

In Class Work (Friday September 22)

[1] A bicycle rider coasts down a hill.

The angle of the slope is $\theta = 10$ degrees = 0.174 radians.

(A) Using your knowledge about air resistance, *estimate* the terminal speed of the bicycle, in meters per second.

$$19.36 \text{ m/s}$$

(B) Determine the speed as a function of time, starting from speed v_0 at $t = 0$.

$$v = v_T \tanh (g \sin \theta t / v_T)$$

Data: Mass = 70 kg ; effective area = 1 m² .

[2] The Large Hadron Collider at CERN

Given these parameters:

$$2 \pi R = 27 \text{ km}$$

$$\text{proton energy} = E = 6.5 \text{ TeV}$$

$$\text{proton momentum} = p = E/c$$

$$1 \text{ TeV} = 10^{12} \text{ e Tm}^2/\text{s}$$

Calculate the magnetic field strength, B.

$$B = 5.04 \text{ T}$$

NAME _____

In Class Work (Friday September 22) - ANSWER SHEET

INSTRUCTIONS FOR THIS PAGE :

WRITE YOUR ANSWERS ONLY; DO NOT SHOW YOUR WORK.

[1] *A bicycle rider coasts down a hill.*

(A) *The terminal speed is*

(B) *The speed as a function of time is*

[2] *The Large Hadron Collider at CERN*

The magnetic field strength is