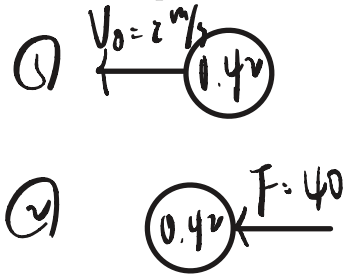
Work and Energy

$V_0 = v\ m/s$

14. A soccer ball with mass 0.420 kg is initially moving with speed 2.00 m/s. A soccer player kicks the ball, exerting a constant force of magnitude 40.0 N in the same direction as the ball's motion. Over what distance must the player's foot be in contact with the ball to increase the ball's speed to 6.00 m/s?



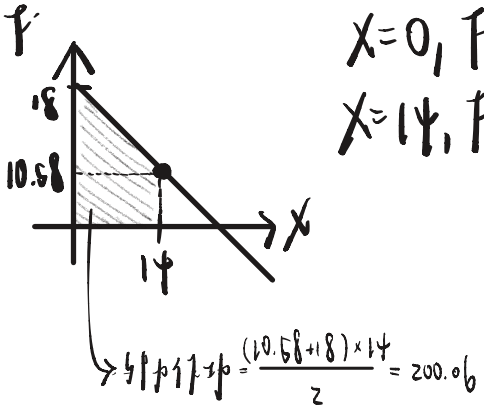
$a: 40 = 0.4v = 95\ m/s^2\ (\leftarrow)$

$36 = 4 + 2 \cdot 95 \cdot s$

$s = 0.168\ m$ #.

15. A force in the $+x$-direction with magnitude $F(x) = 18.0\ \text{N} - (0.530\ \text{N/m})\,x$ is applied to a 6.00 kg box that is sitting on the horizontal, frictionless surface of a frozen lake. $F(x)$ is the only horizontal force on the box. If the box is initially at rest at $x = 0$, what is its speed after it has traveled 14.0 m?

靜止, $V_0 = 0$



$X = 0,\ F = 18\ N$

$X = 14,\ F = 10.68\ N$

$200.06 = \frac{1}{2} \times 6 \times (V_2^2 - 0)$

$V_2 = 8.166\ m/s$ #.

16. It is 5.0 km from your home to the physics lab. As part of your physical fitness program, you could run that distance at 10 km/h (which uses up energy at the rate of 700 W), or you could walk it leisurely at 3.0 km/h (which uses energy at 290 W). Which choice would burn up more energy, and how much energy (in joules) would it burn? Why does the more intense exercise burn up less energy than the less intense exercise?

Run: $s = 10 \times 3600 = 18000\ s$

$700 \times 18000 = 12600000\ J$

Walk: $s = 3 \times 3600 = 60000\ s$

$290 \times 60000 = 17400000\ J$

A: ① 慢走耗的能量比較多, 1740000 J.

② 慢走花的時間長.