

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 1 - Standard(s): 8.EE.1

Smarter Balance

Day 1 Items

1. What value of x makes the equation below true?

$$9^5 \cdot 9^7 = 9^x$$

2. Which exponential expression is equal to $2^{-5} \cdot 2^8$?

a. $\frac{2^2}{2^{-1}}$

b. $(2^3)^{-1}$

c. $\frac{2^{-2}}{2^{-1}}$

d. $(2^{-1})^3$

3. An expression is shown. $j^2 \left(\frac{k^6}{k^4 k^3} \right)^{-3}$

Martha evaluates the expression using these steps:

- Step 1: $j^2 \left(\frac{k^6}{k^7} \right)^{-3}$
- Step 2: $j^2 (k^{-1})^{-3}$
- Step 3: $j^2 k^{-4}$

Martha made a mistake. In which step did Martha make a mistake, and what is a correct expression for that step?

- a. Step 2; $j^2 (k^1)^{-3}$
- b. Step 2; $j^2 (k^{13})^{-3}$
- c. Step 3; $j^2 k^{-2}$
- d. Step 3; $j^2 k^3$

Name _____

Date _____

Set 1 - Standard(s): 7.EE.1, 8.EE.2

Smarter Balance, Engage NY

Day 2 Items

1. Select all possible values for x in the equation $x^3 = 375$.
 - a. $5\sqrt[3]{3}$
 - b. $\sqrt[3]{375}$
 - c. $75\sqrt[3]{5}$
 - d. $125\sqrt[3]{3}$
2. The three steps shown below were used to find an expression equivalent to $\frac{2}{5}(15x - 30y) + 10x$.

Step 1: _____ ?
Step 2: $16x - 12y$
Step 3: $4(4x - 3y)$

Which expression could be used as Step 1?

- a. $\frac{2}{5}(25x - 30y)$
 - b. $6x - 12y + 10x$
 - c. $6x - 30y + 10x$
 - d. $15(x - 2y) + 10x$
3. Simplify the following expression: $\sqrt{25} + 15 \cdot 2$. Show your work.

- https://www.smarterbalanced.org/wp-content/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.engageny.org/resource/new-york-state-common-core-sample-questions>, Engage NY

Name _____

Date _____

Set 1 - Standard(s): 7RP.3, 7EE.3

NAEP Questioning Tool

Day 3 Items

1. Sally can buy 20 pencils for \$0.99. What is the greatest number of pencils Sally can buy for \$3.00?
 - a. 30
 - b. 45
 - c. 60
 - d. 75
 - e. 90

2. Helgas process of calculating the tip to leave in a restaurant starts with the bill for food and drink.
 - First, she rounds the bill to the nearest ten cents.
 - Then she moves the decimal point in the rounded total one place to the left.
 - Finally, she doubles that amount.

Helgas process calculates approximately what percent of the original bill?

- a. 2%
 - b. 5%
 - c. 10%
 - d. 15%
 - e. 20%
-
3. The dress Marsha wants to purchase is on sale for \$56.00 which is 30% off the original price. How much is the original price of the dress Marsha wants to purchase?
 - a. \$80.00
 - b. \$16.80
 - c. \$39.20
 - d. \$72.80

Name _____

Date _____

Set 1 - Standard(s): 8.EE.3

NAEP Questioning Tool, Smarter Balance

Day 4 Items

1. The mean distance from Venus to the sun is 1.08×10^8 kilometers. Which of the following quantities is equal to this distance?
 - a. 10,800,000 kilometers
 - b. 108,000,000 kilometers
 - c. 1,080,000,000 kilometers
 - d. 10,800,000,000 kilometers

2. The diameter of a red blood cell, in inches, is 3×10^{-4} . This expression is the same as which of the following numbers?
 - a. 0.00003
 - b. 0.0003
 - c. 0.003
 - d. 3,000
 - e. 30,000

3. Express each expression below in scientific notation.
 - a. 12, 400
 - b. 0.000008
 - c. 0.607
 - d. 245.38

- 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), 2011, 2013 Mathematics Assessment.
- https://www.smarterbalanced.org/wp-content/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.EE.4

NAEP Questioning Tool, Engage NY

Day 5 Items

1. A tree in Oakland has a mass of approximately 3×10^6 kilograms. A tree in Maplesville has a mass of approximately 6×10^4 kilograms. The mass of the tree in Oakland is about how many times the mass of the tree in Maplesville?
 - a. 20
 - b. 50
 - c. 200
 - d. 500

2. During the first year of operation, a company produced 8.4×10^9 reams of paper. During the second year, the company produced 5.6 times the number of reams of paper that it produced during the first year. Which expression represents the number of reams of paper the company produced during the second year?
 - a. 1.5×10^9
 - b. 1.5×10^{10}
 - c. 4.704×10^9
 - d. 4.704×10^{10}

3. Express the solution of $\frac{(3.6 \times 10^4)(2.8 \times 10^3)}{(8 \times 10^5)}$ in scientific notation.

- 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.engageny.org/resource/new-york-state-common-core-sample-questions>, Engage NY

Set 1 - Standard(s): 8.EE.1, 8.EE.2, 8.EE.3, 8.EE.4

NAEP Questioning Tool

Day 1 Items - KEY

1. $x = 12$
2. A
3. D

Set 1 - Standard(s): 7.EE.1, 8.EE.2

Smarter Balance, Engage NY

Day 2 Items - KEY

1. A. $5\sqrt[3]{3}$ and B. $\sqrt[3]{375}$
2. B
3. 35

Set 1 - Standard(s): 7RP.3, 7EE.3

NAEP Questioning Tool

Day 3 Items - KEY

1. C
2. E
3. A

Set 1 - Standard(s): 8.EE.3

NAEP Questioning Tool, Smarter Balance

Day 4 Items - KEY

1. B
2. B
3. Express each expression below in scientific notation.
 - a. 1.24×10^4
 - b. 8×10^{-6}
 - c. 6.07×10^{-1}
 - d. 2.4538×10^2

Set 1 - Standard(s): 8.EE.4

NAEP Questioning Tool, Engage NY

Day 5 Items - KEY

1. B
2. D
3. $126 = 1.26 \times 10^2$