

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

Instructor: \_\_\_\_\_

Score: \_\_\_\_\_

SIMPLIFY THE FOLLOWING EXPRESSIONS.

Show all appropriate work!

1.  $(64p^9)^{-\frac{1}{3}}$

1. \_\_\_\_\_ (2)

2.  $\left(\frac{2xy}{6x^2}\right)^2 \left(\frac{y^2}{xz}\right)^{-3}$  (write the answer using positive exponents only)

2. \_\_\_\_\_ (3)

3.  $5^m \cdot 5^{3-m}$

3. \_\_\_\_\_ (3)

4.  $\frac{3h^2+15h}{3h^2-75}$

4. \_\_\_\_\_ (3)

5.  $\frac{1}{a-5} \div \frac{a+7}{a^2-4a-5}$

5. \_\_\_\_\_ (3)

6.  $\frac{1}{x+1} + \frac{1}{x-1}$

6. \_\_\_\_\_ (3)

**Show all appropriate work!**

7. Simplify:  $(y + \sqrt{3})(2y - \sqrt{3})$

7. \_\_\_\_\_ (3)

8. Rewrite as a single logarithm:  $3\log x - 2\log w$

8. \_\_\_\_\_ (3)

9. Factor completely:  $2m^2n - 5mn - 3n$

9. \_\_\_\_\_ (4)

**SOLVE AS INDICATED.**

10.  $(5t - 4)^2 = 81$

10. \_\_\_\_\_ (4)

11.  $3w^2 - 2w = 6$  (round answers to two decimal places)

11. \_\_\_\_\_ (4)

12.  $\log(2x) = 3$

12. \_\_\_\_\_ (3)

SOLVE AS INDICATED.

Show all appropriate work!

13.  $x + 1 = \frac{20}{x}$

13. \_\_\_\_\_ (4)

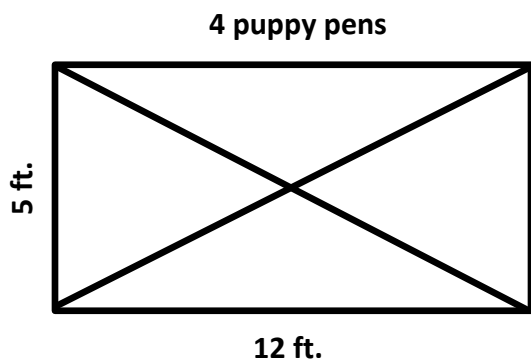
14.  $15 \cdot (1.4)^x = 360$

14. \_\_\_\_\_ (4)  
(round to hundredth place)

15.  $5\sqrt{5a + 6} - 7 = 13$

15. \_\_\_\_\_ (4)

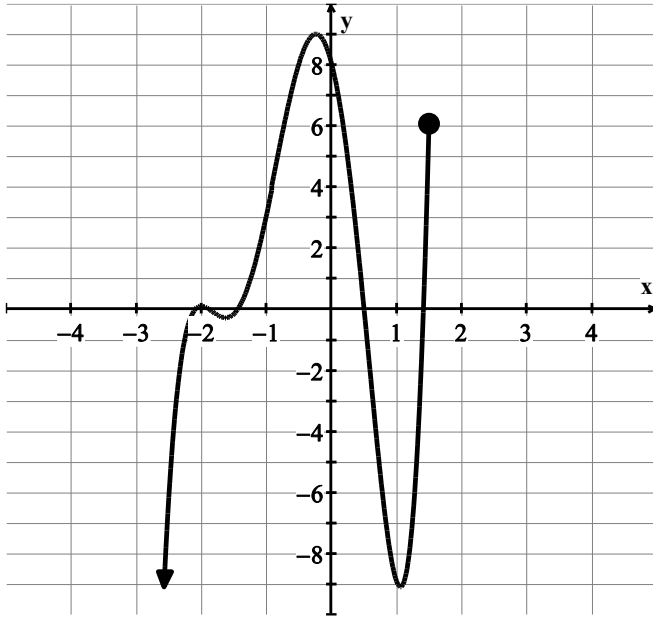
16. A dog trainer wants to make four puppy pens by fencing the four exterior sides and the two interior diagonals as shown in the diagram. The fencing costs \$3.00 per foot. What will be the total cost of fencing?



16. \_\_\_\_\_ (4)

Show all appropriate work!

17. The graph of  $F(x)$  is shown below. Use the graph to answer the parts a) to d) below.



a. For how many value(s) of  $x$  is  $F(x) = -2$ ?

17 a. \_\_\_\_\_ (1)

b.  $F(-1) =$  \_\_\_\_\_ (1)

c. Give the domain of  $F(x)$ . \_\_\_\_\_ (2)

d. Give the range of  $F(x)$ . \_\_\_\_\_ (2)

18. A sunflower in Julia’s garden was 12 centimeters tall when it was first planted. Since then, it has grown approximately 0.6 centimeters per day.

a. Write an equation expressing the sunflower’s height,  $H$ , in terms of the number of days,  $d$ , since it was planted.

18a. \_\_\_\_\_ (2)

b. Assuming the growth rate is constant, what will be the height of the sunflower in 20 days?

18b. \_\_\_\_\_ (1)

19. Bacteria can multiply at an alarming rate when each bacterium splits into two new cells, thus doubling. We start with only one bacterium and the population doubles every hour.

a. Write the number of bacteria  $P(t)$  as a function of the time  $t$ , in hours.

19a. \_\_\_\_\_ (2)

b. How many bacteria will we have in half a day?

19b. \_\_\_\_\_ (2)

**Show all appropriate work!**

**20.** An enclosed field is divided into three equal sections using 500 feet of fencing. Its area is given by

$$A(w) = 250w - 2w^2, \text{ where } w \text{ is the width of the field.}$$

**a.** What is the area if the width of the field is 45 feet?

20a. \_\_\_\_\_ (1)

**b.** What width will yield the greatest area of the field?

20b. \_\_\_\_\_ (2)

**c.** What is the largest area that the field can have?

20c. \_\_\_\_\_ (2)

**21.** The function  $f(x) = 20(0.975)^x$  models the percentage of surface sunlight,  $f(x)$ , that reaches a depth of  $x$  feet beneath the surface of the ocean. Use the function  $f(x)$  to determine at what depth, to the nearest foot, there is 1% of surface sunlight.

21. \_\_\_\_\_ (4)

**22.** Tom and Maria are selling pies for a school fundraiser. Customers can buy apple pies and key lime pies. Tom sold 6 apple pies and 4 key lime pies for a total of \$80. Maria sold 6 apple pies and 7 key lime pies for a total of \$122. What is the cost of each of one apple pie and one key lime pie?

Apple pie: \_\_\_\_\_

(4)

Key lime pie: \_\_\_\_\_

**Show all appropriate work!**

23. Given  $h(x) = \frac{4}{x+3}$

a. Find  $h(5)$ .

23a. \_\_\_\_\_ (1)

b. Find all  $x$  so that  $h(x) = -2$

23b. \_\_\_\_\_ (2)

c. Evaluate  $h(2c - 3)$  and simplify the result.

23c. \_\_\_\_\_ (2)

d. What value of  $x$  will make the function,  $h(x)$ , undefined?

23d. \_\_\_\_\_ (1)

24. Circle the correct response(s) for the following problems.

a.  $\frac{\log_5 x}{\log_5 6} =$  \_\_\_\_\_ (2)

$\log_5 x - \log_5 6$

$\log_6 x$

$\log_5 x^6$

b. The value of  $c$  for which the expression  $x^2 - 8x + c$  is a perfect square trinomial \_\_\_\_\_ (2)

$c = 4$

$c = 16$

$c = -16$

25. Consider the function  $f(x) = -(x + 1)(x - 7)$

a. The y-intercept of  $f(x)$ :

24a. (\_\_\_\_, \_\_\_\_ ) (2)

b. The x-intercept(s) of  $f(x)$ :

24b. (\_\_\_\_, \_\_\_\_ )  
(2)

(\_\_\_\_, \_\_\_\_)

c. Use your graphing calculator and graph the function  $f(x) = -(x + 1)(x - 7)$  in the given grid below. (2)

d. Graph the function  $g(x) = x + 10$  in the same grid below. (2)

e. Use your graphing calculator to find the points of intersection of  $f(x)$  and  $g(x)$ . (2)  
(Round your answers to two decimal places)

(\_\_\_\_, \_\_\_\_)

(\_\_\_\_, \_\_\_\_)

