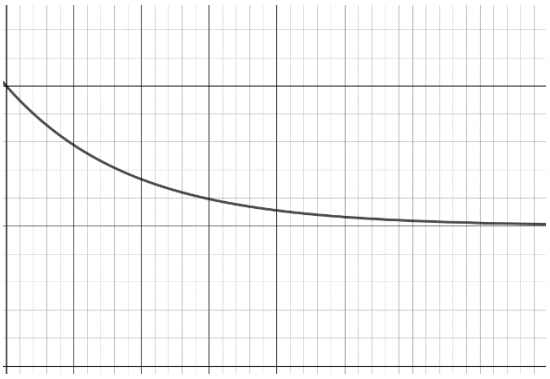
Name: _____KEY_____Class:_____

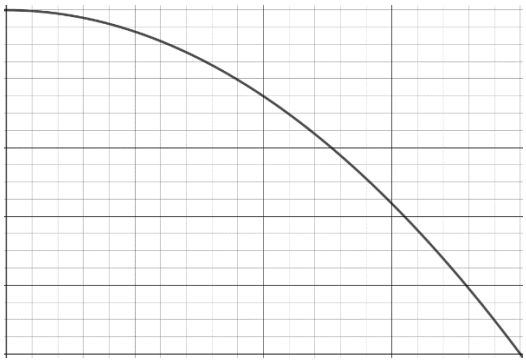
Target 1: I understand how to identify graphs from verbal descriptions

1. Francine bought a cup of cocoa at the cafeteria. The cocoa cooled off rapidly at first, and then gradually approached room temperature. Which graph below more accurately reflects the temperature of the cocoa as a function of time? Explain why.

a



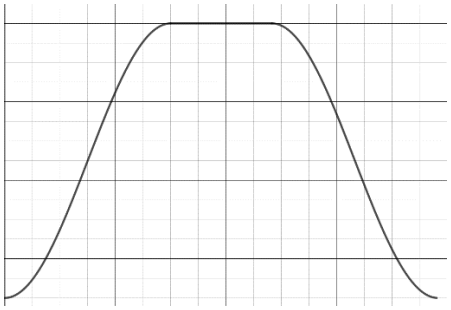
b



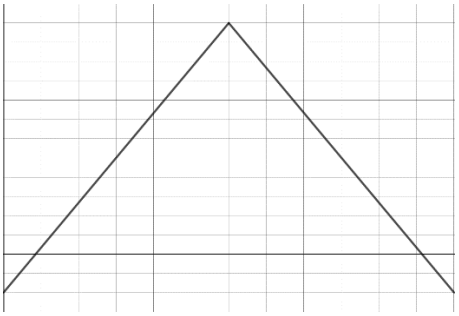
Answer: The first graph most accurately depicts the situation. The rate of decrease is rapid at first and then gradually declines to zero. While the second graph the rate of change is small at first and then increases.

2. Manuel went to an aerobics class and monitored his heart rate during the class. Which graph below more accurately reflects the heart rate as a function of time? Explain why

a)



b)



Answer: This question requires a bit of common sense! Your heart rate would not increase a linear rate and then reach a maximum and decrease at a linear rate immediately. It is more likely that your heart rate would increase slowly as you warm up and then reach a maximum and slow down as you cool down. Also in most aerobics situations, you would remain at your maximum heart rate for a while during the workout.

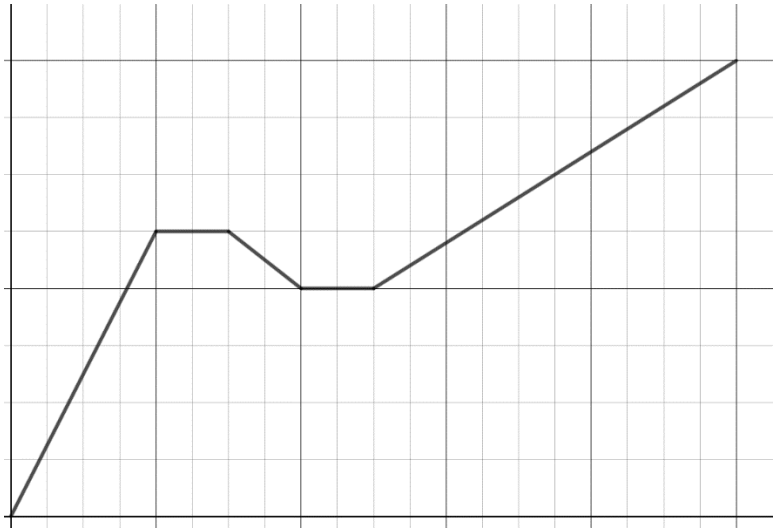
Target 2: I understand how to create graphs from verbal descriptions (distance time graphs) (Yoshiwara)

3. Halfway from your English class to your math class, you realize you left your math book in the English classroom. You return to the English classroom to retrieve your book and then walk to your math class. Halfway from your English to your math class you stop to chat with an old friend for a while and then you continue to your math class. Graph the distance between you and your English classroom as function of time, from the moment you realize you left your book in the English class until you reach the math classroom. Explain why you drew the graph the way you did.

Answer: Since the vertical axis is distance from your English class, start the graph halfway up the vertical axis (halfway from math to English class), then the graph should fall to the x-axis (return to your English class). Then it should increase until about halfway up the vertical axis, where it should stay constant for a while (talk to friend), then it should continue to increase until near the top of the graph. Many answers are possible, but here is one possible solution:

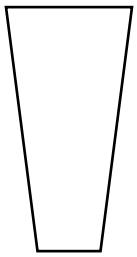
4. While bicycling from home to school. Greg gets a flat tire. He repairs the tire in just a few minutes, but decides to backtrack a few miles to a service station where he cleans up. Finally, he bicycles the rest of the way to school. Graph the distance between Greg and his home as function of time, from the moment he leaves home until he arrives at school. Explain why you drew the graph the way you did.

Answer: Since the vertical axis is distance from home to school start the graph at the origin. The graph should increase until about halfway up the vertical axis, then the graph should be constant for a while (fixing the flat tire), then decrease for a small distance and be constant again (go to the service station and clean up). Finally, the graph should increase again until he reaches school. Many graphs are possible but here is one solution

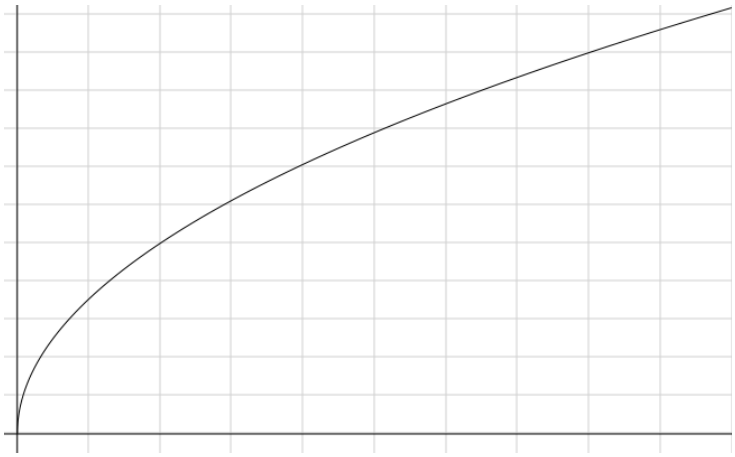


Target 3: I understand how to create graph from physical descriptions using a constant rate of change (Oehrtman, Carlson, Thompson)

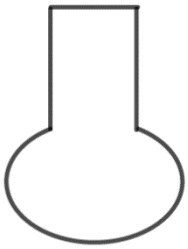
5. Image the vase shown below filling with water at a constant rate. Sketch a graph of the height of the bottle as a function of the amount of water that is in the bottle. Start from an empty bottle and end when the bottle is completely full. Explain why you drew the graph the way you did.



Answer: Since the cross-sectional volume increases, the rate of change of the height should decrease as time increases. Many graphs can suggest this, but here is one possible answer



6. Image the vase shown below filling with water at a constant rate. Sketch a graph of the height of the bottle as a function of the amount of water that is in the bottle. Start from an empty bottle and end when the bottle is completely full. Explain why you drew the graph the way you did.



Answer: Since the cross-sectional volume first is increasing, the rate of increase of height should increase. This happens until you reach halfway up the ball portion of the graph, then the height still increases but at a decreasing rate. Finally, the rate of change of the height should increase linearly until you get to the top of the bottle. Here is a possible graph, but again many answers are possible.