~ Midpoint Velocity ~

Physics 203
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I. Midpoints & Averages

A particle ***starts out from rest*** (i.e. initial velocity is zero), but with an ***acceleration*** of 4 m/s/s.

The particle continues to ***accelerate*** at a ***constant*** rate of 4 m/s/s for 20 seconds.

A) What is the particle's ***instantaneous velocity*** at t = 0 s?

B) What is its ***instantaneous velocity*** at t = 0.5 s?

C) What is its ***instantaneous velocity*** at t = 1 s?

D) What is its ***instantaneous velocity*** at t = 1.5 s?

E) What is its ***instantaneous velocity*** at t=2 s?

F) What is its ***instantaneous velocity*** at t=10 s?

G) What is its ***instantaneous velocity*** at t=20 s?

H) Draw a neat, careful, scale ***graph*** of the particle's ***instantaneous velocity*** vs. ***time***.

I) What is its ***AVERAGE velocity*** during the first TWO seconds of its trip?
HINT #1: Notice that there is a STEADY change in velocity per time?
HINT #2: Think about **Problem VI** above!

J) What is its ***AVERAGE velocity*** for the WHOLE 20-second trip?
HINT: Same hint—think about **Problem VI** above!

II. The First Second

A bicycle is at rest. It then accelerates at a constant rate of 2 m/s/s. How far does it travel in the first second (of this accelerated motion)?

Hint #1: first find the bicycle's average velocity during this trip.
Hint #2: to find average v, think about problems IV & I.
Hint #3: AFTER you find average velocity, go back to the ***definition*** of average velocity to try to find how far the bicycle went.
Hint #4: The answer is ***not*** 2 meters.

III. A Practice Proof

Given variables a, b, c, d, and z, and given that: $\boldsymbol{a + b = c}$
and that: $\boldsymbol{dc - da = z}$
show that: $\boldsymbol{db = z}$