HELP SHEET

LIGHT & HEAVY

Formula :

How to Calculate Velocity :

$$v = d / t$$

Where,
v is velocity,
d is distance and
t is time taken to cover that distance.

How to Calculate Acceleration :

$$a = dv / dt$$

Where,
a is average acceleration,
dv is change in velocity and
dt is the change in time or, time for the velocity to change.

GRAVITY The Challenge

LIGHT & HEAVY

HELP SHEET

First, import your movie into iMovie.

Find the frame where the flask is just starting to drop, now use the arrow key to move forward through the clip one frame at a time, count how many frames to where the bottom of the line made by the LED, is as close to the bottom of the meter stick as possible. You can now calculate the "time for the velocity to change" which is "number of frames divided by 25" as each frame is 1/25th of a second.

Use your final position from above, where the bottom of the line made by the LED is as close to the bottom of the meter stick as possible, and convert this to a still image (edit menu / create still frame). Now holding down the "alt" key drop the new file called "Still *.mov" onto the timeline. Now double click on the file on the timeline and a dialogue box should pop up, change the duration to 1 min or more. Now click on the view full screen button. You should now be able see the divisions on the meter stick, measure the length of the red line, left by the LED, by counting the cm divisions. You now have the distance travelled by the flask in 1/25th of a second. Convert this to the distance, in meters, that it travels in one second. This is your final velocity, which in this case, as we are using a starting velocity of 0m/s, is also your change in velocity.
Use the formula given to calculate the average acceleration.

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First, import your movie into iMovie.

Find the clip where the flask is dropping, drag this onto the viewer, now move the play head to the beginning of the clip and then click on the view full screen button.

Find the frame where the flask is just starting to drop, now use the arrow keys to move forward (and backward) through the clip one frame at a time, count how many frames to where the bottom of the line made by the LED is as close to the bottom of the meter stick as possible. You can now calculate the "time for the velocity to change" which is "number of frames divided by 25" as each frame is 1/25th of a second.

Use your final position from above, where the bottom of the line made by the LED is as close to the bottom of the meter stick as possible. You should now be able see the divisions on the meter stick, measure the length of the red/green line, left by the LED, by counting the cm divisions. To make this easier, you could "esc" from full screen , then on the viewer window use the crop tool to enlarge the area of the screen with the LED line and meter stick, then return to full screen and count the divisons. You now have the distance travelled by the flask in 1/25th of a second. Convert this to the distance, in meters, that it travels in one second. This is your final velocity. Which, in this case, as we are using a starting velocity of 0m/s, is also your change in velocity.
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