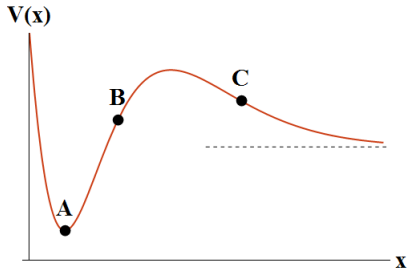
Discovery Exercise for Potential in One Dimension

The drawing shows a "potential function" $V(x)$. An object that experiences this potential will tend to move from high potential to low potential. The function is therefore conventionally described as a hill, and the object as a ball that is pulled downhill.



1. Ball B begins at rest at position B.
   (a) Which direction will ball B roll at first?

   (b) What will happen to ball B over time? Assume it rolls without losing energy.

   See Check Yourself #52 at felderbooks.com/checkyourself
2. Ball C begins at rest at position C.
   (a) Which direction will ball C roll at first?

   (b) What will happen to ball C over time? Assume it rolls without losing energy.

3. Ball A begins at rest at position A, a local minimum of $V(x)$. What will happen to ball A over time?

4. Which of the following most accurately describes the relationship of $V(x)$ to the force on a ball? (choose one)
   (a) Where $V(x)$ is positive, the force is positive (and vice-versa).
   (b) Where $V(x)$ is positive, the force is negative (and vice-versa).
   (c) Where dV/dx is positive, the force is positive (and vice-versa).
   (d) Where dV/dx is positive, the force is negative (and vice-versa).
   (e) Where d^2V/dx^2 is positive, the force is positive (and vice-versa).
   (f) Where d^2V/dx^2 is positive, the force is negative (and vice-versa).