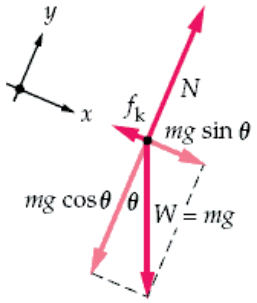
**PHYSQ 124**
**Quiz 2, 22 septembre 2022 (solution)**

Un enfant descend une glissade de terrain de jeux inclinée à un angle de 26.5° au-dessous de l'horizontale. Trouvez l'accélération de l'enfant si le coefficient de frottement cinétique entre l'enfant et la glissade est de 0.315.

58. **Picture the Problem**: The free-body diagram of a child on a slide is shown at right.




**Strategy:** Choose coordinate axes with *x* pointing parallel to the slide and down along the direction of motion, and *y* pointing parallel to $\vec{\mathbf{N}}$. Write Newton's second law in the *y* and *x* directions and combine the equations to solve for *a*.

**Solution: 1.** Write Newton's second law in the *y* direction:

$$\sum F_y = N - mg\cos\theta = 0$$
$$N = mg\cos\theta$$

**2.** Write Newton's second law in the *x* direction:

$$\sum F_x = mg\sin\theta - f_k = ma$$
$$ma = mg\sin\theta - \mu_k N$$

**3.** Substitute the expression for *N* from step 1and solve for *a*:

$$ma = mg\sin\theta - \mu_k (mg\cos\theta)$$
$$a = g(\sin\theta - \mu_k \cos\theta)$$
$$= (9.81\ \text{m/s}^2)[\sin 26.5° - (0.315)\cos 26.5°]$$
$$a = \boxed{1.61\ \text{m/s}^2}$$

**Insight:** As expected, increasing $\theta$ will increase *a*, but increasing $\mu_k$ will decrease *a*.