**NIQB Cell Biology - Enzyme kinetics module student pre-work**

**Biology pre-work**

**B1) Write a definition for an enzyme.**

**B2) What is the name of the site in an enzyme where the substrate binds?**

**B3) What does it mean for an enzyme regulator to bind to an allosteric site?**

**B4) What is a neurotransmitter?**

**B5) Using the given terms, label the following structures on the nerve cells below. Use your textbook as a reference.**

**Terms: synaptic cleft, synaptic vesicles, neurotransmitters, pre-synaptic neuron, post-synaptic neuron, neurotransmitter receptors**

A diagram of a cell

Description automatically generated with low confidence

**Math pre-work**

**M1) Write a definition for an asymptote of a curve on a graph.**

**M2)** Consider the graph below. Recall that linear functions can be represented generally in slope-intercept form by the equation **y=mx+b**, where m is the slope of the line.

**What does b represent?**

A picture containing line, plot, diagram, parallel

Description automatically generatedThree functions are plotted in the graph in different colors.

**M3) Write the general equations for each.**

Blue:

Orange:

Gray:

**M4) Which line(s) has a y-intercept of 3?**

**M5) Which line(s) has a slope of 1?**

**M6) Compare the blue and gray lines above. How would you describe these two lines that have the same slope, but different y-intercepts?**

**M7) Compare the blue and orange lines above. How would you describe these two lines that have the same y-intercept, but different slopes?**

It is useful in science to be able to describe different graphs mathematically, but also in words, which helps us understand the general trends shown by the data. The next four questions will allow you to practice this.

Fill in the blank for the statements below as either: less steep than, as steep as, or more steep than.

**M8) The slope of the orange line is \_\_\_\_\_\_\_\_\_\_\_ the slope of the blue line.**

**M9) The slope of the gray line is \_\_\_\_\_\_\_\_\_\_\_\_ the slope of the blue line.**

Fill in the blank for the change you would expect to see for the two questions below.

**M10) If the line y=mx+b has a positive slope (i.e. m>0), then as x gets larger, y would become \_\_\_\_\_\_\_\_.**

**M11) If the line y=mx+b has a negative slope (i.e. m<0), then as x gets larger, y would become \_\_\_\_\_\_\_\_.**

Next you will be plotting the two equations below using a scatter plot in Excel. Please include an image for your graph in the space below or on a separate page when you submit your pre-work.

**M12) For x values below, determine the corresponding y values using the following two equations: y=x and y=1/x. Create a scatter plot graph of your values for both equation (or one graph that includes them both). Describe what you see in your graph(s).**

x = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

**M13) Considering your functions of y=x and y=1/x, what value would you estimate for x when y =12?**

After making a scatter plot, Excel can identify a linear regression equation (y=mx+b) that best fits the data plotted. Given this equation, you can use it to solve for certain values of x or y, if the other variable is known. In this next step, we will practice solving for the unknown variable of x or y using the known variable and the linear regression equation. For the examples below, values are written using “E” instead of “x10” as this is the type of output you will see when using Excel. For example, a value of 4.0E+3 = 4.0x103 when written in proper scientific notation. For your answers, make sure to keep the proper significant figures.

**M14) For the following linear regression equation (y=4.56E+5x + 5.96E+6), what is the value of y when x = 20.**

**M15) For the following linear regression equation (y=4.56E+5x + 5.96E+6), what is the value of x when y = 2.65E+7.**