GRADES 6-12 • NOVEMBER & DECEMBER • PRINT AND GO

100

NO-PREP ACTIVITIES

The Thanksgiving-to-Winter-Break Survival Kit

25	25	25	25
Reading & Writing	Math	Social Studies	Science

Bell ringers, early-finisher work, and sub-day savers with a full answer key. Every activity fits in 8 to 15 minutes.

Teacher Emergency Toolkit

By a teacher. Priced for a teacher.

BelltoBell.org

How to Use This Kit

The stretch between Thanksgiving and winter break is the hardest part of the fall semester to plan. Attention is short, schedules get interrupted, and somebody is always absent. This kit gives you 100 short activities you can hand out or project with no preparation.

What is inside

100 activities, 25 each for reading and writing, math, social studies and history, and science. Each takes about 8 to 15 minutes.

A full answer key at the back, numbered to match. Open-ended tasks include what to look for instead of a single answer.

Making it work for grades 6-12

Reading, social studies, and science activities are written so a middle school student can complete the numbered questions. Each one ends with a **Level Up** prompt that asks for the deeper thinking expected in grades 9-12. Assign it to older students, or offer it as a challenge to anyone who finishes early.

Math activities carry a grade band or course label in the header (for example, Gr 6-8 or Algebra 1). Pick the ones that fit your class.

Five ways to use it

1. Bell ringers. Project one activity as students walk in.

2. Early finishers. Print a few pages and keep them in a folder by the door.

3. Sub days. Leave three or four activities from your subject. The answer key means a substitute can check the work.

4. Odd schedules. Assemblies, half days, and testing days leave short blocks. Each activity fits one.

5. Cross-curricular days. Trade pages with a teammate so students see your subject in another class.

Good to know

Only activity 99 needs supplies (paper, tape, scissors). A few math sets go faster with a calculator. Historical activities stick to well-documented facts and several ask students to weigh more than one point of view. Holiday content is informational and covers a range of traditions.

Terms of use

This kit is free for use by one teacher in their own classroom. Please share the link where you found it instead of the file, and do not resell or repost it.

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ACTIVITIES 1-25

Reading & Writing

Short passages, grammar fixes, and quick writes. Each one stands alone, so start anywhere.

1. Feast Facts: What Really Happened in 1621?

15 min

> Most of what Americans picture about the "First Thanksgiving" comes from paintings made centuries later. The best eyewitness account is a single paragraph in a letter by colonist Edward Winslow. He wrote that after the harvest in the fall of 1621, the governor sent four men out hunting birds, and that about ninety Wampanoag men, including their leader Massasoit, joined the roughly fifty surviving colonists for three days. The Wampanoag brought five deer. Winslow never used the word "thanksgiving," and he never mentioned pumpkin pie, cranberry sauce, or even turkey by name.

1. In one sentence, what is the main idea of this passage?
2. List two details from the popular picture of the feast that Winslow's letter does not support.
3. Why is one short letter a limited source for understanding an event?

LEVEL UP (Gr 9-12): Whose voice is missing from the written record? Write two questions you would ask a Wampanoag eyewitness.

2. Cold Words: Context Clues

10 min

Write the meaning of each **bold** word. Then underline the words in the sentence that helped you.

1. The wind was so **frigid** that my eyelashes froze on the walk to the bus.
2. By late December, daylight is **scarce**; the sun is down before practice ends.
3. The maple looks dead, but it is only **dormant** until spring.
4. The frozen twig was **brittle** and snapped the moment I bent it.
5. During the ice storm we decided to **hunker down** at home instead of risking the roads.
6. A **meager** breakfast of one cracker left her starving by second period.

LEVEL UP (Gr 9-12): Use three of the bold words correctly in one sentence about your own week.

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3. Where Did "Black Friday" Come From? 15 min

> Ask most shoppers why the day after Thanksgiving is called Black Friday and you will hear a tidy story: it is the day stores finally turn a profit and move from "in the red" to "in the black." The real history is messier. In the 1950s and 1960s, police officers in Philadelphia used "Black Friday" to describe the traffic jams, packed sidewalks, and long shifts that hit the city when shoppers and football fans poured in the day after Thanksgiving. Store owners disliked the gloomy nickname. The cheerful "in the black" explanation did not become popular until the 1980s, long after the name had stuck.

1. What is the author's central claim?
2. Copy the sentence that gives the strongest evidence for that claim.
3. Why might store owners have preferred the newer explanation?

LEVEL UP (Gr 9-12): Which words show the author's attitude toward each story? (Look at "tidy," "messier," and "cheerful.") What do those choices tell you?

4. The Last Bus Before Break: Inference 12 min

> Dev pressed his forehead to the bus window and watched his breath fog the glass. His backpack sat flat and light on his lap for the first time since August. Two seats up, Maria was already asleep with one earbud dangling. When the bus passed the corner store, Dev checked his phone again. Still nothing. He slid it back into his pocket, screen down.

1. What season is it, and what day might it be? Give the evidence.
2. Why is Dev's backpack light? The text never says, so explain how you know.
3. How does Dev feel at the end? Which details show it?

LEVEL UP (Gr 9-12): Write the next four sentences of the story without ever naming Dev's emotion.

5. Fix the Email 10 min

A student sent this email to a teacher. Find and fix at least 10 errors, then rewrite it.

> hey mr carter, i was absent tuesday and wendsday becuase i was sick. can you tell me what i missed. Me and jordan can stay after school thursday too make up the quiz? thanks

LEVEL UP (Gr 9-12): Add a subject line and one sentence that makes it easier for the teacher to say yes.

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6. Fact or Opinion? 8 min

Label each statement F (fact: it can be checked) or O (opinion: it is a judgment).

1. Thanksgiving falls on the fourth Thursday of November.
2. Pumpkin pie is the best dessert on the table.
3. The December solstice has the fewest hours of daylight of any day in the Northern Hemisphere.
4. Winter break should be three weeks long.
5. Pure water freezes at 32°F at sea level.
6. Snow days are more fun than regular days off.
7. December has 31 days.
8. Everyone should travel during the holidays.
9. Cold weather causes colds.

LEVEL UP (Gr 9-12): Number 9 is the trap. Is a false statement an opinion? Explain the difference between "can be checked" and "is true."

7. Why Did the Author Write This? 10 min

Label each text P (persuade), I (inform), or E (entertain). Circle one word or phrase that proves it.

A. Tired of cold toes? SnugStep socks keep feet warm for 12 hours. Order today.

B. To thaw a frozen turkey safely, keep it in the refrigerator. Allow about 24 hours for every 4 to 5 pounds.

C. The snowman had one job: stand there. By noon he had failed, loudly, into the neighbor's driveway.

D. Our town should plow the sidewalks near the school before 7 a.m. Students who walk deserve the same safe route as students who ride.

LEVEL UP (Gr 9-12): Rewrite text B so its purpose is to entertain. Keep the facts accurate.

8. Six-Word Stories 10 min

A six-word story tells something true in exactly six words. Example: *Alarm rang. Snow fell. Back asleep.*

Write three:

1. One about this semester.
2. One about the cafeteria.
3. One about your plans for winter break.

LEVEL UP (Gr 9-12): Revise one story so it includes a colon or a semicolon used correctly.

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9. Figurative Language Hunt

10 min

Name the device in each sentence: simile, metaphor, personification, hyperbole, alliteration, or onomatopoeia.

1. The wind howled through the parking lot.
2. My backpack weighs a thousand pounds.
3. The frozen pond was a sheet of glass.
4. Her hands were as cold as a metal bleacher.
5. Silent snow settled softly on the stadium.
6. The ice went *crack* under his boot.
7. The last week before break crawled by.
8. Final exams are a mountain.

LEVEL UP (Gr 9-12): Write one original example of each device about school lunch.

10. Snowflake Bentley: Summarize It

15 min

> Wilson Bentley grew up on a farm in Jericho, Vermont, where snow fell for months each year. As a teenager he tried to draw the snow crystals he saw under a microscope, but they melted before he could finish. So he attached a camera to the microscope, and in 1885, at age nineteen, he made the first successful photograph of a single snow crystal. Over more than four decades he captured over 5,000 of them, working in the cold with simple equipment. His photographs helped spread the idea that no two snowflakes are exactly alike.

1. Summarize the passage in exactly 20 words.
2. What problem did Bentley face, and how did he solve it?
3. Which word fits Bentley best: lucky, persistent, or wealthy? Support your choice with evidence.

LEVEL UP (Gr 9-12): Cut your summary to 10 words. What did you have to leave out, and does it still work?

11. Name That Text Structure

10 min

Label each: cause and effect, sequence, compare and contrast, problem and solution, or description.

A. Because the ground was still warm, the first snow melted as soon as it landed.

B. First, fill the pot. Next, heat the milk slowly. Finally, stir in the cocoa.

C. Sleet bounces when it lands, while freezing rain coats everything in a smooth glaze.

D. The gym was too small for the winter concert, so the band director moved it to the field house.

E. The old gym smells like floor wax and popcorn, and its wooden bleachers creak with every step.

LEVEL UP (Gr 9-12): Pick one topic (your bus ride, a holiday meal) and write about it twice using two different structures.

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12. Take a Side: Homework Over Break? 15 min

Should teachers assign homework over winter break? Build a complete argument using this frame.

Claim: Teachers (should / should not) assign homework over winter break.

Reason 1 and an example:

Reason 2 and an example:

Counterclaim: Some people argue that...

Rebuttal: However...

LEVEL UP (Gr 9-12): Now write the opposing paragraph and make it just as strong as your own.

13. Sentence Combining 10 min

Combine each set into one smooth sentence. Do not lose any information.

1. The bus was late. The roads were icy.
2. Maya studied for the exam. She still felt nervous.
3. The gym was decorated. The student council decorated it. They used paper snowflakes.
4. We could go to the game. We could stay home and watch it.
5. The power went out. We lit candles. We played cards.

LEVEL UP (Gr 9-12): Write a second, different version of numbers 1 and 2. Which version puts the emphasis where you want it?

14. Winter Word Roots 10 min

Match each root to its meaning. Then answer the question.

Root	Example words	Meanings to match
therm	thermos, thermal	a. equal
hiber	hibernate	b. night
sol	solstice, solar	c. thankful, pleasing
noct / nox	nocturnal, equinox	d. heat
grat	gratitude, grateful	e. winter
frig	frigid, refrigerator	f. sun
equi	equinox, equal	g. cold

Using two roots from the chart, explain what *equinox* literally means.

LEVEL UP (Gr 9-12): "Solstice" joins *sol* with a root meaning "to stand still." Why would ancient skywatchers say the sun stands still in late December?

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15. Same Message, Different Tone

10 min

1. Name the tone of each sentence: (a) "Oh great, another fire drill in the rain." (b) "Take your time; we'll get through this together."
2. Rewrite this message three times so the tone is encouraging, then sarcastic, then urgent: *The assignment is due Friday.*
3. Which version would you actually send to a classmate? Why?

LEVEL UP (Gr 9-12): Rewrite the message for a principal's announcement. What changed besides word choice?

16. Poem Study: "First Frost"

15 min

> The field forgot its green last night
> and woke in borrowed silver.
> The fence posts wear small caps of white;
> the creek has slowed its chatter.
> One crow complains to no one near.
> The sun arrives, unhurried,
> and reads the note the cold left here
> before it melts the letter.

1. Find two examples of personification.
2. What is "the note the cold left here"?
3. Describe the mood in one word and list two words from the poem that create it.
4. What literally happens in the last line?

LEVEL UP (Gr 9-12): Write four lines that personify the first hot day of summer.

17. Three Headlines, One Storm

10 min

A. District Cancels School as Storm Approaches

B. Officials Panic, Shut Schools Over a Few Flurries

C. Snow Day! Students Celebrate Surprise Break

1. Which headline is the most neutral? How can you tell?
2. Which words in headline B reveal the writer's opinion?
3. Who is the intended audience for headline C?
4. Write a fourth headline that is biased against officials for acting too slowly.

LEVEL UP (Gr 9-12): Rewrite headline B so it reports the same criticism fairly, with a source.

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18. Scrambled Paragraph: How a Snow Day Gets Called

10 min

These sentences describe how many districts decide to close school. Put them in order and circle each transition word.

A. Finally, the announcement goes out to families by phone, text, and local news.

B. Before dawn, transportation staff drive the bus routes to check the roads.

C. Next, they report the conditions to the superintendent.

D. The night before, district leaders study the forecast.

E. Then the superintendent decides whether to delay, close, or open on time.

LEVEL UP (Gr 9-12): Write your own five-step scrambled paragraph and trade with a partner.

19. The Specific Thank-You

15 min

Write a short note to an adult at school who rarely gets thanked (custodian, bus driver, cafeteria staff, front office, aide). Use this formula:

1. Greeting with the person's name.
2. Name one specific thing the person did.
3. Explain how it helped you.
4. Look ahead (next semester, next week).
5. Closing and your name.

LEVEL UP (Gr 9-12): Write a second version that never uses the words "thank," "thanks," or "appreciate" but still makes the message clear.

20. Punctuate the Dialogue

10 min

Rewrite each line with correct capitals, quotation marks, and punctuation.

1. are we leaving before lunch asked Tori
2. coach said bring a jacket
3. i can't feel my fingers Marcus yelled
4. if it snows said Ms. Lee the quiz moves to Monday
5. who left the door open asked Dad it's freezing in here

LEVEL UP (Gr 9-12): Write a six-line conversation between two people stuck in a holiday checkout line. Start a new paragraph for each speaker.

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21. Read the Departure Board

10 min

Flight	To	Scheduled	Status
212	Atlanta	8:05 AM	On time
347	Chicago	8:40 AM	Delayed 55 min
518	Denver	9:15 AM	Canceled
604	Dallas	9:30 AM	Delayed 20 min
733	Atlanta	10:10 AM	On time

1. What time will flight 347 now depart?
2. Which flight will actually leave later: 347 or 604?
3. A traveler misses flight 212. What is the next flight to Atlanta, and how long is the wait from 8:05?
4. What should a passenger on flight 518 do next? What information is missing from the board?

LEVEL UP (Gr 9-12): Write a calm, clear two-sentence gate announcement for flight 518.

22. Find the Theme: The Woodpile

15 min

> Two neighbors each cut wood for winter. The first stacked hers high and locked the shed. The second stacked his by the road with a sign: *Take what you need.* In January a storm buried the valley for nine days. The first neighbor burned her last log on day six and sat in the cold, too proud to knock next door. On day seven, three families she had never spoken to knocked on her door instead, arms full of wood from the roadside stack.

1. State the theme as a complete sentence, not a single word.
2. Give two details that support your theme.
3. The author never says who sent the families. How do you know?

LEVEL UP (Gr 9-12): Rewrite the last sentence so the story has a different theme. What is the new theme?

23. Word of the Year

15 min

Dictionaries choose a "word of the year." Nominate one word that sums up 2026 at your school.

1. Your word and its definition in your own words.
2. An example sentence that shows how students use it.
3. Three sentences persuading the class to vote for your word.

LEVEL UP (Gr 9-12): Predict a word that will matter in 2027 and defend your prediction.

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24. Commonly Confused Words

8 min

Circle the correct word.

1. (Their / There / They're) leaving right after sixth period.
2. The cold weather will (affect / effect) the game.
3. This break is longer (then / than) last year's.
4. (Your / You're) jacket is on the bus.
5. The dog shook the snow off (its / it's) coat.
6. We are (to / too / two) tired to shovel.
7. (Whose / Who's) bringing the plates?
8. The storm had a huge (affect / effect) on travel.
9. Put the boxes over (their / there / they're).
10. I would rather (accept / except) a small gift than none.

LEVEL UP (Gr 9-12): Write one sentence that uses there, their, and they're correctly.

25. Semester 3-2-1

15 min

Look back before you look ahead.

3 things you learned this semester (any class).

2 things you are proud of.

1 thing you will do differently in January.

Then write a three-sentence note to your January self.

LEVEL UP (Gr 9-12): Turn your "1 thing" into a plan: what exactly will you do, when, and how will you know it is working?

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ACTIVITIES 26-50

Math

Each problem set is tagged with a grade band. Middle school sets also work as review or warm-ups in high school classes.

26. Turkey Time

10 min • Gr 6-8

A recipe says to roast a turkey 13 minutes per pound. The turkey weighs 16 pounds and must rest 30 minutes after it comes out of the oven.

1. How long does the turkey roast? Give your answer in hours and minutes.
2. Dinner is at 4:00 PM. What time must the turkey go in the oven?
3. How would your answer to question 2 change for a 20-pound turkey?

27. Scale the Recipe

12 min • Gr 6-8

A pumpkin bread recipe serves 8 and uses 2/3 cup sugar, 1 1/2 cups pumpkin, and 3/4 teaspoon cinnamon. You need to serve 20.

1. What number do you multiply each ingredient by?
2. Find the new amount of each ingredient as a mixed number.

28. Black Friday Percents

12 min • Gr 6-8

1. A jacket costs $80 and is 35% off. What is the sale price?
2. Headphones cost $120. They are 25% off, and a coupon takes an extra 10% off the sale price. What is the final price?
3. A friend says, "25% off plus 10% off is the same as 35% off." Use your answer to question 2 to prove the friend wrong.

29. Tax First or Discount First?

12 min • Gr 7-9

A $60 sweater is 20% off. Sales tax is 9%.

1. Find the total if the store applies the discount first and then the tax.
2. Find the total if the store adds tax first and then applies the discount.
3. Explain what you notice and why it happens.

30. Road Trip Math

12 min • Gr 6-8

Your family drives 285 miles to visit relatives. You average 57 miles per hour while driving.

1. How many hours of driving is that?
2. You leave at 7:15 AM and make stops that total 45 minutes. What time do you arrive?
3. The car gets 30 miles per gallon and gas costs $2.90 per gallon. What does the one-way trip cost in gas?

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31. A Week of Cold: Mean, Median, Mode

10 min • Gr 6-8

Daily high temperatures for one week (°F): 52, 47, 47, 39, 44, 35, 30

1. Find the mean, median, mode, and range.
2. An eighth day has a high of 58°F. What is the new mean?
3. Which changed more when you added the eighth day, the mean or the median? Why?

32. Below Zero

8 min • Gr 6-8

1. At 6 PM the temperature is 8°F. By midnight it drops 15 degrees. By 6 AM it rises 4 degrees. What is the temperature at midnight and at 6 AM?
2. City A is at -12°F and City B is at 9°F. How many degrees apart are they?
3. Find the mean of these four temperatures: -12, -7, 9, 2.

33. Cocoa Unit Rates

12 min • Gr 6-8

Hot cocoa packets come in three sizes: 8 for $4.08, 12 for $5.88, and 20 for $9.40.

1. Find the price per packet for each size. Which is the best unit price?
2. Your club needs at least 36 packets. Find the cheapest way to buy them. (It is not just "buy the biggest boxes.")

34. Leftover Pie Fractions

10 min • Gr 6-8

After dinner there is 5/8 of a pumpkin pie, 3/4 of an apple pie, and 1/2 of a pecan pie left.

1. How much pie is left in all?
2. Five people split all of the leftovers equally. What fraction of a pie does each person get?
3. Each pie was cut into 8 equal slices. How many slices is that per person?

35. Countdown Conversions

8 min • Gr 6-8

There are 18 days until winter break begins.

1. How many hours is that? How many minutes?
2. Only 14 of those days are school days, and each school day is 7 hours long. How many school hours are left? How many school minutes?
3. What percent of the 432 total hours will you actually spend in school? Round to the nearest whole percent.

36. Gingerbread Blueprint: Scale

10 min • Gr 6-8

You are building a gingerbread model of a real house. Your scale is 1 inch = 2.5 feet.

1. The real house is 30 feet wide and 20 feet tall. How wide and tall is the model?
2. The real front door is 7.5 feet tall. How tall is the model door?
3. Your model chimney is 1.6 inches tall. How tall is the real chimney?

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37. Saving for Gifts: Linear Equations

15 min • Gr 8-10

You have $45 and save $15 each week. Your friend has $90 and saves $9 each week.

1. Write an equation for each person's total savings after *w* weeks.
2. You need $150. After how many weeks will you have it?
3. After how many weeks will the two of you have the same amount? Who has more after 8 weeks?

38. Winter Concert Tickets: Systems

15 min • Algebra 1

The winter concert sold 210 tickets and collected $1,290. Adult tickets cost $8 and student tickets cost $5.

1. Write a system of two equations.
2. Solve it. How many of each ticket were sold?
3. Check your answer in both equations.

39. Gift Money That Grows: Exponential Growth

15 min • Algebra 1-2

You receive $500 and put it in an account that earns 4% interest, compounded once a year.

1. Write an exponential function for the balance after *t* years.
2. Find the balance after 5 years.
3. With simple interest (4% of the original $500 each year), what would you have after 5 years? How much more does compounding earn?
4. About how many years does it take the money to double with compounding?

40. Wrap It Up: Surface Area

12 min • Gr 7-10

A gift box measures 12 inches by 8 inches by 4 inches.

1. Find the surface area of the box.
2. A roll of wrapping paper is 30 inches wide and 120 inches long. Find its area.
3. Based only on area, how many of these boxes could one roll cover? Why will the real number be lower?

41. Which Pie Is the Better Deal?

12 min • Gr 7-10

A 9-inch pie costs $8. A 12-inch pie costs $13. (The measurement is the diameter. Use 3.14 or the π key.)

1. Find the area of each pie to the nearest tenth.
2. How many times larger is the 12-inch pie?
3. Find the cost per square inch of each. Which is the better buy?

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42. Gift Tag Probability

12 min • Gr 7-10

A bag holds 10 gift tags: 5 red, 3 green, and 2 gold. You draw without looking.

1. What is the probability of drawing a gold tag?
2. What is the probability of drawing a tag that is not green?
3. You draw two tags and do not put the first one back. What is the probability both are red?

43. Count the Ways

12 min • Gr 9-12

1. You have 3 sweaters, 4 scarves, and 2 hats. How many different outfits (one of each) can you make?
2. Five cousins line up for a photo. How many different orders are possible?
3. A dessert table has 6 desserts. You may choose any 2. How many different pairs are possible?
4. Explain why question 2 uses a permutation and question 3 uses a combination.

44. Sledding Hill Slopes

12 min • Gr 8-10

Hill A drops 24 feet over a horizontal distance of 60 feet. Hill B drops 18 feet over a horizontal distance of 40 feet.

1. Find the steepness of each hill (drop ÷ horizontal distance).
2. Which hill is steeper?
3. How long is the actual sledding surface of Hill A? Round to the nearest tenth.

45. Hanging the Lights: Pythagorean Theorem

10 min • Gr 8-10

1. A 13-foot ladder leans against a house with its base 5 feet from the wall. How high up the wall does it reach?
2. You need to reach a point 15 feet up, and the base of the ladder must sit 8 feet from the wall. How long must the ladder be?
3. Why does moving the base farther from the wall lower the top of the ladder?

46. Snowball Flight: Quadratics

15 min • Algebra 1-2

A snowball is thrown upward. Its height in feet after t seconds is $h(t) = -16t^2 + 32t + 5$.

1. From what height was it thrown?
2. When does it reach its highest point, and how high is that?
3. How high is it at 2 seconds? Why does that make sense?
4. When does it hit the ground? Round to the nearest hundredth.

47. Find the Mistake

10 min • Gr 6-9

Each student made an error. Find it, explain it, and give the correct answer.

1. Sam: $24 - 6 \times 2 + 8 \div 4 = 11$
2. Riley: $5 + 3(4 - 1)^2 = 72$
3. Write your own problem with a common mistake built in and trade with a partner.

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48. Light Strand Patterns: Sequences

12 min • Algebra 1-2

1. An arithmetic sequence begins 7, 12, 17, 22. Write a rule for the *n*th term and find the 20th term.
2. Find the sum of the first 20 terms.
3. A geometric sequence begins 3, 6, 12. Write a rule and find the 10th term.
4. Which sequence is larger at the 10th term, and by how much?

49. Favorite Pie Survey: Data

12 min • Gr 6-9

120 students were asked to name their favorite pie.

Pumpkin	Apple	Pecan	Other	None
42	30	24	18	6

1. What percent of students chose each answer?
2. To draw a circle graph, how many degrees does each section get?
3. The school has 900 students. Predict how many would choose pumpkin. What could make that prediction wrong?

50. The $50 Gift Challenge

15 min • All levels

You have exactly $50 to buy 4 different gifts. Sales tax is 8%.

Candle	Socks	Book	Mug	Puzzle	Gloves	Phone stand	Candy box
$7.50	$6.25	$11.99	$8.40	$13.75	$9.60	$12.30	$5.95

1. What is the most you can spend before tax and still stay at or under $50?
2. Choose 4 gifts. Show the subtotal, the tax, and the total.
3. Challenge: find the set of 4 that gets closest to $50 without going over.

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ACTIVITIES 51-75

Social Studies & History

November and December anniversaries, civics, economics, and geography. Good for any social studies course.

51. The Mayflower Compact

15 min

> In November 1620 the *Mayflower* reached Cape Cod, far north of the land its passengers had permission to settle. Some passengers argued that no one had legal authority over them there. Before going ashore, 41 men signed a short agreement to form a "civil body politic" and to obey "just and equal laws" made for the good of the colony.

1. What problem was the Compact meant to solve?
2. Who did not sign or get a say? Name at least two groups.
3. Write a three-rule class compact for the weeks before break. Who should get to sign it?

LEVEL UP (Gr 9-12): The Compact is often called a step toward self-government. Give one reason that is fair and one reason it is an overstatement.

52. The Editor Who Would Not Quit

12 min

> Sarah Josepha Hale, a magazine editor, spent years writing editorials and sending letters to presidents and governors asking for one national day of thanksgiving. In October 1863, in the middle of the Civil War, President Abraham Lincoln issued a proclamation setting the last Thursday of November as that day.

1. Hale could not vote. List the methods she used to influence the government.
2. Earlier presidents had not acted. Why might Lincoln have agreed in 1863?
3. Which of Hale's methods would still work today? What would you add?

LEVEL UP (Gr 9-12): Write the first two sentences of a letter to an elected official about a change you want. Make your request specific.

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53. "Franksgiving": Can a President Move a Holiday?

15 min

> In 1939, November had five Thursdays. Store owners worried that a late Thanksgiving would shorten the holiday shopping season, so President Franklin D. Roosevelt moved the holiday one week earlier. The country split. Some states celebrated on the new date, some kept the old one, and a few observed both. Critics called the new date "Franksgiving." In 1941 Congress passed a law fixing Thanksgiving on the fourth Thursday of November.

1. Who benefited from the change? Who was inconvenienced?
2. Why could states ignore the president's date?
3. Was this a good use of presidential power? Defend your answer.

LEVEL UP (Gr 9-12): The fix came from Congress, not the president. What does that show about the difference between a proclamation and a law?

54. One Day, Two Meanings

15 min

> In 1970, Massachusetts officials planning the 350th anniversary of the Pilgrims' arrival invited Wamsutta Frank James, a Wampanoag leader, to speak. When organizers read his speech, which described what his people lost after colonization, they asked him to change it. He refused. Instead, he and his supporters gathered on Cole's Hill in Plymouth on Thanksgiving Day. That gathering, the National Day of Mourning, has been held every year since.

1. Why might organizers have objected to the speech?
2. Why might James have refused to change it?
3. How can one day carry different meanings for different groups? Give another example from history or from your own community.

LEVEL UP (Gr 9-12): If you were planning a town anniversary today, how would you decide who speaks? Write two rules.

55. Code Talkers

12 min

> During World War II, the U.S. Marine Corps recruited Navajo men to send battlefield messages in a code built on the Navajo language. Enemy forces never broke it. Choctaw soldiers had done similar work in World War I. Many of these men had attended schools that punished students for speaking their own languages. The Navajo program stayed secret until 1968.

1. Why was the Navajo language so effective as the base for a code?
2. What is ironic about the government's use of the language?
3. Why did public recognition take so long?

LEVEL UP (Gr 9-12): November is Native American Heritage Month. Write a two-sentence museum label for an exhibit on the Code Talkers.

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56. One Word: "Infamy"

12 min

> On December 7, 1941, Japanese forces attacked the U.S. naval base at Pearl Harbor, Hawaii, killing 2,403 Americans. The next day President Roosevelt asked Congress to declare war. His first draft called December 7 "a date which will live in world history." He crossed out the last two words and wrote "infamy." Congress voted for war with one dissenting vote.

1. Define *infamy* in your own words.
2. How does the revised phrase change the message?
3. What does this revision teach you about how leaders use language?

LEVEL UP (Gr 9-12): Representative Jeannette Rankin cast the only "no" vote. Give one argument that her vote showed courage and one that it was a mistake.

57. Bill of Rights Day (December 15)

12 min

The Bill of Rights was ratified on December 15, 1791. Name the amendment that applies to each situation.

1. A student wears a black armband to protest a policy.
2. Police want to search a home without a warrant.
3. A person on trial refuses to testify against herself.
4. A defendant asks for a lawyer and a speedy trial.
5. A judge sets bail at $10 million for jaywalking.
6. A newspaper criticizes the mayor.
7. The government wants to house soldiers in your home during peacetime.
8. A power not given to the federal government is left to the states or the people.

LEVEL UP (Gr 9-12): Which of these rights are limited inside a school? Pick one and explain why courts allow the limit.

58. 381 Days in Montgomery

15 min

The Montgomery bus boycott began in December 1955. Put these events in order.

A. The Supreme Court upholds a ruling that bus segregation is unconstitutional.

B. Rosa Parks is arrested for refusing to give up her seat.

C. Black residents return to integrated buses after 381 days.

D. Leaders form the Montgomery Improvement Association and choose Martin Luther King Jr., age 26, to lead it.

E. Volunteers organize a carpool system with hundreds of cars.

Then answer: Black riders were the majority of the bus system's customers. Why did that matter?

LEVEL UP (Gr 9-12): The boycott needed both a protest and a court case to win. What did each one accomplish that the other could not?

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59. Tea in the Harbor: Two Headlines

12 min

> On December 16, 1773, colonists, some of them in disguise, boarded three ships and dumped 342 chests of East India Company tea into Boston Harbor. The Tea Act had actually lowered the price of legal tea, but it kept a tax on the tea and gave one company control of the trade.

1. Write a headline for a Patriot newspaper in Boston.
2. Write a headline for a newspaper in London.
3. If the tea was cheaper, why did colonists protest?

LEVEL UP (Gr 9-12): Protest or vandalism? Write two questions you would ask to decide, then apply them.

60. Washington's Gamble

15 min

> By December 1776 the Continental Army had lost New York and retreated across New Jersey. Many enlistments would end on December 31. On the night of December 25, George Washington led about 2,400 soldiers across the icy Delaware River. The next morning they surprised the Hessian troops at Trenton and captured about 900 of them.

1. List two risks of Washington's plan.
2. List two possible rewards.
3. You are an officer at the planning meeting. Do you vote yes or no? Explain.

LEVEL UP (Gr 9-12): Trenton was a small battle. Why do historians treat it as a turning point?

61. The Christmas Truce of 1914

12 min

> In December 1914, along parts of the Western Front, British and German soldiers stopped fighting without orders. Some sang carols across the trenches, traded food and small gifts, and buried their dead. Commanders on both sides disapproved and took steps to keep it from happening again.

1. What does the truce suggest about how soldiers saw the enemy?
2. Why would commanders want to prevent another truce?
3. What kinds of primary sources would help you confirm what happened?

LEVEL UP (Gr 9-12): The truce did not happen everywhere on the front. Why does that detail matter when someone tells this story?

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62. Twelve Seconds That Changed Travel

12 min

> On December 17, 1903, near Kitty Hawk, North Carolina, Orville Wright flew a powered airplane for 12 seconds and 120 feet. On the fourth flight that day, his brother Wilbur stayed up for 59 seconds and covered 852 feet. Sixty-six years later, people walked on the moon.

1. What was the average speed of the first flight in feet per second?
2. 120 feet is 40 yards. Describe that distance using a place at your school.
3. Name three consequences of powered flight: one positive, one negative, and one nobody expected.

LEVEL UP (Gr 9-12): Which matters more in history: the first attempt or the first practical version? Use the Wrights as your example.

63. The Thirteenth Amendment

15 min

Ratified December 6, 1865, Section 1 reads:

> "Neither slavery nor involuntary servitude, except as a punishment for crime whereof the party shall have been duly convicted, shall exist within the United States, or any place subject to their jurisdiction."

1. Rewrite the sentence in your own words.
2. Underline the exception. What does it allow?
3. The Emancipation Proclamation was issued in 1863. Why was an amendment still needed?

LEVEL UP (Gr 9-12): How was the exception clause used in Southern states in the decades after the Civil War?

64. The Best Land Deal in History?

15 min

> In 1803 the United States bought the Louisiana Territory from France for $15 million. The formal handover took place in New Orleans on December 20, 1803. The purchase covered about 828,000 square miles and roughly doubled the size of the country. President Jefferson worried because the Constitution says nothing about buying territory.

1. One square mile is 640 acres. About how many cents per acre did the United States pay?
2. Explain Jefferson's dilemma. What would you have done?
3. France sold its claim to the land. Who already lived there, and what did the sale mean for them?

LEVEL UP (Gr 9-12): Jefferson believed in a strict reading of the Constitution. Does making an exception for a good result weaken a principle? Argue either side.

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65. Holiday Phone Call: Time Zones

12 min

Standard time, compared with Coordinated Universal Time (UTC):

Los Angeles	Denver	Chicago	New York	London	Tokyo
UTC -8	UTC -7	UTC -6	UTC -5	UTC 0	UTC +9

1. It is 6:00 PM Thursday in Chicago. What time and day is it in each of the other five cities?

2. Cousins in Chicago, London, and Tokyo want a video call when nobody has to be awake between 11 PM and 6 AM. Find a time that works.

LEVEL UP (Gr 9-12): Why do time zones exist at all? What problem in the 1800s pushed countries to create them?

66. Supply, Demand, and the Holidays

12 min

Predict whether the price goes up or down, and explain using supply or demand.

1. Demand for airline tickets rises the week of Thanksgiving.

2. On December 26, stores still have shelves of wrapping paper.

3. A freeze destroys part of the orange crop.

4. A new game console is released with only a limited number available.

5. A warm winter leaves stores with too many heavy coats.

LEVEL UP (Gr 9-12): Grocery stores often sell turkeys at very low prices before Thanksgiving even though demand is high. Why would a store do that?

67. Opportunity Cost

10 min

Opportunity cost is the **next best** choice you give up when you make a decision.

1. You receive $100. Your options: concert ticket ($60), shoes ($85), a game ($70), or saving it toward a car. Rank your top two choices. What is the opportunity cost of your first choice?

2. You have three free hours on Saturday. You could work a shift at $12 an hour, study for exams, or go to a game. What is the opportunity cost of going to the game?

3. Why is opportunity cost only the next best option and not everything you gave up?

LEVEL UP (Gr 9-12): Describe a decision your school or city made this year. What was its opportunity cost?

68. Lame Ducks

12 min

> After every November election there is a gap before the winners take office. An official who is finishing a term after losing or choosing not to run is called a "lame duck." Until 1933, new presidents waited until March 4 to take office. The Twentieth Amendment moved the start of a new Congress to January 3 and the presidential inauguration to January 20.

1. Why did the country need a long gap in 1789?

2. Why did Americans decide to shorten it?

3. Should lame-duck officials make major decisions? Give one argument for each side.

LEVEL UP (Gr 9-12): Some countries change governments within days of an election. What are the benefits and risks of a fast handover?

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69. Law or Tradition? The Turkey Pardon

10 min

> Presidents have received turkeys as gifts for decades, and the yearly "pardon" became a regular White House tradition in 1989. The real pardon power comes from Article II of the Constitution and covers federal crimes.

Label each item L (required by law or the Constitution) or T (tradition).

1. The presidential turkey pardon.
2. A president serves no more than two elected terms.
3. The president delivers the State of the Union as a speech to Congress.
4. Inauguration Day is January 20.
5. The president can pardon a person for a federal crime.

LEVEL UP (Gr 9-12): The two-term limit was a tradition for about 150 years before it became law. What turned it into a law?

70. Lights in the Dark: Celebrations Around the World

12 min

Match each celebration to its description: **Diwali, Hanukkah, Kwanzaa, Las Posadas, Lunar New Year, Christmas, Dongzhi, Yalda**

1. Eight-night Jewish festival marked by lighting a menorah.
2. Festival of lights observed by Hindus, Sikhs, and Jains, often with small oil lamps.
3. Celebration from December 26 to January 1, created in 1966, honoring African American heritage and seven principles.
4. Nine nights of processions in Mexico and parts of Latin America, December 16 to 24.
5. Christian holiday celebrating the birth of Jesus.
6. New year based on a lunar calendar, celebrated in many East and Southeast Asian cultures in January or February.
7. Winter solstice festival in China and other parts of East Asia, marked by family meals.
8. Iranian celebration of the longest night of the year, with pomegranates and poetry.

LEVEL UP (Gr 9-12): What themes do several of these share? Why might so many cultures celebrate near the darkest part of the year?

71. Saturnalia: Rome's December Festival

12 min

> Each December, beginning on the 17th, ancient Romans honored the god Saturn with a festival called Saturnalia. Courts and schools closed. People exchanged small gifts such as candles and clay figurines. Normal rules loosened: gambling was allowed, and in some households enslaved people were served a meal by their masters.

1. Which features of Saturnalia look like modern holiday customs?
2. What is very different from today?
3. Why might Roman leaders have allowed a few days when the usual social order was relaxed?

LEVEL UP (Gr 9-12): Historians call this "continuity and change." Pick another custom you know and trace what has stayed the same and what has changed.

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72. A Continent for Science

12 min

> On December 1, 1959, twelve countries, including the United States and the Soviet Union, signed the Antarctic Treaty. They agreed that Antarctica would be used only for peaceful purposes. The treaty bans military bases and weapons testing there, protects the freedom to do scientific research, and puts territorial claims on hold.

1. This was the middle of the Cold War. Why would rivals agree to this?
2. What made Antarctica easier to agree on than other places?
3. Could a similar treaty work for the Moon or the Arctic? Explain.

LEVEL UP (Gr 9-12): Write one new rule you would add to the treaty today and explain the problem it solves.

73. Human Rights Day (December 10)

15 min

> On December 10, 1948, the United Nations adopted the Universal Declaration of Human Rights. Eleanor Roosevelt chaired the commission that drafted it. Its 30 articles include these rights:

education • freedom of opinion and expression • a fair trial • rest and leisure • freedom of movement • freedom from torture

1. Rank your top three from this list and defend your first choice.
2. Which right on the list is hardest for a government to guarantee? Why?
3. The Declaration is not a binding law. Why might it still matter?

LEVEL UP (Gr 9-12): "Rest and leisure" is Article 24. Should rest be a human right? Argue yes or no.

74. December 1991: The Soviet Union Ends

15 min

> On December 25, 1991, Mikhail Gorbachev resigned as leader of the Soviet Union, and the Soviet flag over the Kremlin was lowered. The next day the country formally ceased to exist. Fifteen independent countries took its place, and the Cold War was over.

1. Name as many of the 15 countries as you can.
2. Sort each cause as long-term or short-term: years of economic stagnation; a failed coup in August 1991; a costly war in Afghanistan; republics declaring independence in 1990 and 1991.
3. Which cause do you think mattered most? Defend your choice.

LEVEL UP (Gr 9-12): Gorbachev's reforms were meant to save the Soviet system. How can a reform speed up the collapse of the thing it was meant to fix?

75. 2026 Time Capsule

15 min

Historians in 2076 will open a box from your class.

1. List five events, inventions, or trends from 2026 that belong in it.
2. For your top choice, explain what it would teach a future historian about life right now.
3. Write the headline a 2076 textbook might use for this year.

LEVEL UP (Gr 9-12): What is missing from your list because nobody thought to record it? Whose daily life would historians struggle to understand?

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ACTIVITIES 76-100

Science

Seasonal phenomena across life, earth, and physical science. Only number 99 needs materials (paper, tape, scissors).

76. Why Leaves Change Color

12 min

> In summer, leaves are packed with chlorophyll, the green pigment that captures sunlight for photosynthesis. Yellow and orange pigments called carotenoids are in the leaf too, but the green hides them. As days shorten in fall, the tree stops making chlorophyll and the green fades, revealing the yellow and orange. Red and purple are different: they come from anthocyanins, which many trees make in autumn from sugars trapped in the leaf.

1. Why are leaves green in summer?
2. Were the yellow and orange pigments made in the fall? Explain.
3. How are red pigments different from yellow ones?
4. What signal tells a tree that fall has arrived?

LEVEL UP (Gr 9-12): Sunny days and cool nights tend to produce brighter reds. Use the passage to explain why.

77. The Shortest Day: True or False

12 min

The December solstice falls on or about December 21. Mark each statement T or F and fix the false ones.

1. Winter happens because Earth is farther from the sun.
2. Earth's axis is tilted about 23.5 degrees.
3. When it is winter in Alabama, it is summer in Australia.
4. On the December solstice, the sun does not rise at the North Pole.
5. After the December solstice, days in the Northern Hemisphere begin to get longer.
6. Places on the equator have big differences in day length between June and December.

LEVEL UP (Gr 9-12): Draw Earth and the sun in December. Show the tilt and shade the half of Earth that is in darkness.

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78. Does Turkey Make You Sleepy? 15 min

> Claim you hear every year: "Turkey makes you sleepy because it contains tryptophan." Facts: tryptophan is an amino acid the body can use to make chemicals involved in sleep. But turkey has about the same amount of tryptophan as chicken, beef, and other meats. People also tend to eat a very large meal with lots of carbohydrates on Thanksgiving, often after a busy day.

1. Write a claim that answers the question.
2. Give two pieces of evidence from the passage.
3. Explain your reasoning: how does the evidence support your claim?
4. Design a fair test. What would you change, measure, and keep the same?

LEVEL UP (Gr 9-12): Why is "I always get sleepy after turkey" weak evidence? Use the word *variable*.

79. Winter Survival Sort 10 min

Sort each animal: **M** (migrates), **D** (hibernates or goes dormant), or **A** (stays active and adapts).

1. Monarch butterfly 2. Groundhog 3. Arctic fox 4. Canada goose

5. Wood frog 6. Snowshoe hare 7. Ruby-throated hummingbird 8. Black bear

Then choose one animal and describe one advantage and one risk of its strategy.

LEVEL UP (Gr 9-12): Wood frogs can survive being partly frozen. What problem does ice cause inside cells, and what might the frog's body do to prevent it?

80. Why Snowflakes Have Six Sides 12 min

> A water molecule has a bent shape. When water freezes, its molecules link together in a repeating six-sided pattern. A snow crystal grows outward from that pattern, so it has six sides or six arms. Temperature and humidity decide whether it becomes a flat plate, a column, or a branching star.

1. Draw a snow crystal with correct symmetry.
2. Explain why a real snowflake cannot have eight arms.
3. Two snowflakes fall from the same cloud. Why might they still look different?

LEVEL UP (Gr 9-12): Look for snowflakes in holiday decorations and ads this week. Tally how many are scientifically wrong.

81. Salt vs. Ice: Design the Experiment 15 min

Road crews spread salt because salt lowers the freezing point of water. Plan an experiment with three ice cubes: one plain, one with salt, and one with sugar.

1. Write a testable question and a hypothesis.
2. Identify the independent variable and the dependent variable.
3. List three things you must keep the same.
4. How will you measure the result?

LEVEL UP (Gr 9-12): Ordinary road salt stops working well when it gets very cold (below roughly 15°F). Why would a freezing-point trick have a limit?

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82. Zap! Winter Static

10 min

You shuffle across carpet in socks, touch a metal doorknob, and get shocked. It happens far more in winter.

1. What particles move when static charge builds up?
2. Why does the shock happen at the metal doorknob and not at the wooden door?
3. Winter air indoors is very dry. Why does dry air make static shocks more common?
4. Suggest two ways to reduce shocks at home.

LEVEL UP (Gr 9-12): Lightning is static discharge on a huge scale. What plays the role of the carpet, your body, and the doorknob in a thunderstorm?

83. Conduction, Convection, or Radiation?

10 min

Label the main type of heat transfer in each.

1. Your hands warm up around a mug of cocoa.
2. Warm air from a floor vent rises toward the ceiling.
3. Your face feels warm facing a bonfire on a cold night.
4. A metal bleacher feels colder than a wooden bench at the same temperature.
5. Soup circulates in a pot as it heats.
6. Sunlight melts the snow on a dark roof first.
7. The handle of a metal spoon gets hot when it sits in soup.
8. A fan pushes warm air down from the ceiling.

LEVEL UP (Gr 9-12): Explain number 4. Both seats are the same temperature, so what is your skin actually sensing?

84. Engineer a Warmer Lunch

15 min

Design a container that keeps soup hot for four hours. You may use any three: aluminum foil, bubble wrap, cotton fabric, newspaper, cardboard, a plastic bag.

1. Sketch your design and label each layer.
2. For each material, name the type of heat transfer it slows down.
3. What is the weakest point of your design? How would you test it?

LEVEL UP (Gr 9-12): Many good insulators are mostly trapped air. Why is still air such a poor conductor of heat?

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85. Why Ice Floats

12 min

> Most substances shrink and get denser when they freeze. Water is unusual: it expands by about 9 percent. Ice has a density of about 0.92 grams per cubic centimeter, while liquid water is about 1.00. Water is densest at about 4°C.

1. Why does ice float?
2. About what percent of a floating ice cube is below the water line?
3. Lakes freeze from the top down. Why does that matter for fish?
4. Why can a full, sealed bottle of water crack in the freezer?

LEVEL UP (Gr 9-12): Imagine ice were denser than water. Describe what would happen to a lake over one long winter.

86. The Floating Cranberry

10 min

> Cranberries have small pockets of air inside. Farmers use this at harvest: they flood the field, knock the berries off the vines, and scoop them up as they float.

1. What does floating tell you about a cranberry's density compared with water?
2. A grape sinks. What does that tell you?
3. Predict: if you cut a cranberry in half and squeeze out the air, will it float as well? Explain.
4. Design a quick test to compare the density of five different fruits.

LEVEL UP (Gr 9-12): A fresh cranberry bounces. Connect that to the air pockets and to the word *elastic*.

87. Kitchen Chemistry: Physical or Chemical?

10 min

Label each change P (physical) or C (chemical).

1. Butter melts in a pan.
2. Bread turns brown in a toaster.
3. Sugar dissolves in tea.
4. Cake batter bakes into a cake.
5. Cream is whipped until it is fluffy.
6. Leftovers freeze in the freezer.
7. A turkey's skin browns in the oven.
8. Vinegar and baking soda fizz when mixed.

LEVEL UP (Gr 9-12): List four clues that a chemical change has happened. Which clue fits number 8?

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88. Follow the Food

10 min

1. Put the organs in the order food travels: stomach, mouth, large intestine, esophagus, small intestine.
2. Match each organ to its job: (a) absorbs most nutrients (b) chews and begins breaking down starch (c) absorbs water (d) mixes food with acid (e) moves food to the stomach.
3. Why does a very large meal take longer to digest?

LEVEL UP (Gr 9-12): Chewing is mechanical digestion. Give one example of chemical digestion and where it happens.

89. Wind Chill: True or False

10 min

1. Wind chill describes how cold it feels on exposed skin, not the actual air temperature.
2. Wind makes you lose heat faster by blowing away the thin layer of warm air next to your skin.
3. If the air is 35°F and the wind chill is 20°F, a bottle of water left outside will freeze.
4. Wind can cool a parked car's engine to a temperature below the air temperature.
5. Wet skin loses heat faster than dry skin.

LEVEL UP (Gr 9-12): Explain number 5 using the word *evaporation*. Why is wet clothing dangerous in cold weather?

90. Graph the Daylight

15 min

Approximate hours of daylight at about 33°N latitude (central Alabama):

Sep 21	Oct 21	Nov 21	Dec 21	Jan 21	Feb 21
12.1	11.1	10.3	10.0	10.3	11.1

1. Make a line graph of the data. Label both axes.
2. Between which two dates does daylight change the most? The least?
3. Describe the shape of the graph. What happens on December 21?
4. Predict the daylight on March 21 and explain your reasoning.

LEVEL UP (Gr 9-12): A city at 60°N has a much deeper dip in December. Sketch its curve on the same graph and explain the difference.

91. Frost, Fog, and Phase Changes

10 min

Match each winter observation to a phase change: **melting, freezing, evaporation, condensation, sublimation, deposition**

1. You can see your breath on a cold morning.
2. Frost forms on a car window overnight without any liquid water appearing first.
3. A snowbank slowly shrinks on a very cold, dry, sunny day without making puddles.
4. An icicle drips in the afternoon.
5. A pond grows a skin of ice.
6. Wet mittens dry on a radiator.

LEVEL UP (Gr 9-12): Deposition and sublimation both skip a state. Which state, and which process releases energy?

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92. Evergreen vs. Deciduous

12 min

> Broad leaves are excellent at collecting sunlight, but they lose a lot of water and are easily damaged by ice. Deciduous trees drop them and wait for spring. Evergreen needles are narrow, coated in wax, and shaped so snow slides off. They lose little water and can photosynthesize on any day warm enough.

1. Make a T-chart comparing the two strategies. Include at least three rows.
2. Why is water loss a problem in winter when there is snow everywhere?
3. Name one cost of each strategy.

LEVEL UP (Gr 9-12): Predict which type of tree should dominate where winters are longest and coldest. Explain your reasoning.

93. Fix This Experiment

12 min

> Jalen wants to know which cup keeps cocoa hot longer. He pours cocoa into a ceramic mug. Five minutes later he pours cocoa into a paper cup. The mug has a lid; the paper cup does not. He sets the mug on the counter and the paper cup next to a window. After 20 minutes he touches each one and decides the mug is warmer.

1. What is the independent variable? The dependent variable?
2. List at least four flaws in the experiment.
3. Rewrite the procedure so it is a fair test.

LEVEL UP (Gr 9-12): Why is one trial not enough? How many would you run, and what would you do with the results?

94. Why Is It So Quiet After It Snows?

10 min

> Fresh, fluffy snow is full of tiny air spaces. Sound waves that hit it are absorbed instead of bouncing back, much like sound hitting foam panels in a recording studio. After snow melts and refreezes into a hard, icy crust, it reflects sound instead.

1. What is the difference between absorbing and reflecting sound?
2. Name two places in your school with sound-absorbing materials and two with hard, echoing surfaces.
3. Predict: is a street louder the morning after a fresh snowfall or three days later? Explain.

LEVEL UP (Gr 9-12): Sound is a wave that needs matter to travel through. Why would a snowy field be silent on the Moon no matter what?

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95. Cold and Flu Season: Myth or Fact? 10 min

Label each statement M (myth) or F (fact) and correct the myths.

1. Going outside with wet hair gives you a cold.
2. Washing your hands with soap for 20 seconds removes many germs.
3. Antibiotics cure the flu.
4. People spend more time indoors together in winter, which helps viruses spread.
5. A flu shot can give you the flu.
6. Covering a cough with your elbow reduces the spread of droplets.

LEVEL UP (Gr 9-12): Colds and flu are caused by viruses. Give two ways a virus differs from a bacterium.

96. Newton on Ice 10 min

Name the law of motion (first, second, or third) that best explains each.

1. A sled keeps sliding across a frozen pond until friction slowly stops it.
2. A sled with two riders needs a harder push to speed up as fast as a sled with one rider.
3. An ice skater pushes against the wall and glides backward.
4. When a car stops suddenly on an icy road, the passengers lurch forward.
5. The harder you throw a snowball, the faster it speeds up.

LEVEL UP (Gr 9-12): Why is it harder to start walking on ice than on pavement? Use the third law and the word *friction*.

97. The Geminids: December's Meteor Shower 12 min

> Every year in mid-December, Earth passes through a trail of rocky debris left by an asteroid named 3200 Phaethon. Bits of that debris, many no bigger than grains of sand, hit the atmosphere at high speed and burn up as streaks of light. The streaks seem to spread out from the constellation Gemini, which gives the shower its name.

1. Why does this shower return on about the same dates every year?
2. Match: **meteoroid, meteor, meteorite** with (a) the streak of light (b) a rock that reaches the ground (c) a rock in space.
3. Why do you see more meteors far from city lights?

LEVEL UP (Gr 9-12): The meteors are not coming from the stars of Gemini. Why do they only appear to?

98. Winter Forest Food Web 15 min

Organisms: **oak tree (acorns), white-tailed deer, gray squirrel, deer mouse, red fox, barred owl, fungi**

1. Draw a food web. Arrows point from the food to the animal that eats it.
2. Label one producer, two primary consumers, one predator, and one decomposer.
3. Oaks produce very few acorns this year. Trace the effect through at least three organisms.

LEVEL UP (Gr 9-12): Where does the energy in an acorn originally come from? About how much of it reaches the owl?

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99. One-Sheet Tower Challenge

15 min

Materials per team: one sheet of paper, 30 centimeters of tape, scissors. Time: 10 minutes.

Goal: build the tallest tower that stands on its own for 10 seconds.

1. Before building, sketch your plan and predict the height.
2. After building, record the actual height.
3. Which shapes made the paper stronger? Why did some towers tip over?

LEVEL UP (Gr 9-12): Redesign with the same materials. What one change would add the most height, and what is the tradeoff?

100. The Cost of Holiday Lights

12 min

Typical values: a 100-bulb string of older incandescent mini lights uses about 40 watts. A similar LED string uses about 5 watts. Electricity costs about $0.15 per kilowatt-hour.

1. Each string runs 6 hours a night for 30 nights. How many kilowatt-hours does each use? (watts × hours ÷ 1,000)
2. What does each string cost to run for the month?
3. A house uses 20 strings. How much does switching to LED save in one month?

LEVEL UP (Gr 9-12): The incandescent bulbs feel warm and the LEDs do not. What does that tell you about where the extra energy goes?

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Answer Key

Reading & Writing

1. Feast Facts: What Really Happened in 1621?. 1. Our picture of the 1621 feast comes mostly from later art, not from the very small eyewitness record. 2. Any two: pumpkin pie, cranberry sauce, turkey as the centerpiece, the name "Thanksgiving." 3. One author, one point of view (English), very short, and no Wampanoag account survives alongside it.

2. Cold Words: Context Clues. 1. very cold 2. in short supply 3. inactive, resting 4. hard and easily broken 5. stay put, take shelter 6. very small, not enough. Clues will vary (eyelashes froze; sun is down before practice ends; until spring; snapped; instead of risking the roads; one cracker, starving).

3. Where Did "Black Friday" Come From?. 1. The popular "in the black" explanation is not the true origin; the name began with Philadelphia police describing a chaotic day. 2. The sentence beginning "In the 1950s and 1960s, police officers in Philadelphia..." 3. It makes the day sound positive and connects it to success instead of traffic and crowds.

4. The Last Bus Before Break: Inference. 1. Winter or a cold day (his breath fogs the glass); likely the last day before break (title, empty backpack). 2. No books or homework to carry: "for the first time since August" suggests the semester's work is done. 3. Disappointed or anxious while waiting for a message: "again," "Still nothing," and putting the phone away "screen down."

5. Fix the Email. Sample: "Hello Mr. Carter, I was absent Tuesday and Wednesday because I was sick. Can you tell me what I missed? Jordan and I can stay after school Thursday to make up the quiz. Thank you, (name)" Errors: greeting and capitals in the name, period after Mr., lowercase i (twice), tuesday, wendsday, becuase, capital C on Can, question mark after "missed," "Me and jordan," thursday, too/to, question mark on a statement, no closing or name.

6. Fact or Opinion?. 1. F 2. O 3. F 4. O 5. F 6. O 7. F 8. O 9. F: it is a factual claim because it can be checked, but it is false (viruses cause colds). A statement of fact can be wrong.

7. Why Did the Author Write This?. A. P ("Order today") B. I (directions and measurements) C. E (humor, personified snowman) D. P ("should," "deserve"). SnugStep is a made-up product.

8. Six-Word Stories. Answers will vary. Check for exactly six words and a clear idea or small story in each.

9. Figurative Language Hunt. 1. personification 2. hyperbole 3. metaphor 4. simile 5. alliteration 6. onomatopoeia 7. personification (metaphor is also defensible) 8. metaphor.

10. Snowflake Bentley: Summarize It. 1. Sample: "Vermont farmer Wilson Bentley photographed thousands of snow crystals through a microscope, showing the world that every snowflake is different." 2. Crystals melted before he could draw them, so he joined a camera to a microscope. 3. Persistent: more than four decades, over 5,000 photographs, working in the cold with simple equipment.

11. Name That Text Structure. A. cause and effect B. sequence C. compare and contrast D. problem and solution E. description.

12. Take a Side: Homework Over Break?. Answers will vary. Look for a clear claim, two different reasons with specific examples, a fair statement of the other side, and a rebuttal that answers it directly.

13. Sentence Combining. Samples: 1. The bus was late because the roads were icy. 2. Although Maya studied for the exam, she still felt nervous. 3. The student council decorated the gym with paper snowflakes. 4. We could either go to the game or stay home and watch it. 5. When the power went out, we lit candles and played cards.

14. Winter Word Roots. therm d, hiber e, sol f, noct/nox b, grat c, frig g, equi a. Equinox = "equal night": day and night are about the same length. Level up: for a few days the sun's noon height and its rising point barely change before reversing.

15. Same Message, Different Tone. 1. (a) sarcastic or annoyed (b) reassuring, patient. 2 and 3. Answers will vary; check that word choice and punctuation create three clearly different tones.

16. Poem Study: "First Frost". 1. Any two: the field forgot and woke; fence posts wear caps; the creek chatters; the crow complains; the sun arrives and reads. 2. The frost. 3. Calm, quiet, or still ("slowed," "unhurried," "no one near"). 4. The morning sun melts the frost.

17. Three Headlines, One Storm. 1. A: it states what happened without judgment words. 2. "Panic" and "a few flurries." 3. Students or families; it is celebratory. 4. Answers will vary, for example: "Buses Slide on Ice as District Waits Too Long to Close."

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18. Scrambled Paragraph: How a Snow Day Gets Called. D, B, C, E, A. Transitions: The night before, Before dawn, Next, Then, Finally.

19. The Specific Thank-You. Answers will vary. Look for a specific action and a specific effect, not general praise. Teacher tip: collect the notes and actually deliver them.

20. Punctuate the Dialogue. 1. "Are we leaving before lunch?" asked Tori. 2. Coach said, "Bring a jacket." 3. "I can't feel my fingers!" Marcus yelled. 4. "If it snows," said Ms. Lee, "the quiz moves to Monday." 5. "Who left the door open?" asked Dad. "It's freezing in here."

21. Read the Departure Board. 1. 9:35 AM. 2. Flight 604 (9:50 AM; flight 347 leaves at 9:35 AM). 3. Flight 733 at 10:10 AM, a wait of 2 hours 5 minutes. 4. See an agent or rebook; the board does not show another Denver flight or a reason for the cancellation.

22. Find the Theme: The Woodpile. 1. Samples: Generosity builds a community that takes care of everyone; keeping everything for yourself can leave you alone when you need help. 2. Any two: the locked shed, the sign, "too proud to knock," families carrying wood. 3. The wood came from the roadside stack, which belonged to the second neighbor.

23. Word of the Year. Answers will vary. Look for an accurate definition and reasons tied to real events of the year. Optional: hold a class vote.

24. Commonly Confused Words. 1. They're 2. affect 3. than 4. Your 5. its 6. too 7. Who's 8. effect 9. there 10. accept.

25. Semester 3-2-1. Answers will vary. This works well as an exit ticket on the last day before break.

Math

26. Turkey Time. 1. 208 minutes = 3 hours 28 minutes. 2. 12:02 PM (out at 3:30 PM). 3. 260 minutes = 4 hours 20 minutes, so in at 11:10 AM, which is 52 minutes earlier.

27. Scale the Recipe. 1. 20 ÷ 8 = 2.5. 2. Sugar 1 2/3 cups; pumpkin 3 3/4 cups; cinnamon 1 7/8 teaspoons.

28. Black Friday Percents. 1. $52. 2. $120 × 0.75 = $90; $90 × 0.90 = $81. 3. 35% off $120 would be $78. The second discount applies to the smaller sale price, so the total discount is 32.5%, not 35%.

29. Tax First or Discount First?. 1. $60 × 0.80 = $48; $48 × 1.09 = $52.32. 2. $60 × 1.09 = $65.40; $65.40 × 0.80 = $52.32. 3. Same total. Both are multiplication, and multiplication can be done in any order (60 × 0.80 × 1.09).

30. Road Trip Math. 1. 5 hours. 2. 1:00 PM. 3. 285 ÷ 30 = 9.5 gallons; 9.5 × $2.90 = $27.55.

31. A Week of Cold: Mean, Median, Mode. 1. Mean 42, median 44, mode 47, range 22. 2. 352 ÷ 8 = 44. 3. The mean rose by 2 (42 to 44); the median rose by 1.5 (44 to 45.5). The mean is pulled more by an extreme value.

32. Below Zero. 1. Midnight: -7°F. 6 AM: -3°F. 2. 21 degrees. 3. -8 ÷ 4 = -2°F.

33. Cocoa Unit Rates. 1. 51 cents, 49 cents, 47 cents; the 20-pack is the best unit price. 2. One 20-pack and two 8-packs = exactly 36 packets for $17.56. (Three 12-packs cost $17.64; two 20-packs cost $18.80.)

34. Leftover Pie Fractions. 1. 5/8 + 6/8 + 4/8 = 15/8 = 1 7/8 pies. 2. 15/8 ÷ 5 = 3/8 of a pie. 3. 3 slices.

35. Countdown Conversions. 1. 432 hours; 25,920 minutes. 2. 98 hours; 5,880 minutes. 3. 98 ÷ 432 = about 23%.

36. Gingerbread Blueprint: Scale. 1. 12 inches wide, 8 inches tall. 2. 3 inches. 3. 4 feet.

37. Saving for Gifts: Linear Equations. 1. You: y = 45 + 15w. Friend: y = 90 + 9w. 2. 45 + 15w = 150, so w = 7 weeks. 3. 45 + 15w = 90 + 9w, so w = 7.5 weeks. After 8 weeks you have $165 and your friend has $162.

38. Winter Concert Tickets: Systems. 1. a + s = 210 and 8a + 5s = 1,290. 2. a = 80 adult tickets, s = 130 student tickets. 3. 80 + 130 = 210; 640 + 650 = 1,290.

39. Gift Money That Grows: Exponential Growth. 1. $A = 500(1.04)^t$. 2. $608.33. 3. $600; compounding earns $8.33 more. 4. About 18 years (17.7).

40. Wrap It Up: Surface Area. 1. 2(96 + 48 + 32) = 352 square inches. 2. 3,600 square inches. 3. 3,600 ÷ 352 = 10.2, so at most 10. Real wrapping needs overlap and leaves scraps that are the wrong shape.

41. Which Pie Is the Better Deal?. 1. About 63.6 and 113.1 square inches. 2. About 1.78 times (16/9). 3. About 12.6 cents and 11.5 cents per square inch; the 12-inch pie is the better buy.

42. Gift Tag Probability. 1. 2/10 = 1/5. 2. 7/10. 3. 5/10 × 4/9 = 20/90 = 2/9.

43. Count the Ways. 1. 3 × 4 × 2 = 24. 2. 5! = 120. 3. 6 × 5 ÷ 2 = 15. 4. Order matters in a lineup; choosing pie and cake is the same pair as cake and pie.

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44. Sledding Hill Slopes. 1. Hill A: 24/60 = 0.4. Hill B: 18/40 = 0.45. 2. Hill B. 3. $\sqrt{(24^2 + 60^2)} = \sqrt{4,176}$ = about 64.6 feet.

45. Hanging the Lights: Pythagorean Theorem. 1. $\sqrt{(169 - 25)} = 12$ feet. 2. $\sqrt{(225 + 64)} = 17$ feet. 3. The ladder length (hypotenuse) stays the same, so as one leg gets longer the other must get shorter.

46. Snowball Flight: Quadratics. 1. 5 feet. 2. $t = -32 \div (2 \times -16) = 1$ second; h(1) = 21 feet. 3. 5 feet; the path is symmetric around t = 1, so t = 2 matches t = 0. 4. About 2.15 seconds.

47. Find the Mistake. 1. Sam worked left to right. Correct: 24 - 12 + 2 = 14. 2. Riley added 5 + 3 before multiplying. Correct: 5 + 3(9) = 32.

48. Light Strand Patterns: Sequences. 1. a(n) = 7 + 5(n - 1) = 5n + 2; 20th term = 102. 2. 20(7 + 102) ÷ 2 = 1,090. 3. $a(n) = 3 \times 2^{n-1}$; 10th term = 1,536. 4. Geometric: 1,536 compared with 52, a difference of 1,484.

49. Favorite Pie Survey: Data. 1. 35%, 25%, 20%, 15%, 5%. 2. 126°, 90°, 72°, 54°, 18°. 3. 315 students; the sample of 120 might not represent the whole school (one grade, one lunch period).

50. The $50 Gift Challenge. 1. $50 ÷ 1.08 = $46.29. 2. Answers will vary; check that subtotal × 1.08 is $50 or less. 3. Candle, book, puzzle, phone stand: subtotal $45.54, tax $3.64, total $49.18.

Social Studies & History

51. The Mayflower Compact. 1. They were outside their legal territory and needed an agreed authority to prevent the group from splitting. 2. Women, children, and the Native peoples whose land it was. 3. Answers will vary. Level up: fair because the signers agreed to make their own laws by consent; overstated because most people affected had no voice.

52. The Editor Who Would Not Quit. 1. Editorials, a magazine with a large audience, and personal letters to leaders over many years. 2. A shared holiday could encourage unity during the war, and it followed major Union victories that summer (Gettysburg and Vicksburg). 3. Answers will vary (letters, petitions, social media, public comment).

53. "Franksgiving": Can a President Move a Holiday?. 1. Retailers benefited; schools, sports schedules, calendar printers, and families split across states were inconvenienced. 2. Each state set its own holidays; the proclamation applied to federal workers and Washington, D.C. 3. Answers will vary. Level up: a proclamation can be changed by any president, while a law binds until Congress changes it.

54. One Day, Two Meanings. 1. They wanted a celebration and saw the speech as critical of the event. 2. He believed the history should be told accurately from his people's point of view. 3. Answers will vary (examples: Columbus Day and Indigenous Peoples' Day, July 4 for enslaved people in 1852, a local anniversary).

55. Code Talkers. 1. It was spoken by few people outside the Navajo Nation, had little written material available, and has a complex structure. 2. The same government that had punished children for speaking it depended on it in war. 3. The program was classified until 1968 in case the code was needed again.

56. One Word: "Infamy". 1. Being famous for something terrible. 2. "World history" is neutral; "infamy" judges the attack as shameful and stirs emotion. 3. A single word choice can turn a report into a call to action. Level up: answers will vary.

57. Bill of Rights Day (December 15). 1. First (speech) 2. Fourth 3. Fifth 4. Sixth 5. Eighth 6. First (press) 7. Third 8. Tenth.

58. 381 Days in Montgomery. B, D, E, A, C. Losing most of its paying riders for more than a year put heavy economic pressure on the bus company and the city. Level up: the boycott created pressure and unity; the court ruling (Browder v. Gayle) made the change legally binding.

59. Tea in the Harbor: Two Headlines. 1 and 2. Answers will vary; look for word choice that shows point of view. 3. Buying it meant accepting Parliament's right to tax colonists who had no representatives, and the monopoly undercut colonial merchants.

60. Washington's Gamble. 1. Samples: the crossing could fail in ice and darkness; a defeat could destroy the remaining army. 2. Samples: a victory to raise morale; a reason for soldiers to reenlist; captured supplies. 3. Answers will vary. Level up: it restored confidence and kept the army together when the cause was close to collapse.

61. The Christmas Truce of 1914. 1. Many saw the other side as ordinary men in the same miserable conditions. 2. Friendly contact makes soldiers less willing to fight and weakens discipline. 3. Letters home, diaries, photographs, unit records, newspaper reports from the time.

62. Twelve Seconds That Changed Travel. 1. 10 feet per second. 2. Answers will vary (less than half a football field). 3. Answers will vary (examples: fast travel and trade; aerial bombing; diseases spreading between continents in

hours).

63. The Thirteenth Amendment. 1. Slavery and forced labor are banned everywhere under U.S. authority, except as punishment for a person convicted of a crime. 2. Forced labor as a criminal sentence. 3. The Proclamation was a wartime order that applied only to areas in rebellion; an amendment made abolition permanent and nationwide. Level up: convict leasing and similar systems.

64. The Best Land Deal in History?. 1. 828,000 × 640 = about 530 million acres; $15,000,000 ÷ 530,000,000 = about 3 cents an acre. 2. He believed in limited federal power but saw the deal as too important to lose; answers will vary. 3. Many Native nations; they were not consulted, and the purchase opened the way for U.S. expansion onto their lands.

65. Holiday Phone Call: Time Zones. 1. Los Angeles 4:00 PM Thu; Denver 5:00 PM Thu; New York 7:00 PM Thu; London 12:00 AM Fri; Tokyo 9:00 AM Fri. 2. One answer: 7:00 AM Chicago = 1:00 PM London = 10:00 PM Tokyo. Level up: railroads needed consistent schedules.

66. Supply, Demand, and the Holidays. 1. Up (higher demand, fixed number of seats). 2. Down (demand drops, supply remains). 3. Up (lower supply). 4. Up (high demand, low supply). 5. Down (low demand, extra supply). Level up: a loss leader; the cheap turkey brings shoppers in to buy everything else.

67. Opportunity Cost. 1. Answers will vary; the opportunity cost is the second-ranked choice. 2. Whichever the student values more: $36 in wages or the study time. 3. You could only have chosen one alternative, so only the best one you passed up counts.

68. Lame Ducks. 1. Travel and communication were slow; it took weeks to count votes and reach the capital. 2. Faster travel and communication made the wait unnecessary, and a long gap left the country with weakened leadership during crises. 3. For: they are still legally in office and elected to serve the full term. Against: voters have already chosen someone else.

69. Law or Tradition? The Turkey Pardon. 1. T 2. L (Twenty-second Amendment) 3. T (the Constitution requires a report "from time to time," not a speech) 4. L (Twentieth Amendment) 5. L (Article II). Level up: Franklin Roosevelt won four terms; the Twenty-second Amendment was ratified in 1951.

70. Lights in the Dark: Celebrations Around the World. 1. Hanukkah 2. Diwali 3. Kwanzaa 4. Las Posadas 5. Christmas 6. Lunar New Year 7. Dongzhi 8. Yalda. Level up: light, family, food, and renewal; the solstice marks the return of longer days.

71. Saturnalia: Rome's December Festival. 1. Time off from work and school, gift giving, feasting, candles. 2. It honored a Roman god, and it took place in a society built on slavery. 3. A brief release of pressure could make people more willing to accept the normal order the rest of the year.

72. A Continent for Science. 1. Neither side wanted the other to gain a military advantage there, and scientists were already cooperating. 2. No permanent population, harsh conditions, and no proven easy profit at the time. 3. Answers will vary. The Arctic has people, shipping routes, and resources, which makes agreement harder.

73. Human Rights Day (December 10). Answers will vary. For question 3: it sets a shared standard, has shaped later treaties and national constitutions, and gives people language to hold governments accountable.

74. December 1991: The Soviet Union Ends. 1. Russia, Ukraine, Belarus, Estonia, Latvia, Lithuania, Moldova, Georgia, Armenia, Azerbaijan, Kazakhstan, Uzbekistan, Turkmenistan, Kyrgyzstan, Tajikistan. 2. Long-term: economic stagnation, Afghanistan war. Short-term: failed coup, independence declarations. 3. Answers will vary.

75. 2026 Time Capsule. Answers will vary. Look for reasoning about significance (who was affected, how many, for how long), not just a list.

Science

76. Why Leaves Change Color. 1. Chlorophyll is abundant and masks other pigments. 2. No, carotenoids were there all along and are revealed when chlorophyll breaks down. 3. Anthocyanins are newly made in autumn from trapped sugars. 4. Shorter days (longer nights), along with cooler temperatures. Level up: sunny days make more sugar and cool nights keep it in the leaf, so more anthocyanin forms.

77. The Shortest Day: True or False. 1. F: seasons come from the tilt; Earth is actually closest to the sun in early January. 2. T 3. T 4. T 5. T 6. F: day length at the equator stays close to 12 hours all year.

78. Does Turkey Make You Sleepy?. 1. Sample: turkey alone probably does not cause the sleepiness. 2. Turkey has no more tryptophan than other meats; the meal is unusually large and high in carbohydrates. 3. If tryptophan in turkey were the cause, a chicken dinner would do the same; meal size is a better explanation. 4. Change the meat (or meal size) only; measure sleepiness the same way; keep portion, time of day, and activity the same.

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79. Winter Survival Sort. 1. M 2. D 3. A (thick white winter coat) 4. M 5. D (spends winter frozen under leaf litter) 6. A (white winter coat) 7. M 8. D. Level up: ice crystals damage cells; the frog floods its cells with glucose, which works like antifreeze.

80. Why Snowflakes Have Six Sides. 1. Six matching arms or sides. 2. The molecules bond in a six-sided (hexagonal) arrangement, so growth follows six directions. 3. Each takes a slightly different path through air with different temperature and humidity.

81. Salt vs. Ice: Design the Experiment. 1. Sample: Which substance melts ice fastest? Hypothesis will vary. 2. Independent: what is put on the ice. Dependent: melting time or amount of water after a set time. 3. Cube size, amount of substance, surface, room temperature, start time. 4. Time to fully melt, or milliliters of meltwater after 10 minutes. Level up: salt only lowers the freezing point by a limited amount; below that, the salty water freezes too.

82. Zap! Winter Static. 1. Electrons. 2. Metal is a conductor, so charge moves quickly through it; wood is a poor conductor. 3. In humid air, charge leaks away through moisture; in dry air it builds up. 4. Humidifier, lotion, touching metal with a key first, different shoes or fabrics.

83. Conduction, Convection, or Radiation?. 1. Conduction 2. Convection 3. Radiation 4. Conduction 5. Convection 6. Radiation 7. Conduction 8. Convection. Level up: metal conducts heat away from your skin faster, and your skin senses the rate of heat loss.

84. Engineer a Warmer Lunch. Answers will vary. Look for: foil reflecting radiation; bubble wrap, fabric, and crumpled newspaper trapping air to slow conduction and convection; a sealed lid or bag to stop warm air escaping. Level up: gas molecules are far apart, so they pass energy along slowly.

85. Why Ice Floats. 1. It is less dense than liquid water. 2. About 92 percent. 3. The ice layer insulates the water below, which stays liquid (about 4°C at the bottom), so fish survive. 4. Water expands as it freezes and pushes on the bottle. Level up: ice would sink, new ice would keep forming on top, and the lake could freeze solid from the bottom up.

86. The Floating Cranberry. 1. Less dense than water (below 1 g/mL). 2. It is denser than water. 3. It should float lower or sink, because the air was lowering its overall density. 4. Sample: drop each in water and record sink or float; or measure mass and volume by water displacement and divide.

87. Kitchen Chemistry: Physical or Chemical?. 1. P 2. C 3. P 4. C 5. P 6. P 7. C 8. C. Level up: gas produced, color change, new odor, temperature change or light, a new substance forms; number 8 produces gas (carbon dioxide).

88. Follow the Food. 1. Mouth, esophagus, stomach, small intestine, large intestine. 2. (a) small intestine (b) mouth (c) large intestine (d) stomach (e) esophagus. 3. More food to break down and move through each organ. Level up: stomach acid and enzymes breaking down protein; enzymes in saliva breaking down starch.

89. Wind Chill: True or False. 1. T 2. T 3. F: objects cannot cool below the actual air temperature, and 35°F is above freezing. 4. F: wind cools it faster, but only down to the air temperature. 5. T. Level up: evaporating water takes heat energy from your skin.

90. Graph the Daylight. 2. Most: Sep 21 to Oct 21 (1.0 hour). Least: Nov 21 to Dec 21 and Dec 21 to Jan 21 (0.3 hour). 3. A U-shaped curve with its lowest point at the solstice. 4. About 12.1 hours; the curve is symmetric and March 21 is near the equinox. Values are calculated estimates.

91. Frost, Fog, and Phase Changes. 1. Condensation 2. Deposition 3. Sublimation 4. Melting 5. Freezing 6. Evaporation. Level up: both skip the liquid state; deposition (gas to solid) releases energy.

92. Evergreen vs. Deciduous. 1. Sample rows: leaf shape, water loss, winter photosynthesis, cost of regrowing leaves. 2. Frozen water in the soil cannot be taken up by roots, so winter acts like a drought. 3. Deciduous: must regrow every leaf each spring. Evergreen: needles collect less light. Level up: conifers; they can use short growing seasons without spending time regrowing leaves.

93. Fix This Experiment. 1. Independent: type of cup. Dependent: temperature of the cocoa after a set time. 2. Different start times, one lid, different locations, no thermometer, amounts not measured, starting temperatures unknown, one trial. 3. Same amount and starting temperature, poured at the same time, both lidded or both open, same location, measured with a thermometer at set intervals, repeated.

94. Why Is It So Quiet After It Snows?. 1. Absorbed sound energy is trapped and turned into a tiny amount of heat; reflected sound bounces back as echoes. 2. Answers will vary (carpet, ceiling tiles, curtains; gym, hallway, cafeteria). 3. Three days later; packed or icy snow reflects sound. Level up: the Moon has no air to carry sound waves.

95. Cold and Flu Season: Myth or Fact?. 1. M: colds are caused by viruses, not by being cold or wet. 2. F 3. M: antibiotics work on bacteria, not viruses. 4. F 5. M: the shot does not contain live flu virus that can cause illness. 6. F. Level up: viruses are much smaller, are not cells, and can only reproduce inside a host cell.

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96. Newton on Ice. 1. First 2. Second 3. Third 4. First 5. Second. Level up: you walk by pushing backward on the ground so the ground pushes you forward; with little friction, your foot slips and the ground cannot push back.

97. The Geminids: December's Meteor Shower. 1. Earth crosses the same part of its orbit, and the same debris trail, at the same time each year. 2. Meteoroid c, meteor a, meteorite b. 3. Light pollution washes out the fainter streaks. Level up: perspective; parallel paths appear to spread from one point, like falling snow seen through a windshield.

98. Winter Forest Food Web. 1. Acorns to deer, squirrel, and mouse; squirrel and mouse to fox and owl; all dead material to fungi. 2. Producer: oak. Primary consumers: deer, squirrel, mouse. Predator: fox or owl. Decomposer: fungi. 3. Fewer acorns means fewer mice and squirrels survive winter, which means less food for foxes and owls. Level up: the sun; only about 10 percent passes on at each step, so about 1 percent of the acorn's energy.

99. One-Sheet Tower Challenge. Answers will vary. Look for: rolled tubes and triangular folds resist bending better than flat paper; a wide base and low center of mass prevent tipping.

100. The Cost of Holiday Lights. 1. Incandescent: 40 × 180 ÷ 1,000 = 7.2 kWh. LED: 5 × 180 ÷ 1,000 = 0.9 kWh. 2. $1.08 and about $0.14 (13.5 cents). 3. 20 × (7.2 - 0.9) = 126 kWh, which is $18.90. Level up: most of the incandescent bulb's energy becomes heat instead of light.

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About the Author

This kit was created by Clay Shumate, a certified grades 6-12 social studies teacher. Tap or click any link below to visit.

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