14. The child-backpack is in static equilibrium while he waits, so Newton's second law applies with $\sum \vec{F} = 0$. Since students sometimes confuse this with Newton's third law, we phrase our results carefully.

(a) The magnitude of the normal force $\vec{N}$ exerted upward by the sidewalk is equal, in this situation, to the total weight of the child-backpack, as a result of $\sum \vec{F} = 0$. Thus, $\vec{N} = (33.5 \text{ kg})(9.8 \text{ m/s}^2) = 328$ N and is directed up; this is $\vec{F}_{sc}$ – the force of the sidewalk exerted up on the child's feet. By Newton's third law, the force exerted down (at the child's feet) on the sidewalk is $\vec{F}_{cs} = 328$ N downward.

(b) Except for an entirely negligible gravitation attraction between the child and the concrete, there is no force exerted on the sidewalk by the child when the child is not in contact with it.

(c) Earth pulls gravitationally on the child, and the child pulls equally in the opposite direction on Earth. This force is the previously computed weight $(29.0)(9.8) = 284$ N. The gravitational force on Earth exerted by the child is 284 N up. But the contact force exerted by the child on the sidewalk (hence, on Earth) is (see part (a)) 328 N downward. Thus, the *net* force exerted by the child on Earth is zero.

(d) Here the answer is simply the gravitational interaction: 284 N up.