Mass and Weight Name: _____ Per.____
Integrated Science: Physics/Design

1. A physical science textbook has a mass of 2.20 kilograms.
   a. What is its weight on Earth?

$W = (2.20\,kg)(9.8\,N/kg) = 21.56\,N$

$W = 22\,N$

   b. What is its weight on Mars? (g = 3.7 N/kg)

$W = (2.20\,kg)(3.7\,N/kg) = 8.14\,N$

$W = 8.1\,N$

   c. If the textbook weighs 19.6 newtons on Venus, what is the strength of gravity on that planet?

$g = \frac{19.6\,N}{2.20\,kg} = 8.909090$

$g = 8.91\,N/kg$

2. An astronaut weighs 104 newtons on the moon, where the strength of gravity is 1.6 newtons per kilogram.
   a. What is her mass?

$m = \frac{104\,N}{1.6\,N/kg} = 65\,kg$

   b. What is her weight on Earth?

$W = (65\,kg)(9.8\,N/kg) = 637\,N$

   c. What would she weigh on Mars?

$W = (65\,kg)(3.7\,N/kg) = 240\,N$

3. Of all the planets in our solar system, Jupiter has the greatest gravitational strength.
   a. If a 0.500-kilogram pair of running shoes would weigh 11.55 newtons on Jupiter, what is the strength of gravity there?

$g = \frac{11.55\,N}{0.500\,kg} = 23.1\,N/kg$

   b. If the same pair of shoes weighs 0.3 newtons on Pluto (a dwarf planet), what is the strength of gravity there?

$g = \frac{0.3\,N}{0.500\,kg} = 0.6\,N/kg$

c. What does the pair of shoes weigh on Earth?

$W = (0.500\,Kg)(9.8\ N/Kg) = \boxed{4.9\ N}$

4. A tractor-trailer truck carrying boxes of toy rubber ducks stops at a weigh station on the highway. The driver is told that the truck weighs 195,000 N.

a. What is the mass of the toy-filled truck?

$m = \frac{195,000\,N}{9.8\ N/Kg} = 19,897.9592$ $\boxed{20,000\,Kg}$

b. The truck drops off its load of toys, and then stops at a second weigh station. Now the truck weighs 147,000. N. What is the new mass of the truck?

$m = \frac{147,000\,N}{9.8\ N/Kg} = \boxed{15,000\,Kg}$

c. Find the total mass of the rubber duck-filled boxes that were carried by the truck

$20,000\,Kg$ ← original mass

$-\ 15,000\,Kg$ ← mass without boxes

$5,000\,Kg$ ← mass of boxes