**SECURE MATERIAL – Reader Name: _____**

**Tennessee Comprehensive Assessment Program**

# TCAP/CRA

# 2014

# 7

# Phase II

## Fixing Up the Yard Task

## Anchor Set

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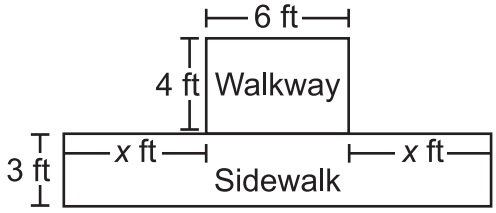
## Fixing Up the Yard

Alicia and her mom are repairing the 6-foot by 4-foot walkway in front of their house, plus a section of the sidewalk it connects to. The sidewalk section is 3 feet wide, and extends *x* feet to each side of the walkway. The dimensions are shown in the drawing.




The total area to be repaired can be calculated by adding the areas of the sidewalk section and the walkway.

a. Alicia's mom writes the expression $3(2x + 6) + 24$ to represent the area. Write a second expression that can be used to determine the area and show that the two expressions are equivalent.

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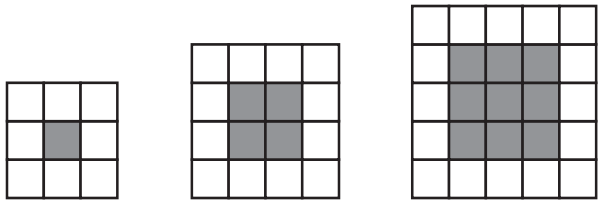
GO ON TO THE NEXT PAGE

## Fixing Up the Yard

Alicia and her mom also decide to tile the patio in their backyard. They will use square tiles to create a design. Alicia wants to create a design that consists of a dark square surrounded by a border of white tiles.

In the diagrams, *n* represents the length of a side of the dark square.




b. Write an expression that can be used to find the number of white tiles bordering a dark square of side length *n*.

c. Determine the side length of the dark square when the border has 52 white tiles. Show your work.

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## Scoring Guide

**The CCSS for Mathematical Content (2 points)**

7.EE.A1 Writes a second expression that can be used to determine the area and shows using properties of operations that the two expressions are equivalent.

**(1 Point)**

7.EE.B4a Determines the side length of the dark square in part c. Students may do this by:

- solving an algebraic equation of the form $b = \frac{1}{4}(52 - 4)$ or an equivalent equation using algebraic methods; or
- solving an algebraic equation using a table (algebraic equation may not be explicitly stated); or
- evaluating an arithmetic expression of the form $\frac{(52 - 4)}{4}$

May use an incorrect expression generated from part b.

**(1 Point)**

**The CCSS for Mathematical Practice (3 points)**

MP1 Completes all parts of the problem, making sense of the problem by interpreting the diagrams.

**(1 Point)**

(MP1: Make sense of problems and persevere in solving them.)

MP6 Uses precise calculations in determining the side length of the dark square in part c.

**(1 Point)**

(MP6: Attend to precision.)

MP8 Looks for and uses a pattern to write a rule to describe the relationship between the side length of the dark square and the number of white tiles in the border in part b. Students may do this by:

- explaining that the number of white tiles is four times the side length of the dark squares plus four additional tiles, or providing a similar description based on an alternate visualization of the diagram; or
- writing the equation $w = 4n + 4$ or an equivalent expression where $w$ represents the number of white tiles and $n$ represents the side length of the dark square.

**(1 Point)**

(MP8: Look for and express regularity in repeated reasoning.)

**TOTAL POINTS: 5**

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## The CCSS for Mathematical Content Addressed In This Task

| | |
|---|---|
| **Extend understanding of fraction equivalence and ordering.** | |
| 7.EE.A1 | Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. |
| **Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers.** | |
| 7.EE.B4a | Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where $p$, $q$, and $r$ are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?* |

**The CCSS for Mathematical Practice***

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

* Gray type indicates Mathematical Practices not addressed in this assessment.

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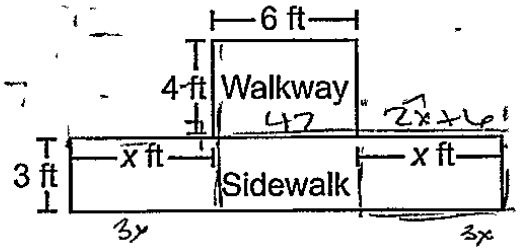
# A-1a

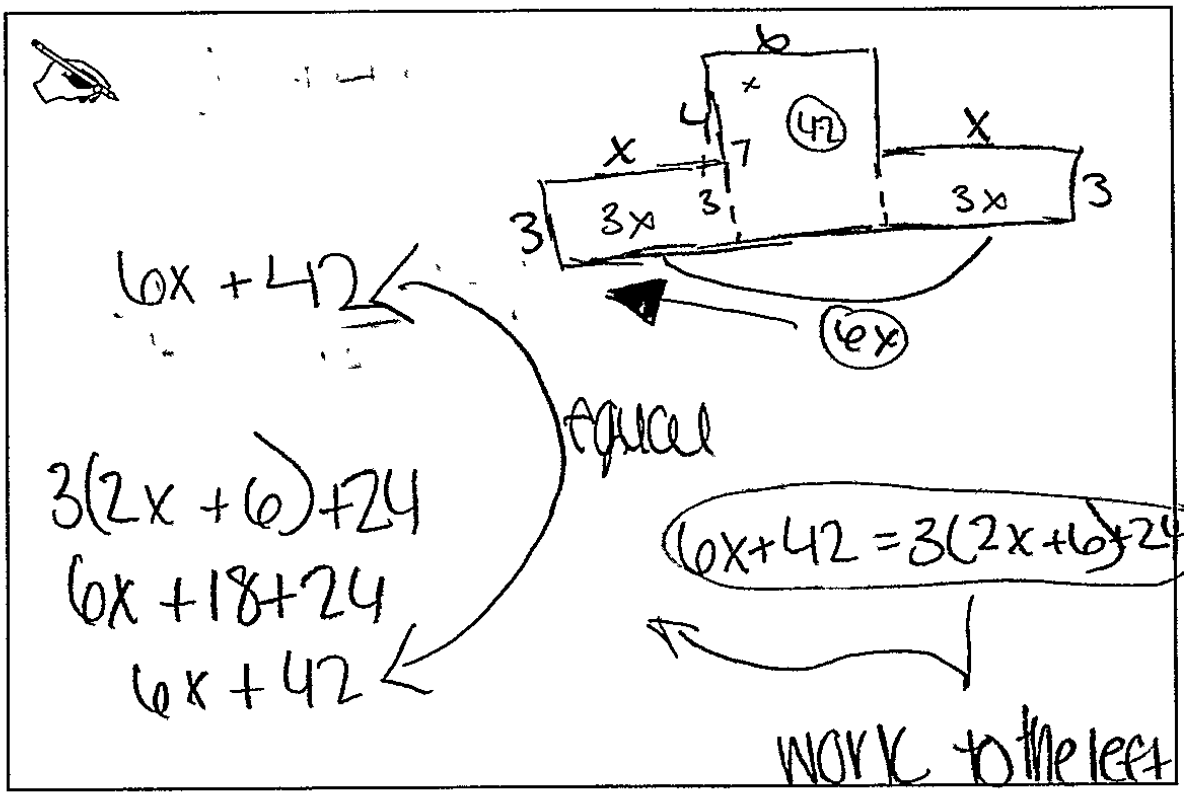
## Fixing Up the Yard

Alicia and her mom are repairing the 6-foot by 4-foot walkway in front of their house, plus a section of the sidewalk it connects to. The sidewalk section is 3 feet wide, and extends $x$ feet to each side of the walkway. The dimensions are shown in the drawing.




The total area to be repaired can be calculated by adding the areas of the sidewalk section and the walkway.

a. Alicia's mom writes the expression $3(2x + 6) + 24$ to represent the area. Write a second expression that can be used to determine the area and show that the two expressions are equivalent.

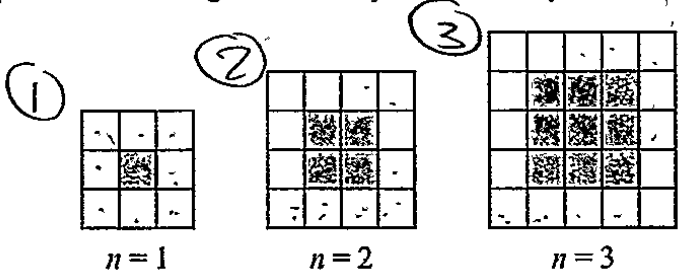


# A-1b

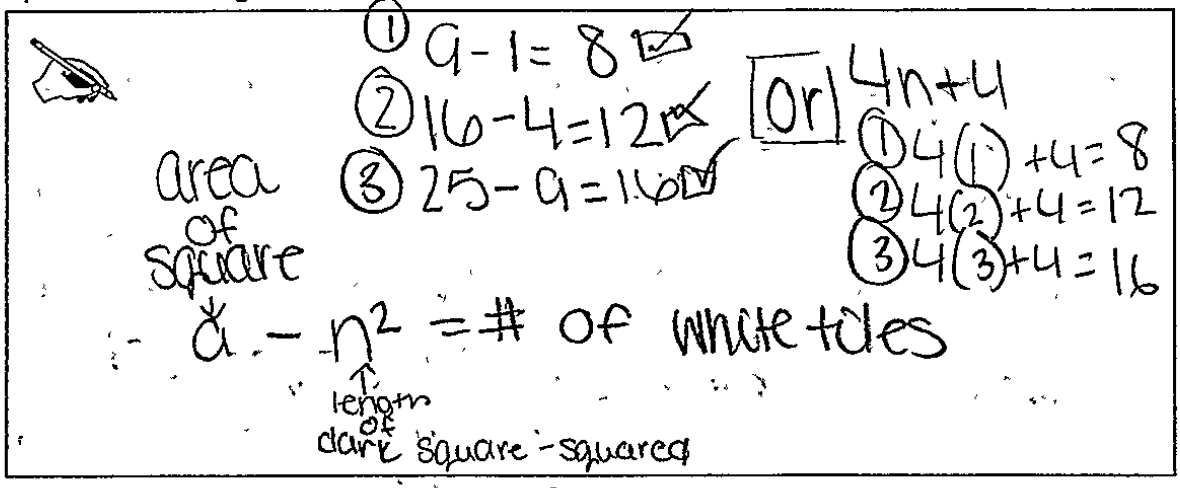
## Fixing Up the Yard

Alicia and her mom also decide to tile the patio in their backyard. They will use square tiles to create a design. Alicia wants to create a design that consists of a dark square surrounded by a border of white tiles.

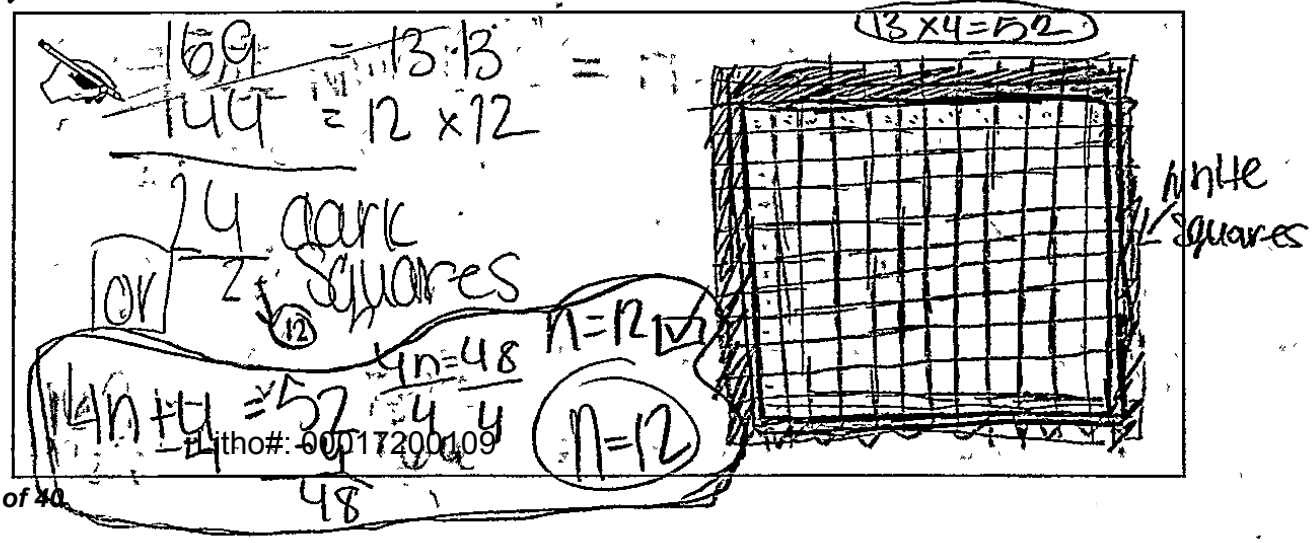
In the diagrams, $n$ represents the length of a side of the dark square.




b. Write an expression that can be used to find the number of white tiles bordering a dark square of side length $n$.




c. Determine the side length of the dark square when the border has 52 white tiles. Show your work.




Litho#: 0001720109

Anchor 1 Litho 00017200109

Total Content Points: 2 (7.EE.A1, 7.EE.B4a)

Total Practice Points: 3 (MP1, MP6, MP8)

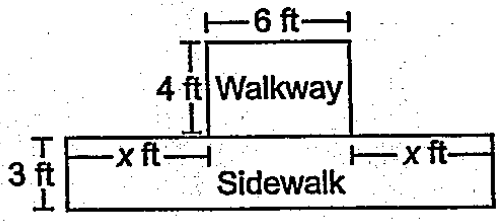
The student writes a second expression ($6x + 42$) that can be used to determine the area in Part A, and shows by using properties of operations that the two expressions are equivalent (7.EE.A1). In Part C, the student correctly determines the side length of the dark square by solving an algebraic equation, $4n + 4$ (7.EE.B4a). The student completes all parts of the problem and makes sense of the problem by interpreting the diagrams, as shown by the student's work in Parts A, B, and C (MP1). The student uses precise calculations to determine the correct side length of the dark square in Part C (MP6). In Part B, the student writes a correct rule ($4n + 4$) to describe the relationship between the side length of the dark square and the number of white tiles in the border (MP8).

Total Awarded Points: 5 out of 5

# A-2a

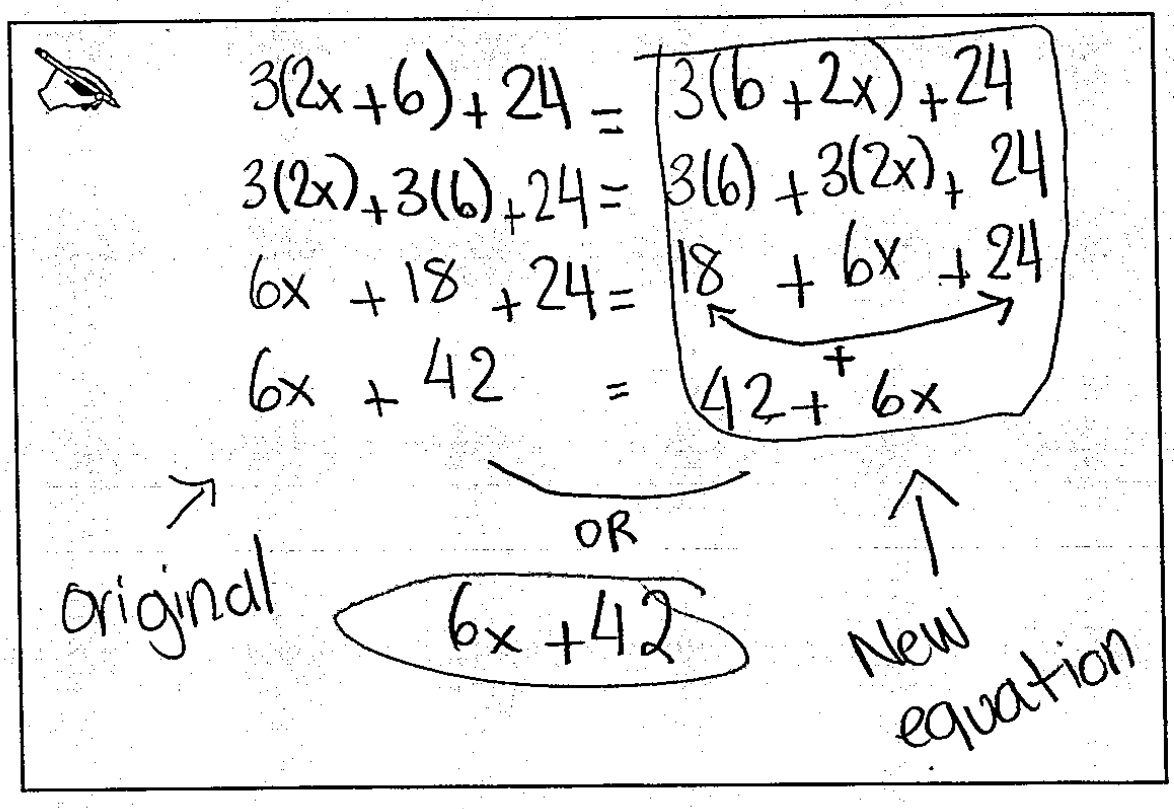
## Fixing Up the Yard

Alicia and her mom are repairing the 6-foot by 4-foot walkway in front of their house, plus a section of the sidewalk it connects to. The sidewalk section is 3 feet wide, and extends $x$ feet to each side of the walkway. The dimensions are shown in the drawing.




The total area to be repaired can be calculated by adding the areas of the sidewalk section and the walkway.

a. Alicia's mom writes the expression $3(2x + 6) + 24$ to represent the area. Write a second expression that can be used to determine the area and show that the two expressions are equivalent.

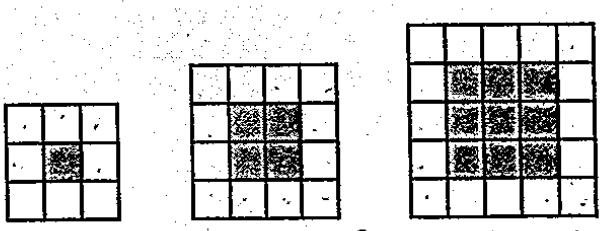


# A-2b

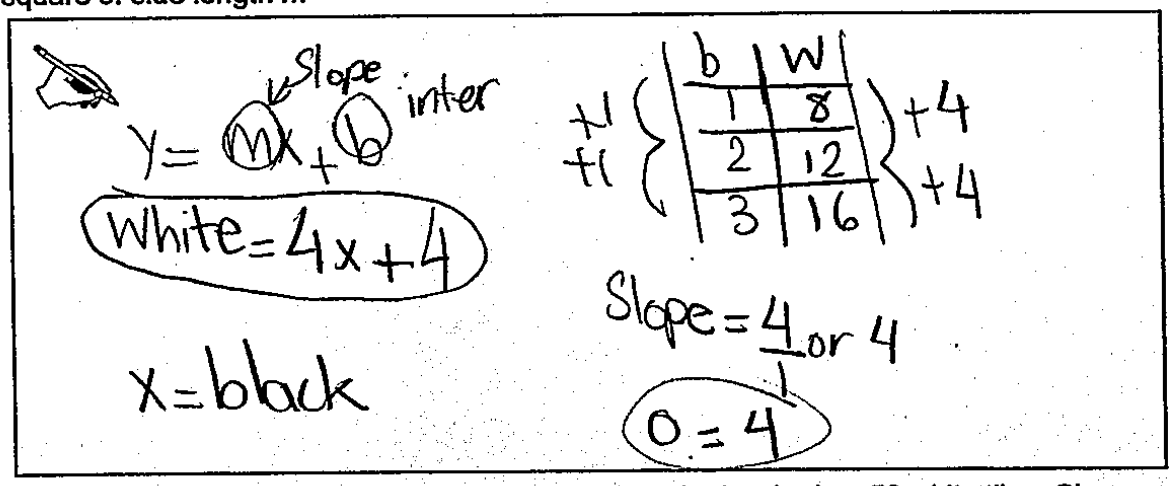
## Fixing Up the Yard

Alicia and her mom also decide to tile the patio in their backyard. They will use square tiles to create a design. Alicia wants to create a design that consists of a dark square surrounded by a border of white tiles.

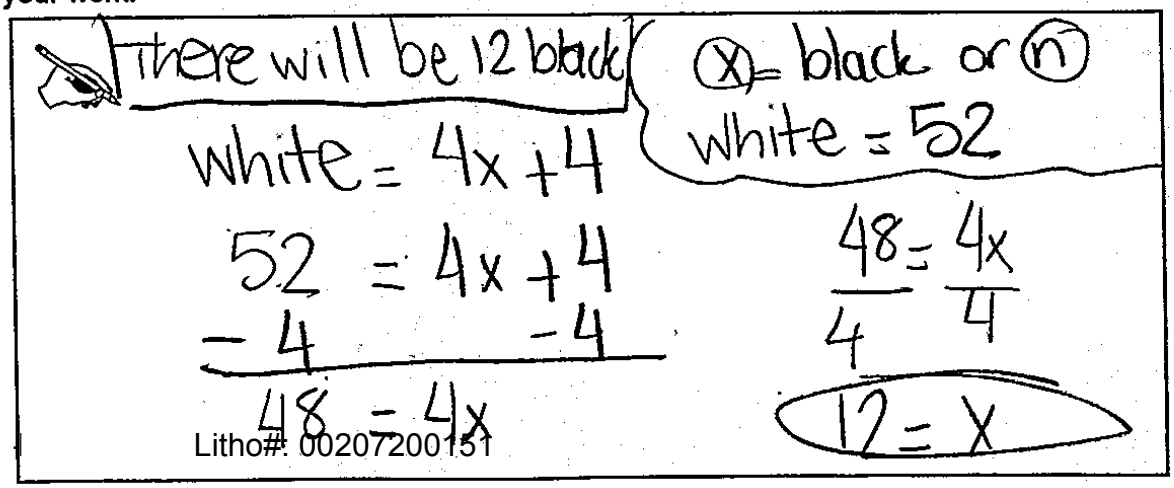
In the diagrams, *n* represents the length of a side of the dark square.




b. Write an expression that can be used to find the number of white tiles bordering a dark square of side length *n*.




c. Determine the side length of the dark square when the border has 52 white tiles. Show your work.



Anchor 2 Litho 00207200151

Total Content Points: 2 (7.EE.A1, 7.EE.B4a)

Total Practice Points: 3 (MP1, MP6, MP8)

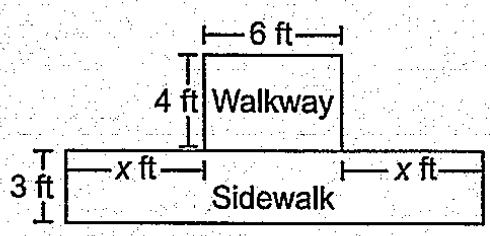
The student writes a second expression, $3(6 + 2x) + 24$, commutatively equivalent to the first, which can be used to determine the area in Part A. The student also shows, by using properties of operations, that the two expressions are equivalent (7.EE.A1). In Part C, the student correctly determines the side length of the dark square by solving an algebraic equation (7.EE.B4a). The student completes all parts of the problem and makes sense of the problem by writing a correct expression for determining the number of white tiles and using this expression to determine the correct length of the dark square when the border has 52 white tiles (MP1). The student uses precise calculations in Part C to determine the correct side length of the dark square when the border has 52 white tiles (MP6). In Part B, the student writes a correct rule ($4x + 4$) to describe the relationship between the side length of the dark square and the number of white tiles in the border (MP8).

Total Awarded Points: 5 out of 5

# A-3a

## Fixing Up the Yard

Alicia and her mom are repairing the 6-foot by 4-foot walkway in front of their house, plus a section of the sidewalk it connects to. The sidewalk section is 3 feet wide, and extends $x$ feet to each side of the walkway. The dimensions are shown in the drawing.




The total area to be repaired can be calculated by adding the areas of the sidewalk section and the walkway.

a. Alicia's mom writes the expression $3(2x + 6) + 24$ to represent the area. Write a second expression that can be used to determine the area and show that the two expressions are equivalent.

$(6x + 18) + 24$

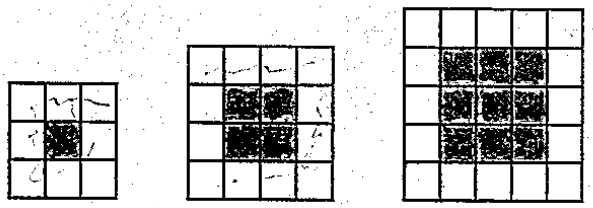
| $x$ | $g_1$ | $g_2$ |
|---|---|---|
| 1 | 36 | 36 |
| 2 | 42 | 42 |
| 3 | 48 | 48 |
| 4 | 54 | 54 |
| 5 | 72 | 72 |
| 6 | 78 | 78 |

# A-3b

## Fixing Up the Yard

Alicia and her mom also decide to tile the patio in their backyard. They will use square tiles to create a design. Alicia wants to create a design that consists of a dark square surrounded by a border of white tiles.

In the diagrams, $n$ represents the length of a side of the dark square.



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

b. Write an expression that can be used to find the number of white tiles bordering a dark square of side length $n$.

$y = 4n + 4$

c. Determine the side length of the dark square when the border has 52 white tiles. Show your work.

$52 = 4n + 4$

$-4 \quad -4$

$\frac{48}{4} = \frac{4n}{4}$

$12 = n$

Anchor 3 Litho 00057200127

Total Content Points: 1 (7.EE.B4a)

Total Practice Points: 3 (MP1, MP6, MP8)

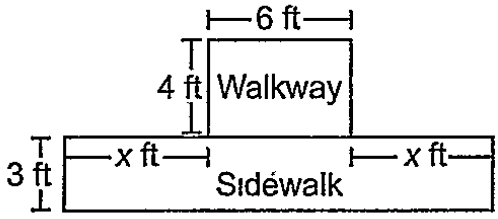
The student writes an equivalent second expression, $(6x + 18) + 24$, in Part A. To show that the two expressions are equivalent, the student constructs a table showing that each of the two expressions, labeled $y_1$ and $y_2$, yields equivalent values for six separate values of $x$. However, the $y_1$ and $y_2$ values for the first four $x$ values are incorrect, so the student does not successfully demonstrate that the two expressions are equivalent (no credit for 7.EE.A1). In Part C, the student determines the side length of the dark square by solving an algebraic expression, $y = 4n + 4$ (7.EE.B4a). The student completes all parts of the problem and makes sense of the problem through interpreting the diagram by writing an expression for determining the number of white tiles and using the diagram to determine the length of the dark square when the border has 52 white tiles (MP1). The student uses precise calculations based on the rule in Part B to determine the correct side length of the dark square when the border has 52 white tiles (MP6). In Part B, the student writes a correct rule ($y = 4n + 4$) to describe the relationship between the side length of the dark square and the number of white tiles in the border (MP8).

Total Awarded Points: 4 out of 5

# A-4a

## Fixing Up the Yard

Alicia and her mom are repairing the 6-foot by 4-foot walkway in front of their house, plus a section of the sidewalk it connects to The sidewalk section is 3 feet wide, and extends $x$ feet to each side of the walkway. The dimensions are shown in the drawing.




The total area to be repaired can be calculated by adding the areas of the sidewalk section and the walkway.

a. Alicia's mom writes the expression $3(2x + 6) + 24$ to represent the area Write a second expression that can be used to determine the area and show that the two expressions are equivalent.

$6x + 18 + 24$

If you distribute Alicia's moms equation, you would get this equation

$3(2x + 6) + 24 = 6x + 18 + 24$

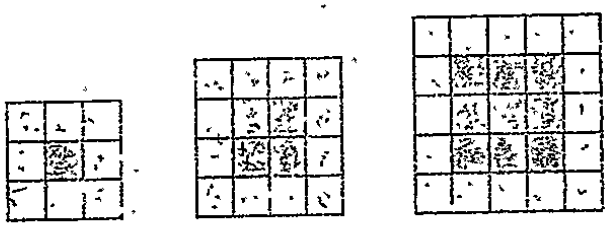
$6x + 18 + 24 = 6x + 18 + 24$ all solutions

# A-4b

## Fixing Up the Yard

Alicia and her mom also decide to tile the patio in their backyard. They will use square tiles to create a design Alicia wants to create a design that consists of a dark square surrounded by a border of white tiles

In the diagrams, *n* represents the length of a side of the dark square.




b. Write an expression that can be used to find the number of white tiles bordering a dark square of side length *n*.

b+7=n
If you add 7 to each of the tiles onto the black ones, you will get the number of white tiles surrounding it.

c Determine the side length of the dark square when the border has 52 white tiles. Show your work

52 ÷ 7 = 45
There would be 45 tiles that are black in the middle of the black tiles.

Anchor 4 Litho 00447200109

Total Content Points: 2 (7.EE.A1, 7.EE.B4a)

Total Practice Points: 2 (MP1, MP6)

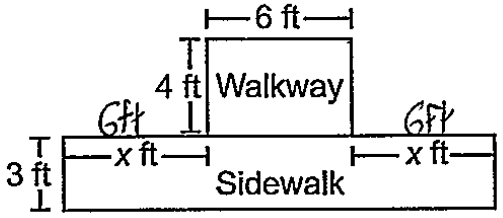
The student writes a second expression ($6x + 18 + 24$) in Part A that can be used to determine the area, and explains how one could use distribution to change the first equation into the second: "If you distribute Alicia's moms equation, you would get this equation" (7.EE.A1). In Part C, the student determines the side length of the dark square using the incorrect expression generated in Part B ($52 – 7 = 45$). Although the answer is incorrect, the student follows the correct process of solving the expression from Part B (7.EE.B4a). The student completes all parts of the problem, making sense of the problem in Part B by interpreting the diagrams. Although the student does not find the correct algebraic expression, a reasonable attempt is made to do so through selecting a number that could have come from geometric relationships depicted within the diagrams. For example, the 7 in $b + 7 = n$ could refer to the 8 white blocks minus the 1 black block in the first diagram (MP1). The student uses precise calculations, $52 – 7 = 45$, in Part C to determine the side length of the dark square when the border has 52 white tiles (MP6). In Part B, the student writes an incorrect rule, $b + 7 = n$, to describe the relationship between the side length of the dark square and the number of white tiles in the border (no credit for MP8).

Total Awarded Points: 4 out of 5

# A-5a

## Fixing Up the Yard

Alicia and her mom are repairing the 6-foot by 4-foot walkway in front of their house, plus a section of the sidewalk it connects to. The sidewalk section is 3 feet wide, and extends $x$ feet to each side of the walkway. The dimensions are shown in the drawing.




The total area to be repaired can be calculated by adding the areas of the sidewalk section and the walkway

a. Alicia's mom writes the expression $3(2x + 6) + 24$ to represent the area Write a second expression that can be used to determine the area and show that the two expressions are equivalent

$3(2x+6)+24=4$

$6x+18+24=0$

$6x+42=0$

$\frac{6x}{6}=\frac{42}{6}$

$x=7$

$3(x+6+x)+24$

$3x+18+3x+24=0$

$6x+18+24=0$

$6x+42=4$

$\frac{6x}{6}=\frac{42}{6}$

$x=7$

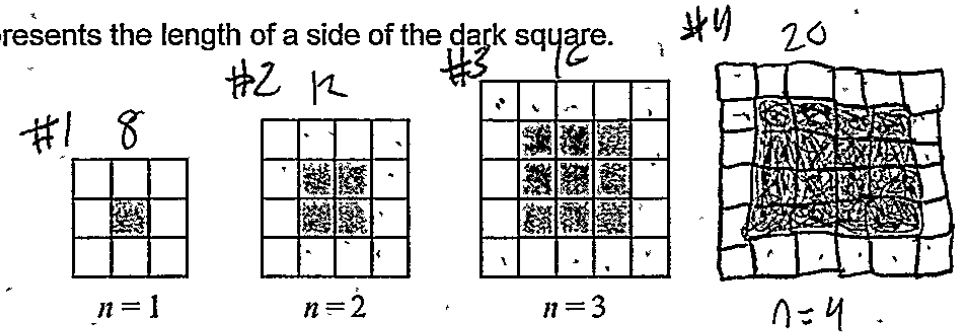
Both expressions lead up to equaling $X=7$

# A-5b

## Fixing Up the Yard

Alicia and her mom also decide to tile the patio in their backyard. They will use square tiles to create a design. Alicia wants to create a design that consists of a dark square surrounded by a border of white tiles

In the diagrams, *n* represents the length of a side of the dark square.




b. Write an expression that can be used to find the number of white tiles bordering a dark square of side length *n*

$(n \cdot 4) + 4 =$

#1 $1 \cdot 4 = 4 + 4 = 8$

#2 $2 \cdot 4 = 8 + 4 = 12$

#3 $3 \cdot 4 = 12 + 4 = 16$

#4 $4 \cdot 4 = 16 + 4 = 20$

They all match up with the number n with this equation

c Determine the side length of the dark square when the border has 52 white tiles. Show your work

$52 - 4 = 48 \div 4 = 12$ $(n \cdot 4) + 4 \rightarrow (52 - 4) \div 4$

the length of the dark square would be 12

Anchor 5 Litho 00367200109

Total Content Points: 1 (7.EE.B4a)

Total Practice Points: 2 (MP1, MP8)

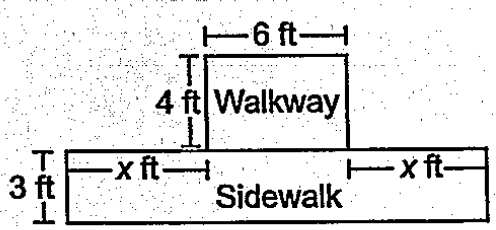
The student writes an equivalent second expression in Part A and attempts to show, using properties of operations, that the two expressions are equivalent. The student attempted to set both equations equal to 0 and solve for $x$. However, this is not a valid strategy to prove that equations are equivalent. Additionally, the equations were solved incorrectly, and the answer should have been –7 (no credit for 7.EE.A1). In Part C, the student determines the side length of the dark square by solving an algebraic expression, $(52 - 4) \div 4$ (7.EE.B4a). The student completes all parts of the problem and makes sense of the problem by interpreting the diagrams in Parts B and C (MP1). Although the student finds the side length of the dark square when the border has 52 white tiles, not all calculations are precise. The student uses a "running equation" rather than stopping and forming each equation separately. The equation "$52 – 4 = 48 \div 4 = 12$" is imprecise because $52 – 4$ is equal neither to $48 \div 4$ nor to 12 (MP6). In Part B, the student writes a correct rule $[(n \times 4) + 4]$ to describe the relationship between the side length of the dark square and the number of white tiles in the border (MP8).

Total Awarded Points: 3 out of 5

# A-6a

## Fixing Up the Yard

Alicia and her mom are repairing the 6-foot by 4-foot walkway in front of their house, plus a section of the sidewalk it connects to. The sidewalk section is 3 feet wide, and extends $x$ feet to each side of the walkway. The dimensions are shown in the drawing.




The total area to be repaired can be calculated by adding the areas of the sidewalk section and the walkway.

a. Alicia's mom writes the expression $3(2x + 6) + 24$ to represent the area. Write a second expression that can be used to determine the area and show that the two expressions are equivalent.

$3(2x+6)+24$

$3(8x)+24$

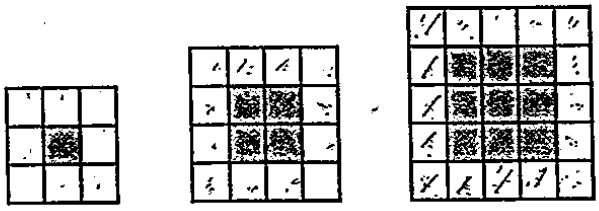
$24x+24$

# A-6b

## Fixing Up the Yard

Alicia and her mom also decide to tile the patio in their backyard. They will use square tiles to create a design. Alicia wants to create a design that consists of a dark square surrounded by a border of white tiles.

In the diagrams, *n* represents the length of a side of the dark square.




b. Write an expression that can be used to find the number of white tiles bordering a dark square of side length *n*.

$n = 4x$

c. Determine the side length of the dark square when the border has 52 white tiles. Show your work.

There would be 12 blocks

n=3 4=tile 20 5=tile 24 6=tile 28
tile16

7=tile32 8=tile36 9=tile40 10=tile44
11=tile48 12=tile52

Litho#: 00447200151

Anchor 6 Litho 00447200151

Total Content Points: 1 (7.EE.B4a)

Total Practice Points: 1 (MP6)

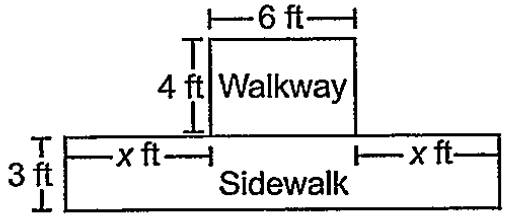
The student does not write an equivalent second expression in Part A (no credit for 7.EE.A1). In Part C, the student correctly determines the side length of the dark square using a table, perhaps using an algebraic equation that is not explicitly stated (7.EE.B4a). The student attempts Part B and Part C, but makes no clear attempt to provide a second expression or show that a second expression is equivalent to the expression in Part A (no credit for MP1). The student precisely constructs a table to determine the correct side length of the dark square when the border has 52 white tiles (MP6). In Part B, the student writes an incorrect rule ($n = 4x$) to describe the relationship between the side length of the dark square and the number of white tiles in the border (no credit for MP8).

Total Awarded Points: 2 out of 5

# A-7a

## Fixing Up the Yard

Alicia and her mom are repairing the 6-foot by 4-foot walkway in front of their house, plus a section of the sidewalk it connects to The sidewalk section is 3 feet wide, and extends $x$ feet to each side of the walkway. The dimensions are shown in the drawing.




The total area to be repaired can be calculated by adding the areas of the sidewalk section and the walkway.

a Alicia's mom writes the expression $3(2x + 6) + 24$ to represent the area. Write a second expression that can be used to determine the area and show that the two expressions are equivalent.

$3(2x+6)+24$ = total area

$\downarrow$

$6x+42$ = total area.

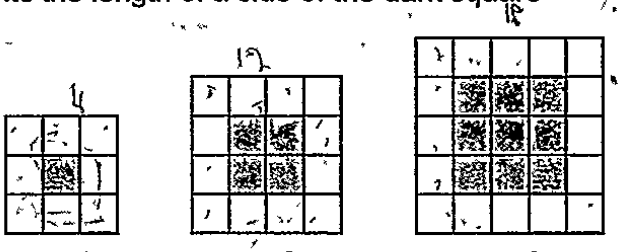
The equation that Alicia's mom wrote can be simplified by multiplying the three by the $2x$ and 6, to get $6x+18+24$. You then add 18 and 24 to get $6x+42$ = total area.

# A-7b

## Fixing Up the Yard

Alicia and her mom also decide to tile the patio in their backyard. They will use square tiles to create a design. Alicia wants to create a design that consists of a dark square surrounded by a border of white tiles.

In the diagrams, $n$ represents the length of a side of the dark square



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

b. Write an expression that can be used to find the number of white tiles bordering a dark square of side length $n$

$4n+4$

4 x the length of the sides on all the tiles and +4 is equal the number of white tiles.

c. Determine the side length of the dark square when the border has 52 white tiles. Show your work.

$52-4=48$

$4$

Anchor 7 Litho 00517200109

Total Content Points: 1 (7.EE.A1)

Total Practice Points: 1 (MP8)

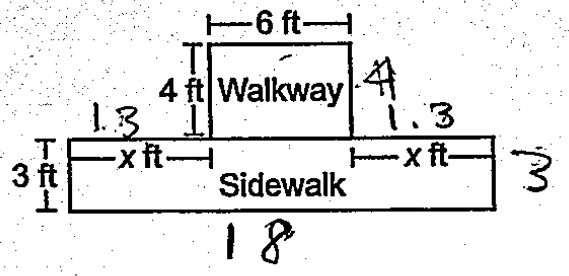
The student writes a second expression, $6x + 42$, that can be used to determine the area in Part A; and verbally explains, using of properties of operations, that the second expression is equivalent: "The equation that Alicia's mom wrote can be simplified by multiplying the three by the $2x$ and 6, to get $6x + 18 + 24$. You then add 18 and 24 to get $6x + 42$ = total area" (7.EE.A1). In Part C, the student begins solving the equation from Part B to determine the side length of the dark square, but does not complete the problem (no credit for 7.EE.B4a, no credit for MP1). The student does not complete the calculation of the side length of the dark square in Part C, and so does not demonstrate precision (no credit for MP6). In Part B, the student writes a correct rule ($4n + 4$) to describe the relationship between the side length of the dark square and the number of white tiles in the border (MP8).

Total Awarded Points: 2 out of 5

# A-8a

## Fixing Up the Yard

Alicia and her mom are repairing the 6-foot by 4-foot walkway in front of their house, plus a section of the sidewalk it connects to. The sidewalk section is 3 feet wide, and extends $x$ feet to each side of the walkway. The dimensions are shown in the drawing.




The total area to be repaired can be calculated by adding the areas of the sidewalk section and the walkway.

a. Alicia's mom writes the expression $3(2x + 6) + 24$ to represent the area. Write a second expression that can be used to determine the area and show that the two expressions are equivalent.

$3(2x+6)+24$

$6x+18+24$

$\frac{6x}{6} = \frac{42}{6}$

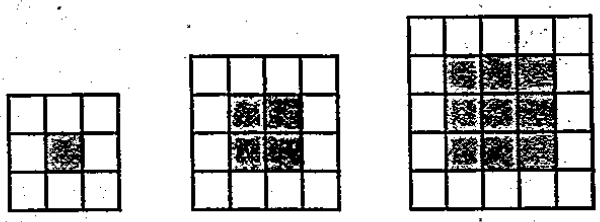
$x = 7$

# A-8b

## Fixing Up the Yard

Alicia and her mom also decide to tile the patio in their backyard. They will use square tiles to create a design. Alicia wants to create a design that consists of a dark square surrounded by a border of white tiles.

In the diagrams, $n$ represents the length of a side of the dark square.




b. Write an expression that can be used to find the number of white tiles bordering a dark square of side length $n$.

| x | y |
|---|---|
| 1 | 8 |
| 2 | 12 |
| 3 | 16 |

+4 +4 +4

4x

White squares = 4n

c. Determine the side length of the dark square when the border has 52 white tiles. Show your work.

the length of the dark squares would be 13

4/52 = 13

13 · 4 = 52

Litho#: 00187200151

Anchor 8 Litho 00187200151

Total Content Points: 1 (7.EE.B4a)

Total Practice Points: 0

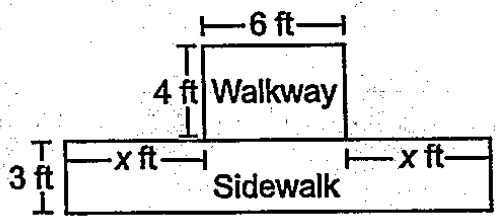
The student does not attempt to demonstrate that $6x + 18 + 24$ is an equivalent expression, nor does the student give any indication of recognizing that it's an equivalent equation in the course of attempting, inappropriately, to solve it for $x$ (no credit for 7.EE.A1). In Part C, the student correctly calculates the side length of the dark square based on the incorrect equation in Part B (7.EE.B4a). The student attempts most parts of the problem, but does not attempt to demonstrate that the two expressions are equivalent in Part A (no credit for MP1). Although the student finds the side length of the dark square when the border has 52 white tiles based on the incorrect expression in Part B, not all calculations are correct ($4/52 = 13$), which demonstrates a lack of precision (no credit for MP6). In Part B, the student writes an incorrect rule, $4n$, to describe the relationship between the side length of the dark square and the number of white tiles in the border (no credit for MP8).

Total Awarded Points: 1 out of 5

# A-9a

## Fixing Up the Yard

Alicia and her mom are repairing the 6-foot by 4-foot walkway in front of their house, plus a section of the sidewalk it connects to. The sidewalk section is 3 feet wide, and extends $x$ feet to each side of the walkway. The dimensions are shown in the drawing.




The total area to be repaired can be calculated by adding the areas of the sidewalk section and the walkway.

a. Alicia's mom writes the expression $3(2x + 6) + 24$ to represent the area. Write a second expression that can be used to determine the area and show that the two expressions are equivalent.

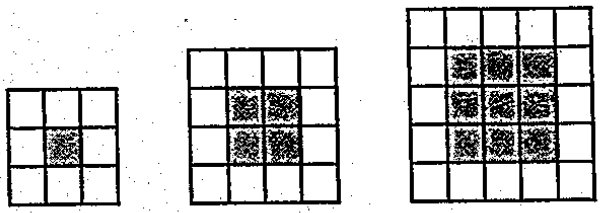
$3(2x+6)+(4\times6)$

# A-9b

## Fixing Up the Yard

Alicia and her mom also decide to tile the patio in their backyard. They will use square tiles to create a design. Alicia wants to create a design that consists of a dark square surrounded by a border of white tiles.

In the diagrams, $n$ represents the length of a side of the dark square.




b. Write an expression that can be used to find the number of white tiles bordering a dark square of side length $n$.

$y = 4n + 4$

c. Determine the side length of the dark square when the border has 52 white tiles. Show your work.

52
× 4
208
+ 4
212

212

Anchor 9 Litho 00297200151

Total Content Points: 0

Total Practice Points: 1 (MP8)

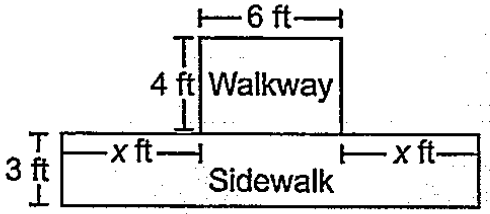
The student writes an equivalent second expression, $3(2x + 6) + (4 \times 6)$, in Part A, but does not attempt to demonstrate that the two expressions are equivalent (no credit for 7.EE.A1). In Part C, the student attempts to solve the equation from Part B ($y = n4 + 4$), but substitutes 52 for $n$ instead of for $y$, which yields the answer 212 (no credit for 7.EE.B4a). The student completes most parts of the problem, but in Part A does not attempt to demonstrate that the two expressions are equivalent (no credit for MP1). The student solves the equation in Part B incorrectly, using 52 as the value for $n$ instead of $y$ (no credit for MP6). In Part B, the student writes a correct rule ($y = n4 + 4$) to describe the relationship between the side length of the dark square and the number of white tiles in the border (MP8).

Total Awarded Points: 1 out of 5

# A-10a

## Fixing Up the Yard

Alicia and her mom are repairing the 6-foot by 4-foot walkway in front of their house, plus a section of the sidewalk it connects to. The sidewalk section is 3 feet wide, and extends $x$ feet to each side of the walkway. The dimensions are shown in the drawing.




The total area to be repaired can be calculated by adding the areas of the sidewalk section and the walkway.

a. Alicia's mom writes the expression $3(2x + 6) + 24$ to represent the area. Write a second expression that can be used to determine the area and show that the two expressions are equivalent.

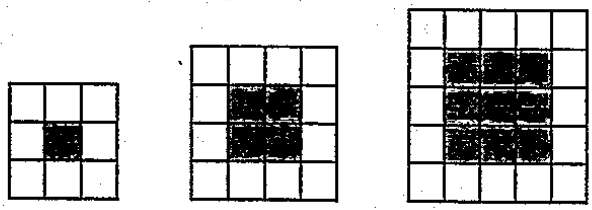
3(2x+6)+24 is the same as 6x+18+24 because you are just using the distributive property with 3(2x+6).

# A-10b

## Fixing Up the Yard

Alicia and her mom also decide to tile the patio in their backyard. They will use square tiles to create a design. Alicia wants to create a design that consists of a dark square surrounded by a border of white tiles.

In the diagrams, $n$ represents the length of a side of the dark square.




b. Write an expression that can be used to find the number of white tiles bordering a dark square of side length $n$.

c. Determine the side length of the dark square when the border has 52 white tiles. Show your work.

Litho#: 00577200127

Anchor 10 Litho 00577200127

Total Content Points: 1 (7.EE.A1)

Total Practice Points: 0

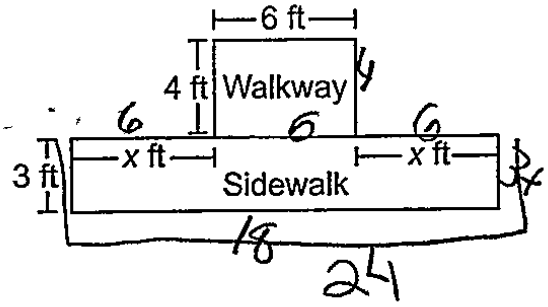
The student writes a second expression, $6x + 18 + 24$, in Part A that can be used to determine the area, and explains using properties of operations that the two expressions are equivalent: "because you are just using the distributive property with $3(2x + 6)$" (7.EE.A1). In Part C, the student does not attempt to determine the side length of the dark square (no credit for 7.EE.B4a). The student does not attempt Parts B and C, thereby not completing all parts of the problem (no credit for MP1). The student does not attempt to calculate the side length of the dark square in part C (no credit for MP6). In Part B, the student does not write a rule to describe the relationship between the side length of the dark square and the number of white tiles in the border (no credit for MP8).

Total Awarded Points: 1 out of 5

# A-11a

## Fixing Up the Yard

Alicia and her mom are repairing the 6-foot by 4-foot walkway in front of their house, plus a section of the sidewalk it connects to. The sidewalk section is 3 feet wide, and extends $x$ feet to each side of the walkway The dimensions are shown in the drawing.




The total area to be repaired can be calculated by adding the areas of the sidewalk section and the walkway.

a Alicia's mom writes the expression $3(2x + 6) + 24$ to represent the area. Write a second expression that can be used to determine the area and show that the two expressions are equivalent

$3(2x+6)+24 = 2(3x+6)+18$

$6x+6+24 = 6x+12+18$

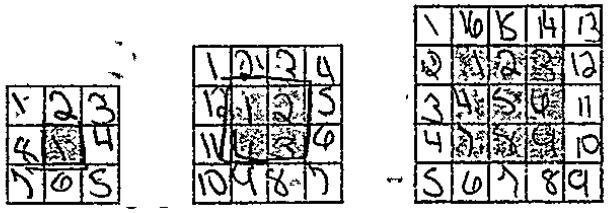
$6x+30 = 6x+30$

# A-11b

## Fixing Up the Yard

Alicia and her mom also decide to tile the patio in their backyard. They will use square tiles to create a design. Alicia wants to create a design that consists of a dark square surrounded by a border of white tiles.

In the diagrams, $n$ represents the length of a side of the dark square.



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

b Write an expression that can be used to find the number of white tiles bordering a dark square of side length $n$.

$4n + 8$

c. Determine the side length of the dark square when the border has 52 white tiles. Show your work.

$52 = 2n + 8$
$-8 \quad -8$
$44 = 2n$
$\frac{44}{2} = \frac{2n}{2}$
$22 = n$

Anchor 11 Litho 00107200109

Total Content Points: 0

Total Practice Points: 1 (MP1)

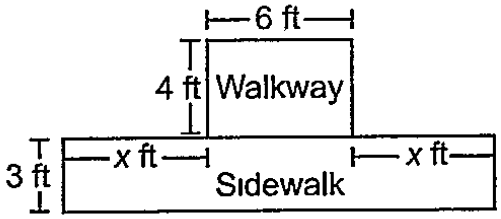
The student writes an incorrect second expression, $2(3x + 6) + 18$, in Part A and attempts to use properties of operations to demonstrate that the two expressions are equivalent, but solves the first equation incorrectly to match the incorrect second equation (no credit for 7.EE.A1). In Part C, the student attempts to determine the side length of the dark square using the incorrect expression generated in Part B, but solves the equation incorrectly (no credit for 7.EE.B4a). The student completes all parts of the problem and makes sense of the problem by interpreting the diagrams, making reasonable attempts at an algebraic expression and a solution in Parts B and C. In Part B, the student has counted the boxes, and the terms in the expression reflect aspects of the diagrams ($2n$ matches the dark square of the second diagram, and 8 corresponds to the white tiles in the first diagram) (MP1). The student incorrectly calculates the length of the dark square in Part C using the equation $52 = 2n + 8$. The student's answer is $n = 23$, but the correct answer is $n = 22$, demonstrating a lack of precision (no credit for MP6). In Part B, the student writes an incorrect rule ($2n + 8$) to describe the relationship between the side length of the dark square and the number of white tiles in the border (no credit for MP8).

Total Awarded Points: 1 out of 5

# A-12a

## Fixing Up the Yard

Alicia and her mom are repairing the 6-foot by 4-foot walkway in front of their house, plus a section of the sidewalk it connects to. The sidewalk section is 3 feet wide, and extends $x$ feet to each side of the walkway. The dimensions are shown in the drawing




The total area to be repaired can be calculated by adding the areas of the sidewalk section and the walkway.

a. Alicia's mom writes the expression $3(2x + 6) + 24$ to represent the area. Write a second expression that can be used to determine the area and show that the two expressions are equivalent

$3(4x+6)+18$

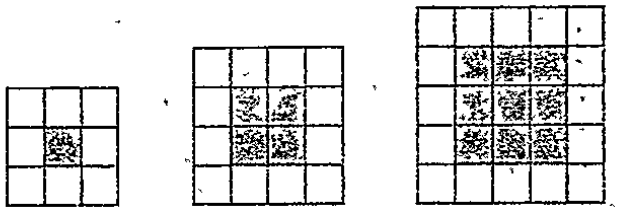
$6x+18+24$

# A-12b

## Fixing Up the Yard

Alicia and her mom also decide to tile the patio in their backyard. They will use square tiles to create a design Alicia wants to create a design that consists of a dark square surrounded by a border of white tiles.

In the diagrams, *n* represents the length of a side of the dark square




b. Write an expression that can be used to find the number of white tiles bordering a dark square of side length *n*.

$3N + 6 + 14$

c. Determine the side length of the dark square when the border has 52 white tiles. Show your work

The border of black tiles would be 86.7 rounded

$52 \div 3 = 17.\overline{3} \times 5 = (86.7)$ black tiles

Anchor 12 Litho 00557200109

Total Content Points: 0

Total Practice Points: 0

The student writes two expressions, one of which is equivalent to $3(2x + 6) + 24$, but does not attempt to demonstrate that the two expressions in Part A are equivalent (no credit for 7.EE.A1). The student attempts to determine the side length of the dark square in Part C with an incorrect process, which is not based on the equation in Part B $(52 \div 3 = 17.\overline{3} \times 5)$ (no credit for 7.EE.B4a). The student attempts to make sense of Parts B and C, but does not attempt to demonstrate that the two expressions are equivalent in Part A (no credit for MP1). In Part C, the student shows a lack of precision by using a "running equation"; 52 divided by 3 is equal neither to $17.\overline{3} \times 5$ nor to 86.7 (no credit for MP6). The student writes an incorrect rule, $3N + 6 + 14$, to describe the relationship between the side length of the dark square in Part B and the number of dark tiles in its border (no credit for MP8).

Total Awarded Points: 0 out of 5