HOMEWORK PROBLEMS:

2a. Due to gravity, does (is it possible for) a 50-kilogram woman exert more (or less) pressure on the ground than a 70-kilogram man? **Explain.**

Answer:

Good Question. This answer depends on a few variables that you set up… IF both the woman and the man are standing upright, and they have the same size feet (with no shoes on their feet) – then the 70 kilogram man exerts more pressure on the ground. Pressure is defined as the amount of mass (force) for a given area and the man's mass is greater than the woman's mass.

2b. Is it possible for a 50-kilogram woman to exert greater pressure on the ground than a 70-kilogram man? Explain.

Answer:

Yes, have the woman stand on her two feet – also, have the man stand on his two feet. Then have the woman pick up one of her feet (to stand on only one foot). Having the woman transfer her weight from two feet to one foot caused the pressure to double on the one foot.

Another way to think about pressure… Which is easier to do? Push-ups on your palms or push-ups from your finger-tips? Your weight does not change as you do push-ups from your palms or your fingertips, but you can "feel" the difference between the two.

2c. A gas is put into a closed-end manometer. The mercury that separates the flask from the vacuum is found to be 165 mm higher on the side with the vacuum. a) What is the pressure of the gas in torr? b) what is the pressure in kPa?

Answer:

a) 1 mm Hg = 1 torr; therefore, 165 torr

b) $\frac{165\ mm\ Hg}{} x \frac{1\ kPa}{7.501\ mm\ Hg} = 22\ kPa$

2d. A mixture of 20% hydrogen gas and 80% nitrogen gas, by volume, has a total pressure of 30 kPa. What is the partial pressure of each gas?

Answer:

$$P_{H_2} = (0.20)(30\ kPa) = 6\ kPa$$

$$P_{N_2} = (0.80)(30\ kPa) = 24\ kPa$$

$$P_T = P_{H_2} + P_{N_2} = 6\ kPa + 24\ kPa = 30\ kPa$$