

1.3 SCIENTIFIC PRINCIPLES AND MATERIALS

? FREQUENTLY ASKED QUESTION

What Is the Difference Between Mass and Weight?

Mass is the amount of matter in an object. One of the properties of mass is inertia. Inertia is the resistance to being put in motion and the tendency to remain in motion once it is set in motion.

The **weight** of an object is the force of gravity on the object and may be defined as the mass times the acceleration of gravity.

Therefore, mass means the property of an object and weight is a force.

ALWAYS LEARNING Automotive Technology, Fifth Edition James Halderman PEARSON

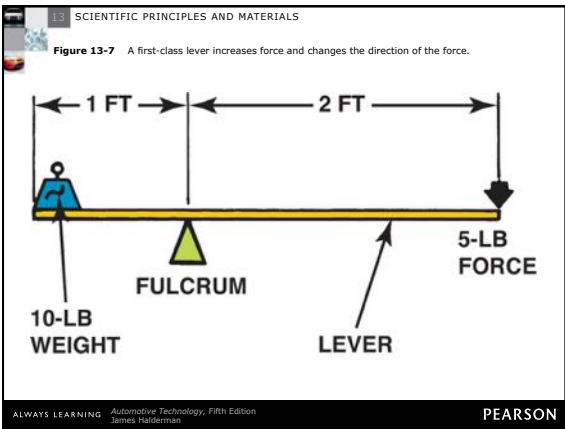
1.3 SCIENTIFIC PRINCIPLES AND MATERIALS

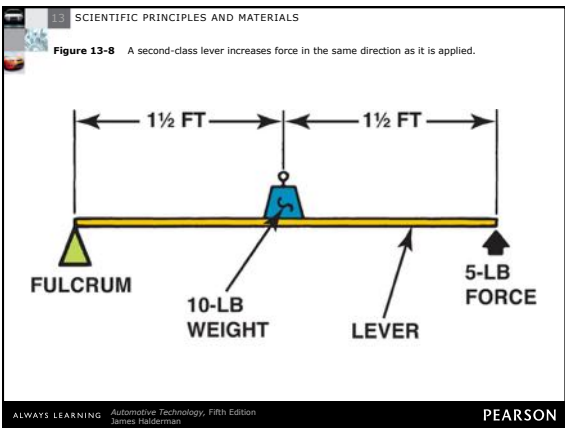
TECH TIP

Brakes Cannot Overcome the Laws of Physics

No vehicle can stop on a dime. The energy required to slow or stop a vehicle must be absorbed by the braking system. All drivers should be aware of this fact and drive at a reasonable speed for the road and traffic conditions.

ALWAYS LEARNING Automotive Technology, Fifth Edition James Halderman PEARSON





1.3 SCIENTIFIC PRINCIPLES AND MATERIALS

Figure 13-9 A third-class lever reduces force but increases the speed and travel of the resulting work.

ALWAYS LEARNING Automotive Technology, Fifth Edition James Halderman PEARSON

1.3 SCIENTIFIC PRINCIPLES AND MATERIALS

Figure 13-10 This brake pedal assembly provides a 5:1 mechanical advantage because a 10-lb force input results in a 50-lb force into the master cylinder.

ALWAYS LEARNING Automotive Technology, Fifth Edition James Halderman PEARSON

1.3 SCIENTIFIC PRINCIPLES AND MATERIALS

TECH TIP

Conductors and Insulators

If a material is a good conductor of heat, it is also a good conductor of electricity. Most **conductors** are metals, such as steel, copper, aluminum, and brass. Most insulators are nonmetals, such as plastic and rubber. Therefore, if a material does not conduct heat, it usually will not conduct electricity.

ALWAYS LEARNING Automotive Technology, Fifth Edition James Halderman PEARSON

1.3 SCIENTIFIC PRINCIPLES AND MATERIALS

? FREQUENTLY ASKED QUESTION

How Does a Coat Keep You Warm?

A coat is worn in cold weather to keep warm. Does it keep the cold out or the heat in? Actually, both, but because heat travels from a warm object (human body) to a colder object (outside cold air), the primary purpose of a coat is to keep the body heat from escaping into the cold air.

ALWAYS LEARNING Automotive Technology, Fifth Edition James Halderman PEARSON

1.3 SCIENTIFIC PRINCIPLES AND MATERIALS

Figure 13-11 A typical outdoor thermometer which is used to measure temperature, not heat.



ALWAYS LEARNING Automotive Technology, Fifth Edition James Halderman PEARSON

1.3 SCIENTIFIC PRINCIPLES AND MATERIALS

TECH TIP

Quick and Easy Temperature Conversion

Many service information and scan tool data are expressed in degrees Celsius, which is often confusing to those used to temperature expressed in Fahrenheit degrees. A quick and easy way to get an approximate conversion is to take the degrees in Celsius, double it, and add 25.

For example,

Celsius $\times 2 + 25 =$ approximate Fahrenheit degrees:

0°C $\times 2 = 0 + 25 = 25^\circ\text{F}$ (actual = 32°F)
10°C $\times 2 = 20 + 25 = 45^\circ\text{F}$ (actual = 50°F)
15°C $\times 2 = 30 + 25 = 55^\circ\text{F}$ (actual = 59°F)
20°C $\times 2 = 40 + 25 = 65^\circ\text{F}$ (actual = 68°F)
25°C $\times 2 = 50 + 25 = 75^\circ\text{F}$ (actual = 77°F)
30°C $\times 2 = 60 + 25 = 85^\circ\text{F}$ (actual = 86°F)
35°C $\times 2 = 70 + 25 = 95^\circ\text{F}$ (actual = 95°F)
40°C $\times 2 = 80 + 25 = 105^\circ\text{F}$ (actual = 104°F)
45°C $\times 2 = 90 + 25 = 115^\circ\text{F}$ (actual = 113°F)
50°C $\times 2 = 100 + 25 = 125^\circ\text{F}$ (actual = 122°F)

ALWAYS LEARNING Automotive Technology, Fifth Edition James Halderman PEARSON

1.3 SCIENTIFIC PRINCIPLES AND MATERIALS

? FREQUENTLY ASKED QUESTION

What Is Thermodynamics?

Thermodynamics is the study of the relationship among temperature, pressure, and volume changes. The laws of thermodynamics help engineers design and develop engines with higher efficiency. Thermodynamics is therefore used in the design of the cooling system, as well as in the engine, because the more heat created by the burning of fuel in the engine, the more power the engine can develop using the same or less amount of fuel.

ALWAYS LEARNING Automotive Technology, Fifth Edition James Halderman PEARSON

1.3 SCIENTIFIC PRINCIPLES AND MATERIALS

? FREQUENTLY ASKED QUESTION

Can Water and Acid Be Mixed Together?

Acids have a very strong affinity for water and as a result, if water is poured into acid, the resulting reaction would be extremely violent and acid would be forced outward in all directions. Always pour acid into water, never water into acid.

Technicians seldom need to work with acids because even battery electrolytes from the water and acid are premixed to help prevent the possibility of a technician creating a harmful reaction.

ALWAYS LEARNING Automotive Technology, Fifth Edition James Halderman PEARSON

1.3 SCIENTIFIC PRINCIPLES AND MATERIALS

TECH TIP

Wear Hearing Protection

According to audiologists (hearing and speech doctors), a person should wear ear protection if the level of sound requires that your voice be raised in order to be heard. Any level that exceeds 90 dB requires the use of ear protection to avoid hearing loss. This means that ear protection should be worn when using a power mower or using an air tool, such as an air impact wrench or air ratchet.

ALWAYS LEARNING Automotive Technology, Fifth Edition James Halderman PEARSON

