

# Aerobic Model of Marathon Performance:

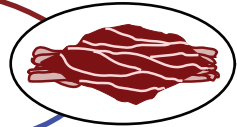
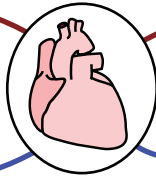
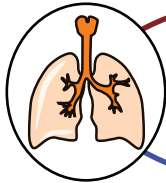
$$v_{\text{marathon}} (\text{m} \cdot \text{s}^{-1}) = \mathbf{VO}_{2\text{MAX}} (\text{mol} \cdot \text{s}^{-1}) \times \mathbf{RE} (\text{m} \cdot \text{mol}^{-1}) \times \mathbf{LT}$$

## Oxygen Transport Factors ( $\mathbf{VO}_{2\text{MAX}}$ )

**Lung**

**Heart**

**Muscle**



$$\frac{[\text{O}_2]_{\text{lung}} \times [\text{Heme}]_t}{K_{\text{Heme}} + [\text{O}_2]_{\text{lung}}}$$

×

$$V_{\text{stroke}} \times \mathbf{HR}_{\text{MAX}}$$

×

$$\frac{[\text{Myo}]}{K_{\text{myo}} \left( \frac{[\text{Heme}]}{K_{\text{heme}}} \right) + [\text{Myo}]}$$

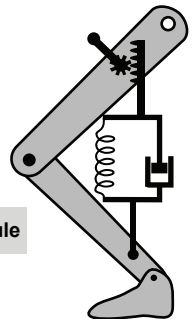
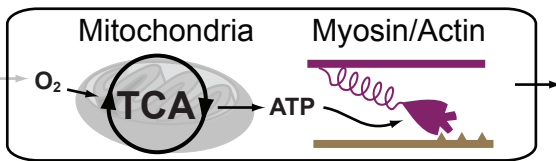
<sup>15</sup> Practically

<sup>21</sup> Science.com

## Running Economy Factors ( $\mathbf{RE}$ )

**Muscle Cell**

**Leg Mechanics**



×

$$\mathbf{3ATP/O_2}$$

×

$$\mathbf{10 \text{ joules Work / ATP}}$$

(20% efficiency)

×

$$\mathbf{\text{meters / joule}}$$