

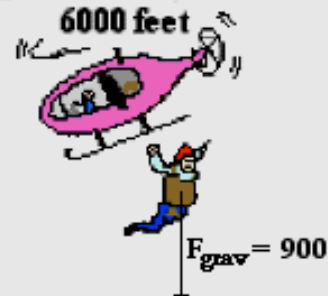
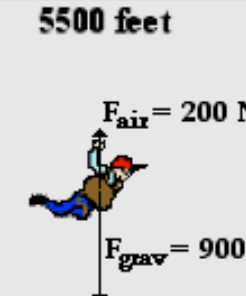
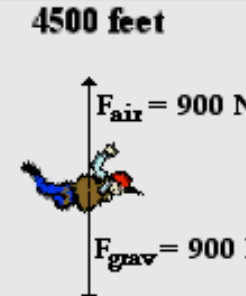
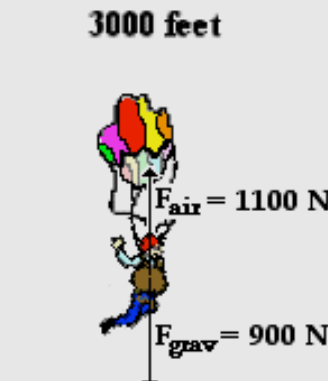

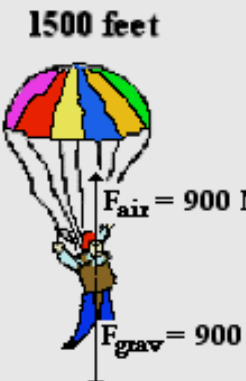
### Skydiving

Read from Lesson 3 of the Newton's Laws chapter at The Physics Classroom:

<http://www.physicsclassroom.com/Class/newtlaws/u2l3e.html>

MOP Connection: Newton's Laws: sublevel 11

A 90-kg (approx.) skydiver jumps out of a helicopter at 6000 feet above the ground. As he descends, the force of air resistance acting upon him continually changes. The free-body diagrams below represent the strength and direction of the two forces acting upon the skydiver at six positions during his fall. For each diagram, apply Newton's second law ( $F_{net} = m \cdot a$ ) to determine the acceleration value.

<p><b>6000 feet</b></p>  <p><math>F_{grav} = 900\text{ N}</math></p> <p><math>a = \underline{\hspace{2cm}}\text{ m/s/s}</math></p>	<p><b>5500 feet</b></p>  <p><math>F_{air} = 200\text{ N}</math></p> <p><math>F_{grav} = 900\text{ N}</math></p> <p><math>a = \underline{\hspace{2cm}}\text{ m/s/s}</math></p>	<p><b>4500 feet</b></p>  <p><math>F_{air} = 900\text{ N}</math></p> <p><math>F_{grav} = 900\text{ N}</math></p> <p><math>a = \underline{\hspace{2cm}}\text{ m/s/s}</math></p>
<p><b>3000 feet</b></p>  <p><math>F_{air} = 1100\text{ N}</math></p> <p><math>F_{grav} = 900\text{ N}</math></p> <p><math>a = \underline{\hspace{2cm}}\text{ m/s/s}</math></p>	<p><b>2900 feet</b></p>  <p><math>F_{air} = 1500\text{ N}</math></p> <p><math>F_{grav} = 900\text{ N}</math></p> <p><math>a = \underline{\hspace{2cm}}\text{ m/s/s}</math></p>	<p><b>1500 feet</b></p>  <p><math>F_{air} = 900\text{ N}</math></p> <p><math>F_{grav} = 900\text{ N}</math></p> <p><math>a = \underline{\hspace{2cm}}\text{ m/s/s}</math></p>

- At which two altitudes has the skydiver reached terminal velocity? \_\_\_\_\_
- At which altitude(s) is the skydiver in the state of speeding up? \_\_\_\_\_
- At which altitude(s) is the skydiver in the state of slowing down? \_\_\_\_\_
- At 2900 feet, the skydiver is \_\_\_\_\_. Choose two.  
 a. moving upward    b. moving downward    c. speeding up    d. slowing down
- Explain why air resistance increases from 6000 feet to 4500 feet.
- Explain why air resistance decreases from 3000 feet to 1500 feet.