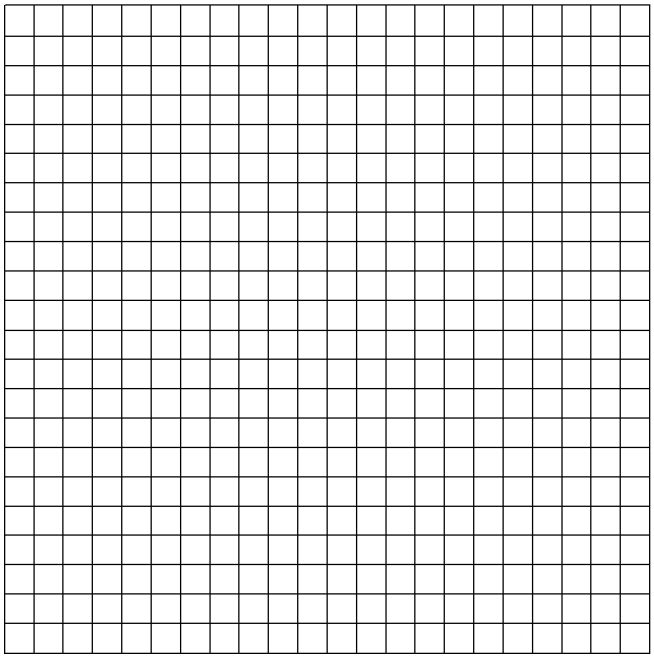
Name: _____

Physics pendulum problems

1) In a laboratory exercise, a student kept the mass and amplitude of swing of a simple pendulum constant. The length of the pendulum was increased and the period of the pendulum was measured. The student recorded the data in the table below.



DATA TABLE

Length (meters)	Period (seconds)
0.05	0.30
0.20	0.90
0.40	1.30
0.60	1.60
0.80	1.80
1.00	2.00

Using the information in the table, construct a graph on the grid above, following the directions below.

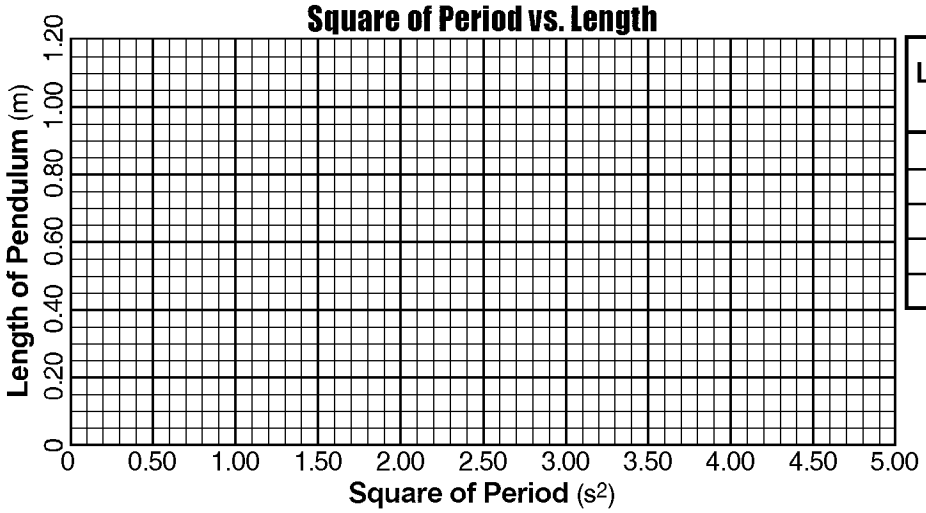
(a) Label each axis with the appropriate physical quantity and unit. Mark an appropriate scale on each axis.

(b) Plot the data points for period versus pendulum length.

(c) Draw the best-fit line or curve for the data graphed.

(d) Using your graph, determine the period of a pendulum whose length is 0.25 meter.

2) In an experiment, a student measured the length and period of a simple pendulum. The data table lists the length (ℓ) of the pendulum in meters and the square of the period (T^2) of the pendulum in seconds^2.



Length (ℓ) (meters)	Square of Period (T^2) (seconds^2)
0.100	0.410
0.300	1.18
0.500	1.91
0.700	2.87
0.900	3.60

Construct a graph on the grid above, following the directions below.

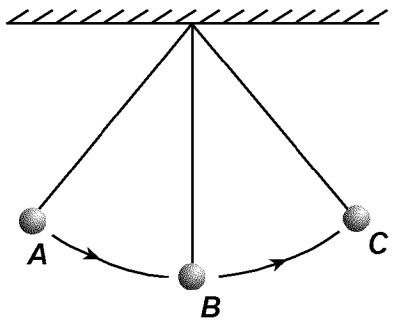
(a) Plot the data points for the square of period versus length.

(b) Draw the best-fit straight line.

(c) Using your graph, determine the time in seconds it would take this pendulum to make one complete swing if it were 0.200 meter long.

(d) The period of a pendulum is related to its length by the formula: $T^2 = (\frac{4\pi^2}{g}) \cdot \ell$ where g represents the acceleration due to gravity. Explain how the graph you have drawn could be used to calculate the value of g. [*You do not need to perform any actual calculations.*]

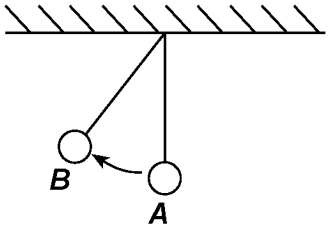
3) The diagram below shows three positions, *A*, *B*, and *C*, in the swing of a pendulum, released from rest at point *A*. [*Neglect friction.*]



Which statement is true about this swinging pendulum?

A) The potential energy at *A* equals the kinetic energy at *C*.
B) The potential energy at *B* equals the potential energy at *C*.
C) The potential energy at *A* equals the kinetic energy at *B*.
D) The speed of the pendulum at *A* equals the speed of the pendulum at *B*.

4) The diagram below shows an ideal simple pendulum.



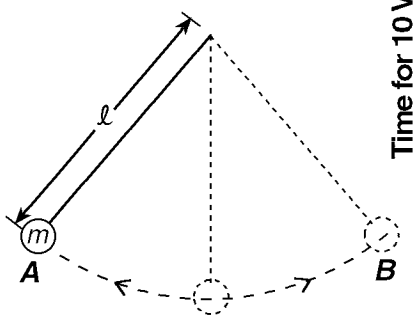
As the pendulum swings from position *A* to position *B*, what happens to its total mechanical energy? [*Neglect friction*.]

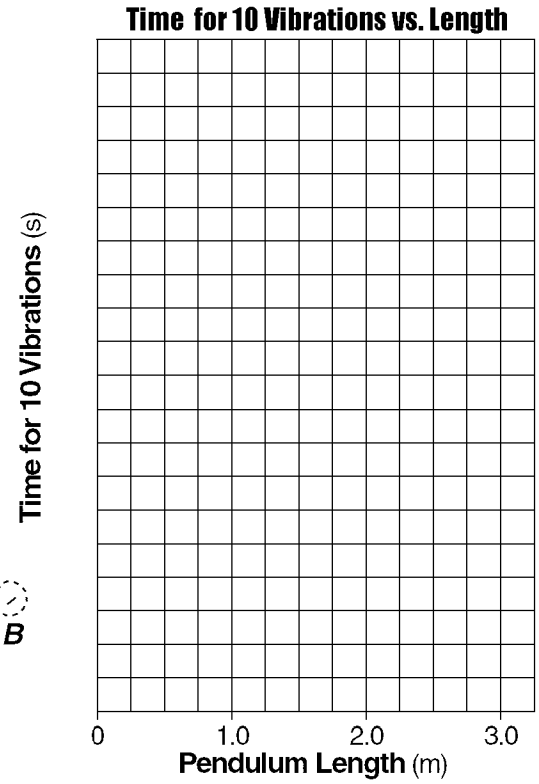
A) It increases. B) It remains the same. C) It decreases.

Questions 4 and 5 refer to the following:

The diagram below shows a light string attached to mass *m* forming a pendulum of length ℓ. One complete vibration of the pendulum consists of mass *m* moving from position *A* to position *B* and back to position *A*. The data table below shows the results of an experiment measuring the time for 10 complete vibrations of the pendulum for various pendulum lengths.

Pendulum Length (meters)	Time for 10 Vibrations (seconds)
0	0
0.2	9
0.5	14
1.0	20.
1.5	25
2.0	28
2.5	32





5) Using the information in the data table, construct a graph on the grid provided, following the directions below.

(a) Mark an appropriate scale on the axis labeled "Time for 10 Vibrations."

(b) Plot the data points for time for 10 vibrations versus length.

(c) Draw the best-fit curve.

6) Determine the period of the 1.0-meter pendulum in the given diagram.