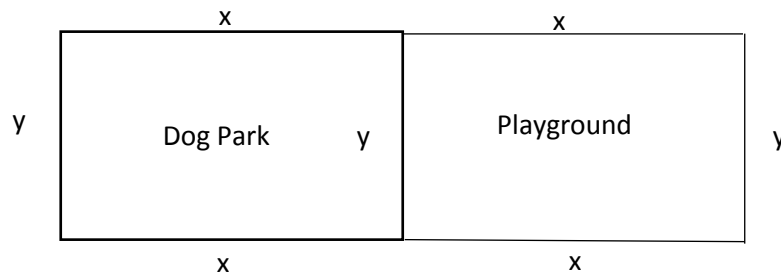


Name: \_\_\_\_\_

### 6.6 Modeling Using Perimeter and Area

1. John wants to put a fence all the way around both a dog park and a playground next to the dog park (as shown below). He wants the area of the playground and the dog park to be the same. John has 78 feet of fencing to work with and wants to use all of the fencing. What dimensions will maximize the area of the dog park?



2. Jason wants to fence in a rectangular garden in his backyard. If one side of the garden is against the house and Jason has 48 ft of fencing, what dimensions will maximize the garden area while utilizing all of the fencing?
3. The largest size envelope that can be mailed with a large envelope rate is 3 inches longer than it is wide. The area is 180 inches squared. Find the length and the width.
4. A photo is 6 in. longer than it is wide. Find the length and width if the area is  $187 \text{ in}^2$ .
5. The base of a triangular tabletop is 20 inches longer than the height. The area is 750 inches squared. Find the height and the base. ( $A = \frac{1}{2} bh$ )
6. A rectangular garden is 30 ft by 40 ft. Part of the garden is removed in order to install a walkway of uniform width around it. The area of the new garden is one-half the area of the old garden. How wide is the walkway?
7. Britton wants to build a pen for his teacup pig. The length must be 5 feet shorter than the width. The pig doesn't need a lot of room so the area should be minimized. What should the dimensions of the pen be if the area is 20 feet squared?

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8. Find three consecutive integers such that the product of the first two plus the square of the third is equal to 137.

9. Find three consecutive integers such that the square of the second number plus the product of the first and third numbers is a minimum.

10. Find two numbers that add to 150 and have a maximum product. What is the maximum product?

11. Find two numbers that differ by 8 and have a minimum product.

12. A quadratic equation is shown.

$$y = x^2 + 19x - 20$$

What are the roots of the equation?

Enter each answer on a separate line.

13. What are the solutions to the equation  $x^2 - 5x + 4 = -2$ ?

(A)  $x = -4$  and  $x = -1$

(B)  $x = -3$  and  $x = -2$

(C)  $x = 3$  and  $x = 2$

(D)  $x = 4$  and  $x = 1$

14. What are the solutions to this quadratic equation:  $x^2 - 8x = 0$ ?

(A) 0 and -8

(B) 0 and 8

(C) 1 and -8

(D) 1 and 8

15. What is the solution set of  $x^2 - 3x - 18 = 0$ ?

(A)  $\{-9, 2\}$

(B)  $\{-6, 3\}$

(C)  $\{-3, 6\}$

(D)  $\{-2, 9\}$

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16. A boy doing chores for a neighbor calculates that, given the rate he paints fence posts and the amount of money he makes per hour, he earns 20 cents per fence post. He wants to create a function that tells him how much money in dollars he earns per fence post.

What are a good domain and range for this function?

- (A) all integers as the domain and the range
- (B) all real numbers as the domain and all integers as the range
- (C) all positive integers as the domain and all positive multiples of 20 as the range
- (D) all positive integers as the domain and all positive multiples of  $\frac{1}{5}$  as the range

17. Solve.

$$\sqrt{x+5} + 10 = 8$$

- (A)  $x = -7$
- (B)  $x = -1$
- (C)  $x = 23$
- (D) There are no real solutions.

18. A polynomial expression is given.

$$(2x^3 - 5x + 7)(x^2 + 1) - (x^5 + 7x^2 + 7)$$

Simplify this expression and leave your answer in standard form.

- (A)  $x^5 - 3x^3 - 5x$
- (B)  $x^5 - 3x^3 + 14x^2 - 5x + 14$
- (C)  $-x^5 + 2x^4 + 2x^3 - 12x^2 + 2x$
- (D)  $2x^5 + 2x^3 - 5x^3 - 5x + 7x^2 + 7 - x^5 - 7x^2 - 7$

19. Which expression has the largest value?

- (A)  $16^{\frac{3}{2}}$
- (B)  $27^{\frac{1}{3}}$
- (C)  $100^{\frac{1}{2}}$
- (D)  $125^{\frac{2}{3}}$

20. Under which operations is the set of all polynomials closed?

- (A) addition, subtraction, and division
- (B) addition, multiplication, and division
- (C) subtraction, multiplication, and division
- (D) addition, subtraction, and multiplication