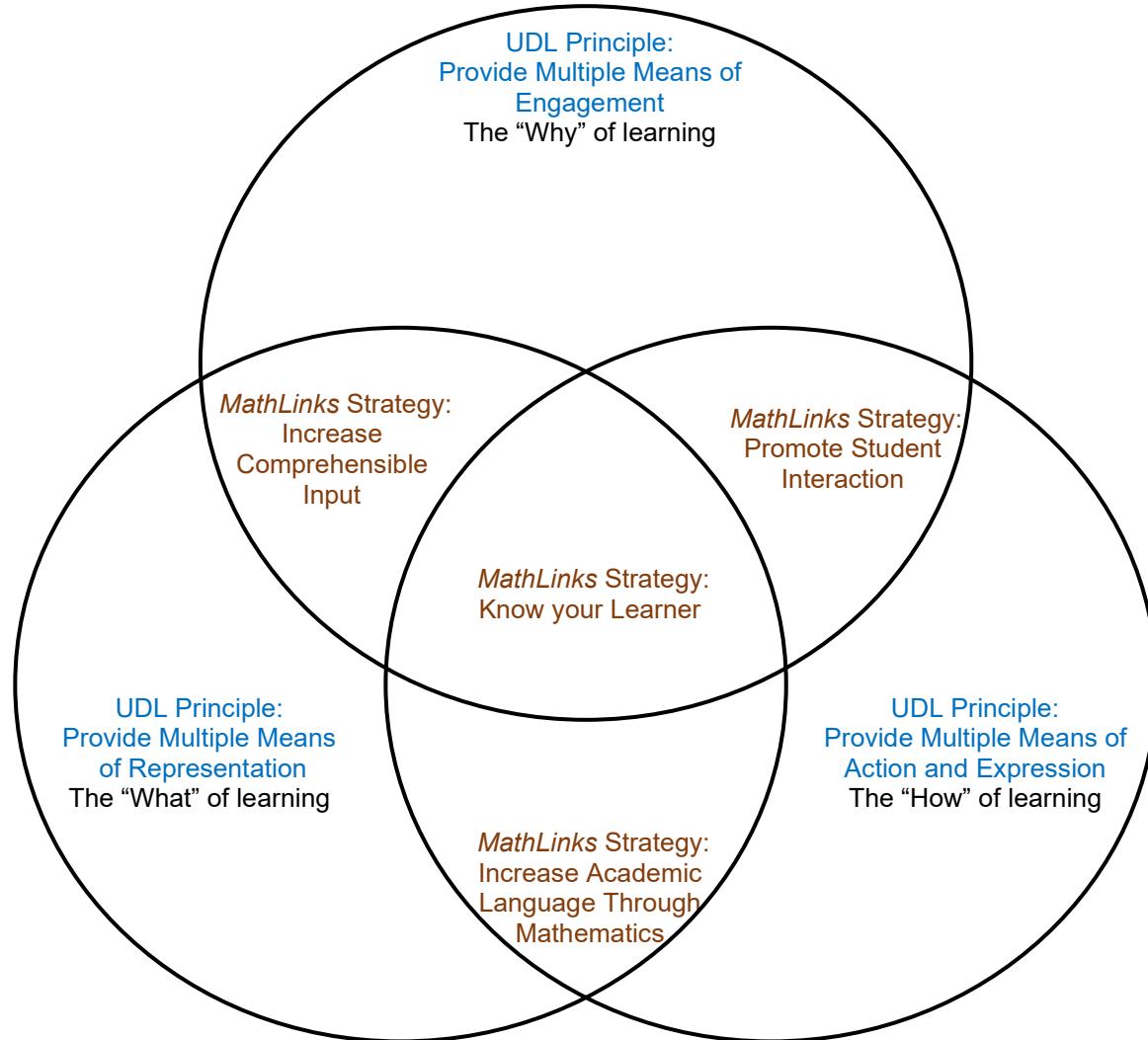


# UNIVERSAL DESIGN FOR LEARNING

## THE BIG PICTURE

Universal Design for Learning (UDL) is a framework with three principles, designed to improve and optimize teaching and learning for ALL students (CAST, 2018). *MathLinks Strategies* synthesize current research around instruction into four general topics to support different learning needs and styles. This Venn Diagram shows how they overlap. Educators can use *MathLinks* with confidence, knowing that it is designed to create interest in the beauty and utility of mathematics and lead to access and success for more students.



### LOCATIONS OF THE FEATURES REFERENCED IN THIS SECTION

Print	Portal
<b>Teacher Edition</b> <ul style="list-style-type: none"><li>Unit Planning Information (TE-UPI)</li><li>Annotated Answer Key, including Student Packet and lesson notes (TE-AK)</li></ul>	<b>Portal Landing Page (LP)</b>
<b>Program Information (PI)</b>	<b>Grade 6 Unit Resources</b> → <Unit number> (UR) <ul style="list-style-type: none"><li>Teacher Edition</li><li>Student Packet</li><li>Other Resources</li></ul> <b>Grade 6 General Resources (GR)</b>

## THE UNIVERSAL DESIGN FOR LEARNING AND *MATHLINKS*

Here are some examples of how UDL principles are built into the *MathLinks* design.

UDL Principles	MathLinks Examples
<b>Provide Multiple Means of Engagement</b> <p>Learners differ in the ways in which they can be engaged to learn. Teachers should devise lessons that motivate students while answering the question: <i>Why do I need to learn this?</i></p> <p>Provide options for:</p> <ul style="list-style-type: none"> <li>• recruiting interest</li> <li>• sustaining effort and persistence</li> <li>• self-regulation</li> </ul>	<p>Opening Problems launch each unit. They create a need to know and create interest in the mathematics in the unit. (TE-AK)</p> <p>Nonroutine Problems, Tasks, Projects, and Technology Activities offer a variety of games, puzzles, problems, and contexts for sustained learning. (UR)</p> <p>Monitor Your Progress is a self-monitoring tool for lesson objectives; the <i>MathLinks</i> Rubric and unit Reflection give students tools for self-assessment. (TE-AK)</p>
<b>Provide Multiple Means of Representation</b> <p>Learners differ in the ways that they perceive and understand information that is presented to them. Teachers should devise lessons that allow students opportunities to learn concepts in multiple ways while answering the question: <i>What do I need to learn?</i></p> <p>Provide options for:</p> <ul style="list-style-type: none"> <li>• presenting and receiving information</li> <li>• language, mathematical expressions, and symbols</li> <li>• comprehension</li> </ul>	<p>Guided instruction options appear with Lesson Notes, Slide Decks, and Slide Deck Alternatives. (TE-AK)</p> <p>Graphic organizers highlight patterns, structural features, and relationships. (TE-AK)</p> <p>The program emphasizes mathematical representations with pictures, numbers, symbols, and words. (TE-AK)</p> <p>My Word Bank, Vocabulary Review, and the Student Resources section all support academic language development. (TE-AK)</p> <p>Every unit includes language objectives, ideas for group discussions, and additional journal prompts. (TE-UPI)</p>
<b>Provide Multiple Means of Action and Expression</b> <p>Learners differ in the ways that they respond in a learning environment and express what they know. Teachers should provide a variety of ways for students to show their knowledge while answering the question: <i>How can I show what I know and don't yet understand?</i></p> <p>Provide options for:</p> <ul style="list-style-type: none"> <li>• physical action</li> <li>• expression and communication</li> <li>• executive functions</li> </ul>	<p>Card sorts and manipulatives help kinesthetic learners show what they know. (TE-UPI, TE-AK, UR)</p> <p>Review section activities are appropriate as formative assessments. For example, with Poster Problems, students move around the room, work together to solve problems, and critique the reasoning of others. (TE-AK)</p> <p>Structured workspace helps students stay organized and on task. (TE-AK)</p> <p>The focus of Activity Routines such as Math Talks, Why Doesn't It Belong, and Match and Compare Sort is explaining and justifying reasoning in small groups or with the whole class. (TE-AK, UR, GR)</p>

Unit Planning Information (TE-UPI), Unit Planning Information (TE-UPI),  
 Annotated Answer Key including Student Packet and Lesson Notes (TE-AK),  
 Unit Resources (UR), General Resources (GR)

## STRATEGIES TO SUPPORT DIFFERENT LEARNERS

Classrooms typically include students with different learning styles and needs. In addition to incorporating principles for UDL when creating *MathLinks*, the team gave additional focus to strategies that support different learners. Synthesized from the work of Echeverria (2009), Moschkovich (2013), Sliva (2003), Lambert (2016, 2020), and others, these strategies center around four main principles: (1) know your learner, (2) increase academic language through mathematics, (3) increase comprehensible input, and (4) promote student interaction. These examples illustrate how UDL principles are built into the *MathLinks* design. Examples of their applications to specific lessons are located at the Front Matter of each Teacher Edition unit. Strategies essential to the academic success of English learners are noted with a star (\*).

	Strategy	MathLinks Feature
Know your Learner	<ul style="list-style-type: none"> <li>Understand student attributes that support or interfere with learning</li> <li>Determine preferred learning and interaction styles</li> <li>Assess student knowledge of prerequisite mathematics content</li> <li>Check for understanding continuously</li> <li>Provide differentiation opportunities for intervention or enrichment to reach more learners</li> <li>Encourage students to write about their attitudes and feelings towards math</li> <li>Use contexts that link to students' cultures *</li> </ul>	<p>Use Assessment, Follow-up, and Feedback Charts as roadmaps to assess if students are ready for and have learned the content. (UR)</p> <p>Assess student needs for preview and review with Getting Started and Spiral Review. Monitor Your Progress and the unit Reflection make excellent student self-assessment tools. (TE-AK)</p> <p>Look at Essential Skills for intervention and Nonroutine Problems for enrichment. Many Projects offer opportunities for choice based on student needs, interests, or cultures. Quizzes provide traditional methods for assessment, and Extra Problems provide more practice when needed or may be used to create customized assessments. (UR)</p> <p>For those who need it, Skill Boosters are designed to fill gaps in knowledge without losing pace on grade-level work. (LP)</p>
Increase Academic Language through Mathematics	<ul style="list-style-type: none"> <li>Provide opportunities for students to read, write, or speak about their mathematical learning</li> <li>Explain the academic vocabulary needed to access mathematical ideas, providing both examples and non-examples</li> <li>Use strategically organized groups that attend to language needs *</li> <li>Use rich mathematical contexts and sophisticated language to help ELs progress in their linguistic development *</li> <li>Use cognates and root words (when appropriate) to link new math terms to students' background knowledge *</li> </ul>	<p>A Teaching Tip in every unit addresses language development with language objectives, additional grouping, and journal ideas. (TEUPI)</p> <p>Word Bank, Vocabulary Review, and Student Resources support academic language development. (TE-AK).</p> <p>Journals and The <i>MathLinks</i> Rubric offer opportunities for students to analyze their work and critique the reasoning of others. (TE-AK, GR)</p> <p>Grouping suggestions for activities provide opportunities for teacher-student and student-student interactions. (TE-AK)</p> <p>Slide Decks with "critique student thinking" prompts encourage reading, speaking, and listening. (TE-AK, UR)</p> <p>Math Talks provide opportunities for mathematical reasoning, using different strategies, and making connections between concepts. (UR)</p>

Unit Planning Information (TE-UPI),  
 Annotated Answer Key including Student Packet and Lesson Notes (TE-AK),  
 Unit Resources (UR), General Resources (GR)

## STRATEGIES TO SUPPORT DIFFERENT LEARNERS

Continued

	<b>Strategy</b>	<b>MathLinks Feature</b>
<b>Increase Comprehensible Input</b>	<ul style="list-style-type: none"> <li>• Link concepts to past learning</li> <li>• Make concepts meaningful through hands-on activities, visuals, demonstrations, and color-coding</li> <li>• Use a think-aloud strategy to model appropriate thinking processes and academic language use</li> <li>• Use graphic organizers to help students record information and data, see patterns, and generalize them</li> <li>• Use multiple representations (pictures, numbers, symbols, words, contexts) of math ideas to create meaning and make connections</li> <li>• Simplify written instructions, rephrase explanations for concepts, and supplement with verbal and visual clues *</li> <li>• Strategically sequence problems and scaffold explorations and activities to give students access to more complex language structures *</li> </ul>	<p>Getting Started reviews or previews important concepts and skills for a lesson. Structured workspace in many units includes graphic organizers and sentence starters that highlight patterns, multiple representations, and relationships. This helps students stay organized. (TE-AK)</p> <p>Reproducibles (e.g., card sorts, puzzles) and easily accessible Materials (e.g., counters, colored pencils) provide options for instruction. (TE-UPI, TE-AK)</p> <p>Slide Decks and Slide Deck Alternatives offer options for lesson delivery. (TE-AK)</p> <p>Language objectives, grouping ideas, and general journal give students practice with reading, writing, speaking, and listening. (TE-UPI).</p>
<b>Promote Student Interaction</b>	<ul style="list-style-type: none"> <li>• Use flexible group configurations that support content objectives</li> <li>• Use strategies and activities that promote teacher/student and student/student interactions (e.g. think-pair-share, Poster Problems)</li> <li>• Encourage elaborate responses through questioning</li> <li>• Allow processing time and appropriate wait time, recognizing the importance of the different requirements for speaking, reading, and writing in a new language *</li> <li>• Allow alternative methods to express mathematical ideas (e.g., visuals, students' first language) *</li> </ul>	<p>Review activities promote engagement and interaction. For example, Poster Problems provide opportunities to solve problems and share ideas in small group settings. (TE-AK)</p> <p>Lesson Notes make specific suggestions for teacher-teacher and teacher-student interactions. (TE-AK)</p> <p>Activity Routines (e.g., Poster Problems, Big Square Puzzles, Four-In-A Row games, Match and Compare Sorts) are typically found in Review, Essential Skills, or Nonroutine Problems. They are designed to encourage interaction and communication using varied grouping configurations. (TE-AK, UR)</p> <p>Prompts in the TE for Journals and the <i>MathLinks</i> Rubric give students opportunities to take ownership of a formative assessment. (TE-AK, GR)</p>

Unit Planning Information (TE-UPI),  
 Annotated Answer Key including Student Packet and Lesson Notes (TE-AK),  
 Unit Resources (UR), General Resources (GR)

## UNFINISHED LEARNING

A snapshot of mathematics achievement on the Nation's Report Card (Institute of Educational Sciences, 2022) showed that overall only 25% of 8<sup>th</sup> grade students performed at the proficient or advanced levels. This means many students start a new grade level with unfinished learning from earlier grades. *MathLinks* provides a variety of components and strategies to help students catch up and succeed in current work. Since all lessons can be completed in about 100 class hours, there should be time to include review and unfinished learning instruction opportunities. This table (adapted from Fossum, 2017) offers suggestions.

<b>Common Instructional Misstep</b>	<b><i>MathLinks</i> Alternative</b>
Blindly adhering to a pacing guide calendar	<p>Use Pre-assessments to gauge student understanding and inform pacing. (GR)</p> <p>Assessment, Follow-up, and Feedback Charts give specific intervention suggestions. (UR)</p>
Halting whole-class instruction to provide a broad review of past material	See Planning for Different Users for specific intervention suggestions for struggling learners. (TE-AK)
Choosing content for intervention based solely on students' weakest areas	<p>The Essential Skills component provides "just-in-time" work for those who need it. Simultaneously, those who do not need this work may benefit from Nonroutine Problems. (UR)</p> <p>Consider Math Talks to help shore up concepts for struggling learners while engaging all students. (UR)</p>
Trying to address every gap a student has	<p>Pre-assessments (GR) and Essential Skills (UR) prioritize the most needed prerequisite skills and concepts for upcoming content.</p> <p>Assessment, Follow-up, and Feedback Charts suggest targeted intervention. (UR)</p>
Trying to build missing understandings of past material from the ground up or going too far back in the learning progression	<p>If students need more intensive work on past material, consider Skill Boosters. These 5-10 minute per day exercises primarily focus on number sense concepts. (LP)</p> <p>Assessment, Follow-up, and Feedback Charts suggest targeted intervention. (UR)</p>
Re-teaching students using previously failed methods and strategies	Grade-level content in different contexts is revisited multiple times throughout the course and practiced through Spiral Review. (TE-AK)
Teaching all standards addressed in an intervention in a step-by-step, procedural way	<p>The Topic Analysis Chart shows where revisited content and review appear (PI-Correlations of <i>MathLinks</i>: Grade 6).</p> <p>Activity Routines such as Four in a Row and Open Middle Problems provide practice in an engaging format. (TE-AK, GR, PI-Features to Engage Students)</p>
Disconnecting intervention from content students are learning in math class	See Planning for Different Users and Strategies to Support Different Learners for specific suggestions. (TE-UPI)
Over-reliance on computer programs in intervention	<i>MathLinks</i> does not rely on a technology-based intervention, but <i>MathLinks</i> technology options could be used for engaging reviews and to fill in gaps. (UR)

Unit Planning Information (TE-UPI),  
 Annotated Answer Key, including Student Packets and Lesson Notes (TE-AK),  
 Program Information (PI), Unit Resources (UR), General Resources (GR)

## MATH AND LANGUAGE DEVELOPMENT

The use of language in the mathematics classroom allows students to understand, interpret, and communicate mathematical concepts clearly, and it serves as a bridge between concrete and abstract representations. *MathLinks* builds language support into the program, and Program Resources also include specific suggestions and accommodations.

### Specific Language Development Suggestions (TE-UPI)

Planning for Different Users (page iii in each unit) includes component options for subgroups of students. Unit-specific features and activities for English learners are listed here.

Strategies to Support Different Learners (a Teaching Tip) gives ideas to increase academic language through mathematics, increase comprehensible input, and promote student interactions. Features that are built into the *MathLinks* design are noted.

Developing Language Skills Through *MathLinks* (a Teaching Tip) identifies language objectives, along with ideas for grouping (emphasis on reading, listening, and speaking) and journals (emphasis on writing).

### Features Built into the Lessons (TE-AK)

Every Student Packet begins with My Word Bank where there is space for students to write explanations of important words or phrases in their own words, and to use examples and pictures where appropriate. Students are prompted to make recordings of words or phrases when they first appear in a lesson. A Vocabulary Review crossword puzzle appears in every Review section. Student Resources in the back of each packet include definitions, explanations, and examples.

Structured workspaces with consistent language instructions help students understand work expectations. Graphic organizers highlight patterns, structural features, and relationships. Grid-paper workspaces provide structure for making drawings, tables, and graphs.

Hands-on activities and visuals are used regularly to aid in the comprehension of concepts and problems.

An emphasis on mathematical representations with pictures, numbers, symbols, and words helps to connect each of these interrelated representations and make them more understandable. Many activity-based lessons, card sorts with Reproducibles, and Activity Routines lend themselves to group work where students can practice reading, writing, speaking, and listening in a safe environment.

Some Activity Routines (e.g., Match and Compare Sorts, Math Talks, The *MathLinks* Rubric) specifically target language development.

Every unit has at least one Slide Deck with a critique reasoning opportunity. This gives students opportunities to speak and listen. Problems identified as potential Journal prompts make excellent reading and writing exercises.

### Translations

Several files are available in .doc formats on the Teacher Portal. These files can be translated into most languages using a translation program, used with a word processing program that has read-aloud features, or even printed in a larger font. If users are giving students access to any of these files, please do it in a space outside the Portal to protect the integrity of Quizzes and Tests.

Text File for Translation, Quizzes, Extra Problems (UR)

Pre-Assessments, Cumulative Tests (GR)

Unit Planning Information (TE-UPI),  
Annotated Answer Key including Student Packets and Lesson Notes (TE-AK),  
Unit Resources (UR), General Resources (GR)

## **ENRICHMENT FOR ADVANCED LEARNERS AND THOSE WITH UNDISCOVERED HIDDEN TALENTS**

*MathLinks:* Core (2<sup>nd</sup> ed.) Grade 6 materials provide multiple opportunities for enrichment where students investigate grade-level mathematics at a higher level of complexity without spending more time than their peers.

### **Specific Enrichment Suggestions**

Planning for Different Users includes options for different learning needs. Unit-specific features and activities for enrichment and advanced learners are listed here. (TE-UPI)

Challenge those who are ready with Enrichment and Challenges for Advanced Learners (a Teaching Tip). At the same time, others can complete unfinished work or Spiral Review. Every student need not do every problem in a Student Packet, and this allows for differentiation. (TE-UPI)

#### **In the Lessons**

(The lessons take about 100 class hours)

Many Real-Life and Mathematical Problems with high ceilings give advanced students natural opportunities to explore grade-level mathematics at a higher level of complexity. They also help to identify the hidden talents of students who are not identified as advanced learners. Many of these problems have elaborated answer keys that guide teachers about responses they may expect from advanced students. (TE-AK, PI-Features to Engage Students)

Some of the Activity Routines in the Review section have built-in high-ceiling components where advanced students analyze mathematics at a higher level of complexity and creativity. (TE-AK, PI-Features to Engage Students)

As with any textbook, students need not do every problem in a Student Packet. Extend Your Thinking pages push past the typical level. Consider pairing these practice pages with other work in the Student Packet (e.g. Spiral Review, unfinished Student Packet work) to differentiate instruction. Or, allow students to choose the problems they wish to solve from a menu of options. (TE-AK)

#### **Portal Resources**

(About 30 class hours of instructional time is allocated in the Pacing Plan)

Online resources provide opportunities for enrichment and for advanced learners. Some of these have embedded high ceilings and are appropriate for a range of learners. Others are specifically intended for advanced students and may be paired with another unit resource to offer students or teachers choice or differentiation.

Puzzles and Games (LP) challenge students at many levels with puzzles identified at multiple levels. Consider especially EGAD (Explore, Generate and Analyze Data), Factor Max Grid Game, Make It Property, Pattern Grid-unLocks, and Shape Up.

Math Talks offer multiple avenues for access and entry into the prompt. These make great warmup activities. (UR)

Nonroutine Problems in every unit were specifically written to challenge and enrich. Often included are Open Middle Problems (low floor / high ceiling). Always included are problems From the Math Olympiad (for advanced students). (UR)

Projects are accessible to most students and often provide a vehicle for extension and creativity. (UR)

Technology activities enhance the meaning of the content being studied and increase student engagement. For differentiation, teachers may assign one of the other technology activities listed. (UR)

Unit Planning Information (TE-UPI),  
Annotated Answer Key including Student Packet and Lesson Notes (TE-AK),  
Program Information (PI), Portal Landing Page (LP), Unit Resources (UR), General Resources (GR)