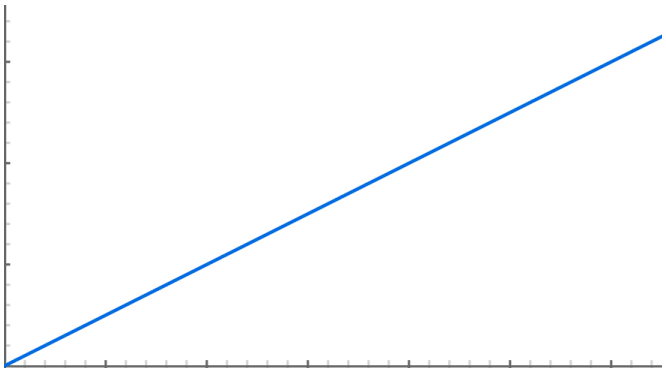
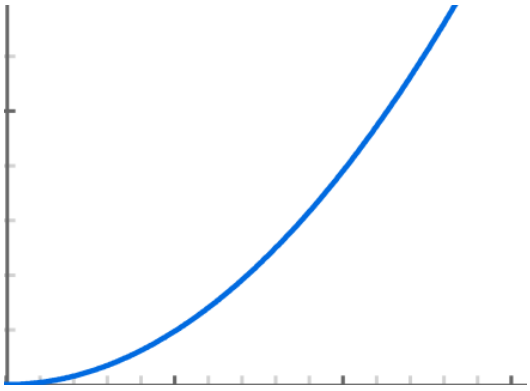
Graphing a Story: Straight vs. Curved
Explore the Mathematics

Straight and Curved Graphs
This activity asks students to graph the movement of ships over different time intervals. There are three basic ways that the ship moves in these stories, at a constant speed, faster and faster (speed increases), and slower and slower (speed decreases).

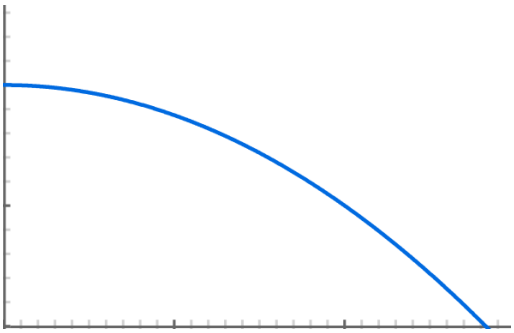
When the ship moves at a constant speed, the graph of distance versus time will be a line. The slope of this line will be the same at all points in time, which corresponds to the constant speed. With this movement, the ship will travel equal amounts of distance in equal time intervals, which can be seen on the graph.



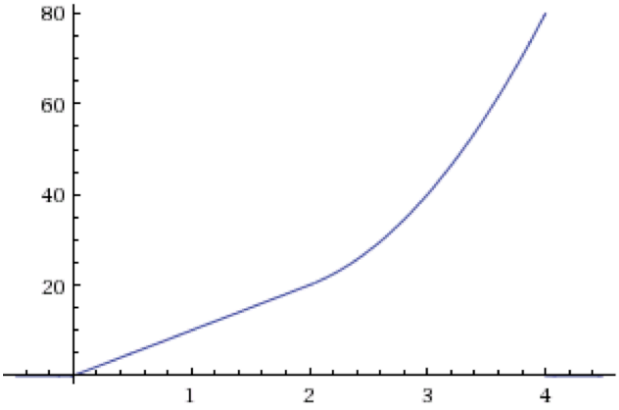
When the ship moves at an increasing speed, the graph of distance versus time will be a curve with an increasing slope. The ship will travel greater distances in equal time intervals as time progresses. We can see this on the graph in the first time interval the ship travels a smaller distance than it does is the next time intervals.



When the ship moves slower and slower, the graph of distance versus time will be a curve with a decreasing slope. The ship will travel smaller distances in equal time intervals as time progresses. We can see this on the graph in the first time interval the ship travels a greater distance than it does is the next time intervals.



In the third graphing story, the ship travels at a constant speed for two hours, and then moves faster and faster for two more hours. Therefore, the graph of the ship's distance versus time is represented by a line until two hours, when it will curve upward, as shown in the figure below.



Connecting to Algebra

This activity allows students to make connections between graphs and physical situations. Students have the opportunity to construct graphs of situations that are represented by linear and curved graphs. Students also have the opportunity to interpret steeper and flatter portions of curved graphs in terms of the corresponding physical situation (a ship moving more quickly or more slowly). Additionally, students can consider rates of change and slope of a graph.

Connecting to the Common Core Standards

8.F.5 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

F-IF.4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.

S.4. Model with mathematics.