The Function Elevator

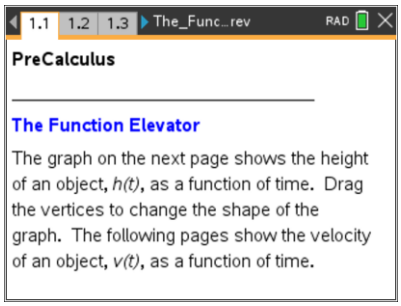
Student Activity

Name _____

Class _____

Open the TI-Nspire document *The_Function_Elevator.tns.*

Graphs can be used to tell a story. In this activity, you will build graphs to represent stories, and compare graphs displaying different features of the story.



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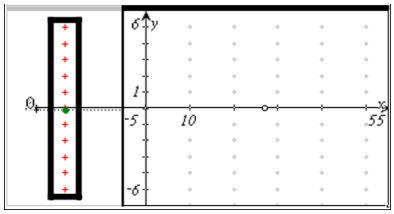
1. The graph on the right side of this page shows the movement of an elevator over time. The bar on the left side of the page shows the vertical motion of the elevator, that is, the floor the elevator is on at a given point in time.
   a. Notice that the scale for $h(t)$, the height of the elevator at time t, ranges from –6 and 6. Describe a real life scenario where it would make sense for the height of the elevator to be a negative number.

   b. Notice that $h(t)$, the height of the elevator at time t, is a continuous function, so it is possible that $h(t)$ is not a whole number; for example, $h(t)$ could be 1.7. Describe a real life scenario where it would make sense for the height of the elevator not to be a whole number.

2. Drag the vertices to transform the graph and model the following scenario. Record a sketch of your graph, and explain how it reflects the scenario.



Scenario: *Gus boarded an elevator on the ground floor. It took 20 seconds for the elevator to rise 4 floors. When Gus reached 4 floors above the ground floor, he remembered that he left his cell phone in the gym, in the basement of the building. Gus rode the elevator to 2 floors below the ground floor in 10 seconds, and was about to get off the elevator to check for his cell phone in the gym, when he reached into his pocket and found that he had his cell phone all along. He promptly rode the elevator back to 4 floors above the ground floor, taking 20 more seconds, where he got out.*

3. Is your graph the only possible graph to represent the scenario described in question 2? If so, why? If not, why not?

4. At what speed was the elevator moving for the first 20 seconds? For the next 10 seconds? For the final 20 seconds? How do you know?

5. a. Luis says Gus was moving fastest 10 seconds into his trip, and Stephanie says Gus was moving fastest 25 seconds into his trip. Who is right? Why?

   b. Amanda says Gus was moving slowest 15 seconds into his trip, and Darryl says Gus was moving slowest 35 seconds into his trip. Who is right? Why?

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6. This graph shows the velocity of the elevator based on the graph you constructed in question 2.
   a. The velocity graph is positive in some places and negative in others. Why?

   b. What are the connections between the scenario of Gus riding the elevator, your graph of the motion of the elevator, and the velocity?

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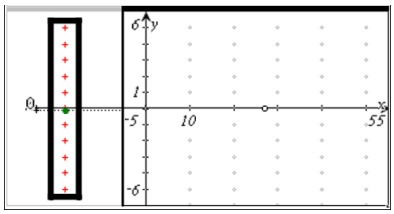
7. Drag the vertices to transform the graph so it models the height of the elevator in the following scenario. Record a sketch of your graph and explain how it models the scenario.

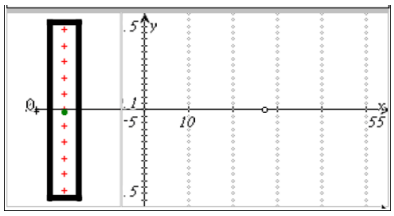
Gus and his dog left their room 2 floors above the ground floor and took the elevator down for 20 seconds at a rate of 2 floors every 10 seconds. When the elevator doors opened, Gus's dog sprinted out of the elevator. A friendly person on the elevator held the doors for 10 seconds while Gus collected his dog. The elevator continued upward at a rate of 3 floors every 10 seconds, and Gus was so busy scolding his dog, that he didn't realize what floor he was on when he got off the elevator 20 seconds later.



8. On what floor do Gus and his dog end up? How do you know?

9. Is your graph the only possible graph to model the scenario described in question 7? If so, why? If not, why not?

10. Draw a sketch showing your prediction of what the velocity graph will look like for the scenario modeled in question 7. Why do you think the velocity graph will look this way?



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11. How does your prediction about the velocity graph compare to the actual graph? If you were incorrect, what mistakes did you make?

12. In general, how are the graphs of the motion of an elevator and its velocity related? Explain your thinking.