Name_____ Period_____ Date_____

Sec1H **HW 7-3 Shifting Expressions** **Unit 7**

1. A transfer station charges $15 for a waste disposal permit and an additional $5 for each cubic yard of garbage it disposes of. This relationship can be described using the expression $15+5x$. Suppose that a different transfer station charges the same for a permit but they charge $2 more per cubic yard of garbage. What would the equation be for the different transfer station?

2. Absolute Cable Company bills on a monthly basis. Each bill includes a $30.00 service fee plus $2.99 for each movie purchased. The following expression describes the cost of the cable service per month: $30+2.99m$. Write an equation for a different cable company that charges the same monthly service fee, but charges less for each movie purchased.

3. Using the Absolute Cable Company from #2, write an equation for another cable company that has a larger monthly service fee, but charges the same per movie purchased.

4. A petri dish starts with 5 bacteria and it doubles each hour. The following equation describes the amount of bacteria in the petri dish per hour: $y = 5(2)^x$. Write an equation that models a different type of bacteria that has the same growth rate but started with 11 bacteria in the petri dish.

5. Using the bacteria from #4, write an equation for a bacteria that also started with 5 in the petri dish but triples every hour instead.

6. The population growth of a town, Smallville is modeled by the equation $y = 20000(1.003)^x$. Suppose that Gotham has the same growth rate as Smallville, but started with more people. Write an equation that could represent the growth of Gotham.

7. Suppose that Star City started with the same population as Smallville (from #6), but has a larger growth rate. Write an equation that could model the population growth of Star City.

8. Metropolis has a larger starting population than Smallville and a larger growth rate. Write an equation that could model the population growth of Metropolis.

9. A bank account balance for an account with an initial deposit of *P* dollars earns interest at an annual rate of *r*. The amount of money in the account after *n* years is described using the following expression: $\boldsymbol{P(1+r)^n}$. Assume that Rachel and Russell both invest money for 5 years. Rachel put in an initial deposit of $500 and earns interest at 2%. Write an equation that models how much money Rachel will have after *n* years.

10. If Russell puts in the same initial deposit as Rachel but ends up with more money at the end of 5 years, what could have been his interest rate?

11. Using Rachel from #9, suppose that Jake invested money at the same interest rate as Rachel, but ended up with less money at the end of 5 years. What could have been Jake's initial deposit?

12. Tony also is investing money. His investment worth can be modeled with the equation $f(x) = 400(1.02)^x$. Did Tony have the same initial deposit or the same interest rate as Rachel?

13. Kim also is investing money. Her investment worth can be modeled with the equation $f(x) = 500(1.003)^x$. If Rachel and Kim invest for the same amount of time, whose will be worth more?

14. Given $f(x)=4x+8$ and $g(x)=4x-1$. If $g(x)$ can be written as $f(x)+k$, what is the value of *k*?

15. Given $f(x)=-2x+1$ and $g(x)=-2x-1$. If $g(x)$ can be written as $f(x)+k$, what is the value of *k*?

16. Given $f(x)=4^x+5$ and $g(x)=4^x-10$. If $g(x)$ can be written as $f(x)+k$, what is the value of *k*?

17. Given $f(x)=2^x-1$ and $g(x)=2^x-20$. If $g(x)$ can be written as $f(x)+k$, what is the value of *k*?

18. You take a job and are promised, if you work well, you will receive a 5% raise each year. You start out making $20,000 this year.

a. Write an equation that will help calculate how much money you will make in *n* years.

b. How much will you make in 5 years?

19. You take a job disposing of hazardous materials. You are able to reduce the waste by 85% each year. You start with 50,000 tons of material.

a. Write an equation that will help you calculate how much money you will make in *n* years.

b. How many pounds of material will remain in 3 years?

20. You deposit $1600 in a bank account. Find the balance after 3 years for each of the following situations.

a. The account pays 2.5% annual interest compounded monthly.

b. The account pays 1.75% annual interest compounded quarterly.

c. The account pays 4% annual interest compounded annually.