Name: _____ **TC**

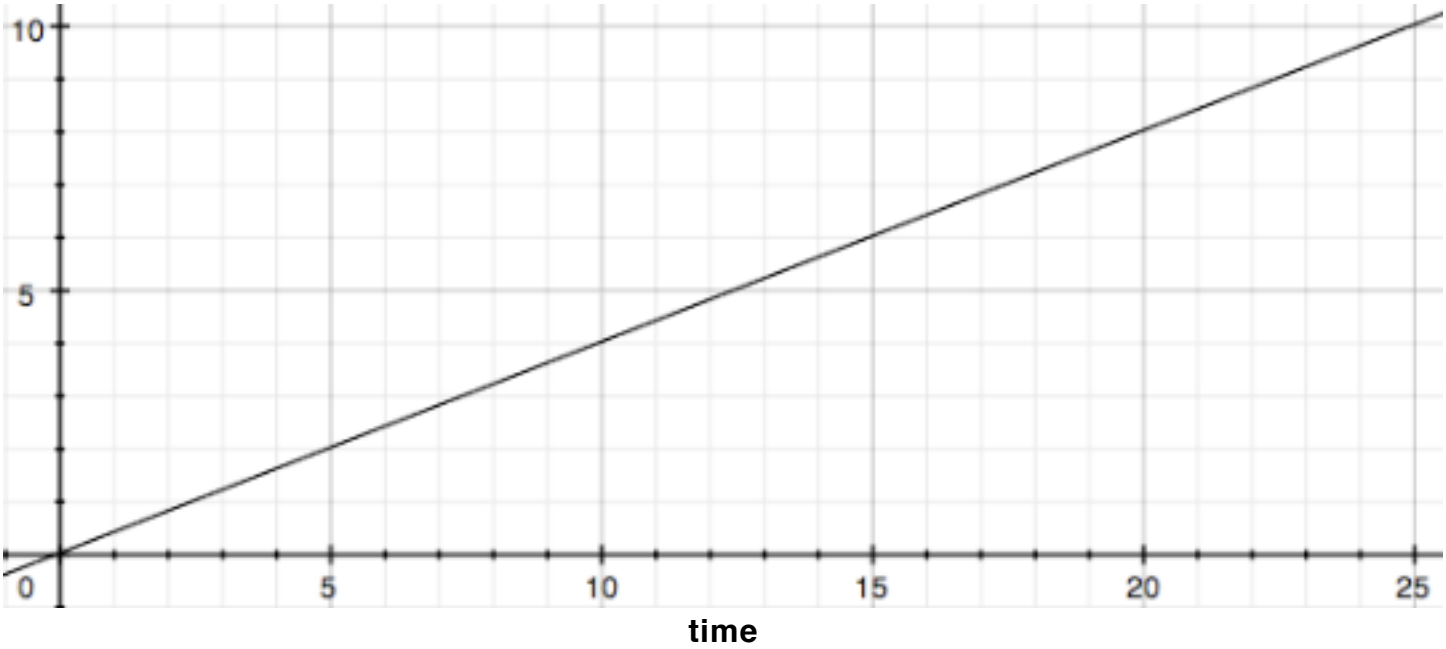
Classwork 18

1. Lily is climbing Mount Everest. 4 hours after the start of her climb, she is at an elevation of 12,000 ft. 12 hours into her climb, she is at an elevation of 12,200 ft.

a) Calculate Lily's vertical speed in that time interval (between t = 4 and t = 12).

b) Shocked at how slow she is going, Lily tries to figure out how far she climbed in the first 4 hours. In her head, she does 12,000 ÷ 4 and gets 3,000 ft per hour. Wait a second... Is that right?? Explain why or why not.

2. The following graph shows the motion of a coke bottle floating on the east river. Time is in minutes and distance is in meters.



a) Calculate the speed of the coke bottle. (Is there more than one way?)

b) What is the speed after exactly 15 minutes? Why?

3. **Picking up where we left off yesterday...**

•Enter the following equations into Y =

Y1 = $1/8x^4 - 1/2x^3 - x^2 + x + 12$
Y2 = -5x + 18
Y3 = x + 12

a) What happened to our original curve (Y1) and -5x + 18 as we zoomed really close to x = 2?
WINDOW: x min = 1.999 x max = 2.001 y min = 7.995 y max = 8.005

b) What do we see when we zoom out?
WINDOW: x min = 1 x max = 5 y min = -1 y max = 12

c) What happened to our original curve (Y1) and x + 12 as we zoomed really close to x = 0?
WINDOW: x min = -.001 x max = .001 y min = 11.999 y max = 12.001

d) What do we see when we zoom out?
WINDOW: x min = -2 x max = 2 y min = 10 y max = 14

e) Describe the relationship between the straight lines and the curve. What is the mathematical name for their relationship?

f) What is the slope of the **curve** at the ***single point*** x = 2? _____ At x = 0 ? _____

g) Why do we have to zoom in to find a slope at a single point?

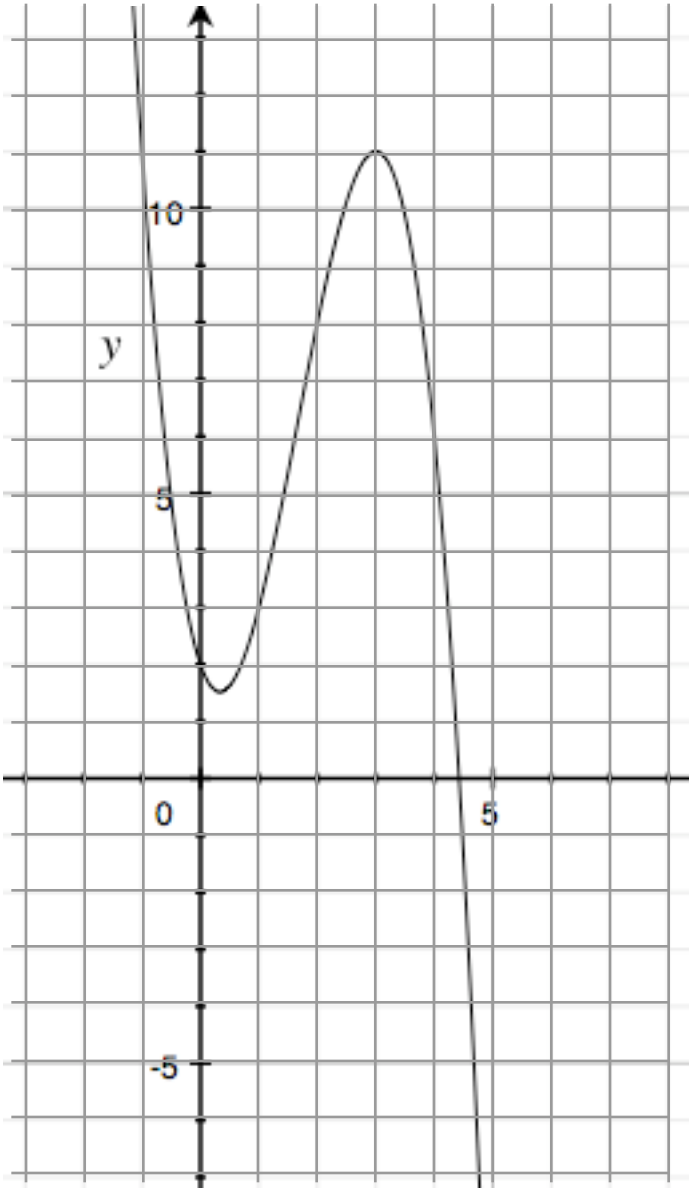
h) Write a limit to express this "zooming in".

4. You are given the graph of a function (below) of an object moving over time.

a) Draw a line on the graph below to approximate the slope at the point where x = 0

b) What is the intercept of that line?

c) What is the slope of that line?



d) The curve's equation is

$$y = -x^3 + 5x^2 - 3x + 2$$

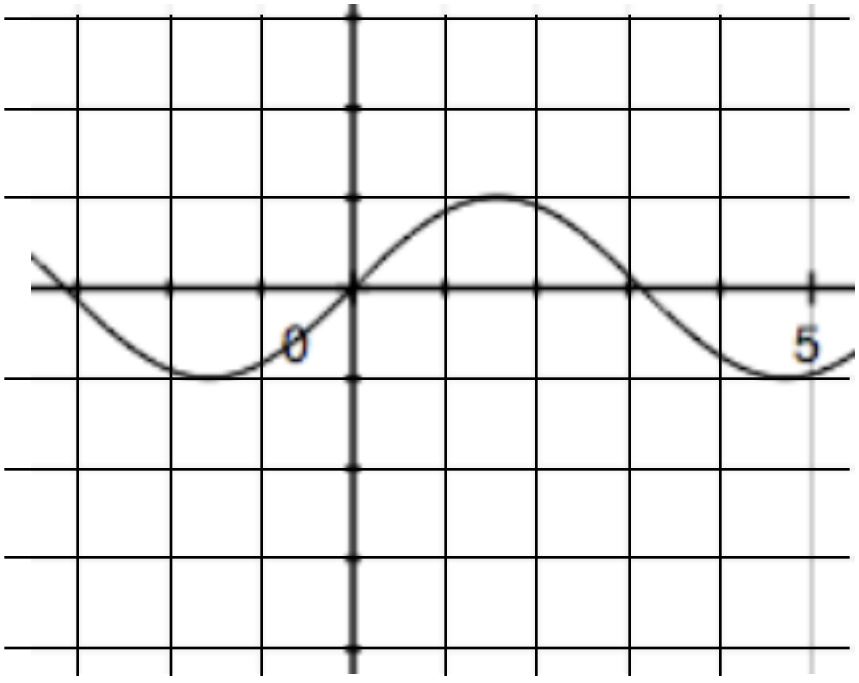
Enter this into Y1.

Now enter the equation of your tangent line into Y2.

Zoom into x = 0 to see if the slope you approximated is close.

4. a)Find the slope of the curve in the 2nd graph when x = 0.

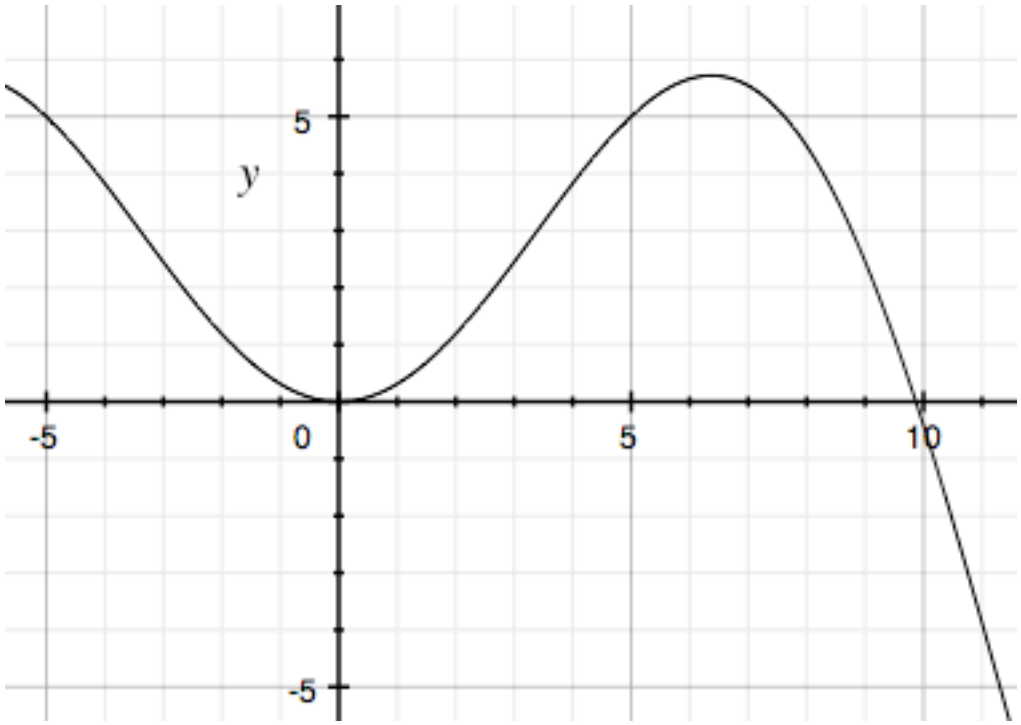
b) Check your answer by graphing the original curve and your tangent line.



Practice problems

1. At 2:15 pm the cross country team is 1 mile away from school. At 2:50 pm the team is 4.5 miles away from school. Find the team's average speed.

2. Use the graph below of distance versus time to answer the following questions.



a) What is the object's average speed between t = 0 and t = 5 ?

b) Draw a line on the graph to approximate the exact speet at t = 5