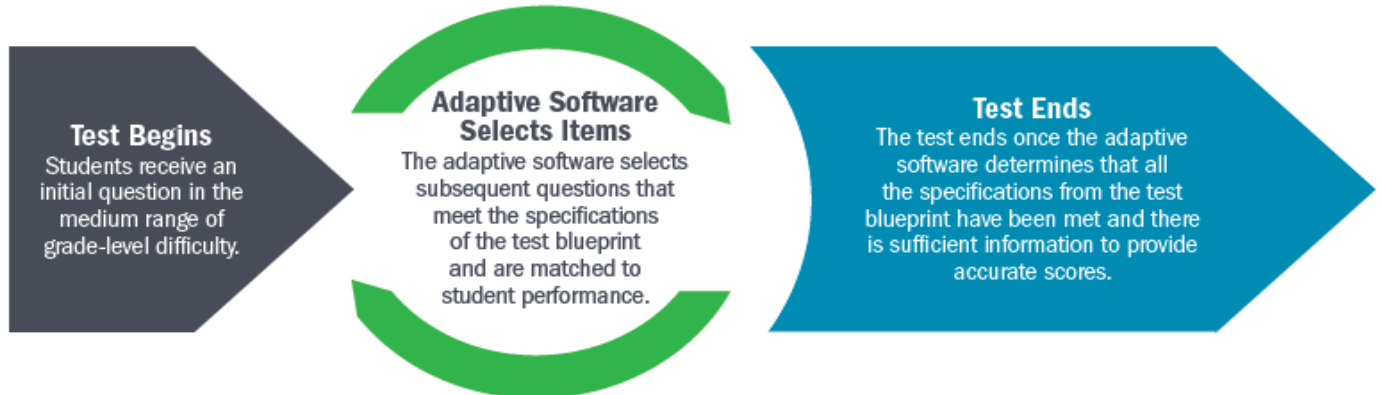# COMPUTER ADAPTIVE TESTING (CAT)

The Smarter Balanced Assessment System includes computer adaptive tests (CAT) that are customized to each student. During the test, the difficulty of questions changes based on student responses. For example, a student who answers a question correctly will receive a more challenging item, while an incorrect answer generates an easier question. In this way, adaptive tests provide more precise information about student achievement in less time than a "fixed-form" test in which all students see the same set of questions.

Two ingredients are required to create an effective computer adaptive test:

- The **test blueprint** describes the content that will be covered on the assessment. The Smarter Balanced test blueprint ensures that the full range of knowledge and skills in the Common Core State Standards will be assessed. In addition the test blueprint specifies the number and types of questions associated with each section of the assessment. The blueprint is available at www.smarterbalanced.org/smarter-balanced-assessments/.

- The **adaptive software** is a set of rules that determine which questions a student will be given during the assessment. Drawing on a large pool of questions, the software ensures that each student's test fulfills the test blueprint—meaning that all content areas are covered with sufficient detail to provide an accurate score—and it adjusts the level of difficulty of questions based on student responses to accurately assess the strengths and weaknesses of each student. More information about the software is available at www.smarterapp.org/documents/AdaptiveAlgorithm-Preview-v3.pdf.

How the Smarter Balanced Adaptive Software Works

The adaptive software runs in the background while students complete the assessment. After each response, it selects the next question based on a number of criteria, including: the specifications from the test blueprint; the number of times a question is likely to be used (to prevent overexposure of questions); and previous responses from the student.

Test Begins
Students receive an initial question in the medium range of grade-level difficulty.

Adaptive Software Selects Items
The adaptive software selects subsequent questions that meet the specifications of the test blueprint and are matched to student performance.

Test Ends
The test ends once the adaptive software determines that all the specifications from the test blueprint have been met and there is sufficient information to provide accurate scores.

Advantages of Computer Adaptive Testing

Computer adaptive testing is more efficient, more secure, more accurate, and more timely than traditional testing. Based on student responses, the computer software adjusts the difficulty of questions throughout the assessment. By adapting to the student as the assessment takes place, the assessment presents an individually tailored set of questions to each student and can quickly identify which skills students have mastered. Fewer questions are required to accurately determine each student's achievement level compared to paper-and-pencil assessments, and getting accurate results takes less time. Since each test is different based on a student's responses, test items are more secure and there is less likelihood of cheating. Computerized assessments also allow teachers, principals, and parents to receive results in weeks, not months. Getting results faster means that teachers can use the information from optional interim assessments during the school year to differentiate instruction to meet the unique needs of students. Having a more detailed and accurate picture of where students excel or need additional support helps teachers to differentiate instruction, and it means that as students advance from one grade to the next, teachers and parents can be confident that higher scores reflect real learning gains.

Common Questions about Adaptive Testing

If students are asked different questions, how can we compare their results?

Each student's test must meet the requirements of the test blueprint. The blueprint specifies the content areas and types of questions that will appear on the test. For example, if the test blueprint requires that each student receive two questions about adding fractions, the adaptive software will select two questions from a group of perhaps a dozen that assess the ability to add fractions. Each question is placed on a scale of difficulty. Students who answer many challenging questions correctly will receive higher scores, which will correspond to higher achievement levels.

How difficult are the test items?

The Smarter Balanced adaptive software is configured to select only from grade-level questions for approximately the first two-thirds of the test. At that point, if the estimate of the student's achievement level is clearly at the lowest or highest level, the question pool is expanded to include questions either from below or above the student's grade level. Before being used, out-of-grade questions are screened to make sure they are instructionally and developmentally appropriate. Expanding the question pool to include out-of-grade questions can help create a more complete picture of each student's knowledge and skills.

What about students with special needs who are advanced in some areas and much weaker in others?

The English and math assessments each include several content areas in which students will be assessed. In English, students will be assessed on reading, writing, listening, and research. In math, questions will focus on concepts and procedures, problem solving and modeling/data analysis, and communicating reasoning. A student with strong skills in one area will be able to demonstrate them because the adaptive software will give the student the opportunity to respond to each content area.

Can students review and change their answers?

Yes. Students may go back and modify their responses within a test segment. The adaptive software continually works to tailor the test to each student, so a modified response will simply generate a new question that satisfies the test blueprint and matches student performance.

How does the adaptive software handle questions that cannot be automatically scored?

The adaptive portion of the assessment includes some "constructed response" questions that must be scored by human readers. Student responses to these questions and to questions in the performance tasks will be combined with the machine-scored questions into a single score report.

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