Suppose the skateboarder shown in the drawing reaches a height of 2.20 m above the right side of the semi-circular ramp. He then makes an incomplete midair turn and ends up sliding down the right side of the ramp on his back. When the skateboarder reaches the bottom of the ramp, his speed is 6.00 m/s. The skateboarder's mass is 68.0 kg, and the radius of the semicircular ramp is 3.40 m. What is the average frictional force exerted on the skateboarder by the ramp?

http://edugen.wileyplus.com/edugen/courses/crs3976/art/qb/qu/c06/EAT_12253086280240_8051901277377528.gif

The law of conservation of energy:

$$\Delta E + W = 0$$

where ΔE – change of body's energy, W – work of friction force

Work can be expressed by the following equation:

$$W = -F_{av} d$$

where F_{av} is the average force of friction, d is the distance along ramp, $d = \frac{\pi r}{2}$.
Sign " $-$ " because force of friction directed against motion.

Change of body's energy equals:

$$\Delta E = mg(h + r) - \frac{mv^2}{2}$$

Therefore:

$$mg(h + r) - \frac{mv^2}{2} = F_{av} \frac{\pi r}{2}$$

$$F_{av} = \frac{mg(h + r) - \frac{mv^2}{2}}{\frac{\pi r}{2}} = 470\ N$$

Answer: $470\ N$