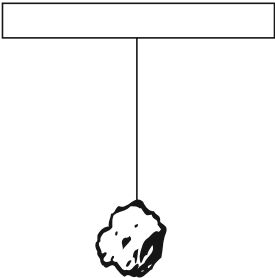

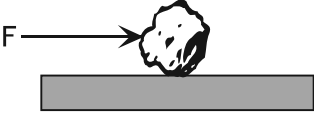



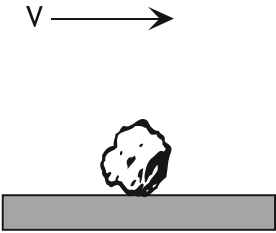



**BLM**

 Blackline  
Master

**Appendix 3.16: Free-Body Diagrams: Linear Motion**

In each case in the pictures below, the rock is acted upon by one or more forces. All drawings are in the vertical plane, and friction is negligible except where noted. Draw accurate free-body diagrams showing all forces acting on the rock. Draw all forces as though they were acting on the centre of mass, even though forces like friction and the normal force act on the surface at the point of contact. Use a ruler and pencil so that you can correct errors. Label the forces using  $F_g$  for the weight or force of gravity,  $T$  for tension,  $F_f$  for force of friction, and  $F_N$  for normal force.

<p>1. Equilibrium</p> 	<p>2. Equilibrium</p> 	<p>3. Rock is pushed but remains motionless. Friction acts.</p> 
<p>4. Rock is falling, no friction.</p> 	<p>5. Rock is sliding at constant speed on a frictionless surface.</p> 	<p>6. Rock is falling at a constant (terminal) velocity.</p> 
<p>7. Rock is decelerating because of kinetic friction.</p> <p><math>v \rightarrow</math></p> 	<p>8. Rock is rising. No friction.</p> 	<p>9. Rock is at the top of its flight, momentarily motionless.</p> 