

50. (a) In the work-kinetic energy theorem, we include both the work due to an applied force  $W_a$  and work done by gravity  $W_g$  in order to find the latter quantity.

$$\Delta K = W_a + W_g \implies 30 = (100)(1.8) \cos 180^\circ + W_g$$

leading to  $W_g = 210 \text{ J}$ .

- (b) The value of  $W_g$  obtained in part (a) still applies since the weight and the path of the child remain the same, so  $\Delta K = W_g = 210 \text{ J}$ .