

## FUNCTIONS ITEMS: OVERVIEW

### Resources:

Attached you will find **practice items** for **Functions**. 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 **Functions** domain. **Two weeks of practice items** have been selected for this domain. Because there is only two weeks, 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 \_\_\_\_\_

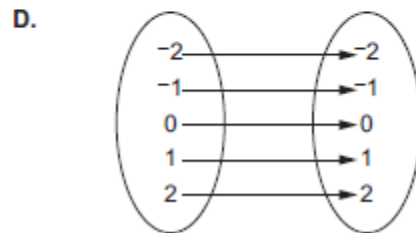
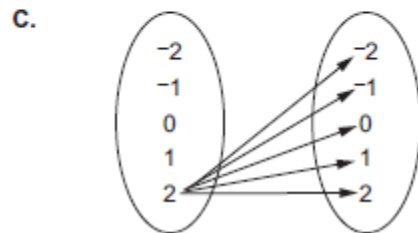
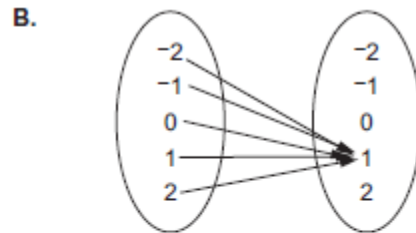
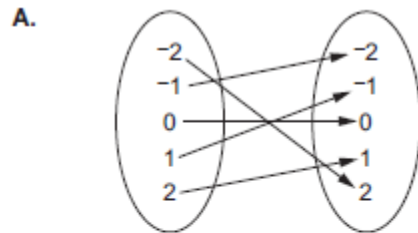
Date \_\_\_\_\_

**Set 1 - Standard(s): 7.RP.2, 8.F.1, 8.F.2**

NAEP Questioning Tool, Louisiana, North Carolina

**Day 1 Items**

1. Which model is **not** a function?



2. In which table is  $y$  a function of  $x$ ?

a.

$x$	$y$
-3	6
2	5
3	2
2	3

b.

$x$	$y$
-1	0
5	2
7	3
5	4

c.

$x$	$y$
2	-1
3	0
4	-5
5	7

d.

$x$	$y$
0	6
-1	3
2	4
-1	5

**Set 1 - Standard(s): 7.RP.2, 8.F.1, 8.F.2 (Continued)**

NAEP Questioning Tool, Louisiana, North Carolina

**Day 1 Items**

3. The table below shows a relation between  $x$  and  $y$ .

$x$	$y$
-4	16
-2	4
0	0
2	4
4	16
6	36

Susie said the relation above is also a function. Explain why Susie is correct or incorrect.

- 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
- <http://www.ncpublicschools.org/docs/accountability/testing/releasedforms/g8mathpp.pdf>, North Carolina Department of Public Instruction

Name \_\_\_\_\_

Date \_\_\_\_\_

**Set 1 - Standard(s): 7.RP.2, 8.F.1**

NAEP Questioning Tool, Louisiana, North Carolina

**Day 2 Items**

1. In which choice do all the points lie on the same line?

- a.  $(0, -2), (1, -1), (2, 2), (3, 7)$
- b.  $(0, 0), (1, 1), (2, 4), (3, 9)$
- c.  $(0, 0), (1, 1), (2, 8), (3, 27)$
- d.  $(0, 0), (1, 2), (2, 4), (3, 6)$

2. Which set of ordered pairs models a function?

- A.  $\{(2, 9), (7, 5), (3, 14), (2, 6)\}$
- B.  $\{(5, 10), (5, 15), (5, 20), (5, 25)\}$
- C.  $\{(-\frac{1}{2}, -\frac{1}{3}), (\frac{1}{2}, -\frac{1}{4}), (-\frac{1}{2}, -\frac{1}{5}), (\frac{1}{2}, -\frac{1}{6})\}$
- D.  $\{(-10, 20), (-20, 30), (-30, 40), (-40, 10)\}$

3. Which of the following tables of values is true for the equation  $y = 3(x-3)$ ?

**A**

$x$	$y$
-4	-21
4	3

**B**

$x$	$y$
-4	-3
4	21

**C**

$x$	$y$
-4	-15
4	9

**D**

$x$	$y$
-4	-9
4	15

- 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), 2011, 2013 Mathematics Assessment.
- <https://www.louisianabelieves.com/docs/assessment/practice-test-math-grade-8.pdf>, Louisiana Department of Education – Louisiana Believes
- <http://www.ncpublicschools.org/docs/accountability/testing/releasedforms/g8mathpp.pdf>, North Carolina Department of Public Instruction

Name \_\_\_\_\_

Date \_\_\_\_\_

**Set 1 - Standard(s): 7.RP.2, 8.F.1, 8.F.2, 8.F.3**

Massachusetts, North Carolina, Engage NY

**Day 3 Items**

1. Alice compared the graphs of two functions.
  - The first function was  $y = 3x + 4$ .
  - The second function fits the values in the table below.

x	y
2	17
5	32
8	47
11	62

What is the distance between the y-intercepts of the two functions?

- a. 1
  - b. 2
  - c. 3
  - d. 4
2. Limousine Company P and Company R both charge a rental fee plus an additional charge per hour.
    - The equation  $y = 50 + 30x$  models the total cost (in dollars),  $y$ , of renting a limousine from Company P for  $x$  hours.
    - The table below shows the cost to rent a limousine from Company R for different lengths of time.

**Company R**

Time (hours)	1	2	3	4	5
Total Cost	\$100	\$125	\$150	\$175	\$200

Which statement accurately compares the per hour charges of the two companies?

- a. Company P charges \$5 less per hour than Company R.
  - b. Company P charges \$5 more per hour than Company R.
  - c. Company P charges \$25 less per hour than Company R.
  - d. Company P charges \$25 more per hour than Company R.
3. It takes Kim 8 hours to travel a distance of 360 miles. At this rate, how many miles does Kim travel in 12 hours?
    - a. 720
    - b. 600
    - c. 540
    - d. 390

- <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://www.ncpublicschools.org/docs/accountability/testing/releasedforms/g8mathpp.pdf>, North Carolina Department of Public Instruction
- <https://www.engageny.org/resource/new-york-state-common-core-sample-questions>, Engage NY

Name \_\_\_\_\_

Date \_\_\_\_\_

**Set 1 - Standard(s): 8.F.1, 8.F.2, 8.F.3**

NAEP Questioning Tool, Massachusetts, North Carolina

**Day 4 Items**

1. Which function has a greater rate of change than the function that passes through the points given in the table below?

<b>x</b>	<b>y</b>
4	2
6	3
8	4
10	5
12	6

- a.  $3x - 5y = 25$   
b.  $7y - 3x = 14$   
c.  $y = 1 + \frac{1}{2}x$   
d.  $y = -1 + \frac{1}{4}x$
2. Compare the following functions to determine which has a greater rate of change.

Function 1:  $y = 5x + 4$

Function 2:

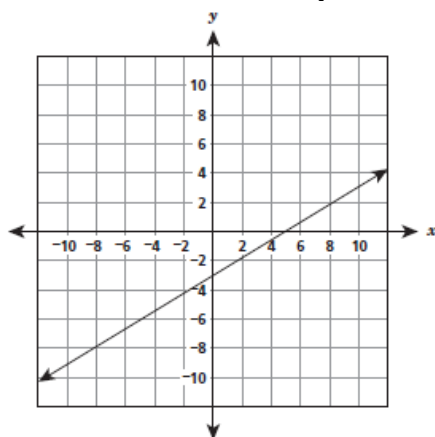
<b>x</b>	<b>y</b>
-1	-6
0	-3
2	3

**Set 1 - Standard(s): 8.F.1, 8.F.2, 8.F.3**

NAEP Questioning Tool, Massachusetts, North Carolina

**Day 4 Items**

3. Function 1 is defined by the equation  $y = \frac{3}{4}x + 1$ , and function 2 is represented by the graph below.



Which statement about the functions is true?

- a. Function 1 has the greater rate of change and the greater y-intercept.
- b. Function 2 has the greater rate of change and the greater y-intercept.
- c. Function 1 has the greater rate of change, and function 2 has the greater y-intercept.
- d. Function 2 has the greater rate of change, and function 1 has the greater y-intercept.

- 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), 2011, 2013 Mathematics Assessment.
- <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://www.ncpublicschools.org/docs/accountability/testing/releasedforms/g8mathpp.pdf>, North Carolina Department of Public Instruction



Name \_\_\_\_\_

Date \_\_\_\_\_

**Set 1 - Standard(s): 8.F.2, 8.F.3**

NAEP Questioning Tool, Louisiana

**Day 5 Items**

1. Several functions represent different savings account plans.

- a.  $y = 5.50x + 7$
- b.  $y = 5.50(1.02)^x$
- c.  $y = 0.5(x)^2$
- d.  $y = 7.25x$

Which functions are nonlinear?

2. Parker states that any function written **without** exponents must be linear. Which function proves Parker's statement is incorrect?

- a.  $y = 5x + 3$
- b.  $y = x^5 + 3$
- c.  $y = \frac{x}{3} + 5$
- d.  $y = \frac{3}{x} + 5$

3. Which function is nonlinear?

- a.  $y = \frac{3x+1}{2}$
- b.  $y = -x$
- c.  $y = 2x(x - 4)$
- d.  $y = \frac{1}{2}x - 7$

- NAEP Questioning Tool - <http://nces.ed.gov/nationsreportcard/ngt/>, SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2011, 2013 Mathematics Assessment.
- <https://www.louisianabelieves.com/docs/assessment/practice-test-math-grade-8.pdf>, Louisiana Department of Education – Louisiana Believes

**Set 1 - Standard(s): 7.RP.2, 8.F.1, 8.F.2**

NAEP Questioning Tool, Louisiana, North Carolina

**Day 1 Items – KEY**

1. C
2. D
3. Susie is correct because the x variable does not repeat. For every y value there is exactly one x value.

**Set 1 - Standard(s): 7.RP.2, 8.F.1**

NAEP Questioning Tool, Louisiana, North Carolina

**Day 2 Items - KEY**

1. A
2. D
3. A

**Set 1 - Standard(s): 7.RP.2, 8.F.1, 8.F.2, 8.F.3**

Massachusetts, North Carolina, Engage NY

**Day 3 Items - KEY**

1. C
2. B
3. C

**Set 1 - Standard(s): 8.F.1, 8.F.2, 8.F.3**

NAEP Questioning Tool, Louisiana, North Carolina

**Day 4 Items - KEY**

1. A
2.  $y = 5x + 4$
3. A

**Set 1 - Standard(s): 8.F.2, 8.F.3**

NAEP Questioning Tool, Louisiana

**Day 5 Items - KEY**

1. B and C
2. D
3. C