



2.2 EXERCICES ÉNERGIE

Exercice n° 2.2.m : Vélo de course

QUESTIONS

Question 1 : Quelle est la puissance requise pour rouler (à plat et sans vent) à 50 km/h avec un vélo de course de 22 lbs si votre propre poids est de 150 lbs ?



REPOSES

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<http://www.mne.psu.edu/lamancusa/ProdDiss/Bicycle/bikecalc1.htm>

Bicycle Power Calculator Assumptions:

Constant speed analysis

Drag coefficients reference "Science of Cycling", E.R. Burke, Leisure Press, 1986, pg 126.

Inputs

Wheel Diameter (inches) 27 Crank Length (inches) 6.75

Desired Constant Speed (mph) 30 Rider's Weight (lbs) 150 Bicycle Weight (lbs) 22

% Grade (+ for uphill,- for downhill) 0 Mechanical Losses (3-5% is typical) 5 %

Gear Ratio (#Teeth Rear/Front) 14/52

Air Resistance Coefficient ($\text{lbf} \cdot \text{s}^2 / \text{ft}^2$) = $C_d \cdot \text{FrontalArea}$.004

Rolling Resistance Coefficient (lbf / lbf) .004

Calculated Outputs

Total required input power from the rider HP Watts 530W

Power needed to overcome air resistance HP 87 %

Power to overcome rolling resistance in tires HP 8 %

Power needed for elevation change HP 0 %

Power lost to mechanical losses, friction, etc. HP 5 %

Calories burned per mile 54 kcals (assuming 28% efficiency in conversion to human power output)

Average Pedal Force 66 Lbs Average Traction Force 8,432Lbs

Pedal Speed 100 RPM Tire Speed 373 RPM