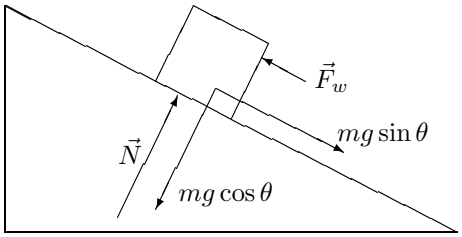
30. We label the 40 kg skier "m" which is represented as a block in the figure shown. The force of the wind is denoted $\vec{F}_w$ and might be either "uphill" or "downhill" (it is shown uphill in our sketch). The incline angle θ is 10°. The $+x$ direction is downhill.



(a) Constant velocity implies zero acceleration; thus, application of Newton's second law along the x axis leads to

$$mg \sin\theta - F_w = 0 \quad .$$

This yields $F_w = 68$ N (uphill).

(b) Given our coordinate choice, we have $a = +1.0$ m/s^2. Newton's second law

$$mg \sin\theta - F_w = ma$$

now leads to $F_w = 28$ N (uphill).

(c) Continuing with the forces as shown in our figure, the equation

$$mg \sin\theta - F_w = ma$$

will lead to $F_w = -12$ N when $a = +2.0$ m/s^2. This simply tells us that the wind is opposite to the direction shown in our sketch; in other words, $\vec{F}_w = 12$ N *downhill*.