NAME_____

Motion Equation Questions 2: Displacement

1. In the previous assignment, Jörg rolled a large steel ball along a flat floor at 1.5 ms^{-1} while Nirk jumped upwards at 9 ms^{-1}.
   (a) Calculate the displacement of the ball after 3.8 s. /2
   (b) Calculate the maximum height reached by Nirk. /2

2. Consider a rock which is dropped off a cliff and takes 10.3 seconds to reach the ground.
   (a) Calculate the height of the cliff. /2
   (b) State and explain the effect on the time it would take the rock to reach the ground if it was launched horizontally off the cliff instead of being dropped. /2
   (c) Calculate the range of a rock launched horizontally off this cliff with an initial speed of 21.6 ms^{-1}. /2
   (d) Explain why increasing the launch height would increase the range. /2

3. A boulder is launched from a catapult at a speed of 32 ms^{-1} and an angle of 41° above the horizontal and lands at the same height it was launched.
   (a) Calculate the initial horizontal and vertical components of velocity. /3
   (b) State why the vertical component is needed to calculate the range of the boulder, even though range is a horizontal measurement. /1
   (c) Calculate the range of the boulder. /4

TOTAL /20