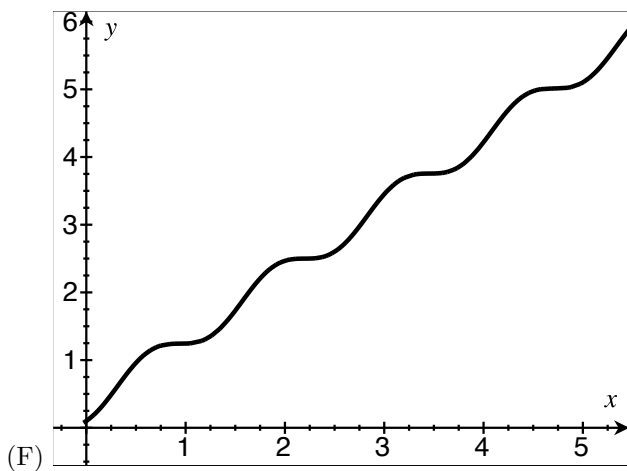
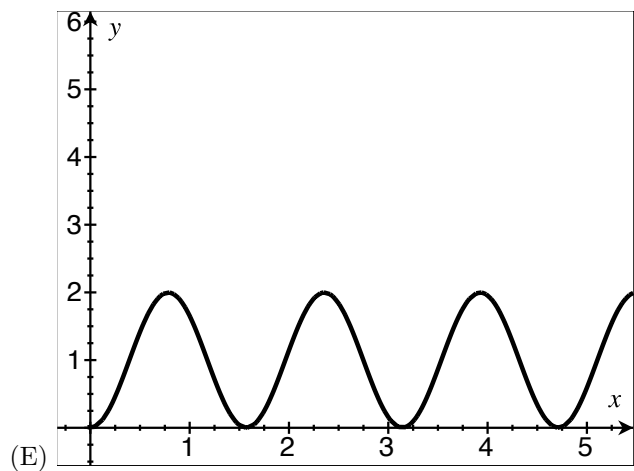
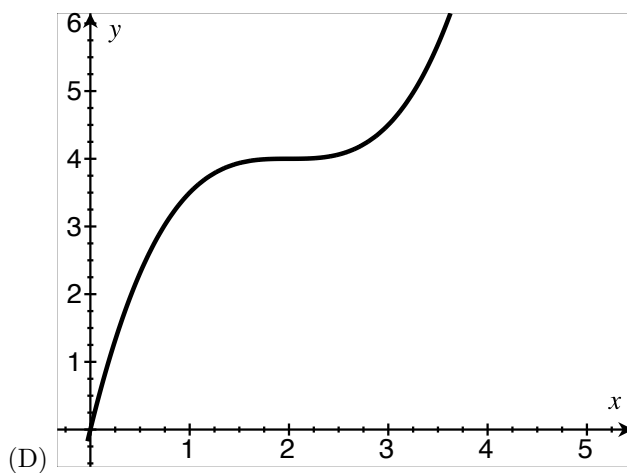
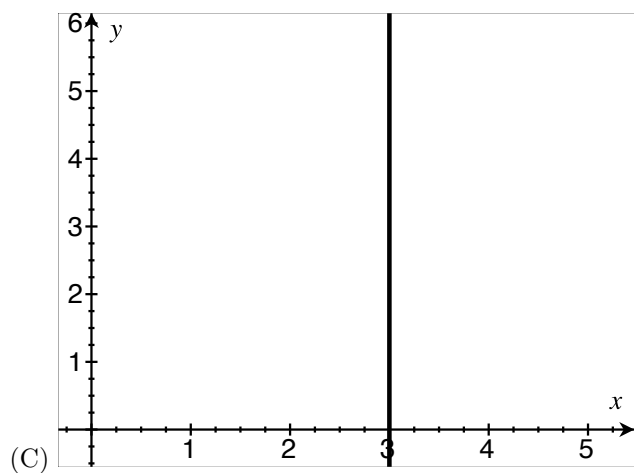
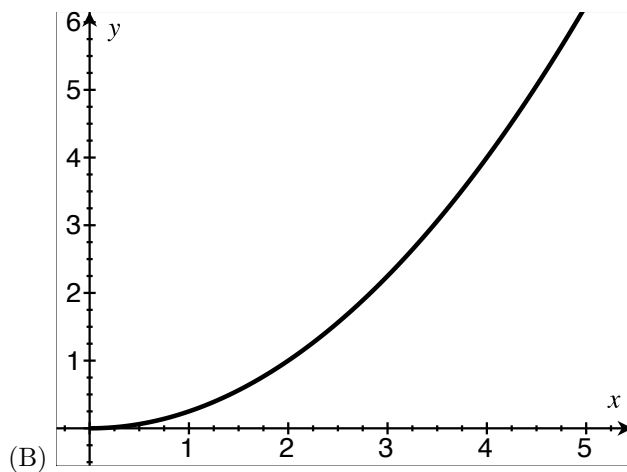
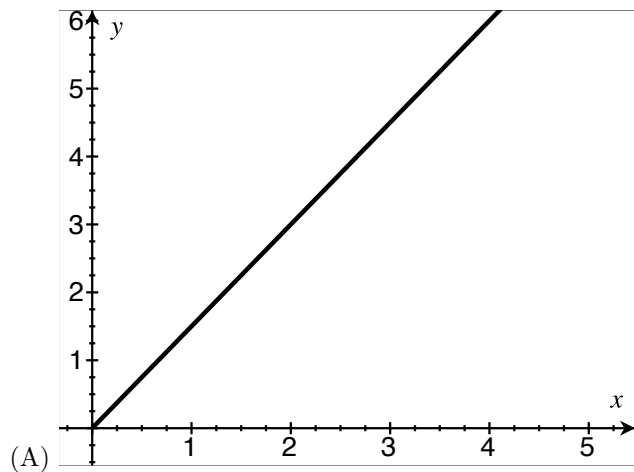


Flag Hoist

- At summer camp, a child comes out every morning to raise a flag. Consider the height of the flag as a function of time. Sketch what such a graph might look like.
- Consider these candidates for the graph in (1), and write two sentences on each of the following questions:
 - Which one seems the most realistic to you?
 - Which one seems the least realistic?



1. **Carla's Bike.** Carla rode her bike to her grandmothers house. The following information describes her trip:
 - For the first 5 minutes, Carla rode fast and then slowed down. She rode 1 mile.
 - For the next 15 minutes, Carla rode at a steady pace until she arrived at her grandmothers house. She rode 3 miles.
 - For the next 10 minutes, Carla visited her grandmother.
 - For the next 5 minutes, Carla rode slowly at first but then began to ride faster. She rode 1 mile.
 - For the last 10 minutes, Carla rode fast. She rode 3 miles at a steady pace.

Graph Carla's miles from home as a function of minutes elapsed!

2. Problem (1) is from an SBAC Grade 8 Sample Test and claims to address at least one of the following Grade 8 Assessment Targets. Write two sentences arguing that your response displayed one of the following abilities. Be as specific as possible about evidence of thinking.

1. *Concepts and Procedures*

- A. Know that there are numbers that are not rational, and approximate them by rational numbers.
 - B. Work with radicals and integer exponents.
 - C. Understand the connections between proportional relationships, lines, and linear equations.
 - D. Analyze and solve linear equations and pairs of simultaneous linear equations.
 - E. Define, evaluate, and compare functions.
 - F. Use functions to model relationships between quantities.
 - G. Understand congruence and similarity using physical models, transparencies, or geometry software.
 - H. Understand and apply the Pythagorean Theorem.
 - I. Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.
 - J. Investigate patterns of association in bivariate data.
3. Come to a group consensus on correct answers for the previous parts.

Bonus Questions

1. There is a speed trap in my hometown. It is a straight stretch of road and at the start, the speed limit suddenly drops to 60 miles per hour. There is a machine that makes a graph for each car that drives on this road, graphing the position of the car (in miles) as a function of time (in minutes).

Suppose the six graphs from *Flag Hoist* are graphs that this machine recorded.

- (a) Did Car (A) break the speed limit? What was its velocity, and at which times?
 - (b) Which of the other cars broke the speed limit? Tell me when the violations happened.
 - (c) For each car, pick a specific time and estimate as well as you can its velocity at that moment. You can use a calculator for this part.
 - (d) Somewhere near the 4 mile mark, there is a stop sign. Did any cars actually stop for it?
2. For as many Flag Hoist graphs as you can, write the formula for a matching function. In case you get stuck, there are a sequence of increasingly helpful hints. Use as few hints as you can !

(a) These can be modelled with combinations of polynomials and trig functions.

(b) These can be modelled with polynomials degree three or lower and cosine.

(c) B is quadratic. D is cubic. E is a shifted, stretched cosine. F is a shifted, scaled, stretched cosine plus a linear function.