6.EE.1

SELECTED RESPONSE
Select the correct answer.

1. Which exponential expression equals $5 \times 5 \times 5 \times 5 \times 5 \times 5$?

   (A) 5^5

   (B) 5^6

   (C) 6^5

   (D) 5^7

2. Which is the expanded form of 7^5?

   (A) $7 \times 7 \times 7 \times 7 \times 7 \times 7$

   (B) $5 \times 5 \times 5 \times 5 \times 5 \times 5 \times 5$

   (C) $7 \times 7 \times 7 \times 7$

   (D) $7 \times 7 \times 7 \times 7 \times 7$

3. Which is the expanded form of $3^2 \times 3^5$?

   (A) $3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$

   (B) $9 \times 9 \times 9 \times 9 \times 9 \times 9 \times 9 \times 9 \times 9 \times 9$

   (C) $3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$

   (D) $9 \times 9 \times 9 \times 9 \times 9 \times 9 \times 9$

4. Which is the value of 6^4?

   (A) 216

   (B) 1,296

   (C) 4,096

   (D) 7,776

Select all correct answers.

5. Which of the following expressions is equal to 64?

   (A) 2^4

   (B) 8^2

   (C) 6^3

   (D) 2^6

   (E) 4^3

Match each exponential expression with its expanded form.

_____ 6. $2^3 \times 5^4$

_____ 7. $9^3 \times 11^5$

_____ 8. 12^5

_____ 9. $2^4 \times 5^4$

_____ 10. $9^4 \times 11^5$

A $2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 5 \times 5$

B $12 \times 12 \times 12 \times 12 \times 12 \times 12 \times 12$

C $9 \times 9 \times 9 \times 9 \times 11 \times 11 \times 11 \times 11 \times 11$

D $5 \times 5 \times 5 \times 5 \times 5 \times 3 \times 3 \times 3$

E $5 \times 5 \times 5 \times 2 \times 2$

F $9 \times 9 \times 9 \times 11 \times 11 \times 11 \times 11 \times 11$

G $2 \times 2 \times 2 \times 5 \times 5 \times 5 \times 5$

H $12 \times 12 \times 12 \times 12 \times 12$

CONSTRUCTED RESPONSE

11. Louis evaluated the expression $3^5 + 6^3$, but he made a mistake. His work is shown. Identify Louis's mistake and show how to find the correct answer.

$$3^5 + 6^3 = 5 \acute{} 5 \acute{} 5 + 3 \acute{} 3 \acute{} 3 \acute{} 3 \acute{} 3 \acute{} 3$$
$$= 854$$

_____

_____

12. Evaluate $11^2 \times 2^3 + 3^5 + 9^3$. Show your work.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

13. A square has a side length of 8 centimeters.

  a. The area of a square is the square of the side length. Write and evaluate an exponential expression for the area of the given square.

  _____

  _____

  b. If the given square is one side of a cube, the surface area of the cube will be 6 times the area of the square. Write and evaluate an exponential expression for the surface area of the cube.

  _____

  _____

  c. If the given square is one side of a cube, the volume of the cube will be the cube of the side length of the square. Write and evaluate an exponential expression for the volume of the cube.

  _____

  _____

14. Kerry puts pennies into a jar every day. On the first day, she puts 2 pennies into the jar. On the second day, she adds double the number of pennies she put into the jar on the first day. On the third day, she adds double the number of pennies she put into the jar on the second day. This pattern follows for a week.

  a. Write exponential expressions for the number of pennies put into the jar on the second, third, and fourth days.

  _____

  _____

  _____

  _____

  b. What pattern do you notice in the expressions you wrote for part a?

  _____

  _____

  _____

  _____

  c. Write an expression in exponential form for the number of pennies she puts into the jar on the seventh day. Expand and evaluate the expression.

  _____

  _____

  _____

  _____

  d. How much money will be in the jar at the end of the week?

  _____

  _____

6.EE.2a

SELECTED RESPONSE

Select the correct answer.

1. Which expression below represents "*k* more than 8"?

   (A) $8k$

   (B) $8 + k$

   (C) $8 - k$

   (D) $\dfrac{8}{k}$

2. Which statement below could be represented by the expression $7 - t$?

   (A) *t* less than 7

   (B) 7 times *t*

   (C) *t* more than 7

   (D) 7 less than *t*

3. Which statement below CANNOT be represented by the expression $t - 16$?

   (A) 16 less than *t*

   (B) *t* decreased by 16

   (C) *t* less than 16

   (D) 16 subtracted from *t*

4. Marcus and Judy are picking apples. At the end of the day, Marcus has *a* apples. Judy has 5 times as many apples as Marcus. How many apples does Judy have in terms of *a*?

   (A) $a - 5$

   (B) $5 + a$

   (C) $\dfrac{5}{a}$

   (D) $5a$

Select all correct answers.

5. Which of the following statements could be represented by the expression $d - 10$?

   (A) 10 less than *d*

   (B) 10 more than *d*

   (C) *d* decreased by 10

   (D) *d* less than 10

   (E) *d* minus 10

   (F) *d* increased by 10

6. Which of the following indicates that the operation is addition?

   (A) 8 plus *j*

   (B) *k* fewer than 10

   (C) *r* increased by 7

   (D) 14 divided by *n*

   (E) 11 decreased by *h*

   (F) 6 more than *s*

Select the correct answer for each lettered part.

7. Choose the operation that is indicated by each statement.

   a. 5 more than *n*   ○ +   ○ −   ○ ×   ○ ÷

   b. 11 fewer than *w*   ○ +   ○ −   ○ ×   ○ ÷

   c. *k* divided by 4   ○ +   ○ −   ○ ×   ○ ÷

   d. *y* less than 8   ○ +   ○ −   ○ ×   ○ ÷

   e. 2 times *r*   ○ +   ○ −   ○ ×   ○ ÷

   f. 9 increased by *g*   ○ +   ○ −   ○ ×   ○ ÷

CONSTRUCTED RESPONSE

8. Rebecca and Clark are playing baseball. During the first hour, Rebecca has *r* hits and Clark has 3 more hits than Rebecca. During the second hour, Clark has *c* hits and Rebecca hits 5 fewer than twice the number of Clark's hits.

   a. Write an expression for the number of hits Clark made in the first hour.

   _____

   b. Write an expression for the number of hits Rebecca made in the second hour.

   _____

9. The zoo has lions, tigers, and bears. There are *t* tigers in the zoo.

   a. How many lions are in the zoo if there are 3 more lions that tigers?

   _____

   b. How many bears are in the zoo if the number of bears is two times the number of lions?

   _____

10. a. Write an expression represented by the statement "3 more than *n.*"

   _____

   b. Write an expression represented by the statement "*n* increased by 3."

   _____

   c. Write an expression represented by the statement "*n* plus 3."

   _____

   d. What can you say about the statements in parts a through c in terms of the expressions they represent?

   _____

   _____

11. A construction crew is installing lights in a room. The room has an area of *s* square feet. The number of lights required in the room is *s* divided by 5.

   a. How many lights are required in the room?

   _____

   b. The construction crew has 10 more lights than the number of lights required. Use your answer from part a to write an expression for the number of lights the construction crew has.

   _____

   c. Some of the lights are broken, so it turns out that the construction crew has 15 fewer lights than the number of lights required. Use your answer from part a to write an expression for the number of lights the construction crew has.

   _____

   d. After receiving a new shipment, the construction crew has twice the number of required lights. Use your answer from part a to write an expression for the number of lights the construction crew has.

   _____

12. Trudy is ordering pies from Sal. Trudy orders 3 more apple pies than *c* cherry pies. Sal gives Trudy *c* cherry pies and $c - 3$ apple pies. Explain Sal's mistake and correct it.

   _____

   _____

   _____

   _____

   _____

6.EE.2b

SELECTED RESPONSE

Select the correct answer.

1. Which expression is the product of two factors?

   (A) $8(5 + n)$

   (B) $2 + h$

   (C) $\dfrac{x}{3}$

   (D) $t - 9$

2. In the expression $n + 23$, what is 23?

   (A) A coefficient

   (B) A factor

   (C) A term

   (D) A sum

3. Which expression is a quotient?

   (A) $9r$

   (B) $\dfrac{b}{12}$

   (C) $15 + d$

   (D) $m - 4$

4. Which is the coefficient in the expression $23y + 5$?

   (A) y

   (B) 5

   (C) $23y$

   (D) 23

Select the correct answer for each lettered part.

5. Identify each expression as a sum, a difference, a product, or a quotient.

   a. $4t$ ○ Sum   ○ Difference   ○ Product   ○ Quotient

   b. $6 - u$ ○ Sum   ○ Difference   ○ Product   ○ Quotient

   c. $f + 10$ ○ Sum   ○ Difference   ○ Product   ○ Quotient

   d. $27(v + 3)$ ○ Sum   ○ Difference   ○ Product   ○ Quotient

   e. $42 + k$ ○ Sum   ○ Difference   ○ Product   ○ Quotient

   f. $\dfrac{t}{13}$ ○ Sum   ○ Difference   ○ Product   ○ Quotient

CONSTRUCTED RESPONSE

6. Write the expression represented by the statement "7 times the sum of 2 and x." Identify the factors in the expression.

   _____

   _____

   _____

7. Identify two sums in the expression $14 + b + 27d$. Identify the terms of each.

   _____

   _____

   _____

8. Identify each product in the expression $14n + 2 + 6k$ and then identify the coefficients in each product.

_____

_____

_____

9. a. Identify the terms of the expression $7x^2 + 2y - 8$. Identify which terms in the expression are products and find the coefficients in those products.

_____

_____

b. List the order of operations used to evaluate the expression. What is the value of the expression at $x = 2$ and $y = -1$?

_____

_____

_____

_____

_____

_____

10. Lara says the factors of the expression $(5 + s)(k + 7)$ are 5, s, k, and 7. Is this correct? If not, explain what Lara found and write the correct factors.

_____

_____

_____

_____

_____

_____

11. Use the expression $56xy + 5 - 6x + \dfrac{y}{20}$, for the following questions.

a. Identify two sums.

_____

_____

b. Identify the terms of the expression.

_____

_____

c. Identify a product of two factors. Find the coefficient in the product.

_____

_____

d. Identify the quotient.

_____

12. Identify all sums, products, and factors in the expression.

$$(x + 5)(y + 9) + (2 + x)(y + 23)$$

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

6.EE.2c

SELECTED RESPONSE
Select the correct answer.

1. Helen bought notebooks and pencils for school. The number of pencils she bought is given by $6(n - 3)$, where n is the number of notebooks she bought. How many pencils did Helen buy if she bought 5 notebooks?

   Ⓐ 2 pencils

   Ⓑ 12 pencils

   Ⓒ 27 pencils

   Ⓓ 48 pencils

2. In what order should the operations be performed to evaluate $6x^2 - 2$ at $x = 3$?

   Ⓐ First, multiply 6 by 3. Then, square the result. Finally, subtract 2 from the result.

   Ⓑ First, find 3^2. Then, subtract 2 from the result. Finally, multiply the result by 6.

   Ⓒ First, find 3^2. Then, multiply the result by 6. Finally, subtract 2 from the result.

   Ⓓ First, multiply 6 by 3. Then, subtract 2 from the result. Finally, square the result.

3. What is the value of the expression $\dfrac{8}{n} - \dfrac{1}{2}n^2$ at $n = 4$?

   Ⓐ −6

   Ⓑ −2

   Ⓒ 2

   Ⓓ 24

4. The area of a triangle is given by the formula $A = \dfrac{1}{2}bh$. What is the area of the triangle if $b = 5$ and $h = 4$?

   Ⓐ 2 Ⓒ 4.5

   Ⓑ 2.5 Ⓓ 10

Select all correct answers.

5. Which expressions are equal to 41 when evaluated at $d = 4$?

   Ⓐ $9d + 5$

   Ⓑ $7 + 3d^2$

   Ⓒ $10d - 1$

   Ⓓ $11d - \dfrac{12}{d}$

   Ⓔ $d^3 - 23$

CONSTRUCTED RESPONSE

6. A rectangular box with dimensions ℓ by w by h has a surface area A given by $A = 2\ell w + 2\ell h + 2wh$. Its volume V is given by $V = \ell wh$. If the dimensions of the box are given as 5 feet by 3 feet by 2.5 feet, what is the surface area and volume of the box? Show your work.

   _____

   _____

   _____

   _____

   _____

   _____

   _____

   _____

   _____

   _____

7. Evaluate the expression $\dfrac{1}{4}y + 10 + y^2$ for $y = 8$.

   _____

   _____

   _____

8. Mandy has *q* quarters. The number of nickels she has is 4 times the number of quarters. She has 10 more dimes than quarters.

   a. Write expressions for the number of nickels and dimes Mandy has.

   _____

   _____

   b. How many nickels and dimes does she have if she has $5 in quarters?

   _____

   _____

   _____

9. Evaluate the expression $11k + 9 - k^2 - \dfrac{15}{k}$

  at $k = 5$. Show your work.

   _____

   _____

   _____

   _____

   _____

10. Mark incorrectly evaluated the expression $4x + 12 - x^2$ at $x = 2$. His work is shown. Identify and correct Mark's mistake. Show your work.

$$4(2) + 12 - 2^2 = 4(2) + 10^2$$
$$= 4(2) + 100$$
$$= 8 + 100$$
$$= 108$$

   _____

   _____

   _____

   _____

   _____

11. Rosa is putting cube-shaped tissue boxes into a shipping crate. Each tissue box has a side length of 4 inches.

   a. The volume *V* of a cube is given by $V = s^3$, where *s* is the side length of the cube. What is the volume of one tissue box?

   _____

   b. If 32 tissue boxes fit into the crate without any gaps or space left over, what is the volume of the crate? Explain how you find your answer.

   _____

   _____

   _____

   _____

   c. Can you tell what the dimensions of the crate are if you only know its volume? Explain why and give the dimensions, or explain why not.

   _____

   _____

12. Tyler is planting a garden. The garden will contain mums that cost $7 each and daisies that cost $10 for 3.

   a. Write an expression for the cost of *m* mums and *d* daisies.

   _____

   b. How much will it cost for 7 mums and 6 daisies? Show your work.

   _____

   _____

   c. How much will it cost for 3 mums and 9 daisies? Show your work.

   _____

   _____

6.EE.3

SELECTED RESPONSE

Select the correct answer.

1. Which expression is equivalent to $12x - 3x$?

   (A) $x(12 - 3)$

   (B) $8x$

   (C) $3(3x - x)$

   (D) 9

2. What property is used to say that the expression $5x + 7 - 2x$ is equivalent to the expression $5x - 2x + 7$?

   (A) Commutative property of addition

   (B) Commutative property of multiplication

   (C) Associative property of addition

   (D) Distributive property

3. What expression is equivalent to the expression $(1 + 4x) + 2x$?

   (A) $7x$

   (B) $5x + 2x$

   (C) $1 + 6x$

   (D) $x(4 + 2)$

4. The expression $11x^3 - 6y + 2x^3$ is simplified as follows. Which property is NOT used to simplify the expression?

   $$11x^3 - 6y + 2x^3 = 11x^3 + 2x^3 - 6y$$
   $$= x^3(11 + 2) - 6y$$
   $$= x^3(13) - 6y$$
   $$= 13x^3 - 6y$$

   (A) Commutative property of addition

   (B) Commutative property of multiplication

   (C) Associative property of multiplication

   (D) Distributive property

Select all correct answers.

5. The expression $(y + 14x) - 5x - x^2$ is simplified as follows. Which properties of operations are used to simplify the expression?

   $$(y + 14x) - 5x - x^2 = y + (14x - 5x) - x^2$$
   $$= y + x(14 - 5) - x^2$$
   $$= y + x(9) - x^2$$
   $$= y + 9x - x^2$$

   (A) Commutative property of addition

   (B) Commutative property of multiplication

   (C) Associative property of addition

   (D) Associative property of multiplication

   (E) Distributive property

CONSTRUCTED RESPONSE

6. a. Use the distributive property to write $23y - (7x - 2y) + x$ without parentheses.

   _____

   _____

   _____

   b. Use the commutative property of addition to collect like terms.

   _____

   _____

   _____

   c. Simplify the result from part b.

   _____

   _____

7. Simplify the expression $(2x + 3y) + y$ using the properties of operations. Show your work.

   _____

   _____

8. Amy is buying fruit for a party she is having. She buys the fruit over a 3-day period. The first day, she buys a apples and n nectarines. The second day, she buys twice as many apples as she bought the first day. On the third day, she buys 10 bananas.

   a. Write an expression for the total number of pieces of fruit Amy buys. Do not simplify.

      _____

   b. Explain how to use the order of operations to simplify the expression. Show your work.

      _____

      _____

      _____

      _____

      _____

      _____

      _____

      _____

      _____

9. A rectangular prism has length a, width b, and height c.

   a. Using the formula $A = \ell w$, find the area of each face of the prism and write an expression for the sum of the areas. Collect like terms, and then use the distributive property to simplify the expression so that there are three terms inside the parentheses. Show your work.

      _____

      _____

      _____

      _____

   b. Use the result from part a to write an expression for the total surface area of a cube with side length a. Use the properties of operations to simplify the expression to one term. Show your work.

      _____

      _____

      _____

      _____

      _____

10. Laura mistakenly found that the expression $4x - 6y$ is equivalent to the expression $12x - 18y - 4(2x + 3y)$. Her work is shown. Find and correct Laura's mistake. Use the properties of operations to correctly simplify $12x - 18y - 4(2x + 3y)$ to two terms. Show your work.

$12x - 18y - 4(2x + 3y) = 12x - 18y - 8x + 12y$ Distributive property

$= 12x - 8x - 18y + 12y$ Commutative property of addition

$= 4x - 6y$ Combine like terms.

_____

_____

_____

_____

6.EE.4

SELECTED RESPONSE
Select the correct answer.

1. Which expression is NOT equivalent to the expression $11 - (3x + 2)$?

   (A) $11 - 3x - 2$

   (B) $9 - 3x$

   (C) $11 - 3x + 2$

   (D) $11 + (-3x - 2)$

2. Which expression is equivalent to $12x - 3(x + 2)$?

   (A) $12x + 6$

   (B) $12x - 6$

   (C) $9x + 6$

   (D) $9x - 6$

3. Which pair of expressions are equivalent?

   (A) $4x - 2 + 5x$ and $7x$

   (B) $(11 + 3x) - x$ and $11 + 2x$

   (C) $12(x - 2)$ and $12x - 2$

   (D) $9x(4)$ and $13x$

Select all correct answers.

4. Which expressions are equivalent to the expression $2x - (-3x + 8y) + 8$?

   (A) $2x + (3x + 8y) + 8$

   (B) $2x + (3x - 8y) + 8$

   (C) $(2x + 3x) - 8y + 8$

   (D) $3x + 8$

   (E) $5x - 8y + 8$

Match each expression with an equivalent expression.

____	5. $3x - 2 + 8x$	**A** $12x$
____	6. $4x - (2x + 1)$	**B** $2x - 1$
____	7. $11(x - 1) + 2$	**C** $7x$
____	8. $4(3x)$	**D** $11x - 9$
____	9. $-13x + 5x$	**E** $11x - 2$
		F $2x + 1$
		G $-8x$

CONSTRUCTED RESPONSE

10. Blaine and Tanya are selling pumpkins and tomatoes at a farm stand. Blaine sells p pumpkins and t tomatoes on the first day. The second day he sells double what he sells the first day. Over both days, Tanya sells triple what Blaine sells on the first day.

   a. Write an expression for the total number of pumpkins and tomatoes Blaine sold both days.

   _____

   b. Write an expression for the total number of pumpkins and tomatoes Tanya sold both days.

   _____

   c. Did Blaine and Tanya sell the same amount? Explain.

   _____

11. Peter is making cookies. He needs to add a total of $2\frac{1}{4}$ cups of flour and $2\frac{2}{3}$ cups of sugar per batch. At the beginning of the recipe, he only adds $1\frac{3}{4}$ cups of flour and $\frac{2}{3}$ cup of sugar per batch. He adds $\frac{1}{2}$ cup of flour and $1\frac{1}{3}$ cups of sugar per batch later in the recipe.

   a. Write an expression for the number of cups of flour Peter added to make *b* batches of cookies.

_____

   b. Write an expression for the number of cups of sugar Peter added to make *b* batches of cookies.

_____

   c. Simplify the expressions from parts a and b. Did Peter add enough flour and sugar to his cookies?

_____

_____

_____

12. Show that the expression $(8x - 12y) + y + 2(3 + 3x)$ is equivalent to the expression $-11y + 6 + 14x$. Use the properties of operations to justify your steps.

_____

_____

_____

_____

_____

_____

13. Nick is finding the perimeter of a garden. The measurements of the garden are given below. Nick's expression for the perimeter is $2n + 1 + 2n + 4n + 5$.

n + 3

n + 1

n + 1

2(n + 1)

n

2n
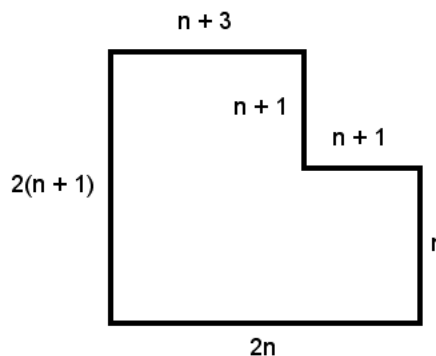
   a. Write an expression for the perimeter of the garden.

_____

   b. Simplify the expression from part a to two terms. Show your work.

_____

_____

_____

   c. Is Nick's expression for the perimeter correct? Show your work.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

6.EE.5

SELECTED RESPONSE
Select the correct answer.

1. For what value of x is the equation $4 = 12x - 2$ true?

   A $\dfrac{1}{6}$

   B $\dfrac{1}{2}$

   C 2

   D 6

2. Which values from the set $\{1, 2, 3, 4, 5, 6\}$ are solutions of $9 < 2x + 3$?

   A $x = \{1, 2\}$

   B $x = \{3, 4, 5, 6\}$

   C $x = \{4, 5, 6\}$

   D $x = \{1, 2, 3, 4, 5, 6\}$

3. What is a common solution of $x - 8 \leq 2$ and $7 \leq 2x - 13$?

   A 9

   B 10

   C 11

   D The inequalities do not have a common solution.

4. Rachel is typing a 1,500-word report. Her progress is represented by the equation $1{,}500 = 500 + 50t$, where t is the number of minutes spent typing. If she does not take a break, how many minutes does Rachel need to type to finish her report?

   A 10 minutes

   B 20 minutes

   C 30 minutes

   D 40 minutes

Select all correct answers.

5. Which statements below are true when $x = 5$?

   A $3 = 2x - 7$

   B $3 < 2x - 9$

   C $2 \leq x + 6$

   D $18 = 6x - 12$

   E $3 = 2 + x$

CONSTRUCTED RESPONSE

6. Is 4 a solution of $7 \leq 5x - 16$? Show your work.

   _____

   _____

   _____

   _____

7. Do all of the values from the set $\{5, 6, 7\}$ make the inequality $9x - 3 < 60$ true? Explain.

   _____

   _____

   _____

   _____

   _____

8. What value(s) from the set $\{0, 1, 2\}$ make the equation $4x + 9 = 13$ true? Show your work.

   _____

   _____

   _____

   _____

   _____

9. What values from the set of natural numbers make the inequality $6 + 2x > 8$ true? Explain.

_____

_____

_____

_____

_____

_____

_____

_____

_____

10. Kyle is saving his money to buy a computer for $300. He has already saved $75, and plans to save an additional $22.50 each day.

   a. Write an equation for the number of days Kyle will need to save in order to buy the computer.

   _____

   b. If Kyle saves for 10 days, will he have enough money to buy the computer? Explain.

   _____

   _____

   _____

   _____

   _____

   _____

   _____

   _____

11. a. Which values from the set {1, 2, 3, 4} are solutions of $11 \geq 2x + 5$? Show your work.

   _____

   _____

   _____

   _____

   b. Which values from the set {1, 2, 3, 4} are solutions of $11 > 2x + 5$? Show your work.

   _____

   _____

   _____

   _____

   _____

   c. How are your answers from parts a and b different?

   _____

   _____

   _____

   _____

   _____

12. Jasmine says that 2 and 3 are solutions of the inequality $16 \geq 11x - 6$. Is Jasmine correct? Explain. Show your work.

   _____

   _____

   _____

   _____

   _____

6.EE.6

SELECTED RESPONSE
Select the correct answer.

1. There are red and blue marbles in a bowl. There are twice as many blue marbles as red marbles. What expression represents the number of blue marbles?

   (A) 2b, where b is the number of blue marbles

   (B) 2r, where r is the number of red marbles

   (C) $r + 2$, where r is the number of red marbles

   (D) $\dfrac{b}{2}$, where b is the number of blue marbles

2. x is 4 less than a number y. What expression represents the value of x?

   (A) $x - 4$

   (B) $y - 4$

   (C) $x + 4$

   (D) $y + 4$

3. Kyle starts with $15.00 and saves $3.50 each day. What expression represents the total amount Kyle saves?

   (A) $3.50

   (B) $15.00

   (C) $3.5t + 15$, where t is the number of days

   (D) $15t + 3.5$, where t is the number of days

4. The product of two different numbers is 132. If one of the numbers is x, what expression represents the value of the other number?

   (A) $\dfrac{132}{x}$

   (B) $132x$

   (C) $132 - x$

   (D) $x + 132$

Select all correct answers.

5. Joan has 3 fewer dogs than rabbits. If r is the number of rabbits Joan has, which expressions represent the total number of animals Joan has?

   (A) r

   (B) $r + (r - 3)$

   (C) $r - 3$

   (D) $2r - 3$

   (E) $r + (r + 3)$

CONSTRUCTED RESPONSE

6. Paulo and Marie are collecting quarters. The number of quarters Paulo has is 3 times the quantity of 5 fewer than the number of quarters Marie has. Write an expression for the number of quarters Paulo in terms of the number of quarters Marie has. Define any variables used.

   _____

   _____

   _____

   _____

7. The value of x is 3 more than half the value of y.

   a. Write an expression for the value of x in terms of y.

   _____

   b. What is the value of x if $y = 7$? Show your work.

   _____

   _____

   _____

   _____

   _____

8. Daisies and tulips are planted in a garden. There are 11 fewer tulips planted than daisies.

   a. Write an expression that represents the number of tulips in terms of the number of daisies. Define any variables used.

_____

_____

   b. If 18 daisies are planted, how many tulips are planted?

_____

_____

9. Elena is selling tickets for an amusement park. She sells triple the number of student tickets as adult tickets and she sells 8 fewer senior tickets than adult tickets.

   a. Write expressions for the number of adult tickets, student tickets, and senior tickets, using *a* as the number of adult tickets.

_____

_____

_____

   b. Using your answers from part b, write a simplified expression for the total number of tickets Elena sells.

_____

_____

_____

   c. If Elena sells 15 adult tickets, does she sell at least 100 total tickets? Show your work.

_____

_____

10. A group of students collect a number of shells on the beach. They sort the shells into three piles based on the size of each shell. The first pile has half as many shells as the number they collected. The second pile has 10 fewer shells than the first pile. The third pile has the remaining shells.

   a. Write simplified expressions for the number of shells in each pile in terms of the total number of shells. Define any variables used.

_____

_____

_____

_____

_____

_____

_____

_____

_____

   b. If there are 22 shells in the first pile, how many total shells did the students collect? Explain two ways you could find the total number of shells.

_____

_____

_____

_____

_____

_____

_____

_____

6.EE.7

SELECTED RESPONSE
Select the correct answer.

1. Which of these equations has the same solution as the equation $x + 5 = 12$?

    Ⓐ $x + 5 = 7$

    Ⓑ $x + 8 = 15$

    Ⓒ $x + 7 = 12$

    Ⓓ $x + 12 = 20$

2. Thomas put $\frac{1}{4}$ of the c coins he had in his pocket into the jar under his bed. He put 16 coins into the jar. The equation that models this situation is $\frac{1}{4}c = 16$. How many coins did Thomas have in his pocket?

    Ⓐ 4 coins

    Ⓑ 12 coins

    Ⓒ 20 coins

    Ⓓ 64 coins

3. What is the procedure for solving the equation $\frac{1}{2}x = 16$?

    Ⓐ Add $\frac{1}{2}$ to both sides of the equation.

    Ⓑ Subtract $\frac{1}{2}$ from both sides of the equation.

    Ⓒ Multiply both sides of the equation by 2.

    Ⓓ Multiply both sides of the equation by $\frac{1}{2}$.

4. There are 6 blue shirts and g green shirts in a drawer. There are 11 shirts total in the drawer. What equation models this situation?

    Ⓐ $6 + g = 11$

    Ⓑ $6g = 11$

    Ⓒ $6 - g = 11$

    Ⓓ $\frac{1}{6}g = 11$

CONSTRUCTED RESPONSE

5. What is the solution of the equation $3 + x = 9$? Show your work.

    _____

    _____

    _____

6. Sally measured the height of a flower growing in her garden. The flower was $3\frac{1}{4}$ inches tall. Over the next week, the flower grew h inches and measured $4\frac{1}{8}$ inches tall. Write an equation that models the situation. Then solve the equation and state how much the flower grew during the week.

    _____

    _____

    _____

7. The sum of 6 and another number is 23. Write and solve an equation to find the other number. Show your work.

    _____

    _____

    _____

8. Cho is driving a car. He gets to his destination, which is 72 miles away, in 1 hour and 30 minutes.

   a. The equation $d = rt$ can be used to model Cho's drive, where d is the distance traveled, r is the speed of the car, and t is the amount of time spent traveling. Substitute Cho's time and distance into the equation.

   _____

   b. Solve the equation in part a to find Cho's speed. Show your work.

   _____

   _____

   _____

9. Kirk owns a bakery and is making muffins. Each batch of muffins uses $\frac{2}{3}$ cup of milk. He has 1 gallon of milk to use.

   a. If Kirk uses $\frac{1}{4}$ gallon of milk in total, how many batches of muffins did he make? Write and solve an equation to find the answer. Show your work. (Hint: There are 16 cups in 1 gallon.)

   _____

   _____

   _____

   b. Kirk earned $108 from selling the muffins. How much money did he earn per batch? Write and solve an equation to find how much money Kirk earned per batch.

   _____

   _____

   _____

   _____

10. Lauren incorrectly solves the equation $\frac{4}{5} + x = \frac{13}{5}$. Her work is shown below. Explain Lauren's mistake and find the correct solution. Show your work.

$$\frac{4}{5} + x = \frac{13}{5}$$
$$\frac{4}{5} + \frac{4}{5} + x = \frac{13}{5} + \frac{4}{5}$$
$$x = \frac{17}{5}$$

   _____

   _____

   _____

   _____

   _____

11. Adam is saving money to buy a computer. He saves s dollars each week. After 7 weeks, he has $315 saved.

   a. Write an equation that models the situation.

   _____

   b. How much does Adam save each week? Show your work.

   _____

   _____

   _____

   _____

   c. The computer Adam wants to buy is $450. How many more weeks does he have to save to buy the computer? Write an equation to model this situation and solve. Show your work.

   _____

   _____

   _____

6.EE.8

SELECTED RESPONSE
Select the correct answer.

1. What inequality has the solutions graphed on the number line?

Ⓐ $x < 3$

Ⓑ $x \le 3$

Ⓒ $x > 3$
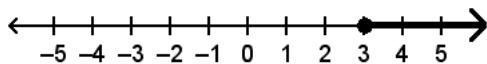
Ⓓ $x \ge 3$

2. All of the students in a class are older than 10 years. What inequality represents the ages a of the students?

Ⓐ $a < 10$

Ⓑ $a \le 10$

Ⓒ $a > 10$

Ⓓ $a \ge 10$

3. Dianne is 5 feet and 6 inches tall. Manuel is taller than Dianne. What inequality represents Manuel's height h in feet? Recall that there are 12 inches in a foot.

Ⓐ $h < 5.6$

Ⓑ $h > 5.6$

Ⓒ $h < 5.5$

Ⓓ $h > 5.5$

4. Jay jogs daily for exercise. He jogs faster than 3.5 miles per hour every day. Which inequality represents Jay's jogging speeds s?

Ⓐ $s < 3.5$

Ⓑ $s \le 3.5$

Ⓒ $s > 3.5$

Ⓓ $s \ge 3.5$

Select all correct answers.

5. Which inequalities share some solutions with $x \ge 3$?

Ⓐ $x > 3$

Ⓑ $x < 0$

Ⓒ $x \le 3$

Ⓓ $x \ge 5$

Ⓔ $x < 3$

CONSTRUCTED RESPONSE

6. Jenna eats dinner at a restaurant. Her bill is $14.50. Jenna pays her bill and leaves a tip. Write an inequality to represent the total cost of Jenna's dinner.

_____

7. Describe the values graphed on the number line in words. The number line represents the solutions of what inequality? How many solutions does this inequality have?

_____

_____

_____
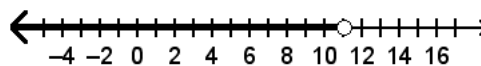
8. Graph the solutions of $x < 2$ and $x \le 2$ on the number lines. How are the solutions of the inequalities similar? How are they different?

_____

_____

_____
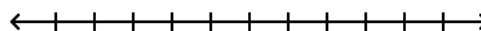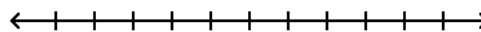
9. Keith wrote the inequality $x < 4$ to represent the statement "a number x is less than 4." He graphed the solutions of the inequality on the number line shown. Did Keith write the inequality and graph the solutions correctly? Explain.

_____

_____

_____

_____

_____

_____
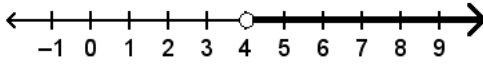
10. a. The value of n is less than 20. Write the inequality that represents the value of n and graph the solutions on the number line.


_____
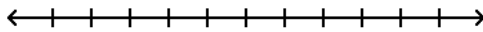
b. The value of m is greater than 5. Write the inequality that represents the value of m and graph the solutions on the number line.

_____
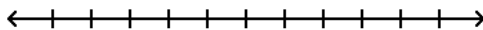
c. Describe the solutions graphed in parts a and b. Find any common solutions to both inequalities.

_____

_____

_____

_____

_____

11. Savannah's daily commute from home to work is more than 35 miles each way.

a. Write an inequality that represents this situation.

_____

b. Graph the solutions of the inequality from part a.
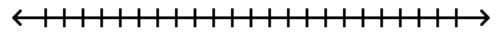
c. If Savannah travels 35 miles from home, is it possible she is at work? Explain.

_____

_____

_____

12. The graph on the number line shows the different amounts of money in dollars that Liam saves weekly.
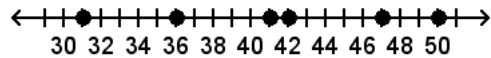
a. Liam wants to save as much as or more than he did the week during which he saved the least. Write an inequality that represents this situation.

_____

b. Describe the solutions of the inequality from part a in terms of the situation.

_____

_____

c. Does every solution of the inequality represent a realistic amount? Explain.

_____

_____

_____

6.EE.9

SELECTED RESPONSE
Select the correct answer.

1. The graph below shows the relationship between the number of miles a person walks and the number of hours spent walking. What equation best describes the relationship between the two variables?

Ⓐ $t = 4d$

Ⓑ $d = 4t$
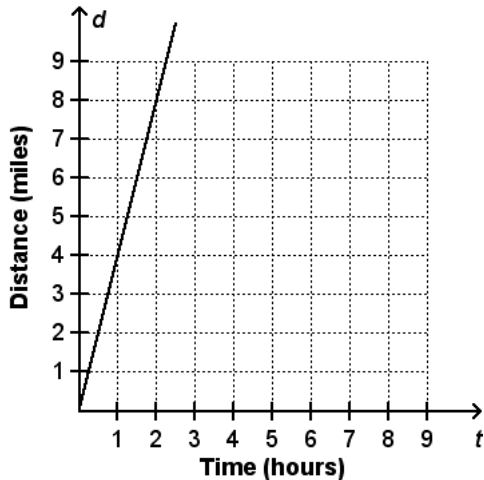
Ⓒ $t = d$

Ⓓ $d = \dfrac{1}{4}t$

2. A gardener is growing tomato plants. One plant starts out 5 cm tall. It grows a constant 2 cm every week. What equation represents the height h of the plant after t weeks?

Ⓐ $t = 5h + 2$

Ⓑ $t = 2h + 5$

Ⓒ $h = 5t + 2$

Ⓓ $h = 2t + 5$

3. The table below shows the balance of a savings account after t weeks, where money is being withdrawn at a constant rate. Peter can find the balance of the account based on how many weeks have passed. What are the independent and dependent variables, and how do they change?

Time (weeks), t	Balance (dollars), b
0	850
1	800
2	750
3	700

Ⓐ As the independent variable t increases by 1, the dependent variable b increases by 50.

Ⓑ As the independent variable t increases by 1, the dependent variable b decreases by 50.

Ⓒ As the independent variable b increases by 1, the dependent variable t increases by 50.

Ⓓ As the independent variable b increases by 1, the dependent variable t decreases by 50.

Select all correct answers.

4. Gloria is an artist. She sets a goal to paint 2 pieces every month. She has already painted 5 pieces. The number of pieces Gloria paints depends on the number of months she spends painting. Which statements describe the number of pieces p Gloria paints over t months if she meets her goal?

Ⓐ p is the independent variable and t is the dependent variable.

Ⓑ t is the independent variable and p is the dependent variable.

Ⓒ p increases by 2 as t increases by 1.

Ⓓ t increases by 2 as p increases by 1.

Ⓔ The equation representing the situation is $p = 2t + 5$.

CONSTRUCTED RESPONSE

5. An online bookstore is having a sale. All paperback books are $6.00, with a flat shipping fee of $2.50. Write an equation that represents the total cost c based on buying b books. Identify the independent and dependent variables and how the dependent variable changes in relation to the independent variable.

_____

_____

_____

_____

_____

6. The graph below shows the relationship between the number of pencils bought and the cost. Describe the relationship between the two variables. Use this relationship to write an equation relating the two variables.

_____

_____

_____

_____

_____
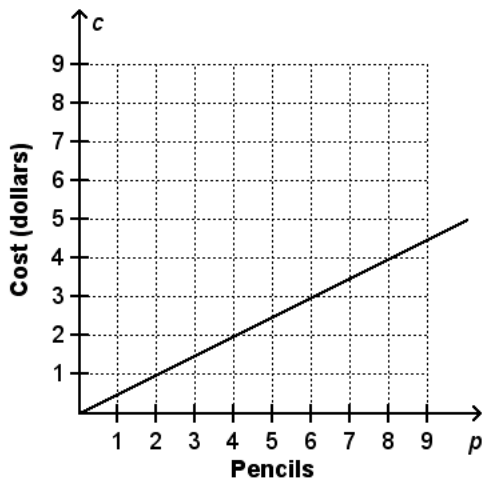
7. The table below shows the number of words w a person types after t minutes. The number of words typed per minute is a constant 52.

Time (minutes), t	Number of words, w
0	0
1	52
2	104
3	156

a. The number of words typed is determined by how many minutes the person spends typing. What are the independent and dependent variables?

_____

_____

_____

_____

_____

_____

_____

b. Graph the values from the table.
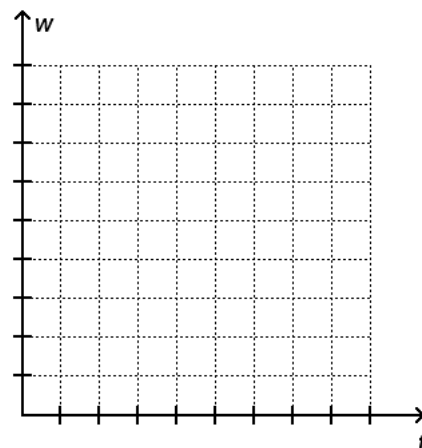
c. Write an equation that represents the situation.

_____

6.EE.1 Answers

1. B
2. D
3. A
4. B
5. B, D, E
6. G
7. F
8. H
9. A
10. C
11. Louis switched the bases and the exponents. He evaluated $5^3 + 3^6$ instead of $3^5 + 6^3$.

    $3^5 + 6^3 = 3 \times 3 \times 3 \times 3 \times 3 \times 6 \times 6 \times 6$
    $= 459$

    Rubric
    1 point for identifying mistake; 1 point for correct expansion; 1 point for correct answer

12.
    $11^2 \times 2^3 + 3^5 + 9^3$
    $= (11 \times 11)(2 \times 2 \times 2) +$
    $\quad (3 \times 3 \times 3 \times 3 \times 3) + (9 \times 9 \times 9)$
    $= (121)(8) + 243 + 729$
    $= 968 + 243 + 729$
    $= 1{,}940$

    Rubric
    1 point for answer; 3 points for work

13. a. The area of the square is
       $8^2 = 8 \times 8 = 64$ square centimeters.
    b. The surface area of the cube is
       $6 \times 8^2 = 6 \times 8 \times 8 = 384$ square centimeters.
    c. The volume of the cube is
       $8^3 = 8 \times 8 \times 8 = 512$ cubic centimeters.

    Rubric
    a. 1 point for expression; 1 point for evaluating
    b. 1 point for expression; 1 point for evaluating
    c. 1 point for expression; 1 point for evaluating

14. a. Kerry puts $2 \times 2 = 2^2$ pennies into the jar on the second day, $2 \times 2 \times 2 = 2^3$ pennies into the jar on the third day, and $2 \times 2 \times 2 \times 2 = 2^4$ pennies into the jar on the fourth day.
    b. For each day, the exponent that 2 is being raised to increases by 1.
    c. On the seventh day, she will put 2^7 pennies into the jar.
       $2^7 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 128$
    d. There will be $2.54 in the jar at the end of the week.

    Rubric
    a. 1 point for each expression
    b. 1 point
    c. 1 point for expression; 1 point for expanding and evaluating
    d. 1 point

6.EE.2a Answers

1. B
2. A
3. C
4. D
5. A, C, E
6. A, C, F
7. a. $+$
   b. $-$
   c. $\div$
   d. $-$
   e. $\times$
   f. $+$
8. a. Clark made $r + 3$ hits in the first hour.
   b. Rebecca made $2c - 5$ hits in the second hour.
   Rubric
   a. 1 point
   b. 1 point
9. a. There are $t + 3$ lions.
   b. There are $2(t + 3)$ bears. ($2t + 6$ is also acceptable.)
   Rubric
   a. 1 point
   b. 1 point
10. a. $n + 3$
    b. $n + 3$
    c. $n + 3$
    d. The statements in parts a through c represent the same expression, $n + 3$.
    Rubric
    a. 1 point
    b. 1 point
    c. 1 point
    d. 1 point

11. a. The number of lights required in the room is $\dfrac{s}{5}$.
    b. The construction crew has $\dfrac{s}{5} + 10$ lights.
    c. The construction crew has $\dfrac{s}{5} - 15$ lights.
    d. The construction crew has $2\left(\dfrac{s}{5}\right)$ lights.
    Rubric
    a. 1 point
    b. 1 point
    c. 1 point
    d. 1 point
12. Sal gave Trudy $c - 3$ apple pies, which is 3 apple pies fewer than c cherry pies. Sal should have given Trudy $c + 3$ apple pies.
    Rubric
    1 point for mistake; 1 point for correction

6.EE.2b Answers

1. A

2. C

3. B

4. D

5. a. Product
   b. Difference
   c. Sum
   d. Product
   e. Sum
   f. Quotient

6. The expression is $7(2 + x)$. The factors of the expression are 7 and $(2 + x)$.

   Rubric
   1 point for expression; 1 point for each factor

7. Possible answer:
   One sum is $14 + b$, with terms 14 and b. Another sum is $b + 27d$, with terms b and $27d$.

   Rubric
   1 point for each sum; 1 point for each set of terms

8. The products are $14n$ and $6k$. The coefficients are 14 and 6.

   Rubric
   1 point for each product; 1 point for coefficients

9. a. Terms: $7x^2$, $2y$, and -8; Products: $7x^2$ and $2y$; Coefficients: 7 and 2
   b. First, evaluate x^2. Next, multiply 7 and x^2 and multiply 2 and y. Finally, add and subtract terms. The value of the expression at $x = 2$ and $y = -1$ is 18.

   Rubric
   a. 1 point for terms; 1 point for products; 1 point for coefficients
   b. 1 point for order of operations; 1 point for value of expression

10. No, this is not correct. Lara found the terms of the two sums. The factors of the product are $(5 + s)$ and $(k + 7)$.

    Rubric
    1 point for answer; 2 points for explaining the mistake; 1 point for each correct factor

11. a. The two sums are $56xy + 5$ and
    $$-6x + \frac{y}{20}.$$
    b. The terms of the expression are $56xy$, 5, $-6x$, and $\frac{y}{20}$.
    c. The product is $-6x$ and the coefficient is -6.
    d. The quotient is $\frac{y}{20}$.

    Rubric
    a. 1 point for each sum
    b. 1 point
    c. 1 point for product; 1 point for coefficient
    d. 1 point

12. Sums: $x + 5$, $y + 9$, $2 + x$, $y + 23$, and $(x + 5)(y + 9) + (2 + x)(y + 23)$

    Products: $(x + 5)(y + 9)$ and $(2 + x)(y + 23)$

    Factors: $(x + 5)$, $(y + 9)$, $(2 + x)$, and $(y + 23)$

    Rubric
    1 point for sums $x + 5$, $y + 9$, $2 + x$, and $y + 23$; 1 point for sum $(x + 5)(y + 9) + (2 + x)(y + 23)$; 1 point for products; 1 point for factors

6.EE.2c Answers

1. B

2. C

3. A

4. D

5. A, D, E

6. The surface area is 70 square feet.

$A = 2(5)(3) + 2(5)(2.5) + 2(3)(2.5)$
$= 10(3) + 10(2.5) + 6(2.5)$
$= 30 + 25 + 15$
$= 70$

The volume is 37.5 cubic feet.

$V = (5)(3)(2.5)$
$= 15(2.5)$
$= 37.5$

Rubric
1 point for surface area; 1 point for surface area work; 1 point for volume; 1 point for volume work

7. 76

Rubric
2 points

8. a. Mandy has $4q$ nickels and $q + 10$ dimes.

b. If Mandy has $5 in quarters, she has $5.00 \div 0.25 = 20$ quarters. So, she has $4q = 4(20) = 80$ nickels and $q + 10 = 20 + 10 = 30$ dimes.

Rubric
a. 1 point for each expression
b. 1 point for number of nickels; 1 point for number of dimes

9. At $k = 5$:

$11(5) + 9 - 5^2 - \dfrac{15}{5} = 11(5) + 9 - 25 - \dfrac{15}{5}$
$= 55 + 9 - 25 - \dfrac{15}{5}$
$= 55 + 9 - 25 - 3$
$= 64 - 25 - 3$
$= 36$

Rubric
1 point for answer; 1 point for reasonable work

10. In the first line of Mark's work, he subtracted 2 from 12 before evaluating the exponent. The order of operations states that exponents should be evaluated first and that subtraction should be performed last.

$4(2) + 12 - 2^2 = 4(2) + 12 - 4$
$= 8 + 12 - 4$
$= 20 - 4$
$= 16$

Rubric
2 points for identifying mistake;
1 point for correcting mistake;
1 point for reasonable work

11. a. The volume of one tissue box is $4^3 = 64$ cubic inches.

b. The volume of the crate will be equal to the total volume of 32 tissue boxes, which is $32 \times 64 = 2048$ cubic inches.

c. No; if you only know the volume, you don't know how the boxes are arranged. They could be in one layer of 32 boxes, two layers of 16 boxes, etc.

Rubric
a. 1 point
b. 1 point for answer; 1 point for explanation
c. 1 point for answer; 1 point for explanation

12. a. $7m + 10\left(\dfrac{d}{3}\right)$

b. It will cost $69.

$7(7) + 10\left(\dfrac{6}{3}\right) = 7(7) + 10(2)$
$= 49 + 20$
$= 69$

c. It will cost $51.

$$7(3) + 10\left(\frac{9}{3}\right) = 7(3) + 10(3)$$
$$= 21 + 30$$
$$= 51$$

Rubric

a. 1 point

b. 1 point for answer; 1 point for work

c. 1 point for answer; 1 point for work

6.EE.3 Answers

1. A

2. A

3. C

4. C

5. B, C, E

6. a.

$$23y - (7x - 2y) + x = 23y - 7x - (-2y) + x$$
$$= 23y - 7x + 2y + x$$

b. $23y - 7x + 2y + x = 23y + 2y - 7x + x$

c. $23y + 2y - 7x + x = 25y - 6x$

Rubric

a. 1 point

b. 1 point

c. 1 point

7. Possible answer: Use the associative property of addition to move the parentheses to the right, and then combine like terms.

$$(2x + 3y) + y = 2x + (3y + y)$$
$$= 2x + (4y)$$
$$= 2x + 4y$$

Rubric

1 point for answer; 1 point for reasonable work; 1 point for using properties of operations correctly

8. a. $a + n + 2a + 10$

b. Possible answer: First, use the commutative property of addition to move $2a$ to the left of n, $a + n + 2a + 10 = a + 2a + n + 10$. Then combine like terms to simplify as shown below.

$$a + n + 2a + 10 = a + 2a + n + 10$$
$$= 3a + n + 10$$

Rubric

a. 1 point

b. 1 point for answer; 1 point for reasonable work; 1 point for explaining use of properties of operations

9. a. Areas of faces: ac, ac, bc, bc, ab, ab

$$A = ac + ac + bc + bc + ab + ab$$
$$= 2ac + 2bc + 2ab$$
$$= 2(ac + bc + ab)$$

b. Substitute a for b and c in the expression $2(ac + bc + ab)$.

$$A = 2(ac + bc + ab)$$
$$= 2(a \cdot a + a \cdot a + a \cdot a)$$
$$= 2(a^2 + a^2 + a^2)$$
$$= 2(3a^2)$$
$$= (2 \cdot 3)a^2$$
$$= 6a^2$$

Rubric

a. 1 point for areas; 1 point for expression; 1 point for reasonable work

b. 1 point for answer; 1 point for reasonable work

10. Laura did not distribute the negative sign to $12y$ when evaluating $-4(2x + 3y)$. Using the distributive property, $-4(2x + 3y) = -8x - 12y$.

$$12x - 18y - 4(2x + 3y) =$$
$$12x - 18y - 8x - 12y$$

Use the commutative property to move $-8x$ to the left of $-18y$. Then combine like terms.

$$12x - 18y - 8x - 12y = 12x - 8x - 18y - 12y$$
$$= 4x - 30y$$

Rubric

1 point for identifying error; 1 point for correcting error; 1 point for correct equivalent expression; 1 point for reasonable work

6.EE.4 Answers

1. C

2. D

3. B

4. B, C, E

5. E

6. B

7. D

8. A

9. G

10. a. $p + t + 2(p + t)$

    b. $3(p + t)$

    c. Yes, Blaine and Tanya sold the same amount. They both sold $3p + 3t$ pumpkins and tomatoes.

    Blaine: $p + t + 2(p + t) = p + t + 2p + 2t$
    $$= p + 2p + t + 2t$$
    $$= 3p + 3t$$

    Tanya: $3(p + t) = 3p + 3t$

    Rubric

    a. 1 point

    b. 1 point

    c. 1 point for answer; 1 point for explanation

11. a. $1\frac{3}{4}b + \frac{1}{2}b$

    b. $\frac{2}{3}b + 1\frac{1}{3}b$

    c. Peter did add enough flour to his cookies, but he did not add enough sugar. He added $2b$ cups of sugar, but he needed $2\frac{2}{3}b$ cups.

    So, the expression:
    $(8x - 12y) + y + 2(3 + 3x)$
    is equivalent to the expression:
    $-11y + 6 + 14x$.

$$1\frac{3}{4}b + \frac{1}{2}b = \frac{7}{4}b + \frac{2}{4}b$$
$$= \frac{9}{4}b$$
$$= 2\frac{1}{4}b$$

$$\frac{2}{3}b + 1\frac{1}{3}b = \frac{2}{3}b + \frac{4}{3}b$$
$$= \frac{6}{3}b$$
$$= 2b$$

Rubric

a. 1 point

b. 1 point

c. 0.5 point for each simplification; 0.5 point for each answer

12. Possible solution:

    First, use the distributive property and the associative property of multiplication to simplify $2(3 + 3x)$.

    $(8x - 12y) + y + 2(3 + 3x)$
    $= (8x - 12y) + y + 2 · 3 + 2 · (3x)$
    $= (8x - 12y) + y + 6 + (2 · 3)x$
    $= (8x - 12y) + y + 6 + 6x$

    Use the associative property of addition to move the parentheses to the right. Combine like terms inside the parentheses.

    $(8x - 12y) + y + 6 + 6x$
    $= 8x + (-12y + y) + 6 + 6x$
    $= 8x - 11y + 6 + 6x$

    Use the commutative property of addition to move $8x$ to the right of 6.

    $8x - 11y + 6 + 6x = -11y + 6 + 8x + 6x$

    Finally, combine like terms.
    $-11y + 6 + 8x + 6x = -11y + 6 + 14x$

    Rubric
    1 point for answer; 3 points for using properties of operations correctly

13. a. $2(n + 1) + n + 3 + n + 1 + n + 1 + n + 2n$

    b. $2(n + 1) + n + 3 + n + 1 + n + 1 + n + 2n$

$$= 2n + 2 + n + 3 + n + 1 + n + 1 + n + 2n$$

$$= 2n + n + n + n + n + 2n + 2 + 3 + 1 + 1$$

$$= 8n + 7$$

c. No, Nick's expression is not correct. His expression simplifies to $8n + 6$, and $8n + 6 \neq 8n + 7$.

$$2n + 1 + 2n + 4n + 5$$

$$= 2n + 2n + 4n + 1 + 5$$

$$= 8n + 6$$

Rubric

a. 1 point

b. 1 point for simplification; 2 points for reasonable work

c. 1 point for answer; 2 points for reasonable work

6.EE.5 Answers

1. B
2. C
3. B
4. B
5. A, C, D
6. $x = 4$:

$$7 \overset{?}{\leq} 5(4) - 16$$

$$7 \overset{?}{\leq} 20 - 16$$

$$7 \not\leq 4$$

4 is not a solution of $7 \leq 5x - 16$ because 7 is not less than or equal to 4.

Rubric
1 point for answer; 1 point for reasonable work

7. No. When substituting 7 for x, the left side of the inequality is equal to $9(7) - 3 = 63 - 3 = 60$, which is equal to 60 and produces a false statement.

Rubric
1 point for answer; 2 points for explanation

8. Substituting 1 for x makes the equation true.

$x = 0$:

$$4(0) + 9 \overset{?}{=} 13$$

$$0 + 9 \overset{?}{=} 13$$

$$9 \neq 13$$

$x = 1$:

$$4(1) + 9 \overset{?}{=} 13$$

$$4 + 9 \overset{?}{=} 13$$

$$13 = 13$$

$x = 2$:

$$4(2) + 9 \overset{?}{=} 13$$

$$8 + 9 \overset{?}{=} 13$$

$$17 \neq 13$$

Rubric
1 point for answer; 1 point for reasonable work.

9. All values from the set of natural numbers except for 1 make the inequality true. When substituting 1 for x, the left side of the inequality is equal to $6 + 2(1) = 6 + 2 = 8$, which is not greater than 8. When substituting 2 for x, the left side of the inequality is equal to $6 + 2(2) = 6 + 4 = 10$, which is greater than 8. Since the left side of the inequality increases as the value of x increases, the inequality is true for all natural numbers greater than 1.

Rubric
1 point for answer; 2 points for explanation

10. a. $300 = 22.5t + 75$

b. Yes, Kyle will have enough to buy the computer if he saves for 10 days because 10 is a solution of the equation $300 = 22.5t + 75$.

$$300 \overset{?}{=} 22.5(10) + 75$$

$$300 \overset{?}{=} 225 + 75$$

$$300 = 300$$

Rubric
a. 2 points
b. 1 point for answer; 1 point for explanation

11. a. 1, 2, and 3 are solutions of $11 \geq 2x + 5$.

$$11 \overset{?}{\geq} 2(1) + 5 \qquad 11 \overset{?}{\geq} 2(2) + 5$$

$$11 \overset{?}{\geq} 2 + 5 \qquad 11 \overset{?}{\geq} 4 + 5$$

$$11 \geq 7 \qquad 11 \geq 9$$

$$11 \overset{?}{\geq} 2(3) + 5 \qquad 11 \overset{?}{\geq} 2(4) + 5$$

$$11 \overset{?}{\geq} 6 + 5 \qquad 11 \overset{?}{\geq} 8 + 5$$

$$11 \geq 11 \qquad 11 \not\geq 13$$

b. 1 and 2 are solutions of $11 > 2x + 5$.

$$11 \overset{?}{>} 2(1) + 5 \qquad 11 \overset{?}{>} 2(2) + 5$$

$$11 \overset{?}{>} 2 + 5 \qquad 11 \overset{?}{>} 4 + 5$$

$$11 > 7 \qquad 11 > 9$$

$$11 \overset{?}{>} 2(3) + 5 \qquad 11 \overset{?}{>} 2(4) + 5$$

$$11 \overset{?}{>} 6 + 5 \qquad 11 \overset{?}{>} 8 + 5$$

$$11 \not> 11 \qquad 11 \not> 13$$

c. The answer from part a includes 3 as a solution, while the answer from part b does not.

Rubric

a. 1 point for solutions; 1 point for reasonable work

b. 1 point for solutions; 1 point for reasonable work

c. 1 point

12. Jasmine is incorrect about 3 being a solution of the inequality $16 \ge 11x - 6$. The inequality is not true when substituting 3 for x:

$$16 \overset{?}{\ge} 11(3) - 6$$

$$16 \overset{?}{\ge} 33 - 6$$

$$16 \not\ge 27$$

Jasmine is correct that 2 is a solution of the inequality $16 \ge 11x - 6$. The inequality is true when substituting 2 for x:

$$16 \overset{?}{\ge} 11(2) - 6$$

$$16 \overset{?}{\ge} 22 - 6$$

$$16 \ge 16$$

Rubric

1 point for saying 3 is not a solution;
1 point for saying 2 is a solution; 2 points for explanation with work

6.EE.6 Answers

1. B
2. B
3. C
4. A
5. B, D
6. Possible answer: $3(q - 5)$; q is the number of quarters Marie has.

   Rubric
   1 point for expression; 1 point for defining variable

7. a. $\frac{1}{2}y + 3$

   b. The value of x is $6\frac{1}{2}$.

   $$\frac{1}{2}(7) + 3 = \frac{7}{2} + 3$$
   $$= \frac{7}{2} + \frac{6}{2}$$
   $$= \frac{13}{2} = 6\frac{1}{2}$$

   Rubric
   a. 1 point
   b. 1 point for answer; 1 point for reasonable work

8. a. $d - 11$; d is the number of daisies planted.

   b. 7

   Rubric
   a. 1 point for expression; 1 point for defining variable
   b. 1 point

9. a. Adult tickets: a
   Student tickets: $3a$
   Senior tickets: $a - 8$

   b. $a + 3a + (a - 8) = 5a - 8$

   c. No, Elena only sells 67 tickets.
   $5(15) - 8 = 75 - 8 = 67$

   Rubric
   a. 1 point for each expression
   b. 0.5 point
   c. 1 point for answer; 0.5 point for work

10. a. Let s be the total number of shells.

    First pile: $\frac{s}{2}$ shells

    Second pile: $\frac{s}{2} - 10$ shells

    Third pile:

    $$s - \left(\frac{s}{2} + \left(\frac{s}{2} - 10 \right) \right) = s - \left(\frac{s}{2} + \frac{s}{2} - 10 \right)$$
    $$= s - (s - 10)$$
    $$= s - s + 10$$
    $$= 10 \text{ shells}$$

    b. The students collected 44 shells.

    First way: Use the expressions from part a. If the first pile contains 22 shells, the second pile contains 10 fewer than the first pile, or $22 - 10 = 12$ shells. The third pile contains 10 shells. The total number of shells the students collected is the sum of 22, 12, and 10, or $22 + 12 + 10 = 44$ shells.

    Second way: Use the information given about the first pile. The first pile contains half as many shells as the number the students collected. So, the total number of shells is double the amount in the first pile, $2 \cdot 22$, or 44 shells.

    Rubric
    a. 1 point for each expression; 1 point for defining variable
    b. 1 point for total shells; 1 point for each method explanation

6.EE.7 Answers

1. B

2. D

3. C

4. A

5.
$$3 + x = 9$$
$$3 - 3 + x = 9 - 3$$
$$x = 6$$

Rubric

1 point for answer; 1 point for reasonable work

6. The equation $3\frac{1}{4} + h = 4\frac{1}{8}$ models the situation.

$$3\frac{1}{4} + h = 4\frac{1}{8}$$
$$\frac{13}{4} + h = \frac{33}{8}$$
$$\frac{13}{4} - \frac{13}{4} + h = \frac{33}{8} - \frac{13}{4}$$
$$h = \frac{33}{8} - \frac{26}{8}$$
$$h = \frac{7}{8}$$

The flower grew $\frac{7}{8}$ inch during the week.

Rubric

1 point for equation; 1 point for solving the equation; 1 point for stating how much the flower grew

7. Define n to be the other number in the sum.
$$n + 6 = 23$$
$$n + 6 - 6 = 23 - 6$$
$$n = 17$$

Rubric

1 point for answer; 1 point for equation; 1 point for reasonable work

8. a. $1.5r = 72$

   b. 48 miles per hour
   $$1.5r = 72$$
   $$\frac{1.5r}{1.5} = \frac{72}{1.5}$$
   $$r = 48$$

Rubric

a. 1 point

b. 1 point for answer; 1 point for reasonable work

9. a. First, convert $\frac{1}{4}$ gallon to cups.

   $$\frac{1}{4} \text{ gallon}\left(\frac{16 \text{ cups}}{1 \text{ gallon}}\right) = \frac{1}{4}(16) \text{ cups} = 4 \text{ cups}$$

   Define m to be the number of batches of muffins Kirk made.

   $$\frac{2}{3}m = 4$$
   $$\frac{3}{2} \cdot \frac{2}{3}m = \frac{4}{1} \cdot \frac{3}{2}$$
   $$m = \frac{12}{2}$$
   $$m = 6$$

   Kirk made 6 batches of muffins.

   b. Define p to be the price per batch of muffins.
   $$6p = 108$$
   $$\frac{6p}{6} = \frac{108}{6}$$
   $$p = 18$$

   Kirk earned $18.00 per batch.

Rubric

a. 1 point for unit conversion; 1 point for equation; 1 point for answer; 1 point for showing work

b. 1 point for equation; 1 point for answer; 1 point for showing work

10. Lauren added $\dfrac{4}{5}$ to both sides instead of subtracting $\dfrac{4}{5}$ from both sides.

$$\dfrac{4}{5} + x = \dfrac{13}{5}$$

$$\dfrac{4}{5} - \dfrac{4}{5} + x = \dfrac{13}{5} - \dfrac{4}{5}$$

$$x = \dfrac{9}{5}$$

Rubric

2 points for explanation of mistake;
1 point for correct answer; 1 point for
reasonable work

11. a. $7s = 315$

b. Adam saves $45 each week.

$$7s = 315$$

$$\dfrac{7s}{7} = \dfrac{315}{7}$$

$$s = 45$$

c. Adam needs to save
$450 − $315 = $135 more to buy the
computer. Let w be the additional
number of weeks Adam must save.

$$45w = 135$$

$$\dfrac{45w}{45} = \dfrac{135}{45}$$

$$w = 3$$

Adam must save for 3 more weeks to
buy the computer.

Rubric

a. 1 point

b. 1 point for answer; 1 point for
reasonable work

c. 1 point for answer; 1 point for
equation; 1 point for reasonable work

6.EE.8 Answers

1. D
2. C
3. D
4. C
5. A, C, D
6. $c > 14.5$, where c is the total cost.

   Rubric
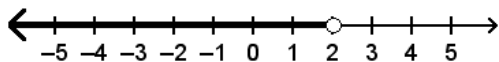   2 points
7. The values graphed on the number line are all numbers less than 11.

   These values are the solutions of $x < 11$.
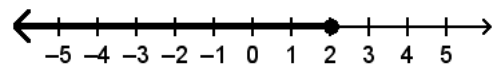
   The inequality has infinitely many solutions.

   Rubric
   1 point for description; 1 point for inequality; 1 point for infinitely many
8.

   represents the solutions of $x < 2$.

   represents the solutions of $x \leq 2$.

   The solutions of both include all values less than 2. The solutions of $x < 2$ do not include 2, but 2 is a solution of $x \leq 2$.
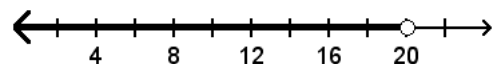
   Rubric
   1 point for each graph; 1 point for similarity; 1 point for difference
9. Keith wrote the correct inequality, but he did not graph the solutions correctly. Numbers less than 4 are to the left of 4 on the number line, not to the right.
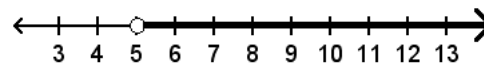
   Rubric
   1 point for identifying mistake; 2 points for explanation
10. a. $n < 20$

b. $m > 5$


c. The solutions of $n < 20$ are all numbers less than 20, and the solutions to $m > 5$ are all numbers greater than 5. The common solutions of the inequalities are all numbers between, but not equal to, 5 and 20.

   Rubric
   a. 1 point for inequality; 1 point for graph
   b. 1 point for inequality; 1 point for graph
   c. 1 point for description; 1 point for common values
11. a. The inequality $d > 35$, where d is the number of miles Savannah commutes to work, represents the situation.

    b.
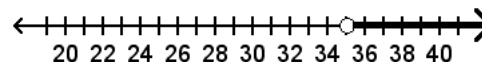
    c. No, because 35 is not a solution of $d > 35$.

    Rubric
    a. 1 point
    b. 1 point
    c. 1 point for answer; 1 point for explanation
12. a. $s \geq 31$
    b. Liam wants to save as much as or more than $31.
    c. No, every solution does not represent a realistic amount. The amounts will get too large to be realistic amounts of money for Liam to save. Also, Liam cannot save anything smaller than a penny, so the graph will not be a solid line.

    Rubric
    a. 1 point
    b. 1 point
    c. 1 point for answer; 2 points for explanation

6.EE.9 Answers

1. B

2. D

3. B

4. B, C, E

5. $c = 6b + 2.5$; the dependent variable is the total cost of the books c, and the independent variable is the number of books bought b. The total cost of the books increases by $6.00 for each book bought.
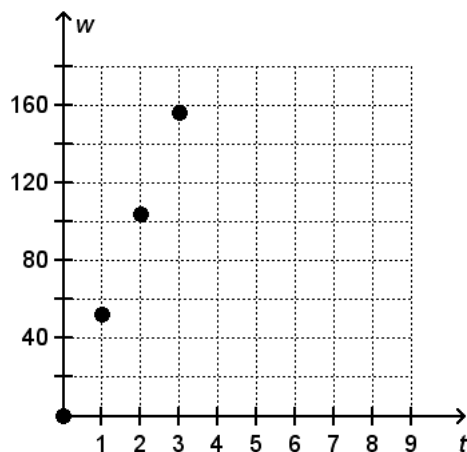
   Rubric
   1 point for equation;
   2 points for explanation

6. The cost increases by $0.50 for every pencil bought; $c = 0.5p$.

   (Also correct: The number of pencils bought increases by 2 for every $1.00 spent; $p = 2c$.)

   Rubric
   1 point for relationship;
   1 point for equation

7. a. The independent variable is t, and the dependent variable is w. The number of words typed increases by 52 over every minute spent typing.

   b.

   c. $w = 52t$

   Rubric
   a. 1 point for each variable
   b. 2 points
   c. 2 points