Mario Velocity Questions   Name_____

Using the graph of Mario's velocity, answer the following questions.

a.   What is Mario's position at 5 seconds? Interpret this result.

Net Distance $= \int_0^5 v(t)dt = 5(-4.086) = -20.43$ blocks

At 5 seconds, Mario is 20.43 blocks left of his starting position.

b.   What is Mario's acceleration at 5 seconds? Interpret this result.

$a(5) = v'(5) = 0$ ft/sec^2

At 5 seconds, Mario's acceleration is 0 ft/sec^2

c.   What is Mario's net distance traveled from 0 seconds to 13 seconds? Interpret this result.

Net Distance $= \int_6^{13} v(t)dt = 6(-4.086) + \frac{1}{2}(\frac{1}{2})(-4.086) + \frac{1}{2}(\frac{1}{2})(4.086) + 6(4.086)$

$= 0$ blocks

At 13 seconds, Mario has traveled a net distance of 0 blocks.

d.   What is Mario's total distance traveled from 0 seconds to 13 seconds? Interpret this result.

Net Distance $= \int_6^{13} |v(t)|dt = |6(-4.086)| + |\frac{1}{2}(\frac{1}{2})(-4.086)| + |\frac{1}{2}(\frac{1}{2})(4.086)| + |6(4.086)|$

$= |-24.516| + |-1.0215| + |1.0215| + |24.516|$

$= 24.516 + 1.0215 + 1.0215 + 24.516$

At 13 seconds, Mario has traveled a net distance of 51.075 blocks.

e.   What is Mario's net distance traveled from 0 to 23 seconds? Interpret this result.

Net distance $= \int_0^{23} v(t)dt = \int_6^{13} v(t)dt + \int_{13}^{17} v(t)dt + \int_{17}^{18} v(t)dt + \int_{18}^{23} v(t)dt$

$= 0 + 4(4.086) + 0 + 5(-4.086)$

$= -4.086$ blocks.

At 23 seconds, Mario's position is 4.086 blocks left of his starting point.

f. Approximate Mario's net distance traveled from 24 to 28 seconds using 2 left hand rectangles. Interpret this result.

$$\text{Net Distance} = \int_{24}^{28} v(t)dt$$

$$\approx 2(30.629) + 2(40)$$

$$\approx 61.258 + 80$$

$$\approx 141.258$$

Mario's net distance traveled from 24 to 28 seconds is about 141.258 blocks right.

g. Find $\int_{24}^{28} a(t)dt.$ Include proper units.

$$\int_{24}^{28} a(t)dt = v(t)\Big|_{24}^{28}$$

$$= v(28) - v(24)$$

$$\approx 47 - 30.629$$

$$\approx 17.629 \text{ blocks/second.}$$

h. On http://smacmathapcalculus.weebly.com/mario-particle-motion.html there are 5 Mario clips. Reassess the matches you made previously in part *a*. If you make any changes, write them beside "Clip #" on part *a*, and state what changes you made and why you made those changes below. For every clip you get correct, you get 4 points. For every clip you get incorrect you lose 4 points. For every clip you choose not to match, you lose 1 point. If you choose not to match any clip, give a reason below.

i. Retrieve your pictures from the board and arrange them in the proper order. Once finished, paper clip your group's papers together and put them into the tray.