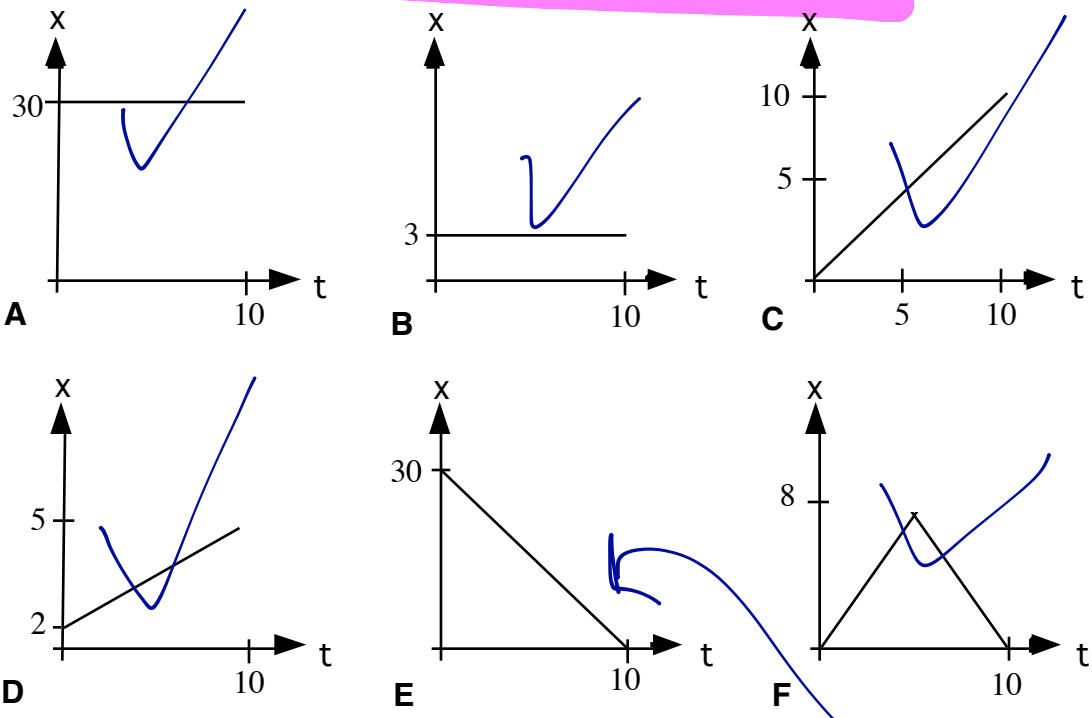
Position Time Graphs—Displacement [8]

In the position vs. time graphs below, all the times are in seconds (s), and all the positions are in meters (m). Rank these graphs on the basis of which graph indicates the greatest displacement from beginning to end of motion. Give the highest rank to the one(s) with the greatest displacement, and give the lowest rank to the one(s) indicating the least displacement. If two graphs indicate the same displacement, give them the same rank. Note: Zero is greater than negative, and ties are possible.



Greatest 1 C 2 D 3 ABF 4 E 5_____ 6_____ Least

Or, none of these graphs indicate any displacement at all. _____

Or, all of the displacements are the same. _____

Please carefully explain your reasoning.

C had displacement of 10m
D had displacement of 3m
ABF had zero displacement E

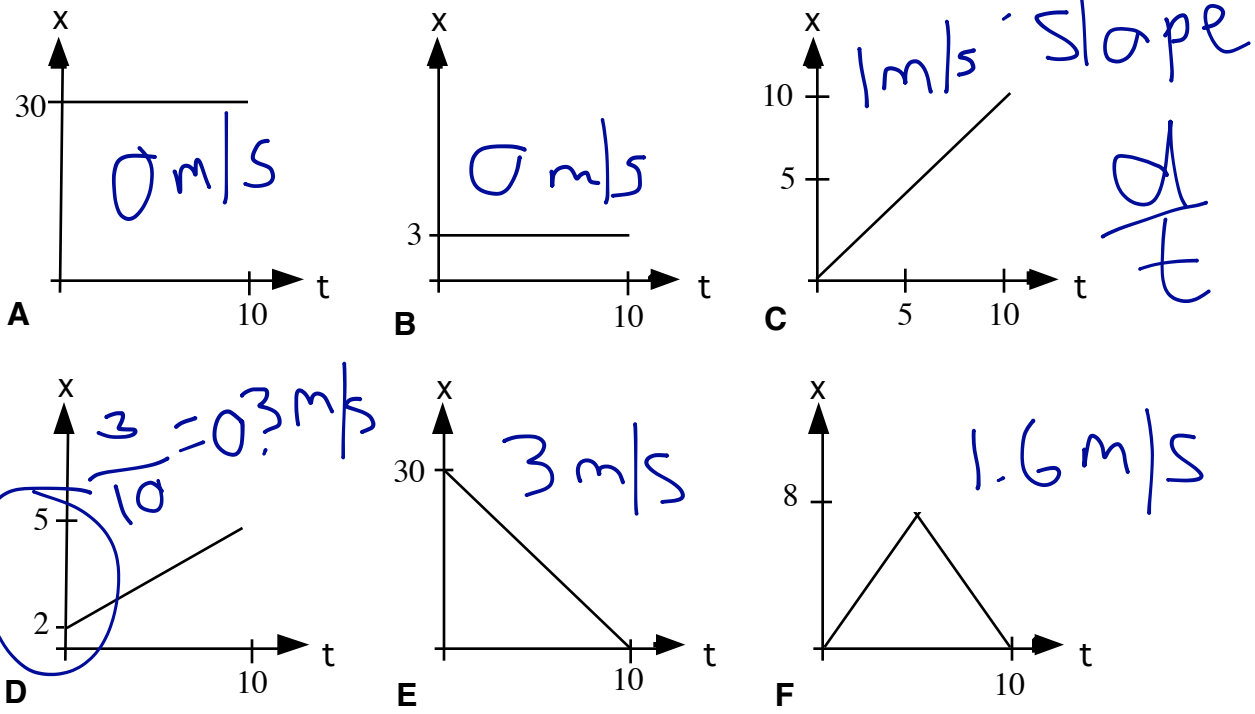
How sure were you of your ranking? (Circle one)

Basically Guessed				Sure				Very Sure	
1	2	3	4	5	6	7	8	9	10

[8] K. W. Nicholson

Position Time Graphs—Average Speed [10]

In the position vs. time graphs below, all the times are in seconds (s), and all the positions are in meters (m). Rank these graphs on the basis of which graph indicates the greatest average speed, where the average speed is calculated from the beginning to the end of motion. Give the highest rank to the one(s) with the greatest average speed, and give the lowest rank to the one(s) indicating the least average speed. If two graphs indicate the same average speed, give them the same rank.



Greatest 1 E 2 F 3 C 4 D 5 AB 6_____ Least

Or, none of these are moving at all. _____

Or, the average speed is the same for all of these. _____

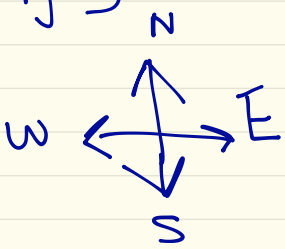
Please carefully explain your reasoning.

How sure were you of your ranking? (circle one)

Basically Guessed			Sure				Very Sure		
1	2	3	4	5	6	7	8	9	10

[10] K. W. Nicholson

Pg. 30 #9.



North is positive

↑

(+)

Given: $\vec{a} = 2.90\ m/s^2\ [S]$

$\vec{a} = -2.90\ m/s^2\ [N]$

$t = 5.72\ s$

$\vec{v}_2 = 0\ m/s$

Required: $\vec{v}_1$ (initial velocity)

Analysis: $\vec{a} = \dfrac{\vec{v}_2 - \vec{v}_1}{t}$

Steps: Isolate $\vec{v}_1$

$\vec{a}\,t = \vec{v}_2 - \vec{v}_1$

$\vec{v}_1 = \vec{v}_2 - \vec{a}\,t$

$$\vec{a}t = \vec{v}_2 - \vec{v}_1$$

$$\vec{a}t - \vec{v}_2 = \vec{v}_2 - \vec{v}_2 - \vec{v}_1$$

$$\frac{\vec{a}t - \vec{v}_2}{-1} = \frac{-\vec{v}_1}{-1}$$

$$-\vec{a}t + \vec{v}_2 = \vec{v}_1$$

$$\vec{v}_2 - \vec{a}t = \vec{v}_1$$

$$0\ m/s - \left(-2.90\ \frac{m}{s^2}\right)[N](5.72s) = \vec{v}_1$$

$$0\ m/s + \left(2.90\ \frac{m}{s^2}\right)[N](5.72s) = \vec{v}_1$$

$$0\ m/s + 16.588\ m/s\,[N] = \vec{v}_1$$

$$\therefore \vec{v}_1 = 16.6\ m/s\ [N]$$

Pg. 30 # 5.

$v_1 = 10\ m/s\ [N]$

$v_2 = 10\ m/s\ [S]$

constant speed?

$$\vec{a} = \frac{v_2 - v_1}{\Delta t}$$

$$= 10\ m/s\ [S] - 10\ m/s\ [N]$$

$$= 10\ m/s\ [S] - (-10\ m/s)\ [S]$$

$$= 20\ m/s\ [S]$$

Pg. 30 #8 Given:

$\vec{a} = 0.53 m/s^2$

2 sig figs $\vec{V}_1 = 0.68 \frac{m}{s}$ [N]

$\vec{V}_2 = 0.89 \frac{m}{s}$ [N]

Required: time = t

Analysis: $\vec{a} = \frac{\vec{V}_2 - \vec{V}_1}{t}$

Steps: Isolate t

$t = \frac{\vec{V}_2 - \vec{V}_1}{\vec{a}}$

$t = \frac{0.89 m/s \text{ [N]} - 0.68 m/s \text{ [N]}}{0.53 m/s^2 \text{ [N]}}$

$$t = \frac{0.21\ m / \cancel{[N]}}{0.53 \frac{m}{s} \cancel{[N]}}$$

$$t = \frac{0.21}{0.53 \frac{1}{s}}$$

$$t = \frac{0.396}{\frac{1}{s}}$$

$$t = 0.396\ s$$

$$t = 0.40\ s$$

Read pgs. 31-35

Carefully go over examples.