Name Answer key Date _____

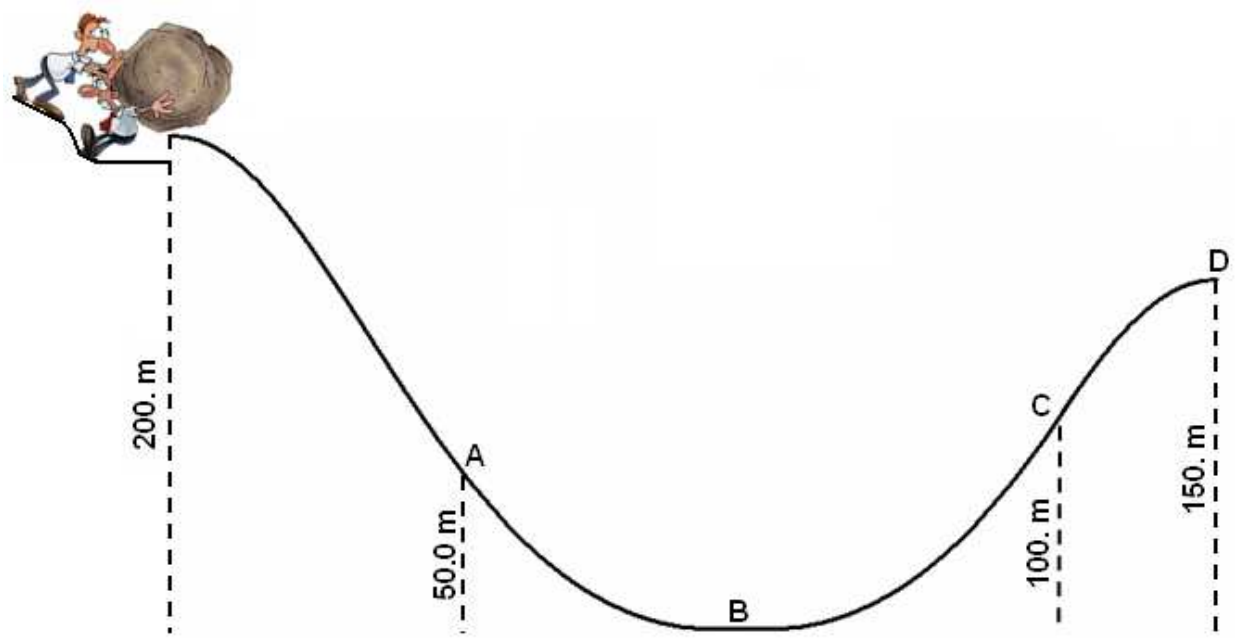
Physics Energy WS #7

Period _____ Mrs. Nadworny

Devious Physics Student

Directions: Solve the following problems using the GUESS method and proper significant figures. Be sure to show ALL work.

Two devious physics students are going to roll a 150.0 kg boulder down the (frictionless) hill as shown below. Determine the potential energy, kinetic energy and the speed of the boulder at each point. Show all work using the GUESS method in the spaces provided in the table.



Location	Total Energy	Potential Energy	Kinetic Energy	Speed
Top	294,000 J	PE = mgh = (150.0 kg)(9.81 m/s^2)(200. m) = 294,000 J	KE = E_T - PE = 294,000 J - 294,000 J = 0 J	$v = \sqrt{\frac{2KE}{m}}$ $= \sqrt{\frac{2(0\ J)}{150.\ kg}}$ = 0 m/s

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A	294,000 J	$PE = mgh$ $= (150.0\ kg)(9.81\ m/s^2)(50.0\ m)$ $= 73{,}600\ J$	$KE = E_T - PE$ $= 294{,}000\ J - 73{,}600\ J$ $= 220{,}000\ J$ $= 2.20\times10^5\ J$	$v = \sqrt{\frac{2KE}{m}}$ $= \sqrt{\frac{2(220{,}000\ J)}{150.\ kg}}$ $= 54.2\ m/s$
B	294,000 J	$PE = mgh$ $= (150.0\ kg)(9.81\ m/s^2)(0\ m)$ $= 0\ J$	$KE = E_T - PE$ $= 294{,}000\ J - 0\ J$ $= 294{,}000\ J$	$v = \sqrt{\frac{2KE}{m}}$ $= \sqrt{\frac{2(294{,}000\ J)}{150.\ kg}}$ $= 62.6\ m/s$
C	294,000 J	$PE = mgh$ $= (150.0\ kg)(9.81\ m/s^2)(100.\ m)$ $= 147{,}000\ J$	$KE = E_T - PE$ $= 294{,}000\ J - 147{,}000\ J$ $= 147{,}000\ J$	$v = \sqrt{\frac{2KE}{m}}$ $= \sqrt{\frac{2(147{,}000\ J)}{150.\ kg}}$ $= 44.3\ m/s$
D	294,000 J	$PE = mgh$ $= (150.0\ kg)(9.81\ m/s^2)(150.\ m)$ $= 221{,}000\ J$	$KE = E_T - PE$ $= 294{,}000\ J - 221{,}000\ J$ $= 73{,}000\ J$	$v = \sqrt{\frac{2KE}{m}}$ $= \sqrt{\frac{2(73{,}000\ J)}{150.\ kg}}$ $= 31\ m/s$