APPC Lesson 3.5 Homework

Name _____

1. The parent function $y = x^3$ was shifted to the right 10, then shifted up 6, then shrunk vertically by a factor of $\frac{1}{4}$. Write an equation for the resulting function.

2. Karah is making baskets out of her supply of popsicle sticks. She uses the

same number of popsicle sticks for every basket. The table below gives the number of popsicle sticks remaining after she makes certain numbers of baskets.

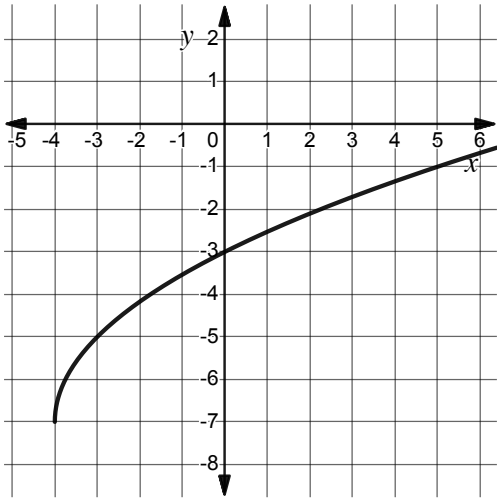
Baskets	Popsicle Sticks
4	481
7	364
10	247

a. How many popsicle sticks does Karah need for each basket?

b. Write an equation for $P(b)$, the number of popsicle sticks remaining after making b baskets.

c. What is the maximum number of baskets Karah can make with her supply of popsicle sticks?

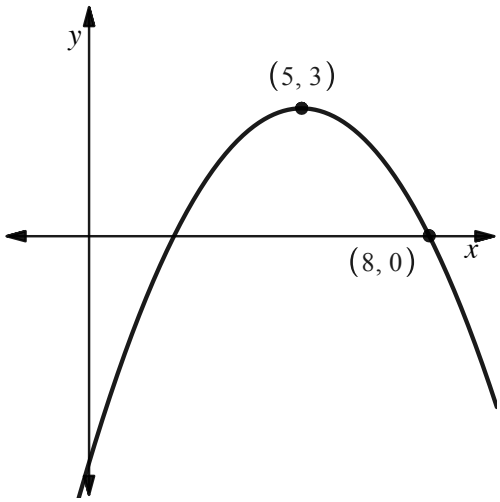
3. The parent function $y = \sqrt{x}$ was transformed to produce the graph of f shown. Write an equation for $f(x)$.



4. The time it takes for a crowd to disperse is inversely proportional to the

number of exits available. If it takes 10 minutes for a crowd to disperse with 2 exits, write a function to model the time, $T(n)$, it takes for a crowd to disperse with n exits. What is the domain of this function?

5. The graph of $y = g(x)$ is shown. Write an equation for $g(x)$.



6. A group of students is investigating the growth of a certain type of plant.

They find that the height (in centimeters) of the plant is proportional to the square root of the number of days since it was planted. On day 1, the plant was 2 cm tall, and on day 9, the plant was 6 cm tall.

a. Construct a function that models the height of the plant (in cm), $h(d)$, d days after it was planted.

b. Does the plant grow at a constant rate? How do you know?

c. According to the model, how tall will the plant be after 25 days? After 2 months?

7. Write the equation of a cubic function f that satisfies the following criteria:

- The graph of f has exactly two distinct x-intercepts
- $x = 5$ is a zero of f with multiplicity 1
- $\lim_{x \to \infty} f(x) = -\infty$

8. An organization puts together care packages to distribute to people in

nursing homes. This requires putting various items in a box, wrapping the box, adding ribbon, and labeling the boxes. The organization has several volunteers come in to assemble the care packages. The person overseeing the project notices that the number of care packages assembled per hour by each volunteer depends on the number of volunteers. Specifically, for every additional volunteer, the number of care packages assembled per hour by the volunteer decreases by a constant amount. When 7 volunteers worked, each volunteer was able to assemble 20 care packages per hour. When 10 volunteers worked, each volunteer was able to assemble only 16 care packages per hour. Let $A(x)$ represent the total number of care packages assembled per hour when x volunteers are working.

a. Why might the productivity of each volunteer decrease when there are more volunteers?

b. Write an equation for $A(x)$.

c. How many volunteers should the organization have to maximize productivity?

d. When does the model predict that there will be no care packages assembled per hour? Does this make sense? Why or why not?

Math Medic