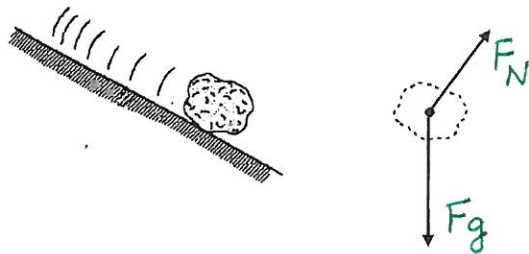
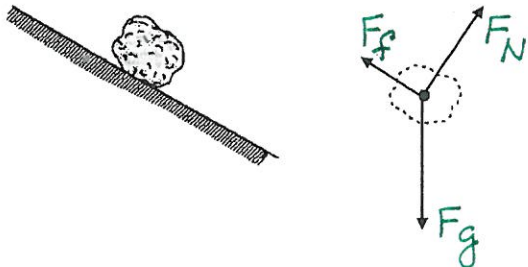
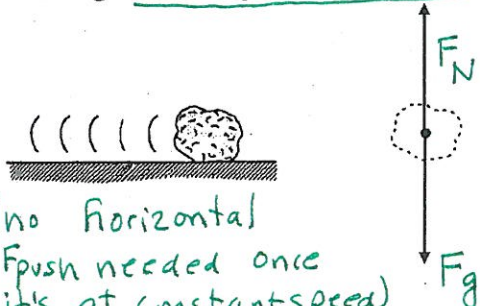
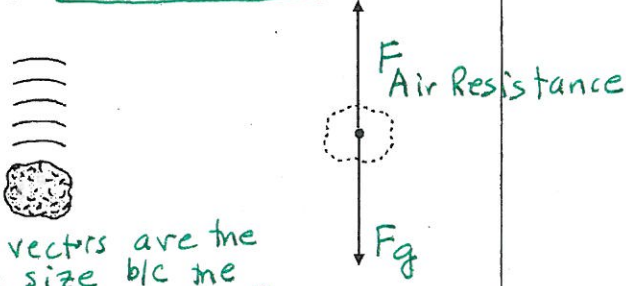
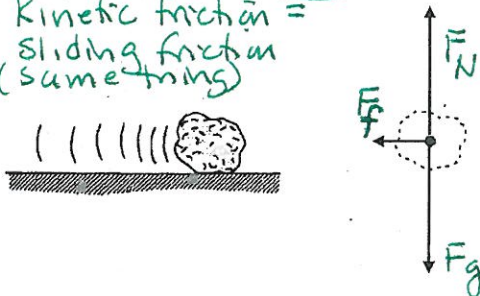
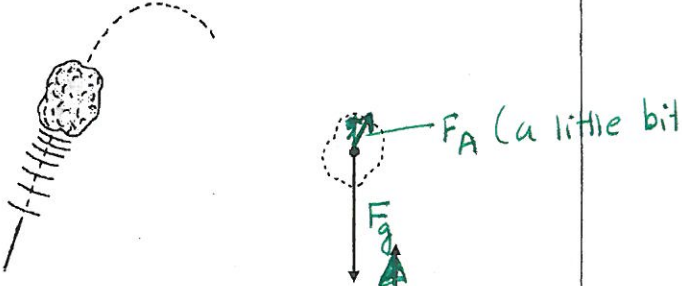
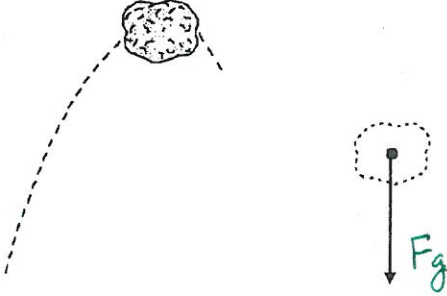
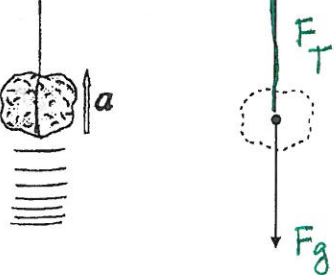


# Physics 8

## Free-Body Diagrams – Solutions

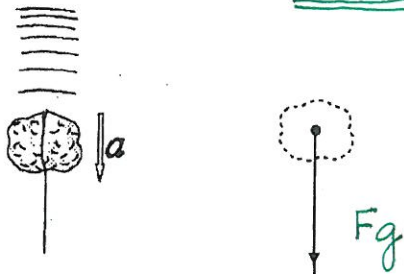
<p>1. Static</p>	<p>2. Static</p>
<p>3. Rock is falling. No air friction.</p>	<p>4. Static</p>
<p>5. Static</p>	<p>6. Static</p>
<p>7. Static</p>	<p>8. Static</p>

# Free-Body Diagrams – Solutions

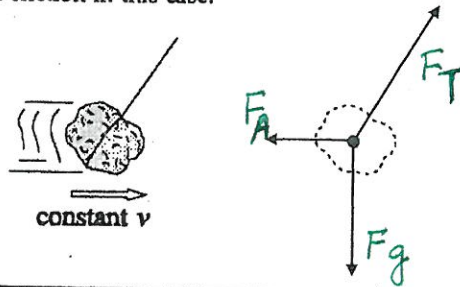
<p>9. Sliding <u>without friction.</u></p> 	<p>10. <u>Static friction prevents sliding.</u></p> 
<p>11. Sliding at <u>constant speed without friction.</u></p>  <p>(no horizontal <math>F_{push}</math> needed once it's at constant speed)</p>	<p>12. Falling at <u>constant (terminal) velocity.</u></p>  <p>These vectors are the same size b/c the velocity is constant</p>
<p>13. Decelerating because of <u>kinetic friction.</u></p> <p>Kinetic friction = sliding friction (same thing)</p> 	<p>14. Rising in a parabolic trajectory.</p>  <p><math>F_A</math> (a little bit)</p>
<p>15. At the top of a parabolic trajectory.</p> 	<p>16. Tied to a rope and pulled straight upward. Accelerating upward at <math>9.8 \text{ m/s}^2</math>. No friction.</p>  <p>Here <math>F_T &gt; F_g</math> which is causing it to move faster + faster</p>

# Free-Body Diagrams – Solutions

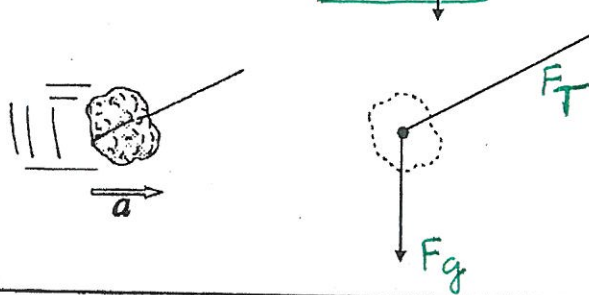
17. Tied to a rope and pulled straight downward. Accelerating downward at  $19.6 \text{ m/s}^2$ . No friction.



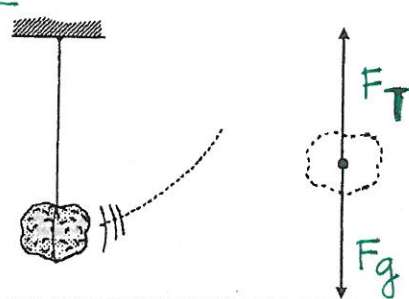
18. Tied to a rope and pulled so that the rock moves horizontally at constant velocity. Note: There must be air friction in this case.



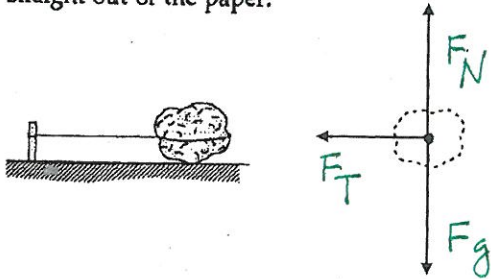
19. Tied to a rope and pulled so that the rock accelerates horizontally at  $2g$ . No air friction



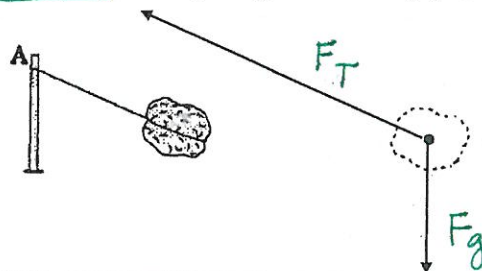
20. Swinging on a rope, at lowest position. No friction.



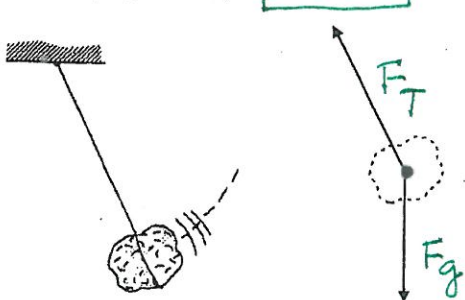
21. Tied to a post and moving in a circle at constant speed on a frictionless horizontal surface. Coming straight out of the paper.



22. Tied to point A by a string. Moving in a horizontal circle at constant speed. Not resting on a solid surface. No friction. Coming straight out of the paper.



23. Swinging on a rope. No friction.



24. Tied to point B. Moving downward in a vertical circle with string horizontal. No friction.

