

Data Literacy for Every Classroom

10 Cross-Curricular Lessons for Grades 5–9

Science • Social Studies • ELA • Math

Graph Reading • Misleading Data • Survey Design

Infographic Analysis • Evidence-Based Conclusions

UM Printables

Table of Contents

Introduction

- How to Use This Resource

Lesson Plans

- Lesson 1: What Is Data?
- Lesson 2: Reading Graphs & Tables
- Lesson 3: The Story Behind the Numbers
- Lesson 4: Spotting Misleading Data
- Lesson 5: Designing Effective Surveys
- Lesson 6: Collecting & Organizing Data
- Lesson 7: Infographic Analysis
- Lesson 8: Correlation vs. Causation
- Lesson 9: Drawing Evidence-Based Conclusions
- Lesson 10: Data Literacy in Action

Reference & Activities

- Graph-Reading Anchor Chart
- Misleading Data Analysis Activity (5 Examples)
- Student Survey Design Guide
- Infographic Analysis Set (5 Infographics)
- Evidence-Based Argument Writing Frame

Teacher Support

- Teacher Notes

This resource is designed to be flexible — use lessons sequentially or select individual lessons to support your curriculum needs.

How to Use This Resource

Data Literacy for Every Classroom is a comprehensive, cross-curricular resource designed to help students in Grades 5–9 develop the skills they need to read, interpret, question, and create data. In today's world, data literacy is not just a math skill — it is an essential life skill that spans every subject area.

Why Data Literacy?

Every day, students encounter data in news articles, social media, advertisements, and classroom materials. Yet many students (and adults) struggle to critically evaluate the data they see. This resource equips students with the tools to:

- Read and interpret graphs, tables, and infographics accurately
- Identify misleading data presentations and manipulative visuals
- Design fair, unbiased surveys and collect data responsibly
- Draw evidence-based conclusions and communicate them effectively
- Apply data literacy skills across science, social studies, ELA, and math

Who Is This For?

This resource is designed for Grades 5–9 and can be used by any teacher — not just math teachers. Each lesson includes cross-curricular connections and adaptable activities.

Subject	Data Literacy Connection
Science	Analyzing experimental data, interpreting results, graphing variables
Social Studies	Reading population data, evaluating statistics in news, understanding census data
ELA	Using data as evidence in argument writing, evaluating claims in informational texts
Math	Statistical reasoning, graphing, probability, data analysis

How the Lessons Are Structured

Each of the 10 lessons follows a consistent structure:

- **Learning Objectives** — Clear, measurable goals for the lesson
- **Materials Needed** — Simple, classroom-ready materials
- **Time Estimate** — Approximately 45–60 minutes per lesson (adaptable)
- **Introduction** — A hook or activating strategy to engage students
- **Core Activity** — The main instructional activity

- **Guided Practice** — Students apply skills with support
- **Wrap-Up & Reflection** — Consolidation and exit ticket
- **Cross-Curricular Extensions** — Ideas for other subject areas
- **Assessment** — Formative assessment suggestions

Suggested Pacing

While lessons can be used in any order, we recommend teaching Lessons 1–3 first to build foundational skills. Lessons 4–6 develop critical evaluation and data collection skills. Lessons 7–10 focus on analysis and application.

Option	Schedule	Best For
2-Week Intensive	1 lesson per day; supplemental activities as homework	Dedicated data literacy unit
4-Week Extended	1 lesson every 2–3 days with practice between	Ongoing cross-curricular integration
Semester-Long	1 lesson per week, revisited throughout the term	Spiraled instruction across subjects

Teacher Tip: Start each lesson by displaying a real-world graph or data visualisation at the front of the classroom. Ask students: "What do you notice? What do you wonder?" This simple protocol builds curiosity and activates prior knowledge.

Supplementary Materials Included

In addition to the 10 lesson plans, this resource includes:

- **Graph-Reading Anchor Chart** — A ready-to-display reference for reading bar graphs, line graphs, pie charts, and tables
- **Misleading Data Analysis Activity** — 5 real-world-style examples of misleading data for students to analyze
- **Student Survey Design Guide** — A step-by-step guide for creating unbiased surveys
- **Infographic Analysis Set** — 5 infographics with guided analysis questions
- **Evidence-Based Argument Writing Frame** — A structured template for writing data-supported arguments
- **Teacher Notes** — Additional guidance, answer keys, and differentiation tips

1

Lesson 1: What Is Data?

Time Estimate	45–60 minutes
Subjects	Math, Science, Social Studies, ELA
Key Vocabulary	data, qualitative data, quantitative data, categorical data, numerical data

Learning Objectives

- Define what data is and explain why it matters
- Distinguish between qualitative (categorical) and quantitative (numerical) data
- Identify examples of data in everyday life and across subject areas

Materials Needed

- Whiteboard or chart paper
- Sticky notes (two different colors per student)
- Student notebooks

Introduction: The Data Detective (10 min)

Display three common classroom objects (e.g., a book, a water bottle, and a ruler). Ask students: *"If we wanted to describe these objects using facts, what could we say?"* Record student responses on the board. Guide them to see that some descriptions are numbers (e.g., "The ruler is 30 cm long") and some are words (e.g., "The book has a blue cover"). Introduce the term **data**: facts and statistics collected together for reference or analysis.

Core Activity: Two Types of Data (15 min)

Explain that data generally falls into two categories:

Quantitative (Numerical) Data: Data that can be counted or measured, expressed as numbers.
Example: The water bottle holds 500 mL.

Qualitative (Categorical) Data: Data that describes qualities or characteristics, often expressed as words or labels. Example: The water bottle is made of metal.

Provide additional examples and non-examples to solidify understanding.

Class Sort: Write the following data points on the board. Have students categorize them as Quantitative or Qualitative in their notebooks:

- The temperature outside is 22°C. (*Quantitative*)

-
- The classroom walls are painted beige. (*Qualitative*)
 - There are 24 students in the class. (*Quantitative*)
 - The dog is friendly. (*Qualitative*)
 - A gallon of milk costs \$3.49. (*Quantitative*)

Guided Practice: Sticky Note Sort (15 min)

Give each student two different-colored sticky notes (e.g., blue for quantitative, yellow for qualitative). Ask students to look around the classroom or think about their daily lives and write one example of quantitative data on the blue note and one example of qualitative data on the yellow note. Have students place their notes on the board under the correct headings. Review the notes as a class, correcting any misconceptions (e.g., "I am 12 years old" is quantitative; "My favorite food is pizza" is qualitative).

Wrap-Up & Reflection (5 min)

Exit Ticket: Have students write down one piece of quantitative data and one piece of qualitative data about themselves on a slip of paper before leaving.

Cross-Curricular Extensions

- **Science:** Classify observations from a nature walk (e.g., "The leaf is green" vs. "The leaf is 8 cm long").
- **Social Studies:** Compare qualitative data (cultural traditions) and quantitative data (population numbers) of different countries.
- **ELA:** Describe a character using both types of data (e.g., "Harry Potter is a wizard" vs. "Harry Potter is 11 years old").
- **Math:** Discuss why "categorical" and "numerical" are the mathematical terms for these data types.

Assessment

Observe student participation during the Sticky Note Sort and review exit tickets for accuracy. Watch for students who confuse numbers embedded in qualitative data (e.g., a phone number is qualitative/categorical, not quantitative, because you don't measure or count with it).

Teacher Tip: A common misconception is that any data containing numbers is quantitative. Remind students that if the number is a label or identifier (like a jersey number or zip code), it is qualitative/categorical.

2

Lesson 2: Reading Graphs & Tables

Time Estimate	45–60 minutes
Subjects	Math, Science, Social Studies
Key Vocabulary	title, axis (x-axis, y-axis), scale, interval, legend, data point

Learning Objectives

- Identify the key components of a graph (title, axes, labels, scale, legend)
- Extract specific data points from bar graphs and data tables
- Summarize the overall trend or pattern shown in a data display

Materials Needed

- Graph-Reading Anchor Chart (included in this resource)
- Projected or printed examples of a bar graph and a data table
- Student notebooks

Introduction: The Missing Pieces (10 min)

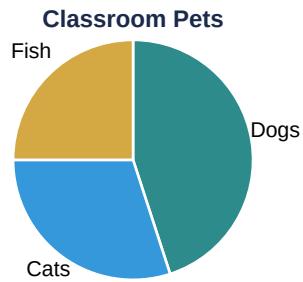
Display a bar graph on the board but remove the title, axis labels, and scale. Ask students: *"What information is missing? Can you tell what this graph is about?"* Discuss why each missing element is essential for understanding the data. Reveal the complete graph and show how the missing pieces change their understanding.

Core Activity: Anatomy of a Graph (15 min)

Introduce the key components of any graph using the Graph-Reading Anchor Chart. Define each term clearly:

- **Title:** Tells what the graph is about.
- **X-axis:** The horizontal line; usually shows categories or time.
- **Y-axis:** The vertical line; usually shows the amounts or frequency.
- **Scale / Interval:** The amount between each mark on the axis.
- **Legend:** Explains the colors or symbols used in the graph.
- **Data Point:** A single piece of information on the graph.

Example: Reading a Table



How to Read: Compare the *size of the slices*. The largest slice is the most popular or highest percentage. All slices must equal 100%.

Data Table

Best for: Showing exact values for multiple variables.

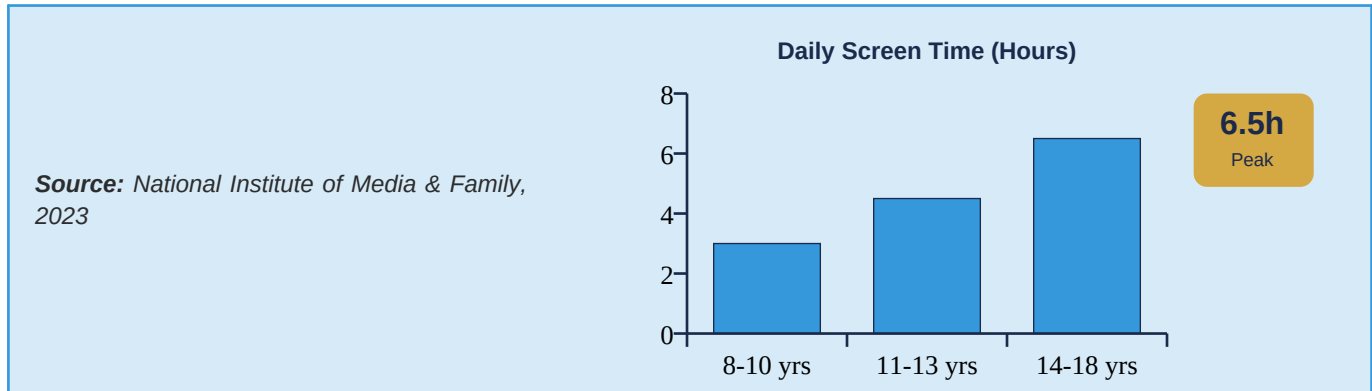
Month	Rain (in)
April	3.2
May	4.5

How to Read: Find the intersection of a specific row and column. Always check the column headers and row labels for units and context.

Infographic Analysis Set

The following five infographic cards present data in visually appealing formats. For each infographic, examine the visual elements, extract the data, and answer the analysis questions using complete sentences. Remember: look for the actual data hidden within the decorations!

Infographic 1: Daily Screen Time by Age



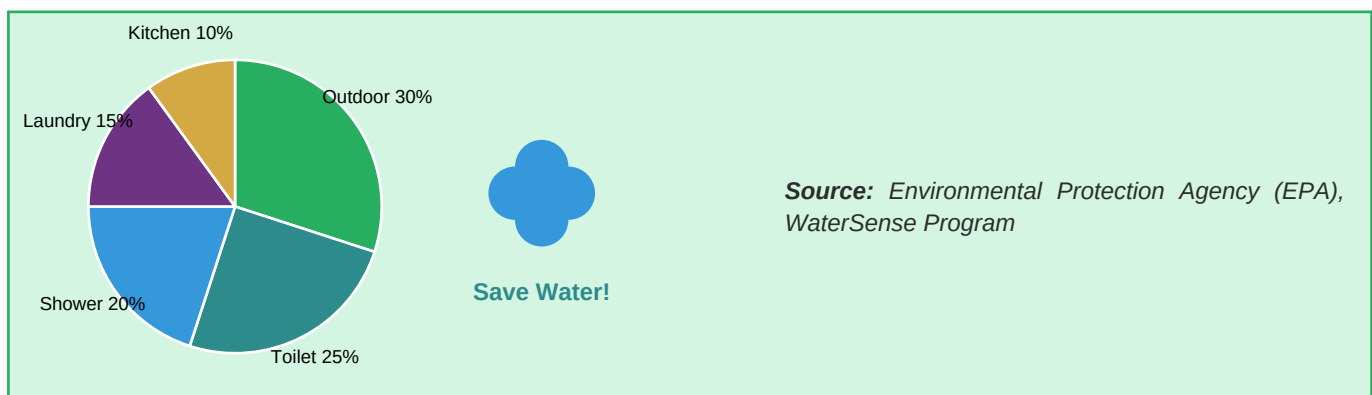
Analysis Questions:

Step 1: What is the dependent variable (what is being measured) in this infographic?

Step 2: How many more hours of screen time do 14-18 year olds have compared to 8-10 year olds? (Show your calculation)

Step 3: The gold callout box highlights "6.5h Peak". Why might a data detective be critical of highlighting only the peak value?

Infographic 2: Home Water Usage



Analysis Questions:

Step 1: Which two categories combined account for exactly half (50%) of home water usage?

Evidence-Based Argument Writing Frame

Use this frame to construct a strong, evidence-based conclusion. Every good data argument needs a Claim, Evidence, and Reasoning (CER). Write your responses in the spaces provided.

The Research Question: Write the question you are trying to answer based on your data.

Example: "Does the amount of sleep a student gets affect their quiz score?"

My Research Question:

Part 1: The Claim

Your claim is a one-sentence statement that directly answers the research question. It should be specific and defensible.

Sentence Starter: "Based on the data, I claim that..."

Example: Based on the data, I claim that students who get more sleep score higher on quizzes.

My Claim:

Part 2: The Evidence

Your evidence is the specific data that supports your claim. You must include actual numbers, percentages, or data points from your graph or table. Never use vague words like "a lot" or "some" when you can use an exact number.

Sentence Starters:

- "The data shows that..."
- "According to the graph..."
- "For example, the data point for..."

Example: The data shows that Student A, who slept for 5 hours, scored 11/20. In contrast, Student C, who slept for 8 hours, scored 19/20.

My Evidence:

Part 3: The Reasoning

Your reasoning explains *how* and *why* your evidence supports your claim. This is where you connect the numbers to the science, math, or logic behind your claim.

Sentence Starters:

- "This evidence proves my claim because..."
- "The reason this data supports my claim is..."

Example: This evidence proves my claim because there is a clear pattern: as the hours of sleep increase from 5 to 8, the quiz score also increases from 11 to 19. A well-rested brain retains information better, which explains the higher scores.

My Reasoning:

Self-Evaluation Checklist

Checklist Item	✓ / ✗
My claim directly answers the research question.	
My evidence includes specific numbers or data points (no vague terms).	
My reasoning explains the scientific or logical connection between the claim and evidence.	
I have not introduced any new data in my reasoning section.	

Teacher Notes & Answer Keys

This section provides guidance for differentiation, facilitation, and answer keys for the Misleading Data Analysis Activity and Infographic Analysis Set.

Differentiation Strategies

For Struggling Learners:

- Provide sentence starters for all CER (Claim-Evidence-Reasoning) writing tasks.
- Work through the first misleading data example as a whole class before releasing students to independent work.
- Reduce the number of survey respondents required in Lesson 6 to ensure they focus on the organization process rather than the counting.
- Pre-label the axes on graph paper for students who struggle with spatial organization or scale.

For Advanced Learners:

- Challenge students to find their own examples of misleading graphs in real media (newspapers, online articles) and present them to the class.
- Require students to calculate the exact percentage of visual distortion in the pictograph example (e.g., "The area is 400% larger, but the value is only 200% larger").
- Have advanced students design a survey with branching logic (e.g., "If yes, go to question 2; if no, go to question 3").
- Ask students to write a counter-CER: a claim that argues the opposite using the same data set.

Answer Key: Misleading Data Analysis Activity

Example 1: The Truncated Axis

The Trick: The y-axis starts at 90 instead of 0.

Explanation: A 4% difference (94% vs. 98%) is made to look like a massive gap because the base of the bars is cut off. When redrawn starting at 0, the bars are nearly identical.

Example 2: The Pictograph Distortion

The Trick: Doubling both the height and width of the icon.

Explanation: Company B's profit (\$20k) is double Company A's (\$10k). By doubling the height AND width, the area of B's icon is 4 times larger ($2 \times 2 = 4$), making the visual difference look like a 4x increase instead of a 2x increase.

Example 3: Cherry-Picking the Timeline

The Trick: Only showing 3 months of data.

Explanation: A 3-month trend might be seasonal (e.g., snowbirds moving in for winter). Without seeing a full 12-month or multi-year cycle, the viewer cannot know if this is a true "boom" or a regular annual fluctuation.

Example 4: The Inconsistent Scale

The Trick: The y-axis skips from 20 to 80 without a visual break.

Explanation: The value for 2020 (100) is exactly 5 times larger than 2010 (20). However, because the distance between 20 and 80 is compressed into the same visual space as 0 to 20, the bar for 2020 looks less than twice as tall as the 2010 bar.

Example 5: The Pie Chart Exceeding 100%

The Trick: Using a pie chart for a multiple-choice survey where total responses exceed 100%.

Explanation: Pie charts only work when data is mutually exclusive and totals exactly 100%. Because students could choose more than one pet ($60\% + 50\% + 40\% = 150\%$), the pie chart mathematically distorts the slices (e.g., the 60% slice visually looks like only 40% of the pie, because $60/150 = 0.40$). A bar graph is the correct display for this data.

Answer Key: Infographic Analysis Set

Infographic 1: Daily Screen Time by Age

1. The dependent variable is *hours of daily screen time*.
2. $6.5 \text{ hours} - 3 \text{ hours} = 3.5 \text{ hours}$. (14-18 year olds have 3.5 more hours of screen time than 8-10 year olds).
3. Highlighting only the peak value ignores the context of the other groups. It might make it seem like only teenagers are on screens, while the data shows even young children average 3 hours. It creates a sensationalist narrative.

Infographic 2: Home Water Usage

1. $\text{Outdoor (30\%)} + \text{Shower (20\%)} = 50\%$.
2. $15\% \text{ of } 200 \text{ gallons} = 0.15 \times 200 = 30 \text{ gallons used for laundry}$.
3. A pie chart is a good choice because the categories (outdoor, toilet, shower, etc.) are mutually exclusive and collectively add up to 100% of the household water usage. It shows parts of a whole.

Infographic 3: Plastic Waste Over Time

1. The trend is accelerating (the line gets steeper over time). The increase between 2000-2020 is much larger than between 1980-2000.
2. $\text{Percent increase} = ((\text{New} - \text{Old}) / \text{Old}) \times 100$. $((380 - 50) / 50) \times 100 = (330 / 50) \times 100 = 6.6 \times 100 = 660\%$. The claim is mathematically accurate.
3. The increase was greatest between 2010 and 2020 ($380 - 250 = 130$ million tons).

Infographic 4: Reading Habits by Grade Level

Thank You for Your Purchase!

I truly appreciate your support and hope this resource brings valuable data literacy skills to your classroom.

Your feedback is incredibly important and helps other teachers find quality resources. If you found this product helpful, please take a moment to leave a rating and a brief comment on Teachers Pay Teachers.

Please Consider Leaving a Review!

*Log in to your TPT account, go to "My Purchases,"
and click the "Provide Feedback" button next to this resource.*

*Every review helps me continue creating premium, high-quality
materials!*

Thank you for making data literacy a priority for your students.

UM Printables

Premium Resources for the Modern Classroom
