



1. A skier accumulates gravitational potential energy as the ski lift has exerts force against gravity to lift the skiers up to the top

2. A skier's reservoir of acquired potential energy enables them to perform work.

The amount of potential energy is

$$U = mgh$$

where **U** represents the gravitational potential energy, **m** represents the mass of the skier, **g** represents the gravitational acceleration acting on the skier, and **h** represents the height.

If gravity is the only force acting on the skier, then all this work must be converted to kinetic energy (that is, energy to do work by being in motion) to satisfy the law of conservation of mechanical energy.

$$E = \frac{1}{2}mv_{\text{bottom}}^2 = mgh_{\text{top}}$$

Therefore, if the slalom course starts 50 meters above the finish line, and a skier with a weight of 80 kg navigates it (with only gravity acting on the skier), the skier will achieve a speed of 31.32 m/s at the finish line using simple algebraic rearrangement.

$$\begin{aligned}v_{\text{bottom}} &= \sqrt{2gh_{\text{top}}} \\v_{\text{bottom}} &= \sqrt{2 * 9.81 * 50_{\text{top}}} \\v_{\text{bottom}} &= 31.32 \text{ m/s}\end{aligned}$$