

### Student Discussion Worksheet

**Directions:** Read the online *Science News* article "[Calculating a dog's age in human years is harder than you think](#)" and answer the questions below. Partner with a classmate to discuss the final two prompts.

#### Define the model

1. The article describes a new mathematical model for determining a dog's age in human years. Use the information from the article to write an equation for the new relationship between a dog's age in dog years and a dog's age in equivalent human years. Define the variables used.
2. Use the article to define the general steps taken by scientists to determine the equation above.

#### Apply the model

3. Based on the new dog age equation, if a dog is 14 years old, how old is the dog in human years (round your answer to the nearest whole year)? Use the graph in the online article to verify your answer.
4. Based on the new dog age equation, if a human is 14 years old, how old is the human in dog years (round your answer to the hundredths place)? Use the graph in the online article to verify your answer. Then, convert your answer to a number of months (round to the nearest whole number of months).

#### Analyze the model

5. What does the new canine age model tell you about the rate of a dog's development compared with that of a human's over their respective life spans? Use the equation and the graph to explain your answer.
6. Explain why you think this model was created. Why is it helpful?

7. What factors might affect the rate at which a dog ages? How do these factors limit the new mathematical model that the article describes?

### **Compare models**

8. The existing “rule of thumb” for determining dog age in equivalent human years was to multiply a dog’s age by seven. Either print out or redraw the graph from the online version of the article. Then, plot at least five points that fit the “rule of thumb” equation on the dog age graph and draw the resulting line that represents the formula. Write the appropriate equation below.

9. Now compare the new and old dog age graphs. At what age in dog years do the two equations predict the most similar age in human years (only use whole number dog years unless otherwise instructed by your teacher)? What is happening to the two graphed equations near this point?

10. According to the graphs, does the old formula predict a human age that is too young or too old relative to the new formula for dogs under the age you mentioned in the answer above. What about for dogs older than the age you mentioned above?

11. What does the old dog age model indicate about the rate of a dog’s development compared with that of a human’s over their respective life spans? How does that compare with the new dog age formula? Use the graphed equations to explain your answer.

### **Final prompts**

12. What additional questions might you ask based on the current dog age model? What other pet-related questions could be asked and answered using a mathematical model? Give a few examples of mathematical models used in other fields of study.

13. Why are mathematical models beneficial? What are some limitations of models?