

- 10. Organizing Data** Calculate the height of the mass at the lowest point of each trial. Use the equation $lowest = initial\ distance - elongation$.
- 11. Organizing Data** For each trial, calculate the gravitational potential energy, $PE_g = m a_g h$, at the highest point of the oscillation.
- 12. Organizing Data** For each trial, calculate the gravitational potential energy at the lowest point of the oscillation.
- 13. Analyzing Results** According to your calculations in items 11 and 12, where is the gravitational potential energy the greatest? Where is it the least? Explain these results in terms of gravity and the height of the mass and the spring.
- 14. Organizing Data** Find the total potential energy at the top of the oscillation and at the bottom of the oscillation.

CONCLUSIONS

- 15. Drawing Conclusions** Based on your data, is mechanical energy conserved in the oscillating mass on the spring? Explain how your data support your answers.
- 16. Making Predictions** How would using a stiffer spring affect the value for the spring constant? How would this change affect the values for the elastic and gravitational potential energies?

EXTENSIONS

- 17. Extending Ideas** Use your data to find the midpoint of the oscillation for each trial. Calculate the gravitational potential energy and the elastic potential energy at the midpoint. Use the principle of the conservation of mechanical energy to find the kinetic energy and the speed of the mass at the midpoint.
- 18. Designing Experiments** Based on what you have learned in this lab, design an experiment to measure the spring constants of springs and other elastic materials in common products, such as the springs inside ball point pens, rubber bands, or even elastic waistbands. Include in your plan a way to determine how well each spring or elastic material conserves mechanical energy. If you have time and your teacher approves your plan, carry out the experiment on several items, and make a table comparing your results for the various items.