

DesCartes: A Continuum of Learning®

DESCARTES EXPLAINED

for the MAP® system

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NWEA Philosophy

Guided by our mission—Partnering to help all kids learn™—NWEA is keenly aware of the student achievement differences within a district, a school, and even within a classroom. Students learn and grow when they are presented with information that is appropriately challenging, engaging, but not overwhelming.

Historically, school districts have used a student's age (grade level) as the primary criterion for selecting instructional materials and lessons. This traditional approach provides targeted instruction for only those students performing close to the average. We believe that a student's current achievement level should be the dominant consideration when grouping for instruction, selecting materials, and providing instruction.

DesCartes provides instructors with a tool to translate student scores so that they know when to move a student, or students, beyond the conventional curriculum at a particular grade level and when to develop skills that may have been presented in earlier grades.

Background

NWEA assessments use a measurement scale that has proven to be exceptionally stable and valid over time. Our scale is based on the same modern test theory that aligns student achievement levels with item difficulties on the same scale.

The scale is divided into equal parts (an equal interval scale), like centimeters on a ruler. NWEA calls these parts RITs, which is short for Rasch unIT (after the test theory's founder, Danish statistician, Georg Rasch). Each subject area has its own unique RIT scale. NWEA uses the RIT scales to measure a student's academic growth over time.

Like using a ruler to measure a child's growth in height, we use the RIT scale to measure a student's academic growth over time. We also apply this measurement scale to organizing the skills and concepts described in DesCartes.

Purposes and Suggested Uses

DesCartes helps guide instruction based Measures of Academic Progress (MAP) assessment reports. DesCartes enhances an instructor's ability to provide targeted instruction for individual students or groups of students.

NWEA encourages educators to explore the following suggested uses:

Table 1: DesCartes Suggested Uses and Purposes

PURPOSE OR USE	EXPLANATION
Materials Selection	In a typically diverse classroom, selecting materials for students at the extreme ends of the spectrum is challenging. DesCartes guides instructors in the search for more appropriate materials for all students.
Sharing Resources	NWEA encourages partnering with other educators to develop better ways to share and store resources.
Gifted and Talented, Title I, and English Language Learners (ELL)	When instructors apply DesCartes to gifted and talented, Title I, and ELL programs, it serves as a guide to constantly push all students to maximize academic growth.
Curriculum Planning	DesCartes, as a resource for curriculum development or program revision, becomes a valuable planning tool.
School Improvement Planning	Knowledge of student achievement, translated by DesCartes, can help personnel plan or change how the district: <ul style="list-style-type: none"> ▪ Groups for instruction ▪ Uses instructional time ▪ Structures the schools ▪ Organizes the staff ▪ Designs the facilities
Monitoring Student Progress	Use DesCartes to create checklists to assist with tracking where students are on a learning continuum.
Individual Education Plans	DesCartes can help identify specific skills to support the student in reaching targeted goals.
Parent Conferencing	DesCartes provides a way for instructors to communicate with parents about their child's academic progress. When parents understand how test scores translate into the skills and concepts their child is developing, they can encourage activities to engage their child in additional learning.

Organization

DesCartes is divided into the following subjects:

- Reading
- Language usage
- Mathematics (upper grades, lower grades)

Each subject is divided into categories called main goal strands. The main goal strands are then broken down into ten-point RIT ranges, based on difficulty.

Within each RIT range, sub-goals further divide content within the goal area and break down the skills and concepts found in the NWEA test questions. These skills and concepts are described in learning continuum statements.

State Standards and Other Curriculum Guides

To ensure that NWEA tests and DesCartes align to local needs, NWEA extracts the content—that which can be assessed with multiple choice test questions—from state standards and other curriculum guides.

This content is organized into main goal strands for meaningful testing and reporting. These main goal strand headings appear in NWEA reports and in DesCartes.

Using DesCartes

With a student's RIT score, an instructor can identify the student's instructional level.

- The skills and concepts listed at RIT ranges below the student's score may need to be reinforced and enhanced to maintain them.
- The skills and concepts listed at RIT ranges above the student's score may need to be introduced with appropriate structure.

These RIT score ranges can help instructors prepare for flexible small group instruction within a classroom. By putting students together who have similar instructional needs, instructors can better meet the needs of all students. NWEA's goal is to create maximum growth for all students, whether they are in the lowest quartile or the highest quartile. As students learn the skills and concepts within a RIT range, they can be shifted to another flexible group.

Learning Continuum Statements

DesCartes is an instructional resource that translates student scores to relevant learning continuum statements.

All learning continuum statements have test question data to support their RIT range placement. Learning continuum statements without an asterisk are consistent with previous editions of DesCartes (the NWEA Learning Continuum).

An asterisk appears at the end of the statement to indicate that both data from test questions and NWEA curriculum specialists' review results are used to place these learning continuum statements into appropriate RIT ranges. The test question response data associated with these statements are not sufficient to be solely data-driven. Therefore, NWEA combines the test question response data and RIT scale knowledge with NWEA curriculum specialists' content expertise. This allows for a more comprehensive instructional resource.

As the test question banks grow and NWEA assesses more students, DesCartes will continue to evolve into an even more comprehensive and useful resource.

A learning continuum statement first appears in the earliest RIT range where the skills and concepts it describes appear prominently. A statement may appear in up to three consecutive RIT ranges. It is important to not only focus on the RIT range where the student is functioning, but also to watch for any holes in a student's grasp of skills and concepts that may appear earlier in the continuum.

Instructors use DesCartes learning continuum statements to determine what a student has learned, is learning, and needs to learn.

A sample, annotated DesCartes report appears on the following pages.

Sample Report



DesCartes: A Continuum of Learning[®]

Mathematics
Goal: Algebra

RIT Score Range: 191 - 200
Statements Last Updated: Nov 30, 2010

4 Skills and concepts to Enhance (73% Probability*) 181 - 190	5 Skills and Concepts to Develop (50% Probability*) 191 - 200	6 Skills and Concepts to Introduce (27% Probability*) 201 - 210
8 Functions: Representations, Linear & Non Linear	Functions: Representations, Linear & Non Linear	7 Functions: Representations, Linear & Non Linear
Algebraic and Numerical Expressions; Polynomials	Algebraic and Numerical Expressions; Polynomials	Algebraic and Numerical Expressions; Polynomials
<ul style="list-style-type: none"> Identifies the missing operation symbol - 2-step number sentence Solves basic facts addition and subtraction open sentences using diagrams and models (e.g., using balances) Solves 1-step open sentences with missing addends (numbers 100 and under) 	<ul style="list-style-type: none"> Identifies the missing operation symbol - 2-step number sentence Demonstrates an understanding of the commutative property of multiplication with simple problems Solves basic facts addition and subtraction open sentences using diagrams and models (e.g., using balances) Solves 1-step open sentences with missing addends (numbers 100 and under) Solves 1-step open sentences with missing addends (numbers over 100) Solves simple open sentences with missing factors (numbers 100 and under) 	<ul style="list-style-type: none"> Graphs ordered pairs in the first quadrant Identifies the missing operation symbol - 2-step number sentence Demonstrates an understanding of the associative property of addition Demonstrates an understanding of the commutative property of addition Demonstrates an understanding of the commutative property of multiplication with simple problems Uses the commutative property of addition with rational numbers Uses basic operations on algebraic expressions (uses correct order of operations) Solves 1-step open sentences with missing addends (numbers over 100) Solves simple open sentences with missing factors (numbers 100 and under)
11 Functions: Linear, Quadratic, Exponential	Functions: Linear, Quadratic, Exponential	Functions: Linear, Quadratic, Exponential
<ul style="list-style-type: none"> Extends a growing arithmetic pattern, defined by numbers Completes a growing arithmetic pattern using models by identifying the missing members Completes arithmetic growth patterns in number tables by identifying the missing elements Extends a decreasing arithmetic patterns 	<ul style="list-style-type: none"> Extends a growing arithmetic pattern, defined by objects or diagrams Completes a growing arithmetic pattern using models by identifying the missing members Extends a decreasing arithmetic patterns 	<ul style="list-style-type: none"> Extends a growing arithmetic pattern, defined by objects or diagrams Uses simple linear equations to represent problem situations Describes a realistic situation using information given in a linear equation
12 Linear, Quadratic, Root: Equations & Inequalities	Linear, Quadratic, Root: Equations & Inequalities	Linear, Quadratic, Root: Equations & Inequalities
<ul style="list-style-type: none"> Solves linear equations with basic facts - 1-step addition using a letter for the variable 		<ul style="list-style-type: none"> Extends a pattern formed by rotating a geometric figure
New Vocabulary: None	13 New Vocabulary: None	New Vocabulary: coordinate point, minimum
New Signs and Symbols: < less than	New Signs and Symbols: None	New Signs and Symbols: () order of operations, () ordered pair, • point

Explanatory Notes

* At the range mid-point, this is the probability students would correctly answer items measuring these concepts and skills. Both data from test items and review by NWEA curriculum specialists are used to place Learning Continuum statements into appropriate RIT ranges. Blank cells indicate data are limited or unavailable for this range or document version.

Legend

1. **Subject:** Indicates the subject covered in the report (Mathematics, Reading, or Language Usage).
2. **Goal Strand:** Reporting area for tests; also referred to as the goal area.
3. **RIT Score Range:** Measurement of the assessment scale for each subject and goal area.
4. **Skills and Concepts to Enhance:** Skills and concepts of the RIT range that students are able to retain and maintain.
5. **Skills and Concepts to Develop:** Skills and concepts of the RIT range that students are ready to learn now.
6. **Skills and Concepts to Introduce:** Skills and concepts of the RIT range that students may be ready to learn soon.
7. At the range mid-point, this is the probability that students would correctly answer test questions measuring these concepts and skills.
8. Blank cells indicate data are limited or unavailable for this range or document version.
9. Learning continuum statements.
10. A statement may appear in up to three consecutive RIT ranges. It is important to not only focus on the RIT range where the student is functioning, but also to watch for any holes in a student's grasp of skills and concepts that may appear earlier in the continuum.
11. **Functions: Linear, Quadratic, Exponential:** Sub-goal.
12. **New vocabulary:** New vocabulary that first appears in items at the RIT range indicated.
13. **New Signs and Symbols:** New signs and symbols that first appear in items at the RIT range indicated.

Using the Skills and Concepts Columns

DesCartes pages are divided into three columns:

- **Skills and concepts to enhance**—helps ensure no holes exist in a student’s grasp of skills and concepts that may appear earlier in the continuum
- **Skills and concepts to develop**—identifies areas to be reviewed for alignment with what the students are currently learning
- **Skills and concepts to introduce**—indicates areas where more foundation and structure may be needed

Enhance

When a student responds correctly to 75% of the test items, NWEA considers the related skills and concepts appropriate to **enhance**. The statements in the skills and concepts to enhance column may need continued reinforcement, support, and enhancement to maintain.

Develop

When a student responds correctly to test items 50% of the time, NWEA considers the related skills and concepts appropriate to **develop**. The statements in the skills and concepts to develop column are those that a student is ready to learn. The RIT score in the upper left corner of each page of DesCartes is the marker for the center column. These learning continuum statements inform instructors of skills and concepts they may want to include in current classroom instruction.

Introduce

When a student responds correctly to test items 25% of the time, we consider the related skills and concepts appropriate to introduce. Many students can learn skills and concepts in this column if the appropriate groundwork is laid or if a task is presented in a more structured format.

Research Concepts

RIT scores represent both the difficulty of test items and the achievement of students. A higher score represents a student’s ability to perform more complex skills and understand more difficult concepts. The skill or concept, however, is only one factor that affects item difficulty. Do not assume that a 230 RIT concept or skill can be understood or performed only by students with a score of 230 or above. Teachers can often make these concepts accessible to lower performing students by presenting them in a simpler, more structured format.

The difficulty of test questions and the achievement level of students are both placed on the RIT scales. A higher score represents a student’s ability to perform more complex skills and understand more difficult concepts. RIT scores generally range from 100 to 300, depending on the subject.

Three different dimensions contribute to the overall difficulty of each test question:

- Cognitive demand of the task(s)
- Presentation
- Passage (reading and text level) difficulty

Students who have mastered a concept will be able to answer questions about that concept in many formats. They can answer questions about the concept, even when the concept

may be embedded in a complex problem. More importantly, teachers can make concepts more accessible or more challenging to students by changing these underlying factors when offering instruction to students.

Cognitive Demand

Cognitive demand captures both the complexity of the task and the type of thinking (the complex thinking part) required to resolve a problem. NWEA test question banks contain tasks that are similar to each other, but the cognitive complexity varies:

Example 1

Analyze three short passages and identify the one that makes an ad hominem argument. This task requires complex thinking (analysis); but this task may not require much cognitive demand.

Read three complex opinion pieces from a newspaper and identify logical fallacies committed in each. This task requires the same form of complex thinking (it's still an analysis task), but has much greater cognitive demand because the student was not told which fallacy to look for and because the opinion pieces were not intentionally designed to contain a fallacy.

Example 2

Multiply 10 by 10. The RIT value and cognitive demand is somewhat low because most students know the answer.

Multiply 68 by 73. The RIT value and cognitive demand associated with two-digit multiplication is much higher.

With an understanding of what influences test scores, the statement nuances are easier to interpret. If instructors understand that the difference is in cognitive demand, which is independent of presentation, the process of interpreting scores using the learning continuum statements in DesCartes becomes more flexible and less rigid. An assumption is that as a student moves up through the grades, the content becomes more difficult; however, this may not always be the case.

Presentation

Testing format can influence test scores. For example, in the classroom, mathematics problems may have only been presented in a vertical format. However, NWEA tests present mathematics problems both vertically and horizontally. Story problems may also represent a different orientation by their textual representation. Where the two latter formats deviate from mathematics problems that a student has been exposed to (horizontal formatting and textual representation), these variations may influence test scores.

Passage Difficulty

Reading questions contain three parts:

1. Reading passage
2. Question
3. Answer choices

All three affect the RIT value of the reading question.

For example, asking the student to identify the main character in a passage is usually easy. However, asking a student to identify the main character in a selection from Dante's *The Inferno* would be quite difficult because the passage's middle-English vocabulary makes it denser and more difficult to understand.

Tips

This section provides useful tips and commentary for instructors—from other instructors—who want to maximize the DesCartes potential.

Give Meaning to RIT Scores

The RIT scale provides the framework to measure student growth. DesCartes puts flesh on that framework and provides better insight to what students already know and what they need to learn next:

Share DesCartes with parents and students during conferences. Students and parents will better understand that learning happens on a continuum rather than in grade-specific chunks. Together they will celebrate what's been learned and look forward to the learning that lies ahead.

Share Instructional Materials

By knowing where students are performing, instructors can collaborate to use resources typically found outside their individual classrooms. This helps make appropriate materials available:

Set up a central resource center in each school around RIT bands to provide shared lesson plans, textbooks, and other resources. Instructors can check out materials needed to match students' instructional needs.

Develop Needs-Based or Flexible Groups

DesCartes provides a learning path for individual students and groups of students based on students' specific instructional levels and needs. Most states have state standards that define grade-level skills and benchmarks. While state standards serve as the direct connection to mandatory curriculum, DesCartes can help define skills for those students currently performing below grade-level standards as well as for those students who have already reached their specific grade-level standards:

Study DesCartes to determine where grade-level standards fit for your grade. Find skills that may supplement specific grade-level standards, and also skills that fall below and above that standard. To begin working with flexible groups, select only one goal area. Based on their RIT ranges, divide the students into three or four groups. Work with them in these groups once or twice a week on specific skills related to their goal area. Instructors can then better observe growth along a continuum of skills.

Many instructors feel the pressure to focus on their grade-level standards. Actually, most large concepts are built on a spiral. DesCartes provides concrete evidence of the continuum of learning around concepts that take place over several RIT bands:

Identify one concept, such as Fact/Opinion, and ask instructors to meet in teams (such as a group of three instructors from three different grade levels) to look at six RIT bands of Fact/Opinion and identify how the difficulty changes through the bands.

Establish and Communicate Goals

By providing general information about students' instructional needs, goals can be specific, measurable, and attainable by every student:

- **Create learning goals at the beginning of the school year** based on students' fall assessment reports. Revisit these goals during the year and adjust them as necessary.
- **Talk with a colleague about the goals you have for a student.** Instructor-to-instructor dialogue about goals can be a powerful way to focus conversation. When instructors know what they need to teach, they can collaborate to explore different ways to facilitate the learning.

Focus on the Students' Specific Needs

Many instructors put together individualized plans for each student in a classroom. DesCartes is an excellent guide to assist in this process:

Create a specific set of learning goals for a student by listing certain skills and competencies to focus on for the next determined period of time. Use DesCartes to help determine what the next steps are for a student. This plan can then be shared with others responsible for the student's learning, including parents and the student.

Apply a Test Score to DesCartes

An example of how to use and apply a DesCartes test score:

One student, Marty, has an overall score of 187 in reading. Marty's instructor can look up the RIT range (181-190) in the DesCartes notebook Reading section. The instructor can then refer to the center column (Skills and Concepts to Develop) and use the corresponding statements as a guideline for targeted instruction.

If Marty is the only one in the RIT range 181-190, the learning statements in reading will provide targeted instruction for him alone. However, if other students fall into the same RIT range, Marty's instructor can use the statements for all students who fall in that range. NWEA's Class Breakdown by RIT report automatically arranges students by RIT range achievement to assist in this effort.

Training

NWEA training sessions are designed for educators with varying levels of assessment knowledge. Our series of workshops and seminars lead participants to make practical use of assessment data. Participants leave with an understanding that data are fundamental to improving student achievement.

We guide instructors through using data to plan lessons in accordance with state standards and DesCartes. With training, instructors see how their state standards fit with DesCartes, and they learn how to manage the diversity in their classrooms by understanding what the data reveals. We show instructors how to use NWEA resources so that all their students can grow academically, regardless of what skills and concepts they currently understand.

If data are analyzed with the traditional methods (normative or comparative), an NWEA assessment becomes just another test. However, if instructors understand the data, rely on the data, and use DesCartes with the data, the information becomes meaningful. With accurate interpretation, instructors can use DesCartes to improve what they do for every student in the classroom. Rather than teaching to the middle segment of the classroom, instructors can look at the diversity in their classrooms and plan their curriculum to address it accordingly. If a student is struggling in a subject area, instructors use the learning continuum statements in DesCartes as a resource to customize individual student instruction.

Our professional development workshops are scheduled throughout the year and across the country; however, you can also contact us to schedule an on-site training at your district. To schedule training for your staff, please call the Partner Relations Representative (PRR) for your school or district at 503-624-1951.