Description: Short quantitative problem relating time and stopping distance to acceleration. Requires that students use proportional reasoning.

Constants | Periodic Table

Light, dry snow is called powder. Skiing on a powder day is different than skiing on a day when the snow is wet and heavy. When you slow down on dry snow the maximum (negative) acceleration caused by the snow acting on your skis is about two-fifths as much as that of stopping on wet snow.

Part A

For a given initial velocity, how does the time t_{d} it takes to stop on dry snow differ from the time t_{w} it takes to stop on wet snow?

View Available Hint(s) (3)

ANSWER:

- $t_{\mathrm{d}} = 0.4t_{\mathrm{w}}$
- $t_{\mathrm{d}} = t_{\mathrm{w}}$
- $t_{\mathrm{d}} = 2.5t_{\mathrm{w}}$

This solution illustrates that time is inversely proportional to acceleration. This should make sense; the greater the acceleration, the less time is required to come to a stop from any given initial speed.

Part B

For a given initial velocity, how does the stopping distance x_{d} on dry snow differ from the stopping distance x_{w} on wet snow?

View Available Hint(s) (2)

ANSWER:

- $x_{\mathrm{d}} = 0.4x_{\mathrm{w}}$
- $x_{\mathrm{d}} = x_{\mathrm{w}}$
- $x_{\mathrm{d}} = 2.5x_{\mathrm{w}}$

This solution illustrates that stopping distance is inversely proportional to acceleration. This should make sense; the greater the acceleration, the less time and distance is required to come to a stop from any given initial speed.