



4.4 Three Animals Race Task

This task explores the infamous race of the tortoise and the hare. Well, there is another version of the story that includes an alligator! It goes something like this:

Turtle, Rabbit, and Alligator are competing in a 100-meter dash. Rabbit is excited, she knows she is the fastest of them all. She's bouncing around at the starting line taunting Turtle. Alligator and Rabbit decide to give Turtle a 50-meter head start. So the race referee has Turtle line up 50 meters ahead of Rabbit and Alligator when she announces, "Take your mark...get set...go!"



Rabbit takes off slowly but keeps getting faster, starting at a rate of 1 meter/sec and going 1 meter/sec faster each second of the race until she arrives at the finish line. Turtle takes off and walks at a steady rate of 3 meters/sec for the duration of the race. When the starting signal sounds, Alligator is caught off guard. She stands still and watches Rabbit and Turtle take off. At five seconds she finally starts running. She begins at a pace of 1.5 meters/sec and continues to speed up, going 1.5 times faster each second of the race.

The story ends with a winner of the race, but who is it?

Q1. Make a prediction. Who wins?



Let's explore the race using a simulation.



[Three Animals Race Task](#)

On the first page of the GeoGebra book, drag the *time* slider to observe a simulation of the race.

Q2. Based on what you have observed, who do you think wins the race and why?

Let's use a spreadsheet to create a model of the race.



[Three Animals Race Spreadsheet](#)

Examine the spreadsheet set up. Notice the column on the left indicates the amount of time that has passed since the race started. The next three columns are set up to record the distance from the starting line each animal is at each second since the race began.

Q3. How many meters has each animal traveled after 0 seconds? 1 second? 2 seconds? 3 seconds? Record these in the spreadsheet. Include a screenshot of your spreadsheet.



Q4. In your own words, explain how each of Turtle, Rabbit, and Alligator's rates change throughout the race.

Turtle:

Rabbit:

Alligator:

Q5. In your spreadsheet, continue building up the animals' distances from the starting line as the race continues. Approximately how many seconds does it take for each animal to finish the race? Include a screenshot of your spreadsheet.

Turtle:

Rabbit:

Alligator:



Q6. Rabbit and Alligator both sped up during the race, whose rate of change is increasing faster? Explain.

Q7. Who wins the race? How do you know?

Q8. If you were to create a graph of time vs. distance from the start line for each of the animals, what would you expect each graph to look like? Explain.

Turtle:

Rabbit:

Alligator:



Add a graphing view and use the create polyline tool to graph each of the animals' distance from the starting line over time. Please include a screenshot of your graph.

Note: To select two columns of data that are not adjacent to each other, select one and then hold down the "control" key to select the second.

Q9. Approximately how long did it take for each of the contestants to finish the race? How do you know? Who won?

Q10. Who would have won if the race were 95 meters rather than 100? Why?

Q11. Who would have won if the race were 115 meters rather than 100? Why?