PhyzJob: Mysteries of the Jiggler
Analysis of a Simple Harmonic Oscillator

Felix

On the other side of this sheet there are several figures depicting the sequence of motion for a mass oscillating horizontally at the end of a spring. Analyze the following quantities in the order they are given.

A. THE VECTORS (CAN BE POSITIVE OR NEGATIVE)

1. **Displacement x:** Chart (by means of bar graphs) the position of the mass as it moves through a complete cycle of motion. Please observe the sign convention indicated.

2. **Restoring Force F:** If you know **x**, how can you deduce **F**? Is there an algebraic connection? If so, what is it? Explain. (Don't forget to complete the bar graphs.)

3. **Acceleration a:** If you know **F**, how can you determine **a**? Is there an algebraic connection? If so, what is it? Explain. (Don't forget to complete the bar graphs.)

4. **Velocity v:** Chart (by means of bar graphs) the velocity of the mass as it moves through a complete cycle of motion. Note the "speed lines" following the mass at various points.

5. **Momentum p:** If you know **v**, how can you determine **p**? Is there an algebraic connection? If so, what is it? Explain. (Don't forget to complete the bar graphs.)

B. THE SCALARS (ENERGY)

1. **Potential Energy PE:** Based on what you know about the vector quantities, how can you determine the potential energy of the system? Which quantity above is it related to and what is the relation? Explain.

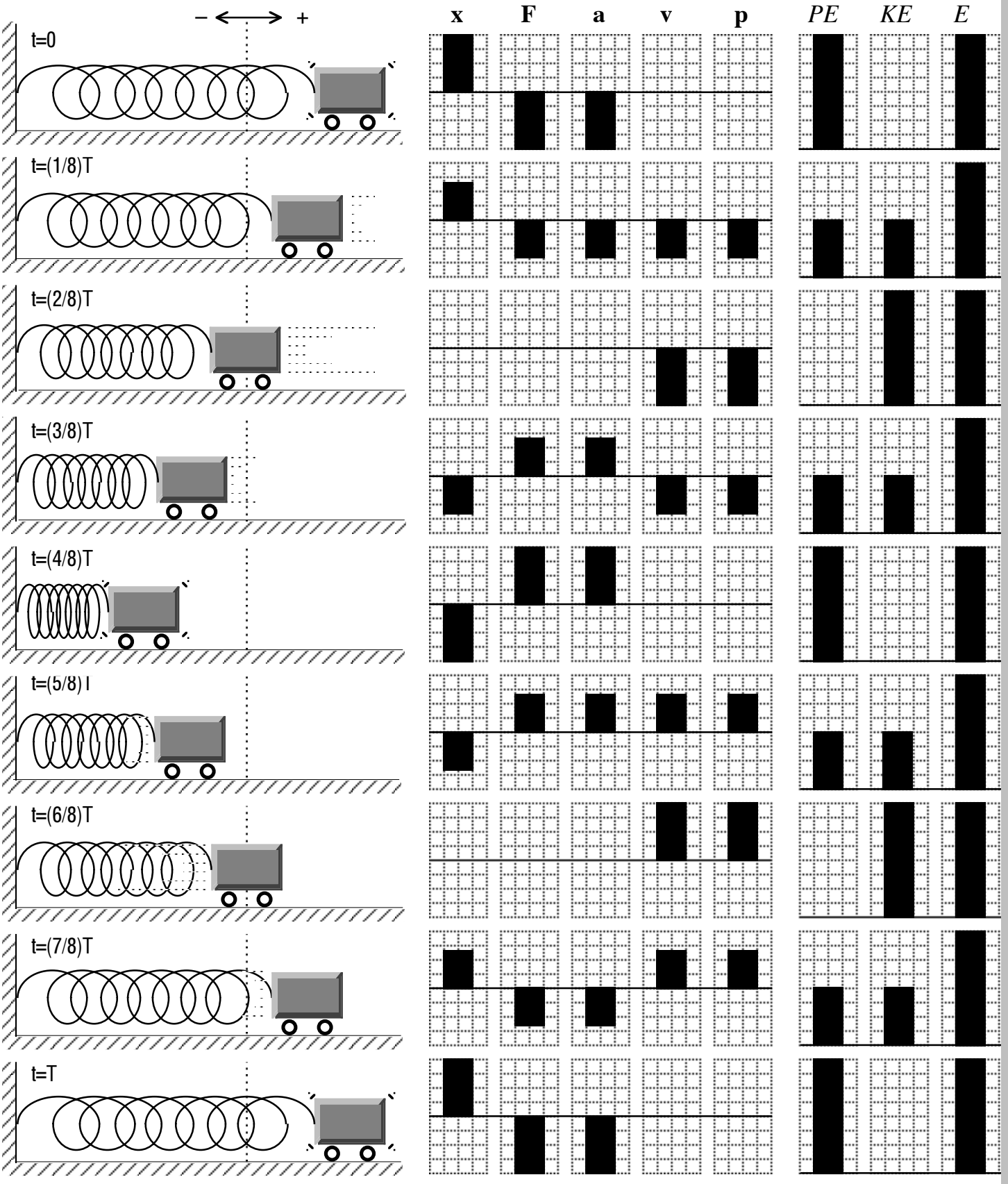
2. **Kinetic Energy KE:** Based on what you know about the vector quantities, how can you determine the kinetic energy of the system? Which quantity above is it related to and what is the relation? Explain.

3. **Total Energy E:** How can you determine the total energy of the system? Which quantity or quantities above is it related to and what is the relation? Explain.

The figures below depict snapshots of a mass oscillating horizontally at the end of a spring.

VECTORS

SCALARS



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