

# CONSERVATION OF ENERGY AND MOMENTUM

**The laws of conservation of energy and momentum provide a way to predict and describe the movement of objects.**

## STANDARDS<sup>1</sup>

- Students know* how to calculate kinetic energy by using the formula  $KE = \frac{1}{2} mv^2$ .
- Students know* how to calculate changes in gravitational potential energy near Earth by using the formula change in potential energy =  $mgh$   $h$  is the change in the elevation .
- Students know* how to solve problems involving conservation of energy in simple systems, such as falling objects.
- Students know* how to calculate momentum as the product  $mv$ .
- Students know* momentum is a separately conserved quantity different from energy.
- Students know* an unbalanced force on an object produces a change in its momentum.
- Students know* how to solve problems involving elastic and inelastic collisions in one dimension by using the principles of conservation of momentum and energy.

## FRAMEWORK EQUATIONS<sup>2</sup>

- $W = Fd$
  - $PE = mgh$
  - $v = \sqrt{2gh}$   
 $TE = KE + PE$   
 $\Delta KE + \Delta PE = 0$
  - $\Delta p = F\Delta t$
- $W$  work  
 $F$  force  
 $d$  distance  
 $PE$  potential energy  
 $m$  mass  
 $g$  gravitational acceleration  $\approx 9.8 \text{ m/s}^2$   
 $h$  change in elevation  
 $TE$  total mechanical energy  
 $KE$  kinetic energy  
 $p$  momentum  
 $t$  time

1. *Science Content Standards for California Public Schools, Kindergarten Through Grade Twelve.* This sheet does not include starred, “opportunities to learn” standards.

2. *California Science Framework for K 12 Public Schools.* Some equations were modified for this sheet to better align with conventional notation.

This sheet was prepared by Dean Baird [www.phyz.org](http://www.phyz.org) and is not a publication of the California Department of Education.