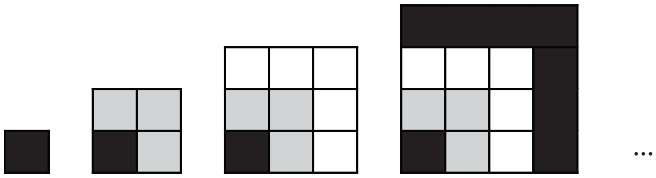
Assignment

Name _____ Date _____

Squares and More
Using Patterns to Generate Algebraic Functions

Use the pattern below to answer Questions 1 through 5.



1. Sketch the design that continues the pattern.

2. Complete the table to summarize the numbers and colors of the squares used in each step of the pattern.

Squares in design	1	2	3	4	5
Black squares					
Gray squares					
White squares					
New squares					
Total squares					

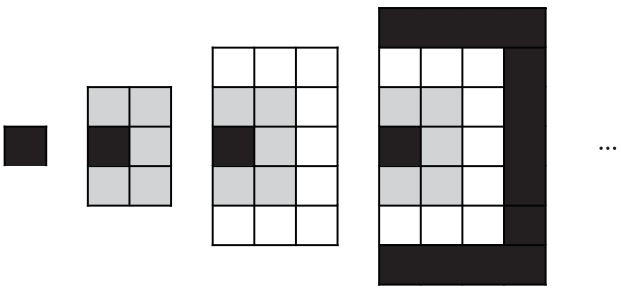
3. Continue the table for the numbers below.

Squares in design	6	8	10
Black squares			
Gray squares			
White squares			
New squares			
Total squares			

4. Write an expression for the number of new squares that are added in the *n*th design of the series.

5. Write an expression for the total number of squares in the *n*th design of the series.

Use the pattern below to answer Questions 6 through 14.



6. Sketch the design that continues the pattern.

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7. Complete the table to summarize the numbers and colors of the squares used in each step of the pattern.

Squares in design	1	2	3	4	5
Black squares					
Gray squares					
White squares					
Horizontal squares in each row					
Vertical squares in each column					
New squares					
Total squares					

8. Continue the table for the numbers below.

Squares in design	6	8	10
Black squares			
Gray squares			
White squares			
Horizontal squares in each row			
Vertical squares in each column			
New squares			
Total squares			

9. Write an expression for the number of horizontal squares in each row of the *n*th design of the series.

10. Write an expression for the number of vertical squares in each column of the *n*th design of the series.

11. Write an expression for the total number of squares in the *n*th design of the series.

12. Bobby says that to obtain the number of new squares in the *n*th design of the series, you have to multiply the number of vertical squares in each row of that design by two and then subtract 1 from the result. Write an expression that represents Bobby's pattern.

13. Channell says that to obtain the number of new squares in the *n*th design of the series, first you have to subtract *n* from 3, and then you have to subtract that result from three times *n*. Write an expression that represents Channell's pattern.

14. Show whether Bobby's and Channell's expressions are the same.

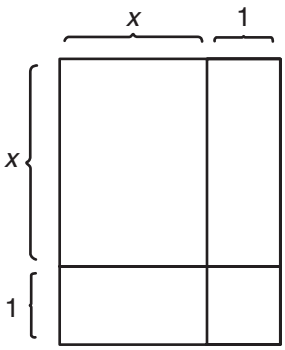
15. Determine whose expression for the number of new squares is correct: Bobby, Channell, both, or neither. Explain your answer.

Assignment

Name _____ Date _____

Areas and Areas
Using Multiple Representations of Algebraic Functions

Lauren is dividing a community garden into square plots, where members will grow their plants. Each square plot will be *x* feet on a side, with a 1-foot-wide divider along one of its sides, and a 3-foot-wide walkway along the front, as shown below.



1. What is the area of each square plot? Label the diagram.

2. What is the area of each divider? Label the diagram.

3. What is the area of each walkway? Label the diagram.

4. Use area composition to write an expression for the total area of the square plot, the divider, and the walkway.

5. What is the length of the square plot, divider, and walkway?

6. What is the width of the square plot, divider, and walkway?

7. Use the length and width from Questions 5 and 6 to write an expression for the total area of the square plot, divider, and the walkway.

8. You wrote the total area in two different ways in Questions 4 and 7. Show how the two expressions are equivalent.

9. Complete the table.

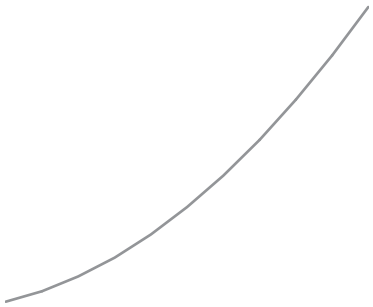
Width of square plot	Total width of plot	Total length of plot	Area of square plot	Area of divider	Area of walkway	Total area
5						
6						
8						
10						
x						

10. Write a function $A(x)$ to represent the total area of the plot, divider, and walkway for a lot with side length x.

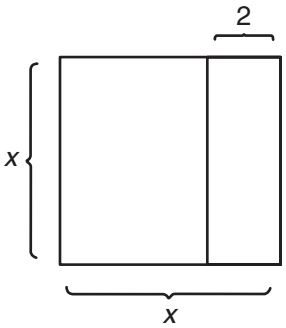
11. What are the domain and range of $A(x)$ in terms of the problem situation?

Name _____ Date _____

12. Graph $A(x)$.



Each square plot of a community garden is *x* feet on a side. Within each plot, the members of the community must plant a 2-foot wide section with flowers to attract bees. The members will plant vegetables in the remainder of the plot, as shown.



13. What is the area of each square plot?

14. What is the area of each section with flowers? Label the diagram.

15. What is the area of each section with vegetables? Label the diagram.

16. What is the length of each section with vegetables?

17. What is the width of each section with vegetables?

18. Use the length and width from Questions 16 and 17 to write an expression for the total area of each section with vegetables.

19. You wrote the total area in two different ways in Questions 16 and 19. Show how these expressions are equivalent.

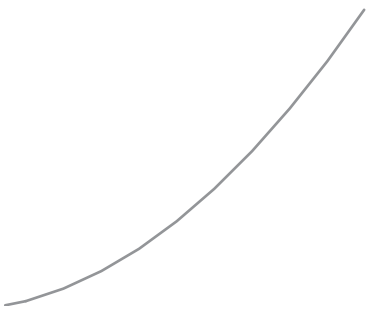
20. Complete the table.

Width of square plot	Length of section with vegetables	Area of plot	Area of section with flowers	Area of section with vegetables
5				
6				
8				
10				
x				

21. Write a function $A(x)$ to represent the total area of the section with vegetables.

22. What are the domain and range of $A(x)$ in terms of the problem situation?

23. Graph $A(x)$.



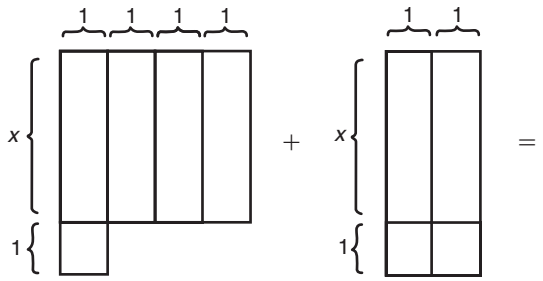
Assignment

Name _____ Date _____

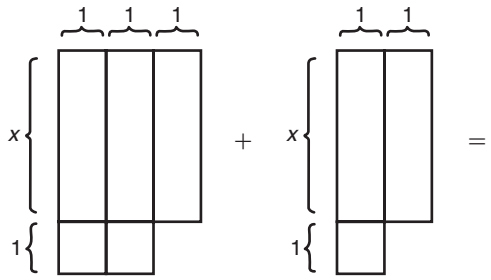
Models for Polynomials
Operations with Polynomials

For each sum or difference, sketch the resulting model. Then calculate the sum or difference.

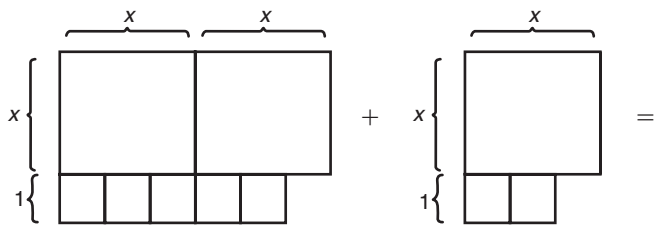
1. $(4x + 1) + (2x + 2) =$



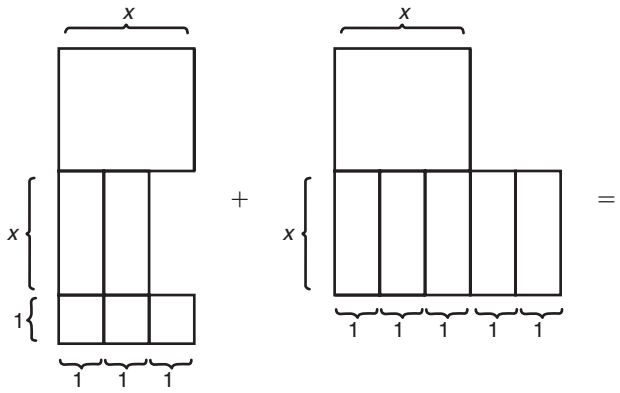
2. $(3x + 2) - (2x + 1) =$



3. $(2x^2 + 5) - (x^2 + 2) =$

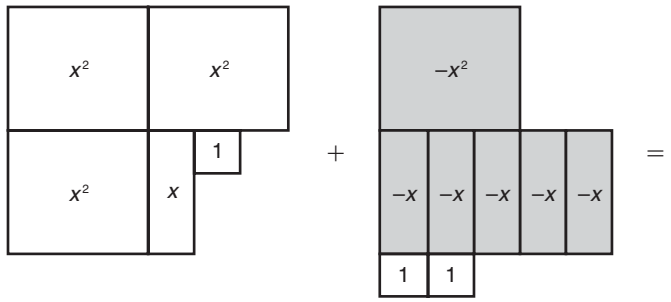


4. $(x^2 + 2x + 3) + (x^2 + 5x) =$

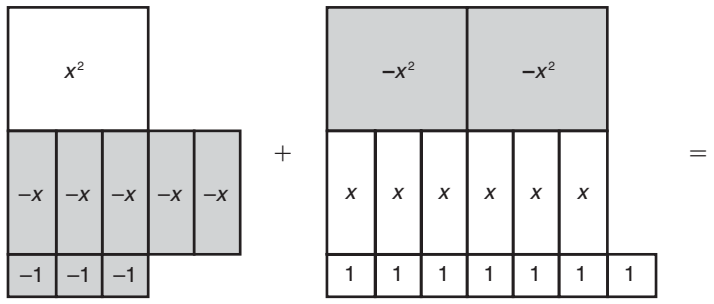


For each sum or difference, sketch the resulting model. Then calculate the sum or difference.

5. $(3x^2 + x + 1) + (-x^2 - 5x + 2) =$



6. $(x^2 - 5x - 3) + (-2x^2 + 6x + 7) =$



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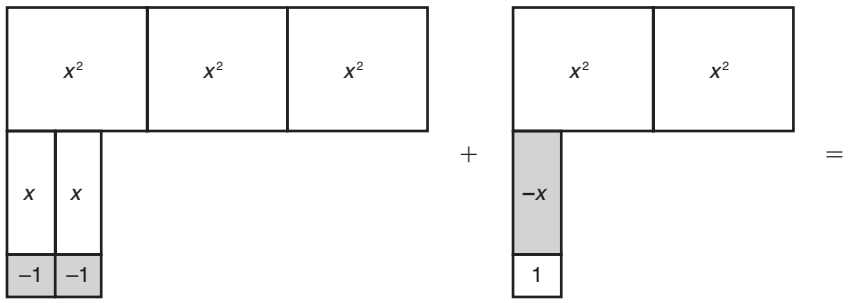
7. $(3x^2 + 2x - 2) - (2x^2 - x + 1) =$



Calculate each sum or difference without sketching a model.

8. $(7x^2 - 8) + (-3x^2 - 4x) =$

9. $(-2x^2 + 10x - 5) + (14x^2 - 4x) =$

10. $(-x^2 + 3) - (8x^2 - 4) =$

11. $(-5x^2 - 5x) - (-7x^2 + 6x - 13) =$

12. $(x^2 - 3x - 7) - (x^2 + 11x - 7) =$

For each product, sketch the resulting model. Then calculate the product.

13. $(x + 5)(x + 3) =$

14. $(x - 3)(x + 2) =$

4

15. $(x - 4)(x - 1) =$

16. $(x + 3)(x - 3) =$

4

Assignment

Name _____ Date _____

Another Factor
Dividing and Factoring Quadratic Trinomials

Perform each multiplication using the method specified.

1. Use a multiplication table to multiply $(x + 8)(x - 4)$.

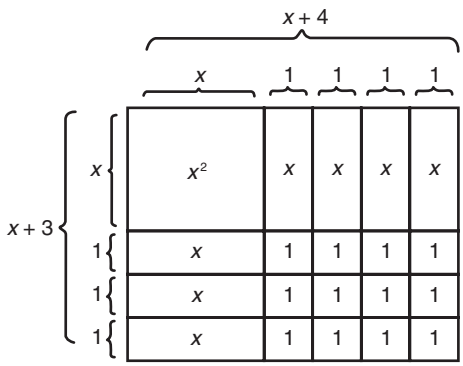
2. Use the distributive property to multiply $(x - 6)(x - 10)$.

3. Use a multiplication table to multiply $(2x + 3)(3x - 2)$.

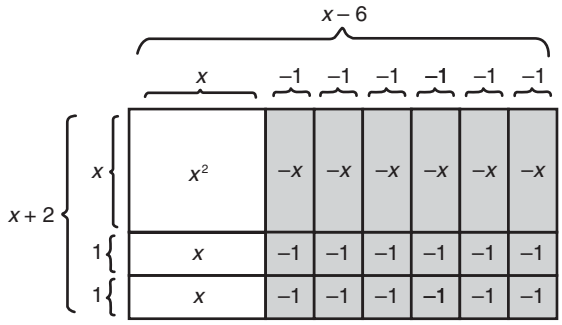
4. Use the distributive property to multiply $(x - 5)(x + 5)$.

Perform each division using an area model.

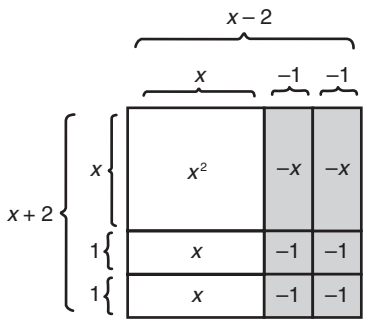
5. $(x^2 + 7x + 12) \div (x + 4) =$



6. $(x^2 - 4x - 12) \div (x - 6) =$



7. $(x^2 - 4) \div (x - 2) =$



Perform each division using a multiplication table.

8. $(x^2 + 13x - 30) \div (x - 2) =$

9. $(x^2 - 14x + 49) \div (x - 7) =$

10. $(x^2 - x - 42) \div (x + 6) =$

11. $(x^2 - 121) \div (x - 11) =$

Name _____ Date _____

Perform each division using long division.

12. $(x^2 + 10x + 16) \div (x + 2) =$

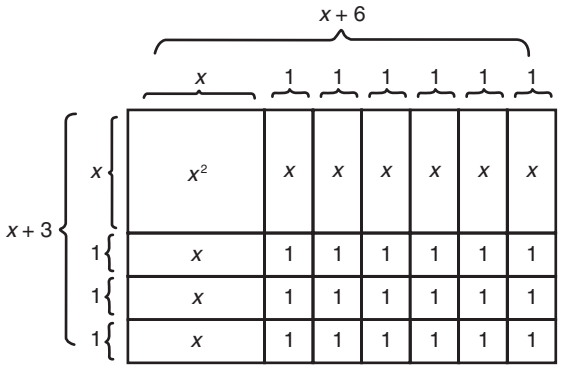
13. $(x^2 + 5x + 6) \div (x + 3) =$

14. $(x^2 - 12x - 13) \div (x + 1) =$

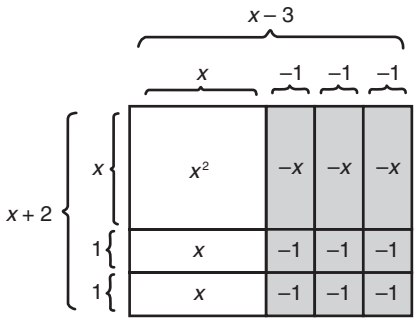
15. $(x^2 - 12x + 27) \div (x - 3) =$

Factor each trinomial using an area model.

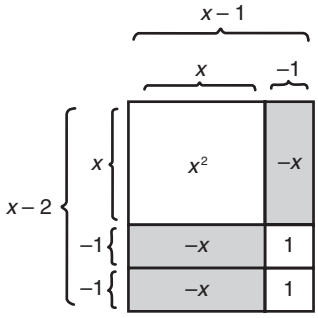
16. $(x^2 + 9x + 18) =$



17. $(x^2 - x - 6) =$



18. $(x^2 - 3x + 2) =$



4

Assignment

Name _____ Date _____

More Factoring
Factoring Quadratic Trinomials

Factor the trinomials by using the method of factor pairs and sums.

1. $x^2 + 14x + 45$

2. $x^2 - 9x + 20$

3. $x^2 - 50x + 49$

4. $x^2 + 7x - 30$

5. $x^2 + 18x - 40$

6. $x^2 + 27x + 50$

7. $x^2 - 51x + 98$

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8. $x^2 + 15x + 44$

9. $x^2 - 17x - 60$

10. $x^2 - 16x + 39$

11. $x^2 - 16x - 36$

12. $x^2 - 11 - 80$

4

13. $x^2 - 16x + 63$

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14. $x^2 - 99 - 100$

4

Assignment

Name _____ Date _____

Radically Speaking!
Operations with Square Roots

Calculate the missing side of each right triangle.

1. $a = 5, b = 12, c = ?$

2. $a = 3, b = ?, c = 5$

3. $a = ?, b = 7, c = 10$

4. $a = 10, b = 30, c = ?$

Calculate each product.

5. $\sqrt{5} \cdot \sqrt{5}$

6. $\sqrt{2} \cdot \sqrt{3}$

7. $\sqrt{7} \cdot \sqrt{7}$

8. $\sqrt{18} \cdot \sqrt{2}$

9. $\sqrt{12} \cdot \sqrt{3}$

10. $\sqrt{12} \cdot \sqrt{12}$

11. $\sqrt{4} \cdot \sqrt{25}$

12. $\sqrt{36} \cdot \sqrt{9}$

Simplify each radical completely.

13. $\sqrt{84}$

14. $\sqrt{48}$

15. $\sqrt{28}$

16. $\sqrt{108}$

17. $\sqrt{288}$

18. $\sqrt{125}$

19. $\sqrt{150}$

20. $\sqrt{300}$

Calculate each product and simplify completely.

21. $\sqrt{7} \cdot \sqrt{14}$

22. $\sqrt{54} \cdot \sqrt{3}$

23. $\sqrt{12} \cdot \sqrt{27}$

24. $\sqrt{75} \cdot \sqrt{6}$

25. $\sqrt{10} \cdot \sqrt{70}$

26. $\sqrt{10} \cdot \sqrt{80}$

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27. $\sqrt{10} \cdot \sqrt{90}$

28. $\sqrt{21} \cdot \sqrt{77}$

29. $\sqrt{2}\,(\sqrt{14} + \sqrt{10})$

30. $\sqrt{8}\,(\sqrt{14} + \sqrt{10})$

4

Assignment

Name _____ Date _____

Working with Radicals
Adding, Subtracting, Dividing, and Rationalizing Radicals

Calculate the sum or difference.

1. $5\sqrt{6} + 2\sqrt{6}$

2. $17\sqrt{2} - 6\sqrt{2}$

3. $\sqrt{3} + \sqrt{27}$

4. $2\sqrt{7} - 9\sqrt{7} + 7\sqrt{2}$

5. $-\sqrt{8} + 5\sqrt{2} + 2\sqrt{3}$

Calculate the quotient and simplify.

6. $15\sqrt{5} \div 3\sqrt{5}a$

7. $\sqrt{75} \div 6\sqrt{3}$

8. $14\sqrt{2} + \sqrt{8}$

9. $\frac{\sqrt{2}}{\sqrt{8}} \div \frac{\sqrt{2}}{\sqrt{40}}$

10. $\frac{\sqrt{2}}{\sqrt{18}} \div \frac{\sqrt{2}}{\sqrt{6}}$

Simplify the expression by rationalizing the denominator.

11. $\frac{5}{\sqrt{2}}$

12. $\frac{3}{\sqrt{3}}$

13. $\frac{6}{\sqrt{10}}$

14. $\frac{4}{\sqrt{6}}$

15. $\frac{21}{\sqrt{7}}$

16. $\frac{3}{\sqrt{15}}$

17. $\frac{8}{\sqrt{26}}$

18. $\frac{3}{\sqrt{34}}$

Simplify the expression completely.

19. $\frac{2\sqrt{45}}{3} + \frac{7\sqrt{5}}{3}$

20. $\frac{\sqrt{98}}{5} + \frac{8\sqrt{2}}{5}$

21. $\frac{\sqrt{8}}{4} - \frac{\sqrt{18}}{6}$

22. $\frac{\sqrt{512}}{\sqrt{9}} - \frac{2}{3\sqrt{2}}$

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23. $\frac{\sqrt{12}}{\sqrt{33}} \div \frac{6}{\sqrt{22}}$

24. $\frac{\sqrt{6}}{\sqrt{7}} \div \frac{\sqrt{39}\sqrt{10}}{\sqrt{91}}$

4

Assignment

Name _____ Date _____

Rain Gutters
Modeling with Functions

Lily is having a party. She has $30 and wants to buy brownies for $0.75 each and sandwiches for $3 each for her guests. How many of each can she buy?

1. Complete the table to show the number of sandwiches and brownies that Lily can afford.

Number of sandwiches	Dollars spent on sandwiches	Dollars left for brownies	Number of brownies
10			
9			
8			
7			
6			
5			
4			
3			
2			
1			
0			

2. Based on the table, describe the relationship between the number of sandwiches and the number of brownies.

3. As the number of sandwiches decreases by 1, how does the number of brownies change?

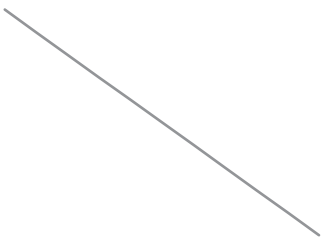
4. As the number of sandwiches decreases by 2, how does the number of brownies change?

5. As the number of sandwiches increases by 1, how does the number of brownies change?

6. Describe how to calculate the number of brownies for any number of sandwiches.

7. Define a function $b(s)$ for the number of brownies, b, for a number of sandwiches s.

8. Graph the function $b(s)$.



9. What are the domain and range of $b(s)$?

Name _____ Date _____

10. What type of function is $b(s)$?

Brenda is digging a garden in her back yard. The garden will be a square that is *x* feet on a side. Within the square garden area, Brenda divides a 2-foot-wide section along a side in which she will plant cantalope. The rest of the garden will be for vegetables.

11. Calculate the area of the vegetable section if the garden is 5 feet on its side.

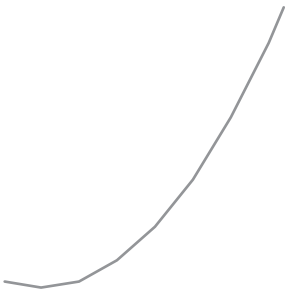
12. Calculate the area of the vegetable section if the garden is 3.5 feet on its side.

13. Complete the table below.

Side length of the garden	Length of the vegetable section	Width of the vegetable section	Area of the vegetable section
2			
3			
4			
5			
6			
7			
8			
9			
10			

14. Define a function $V(x)$ for the area of the vegetable section, V, for a garden with a side length of x.

15. Graph the function $V(x)$.



16. What type of function is $V(x)$?

17. Set the function $V(x)$ equal to 0 and calculate the values of x.

18. What are the intercepts of $V(x)$? What does each mean in terms of the problem? Is there any intercept that doesn't make sense in terms of the problem?

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19. What is the vertex of $V(x)$? What does it mean in terms of the problem?

20. What is the equation of the axis of symmetry?

21. What are the domain and range of $V(x)$?

4

Assignment

Name _____ Date _____

More Areas
More Modeling with Functions

Maria is planning to build a house. The base of the house will be a square that is *x* feet on each side. A 4-foot walkway will surround the house on all four sides. To one side, along the entire walkway, there will be a 12-foot-wide garden. Use this information to answer Questions 1 through 11.

1. Draw a diagram of the plot that includes the house, walkway, and garden. Label all dimensions in the diagram.

2. What is the area of the base of the house?

3. What is the area of the walkway? Write the area as a simplified expression.

4. What is the area of the garden? Write the area as a simplified expression.

5. What is the total area of the plot? Write the area as a simplified expression.

6. What is the total length of the plot?

7. What is the total width of the plot?

8. Use the length and width from Questions 7 and 8 to write an expression for the total area of the plot.

9. You wrote the area of the plot in two different ways in Questions 5 and 8. Show how these expressions are equivalent.

10. Suppose that the square base of the house is 40 feet on each side. Calculate each area.

a. Area of the base of the house

b. Area of the walkway

c. Area of the garden

d. Total area of the plot

Marjane is designing a house. On a square lot that is *x* feet on each side, she wants to have a 12-foot-wide garden along all four sides of the house. On one side of the house, there will be a 5-foot-wide walkway that will cut through the middle of the garden from one edge of the lot to the front of the house.

11. Draw a diagram of the plot that includes the house, walkway, and garden. Label all dimensions in the diagram.

12. What is the area of the base of the house?

13. What is the area of the walkway?

14. What is the area of the garden? Write the area as a simplified expression.

15. What is the area of the entire plot? Write the area as a simplified expression.

16. What is the side length of the plot?

17. Using the side length of the plot, write an expression for the total area of the plot.

18. You wrote the area of the plot in two different ways in Questions 15 and 17. Show how these expressions are equivalent.

19. Suppose that the base of the house is 100 feet on each side. Calculate each area.

a. Area of the base of the house

b. Area of the garden

c. Area of the walkway

d. Area of the plot