PROB

A. $3000\ Cal = (3\times10^3\ Cal)(4.19\times10^3\ J/Cal)$

$= 1.26\times10^7\ J$

ASSUME NONE OF THE WATER BOILS AWAY. YOU MIGHT WONDER HOW YOU WOULD KNOW SOME DOES.

$$1.26\times10^7\ J = m_{H_2O}\, c_{H_2O}\,(T_f - 37.0^\circ C)$$

$$T_f = \frac{1.26\times10^7\ J}{(65\ kg)(4.19\times10^3\ J/kg^\circ C)} + 37.0^\circ C$$

$$= 46.2^\circ C + 37.0^\circ C$$

$$\boxed{T_f = 83.2^\circ C}$$

B. $\#\ RACES = \frac{1\ RACE}{10\ km} \times \frac{1.61\ km}{100\ Cal} \times 3000\ Cal$

$= 4.83 \longrightarrow 5\ RACES$

C. $5000\ Cal = 5\times10^3\ Cal \times 4.19\times10^3\ J/Cal = 2.095\times10^7\ J$

LET'S SEE IF WATER REACHES BP AT $100^\circ C$

$Q(REQUIRED) = m_{H_2O}\, c_{H_2O}\,(100^\circ C - 37^\circ C)$

$= (65\ kg)(4.19\times10^3\ J/kg^\circ C)(63^\circ C) = 1.716\times10^7\ J$

WATER DOES GET TO BP AND THERE IS Q LEFT OVER TO BOIL SOME OF IT AWAY

$Q_{LEFT} = (2.095 - 1.716)\times10^7\ J = 3.792\times10^6\ J$

$3.792\times10^6\ J = m'_{H_2O}\, L_v(H_2O)$

$$m_{H_2O} = \frac{3.792\times10^6\ J}{3.35\times10^6\ J/kg} = \boxed{1.13\ kg}$$

$$\boxed{T_f = 100^\circ C}$$