

Just in Time Quick Check

Standard of Learning 7.PFA.2

Strand: Patterns, Functions, and Algebra

Standard of Learning 7.PFA.2

The student will simplify numerical expressions, simplify and generate equivalent algebraic expressions in one variable, and evaluate algebraic expressions for given replacement values of the variables.

Students will demonstrate the following Knowledge and Skills:

- a) Use the order of operations and apply the properties of real numbers to simplify numerical expressions. Exponents are limited to 1, 2, 3, or 4 and bases are limited to positive integers. Expressions should not include braces { } but may include brackets [] and absolute value bars | |. Square roots are limited to perfect squares.*
- b) Represent equivalent algebraic expressions in one variable using concrete manipulatives and pictorial representations (e.g., colored chips, algebra tiles).
- c) Simplify and generate equivalent algebraic expressions in one variable by applying the order of operations and properties of real numbers. Expressions may require combining like terms to simplify. Expressions will include only linear and numeric terms. Coefficients and numeric terms may be positive or negative rational numbers.*
- d) Use the order of operations and apply the properties of real numbers to evaluate algebraic expressions for given replacement values of the variables. Exponents are limited to 1, 2, 3, or 4 and bases are limited to positive integers. Expressions should not include braces { } but may include brackets [] and absolute value bars | |. Square roots are limited to perfect squares. Limit the number of replacements to no more than three per expression. Replacement values may be positive or negative rational numbers.

*** On the state assessment, items measuring this knowledge and skill are assessed without the use of a calculator.**

Just in Time Quick Check

Just in Time Quick Check Teacher Notes

Supporting and Prerequisite SOL: 6.PFA.3

Just in Time Quick Check 7.PFA.2

1. Use the key to answer the question below.

Key:	<input type="checkbox"/> = 1	<input checked="" type="checkbox"/> = -1	<input type="text"/> = x	<input checked="" type="checkbox"/> = $-x$
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Draw a model to represent each expression.

- a) $3x + 4$
- b) $x - 2$
2. Evaluate the expression for $x = 3$, $w = 2$ and $z = 5$.
- $$x^3 + 4w - z$$
3. Michael and Greg each simplified the expression $40 - 4^2 \cdot 2$. Michael explained that the last step he performed was $40 - 32$ while Greg explained that the last step he performed was $24 \cdot 2$. Which student is correct? Explain your reasoning.

4. Determine the value of the expression $-2|3 - 8| + 3^3$.

5. Simplify the expression $-\frac{5}{2}b + 4 + \frac{3}{2}b - 1$.

6. Simplify the expression $3(2x - 5) + 7$.




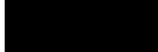
7. Evaluate the expression $bc + \sqrt{4a}$ when $a = 4$, $b = -2$ and $c = 9$.

8. Evaluate the expression $\frac{1}{2}(2x - y)$ when $x = 4$ and $y = -2$.

7.PFA.2 Just in Time Quick Check Teacher Notes

Common Errors/Misconceptions and their Possible Indications

1. Use the key to answer the question below.

Key:	 = 1	 = -1	 = x	 = $-x$
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Draw a model to represent each expression.

a) $3x + 4$

A common misconception is that some students may incorrectly represent three x as three positive square tiles and one x -tile along with four positive square tiles. Another misconception is that some students may model three x as three positive square tiles along with four positive square tiles to represent the four. In either scenario, students may need more experience modeling single term expressions or numbers before modeling expressions with multiple terms.

b) $x - 2$

Students may incorrectly model the expression using only positive tiles, ignoring the negative two. These students may need more experience modeling positive and negative values. In both examples, a student may need opportunities to identify the terms in the expression and model each one separately.

2. Evaluate the expression for $x = 3$, $w = 2$ and $z = 5$.

$$x^3 + 4w - z$$

Students may incorrectly calculate 3^3 as 9 resulting in a value of 12 for the expression. This may indicate that they believe the base and exponent should be multiplied. Students making this error may benefit from additional opportunities to practice simplifying exponents.

3. Michael and Greg each simplified the expression $40 - 4^2 \cdot 2$. Michael explained that the last step he performed was $40 - 32$ while Greg explained that the last step he performed was $24 \cdot 2$. Which student is correct? Explain your reasoning.

Students may incorrectly determine that Greg is correct because they simplified the expression from left to right. These students may benefit from reviewing the order of operations and additional practice modeling and simplifying expressions that involve multiple operations.

4. Determine the value of the expression $-2|3 - 8| + 3^3$.

Students may incorrectly take the absolute value of 3 and -8 separately and then add the results. This may indicate that a student believes that the absolute value of each term inside the absolute value bars should be determined separately. A student may need to review grouping symbols and practice simplifying operations within absolute value bars.

5. Simplify the expression $-\frac{5}{2}b + 4 + \frac{3}{2}b - 1$.

Students may fail to keep track of the negative sign with the coefficient resulting in the incorrect expression $b + 3$. Students may benefit from additional experiences where the coefficients of like terms are rational numbers that are not just integers.

6. Simplify the expression $3(2x - 5) + 7$.

A common error is for students to multiply the first term, $2x$, by 3 but neglect to multiply the second term, -5 , by 3. These students will obtain a simplified expression that is not equivalent to the original expression. This indicates that students may not have a conceptual understanding of the distributive property. Modeling the original expression with a manipulative like algebra tiles will reinforce the fact that the quantity $2x - 5$ needs to be laid out, using a set of tiles, three times creating the equivalent expression $6x - 15 + 7$ which, in turn, simplifies to $6x - 8$.

7. Evaluate the expression $bc + \sqrt{4a}$ when $a = 4$, $b = -2$ and $c = 9$.

Students may substitute the incorrect value for each variable when there are multiple variables in the algebraic expression, especially when the variables in the expression are not in alphabetical order, but the replacement values are. For example, if students substitute the values as they appear, the expression would be $4(-2) + \sqrt{4(4)}$, resulting in a value of -2 . Students may benefit from a reminder to pay attention to the variables as they are substituting values. Students may forget to follow the order of operations when simplifying the value under the radical. For example, students may find the square root of the coefficient 4 and not the product of $4a$. Provide students with opportunities to simplify square root expressions using the order of operations.

8. Evaluate the expression $\frac{1}{2}(2x - y)$ when $x = 4$ and $y = -2$.

Students may be confused when substituting a negative replacement value into an expression. A common misconception is that a student may substitute the value of four for x and negative two for y into the expression incorrectly obtaining a value of three inside the parentheses. Encourage students to use parentheses when substituting in values before simplifying. Provide students with additional practice evaluating expressions with negative values.