Projectile Motion – Zero Launch Angle

1. An astronaut on the planet Zircon tosses a rock horizontally with a speed of 6.75 m/s. The rock falls through a vertical distance of 1.20 m and lands a horizontal distance of 8.95 m from the astronaut. What is the acceleration of gravity on Zircon?

2. Pitcher's mounds are raised to compensate for the vertical drop of the ball as it travels 18 m to the catcher.
    a. If a pitch is thrown horizontally with an initial speed of 32 m/s, how far does it drop by the time it reaches the catcher?

    b. If the speed of the pitch is increased, does the drop distance increase, decrease, or stay the same? Explain.

    c. If this baseball game were to be played on the moon, would the drop distance increase, decrease, or stay the same? Explain.

3. Playing shortstop, you pick up a ground ball and throw it to second base. The ball is thrown horizontally, with a speed of 22 m/s, directly toward the player (point A). When the ball reaches the second baseman 0.45 s later, it is caught at point B (directly below point A).
    a. How far were you from the second baseman?

    b. What is the distance of vertical drop (the distance between points A and B)?

4. In Denver, children bring their old jack-o-lanterns to the top of a tower and compete for accuracy in hitting a target on the ground. Suppose that the tower is 9.0 m high, and that the bulls-eye is a horizontal distance of 3.5 m from the launch point. If the pumpkin is thrown horizontally, what is the launch speed needed to hit the bulls-eye?