too few, there's no comparison group, and the snow was coming anyway: the weather caused both.

5. Circle: snow by 7 AM, ice on the roads, wind chill at bus time, a Winter Storm Warning, how often your district closes.

MISSION 3 · GRADES 6-8 (TO 11) · 45 MINUTES

4 AM Commander

Ice Storm in the Bluegrass.

BIG IDEA

Forecasts are probabilities, and decisions still have to be made. Students read a real ice storm, make the superintendent's call, then explain how an arctic air mass made a 3-day forecast miss.

YOU NEED

- Mission 3 pages A, B and C, one per student
- The Mission 3 slides (the radar and satellite pictures project well)
- Optional: Lab 3, Snow, Sleet or Freezing Rain?

45 MINUTES

5 min **Hook.** *It's 4:30 AM. Buses roll at 6:30. Open, delay, close or learn at home?* Many superintendents decide in that window; when a storm is obvious, some decide the night before.

12 min **Read the storm.** The radar picture, then the airport reports. Teach sleet vs freezing rain (or run Lab 3 first).

13 min **The 4 AM Call.** Small groups decide and defend with three facts and who it affects. Vote, then flip the page to see what happened.

12 min **Snow from Space.** The satellite picture four days later, the week's highs and the outlook that missed Wednesday.

3 min **Wrap up.** Further ahead means less certain, so outlooks use bigger steps. Hand out the 4 AM Commander badge.

STANDARDS

MS-ESS2-5 · MS-ESS3-2 · 7.SP.C.5

ANSWER KEY · READ THE STORM

1. About 3 PM Sunday, between the 2:53 and 3:17 PM reports.

2. 27°F to 32°F.

3. Freezing rain leaves a clear, slick glaze that's hard to see and hard to treat. A heavy bus can't stop on it, and ice can bring down trees and power lines.

4. 0.06 + 0.12 + 0.21 + 0.11 = **0.50 inches** in 4 hours.

ANSWER KEY · THE 4 AM CALL

1. No single right answer. Grade the evidence: the warning, 5½ inches under ice, 32°F and falling, an 80% chance.

2. 80% means a strong chance, not a promise. Use it to plan early: tell families, line up road crews, and decide as soon as the evidence is clear.

Real. Lexington's district didn't wait for 4 AM: on Sunday evening it called off Monday for students, then stayed closed all week. Side roads were still iced in, bus stops were dangerously cold, some buildings had heating problems, and many students' Chromebooks were at school, so learning from home wasn't possible.

ANSWER KEY · SNOW FROM SPACE

1. **All 5.** Highs: 32°F, 23°F, 25°F, 25°F, 28°F.

2. The further ahead, the less certain. Bigger steps are more honest about that.

3. Arctic air kept highs at or below freezing, so the snow and ice never melted; more light snow fell Wednesday; about 6 inches still covered the ground.

4. Snow and ice already on the ground, and how cold the next days will be, not just new snow.

SNOW DAY LABS · GRADES 3-8

Lab Guide

Prep, safety and answers for all four labs.

LAB 1 · THE GREAT ICE RACE · 30 MIN

Salt, sugar, sand or nothing on four ice cubes. **Prep:** freeze same-size cubes; measure the teaspoons ahead for young classes. Start the timer together so every group races the same clock.

LAB 2 · MAKE YOUR OWN FROST · 20 MIN

Crushed ice in two metal cans, salt in one. **Prep:** crushed ice works much faster than cubes. Clean cans with no sharp rims, or use metal cups. On a humid day frost shows up in 2 to 3 minutes.

LAB 3 · SNOW, SLEET OR FREEZING RAIN? · 25 MIN

A paper lab: no materials. Pairs well right before Mission 3, since the four skies match the real storm.

LAB 4 · SNOW IN A CUP · SNOW DAY

A snow-day or take-home lab. Straight-sided clear cups give the cleanest numbers. Collect ratios from every snow on the board.

SAFETY FOR EVERY LAB

- Nothing gets tasted.
- Ice and salt together can drop well below freezing: quick touches only.
- Wipe up melt water right away; wet floors are slippery.

STANDARDS

3.MD.B.3 · MS-PS1-4 · MS-ESS2-4 · MS-ESS2-5 · 6.RP.A.1

ANSWER KEY · LAB 1

4. Usually salt melts the most, then sugar. Sand is about the same as nothing.

5. Sand doesn't melt ice. It gives tires and boots something to grip, which matters on hills.

Why. Salt dissolves into the thin film of water on ice; salty water must get colder than 32°F to freeze. Sugar does it too but much less: a spoonful of salt makes far more dissolved particles.

Note. Rock salt works well down to a road temperature of about 15°F and stops below about −6°F; then crews switch chemicals or add sand.

ANSWER KEY · LAB 2

2. Ice only stays near 32°F. Ice and salt often reaches about 10 to 20°F.

3. Frost grows only on the salted can. The plain can just gets wet: water drops, not ice.

Why. Vapor touching metal below 32°F turns straight to ice (deposition), the same way snowflakes grow in clouds.

ANSWER KEY · LAB 3

Skies. A: snow. B: freezing rain. C: sleet. D: rain.

1. In C the cold layer near the ground is deep, so melted drops refreeze into pellets. In B it's shallow, so drops land as liquid and freeze on contact.

2. Afternoon B, overnight C, Monday morning A. Colder air pushed in, so the warm layer got thinner, then disappeared.

ANSWER KEY · LAB 4

1-2. Answers vary. The US average is about 13 to 1 (NOAA). Wet snow packs and drips, near 5 to 1; dry powder blows and won't pack, 20 to 1 or more. Sleet can be as low as 2 to 1.

ALL WINTER LONG

Games, Posters and Badges

Keep the science going every time snow is in the forecast.

CALL IT! CARDS

22 real Kentucky school mornings, 13 that closed and 9 that didn't, including a few surprises the forecast missed. Print on cardstock, cut and fold. Students write a chance of no school and score Snow Points on the Mission 2 game sheet. The last page has blank cards to make from tonight's forecast. The answer key is on the cards' first page.

Try it as a bell ringer: one card on the board, reveal at the bell.

SNOW DAY TRACKER

Post it on your board for the season. When Snow Day Radar shows a chance for your district, a student circles the odds. Next morning, circle what happened. In spring, run Mission 2's scorecard on your own district's data.

MISSION BADGES AND CERTIFICATE

Print the badge sheet on 2-inch round stickers (12 per page) or cardstock. One badge per mission: Snow Detective, Odds Master, 4 AM Commander, Lab Scientist (any two labs) and Snow Spotter. Three badges earns the Certified Snow Day Forecaster certificate. The tracker's PJs column lets your class test the inside-out pajama myth all winter.

POSTERS

- **Snow from Space** (24 x 18): NASA's satellite view of Kentucky under snow after the January 2025 storm.
- **How to Read the Odds** (18 x 24): every step from 20 to 80%, in plain words.
- **Measure Snow Like a Pro** (18 x 24): the spotter's method in four steps.

All print at poster size or scale down to letter paper.

LOW-INK VERSIONS

Every worksheet and lab comes in a low-ink version: white headers, outlined boxes, same content and page numbers. Mix freely.

CHECK THE ODDS TOGETHER

On a stormy afternoon, pull up snowdayradar.com on the board and read your district's Why card together: what's driving the number? It's a two-minute lesson in reading evidence.

COMING THIS WINTER

Snow Day Showdown: a free class forecasting game. Your class gets a code, students lock in their call on snow nights and classes climb a leaderboard. No student accounts.

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Standards

What each mission and lab covers.

Code	Standard, word for word	Where
3-ESS2-1	Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.	**M1**
3-ESS2-2	Obtain and combine information to describe climates in different regions of the world.	**M1**
3-ESS3-1	Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.	**M1**
3.MD.B.3	Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs.	**M1, Lab 1**
3.MD.B.4	Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units: whole numbers, halves, or quarters.	**M1**
6.RP.A.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.	**Lab 4**
7.SP.C.5	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood.	**M2, M3, Call It!**
7.SP.C.6	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.	**M2**
7.SP.C.7a	Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events.	**M2**
MS-PS1-4	Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.	**Lab 2**
MS-ESS2-4	Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.	**Labs 2, 3**
MS-ESS2-5	Collect data to provide evidence for how the motions and complex interactions of air masses results in changes in weather conditions.	**M2, M3, Lab 3**
MS-ESS3-2	Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.	**M3**

NGSS: Next Generation Science Standards (nextgenscience.org). CCSS: Common Core State Standards for Mathematics (thecorestandards.org). Every mission also practices the science practices of analyzing data, arguing from evidence and planning investigations.

TEACHER GUIDE

About the Data

Where every number in the kit comes from.

Snow climate (Mission 1)	NOAA 1991-2020 snowfall normals: average days a year with 2 inches or more, carried from nearby weather stations to each district by the Snow Day Radar engine.
Kentucky closures (Missions 1-3, Call It!)	Kentucky Department of Education amended school calendar summaries, 2009-10 to 2025-26 (the backtest uses 15 of those winters): traditional weather days by date, and virtual (NTI) days.
Call It! mornings	Real Kentucky mornings: KDE closure records plus that morning's weather (snow by 7 AM, overnight low, freezing rain, snow on the ground, NWS alerts). Odds from the blind test below.
Forecast track record (Mission 2)	Snow Day Radar tested on 15 Kentucky winters. Each winter was hidden, forecast from the weather alone, then checked against what schools did: 19,888 mornings with winter weather.
The storm (Mission 3, Lab 3)	Lexington airport (KLEX) reports and NWS NEXRAD radar via the Iowa Environmental Mesonet, Iowa State University; NWS daily climate reports for Lexington, January 4-11, 2025.
Satellite pictures	NASA Worldview, VIIRS on the Suomi NPP satellite, January 9, 2025. NASA imagery is public.
Measuring snow	Adapted from CoCoRaHS, the Community Collaborative Rain, Hail and Snow Network.

ABOUT SNOW DAY RADAR

Snow Day Radar gives public school districts their chance of no in-person school (closed or a virtual day) for the next school day, with the reason in plain words. It asks three questions: how rare is this snow here, how hard is it to get kids to school, and what does this district usually do? Kentucky's odds come from a model tested on 15 winters of real closures; other states stay in beta until their own tests pass. It's built by Hall Enterprises and Ryan Hall, Y'all, and isn't affiliated with any school district or the National Weather Service.

OUR PROMISE TO CLASSROOMS

- Free to print, copy and share for teaching.
- No accounts or sign-ups for students. No student information collected.
- No ads in the kit or in anything students do.
- Odds, never announcements: only your district makes the call.

TELL US HOW IT WENT

We're building more for teachers: more missions, a live class game and tools for school leaders. Tell us what you'd use at snowdayradar.com/educators.