SPEED MACHINES

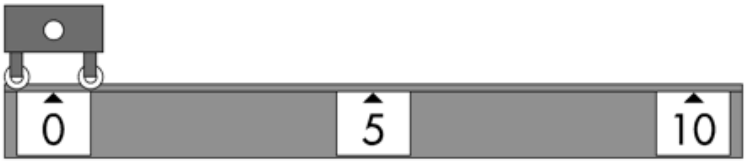
A DEMONSTRATION OF REAL-TIME GRAPHICAL KINEMATICS

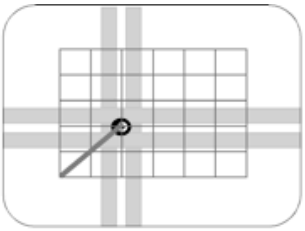
Physics Cinema Classics: Cart Trip - Car Trip

Name:_____ Per:_____ Date:_____

CART TRIP

A small track cart has been connected to a mechanical linkage that plots any of the kinematics graphs in real time.



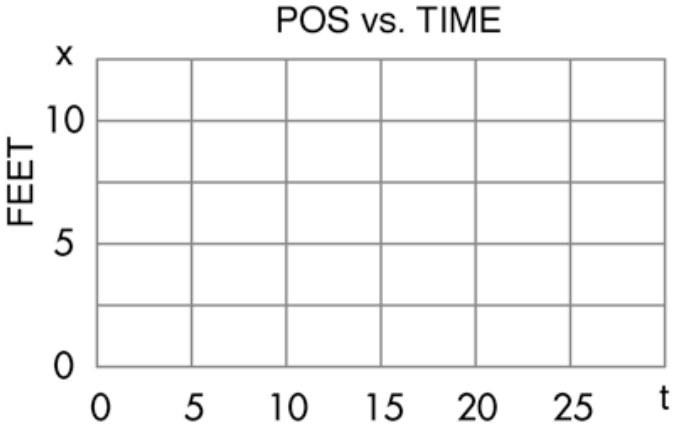


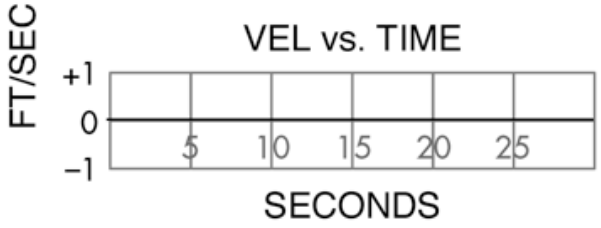
1. Watch the initial trials and plot the position versus time on the graph to the right.

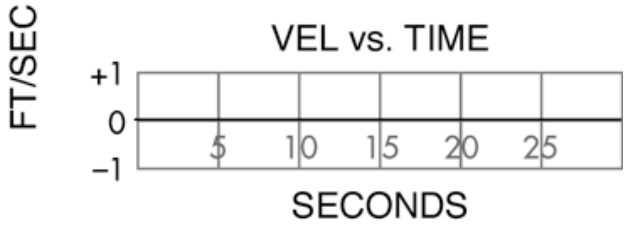
2. On the graphs below and to the left, predict the plots of velocity and acceleration versus time.

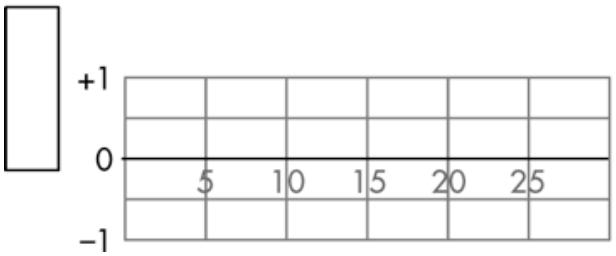
3. On the graphs below and to the right, plot the ACTUAL velocity and acceleration versus time graphs.

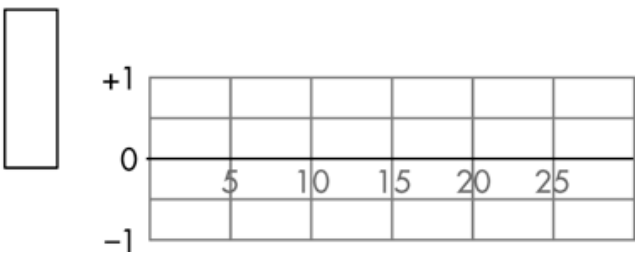
4. Don't forget to complete the graphs by adding axis labels and/or unit labels where they have been left blank.







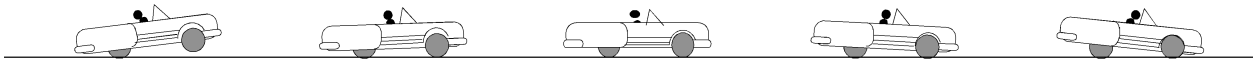




CAR TRIP

A wheel has been engineered to drive pens on three kinematics charts in real time. The wheel is then towed by a sweet convertible T-bird. The velocity versus time graph of a car trip has been plotted.

1. Before the video clip of the trip is shown, examine the motion types A-E described below. Match a motion type to each segment (I-X) of the trip.



A. *Large forward acceleration*

B. *Small forward acceleration*

C. *No acceleration*

D. *Small backward acceleration*

E. *Large backward acceleration*

I II III IV V VI VII VIII IX X

MOTION TYPE: C

2. Make a predictive plot of the position versus time graph for the trip.

3. Make a predictive plot of the acceleration versus time graph for the trip.

4. a. After the trip is shown, make corrections to your plots using a dotted line. Do not erase your predictive plots.

b. What differences—if any—are there between the trip plotted on this sheet and the actual trip shown in the video clip?

5. If the car begins and ends the trip at rest, what must be true of the acceleration versus time plot?