**Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Date\_\_\_\_\_\_\_\_\_\_\_\_\_\_Period\_\_\_\_**

**Exponential Functions Unit Review**

1. Records at the Universal Video store show that sales of new DVDS are greatest in the first month after the release date. In the second month, sales are usually only about one-third of sales in the first month. Sales in the third month are usually only about one-third of sales in the second month, and so on.
	1. If Universal Video sells 180 copies of one particular DVD in the first month after its release, how many copies are likely to be sold in the second month? In the third month? Use the table below to help you answer the questions.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Number of Months | 0 | 1 | 2 | 3 | 4 | 5 |
| Number of DVD Sales | 180 |  |  |  |  |  |

* 1. What NOW-NEXT and “y = “ rules predict the sales in the following months?
	2. Use your equations to predict how many DVDs are in the 12th month?
	3. In what month are sales likely to first be fewer than 5 copies?
	4. How would your answers to parts a – d change for a different DVD that has first month sales of 450 copies?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Number of Months | 0 | 1 | 2 | 3 | 4 | 5 |
| Number of DVD Sales | 450 |  |  |  |  |  |

 NOW-NEXT rule:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Y = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Number of DVDs in the 12th month:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 First month in which fewer than 5 copies are sold:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. You may have heard of athletes being disqualified from competitions because they have used anabolic steroid drugs to increase their weight and strength. These drugs are dangerous and leave the body slowly. With an injection of the steroid cyprionate, about 10% of the drug will dissolve after one day. Suppose that an athlete tries steroids and injects a dose of 100 mg of cyprionate.
	1. Make a table showing the amount of the drug remaining at various times.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Number of Days | 0 | 1 | 2 | 3 | 4 | 5 |
| Amount of Cyprionate | 100 |  |  |  |  |  |

* 1. Write two rules that describe the amount of steroid in the blood.

NOW-NEXT rule:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Y = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. Use one of the rules in part c to estimate the amount of steroid left after 0.5 days and 8.5 days.
	2. Estimate, to the nearest tenth of a day, the half-life of cyprionate.
	3. How long will it take the steroid to be reduced to only 1% (1 mg) of its original level in the body?
1. In 2000, the number of people worldwide living with HIV/AIDS was estimated at more than 36 million. That number was growing at an annual rate of about 15%.
	1. Make a table showing the projected number of people around the world living with HIV/AIDS in each of the ten years after 2000, assuming the growth rate remains 15% per year.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Years after 2000 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| AIDS Cases (in millions) |  |  |  |  |  |  |  |  |  |  |  |

* 1. Write two different kinds of rules that could be used to estimate the number of people living with HIV/AIDS at any time in the future.

NEXT = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Y = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. Use the rules from part b to estimate the number of people living with HIV/AIDS in 2015.
1. The graphs, tables, and rules below model four exponential growth and decay situations. For each graph, there is a matching table and a matching rule. Use what you know about the patterns of exponential relations to match each graph with its corresponding table and rule. In each case, explain the clues that can be used to match the items without any use of a graphing calculator or computer.



5. Mr. Lemmond wants to test which drops fast, a watermelon or a golf ball. When he drops the watermelon he calculates the speed to be an exponential function of y=157(0.4)^x. He then drops the golf ball and calculates the speed to have a function of y= 157(0.6)^x.

1. a. From what initial height did they drop the ball?

Initial height of ball:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Write a *NOW-NEXT* rule that could be used to calculate the speed of the watermelon dropping.

*NEXT* =\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. How fast will the golf ball bounce on the fifth second? Explain or show your work.

*Height of fifth second:*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. At what second does the watermelon reach 37 feet? Explain.

*Second:*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6. When you were born your grandparents put away $8,000 to be saved for a graduation present. The account earns 4.6% and is compounded quarterly.

1. Make a table showing the value of that account each year for 6 years. Round your answer to the nearest dollar.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Year | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| Balance | 8,000 |  |  |  |  |  |  |

1. Write a *NOW-NEXT* rule that could be used to calculate the value of the account in any year from the value in the previous year.

*NEXT* = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**d.** Write a rule beginning “*y* = …” that could be used to calculate the value of the account for any number of years.

*y* = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**e.** What is the value of your account after 18 years? Show your work.

*Value of account after 18 years:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

**f.** If you do not take out any money until your account is over $17,000, how old would you be? Show or explain how you got your answer.

*Age when account is over $17,000:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

7. Chromium-48 has a short half-life of 21.6 hours. How many grams of radium remain after 65 hours if you start with a 100 mg sample?  Remember, half-life is the amount of time it takes for half of the amount of a substance to decay.

 a. Complete the chart

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Cycle  | 0 | 1 | 2 | 3 | 4 |
| Remaining Chromium |  |  |  |  |  |

b. Write a function to illustrate the situation.

c. Plot the data and graph the equation for the first 4 time intervals.