Common Core State Standards

- Define the knowledge and skills students need for college and career
- Developed voluntarily and cooperatively by states; more than 40 states have adopted
- Provide clear, consistent standards in English language arts/Literacy and mathematics

Source: www.corestandards.org
PISA 2009

Overall Reading Scale

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>57</td>
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</table>

Significantly Above OECD Average

Not Significantly Different (OECD Average 493)

Significantly below OECD Average
## PISA 2009

### Overall Math Scale

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
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<tr>
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*OECD Average 496*
## PISA 2009

### Overall Science Scale

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<th>Score</th>
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Reading Risk

Figure 2. NAEP scale equivalents of state grade 4 reading standards for proficient performance, by state: 2009

Inferences based on estimates with relative error greater than .5 may require additional evidence.

Mapping State Proficiency Standards onto NAEP Scales, IES August 2011
### Proficiency

#### Grade 4 Reading 2009

<table>
<thead>
<tr>
<th>State</th>
<th>Proficient</th>
<th>Required NAEP Score</th>
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<tbody>
<tr>
<td>California</td>
<td>60 %</td>
<td>202</td>
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<tr>
<td>Massachusetts</td>
<td>54 %</td>
<td>234</td>
</tr>
<tr>
<td>Missouri</td>
<td>47 %</td>
<td>229</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>74%</td>
<td>211</td>
</tr>
<tr>
<td>Oregon</td>
<td>84 %</td>
<td>177</td>
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<tr>
<td>Washington</td>
<td>73 %</td>
<td>205</td>
</tr>
<tr>
<td>Vermont</td>
<td>70%</td>
<td>214</td>
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</tbody>
</table>
Reading Risk

Figure 4. NAEP scale equivalents of state grade 8 reading standards for proficient performance, by state: 2009

Mapping State Proficiency Standards onto NAEP Scales, IES August 2011
## Proficiency

### Grade 8 Reading 2009

<table>
<thead>
<tr>
<th>State</th>
<th>Proficient</th>
<th>Required NAEP Score</th>
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</thead>
<tbody>
<tr>
<td>California</td>
<td>48%</td>
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<td>Minnesota</td>
<td>67%</td>
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<td>Missouri</td>
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<tr>
<td>Vermont</td>
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<td>Oregon</td>
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<td>Washington</td>
<td>68%</td>
<td>253</td>
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</table>
Math Risk

Figure 6. NAEP scale equivalents of state grade 4 mathematics standards for proficient performance, by state: 2009

Inferences based on estimates with relative error greater than .5 may require additional evidence.
# Proficiency
## Grade 4 Mathematics 2009

<table>
<thead>
<tr>
<th>State</th>
<th>Proficient</th>
<th>Required NAEP Score</th>
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</thead>
<tbody>
<tr>
<td>California</td>
<td>65%</td>
<td>220</td>
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<td>48%</td>
<td>255</td>
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<tr>
<td>Hawaii</td>
<td>50%</td>
<td>239</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>73%</td>
<td>237</td>
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<tr>
<td>New Mexico</td>
<td>77%</td>
<td>224</td>
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<tr>
<td>Washington</td>
<td>52%</td>
<td>243</td>
</tr>
<tr>
<td>Missouri</td>
<td>45%</td>
<td>246</td>
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</tbody>
</table>
Math Risk

Figure 8. NAEP scale equivalents of state grade 8 mathematics standards for proficient performance, by state: 2009

Leadership in Education

Mapping state proficiency standards onto NAEP Scales, IES August 2011
### Proficiency
#### Grade 8 Mathematics 2009

<table>
<thead>
<tr>
<th>State</th>
<th>Proficient</th>
<th>Required NAEP Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>California</td>
<td>41%</td>
<td>270</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>49%</td>
<td>300</td>
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<tr>
<td>Missouri</td>
<td>47%</td>
<td>287</td>
</tr>
<tr>
<td>Hawaii</td>
<td>39%</td>
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<td>Minnesota</td>
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<td>287</td>
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<tr>
<td>Oregon</td>
<td>71%</td>
<td>266</td>
</tr>
<tr>
<td>Washington</td>
<td>53%</td>
<td>270</td>
</tr>
</tbody>
</table>
FOUR KEYS TO COLLEGE AND CAREER READINESS

### Key Cognitive Strategies
- Problem formulation
  - Hypothesize
  - Strategize
- Research
  - Identify
  - Collect
- Interpretation
  - Analyze
  - Evaluate
- Communication
  - Organize
  - Construct
- Precision & accuracy
  - Monitor
  - Confirm

### Key Content Knowledge
- Structure of knowledge
  - Key terms and terminology
  - Factual information
  - Linking ideas
  - Organizing concepts
- Challenge level
- Value
- Attribution
- Effort

### Key Learning Skills & Techniques
- Ownership of learning
  - Goal setting
  - Persistence
  - Self-awareness
  - Motivation
  - Help seeking
  - Progress monitoring
  - Self-efficacy
- Learning techniques
  - Time management
  - Test taking skills
  - Note taking skills
  - Memorization/recall
  - Strategic reading
  - Collaborative learning
  - Technology proficiency

### Key Transition Knowledge & Skills
- Postsecondary awareness
  - Aspirations
  - Norms/culture
- Postsecondary costs
  - Tuition
  - Financial aid
- Matriculation
  - Eligibility
  - Admissions
  - Program
- Career awareness
  - Requirements
  - Readiness
- Role and identity
  - Role models
- Self-advocacy
  - Resource acquisition
  - Institutional advocacy

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Common Core Research

- 1900 entry level courses
- Instructor ratings
- 25 areas, 14 general education,
- Reviewed syllabi, assignments and exams
Key Findings

- CCSS applicable to success in a wide range of courses
- Challenge level is sufficient
- Coherent representation of knowledge necessary
- Core of knowledge is common across general education and career courses
- Career areas tend to have knowledge profiles that differ from general education
Applicability Ratings for **Mathematics**: General Education Courses

![Bar chart showing applicability ratings for various mathematics concepts in different courses.](chart.png)

- **Number and Quantity**
- **Algebra**
- **Functions**
- **Geometry**
- **Statistics and Probability**
- **Mathematical Practices**

- **ELA (312 respondents)**
- **Math (302 respondents)**
- **Science (281 respondents)**
- **Social science (420 respondents)**
Applicability Ratings for **Mathematics**: Career Oriented Courses

![Bar chart showing applicability ratings for different areas of mathematics in career-oriented courses.]
The Assessment Challenge

How do we get from here...

Common Core State Standards specify K-12 expectations for college and career readiness

...to here?

All students leave high school college and career ready

...and what can an assessment system do to help?
### Summative Assessments Today

| Each state procures its own assessment system | • Each state bears the burden of test development; no economies of scale |
| Measure proficiency against state standards, not agreed-upon standards | • Students often leave high school unprepared to succeed in entry-level college courses |
| Usually heavy reliance on multiple choice questions | • Poor measures of demonstration of skills and complex cognitive performance |
| Results often delivered months after tests are given | • Tests cannot be used to inform instruction or affect program decisions |
| Accommodations for special education and ELL students vary | • Difficult to interpret meaning of scores; concerns about access and fairness |
| Most administered on paper | • Costly, time consuming, and challenging to maintain security |
Next Generation Assessments

• More rigorous tests measuring student progress toward “college and career readiness”
• Have common, comparable scores across member states, and across consortia
• Provide achievement and growth information to help make better educational decisions and professional development opportunities
• Assess all students, except those with “significant cognitive disabilities”
• Administer online, with timely results
• Use multiple measures

Source: Federal Register / Vol. 75, No. 68 / Friday, April 9, 2010 pp. 18171-85
Smarter Balanced
Background
The Purpose of the Consortium

- To develop a **comprehensive and innovative** assessment system for grades 3-8 and high school in English language arts and mathematics aligned to the Common Core State Standards, so that...

- ...students leave high school **prepared for postsecondary success** in college or a career through increased student learning and improved teaching

[The assessments shall be **operational** across Consortium states in the 2014-15 school year]
A National Consortium of States

- 28 states representing 44% of K-12 students
- 21 governing, 7 advisory states
- Washington state is fiscal agent
State Led
Committed to Transparency
State-Led Governance

States Join Consortium as Governing or Advisory State:
- Governors
- Education Chiefs
- State Legislatures
- State Boards of Education

State Representatives Serve on Executive Committee:
- 2 elected co-chairs
- 4 representatives elected by governing states
- Lead procurement state (WA)
- Higher education representative

Smarter Balanced Staff
- WestEd, Project Management Partner
- Advisory Committees
# Who We Are

<table>
<thead>
<tr>
<th>Role</th>
<th>Name and Details</th>
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</thead>
<tbody>
<tr>
<td><strong>Two Co-chairs</strong></td>
<td>Judy Park (UT) Carissa Miller (ID)</td>
</tr>
<tr>
<td><strong>Executive Committee</strong></td>
<td>Dan Hupp (ME); Joseph Martineau (MI); Michael Hock (VT); Mike Middleton (WA); Lynette Russell (WI); Charlie Lenth (SHEEO)</td>
</tr>
<tr>
<td><strong>Executive Director</strong></td>
<td>Joe Willhoft</td>
</tr>
<tr>
<td><strong>Chief Operating Officer</strong></td>
<td>Tony Alpert</td>
</tr>
<tr>
<td><strong>Project Management</strong></td>
<td>WestEd (Stanley Rabinowitz, PMP Director)</td>
</tr>
<tr>
<td><strong>Policy Coordinator</strong></td>
<td>Sue Gendron (former Maine Education Commissioner)</td>
</tr>
<tr>
<td><strong>Senior Research Advisor</strong></td>
<td>Linda Darling-Hammond (Stanford University)</td>
</tr>
<tr>
<td><strong>Lead Psychometrician</strong></td>
<td>Marty McCall</td>
</tr>
<tr>
<td><strong>Director of Higher Education Collaboration</strong></td>
<td>Jacqueline King</td>
</tr>
<tr>
<td><strong>Director of Strategic Communications and PIO</strong></td>
<td>Eddie Arnold, APR</td>
</tr>
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</table>
Advisory Panels

• Technical Advisory Committee
• ELL Advisory Panel
• Advisory Panel for Students with Disabilities
• Formative Assessment Advisory Panel
• Higher Education Advisory Panel
Work group engagement of 90 state-level staff:

Each work group:
• Led by co-chairs from governing states
• 6 or more members from advisory or governing states
• 1 liaison from the Executive Committee
• 1 WestEd partner

Work group responsibilities:
• Define scope and time line for work in its area
• Develop a work plan and resource requirements
• Determine and monitor the allocated budget
• Oversee Consortium work in its area, including identification and direction of vendors
Technical Advisory Committee

Jamal Abedi  
*UC Davis/CRESST*

Randy Bennett  
*ETS*

Derek Briggs  
*University of Colorado*

Greg Cizek  
*University of North Carolina*

David Conley  
*University of Oregon*

Linda Darling-Hammond  
*Stanford University*

Brian Gong  
*The Center for Assessment*

Ed Haertel  
*Stanford University*

Joan Herman  
*UCLA/CRESST*

Jim Pellegrino  
*University of Illinois, Chicago*

W. James Popham  
*UCLA, Emeritus*

Joe Ryan  
*Arizona State University*

Martha Thurlow  
*University of Minnesota/NCEO*
Higher Education Partners Involved in Application

• **175 public** and **13 private** systems/institutions of higher education
• Representing **74%** of the total number of direct matriculation students across all Smarter Balanced States
• Higher education **representatives** and/or postsecondary faculty serve on
  – Executive Committee
  – Assessment scoring and item review committees
  – Standard-setting committees
• Jacqueline King named director of higher education collaboration; higher education advisory panel now forming
Seven Key Principles

1. An integrated system
2. Evidence-based approach
3. Teacher involvement
4. State-led with transparent governance
5. Focus: improving teaching and learning
6. Actionable information – multiple measures
7. Established professional standards
A Balanced Assessment System

Common Core State Standards specify K-12 expectations for college and career readiness.

Teachers and schools have information and tools they need to improve teaching and learning.

Summative assessments Benchmarked to college and career readiness.

Teacher resources for formative assessment practices to improve instruction.

Interim assessments Flexible, open, used for actionable feedback.

All students leave high school college and career ready.

Common Core State Standards specify K-12 expectations for college and career readiness.

Interim assessments Flexible, open, used for actionable feedback.

Summative assessments Benchmarked to college and career readiness.

Teacher resources for formative assessment practices to improve instruction.

All students leave high school college and career ready.
A Balanced Assessment System

English Language Arts and Mathematics, Grades 3-8 and High School

DIGITAL CLEARINGHOUSE of formative tools, processes and exemplars; released items and tasks; model curriculum units; educator training; professional development tools and resources; scorer training modules; and teacher collaboration tools.

School Year

Optional Interim Assessment
Computer Adaptive Assessment and Performance Tasks

Scope, sequence, number and timing of interim assessments locally determined

Optional Interim Assessment
Computer Adaptive Assessment and Performance Tasks

Summative Performance Tasks For Accountability
• Reading
• Writing
• Math

Summative End Of Year Adaptive Assessment for Accountability
Re-take option

Last 12 weeks of the year*

*Time windows may be adjusted based on results from the research agenda and final implementation decisions.
Using Computer Adaptive Technology for Summative and Interim Assessments

<table>
<thead>
<tr>
<th>Feature</th>
<th>Benefits</th>
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</thead>
<tbody>
<tr>
<td>Faster results</td>
<td>Turnaround in weeks compared to months today</td>
</tr>
<tr>
<td>Shorter test length</td>
<td>Fewer questions compared to fixed form tests</td>
</tr>
<tr>
<td>Increased precision</td>
<td>Provides accurate measurements of student growth over time</td>
</tr>
<tr>
<td>Tailored to student ability</td>
<td>Item difficulty based on student responses</td>
</tr>
<tr>
<td>Greater security</td>
<td>Larger item banks mean that not all students receive the same questions</td>
</tr>
<tr>
<td>Mature technology</td>
<td>GMAT, GRE, COMPASS (ACT), Measures of Academic Progress (MAP)</td>
</tr>
</tbody>
</table>
Teacher Involvement

Teachers Participate In
- Test item development
- Test scoring
- Formative tool development
- Professional development cadres

Teachers Benefit From
- Professional development
- Formative tools and processes
- Data from summative and interim assessments
Assessment System Components

**Summative Assessment (Computer Adaptive)**

- **Assesses** the full range of Common Core in English language arts and mathematics for students in grades 3–8 and 11 (interim assessments can be used in grades 9 and 10)
- **Measures** current student achievement and growth across time, showing progress toward college and career readiness
- **Can be given** once or twice a year (mandatory testing window within the last 12 weeks of the instructional year)
- **Includes a** variety of question types: selected response, short constructed response, extended constructed response, technology enhanced, and performance tasks
Assessment System Components

Interim Assessment (Computer Adaptive)

- Optional comprehensive and content-cluster assessment to help identify specific needs of each student
- Can be administered throughout the year
- Provides clear examples of expected performance on Common Core standards
- Includes a variety of question types: selected response, short constructed response, extended constructed response, technology enhanced, and performance tasks
- Aligned to and reported on the same scale as the summative assessments
- Fully accessible for instruction and professional development
Assessment System Components

Performance Tasks

- Extended projects demonstrate real-world writing and analytical skills
- May include online research, group projects, presentations
- Require 1-2 class periods to complete
- Included in both interim and summative assessments
- Applicable in all grades being assessed
- Evaluated by teachers using consistent scoring rubrics

“The use of performance measures has been found to increase the intellectual challenge in classrooms and to support higher-quality teaching.”

- Linda Darling-Hammond and Frank Adamson, Stanford University
Few initiatives are backed by evidence that they raise achievement. Formative assessment is one of the few approaches proven to make a difference.

- Stephanie Hirsh, Learning Forward

<table>
<thead>
<tr>
<th>Formative Assessment Practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Research-based, <strong>on-demand tools and resources for teachers</strong></td>
</tr>
<tr>
<td>• Aligned to <strong>Common Core</strong>, focused on increasing student learning and enabling <strong>differentiation of instruction</strong></td>
</tr>
<tr>
<td>• <strong>Professional development</strong> materials include model units of instruction and publicly released assessment items, formative strategies</td>
</tr>
</tbody>
</table>
Definition:
Assessment that takes place continuously during the course of teaching and learning to provide teachers and students with feedback to close the gap between current learning and desired goals.

Assessment Reform Group, 2002; Bell & Cowie, 2001; Black et al., 2003; Black & Wiliam, 1998; OECD, 2005; Sadler, 1989; Shepard, 2000)
Advantages of Formative Assessment

• Students learn faster
• Teachers know what students already know & adjust instruction
• Students aware of progress
• Most powerful moderator in student achievement
• Works for at risk students
Connecting Formative Assessment Process & the Standards

Helps the teacher understand “HOW” students can improve in learning so they can be proficient!
Formative Assessment Strategies

(Black, Wiliam, 1998; Sadler, 1998; Stiggins, 2007; Heritage, 2007)

• Pre-assessing students
• Sharing Learning goals with students
• Co-creating classroom discourse & questioning
• Rich & challenging tasks elicit student response
• Identifying gaps
Formative Assessment Strategies
(Black, Wiliam, 1998; Sadler, 1998; Stiggins, 2007; Heritage, 2007)

- Providing feedback/how to improve
- Self-assessments
- Peer-assessments
- Opportunities to close the gap
- Celebrations
Formative assessment system:
  – Where am I going? (feed-up)
  – How am I doing? (feedback)
  – Where am I going next? (feed-forward)
Feed-Up: Where Am I Going?

- Focus of Learning
- Relevance/motivation
- Meta-cognition/ Depth of Knowledge
- Student sets goals
Checking for Understanding: Where Am I Now?

- Student centered
- Instruction and checking for understanding can’t be separated
- Teacher constantly checking
- Student self-assessing
“Feedback has no effect in a vacuum; to be powerful in its effect, there must be a learning context to which feedback is addressed.” (2007 pg. 82)

• Hattie, J. & Timperley, H. The power of feedback. Review of Educational Research
Feedback

- Student Work
- Student work
- Student Proficient

Celebrate
Strategies

• Traffic Light feedback
• Gallery Walk
• Portfolio
• Concept Map
• Ticket out the door
What do students say

- Class discussion
- Debate
- Oral presentation
- Story/event telling
- Agree/disagree
- Choral reading
- Think-Pair-Share
- You’re the Judge
- Ask a question
- Make a Statement
- Radio Show

- Small group talk
- Play/drama
- Reciting a poem/speech
- Panel discussion
- Music
- Interviews
- Think aloud
- Answer specific
- Podcasts
- Read aloud
- Other____
Ask Questions

• Use Fingers, Cards, Fingers
• A, B, C, D cards
• Rate responses
  – 4 – Complete response
  – 3 – Demonstrates an understanding or application of the goal
  – 2 – Minimal evidence
  – 1 – No evidence
Take a Three Minute Pulse

- After 10-15 discussion, reading, lecture
- Reflect, discuss what they learned using higher order thinking skills
- Suggested questions: (Marzano)
  - How does this information relate to you?
  - How does what we’ve just learned relate to...
  - How is what we just learned similar or different to
  - Identify one thing you knew and one thing that was new to you...
Feedback: How am I Doing?

• Levels:
  1. About the task – performance
  2. About processing the task – learning processes used by student
  3. Self appraisal – regulating behaviors and actions (ability, knowledge, cognitive strategies, and achievement)
Criterion for Feedback

• Timely
• Specific
• Understandable
• Actionable
Exit Sheet

I think I Got It
This is what I learned:
This is how your lesson helped:

Still Need More Practice
I’m still struggling with:
My biggest question is:

Tomorrow, Tomorrow
Can I have help with:
I could practice by:

Teach Me More
Mini-lesson idea:
This would help me because:
One Minute Response

What I learned today...

What I am unclear/unsure about

Comments...
Feed-Forward: Where Am I Going Next?

• Understanding the mis-conceptions and error analysis – what students know; what they don’t know; what they use but confuse; and what they think

• Checking for understanding with rigorous questions
## Diagnostic Learning Log

<table>
<thead>
<tr>
<th>Major Concept</th>
<th>Unsure/Questions</th>
<th>My solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Planning Rigorous and Relevant Instruction

Step 1: Focus of Learning

Step 2: Student Performance
- Rigor/Relevance

Step 3: Assessment

Step 4: Learning Experiences

Data
- Standards
- Student
- Best Practices
- Reading

Alignment with Performance

Alignment with Assessment
## Grades Supported

<table>
<thead>
<tr>
<th>Grades</th>
<th>Summative</th>
<th>Interim (Optional)</th>
<th>Formative Tools and Professional Learning (Optional)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-8</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>9-10</td>
<td>1-2 Performance Tasks as Required to Cover CCSS</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>11</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>12</td>
<td>Optional</td>
<td>✔</td>
<td>✔</td>
</tr>
</tbody>
</table>
Assessment System Components

**Online Reporting**

- **Static and dynamic reports**, secure and public views
- Individual **states retain jurisdiction** over access and appearance of online reports
- Dashboard gives parents, students, practitioners, and policymakers access to **assessment information**
- **Graphical display** of learning progression status (interim assessment)
- **Feedback and evaluation** mechanism provides surveys, open feedback, and vetting of materials

"Data are only useful if people are able to access, understand and use them...

For information to be useful, it must be timely, readily available, and easy to understand."

- Data Quality Campaign
Support for Special Populations

- Accurate measures of progress for students with disabilities and English Language Learners
- Accessibility and Accommodations Work Group engaged throughout development
- Outreach and collaboration with relevant associations

“Common-Core Tests to Have Built-in Accommodations”

- June 8, 2011
Progress to Date

Master Work Plan for Summative Assessment
- Major tasks / scope of work
- Schedule and description of procurements

Content Specifications for ELA/Literacy & Math
- Two rounds of public comment
- Review by Governing States

Item & Test Development
- RFPs issued for: item/task specifications, item/task materials development; test and CAT specifications; pilot test item/task development

IT Systems Architecture
- Phase 1 development complete
- Architecture review board established

Communications
- Delivered presentations to more than 130 groups and organizations

Staffing
- COO; Lead psychometrician; Director of higher education collaboration; Director of strategic communications
<table>
<thead>
<tr>
<th>Section</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sustainability Task Force</strong></td>
<td>- Recommendations for procurement, administration, and maintenance post 2015</td>
</tr>
<tr>
<td><strong>Item/Task Development</strong></td>
<td>- Item/task specifications issued</td>
</tr>
<tr>
<td></td>
<td>- Rapid prototyping &amp; small scale trials for pilot test</td>
</tr>
<tr>
<td><strong>Master Work Plans for Interim and Formative</strong></td>
<td>- Major tasks / scope of work</td>
</tr>
<tr>
<td></td>
<td>- Schedule and description of procurements</td>
</tr>
<tr>
<td><strong>Definition of College/Career Readiness</strong></td>
<td>- Higher ed collaboration; Research-based alignment of CCSS and credit-bearing courses</td>
</tr>
<tr>
<td><strong>Access and Accommodations</strong></td>
<td>- Common accessibility guidelines issued</td>
</tr>
<tr>
<td></td>
<td>- Convene advisory groups for ELL and SWD</td>
</tr>
<tr>
<td><strong>Staffing</strong></td>
<td>- Math and ELA/literacy content specialists</td>
</tr>
</tbody>
</table>
How it Fits Together

Accessibility and Administration

Technology

Item and Test Design

Formative Practices, Professional Learning and Implementation
Technology

Identify Tech Needs
- IT readiness survey: Available January 2012

Design the Technology System
- System architecture: Available January 2012

Build the Systems
- Vendors start building the system: February 2012

Pilot and Field Test
- Improve the technology throughout pilot and field test: 2012 and 2013
Item and Test Design

Organize the Content

- Content Specifications: October 2011

Design the Items

- Item Specifications: January 2012

Design the Tests

- Test Specifications: February 2012

Write the Items

- Item Writing for Pilot Test: 2012-2013
## Item and Test Design

### Organize the Content

- **Use Evidence Based Design (EBD) as a disciplined approach to assessing the Common Core State Standards**
  - Test developers use specific outcomes for students (e.g., claims) as the starting point to ensure the test will meet the purposes for which it was designed (and therefore directly enhance validity)
- **Once claims are established, build into test design the types of items that will create the evidence necessary to make claims**
Evidence-Based Design Overview
Curriculum-Instruction-Assessment Connections

Curriculum-Instruction-Assessment

- What should students know and to be able to do?
  - What should students learn?
  - What should students be taught?

- What have students learned?
- What haven’t students learned?

Curriculum → Instruction → Assessment → Students

- What are students being taught?
  - How are students being taught?
- What have students learned?
- What haven’t students learned?
Evidence-Based Design Framework

Observation

Interpretation

“Assessment Triangle”

Cognition
Models of Cognition

• Describe how students acquire knowledge and develop competence in a particular area

• Reflect recent and credible scientific evidence of typical learning processes and informed experiences of expert teachers

• Describe typical learning progression toward competence, including milestones (benchmarks)
Observation Models

• A set of specifications for assessment tasks that will elicit illuminating responses from students

• The tasks or situations are linked to the cognitive model of learning and should prompt students to say, do, or create something that provides evidence to support inferences about students’ knowledge, skills, and cognitive processes
Interpretation

• Interpretations use the evidence from observations to make claims about what students understand and can do

• Claims
  – Frame a manageable number of learning goals around which instruction can be organized
  – Guide the specification of appropriate evidence
  – Provides a basis for meaningful reporting to different interested audiences
An Overview of SBAC’s Approach

Content Specifications …

– Create a bridge between standards and assessment and, ultimately, instruction
– Organize the standards around major constructs & big ideas
– Express what students should learn and be able to do
Each claim is described for assessment

• Rationale for each claim
  – Why is this learning goal important for College & Career Readiness (CCR)?
  – What does the research say about learning in this area?

• What does ‘sufficient’ evidence look like?
  – What types of items/tasks?
  – What content/texts will be emphasized?

• What are some suggested reporting categories?
Summative Assessment Targets

• Indicate proposed **prioritized content** for the summative assessment - link CCSS to the kinds of items/tasks students will respond to

• Show how one or more (or parts) CCSS addresses the target – ‘bundles’ CCSS (examples on next slide)
  – Standards or parts of standards that relate to same type of understanding & comparable rigor/DOK demands
  – Several similar CCSS from different strands
Grade 5

Key:  ■ Major Clusters;  ● Supporting Clusters;  ○ Additional Clusters

Operations and Algebraic Thinking
■ Write and interpret numerical expressions.
■ Analyze patterns and relationships.

Number and Operations in Base Ten
■ Understand the place value system.
■ Perform operations with multi-digit whole numbers and with decimals to hundredths.

Number and Operations—Fractions
■ Use equivalent fractions as a strategy to add and subtract fractions.
■ Apply and extend previous understandings of multiplication and division to multiply and divide fractions.

Measurement and Data
■ Convert like measurement units within a given measurement system.
■ Represent and interpret data.
■ Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

Geometry
■ Graph points on the coordinate plane to solve real-world and mathematical problems.
■ Classify two-dimensional figures into categories based on their properties.
Draft Assessment Claims for English Language Arts/Literacy

**Reading**
- Students can read closely and analytically to comprehend a range of increasingly complex literary and informational texts.

**Writing**
- Students can produce effective and well-grounded writing for a range of purposes and audiences.

**Speaking/Listening**
- Students can employ effective speaking and listening skills for a range of purposes and audiences.

**Research/Inquiry**
- Students can engage in research and inquiry to investigate topics, and to analyze, integrate, and present information.
Draft  Overall Assessment Claims for English Language Arts/Literacy

OVERALL 3-8

Students can demonstrate progress toward college and career readiness in English language arts and literacy.

OVERALL 9-12

Students can demonstrate college and career readiness in English language arts and literacy.
Draft Assessment Claims for Mathematics

Concepts and Procedures
“Students can explain and apply mathematical concepts and carry out mathematical procedures with precision and fluency.”

Problem Solving
“Students can frame and solve a range of complex problems in pure and applied mathematics.”

Communicating Reasoning
“Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.”

Data Analysis and Modeling
“Students can analyze complex, real-world scenarios and can use mathematical models to interpret and solve problems.”
Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to Precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.
Claim #1: Conceptual understanding and procedural fluency

This claim focuses particularly on the CCSSM content standards:

Grades 3-5 - number and operations, algebraic thinking, measurement and data, and geometry;

Grades 6-HS - number, algebra, functions, geometry, statistics, and probability (see the schematic on the following page).

Assessment follows the prioritization discussed above.
A Schematic representation of CCSSM content

<table>
<thead>
<tr>
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<th>k</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<th>HS</th>
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<td>Functions</td>
<td>Algebra And Functions</td>
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<td>Ratio and Proportions</td>
<td>Functions</td>
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<td>Expressions and Equations</td>
<td>Algebra And Functions</td>
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<td>Number and Functions</td>
<td>Algebra And Functions</td>
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<td>Number and Operations Base Ten</td>
<td>Number and Quantity</td>
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<td></td>
<td>The Number System</td>
<td>Number and Quantity</td>
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<td></td>
<td>Number and Operations Fractions</td>
<td>Statistics and Probability</td>
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<td>8</td>
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<td></td>
<td>Measurement and Data</td>
<td>Statistics and Probability</td>
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<tr>
<td>HS</td>
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<td></td>
<td>Geometry</td>
<td>Geometry</td>
</tr>
</tbody>
</table>

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[Smarter Balanced Assessment Consortium]
Essential properties of tasks that assess Claim #1, conceptual understanding and procedural fluency

Assessment types: short items, including multiple-choice, other selected-response, and short constructed-response items, that focus on a particular skill or concept.

They will also include items that require students to translate between representations of concepts (words, diagrams, symbols) and items that require the identification of structure.
Essential properties of tasks that assess Claim #2, problem solving

Evidence for Claim #2 depends on tasks that

• present non-routine problems where a substantial part of the challenge is in deciding what to do, and which mathematical tools to use;

• involve chains of autonomous reasoning, taking a successful student at least 5 to 10 minutes (depending on the age of the student and complexity of the task), including explanation of assumptions and conclusions as well as the use of representational and procedural skills.
Essential properties of tasks that assess Claim #3, communicating reasoning

Evidence for Claim #3 depends on tasks that

• present a situation in which either propositions are given or students are encouraged to make their own conjectures;

• ask students to test propositions or conjectures with specific examples;

• ask students to construct, autonomously, chains of reasoning that will justify or refute the propositions or conjectures; these chains should typically take a successful student 10 minutes or more. (Times will be somewhat shorter for younger students, but still giving them time to think and explain.)
Claim #4: Mathematical Modeling

Modeling is the process of choosing and using appropriate mathematics and statistics to analyze empirical situations, to understand them better, and to improve decision-making. (p.72, CCSSM)
Essential properties of tasks that assess Claim #4, mathematical modeling

Evidence for Claim #4 depends on tasks that

- present non-routine problems from the real world where the solution involves some or all of the phases of the modeling cycle;

- for some tasks, a substantial part of the challenge is in formulating an approach: deciding what to do, and which mathematical tools to use;

- involve substantial chains of autonomous reasoning, taking a successful student at least 10 minutes (less for younger students), and call for explanation of assumptions, interpretations, evaluations, and conclusions as well as reliable representational and procedural skills.
There is not necessarily a simple correspondence between standards, claims, and tasks.

Some items will assess student understanding of particular content-related standards. For example, the task

“If x and y are positive integers, and $3x + 2y = 13$, what could be the value of $y$? Write all possible answers”

addresses Content Standard EE-8.1 and Claim #1. But, consider the following problem, “Hurdles Race.”
"Hurdles Race

The graph sketched above describes what happens when 3 athletes A, B, and C enter a 400 meter hurdle race.

Imagine that you are the race commentator. Describe what is happening as carefully as you can. You do not need to measure anything accurately.
Think of the Content involved

- Interpreting distance-time graphs in a real-world context
- Realizing “to the left” is faster
- Understanding points of intersection in that context (they’re tied at the moment)
- Interpreting the horizontal line segment
- Putting all this together in an explanation
Think of the Practices involved

- Make sense of problems and persevere in solving them.
- Reason abstractly and quantitatively.
- Construct viable arguments...
- Model with mathematics.
- Use appropriate tools strategically.
- Attend to Precision.
- Look for and make use of structure.
- Look for and express regularity in repeated reasoning.
Summative Assessment Targets

• Identify intended rigor/Depth of Knowledge/DOK level for assessment targets and test items/tasks (Appendix B)

• Illustrate how assessment targets relate to a hypothesized* learning progression across grade levels (See excerpts from the example reading Learning Progressions Frameworks (LPFs) in Appendix C).

*Hypothesized learning progressions use our best application of current research to describe typical learning pathways. Student work analysis is used to validate our assumptions about learning.
<table>
<thead>
<tr>
<th>Depth of Thinking (Webb) + Type of Thinking (Revised Bloom)</th>
<th>DOK Level 1 Recall &amp; Reproduction</th>
<th>DOK Level 2 Basic Skills &amp; Concepts</th>
<th>DOK Level 3 Strategic Thinking &amp; Reasoning</th>
<th>DOK Level 4 Extended Thinking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remember</td>
<td>- Recall conversions, terms, facts</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Understand</td>
<td>- Evaluate an expression</td>
<td>- Specify, explain relationships</td>
<td>- Use concepts to solve non-routine problems</td>
<td>- Relate mathematical concepts to other content areas, other domains</td>
</tr>
<tr>
<td></td>
<td>- Locate points on a grid or number on number line</td>
<td>- Make basic inferences or logical predictions from data/observations</td>
<td>- Use supporting evidence to justify conjectures, generalize, or connect ideas</td>
<td>- Develop generalizations of the results obtained and the strategies used and apply them to new problem situations</td>
</tr>
<tr>
<td></td>
<td>- Solve a one-step problem</td>
<td>- Use models/diagrams to explain concepts</td>
<td>- Explain reasoning when more than one response is possible</td>
<td>- Explain phenomena in terms of concepts</td>
</tr>
<tr>
<td></td>
<td>- Represent math relationships in words, pictures, or symbols</td>
<td>- Make and explain estimates</td>
<td>- Explain reasoning when more than one response is possible</td>
<td>- Explain phenomena in terms of concepts</td>
</tr>
<tr>
<td>Apply</td>
<td>- Follow simple procedures</td>
<td>- Design investigation for a specific purpose or research question</td>
<td>- Initiate, design, and conduct a project that specifies a problem, identifies solution paths, solves the problem, and reports results</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Calculate, measure, apply a rule (e.g., rounding)</td>
<td>- Solve routine problem applying multiple concepts or decision points</td>
<td>- Use reasoning, planning, and supporting evidence</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Apply algorithm or formula</td>
<td>- Retrieve information to solve a problem</td>
<td>- Translate between problem &amp; symbolic notation when not a direct translation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Solve linear equations</td>
<td>- Translate between representations</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Make conversions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Analyze</td>
<td>- Retrieve information from a table or graph to answer a question</td>
<td>- Categorize data, figures</td>
<td>- Compare information within or across data sets or texts</td>
<td>- Analyze multiple sources of evidence or data sets</td>
</tr>
<tr>
<td></td>
<td>- Identify a pattern/trend</td>
<td>- Organize, order data</td>
<td>- Analyze and draw conclusions from data, citing evidence</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>- Select appropriate graph and organize &amp; display data</td>
<td>- Generalize a pattern</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Interpret data from a simple graph</td>
<td>- Interpret data from complex graph</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Extend a pattern</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Evaluate</td>
<td>Create</td>
<td>Apply understanding in a novel way, provide argument or justification for the new application</td>
<td></td>
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</tr>
<tr>
<td>----------</td>
<td>--------</td>
<td>--------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| - Cite evidence and develop a logical argument  
- Compare/contrast solution methods  
- Verify reasonableness | - Brainstorm ideas, concepts, problems, or perspectives related to a topic or concept  
- Generate conjectures or hypotheses based on observations or prior knowledge and experience | - Synthesize information across multiple sources or data sets  
- Design a model to inform and solve a practical or abstract situation |

| Create | - Develop an alternative solution  
- Synthesize information within one data set | - Synthesize information across multiple sources or data sets  
- Design a model to inform and solve a practical or abstract situation |
Item and Test Design

Design the Items

- Item specifications will guide item writing to ensure items are of high quality, consistent in appearance and able to be written in an efficient manner.
- Item specifications will focus on five different areas:
  - Selected responses
  - Universal design and style guidelines
  - Technology enhanced constructed response
  - Traditional constructed response
  - Performance tasks
- RFP to write the specifications recently released; responses being reviewed by panel led by Item Development work group.
Item and Test Design

Design the Test

- Test specifications will describe what each student’s test event will look like, including:
  - Total number of items
  - Allocation of content by grade based on content specifications
  - Number of each type of item a student will likely see
  - Number of items with each required level of Depth of Knowledge
- Will also include information about the adaptive algorithm and how it will create a test for each student
## Item and Test Design

### Write the Items

<table>
<thead>
<tr>
<th>Item and test specifications will be used to drive item writing</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Item specifications: ensure items are accessible and in the right form and format</td>
</tr>
<tr>
<td>- Test specifications: ensure the right number of items will be written so the pool is sufficient</td>
</tr>
<tr>
<td>Item writing led by vendors, states and SMARTER Balanced</td>
</tr>
<tr>
<td>Balance of item-writing burden will likely change from short-term to the long-term</td>
</tr>
<tr>
<td>- Item writing in short-term needs to be aggressive to build the initial pool; time and volume will be a driving factor</td>
</tr>
<tr>
<td>- Long-term, other priorities can take precedence</td>
</tr>
</tbody>
</table>
Fifteen students watched a movie and rated the movie on a scale of 1 (very bad movie) to 20 (very good movie). Their ratings are shown in the table.

a. Using the data in the table, complete the box-and-whisker plot by adding the upper quartile, the lower quartile, and the median. A box will be formed with the three points indicated. You will be able to adjust the box once created if needed.

**Movie Ratings**

<table>
<thead>
<tr>
<th>Student</th>
<th>Movie Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andy</td>
<td>14</td>
</tr>
<tr>
<td>Bee</td>
<td>8</td>
</tr>
<tr>
<td>Cory</td>
<td>5</td>
</tr>
<tr>
<td>Doug</td>
<td>8</td>
</tr>
<tr>
<td>Jamal</td>
<td>5</td>
</tr>
<tr>
<td>Jasper</td>
<td>11</td>
</tr>
<tr>
<td>Jenn</td>
<td>12</td>
</tr>
<tr>
<td>Katie</td>
<td>13</td>
</tr>
<tr>
<td>Martin</td>
<td>9</td>
</tr>
<tr>
<td>Pat</td>
<td>11</td>
</tr>
<tr>
<td>Rose</td>
<td>13</td>
</tr>
<tr>
<td>Sam</td>
<td>4</td>
</tr>
<tr>
<td>Sofie</td>
<td>7</td>
</tr>
<tr>
<td>Thomas</td>
<td>12</td>
</tr>
<tr>
<td>Young</td>
<td>9</td>
</tr>
</tbody>
</table>
b. The teacher gave the movie a rating of 8. The teacher's rating was added to the ratings of the 15 students. Explain how the addition of the teacher's rating will affect the:

- minimum
- maximum
- upper quartile
- lower quartile
- median
A spinner has 10 sections of equal size. Each section on the spinner is labeled with one letter (A, B, C, or D). The arrow on the spinner was spun 40 times. The results of the spins are recorded in the table below.

<table>
<thead>
<tr>
<th>Letter</th>
<th>Number of Spins</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>8</td>
</tr>
<tr>
<td>B</td>
<td>12</td>
</tr>
<tr>
<td>C</td>
<td>4</td>
</tr>
<tr>
<td>D</td>
<td>16</td>
</tr>
</tbody>
</table>

Based on the data in the table, complete the spinner below to show the number of sections that are most likely labeled with each letter. Click on the letter you want to select. Then click where you would like to place the letter on the spinner.
The spinner below is divided into six equal sections. Each section is marked with a number from 1 to 6.

a. The theoretical probability of spinning each number is $\frac{1}{6}$. Based on this probability, how many times should each number occur in 20 spins?
You will now conduct an experiment by spinning the spinner 20 times. Use the spinner below to conduct the experiment. Use the spin button to run each trial, then tabulate the results on your scratch paper.

b. Create a frequency table in the template below that shows the results of the spins. Provide appropriate labels for the table.
Item Exemplars: 
Technology Enhanced and Constructed Response

The Hardwood Furniture Company manufactures small tables and chairs. It costs $30 to make each table and $20 to make each chair. The amount available to produce all the tables and chairs in one week is $1,200. Let $t$ represent the number of tables produced and $c$ represent the number of chairs produced.

a. The equation for the cost of making furniture for one week is $30t + 20c = 1,200$. On the grid below, construct a graph of this equation (with correct labels and scales).

b. The Hardwood Furniture Company always produces two chairs with each table. Write an equation that represents the number of chairs ($c$) in terms of the number of tables ($t$). Graph and label this equation on the same grid used for part a.

(continued)
Item Exemplars:
Technology Enhanced and Constructed Response

c. Determine the number of tables and chairs the Hardwood Furniture Company can produce per week based on the production costs and the amount of money available (i.e., $1,200). Round the answer appropriately.
d. Explain how the answer to part c is indicated on the graph.

Enter response for parts c and d here
Item Exemplars:

Performance Task

Gas Bills, Heating Degree Days, and Energy Efficiency

Here is a typical story about an Ohio family concerned with saving money and energy by better insulating their house.

Kevin and Shana Johnson’s mother was surprised by some very high gas heating bills during the winter months of 2007. To improve the energy efficiency of her house, Ms. Johnson found a contractor who installed new insulation and sealed some of her windows. He charged her $600 for this work and told her he was pretty sure that her gas bills would go down by “at least 10 percent each year.” Since she had spent nearly $1,500 to keep her house warm the previous winter, she expected her investment would conserve enough energy to save at least $150 each winter (10% of $1,500) on her gas bills.

Ms. Johnson’s gas bill in January 2007 was $240. When she got the bill for January 2008, she was stunned that the new bill was $235. If the new insulation was going to save only $5 each month, it was going to take a very long time to earn back the $600 she had spent. So she called the insulation contractor to see if he had an explanation for what might have gone wrong. The contractor pointed out that the month of January had been very cold this year and that the rates had gone up from last year. He said her bill was probably at least 10% less than it would have been without the new insulation and window sealing.

Ms. Johnson compared her January bill from 2008 to her January bill from 2007. She found out that she had used 200 units of heat in January of 2007 and was charged $1.20 per unit (total = $240). In 2008, she had used 188 units of heat but was charged $1.25 per unit (total = $235) because gas prices were higher in 2008. She found out the average temperature in Ohio in January 2007 had been 32.9 degrees, and in January of 2008, the average temperature was more than 4 degrees colder, 28.7 degrees. Ms. Johnson realized she was doing well to have used less energy (188 units versus 200 units), especially in a month when it had been colder than the previous year.

Since she used gas for heating only, Ms. Johnson wanted a better estimate of the savings due to the additional insulation and window sealing. She asked Kevin and Shana to look into whether the “heating degree days” listed on the bill might provide some insight.

Performance Task drawn from the Ohio Performance Assessment Project.
a. Assess the cost-effectiveness of Ms. Johnson’s new insulation and window sealing. You will need to research “heating degree days” on the internet. In your response, you must do the following:

- Explain Ms. Johnson’s savings after the insulation and sealing.
- Identify circumstances under which Ms. Johnson’s January 2008 gas bill would have been at least 10% less than her January 2007 bill.
- Decide if the insulation and sealing work on Ms. Johnson’s house was cost-effective and provide evidence for this decision.

Enter response here
b. Create a short pamphlet for gas company customers to guide them in making decisions about increasing the energy efficiency of their homes. The pamphlet must do the following:

- List the quantities that customers need to consider in assessing the cost-effectiveness of energy efficiency measures.
- Generalize the method of comparison used for Ms. Johnson’s gas bills with a set of formulas, and provide an explanation of the formulas.
- Explain to gas customers how to weigh the cost of energy efficiency measures with savings on their gas bills.

When you have completed your pamphlet, upload it using the button below.

Select a file... Submit
Find Out More

The Smarter Balanced Assessment Consortium can be found online at

SmarterBalanced.org