PH 203 Phase-Line Writ 2, Fall 03 **Name**_____
Lesson 24 / 100 Marks / 30 minutes **Section**_____**, G Hour**

AUTHORIZED REFERENCES: Calculator, Physics Reference Card

Wt.	**No.**	
60	1.	You are part of Special Operations infantry team fast roping into a soccer stadium in central Iraq. Your helicopter comes to a stable hover at 95.5 m above the ground. As you exit the helicopter you start your stopwatch to time your descent. When you hit the ground, you look at your watch. It took you 6.06 s to descend.
20		a. Assuming you descend the rope at a constant speed, calculate your velocity during the descent (magnitude and direction). ANS: v=15.8 m/s, downward
40		b. When you are ¾ of the way down the rope and still descending at the above constant speed, the jumpmaster's field knife (mass of 1.04 kg) falls out of his sheath directly over your head. Calculate the amount of time you will have to react to the falling knife once you reach the ground. Ignore the effects of drag and wind on the knife. ANS: t=2.90 s

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Wt.	**No.**	
40	2.	Intelligence has reported an enemy air defense artillery system behind a tall concrete wall to your front that has an active microwave radar dish. Battle damage has produced a thin vertical crack in the wall. You are pinned down, but must determine what type of system it is. If you know the microwave frequency of the radar, you can identify it. You have a microwave receiver and decide to conduct an experiment. You stand directly across from the crack in the wall, which is 553 m to your front, and use your M24 binoculars to measure the width of the crack to be 10.5 cm. The receiver reads a maximum intensity of 13.5 W/m^2. You sidestep to your right until the receiver intensity drops to zero. You determine that you have moved 1.27 m. Calculate the frequency of the microwaves.

ANS: $f=1.24\text{x}10^{12}$ Hz

Bonus (5 Marks): After conducting a motion experiment, you determine that the position as a function of time is: $x(t) = 1.32 + 23.5t - 25.3t^{-2}$. Derive the acceleration as a function of time.

ANS: $a(t)=-151.8t^{-4}$