

Physics 180A Summer 2009

Quiz 2 - 60 points

Name _____

Draw a neat and complete diagram for each problem. Show all your work in steps. Pretend that you are explaining these problems on the board to your friends who may be completely clueless. Show all implicit as well as explicit information. Include all equations that are needed. Do not use derived equations. Please be neat and organized. First, practice the problem on scrap paper then, re-do it on this Quiz Form.

I will grade all your work based on these instructions.

I do not want you to work with anyone on this quiz. Your solutions, styles and format should be different. Just tell your friend who is lazy that you are not home and you will lose points if your work looks the same. Thanks for being honest. I look forward to giving you maximum points.

1. The punter on a football team tries to kick a football so that it stays in the air for a long "hang time." If the ball is kicked with an initial velocity of 21.0 m/s at an angle of 53° above the ground, what is the "hang time"? What is the Maximum height? What is the Range? Diagram 5 pts - Solution 5 pts

2. A quarterback claims that he can throw the football a horizontal distance of 182 m. Furthermore, he claims that he can do this by launching the ball at the relatively low angle of 33.0° above the horizontal. To evaluate this claim, determine the speed with which this quarterback must throw the ball. Assume that the ball is launched and caught at the same vertical level and that air resistance can be ignored. Is this possible? Explain. Diagram 5 pts - Solution 5 pts

3. A rocket is fired at a speed of 58 m/s from ground level, at an angle of 44.0° above the horizontal. The rocket is fired toward an 13.3-m high wall, which is located 19.0 m away. The rocket attains its launch speed in a negligibly short period of time, after which its engines shut down and the rocket coasts. By how much does the rocket clear the top of the wall? Diagram 5 pts - Solution 5 pts

4. The 1994 Winter Olympics included the aerials competition in skiing. In this event skiers speed down a ramp that slopes sharply upward at the end. The sharp upward slope launches them into the air, where they perform acrobatic maneuvers. In the women's competition, the end of a typical launch ramp is directed 63° above the horizontal. With this launch angle, a skier attains a height of 13.1 m above the end of the ramp. What is the skier's launch speed? Diagram 5 pts - Solution 5 pts

5. In the amusement park ride known as Magic Mountain Superman, powerful magnets accelerate a car and its riders from rest to 38.1 m/s in a time of 8.85 s. The mass of the car and riders is 5.81×10^3 kg. Find the average net force exerted on the car and riders by the magnets. Diagram 5 pts - Solution 5 pts

6. A rocket of mass 3.92×10^5 kg is in flight near earth's surface. Its thrust is directed at an angle of 57.1° above the horizontal and has a magnitude of 8.04×10^6 N. Find the **(a)** magnitude and **(b)** direction of the rocket's acceleration. Give the direction as an angle above the horizontal. Diagram 5 pts - Solution 5 pts