Inspect
CCR Performance Tasks

Math Grade 6: Use Expressions and Equations

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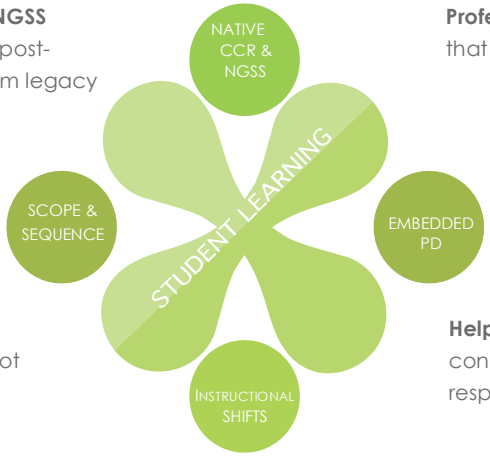
Inspect offers the following assessment products:

Content Bank for English/Language Arts and Math Grades 2 – High School	▪ More than 36,000 items ▪ More 1500 complex texts, including authentic permissioned texts ▪ Includes Literacy in History, Social Science, Science, and Technical Subjects
Quick Checks for English/Language Arts and Math Grades 2 – High School	▪ Fixed-form assessments with five to seven items including constructed response ▪ Key instructional concepts embedded in standards (clusters for Math, staircase of text complexity for ELA)
Focused Interim Assessments for English/Language Arts and Math Grades 3 – High School	▪ Prebuilt assessments with up to 15 items that focus on groups of related standards within a Claim or domain ▪ More focused than summative assessments ▪ Flexible and customizable ▪ Mirrors SBAC IAB blueprints
NGSS Formative Assessments Grades 5 – High School	▪ Prebuilt assessments with items linked to experimental contexts that assess the three dimensions of science learning ▪ Flexible and customizable ▪ Addresses the California Course Models and NGSS Bundles
Observational Tasks for English/Language Arts and Math Grades K - 1	▪ Developmentally appropriate for individual students and small groups

Inspect Assessment Content is available through a variety of assessment administration and data analysis platforms.

Inspect assessment content offers these benefits:

Native college- and career-ready and NGSS content prepares students to meet their post-secondary goals. Content re-aligned from legacy standards cannot do this.



Professional development embedded within content that

- shows the relationship between specific skills and higher-order thinking
- includes authentic, permissioned texts of appropriate complexity
- and documents student progress using DOK and learning progressions

Content that addresses your scope and sequence so that your assessments do not waste valuable instruction time

Help for teachers addressing the instructional shifts with content that elicits evidence of learning from each response

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CCR Performance Tasks

Math Grade 6: Use Expressions and Equations

Student Test Booklet

Name:

Student Rubric

This problem is meant to test if you can:
- Use expressions to show calculations with numbers;
- Write an equation with a variable to show calculations;
- Use equations to explain a pattern in the results of calculations.

Your teacher will rate your answer as a level 4, 3, 2, 1, or 0. The descriptions below explain the types of answers expected at each level.

Level 4:
Your answer is correct and complete. Your answer includes:
- Correct expressions that show calculations that follow the steps in the problem;
- A correct explanation of the calculation results which uses an equation with a variable.

Level 3:
Your answer is correct but one or two of your explanations are incomplete or you have made minor calculation mistakes. Your answer includes:
- Correct expressions that show calculations that follow the steps in the problem;
- A correct but incomplete explanation of the calculation results which do not use an equation with a variable.

Level 2:
You have answered one part correctly but your explanations are missing or weak. Your answer includes:
- Correct expressions that show calculations that follow the steps in the problem;
- A vague or partially incorrect explanation of the calculation results.

Level 1:
Your answers are incorrect. Your answer includes:
- Incorrect expressions that show calculations that do not correctly follow the steps in the problem;
- A missing or incorrect explanation of the results of the calculations.

Level 0:
Your answer is not related to the question, the teacher cannot understand your answer, or you do not write anything.

Name:_____

Math Grade 6: Use Expressions and Equations

Complete all the tasks in the test booklet.

1 **A. Think of a number. Use your number when completing the steps below. Show your work.**

1. **Add 5 to the number.**
2. **Multiply the result by 2.**
3. **Subtract your original number from the result.**
4. **Subtract your original number from the result again.**

What is the final result?

B. Think of a different number. Do the same steps as in part A. What is the result? Show your work.

C. Is there a number you can start with that gives you a different result? Explain why or why not. (Hint: Use an equation with a variable to help explain.)

CCR Performance Tasks

Math Grade 6: Use Expressions and Equations

Teacher Guide

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About the Teacher Guide

This document contains support materials for “Math Grade 6: Use Expressions and Equations.” This includes:

(a) The task
(b) The standards and depth of knowledge level of the task
(c) The scoring rubric
(d) Discussion questions
(e) Extension activities

These specifications have been included to help you connect the task to the Common Core content standards and the standards for mathematical practice. The rubric is designed to help you look for the development of mathematical practices in student work. It is also here to help you look for consistencies in student content errors that can help guide intervention and reteach strategies.

Test Definition File

Item #	Correct Answer	Practice Standard	Content Standards
1	See Scoring Rubric	Mathematical Practice 8	6.EE.2; 6.EE.3; 6.EE.4; 6.EE.5; 6.EE.6

SBAC Claims	PARCC Sub-Claims
1 and 2	A and D

Performance Task

A. Think of a number. Use your number when completing the steps below. Show your work.

1. **Add 5 to the number.**
2. **Multiply the result by 2.**
3. **Subtract your original number from the result.**
4. **Subtract your original number from the result again.**

What is the final result?

B. Think of a different number. Do the same steps as in part A. What is the result? Show your work.

C. Is there a number you can start with that gives you a different result? Explain why or why not. (Hint: Use an equation with a variable to help explain.)

Standards Alignment

Practice Standards

MP8 > DOK 3

Look for and express regularity in repeated reasoning. -- Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $\frac{(y - 2)}{(x - 1)} = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

Content Standards

6.EE.2

Write, read, and evaluate expressions in which letters stand for numbers.

a. Write expressions that record operations with numbers and with letters standing for numbers. *For example, express the calculation "Subtract* y *from 5" as 5 –* y.

b. Identify parts of an expression using mathematical terms (sum, term, product, factor, quotient, coefficient); view one or more parts of an expression as a single entity. *For example, describe the expression 2 (8 + 7) as a product of two factors; view (8 + 7) as both a single entity and a sum of two terms.*

c. Evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). *For example, use the formulas* $V = s^3$ *and* $A = 6\ s^2$ *to find the volume and surface area of a cube with sides of length* $s = \frac{1}{2}$.

6.EE.3

Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.*

6.EE.4

Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). F*or example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.*

6.EE.5

Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.

6.EE.6

Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

SBAC Claims

Mathematics Claim #1:
Concepts and Procedures. Students can explain and apply mathematical concepts and interpret and carry out mathematical procedures with precision and fluency.

Mathematics Claim #2:
Problem Solving. Students can solve a range of complex well-posed problems in pure and applied mathematics, making productive use of knowledge and problem solving strategies.

PARCC Sub-Claims

Sub-Claim A:
Major Content with Connections to Practices. The student solves problems involving the Major Content for her grade/course with connections to the Standards for Mathematical Practice.

Sub-Claim D:
Highlighted Practice MP.4 with Connections to Content: modeling/application. The student solves real-world problems with a degree of difficulty appropriate to the grade/course by applying knowledge and skills articulated in the standards for the current grade/course (or, for more complex problems, knowledge and skills articulated in the standards for previous grades/courses), engaging particularly in the Modeling practice, and where helpful making sense of problems and persevering to solve them (MP.1), reasoning abstractly and quantitatively (MP.2), using appropriate tools strategically (MP.5), looking for and making use of structure (MP.7), and/or looking for and expressing regularity in repeated reasoning (MP.8).

Scoring Rubric

4 Point Response:
The response demonstrates a high level of understanding. A level 4 response is characterized by:

- A strong ability to use expressions and equations to represent calculations;
- A strong ability to use a variable to represent an unknown number;
- An understanding of equations as statements that are sometimes true, always true, or never true;
- An ability to explain why the results of the steps are always the same using the concept of an equation that is always true.

A level 4 response should include:

- Correct and complete calculations in parts A and B, with a final result of 10.
- The correct answer (no) and complete explanation in part C.

A sample level 4 response follows.

Part A:
My number is 3.
Step 1: 3 + 5 = 8
Step 2: 2 × 8 = 16
Step 3: 16 – 3 =13
Step 4: 13 – 3 = 10
The final result is 10.

Part B:
This time my number is 7.
Step 1: 5 + 7 =12
Step 2: 2 × 12 = 24
Step 3: 24 – 7 = 17
Step 4: 17 – 7 = 10
The final result is 10 again.

Part C:
"No, no matter what number you start with you always get a final result of 10. If I use a variable instead of picking a number, the steps result in this equation: $2(5 + n) – n – n$. This equation is the same as $10 + 2n – 2n$. If you add $2n$ and then take away 2n that is the same as adding 0 or doing nothing. So you are always left with 10. The equation $2(5 + n) – n – n = 10$ is always true no matter what number n is.

3 Point Response:
The response demonstrates a strong understanding, but the work is incomplete or contains minor errors. A level 3 response is characterized by:

- A strong ability to use expressions and equations to represent calculations;
- An understanding of equations as statements that are sometimes true, always true, or never true;
- A basic ability to explain why the results of the steps are always the same, but the student does not use the concept of an equation that is always true. The student is likely to show many examples using numbers to construct a convincing argument that the result is always the same but does not generalize using an algebraic equation, making the explanation incomplete.

2 Point Response:
The response demonstrates a basic but incomplete understanding. A level 2 response is characterized by:

- A basic ability to use expressions and equations to represent calculations;
- Correct calculations in parts A and B but an inability to generalize the situation. Part C is vague, incomplete, or incorrect.

1 Point Response:
The response demonstrates minimal understanding. A level 1 response is characterized by:

- A weak ability to use expressions and equations to represent calculations. The work in parts A and B contain errors so the student does not see that the result is always 10;
- An inability to determine and generalize that the results of the steps are always the same. Part C is incorrect or missing.

0 Point Response:
There is no response, or the response is off topic.

Discussion Questions

Use the following questions to help students struggling to access the problem:

1. How can you write an expression to represent adding 9 to a number?

Possible response: *9* + x.

2. [Write these equations on the board: 8*x* + 8 = 8; 3 + *x* + 3 – 6 = *x*; *x* – 3 = *x* + 1] Are these equations always true, sometimes true, or never true? Explain.

Possible response: *8*x + *8 is sometimes true. It is true when* x *is 0 but not true for any other values of* x*. 3 +* x *+ 3 – 6 =* x *is always true. The order that you add 3 +* x *+ 3 doesn't matter so it is the same as* x *+ 6. So the equation can be written as* x *+ 6 – 6 =* x*, which is always true because 6 – 6 is 0 and any number plus 0 is the number. The equation* x *– 3 =* x *+ 1 is never true. Taking away 3 can never be the same as adding 1.*

3. The equation below always results in the same number, *x*, no matter what number, *n*, you start with.

$$x = \frac{(2n + 6)}{2} - n$$

Write out a series of calculations that you can use to find the result, *x*, given a starting number, *n*.

Possible response:
Step 1: Multiply the number by 2.
Step 2: Add 6.
Step 3: Divide the sum by 2.
Step 4: Subtract the original number.

Extension Activities

1. Have students work individually or in groups to develop another series of steps that always results in the same number, no matter what number you start with.

2. Extend the series of steps which the students developed.

   A. Can you use multiplication in one of your steps?

      Sample: This requires paying attention to the distributive property. For example, this series of steps results in 10: Pick a number, add 2, multiply by 10, subtract 20, and divide by your original number.

   B. Can you add three more steps to your series?

      Sample: Add 2, then subtract 1, and subtract 1 again.

   C. Can you add five more steps to your series?

      Sample: Add your original number, add 5, subtract 6, add 1, and subtract your original number.

   D. Can you use negative numbers, fractions, and decimals in your equation?

      Sample: Multiply your number by $\frac{1}{2}$, add -1, multiply by 2, and subtract your original number.