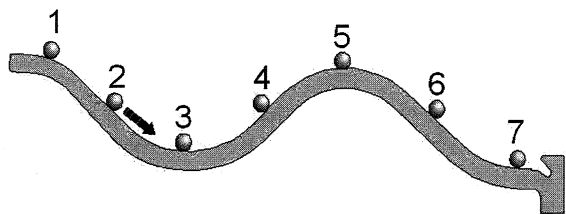**III. Calculating the kinetic energy of the marble** As the marble is rolling down the roller coaster, it will gaining Kinetic Energy as it is losing Potential Energy. The Total Mechanical Energy of the system will stay constant during this change. Calculate the Kinetic Energy by subtracting the Potential Energy from the Total Mechanical Energy (KE = TME — PE).

Position	Mass kg	Height m	g m/s^2	PE J	KE J	TME J
1						
2						
3						
4						
5						
6						
7						

IV. Conclusion

1. What is the total Mechanical Energy of the marble at point 1, before the marble starts to roll? _____

2. What is the total Mechanical Energy of the marble at point 7? _____

3. Compare your answers to questions 1 and 2. Should these answers be the same? _____ why or why not?

_____

_____

Consider the three situations below. Identify whether or not the total Mechanical energy (TME) is being conserved. Explain why.

KE=100J
PE=0J

KE=20J
PE=80J

TME Conserved? _Yes_

Why or why not? _Becaus TME = 100J end_

KE=0J
PE=5000J

KE=4500J
PE=0J

TME Conserved? _NO_

Why or why not? _TME$_{Begin}$ > TME$_{end}$_

KE=0J
PE=8J

KE=6J
PE=2J

TME Conserved? _Yes_

Why or why not? _TME$_{Begin}$ = TME$_{end}$_

For each statement, identify which forces (F_{grav}, F_{norm}, F_{frict}, F_{air}, F_{app}, F_{tens} and F_{spring}) are doing work. Then state whether the total mechanical energy will be conserved.

a. A bungee jumper rapidly decelerates as he reaches the end of his spring-like bungee chord. Ignore the effect of air resistance.	b. A girl releases a softball from rest from a height of 2 meters above the ground; the ball free-falls to the ground.
Forces doing work? _F_{grav} F_{spring}_ TME Conserved? (Yes) No	Forces doing work? _F_{grav}_ TME Conserved? (Yes) No
c. A weightlifter briskly raises a 200-pound barbell above his head.	d. A swimmer pushes off the blocks to accelerate forward at the beginning of a race.
Forces doing work? _F_{app}, F_{grav}_ TME Conserved? Yes (No)	Forces doing work? _F_{app} F_{grav}_ TME Conserved? Yes (No)

Consider the falling and rolling motion of the ball in the following two friction-free situations. In one situation, the ball falls off the top of the platform to the floor. In the other situation, the ball rolls from the top of the platform along the staircase-like pathway to the floor. For each situation, indicate what types of forces are doing work upon the ball. Indicate whether the energy of the ball is conserved and explain why. Finally, fill in the blanks for the 2-kg ball.

A. _50J_ D. _50J_ G. _100J_ J. _100J_
B. _100J_ E. _100J_ H. _100J_ K. _100J_
C. _50J_ F. _0J_ I. _0J_

PE=100J
KE=0J

PE=50J
KE=_A_ J
TME=_B_ J

PE=_C_ J
KE=_D_ J
TME=_E_ J

PE=_F_ J
KE=_G_ J
TME=_H_ J

PE=_I_ J
KE=_J_ J
TME=_K_ J