FEATURES TO ENGAGE STUDENTS

At the Center for Mathematics and Teaching, we know that all students have the potential to achieve in mathematics, believe that the development of mathematics should reflect the connectedness of Big Ideas into a coherent whole, and make mathematics inviting and inclusive to more students. Many features in *MathLinks* programs engage students in problems and routines that will help them experience success as they see the beauty and utility of mathematics and see themselves as "do-ers" of mathematics.

LOCATIONS OF THE FEATURES REFERENCED IN THIS SECTION

Print	Portal
Teacher Edition  • Unit Planning Information (TE-UPI) • Annotated Answer Key, including Student Packet and Lesson Notes (TE-AK) **Program Information** (PI) 	**Portal Landing Page** (LP)  **Grade 8 Unit Resources** → <Unit number> (UR) • Teacher Edition (TE) • Student Packet (SP) • Other Resources for Students (OR-S) ✓ Essential Skills (ES) ✓ Math Talks (MT) ✓ Nonroutine Problems (NP) ✓ Tasks (T) ✓ Projects (P) ✓ Technology Activities (TA) **Grade 8 General Resources** (GR)

HANDS-ON ACTIVITIES

Building conceptual understanding is at the heart of every *MathLinks* Core course, and many lessons employ kinesthetic methods to engage students in attaining this goal. Here are some examples for Grade 8:

- Unit 1, **Plane and Solid Figures**: Students make paper solids for a volume exploration. They develop volume formulas for cylinders, cones, and spheres by using physical models or technology. A toilet paper roll and a card sort activity sheds insight into angle measures and relationships.
- Unit 2, **Real Numbers and the Pythagorean Theorem**: A triangle "cut-up-proof" using a paper model is at the heart of justifying the famous Pythagorean theorem.
- Unit 3, **The Algebra of Exponents and Roots**: A paper folding activity provides a pattern that gives meaning to the fact that a number to the zero power is equal to one.
- Unit 4, **Introduction to Functions**: A fun board game/puzzle opens the unit and sets the stage for collecting data and generalizing patterns using algebra.
- Unit 5, **Linear Functions**: Students review important linear function topics with a card sort activity.
- Unit 6, **Bivariate Data**: A stacking cups investigation leads to imperfect data and the need to look at patterns of association that can be represented by lines of best fit and their equations.
- Unit 7, **Linear Equations and Systems 1**: Using positive and negative integer counters with cups (the unknowns) sets the stage for manipulating expressions and solving equations with variables on both sides. ("Cups and counters" are included with the program.)
- Unit 8, **Linear Equations and Systems 2**: Students practice solving equations algebraically by playing a card game.
- Units 9 and 10, **Congruence**; **Similarity**: Students use patty paper to explore rigid motions and arrive at the definitions of congruence and similarity. A rubber band experiment that helps them make sense of dilations.

ACTIVITY ROUTINES

Activity Routines are recurring features in *MathLinks*, designed to engage students in problem-solving and practice. Activity Routines are accessible to a wide range of learners and learning styles. Planning for Different Users (TE-UPI) identifies Activity Routines that are especially appropriate for English learners, struggling learners, and enrichment.

This chart shows the location of the routines throughout the course. Detailed instructions for each Activity Routine, along with introductory sample activities, can be found in General Resources on the Teacher Portal. We recommend that teachers use these samples to establish classroom norms and procedures prior to using these activities in the units.

GRADE 8: ACTIVITY ROUTINES

Unit / Domain →	1 G	2 NS	3 EE	4 F	5 F	6 SP	7 EE	8 EE	9 G	10 G
Big Square (or Triangle) Puzzles		ES			ES		TE-AK	TE-AK		
Four in a Row	ES	ES NP	ES	ES	ES	ES	ES			ES
Match and Compare Sorts	TE-AK		TE-AK			TE-AK				
Math Talks	MT	MT	MT	MT	MT	MT	MT	MT	MT	MT
Open Middle Problems	ES	ES	ES NP	NP	TE-AK NP	NP	TE-AK NP	TE-AK ES NP		NP
Poster Problems	TE-AK	TE-AK	TE-AK	TE-AK	TE-AK	TE-AK	TE-AK	TE-AK	TE-AK	TE-AK
Why Doesn't It Belong?		TE-AK	TE-AK	TE-AK			NP			
Alge-Grid: What's the *a*?		TE-AK		TE-AK		TE-AK		TE-AK		TE-AK
READY-X	TE-AK		TE-AK		TE-AK		TE-AK		TE-AK	
The *MathLinks* Rubric	TE-AK T	TE-AK T	TE-AK T	TE-AK T	TE-AK T	TE-AK T	TE-AK T	TE-AK T	T	TE-AK T

Unit Planning Information (TE-UPI),
Annotated Answer Key including Student Packets and Lesson Notes (TE-AK),
Essential Skills (ES), Math Talks (MT), Nonroutine Problems (NP), Tasks (T)

TECHNOLOGY ACTIVITIES

While not technology-driven, *MathLinks* promotes the use of technology for the exploration of concepts. Some technology experiences are built into lessons (TE-UPI, TE-AK), and a Technology Activities component (TA) appears in Unit Resources on the Portal. TA suggestions include a link, and many come with a *MathLinks* worksheet as a companion to facilitate deeper thinking and connect it to a *MathLinks* lesson.

All *MathLinks* TAs are open source and available to all at the time of the 2025 printing of the program. We invite users to contact us with updates to the availability or other open-source activities they find useful.

GRADE 8: TECHNOLOGY ACTIVITIES

Unit Domain	Title	Technology Required
1 G	Volume: Intuition Introduction Cylinders Polygraph: Angle Relationships Lines, Traversals, and Angles Puzzling It Out	Geogebra[1] Desmos Desmos Desmos Desmos
2 NS	Open Middle Problems: Number system	Open Middle Website
G	Pythagorean Theorem Exploring Length with Geoboards Taco Truck Open Middle Problems: Geometry	Geogebra[1] Desmos Desmos Open Middle Website
3 EE	Question 4 The Solar System, Test Tubes, and Scientific Notation Open Middle Problems	Geogebra[1] Desmos Open Middle Website
4 F	Graphing Exploration 1 Visual Patterns Guess My Rule The Tortoise and the Hare Turtle Crossing Function Carnival	Desmos or Graphing Calculator[1] Public domain website Desmos Desmos Desmos Desmos[1]
5 F	Graphing Exploration 2 Flags Polygraph Lines Part 1 Polygraph Lines Part 2 Parallel Lines	Desmos or Graphing Calculator[1] Desmos Desmos[1] Desmos[1] Desmos
6 SP	Polygraph: Scatter Plots Charge! Dapper Cats LEGO® Prices	Desmos[1] Desmos Desmos Desmos
7 EE	Polygraph Linear Systems Solutions to Systems of Linear Equations Interpreting Systems of Linear Functions 1 and 2 Make Them Balance Systems of Two Linear Equations	Desmos Desmos Geogebra[1] Desmos Desmos
8 EE	Playing Catch-Up Line Zapper Card Sort: Linear Systems Open Middle: Systems of Linear Equations Problems	Desmos[1] Desmos Desmos Open Middle Website
9 G	Translations Transformations – Rotations Reflections Transformation Golf: Rigid Motion Des-Patterns	Desmos[1] Geogebra[1] Desmos[1] Desmos Desmos
10 G	Polygraph: Transformations Transformation Golf: Non-Rigid Motion Messing with Lisa Transformation Station Dilation	Desmos[1] Desmos Geogebra[1] Geogebra[1]

Student Packet (SP), Essential Skills (ES), Nonroutine Problems (NP), Project (P)
[1]Followup worksheet included

PUZZLES, GAMES, AND CARD SORTS

Puzzles, games, and card sorts add variety and encourage student interaction as students develop skills and practice concepts. These activities frequently require copying a Reproducible (TE-UPI or UR)

GRADE 8: PUZZLES, GAMES, AND CARD SORTS

Unit Domain	Puzzles	Games	Card Sorts
1 G	A Big Puzzle (TE-AK) READY-X (TE-AK)	Four in a Row (ES)	Angles (TE-AK) Angle Facts Related to Triangles (TE-AK) Match and Compare Sort (TE-AK) Angles Match (ES)
2 NS	Alge-Grid: What's the *a*? (TE-AK) Big Triangle Puzzle (ES)	Four in a Row (ES) 2-Step Equation Challenge (ES)	Sort and Match (TE-AK)
G		Four in a Row (NP)	Lengths and Areas (TE-AK)
3 EE	READY-X (TE-AK)	Exponent Challenge 1 (ES) Four in a Row (ES) Exponent Challenge 2 (NP) A "Powerful" Big Triangle Puzzle (NP)	Big and Small Jigsaw (TE-AK) Match and Compare Sort (TE-AK)
4 F	Slides and Jumps (TE-AK) Alge-Grid: What's the *a*? (TE-AK)	Battling Ships (ES) Four in a Row (ES)	$y = 3x + 4$ (TE-AK)
5 F	READY-X (TE-AK)	Big Triangle Puzzle (ES) Four in a Row (ES) Linear Function Memory (NP) Create Your Own Linear Function Memory Game (P)	Matching Activity (TE-AK) Proportion Sort (ES)
6 SP	Alge-Grid: What's the *a*? (TE-AK)	Four in a Row (ES)	Match and Compare Sort (TE-AK) Fighting Stereotypes (TE-AK) Slope Sort (ES)
7 EE	Big Square Puzzle (TE-AK) READY-X (TE-AK) Balance Scale Puzzles (ES) Shape Puzzles (NP) Systems of Equations Maze (NP)	Expression Game (ES) 2-Step Equations Challenge (ES) Four in a Row (ES)	
8 EE	Number Tricks (TE-AK) Big Square Puzzle (TE-AK) Alge-Grid: What's the *a*? (TE-AK) A Rational Number Maze (ES) Mystery Values (ES)	Play it Positively or Negatively (TE-AK) Rational Number Challenge (ES) Simplify Expressions Challenge (ES)	Sorting Systems of Equations (NP) Get a Clue (NP)
9 G	Talking Transformations: Congruence (TE-AK) READY-X (TE-AK)	Battling Ships (ES)	X Marks the Spot (ES)
10 G	Talking Transformations: Similarity (TE-AK) Alge-Grid: What's the *a*? (TE-AK)	Four in a Row (ES)	True-False-Explain (TE-AK)

Unit Planning Information (TE-UPI),
Annotated Answer Key including Student Packets and Lesson Notes (TE-AK),
Unit Resources (UR), Essential Skills (ES), Nonroutine Problems (NP)

REAL-LIFE PROBLEMS AND MATHEMATICAL INVESTIGATIONS

Real-life problems and mathematical investigations provide natural opportunities to work on the Common Core Standards for Mathematical Practice in the context of grade-level mathematics. These problems sometimes create a "need to know," and sometimes provide opportunities to apply math concepts to meaningful and interesting work. Rubric-worthy problems in Student Packets are good formative assessment options, and Tasks in Other Resources are good summative assessment options.

GRADE 8: REAL-LIFE AND MATHEMATICAL PROBLEMS

Unit **Domain**	**Print** (TE-AK) Opening Problems, Lessons, Practice	**Portal** (UR → OR-S)
1 **G**	Paper Solids[1] A Coin Problem Ice Cream Cones	Canned Fruit (NP) All About Angles (T) The Math of Collecting Rain Water (T) Packaging Problems (P) Shapes in Our World (P)
2 **NS**	Practice 2 (Greg and Lauren..)	
G	Rectangle Paradox[1] The Club and the Box	Sports and Hobbies (NP) Trying Triangles (T)
3 **EE**	Folding Paper[1] What in the World?[1] A Gut Feeling [1]	Pay it Forward (T) Create a Comic Strip (P)
4 **F**	Slides and Jumps[1] The Pool Problem Saving vs. Spending To School and Back Home The Bath Graph The Rollercoaster	Step by Step (T) Growing Squares(T)
5 **F**	The Rope Investigation[1] Rectangle Paradox: A Fresh Look[1]	Saving Money (T) Parallel Linear Functions (T)
6 **SP**	Stacking Cups[1] "Education" situations[1] "Obesity vs. Exercise" situations[1] "Two-Way Table" situations[1] Fighting Stereotypes	Dance Fundraiser (ES) Grades or Popularity? (NP) Phone Battery (T) Vitruvian Man (P) A Bivariate Environmental Data Research Project (P)
7 **EE**	Using Substitution (100-Mile Walking Challenge) Practice 3 (Saving for a Skateboard) Estimating Solutions to Systems (Going to the Park)	Algebra Machines (T) Recycling Plastic Bottles (T) Staircase Slopes (P)
8 **EE**	Training for a Marathon Watering Cans Talia's Coin Jar	Working Out (T) Soccer Club Orders (T)
9 **G**	Swimming at the River Mandalas Spiral Review (Healthy Earth Club)	A Transformation Design (T) Tessellation Design Project (P)
10 **G**	Practice 6 (various) And Finally…A Mathematical Surprise Review: Scale Up	A Parallelogram Transformation (T) Geometry in our World (P)

Annotated Answer Key including Student Packets and Lesson Notes (TE-AK),
Essential Skills (ES), Nonroutine Problems (NP), Tasks (T), Projects (P)

[1]Extensions or follow-ups are included.

DEALING WITH DATA

MathLinks includes a variety of experiences that are intended to help students become critical consumers of data. This knowledge is essential for many future careers and important for everyone in the digital age and a thriving democracy. In many instances, this work involves data about themselves, which generally increases engagement. Data experiences are located in data-driven lessons and problems, Math Talks that focus on data, Projects, Tasks, and EGAD Puzzles (Explore, Generate, and Analyze Data) in Puzzles and Games.

GRADE 8: DATA EXPERIENCES

Unit Domain	**Print** (TE-AK) Opening Problems, Lessons, Practice	**Portal** (UR → OR-S)
1 **G**	A Coin Problem Ice Cream Cones	The Math of Collecting Rain Water (T) Data Talks A: Teen behaviors (MT) Data Talks B: Teen behaviors (MT) Data Talks C: Interpreting a bar graph (MT) Explore, Generate, and Analyze Data (LP)
2 **NS**		Data Talks A: Teen behaviors (MT) Data Talks B: Teen behaviors (MT)
3 **EE**	What in the World?[1] Big and Small Jigsaw Poster Problems: The Algebra of Exponents and Roots	Data Talks A: Cost of a food item – slow reveal (MT) Data Talks B: Teen behaviors (MT)
4 **F**	Opening Problem: Slides and Jumps Function Representations (Getting Started: Football Champions)	Data Talks A: Population – slow reveal (MT) Data Talks B: Teen behaviors (MT)
5 **F**	Opening Problem: The Rope Investigation[1]	Data Talks A: Life expectancy – slow reveal (MT) Data Talks B: Teen behaviors (MT)
6 **SP**	Opening Problem: Stacking Cups Linear Association (Education Data) Association and Causation Education Data Revisited Obesity Rates by State Two-Way Tables A Marketing Decision Fighting Stereotypes	Vitruvian Man (P) A Bivariate Environmental Data Research Project (P) Data Talks A: Water usage – slow reveal (MT) Data Talks B: Teen behaviors (MT)
7 **EE**		Data Talks A: NBA Salaries – slow reveal (MT) Data Talks B: Teen behaviors (MT)
8 **EE**		Data Talks A: Cereal Consumption (MT) Data Talks B: Teen behaviors (MT)
9 **G**	Spiral Review: Healthy Earth Club	Data Talk A: Olympic medals (MT)
10 **G**		Data Talks A: Height vs shoe size (MT) Data Talks B: Incomplete table – occupations (MT) Data Talks C: Incomplete chart – countries (MT) Data Talks D: Incomplete circle graph - sports (MT) Data Talks E: Incomplete bar graph – power sources (MT) Explore, Generate, and Analyze Data (LP)

Annotated Answer Key including Student Packets and Lesson Notes (TE-AK),
Portal Landing Page (LP), Math Talks (MT), Tasks (T), Projects (P)

[1]Extensions or follow-ups are included.

MATHEMATICS AND THE ENVIRONMENT

Environmental education is important because it provides the knowledge and understanding necessary to address global issues such as climate change, pollution, and habitat destruction. Many students today are concerned about these issues and may be motivated by problems associated with the environment. *MathLinks* includes several references or problems that call attention to environmental challenges in the context of grade-level mathematics. We invite teachers to launch discussions based on these problems as time permits. See more about connections to the environment in General Resources on the Teacher Portal.

GRADE 8: CONNECTIONS TO ENVIRONMENTAL ISSUES

Unit Domain	**Print (TE)**	**Portal** (UR → OR-S)
1 G		The Math of Collecting Rain Water (T)
3 EE	What in the World?[1] (TE-AK)	
6 SP	Using Data to Understand Our World (TE-UPI)	Mixed Problems (Earth Day) (NR) A Bivariate Environmental Data Research Project (P) Data Talk A: Water Used to Make Various Food Items (MT)
7 EE		Recycling Plastic Bottles (T)
9 G	Spiral Review: Healthy Earth Club (TE-AK)	

Teacher Edition – Unit Program Information (TE-UPI),
Annotated Answer Key including Student Packets and Lesson Notes (TE-AK),
Math Talks (MT), Tasks (T), Projects (P) Nonroutine Problems (NR)

[1]Extensions or follow-ups are included.

STUDENT IDENTITY AND CULTURE

At the Center for Mathematics and Teaching, we believe that all students have the ability and deserve the opportunity to learn the mathematics that will make them capable and confident problem solvers and put them on the pathway to college and career readiness. To accomplish this, we believe that students must see themselves as "do-ers of mathematics". In addition to engaging students with features previously cited in this section, *MathLinks* empowers student effort and success through:

- An inclusive classroom of students pictured on the front of each Student Packet. These students "join" the class on slide decks with problem-solving ideas and opportunities to critique the reasoning of others.
- Self-assessment opportunities in every unit (e.g., Monitor Your Progress, unit Reflection pages, the *MathLinks* Rubric)
- References to accomplished role models (e.g. John Baxter Taylor, African American gold medal winner (Unit 4); Marjorie Lee Browne, African-American PhD mathematician who established professional learning opportunities for teachers (Unit 4) Malala Yousafzai, Muslim humanitarian (Unit 4); Ruth Gonzalez, first Hispanic woman to earn PhD in mathematics (Unit 6); John Herrington, Native American astronaut (Unit 9))
- Reference to art and culture (e.g. Mandalas, Indian art (Unit 9).
- Data talks where students may use personal experiences to analyze data about teens.