

# THE NUMBER SYSTEM ITEMS: OVERVIEW

## Resources:

Attached you will find **practice items** for **The Number System**. These practice items are packaged so that you will have weekly items to use in your classroom as bell ringers or engagement items. Three items per day have been provided for this domain and should take no more than fifteen minutes of classroom instruction.

The purpose of using these practice items daily is to be able to formatively assess student understanding and any misconceptions they may have in this domain. Being able to gather evidence of student learning and misconceptions in the moment, will give you the flexibility to change your instruction to meet their needs. As the instructional decision-maker, you are able to adjust your methods for whole class or small groups to address student misconceptions and move them toward proficiency.

The practice items represent a variety of standards from **The Number System** domain. **One week of practice items** have been selected for this domain. Because there is only one week, every standard may not be addressed.

The goal is for you to have a total of 10 weeks of practice items that represent the 5 domains in 8<sup>th</sup> grade. We would like for you to use these items for a 10 week period between the time you receive them and the end of January. If used daily for student and teacher practice, in accordance with our recommendations or tips, the outcome will be an improvement in ACT ASPIRE test scores.

At the end of each weekly packet, you will find an answer key for your use. **Although answer keys are provided, students should explain their thinking during the discussion of the practice item.**

A separate resource available to you is tasks addressing each of the domains. These tasks require students to think about an efficient strategy to solve the problem, show their work and justify their reasoning. This is the ultimate goal for what we want students to be able to do.

## Recommendations or Tips:

When administering the practice items, please allow students to read through the daily items to see if they have any questions about vocabulary or what the problem is asking them to do prior to engagement. Taking the time to do these things now, will help to ensure that students are familiar with vocabulary and the different question types before the actual test.

## Providing Feedback to Students:

Since the purpose of the test practice items is to assess student understanding, it is not enough just to give the practice items as bell ringers or engagement items. **A key part of the process for advancing student thinking, is to debrief the practice items and provide specific feedback on the student thinking and performance.** This can be done during the sharing out process by asking effective questions. It is difficult to make student thinking and understanding visible by just giving **multiple choice** questions and determining whether their response is correct or incorrect. Asking questions similar to the ones below can help students verbalize the reasoning for their choices:

- To get the correct solution, what concept do you have to be aware of?
- Why are the answer choices you did not choose incorrect?

- What strategy did you use to solve the problem? Why did you use that particular strategy?
- Is there another strategy that you could use to solve the problem?

The above questions can be used with **short response** and **constructed response** also. Other questions to consider when prompting students to verbalize or justify their thinking are:

**Monitoring as students work:**

- What is the problem asking you to find?
- How would you start the problem? How did you start the problem?
- What else do you need to do?

**During debriefing:**

- What did the problem ask you to do?
- What information do you see in the problem?
- What did you do first to solve this problem?
- Who else started this same way?
- What did you do next?
- Who started a different way?
- What are some strategies that you heard today that you would like to try when solving a similar problem in the future?

**Answer Key:**

The information above is intended to help teachers assess student understanding of the mathematical idea(s) in each problem. Also provided is an Answer Key for each set of items. While it is important for students to get the answer correct, **it is equally important for them to understand how their thinking leads or does not lead to a correct solution.** Incorrect solutions set the stage for teachable moments!!!!

Name \_\_\_\_\_

Date \_\_\_\_\_

### Set 1 - Standard(s): 8.NS.A.1

Minnesota, Massachusetts, Smarter Balance

#### Day 1 Items

- Which expression results in a rational number?
  - $1.5 + \sqrt{1.5}$
  - $12 - \sqrt{12}$
  - $\frac{3}{4} \cdot \sqrt{\frac{3}{4}}$
  - $25 + \sqrt{25}$
- Express each fraction as a decimal expansion.
  - $\frac{4}{24}$
  - $\frac{3}{4}$
  - $\frac{7}{20}$
  - $1\frac{3}{5}$
- Determine if the numbers below are rational or irrational? Why or why not?
  - 3
  - 2.7
  - $\sqrt{4}$
  - $\sqrt{5}$

- [http://minnesota.pearsonaccessnext.com/resources/item-samplers/math/item-samplers/grade8/G8\\_Math\\_MCA\\_12\\_point\\_Accommodated\\_Item\\_Sampler.pdf](http://minnesota.pearsonaccessnext.com/resources/item-samplers/math/item-samplers/grade8/G8_Math_MCA_12_point_Accommodated_Item_Sampler.pdf), Minnesota Department of Education.
- <http://www.doe.mass.edu/mcas/> - Massachusetts Department of Elementary and Secondary Education, *Permission is hereby granted to copy for non-commercial educational purposes any or all parts of this document. Please credit the "Massachusetts Department of Elementary and Secondary Education."*
- [https://www.smarterbalanced.org/wpcontent/uploads/2015/11/G8\\_Practice\\_Test\\_Scoring\\_Guide\\_Math.pdf](https://www.smarterbalanced.org/wpcontent/uploads/2015/11/G8_Practice_Test_Scoring_Guide_Math.pdf), © Smarter Balanced Assessment Consortium, 2013 Descriptions of the operation of the Test Delivery System, Test Information Distribution Engine, and related systems are property of the American Institutes for Research® (AIR) and are used with permission of AIR.  
<https://www.smarterbalanced.org/assessments/sample-questions/>

Name \_\_\_\_\_

Date \_\_\_\_\_

**Set 1 - Standard(s): 8.NS.A.1**

Massachusetts, Florida, Smarter Balance

**Day 2 Items**

1. Which is equivalent to  $5\frac{2}{15}$ ?
  - a.  $5.1\bar{3}$
  - b.  $5.\bar{13}$
  - c. 5.13
  - d.  $5.\bar{3}$
2. What is the approximate value of  $\sqrt{3}$ , to the nearest integer? Is  $\sqrt{3}$  rational or irrational and why?
3. List the following expressions in order from least to greatest value.  
 $\sqrt{5}, \pi, \sqrt{3}$

- <http://www.doe.mass.edu/mcas/> - Massachusetts Department of Elementary and Secondary Education, *Permission is hereby granted to copy for non-commercial educational purposes any or all parts of this document. Please credit the "Massachusetts Department of Elementary and Secondary Education."*
- [http://fsassessments.org/wp-content/uploads/2014/06/Grade-8-Florida-Standards-Assessments-Item-Specifications\\_AIR\\_06272014\\_TG-clean.pdf](http://fsassessments.org/wp-content/uploads/2014/06/Grade-8-Florida-Standards-Assessments-Item-Specifications_AIR_06272014_TG-clean.pdf), Florida Standards Assessments
- [https://www.smarterbalanced.org/wpcontent/uploads/2015/11/G8\\_Practice\\_Test\\_Scoring\\_Guide\\_Math.pdf](https://www.smarterbalanced.org/wpcontent/uploads/2015/11/G8_Practice_Test_Scoring_Guide_Math.pdf), © Smarter Balanced Assessment Consortium, 2013 Descriptions of the operation of the Test Delivery System, Test Information Distribution Engine, and related systems are property of the American Institutes for Research® (AIR) and are used with permission of AIR.

Name \_\_\_\_\_

Date \_\_\_\_\_

**Set 1 - Standard(s): 8.NS.A.1**

NAEP Questioning Tool, Smarter Balance

**Day 3 Items**

1. Convert each decimal into a rational number (fraction) in simplest form.
  - a. 0.75
  - b. 0.07
  - c. 0.225
  - d. 1.28
  
2. Which of the following is equivalent to  $0.\overline{4}$  ?
  - a.  $\frac{4}{10}$
  - b.  $\frac{4}{9}$
  - c.  $\frac{44}{100}$
  - d.  $\frac{1}{2}$
  
3. Sue began converting the repeating decimal  $0.\overline{89}$  below to a fraction so that she could use it during her calculations. Sue knew she had to set up equations, but as she began to solve it she was not sure of how to complete the problem. Help Sue solve the problem below by finding the fractional equivalent to the decimal  $0.\overline{89}$ .

$$x = 0.\overline{89}$$

$$100x = 89.\overline{89}$$

$$100x - x = 89.\overline{89} - ?$$

- NAEP Questioning Tool - <http://nces.ed.gov/nationsreportcard/nqt/>, SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Mathematics Assessment.
- [https://www.smarterbalanced.org/wpcontent/uploads/2015/11/G8\\_Practice\\_Test\\_Scoring\\_Guide\\_Math.pdf](https://www.smarterbalanced.org/wpcontent/uploads/2015/11/G8_Practice_Test_Scoring_Guide_Math.pdf), © Smarter Balanced Assessment Consortium, 2013 Descriptions of the operation of the Test Delivery System, Test Information Distribution Engine, and related systems are property of the American Institutes for Research® (AIR) and are used with permission of AIR.

Name \_\_\_\_\_

Date \_\_\_\_\_

**Set 1 - Standard(s): 8.NS.A.2**

NAEP Questioning Tool, North Carolina, Massachusetts

**Day 4 Items**

1. Which of the following is the closest value to  $\sqrt{200}$ ?
  - a. 20
  - b. 16
  - c. 15
  - d. 14
  
2. On a number line, let point  $P$  represent the largest integer value that is less than  $\sqrt{407}$ . Let point  $Q$  represent the largest integer value that is less than  $-\sqrt{68}$ . What is the distance between  $P$  and  $Q$ ?
  
3. Which of the following statements is incorrect?
  - a.  $\sqrt{37} > 5\frac{1}{4}$
  - b.  $3\pi > 3\sqrt{3}$
  - c.  $\sqrt{5} < \frac{5}{7}$
  - d.  $\frac{15}{\sqrt{10}} < 8.38$

- NAEP Questioning Tool - <http://nces.ed.gov/nationsreportcard/nqt/>, SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Mathematics Assessment.
- <http://www.ncpublicschools.org/docs/accountability/testing/releasedforms/g8mathpp.pdf>, North Carolina Department of Public Instruction
- [https://www.smarterbalanced.org/wpcontent/uploads/2015/11/G8\\_Practice\\_Test\\_Scoring\\_Guide\\_Math.pdf](https://www.smarterbalanced.org/wpcontent/uploads/2015/11/G8_Practice_Test_Scoring_Guide_Math.pdf), © Smarter Balanced Assessment Consortium, 2013 Descriptions of the operation of the Test Delivery System, Test Information Distribution Engine, and related systems are property of the American Institutes for Research® (AIR) and are used with permission of AIR.

Name \_\_\_\_\_

Date \_\_\_\_\_

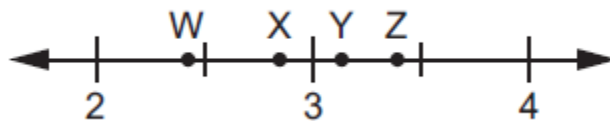
**Set 1 - Standard(s): 8.NS.A.1**

NAEP Questioning Tool, Smarter Balance

**Day 5 Items**



- On the number line above, the arrow is pointing to a number that is closest to which of the following?
  - 0.20
  - 0.37
  - 0.62
  - $\sqrt{2}$



- Which point on the number line is the **best** approximation for  $\sqrt{6}$ ?
  - point W
  - point X
  - point Y
  - point Z
- John had to place the numbers on the number line below in the ascending order. Did John get them in the correct order? Explain your answer.



- NAEP Questioning Tool - <http://nces.ed.gov/nationsreportcard/nqt/>, SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2009 Mathematics Assessment.
- <https://www.louisianabelieves.com/docs/assessment/practice-test-math-grade-8.pdf>, Louisiana Department of Education – Louisiana Believes

**Set 1 - Standard(s): 8.NS.A.1**

Smarter Balance, Massachusetts, Minnesota

**Day 1 Items – KEY**

1. D

A	The number is not rational because the square root of 1.5 is an irrational number and the sum of a rational number and an irrational number is an irrational number.
B	The number is not rational because the square root of 12 is an irrational number and the difference of a rational number and an irrational number is an irrational number.
C	The number is not rational because the square root of $\frac{3}{4}$ is an irrational number and the product of a rational number and an irrational number is an irrational number.
D	Correct. The square root of 25 simplifies to 5; $25/5 = 5$ .

2.

- a.  $.1\overline{66}$
- b. 0.75
- c. 0.35
- d. 1.6

3.

- a. rational
- b. rational
- c.  $\sqrt{4} = 2$  - rational
- d.  $\sqrt{5}$  – irrational (keeps going on and on)

**Set 1 - Standard(s): 8.NS.A.1**

Smarter Balance, Florida, Massachusetts

**Day 2 Items – KEY**

1. A.

2. Nearest whole number is 2,  $\sqrt{3} \approx 1.732050808\dots$  which keeps going on; therefore it is irrational.3.  $\sqrt{3}, \sqrt{5}, \pi$



**Set 1 - Standard(s): 8.NS.A.1**

NAEP Questioning Tool, Smarter Balance

**Day 3 Items – KEY**

1.
  - a.  $\frac{3}{4}$
  - b.  $\frac{7}{100}$
  - c.  $\frac{9}{40}$
  - d.  $1\frac{7}{25}$

2. B

3.

$$\begin{aligned}x &= 0.\overline{89} \\100x &= 89.\overline{89} \\100x - x &= 89.\overline{89} - 0.\overline{89} \\99x &= 89 \\\frac{99x}{99} &= \frac{89}{99} \\x &= \frac{89}{99}\end{aligned}$$

**Set 1 - Standard(s): 8.NS.A.2**

North Carolina, NAEP Questioning Tool, Smarter Balance

**Day 4 Items - KEY**

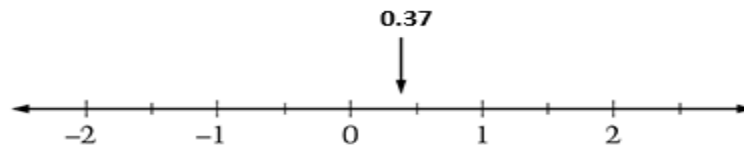
1. D
2. 29
3. C

**Set 1 - Standard(s): 8.NS.A.2**

NAEP Questioning Tool, Smarter Balance

**Day 5 Items - KEY**

1. Please see the labeling on the number line below.



2. A

3. Please see the solution labeled on the number line below.

