**Exponential Growth and Decay GREEN**

1. y = 250 x 0.755

a) Does this represent exponential growth or decay?

b) What is the original amount in this equation?

c) What is the rate as a percent?

2. The population of Winnemucca, Nevada, can be modelled by P = 6191 x 1.04t where t is the number of years since 1990.

a) What was the population in 1990?

b) By what percent did the population increase by each year?

3. Bacteria can multiply at an alarming rate when each bacteria splits into two new cells, thus doubling. If we start with only one bacteria which can double every hour, how many bacteria will we have by the end of one day?

4. Each year the local country club sponsors a tennis tournament. Play starts with 128 participants. During each round, half of the players are eliminated. How many players remain after 5 rounds?

5. During normal breathing, about 12% of the air in the lungs is replaced after one breath. Write an exponential decay model for the amount of the original air left in the lungs if the initial amount of air in the lungs is 500 mL. How much of the original air is present after 25 breaths?

6. An adult takes 400 mg of ibuprofen. Each hour, the amount of ibuprofen in the person’s system decreases by about 29%. How much ibuprofen is left after 6 hours?

7. You drink a beverage with 120 mg of caffeine. Each hour, the caffeine in your system decreases by about 12%. How long until you have 10mg of caffeine?

8. The foundations of your house has about 1,200 termites. The termites grow at a rate of about 2.4% per day. How long until the number of termites doubles?

9. The population of a school of fish increases at a rate of 18% a month. There are currently 500 fish in the school.

a) How many fish will there be in 3 months?

b) How many fish will there be in 2 years?

10. A rock of radioactive material decays at a rate of 8% per hour. There are currently 145 atoms in the rock.

a) How many atoms will there be in 5 hours?

b) How many atoms will there be in 1 day?

**Extension**: Sketch graphs of the above exponential equations to model the growth or decay.

**Exponential Growth and Decay AMBER**

If the underlined part is great than 1, the equation shows growth. If it’s less than 1, it shows decay.

1. y = 250 x 0.755

a) Does this represent exponential growth or decay?

b) What is the original amount in this equation?

By what value has the 100% changed by?

c) What is the rate as a percent?

2. The population of Winnemucca, Nevada, can be modelled by P = 6191 x 1.04t where t is the number of years since 1990.

a) What was the population in 1990?

b) By what percent did the population increase by each year?

3. Bacteria can multiply at an alarming rate when each bacteria splits into two new cells, thus doubling. If we start with only one bacteria which can double every hour, how many bacteria will we have by the end of one day?

Rate of growth = 100% every hour

4. Each year the local country club sponsors a tennis tournament. Play starts with 128 participants. During each round, half of the players are eliminated. How many players remain after 5 rounds?

Rate of decay = 50% every round

5. During normal breathing, about 12% of the air in the lungs is replaced after one breath. Write an exponential decay model for the amount of the original air left in the lungs if the initial amount of air in the lungs is 500 mL. How much of the original air is present after 25 breaths?

Rate of decay = 12% every breath

6. An adult takes 400 mg of ibuprofen. Each hour, the amount of ibuprofen in the person’s system decreases by about 29%. How much ibuprofen is left after 6 hours?

7. You drink a beverage with 120 mg of caffeine. Each hour, the caffeine in your system decreases by about 12%. How long until you have 10mg of caffeine?

8. The foundations of your house has about 1,200 termites. The termites grow at a rate of about 2.4% per day. How long until the number of termites doubles?

9. The population of a school of fish increases at a rate of 18% a month. There are currently 500 fish in the school.

a) How many fish will there be in 3 months?

b) How many fish will there be in 2 years?

10. A rock of radioactive material decays at a rate of 8% per hour. There are currently 145 atoms in the rock.

a) How many atoms will there be in 5 hours?

b) How many atoms will there be in 1 day?

**Extension**: Sketch graphs of the above exponential equations to model the growth or decay.

**Exponential Growth and Decay RED**

If the underlined part is great than 1, the equation shows growth. If it’s less than 1, it shows decay.

1. y = **250** x 0.755

a) Does this represent exponential growth or decay?

Use the value in bold.

b) What is the original amount in this equation?

By what value has the 100% changed by?

c) What is the rate as a percent?

 100% - 75% = \_\_\_\_\_\_\_\_ %

2. The population of Winnemucca, Nevada, can be modelled by P = **6191** x 1.04t where t is the number of years since 1990.

Use the value in bold.

a) What was the population in 1990?

b) By what percent did the population increase by each year?

By what value has the 100% changed by?

3. Bacteria can multiply at an alarming rate when each bacteria splits into two new cells, thus doubling. If we start with only one bacteria which can double every hour, how many bacteria will we have by the end of one day?

Rate of growth = 100% every hour

 1 x 224 = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Where do each of these numbers come from?

4. Each year the local country club sponsors a tennis tournament. Play starts with 128 participants. During each round, half of the players are eliminated. How many players remain after 5 rounds?

Rate of decay = 50% every round

 128 x 0.55 = \_\_\_\_\_\_\_\_\_\_\_\_

Where do each of these numbers come from?

5. During normal breathing, about 12% of the air in the lungs is replaced after one breath. Write an exponential decay model for the amount of the original air left in the lungs if the initial amount of air in the lungs is 500 mL. How much of the original air is present after 25 breaths?

Rate of decay = 12% every breath

6. An adult takes 400 mg of ibuprofen. Each hour, the amount of ibuprofen in the person’s system decreases by about 29%. How much ibuprofen is left after 6 hours?

Rate of decay = 29% every hour

7. You drink a beverage with 120 mg of caffeine. Each hour, the caffeine in your system decreases by about 12%. How long until you have 10mg of caffeine?

You will need to use trial and improvement for this one!

Rate of decay = 12% every hour

8. The foundations of your house has about 1,200 termites. The termites grow at a rate of about 2.4% per day. How long until the number of termites doubles?

9. The population of a school of fish increases at a rate of 18% a month. There are currently 500 fish in the school.

a) How many fish will there be in 3 months?

b) How many fish will there be in 2 years?

10. A rock of radioactive material decays at a rate of 8% per hour. There are currently 145 atoms in the rock.

a) How many atoms will there be in 5 hours?

b) How many atoms will there be in 1 day?

**Extension**: Sketch graphs of the above exponential equations to model the growth or decay.