

1. [10 points] Laquita decides to visit an amusement park during Fall Break and rides several roller coasters, including the Classic Amazing Looping Coaster and the Ultra Mountain. Let  $R(t)$  be the distance, in feet, that the CAL Coaster has moved along the track  $t$  seconds after the ride begins. The ride lasts a total of 60 seconds. Several values of  $R(t)$  are shown in the following table.

$t$	0	10	25	30	40	45	55	60
$R(t)$	0	496	1103	1327	1817	2136	2718	3141

For parts a.– c., remember to show your work and reasoning clearly.

- a. [2 points] Find the average velocity of the CAL Coaster during the last 15 seconds of the ride, i.e. for  $45 \leq t \leq 60$ . *Include units.*

**Answer:** \_\_\_\_\_

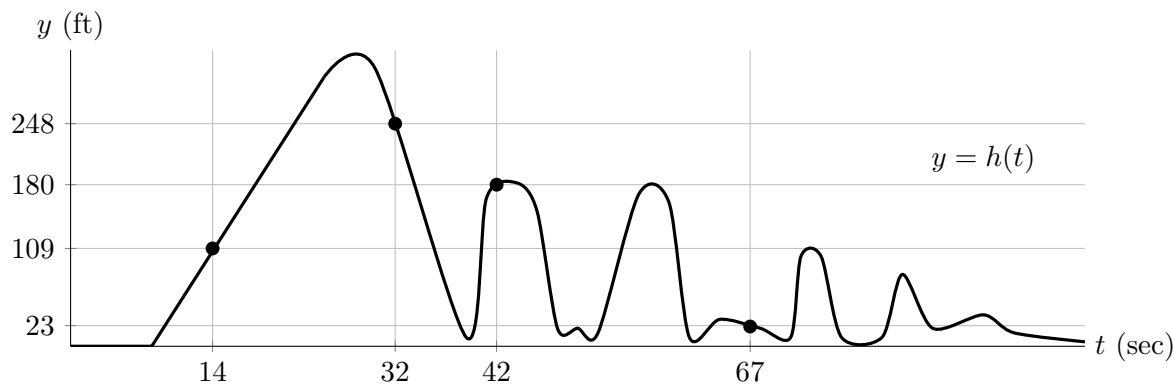
- b. [2 points] Estimate the instantaneous velocity of the CAL Coaster 30 seconds after the ride begins. *Include units.*

**Answer:** \_\_\_\_\_

- c. [2 points] Estimate  $R'(55)$ .

**Answer:**  $R'(55) \approx$  \_\_\_\_\_

- d. [4 points] Let  $h(t)$  be Laquita’s height, in feet, above the ground,  $t$  seconds after her ride on the Ultra Mountain begins. A graph of  $h(t)$  is shown below.



Let the quantities I–V be defined as follows:

- I. The number 0.
- II. Laquita’s instantaneous vertical velocity, in ft/sec, at  $t = 14$ .
- III.  $h'(32)$
- IV. Laquita’s average vertical velocity, in ft/sec, between  $t = 14$  and  $t = 42$ .
- V. Laquita’s instantaneous vertical velocity, in ft/sec, at  $t = 67$ .

Rank the quantities in order from least to greatest by filling in the blanks below with the options I–V. You do not need to show your work.

\_\_\_\_\_ < \_\_\_\_\_ < \_\_\_\_\_ < \_\_\_\_\_ < \_\_\_\_\_