

EXPRESSIONS AND EQUATIONS ITEMS: OVERVIEW

Resources:

Attached you will find **practice items** for **Expressions and Equations**. 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 **Expressions and Equations** domain. **Three weeks of practice items** have been selected for this domain. Because there is only three 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 8th 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 3 - Standard(s): 7.EE.3, 7.EE.4, 8.EE.7, 8.EE.8

NAEP Questioning Tool, Massachusetts

Day 1 Items

1. At the school carnival, Carmen sold 3 times as many hot dogs as Shawn. The two of them sold 152 hot dogs altogether. How many hot dogs did Carmen sell?
 - a. 21
 - b. 38
 - c. 51
 - d. 114
 - e. 148

2. Peter bought 45 sheets of plywood at a total cost of \$400. He plans to sell each sheet of plywood for \$15. If Peter has no other expenses, what is the fewest number of sheets he must sell to make a profit?
 - a. 3
 - b. 15
 - c. 16
 - d. 26
 - e. 27

3. A store sells white scarves and red scarves.
 - A white scarf costs \$3.
 - A red scarf costs \$5.

On Monday, the store sold 12 scarves for a total of \$50.

What is the total number of red scarves that the store sold on Monday?

- a. 4
- b. 5
- c. 6
- d. 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), 2009 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."*

Name _____

Date _____

Set 3 - Standard(s): 7.EE.3, 7.EE.4, 8.EE.7

NAEP Questioning Tool, Massachusetts

Day 2 Items

1. Which of the following sets of steps could be used to completely solve the equation below?

$$3x + 9 = 15$$

- a. add 9 to each side, and then multiply each side by 3
 - b. subtract 9 from each side, and then divide each side by 3
 - c. multiply each side by 3, and then add 9 to each side
 - d. divide each side by 3, and then subtract 9 from each side
2. In the equation below, what is the value that makes the equation true?
$$\frac{3}{4}(x + 8) = 9$$
 3. What value of x makes the equation $3(x - 6) - 8x = -2 + 5(2x + 1)$ true?

- 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."*

Name _____

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Set 3 - Standard(s): 7.EE.3, 7.EE.4, 8.EE.7

Massachusetts, NAEP Questioning Tool

Day 3 Items

1. Which equation has infinitely many solutions?

a. $x = \frac{1}{4}x + \frac{3}{4}$

b. $\frac{1}{3}x - 5 = \frac{2}{3}x - 5$

c. $\frac{1}{2}(1 + 4x) = 2x - 3$

d. $3 - 4x = -6\left(\frac{2}{3}x - \frac{1}{2}\right)$

2. How many solutions does the equation below have?

$$\frac{1}{4}(x - 3) = 3x - \frac{11}{4}x - 3?$$

3. A system of equations is shown below.

$$5x + 3y = -6$$

$$2x + y = -4$$

Which statement about the ordered pair $(-6, 8)$ is true?

- It is the only solution to the system.
- It is not a solution to either equation.
- It is one of many solutions to the system.
- It is a solution to the first but not the second equation.

- <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."*
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Name _____

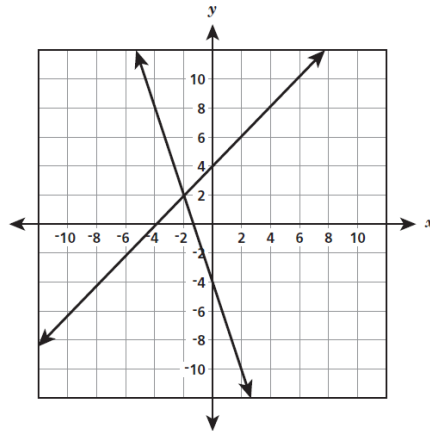
Date _____

Set 3 - Standard(s): 7.EE.3, 7.EE.4, 8.EE.7, 8.EE.8

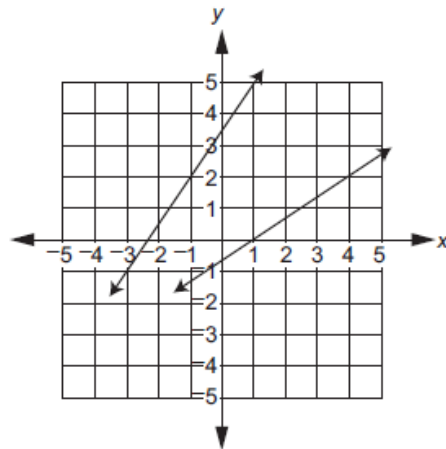
NAEP Questioning Tool, Massachusetts, North Carolina

Day 4 Items

1. Which statement explains why the point $(-2, 2)$ is the solution to the system of linear equations shown below?



- a. It lies on the graph of only one of the equations.
b. It lies in the second quadrant of the coordinate plane.
c. It is the only point that satisfies both equations simultaneously.
d. It is one of many points that satisfies both equations simultaneously.
2. Use the system of two linear equations graphed below to answer the question.



What is the solution to the system of linear equations?

- a. $(-5, -4)$
b. $(1, 3.5)$
c. $y = -x + 1$
d. $y = 3.5x + 1$

Set 3 - Standard(s): 7.EE.3, 7.EE.4, 8.EE.7, 8.EE.8 (Continued)

NAEP Questioning Tool, Massachusetts, North Carolina

Day 4 Items

3. A system of two linear equations is graphed on a coordinate plane. If the system of equations has infinitely many solutions, which statement must be true?
 - a. On the graph, there are no points (x, y) that satisfy both equations.
 - b. On the graph, there is exactly one point (x, y) that satisfies both equations.
 - c. On the graph, any point (x, y) that satisfies one of the equations cannot satisfy the other equation.
 - d. On the graph, any point (x, y) that satisfies one of the equations must satisfy the other equation.

- 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 3 - Standard(s): 7.EE.3, 7.EE.4, 8.EE.7, 8.EE.8

North Carolina, Massachusetts, Engage NY

Day 5 Items

1. What are the solutions to the system of equations below?

$$3y = x - 2$$

$$y = -2x + 4$$

- a. $x = 0; y = 2$
b. $x = 1; y = -2$
c. $x = 2; y = 0$
d. $x = -2; y = 4$
2. Glen spends a total of 9 hours writing a paper and finishing a project. He spends x hours on the paper and y hours finishing the project. Glen spends $1\frac{1}{2}$ more hours on the paper than he spends on the project. The equations below can be used to find how many hours he spends on the paper and finishing the project.

$$x + y = 9$$

$$x - y = 1\frac{1}{2}$$

How many hours does Glen spend writing the paper?

- a. $3\frac{1}{4}$ hours
b. $3\frac{3}{4}$ hours
c. $5\frac{1}{4}$ hours
d. $5\frac{3}{4}$ hours
3. What is the solution to the system of equations below?

$$3x + 4y = -2$$

$$2x - 4y = -8$$

- a. $x = 2; y = -2$
b. $x = 6; y = -5$
c. $x = 4; y = 4$
d. $x = -2; y = 1$

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

Set 3 - Standard(s): 7.EE.3, 7.EE.4, 8.EE.7

NAEP Questioning Tool, Massachusetts

Day 1 Items - KEY

1. D
2. E
3. D

Set 3 - Standard(s): 7.EE.3, 7.EE.4, 8.EE.7

NAEP Questioning Tool, Massachusetts

Day 2 Items - KEY

1. B
2. $x = 4$
3. $x = -\frac{7}{5}$

Set 3 - Standard(s): 7.EE.3, 7.EE.4, 8.EE.7

NAEP Questioning Tool, Massachusetts

Day 3 Items - KEY

1. D
2. No solution
3. A

Set 3 - Standard(s): 7.EE.3, 7.EE.4, 8.EE.7, 8.EE.8

NAEP Questioning Tool, Massachusetts, North Carolina

Day 4 Items - KEY

1. C
2. A
3. D

Set 3 - Standard(s): 7.EE.3, 7.EE.4, 8.EE.7, 8.EE.8

North Carolina, Massachusetts, Engage NY

Day 5 Items - KEY

1. C
2. C
3. D