PARCC Massachusetts

Partnership for Assessment of Readiness for College and Careers

Massachusetts Association of School Committee

Making Space for PARCC

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MA Board of Education Math & Science Advisory Council
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Purpose/goal of this session

- To provide educational stakeholders and partners updated information and resources to support the implementation and assessment of the 2011 Massachusetts ELA and Mathematics Curriculum Frameworks.

- To review PARCC prototypes in mathematics

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The "Massachusetts PARCC Fellows"

- Twenty-four fellows from K-12 and Higher Education
- Act as a major arm of states' transition and implementation plans by providing professional development to their peers
- Become a network of in-state experts on the CCSS (Common Core State Standards) and PARCC
- Be state and peer leaders around CCSS and PARCC implementation
- Build and expand the number of other educators who understand and take action and ownership for implementing the CCSS and PARCC Assessments

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The PARCC Goals

1. Create high-quality assessments
2. Build a pathway to college and career readiness for **all** students
3. Support educators in the classroom
4. Develop 21st century, technology-based assessments
5. Advance accountability at all levels
6. Build an assessment that is sustainable and affordable

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Assessment Process

- PARCC states first developed the Model Content Frameworks to provide guidance to key elements of excellent instruction aligned with the Standards.
- The Model Content Frameworks were then used to provide guidance in the content emphasis for the ELA & Mathematics assessments.
- State Education leaders and teachers review and approve test items for the assessments.

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Assessment Design: English Language Arts/Literacy and Mathematics, Grades 3-11

Performance-Based Assessment (PBA)

•Administered near 70% year completion

•Extended tasks

•Applications of concepts and skills

End-of-Year Assessment (EOY)

•Administered near 90% year completion

•Innovative

•computer-based items

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Key Mathematics Shifts in the Standards

- **Focus:** Deeper look into fewer standards
- **Coherence:** Think across grades, and link to major topics
- **Rigor:** In major topics, pursue conceptual understanding, procedural skill and fluency, and application

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Old vs. New Frameworks

- 2000 Frameworks grades were grouped together; 1-2, 3-4, 5-6, 7-8, 9-10, 11-12

  Grades 3-4 had 44 standards listed in five areas

- 2011 Frameworks have content standards listing for each grade (course for high school)

  Grades 3 & 4 have the same five Domains with 24 and 28 standards, respectively

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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.

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The *PARCC Model Content Frameworks for Mathematics*, grades 3-11

Examples of

- Key advances from previous grade
- Fluency expectations and culminating standards
- Major within-grade dependencies—point to standards that should precede others
- Connections among standards, clusters, or domains
- Opportunities for in-depth focus
- Connections among content and practice standards
- Content emphases by cluster as **major, supporting, or additional**

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From the *PARCC Model Content Frameworks for Algebra I*

■ Major Content; ◘ Supporting Content; ○ Additional Content.

The Real Number System (N-RN)

○ Use properties of rational and irrational numbers (3)

Quantities★ (N-Q)

◘ Reason quantitatively and use units to solve problems (1, 2, 3)

Seeing Structure in Expressions (A-SSE)

■ Interpret the structure of expressions (1, 2)

◘ Write expressions in equivalent forms to solve problems (3)

Arithmetic with Polynomials and Rational Expressions (A-APR)

■ Perform arithmetic operations on polynomials (1)

◘ Understand the relationship between zeros and factors of polynomials (3)

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PARCC Assessment Claims for Mathematics

Students are on-track or ready for college and careers

Sub-claim A

Students solve problems involving **the major content*** for their grade level with connections to mathematical practices

Sub-claim B

Students solve problems involving the **additional and supporting content*** for their grade level with connections to practices

Sub-claim C

Students **express mathematical reasoning** by constructing mathematical arguments and critiques (MP 3,6)

Sub-claim D

Students solve real world problems engaging particularly in the **modeling practice**

Sub-claim E

Student **demonstrate fluency** in areas set forth in the Standards for Content in grades 3-6

***See PARCC Model Content Frameworks for details**

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Mathematics Task Types

- **Type I (PBA and EOY):** Machine scorable, focusing on major content and/or fluency, can involve all MP; *Sub-claims A, B, and E*
- **Type II (PBA):** Hand scored (or machine scored if innovative); focused on expressing reasoning, Mostly MP 3 & 6; *Sub-claim C*
- **Type III (PBA):** Hand scored (or machine scored if innovative); focused on modeling/application, mostly MP 4; *Sub-claim D*

- PBA – Performance-Based Assessment
- EOY – End of Year Assessment
- MP – Mathematical Practices

http://www.parcconline.org/samples/mathematics/high-school-mathematics

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PARCC Mathematics Released Prototype Assessment Items

- Released prototypes for grades 3 - 8, and high school
- Include examples of all three task types

All items available at
www.parcconline.org/samples/item-task-prototypes

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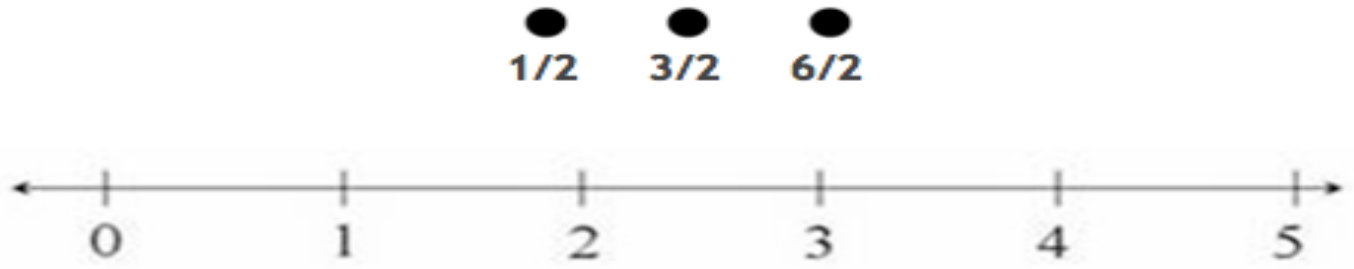
Home › Grade 3 ›

Grade 3 Mathematics (Number Line)

SAMPLE ITEM

Drag each fraction to the correct location on the number line.



The fraction number line task is adapted from a task available at http://illustrativemathematics.org.

Reset

Task Type I http://www.parcconline.org/samples/mathematics/grade-3-mathematics-number-line

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Grade 3

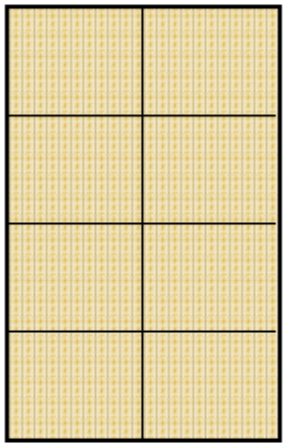
Grade 3 Mathematics (The Field)

SAMPLE ITEM

Part A

A farmer plants 3/4 of the field with soybeans.
Drag the soybean to the field as many times as needed to show the fraction of the field that is planted with soybeans.

Farmer's Fields



Soybean

Reset

- Type II Task – Part A is machine-scored
- Assessing the standard 3.NF.1 – major focus in grade 3
- Assessing MP.2 (Reason abstractly and quantitatively) and MP.7 (Look for and make use of structure)
- Unlike traditional multiple choice, there is more than one correct solution and difficult to guess.

This item can be found at: http://www.parcconline.org/samples/mathematics/grade-3-mathematics-field

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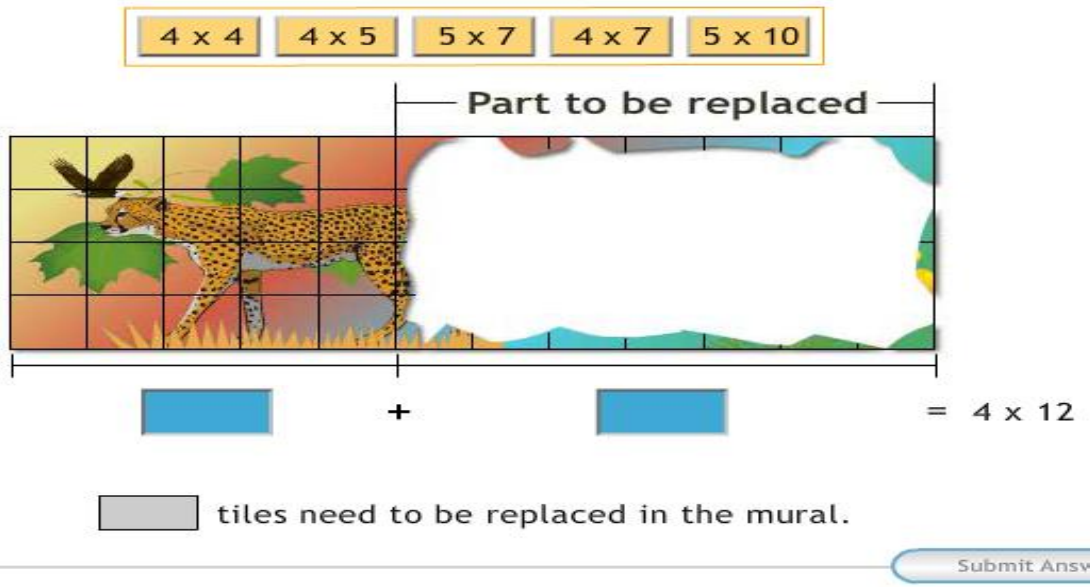
School mural (grade 3)

About the task | CCSSM Alignment | Part a | **Part b** | Scoring

There is a large mural made of colored tiles at the entrance of Rena's school.

A part of the mural was damaged in a heavy storm as shown. The part of the mural that was NOT damaged is 5 tiles long and 4 tiles high.

Rena wants to know how many tiles need to be replaced. First drag the tiles to label the model. Then fill in the blank with the number of tiles that need to be replaced in the mural.



- Task Type III
- http://www.ccsstoolbox.com/parcc/PARCCPrototype_main.html

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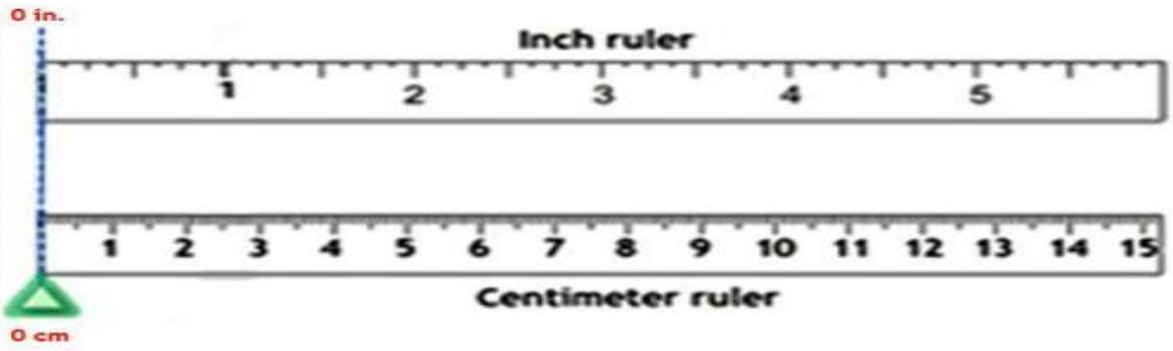
Grade 6 Slider Ruler

SAMPLE ITEM

Drag the slider to explore the relationship between the number of inches and the number of centimeters.



Select all of the statements that accurately represent the relationship between the number of inches and the number of centimeters.

- ☐ The ratio of centimeters to inches is 1 to 2.54.
- ☐ The ratio of centimeters to inches is 2.54 to 1.
- ☐ $i = 2.54c$, where i represents the number of inches and c represents the number of centimeters
- ☐ $c = 2.54i$, where i represents the number of inches and c represents the number of centimeters
- ☐ For every centimeter, there are 2.54 inches.
- ☐ For every inch, there are 2.54 centimeters.

Task Type I http://www.parcconline.org/samples/mathematics/grade-6-slider-ruler

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Grade 6 – Slider ruler

- Most relevant Standard for Content: **6.R.P** (Understand ratio concepts and use ratio reasoning to solve problems)
- Most Relevant Standard for Mathematical Practice:

  MP. 8 (Look for and express regularity in repeated reasoning)
- This task centers on conceptual understanding of ratios, an important subject that is first introduced in Grade 6 in the Standards.
- Scoring: The second, fourth, and sixth boxes (and only these boxes) must be checked to earn full credit. Other patterns of responses could earn partial credit.

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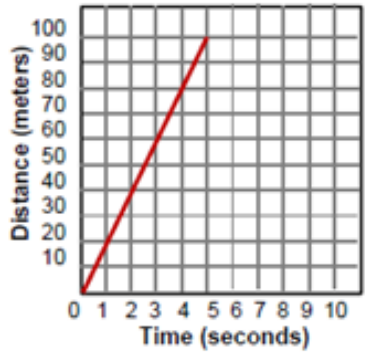
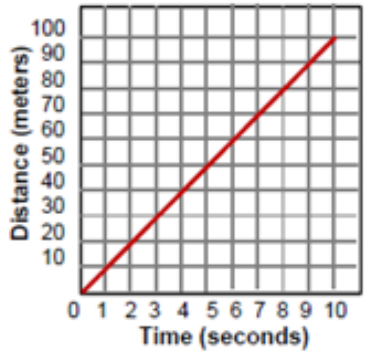
Grade 7 - Speed

Object A



Object B



Object C

Time (seconds)	Distance (meters)
0	0
3	10
6	20
9	30

Object C moves at constant speed.

Object D

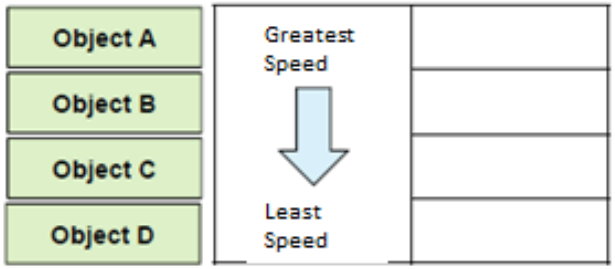
Time (seconds)	Distance (meters)
0	0
1.5	10
3	20
4.5	30

Object D moves at constant speed.

The speed of an object is defined as the change in distance divided by the change in time.

Information about objects A, B, C and D are shown in the graphs and tables.

Based on the information given, drag and drop the object names in order from greatest speed to least speed in the table provided.



[Task Type I http://www.parcconline.org/samples/mathematics/grade-7-speed](http://www.parcconline.org/samples/mathematics/grade-7-speed)

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Grade 7 - Speed

Task Type I: *Tasks assessing concepts, skills and procedures*

Most Relevant Content Standard(s)

Ratios & Proportional Relationships

- **7.RP.2b.** Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
- **7.RP.2d:** Explain what a point (*x*, y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, *r*) where r is the unit rate. (The "explain" portion is not required in the task, but the task involves some of the concepts detailed here.)

Alignment: Most Relevant Mathematical Practice(s)

- **MP.2** enters (Reason abstractly and quantitatively)

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Transforming graphs of quadratic functions (high school)

About the task | CCSSM Alignment | Part a | Part b | Scoring

The graph of the quadratic function $f(x) = 2(x - 5)^2 + 6$ is shown.

A new function, $p(x)$, is created from the existing function, such that $p(x) = -f(x)$. You may use the coordinate plane and the sliders to show the graph of the new function if you would like. The graph will not be scored.

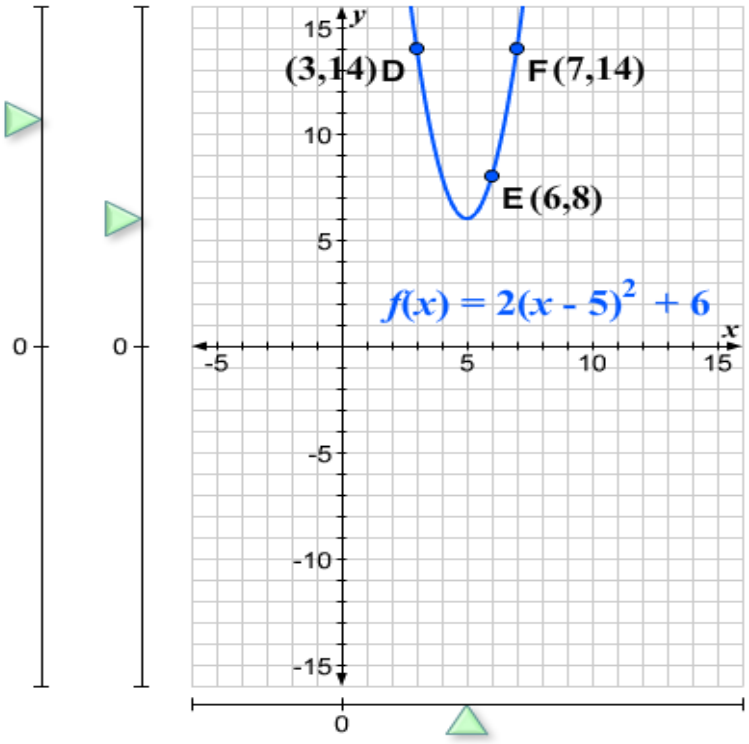
Fill in the blanks to give the coordinates of points **D'**, **E'**, and **F'** that lie on the graph of the new function $p(x)$ and that are the images of points **D**, **E**, and **F** that lie on the graph of $f(x)$.

D'(,)

E'(,)

F'(,)

Submit Answer



Task Type II http://www.ccsstoolbox.com/parcc/PARCCPrototype_main.html

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High School – Transforming graphs of quadratic functions

- Task Type II
- Most relevant standard: **F-BF 3.** Build new functions from existing functions
- Mathematical Practices:
- **MP. 3** (Construct viable arguments and critique the reasoning of others) and
- **MP. 7** (Look for and make use of structure)
- Practice Forward task

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Illustrative Mathematics

HOME
ILLUSTRATIONS
K-8 STANDARDS
HIGH SCHOOL STANDARDS
PRACTICE STANDARDS
FRACTIONS PROGRESSION
FREQUENTLY ASKED QUESTIONS
COMMUNITY
ABOUT US
TERMS OF USE

K-8 Standards

High School Standards

Practice Standards

Illustrative Mathematics provides guidance to states, assessment consortia, testing companies, and curriculum developers by illustrating the range and types of mathematical work that students experience in a faithful implementation of the Common Core State Standards, and by publishing other tools that support implementation of the standards.

http://www.illustrativemathematics.org/

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DESE Curriculum Model Units

- DESE with teachers have developed 85 (and counting) curriculum model units
- For grades Pre K through High School
- In the following areas: Social Studies, History & Science, ELA/Literacy, Mathematics, High School Writing to Text
- Science Units will be posted once the MA Revised Science Curriculum Framework is presented to the State Board of Education.

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DESE Curriculum Model Units

High School Mathematics		
Math	Algebra I	* Reasoning with Equations
Math	Algebra II	Modeling Exponential and Logarithmic Functions
Math	Geometry	* Experimenting with Congruency Transformations
Math	Geometry	* Similarity through Transformations

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Needs to Implement 2011 Frameworks

- Professional Development time
- Supplies
- Technology

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Positive Direction

- Incorporating the CCSS in our State Frameworks
  - Students transferring from another State have been taught the same standards

- PARCC is a multiple State test
  - The needs of a transferring student will be easily identified through test scores from a PARCC State – not comparing different State Tests

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More information

- 2011 *Massachusetts Curriculum Framework for English Language Arts and Literacy* and *Massachusetts Curriculum Framework for Mathematics* and related resources:

  www.doe.mass.edu/candi/commoncore
- ELA/Literacy resources: www.doe.mass.edu/literacy
- Mathematics resources: www.doe.mass.edu/omste
- MCAS transition: www.doe.mass.edu/mcas/transition
- Illustrative Mathematics: http://www.illustrativemathematics.org/
- PARCC: www.parcconline.org

  www.parcconline.org/parcc-content-frameworks

  www.parcconline.org/samples/item-task-prototypes

  http://www.ccsstoolbox.com/parcc/PARCCPrototype_main.html

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Thank you!

Questions?