Washtenaw Community College

Hydraulic Brakes Fundamentals

ASV255

In this course, students develop skills in diagnosing and repairing brake systems on vehicles, including hydraulic, mechanical, and electrical component systems.

Brake Diagnosis

1. Which tool would you use for diagnosis of a brake pull complaint? (Single Choice)
   - A. Brake pad thickness gauge.
   - B. An infrared thermometer.
   - C. A brake fluid pressure bleeding machine.
   - D. A digital volt ohm meter (DVOM).

A bit of physics

Law of conservation of energy: roughly states energy cannot be created or destroyed, only converted from one “form” to another.

also

First law of thermodynamics: Energy can be changed from one form to another. It can’t be created or destroyed

Some Physics

Law of conservation of energy: roughly states energy cannot be created or destroyed, only converted from one “form” to another.

Image Credit: Allen Day

Some Physics

Images Credit: Allen Day

Some Physics

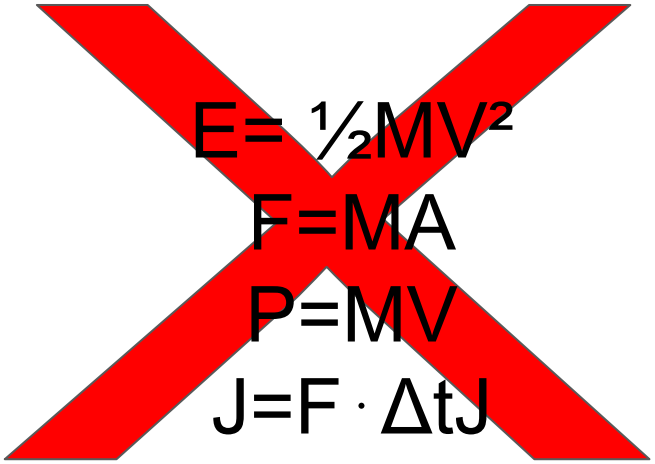
$$E = \tfrac{1}{2}MV^2$$

$$F = MA$$

$$P = MV$$

$$J = F \cdot \Delta t J$$

Math Not Required



Some Physics

Kinetic Energy

Images Credit: Allen Day

Some Physics

Energy = ½mass x velocity²

Images Credit: Allen Day

Some Physics

Energy = ½mass x velocity²

5000 Pounds

65 MPH

228512 Cal

Images Credit: Allen Day

Some Physics

Energy = ½mass x velocity²

228512 Calories

500 Calories

457 Tacos

Images Credit: Allen Day

All of the Energy Converted to Heat

457 Tacos

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All of the Energy Converted to Heat

The brakes convert 457 tacos of heat for our 65MPH to stop.

Image Credit: Late Model Restoration CC BY-NC-SA 2.0

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Energy Converted to Heat:
Brake Parts Get HOT
Air Near the Brakes Heats Up

Image Credit: Late Model Restoration CC BY-NC-SA 2.0

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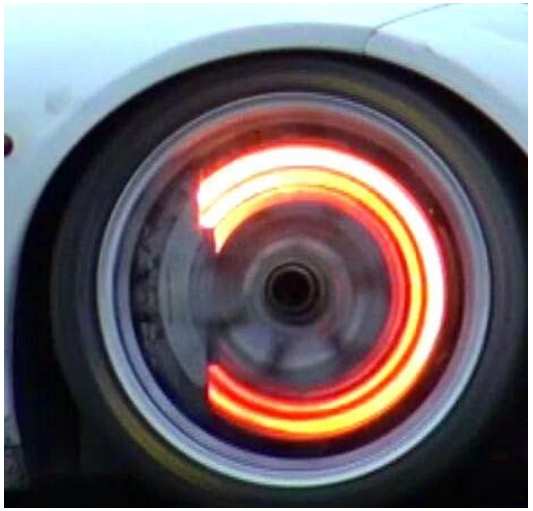
How Can Small Brakes Stop a Big Car?

Image Credit: Allen Day

How Can Small Brakes Stop a Big Car?
Thermodynamics Simplification:

The bigger the heat difference, the faster the energy transfer.
The longer the time the more energy transfer.
Materials and area matter.



How does this help me fix cars?

Look at the brakes as energy conversion and heat transfer devices. What do you see?

Images Credit: Allen Day

How does this help me fix cars?

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