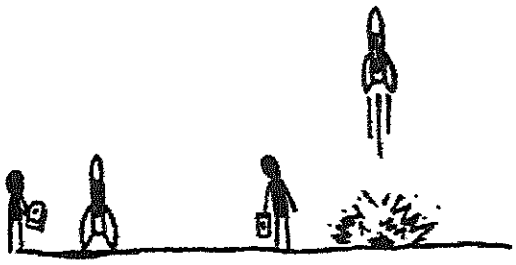
NAME _____ DATE _____

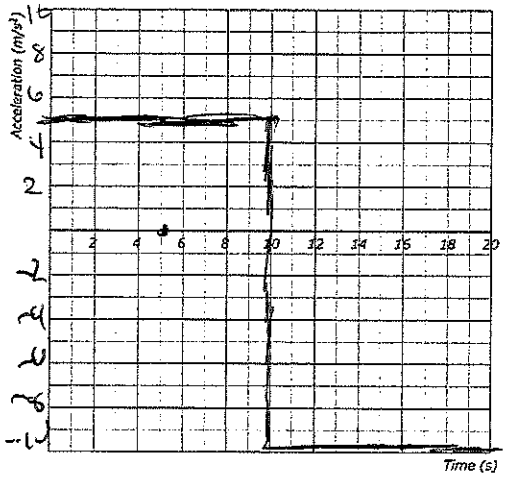
Scenario

A rocket fires its engines to launch straight up from rest with an upward acceleration of 5 m/s² for 10 seconds. After this time, the engine shuts off and the rocket freely falls straight down back to Earth's surface.



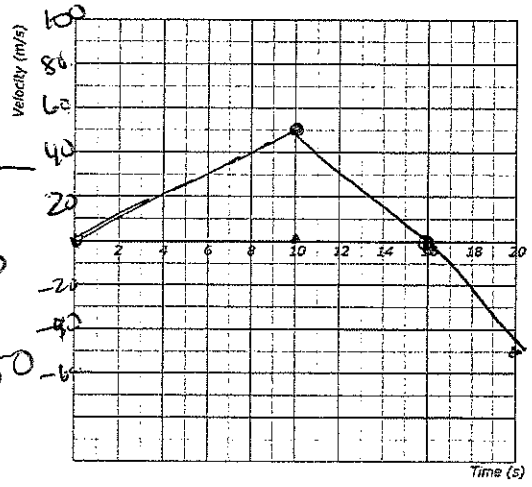
Using Representations

PART A: Draw a graph of the acceleration as a function of time from $t = 0$ seconds to $t = 20$ seconds.



PART B: Draw a graph of the velocity as a function of time from $t = 0$ seconds to $t = 20$ seconds.

T	V
0	0
10	50
15	0
20	-50



$V_f = V_i + at$

$50 = 0 + 5(10)$

$V_f = V_i + at$

$0 = 50 + 10(t)$

$t = 5$

$-50 = 50 + -10(10)$

-100

Quantitative Analysis

PART C: Using the kinematics equation $y = y_0 + v_{y0}t + \frac{1}{2}a_y t^2$, a classmate writes out the following solution to find the time when the rocket lands back on Earth. Explain in one sentence, using terms such as *acceleration, velocity, position, constant, changing*, and *zero*, why the solution below is incorrect.

$y = y_0 + v_{y0}t + \frac{1}{2}a_y t^2$

$0 = 0 + \left(0\frac{m}{s}\right)t + \frac{1}{2}\left(5\frac{m}{s^2}\right)t^2$

The acceleration on earth is -10 Not +5, the acceleration he is only going to give location as the rocket goes up

Argumentation

PART D: From your velocity vs. time graph in Part B, determine the time when the rocket reaches its maximum height.

Time for the rocket to reach its maximum height = 7.5sec

Explain how you determined your answer.

7.5 sec is time Vel=0 area under the Curve.

PART E: Make a claim about the numerical value of the rocket's maximum height.

The rocket's maximum height is equal to _____

Evidence: What physical feature of the velocity vs. time graph supports your claim?

area under the Curve.