

**Mass and Weight Worksheet**

- 1) How many atoms are in something determines its mass.
- 2) How strongly the planet you're on pulls on you is your weight (Fg).
- 3) Your weight will change depending on where you are in the universe.
- 4) Your mass never changes despite what planet you go to.

5) Knowing that 1 kg = 2.2 lbs, find:

A) Your mass in kilograms.

$$158 \text{ lbs} \times \frac{1 \text{ kg}}{2.2 \text{ lbs}} = 71.8 \text{ kg}$$

$$72 \text{ kg} \times \frac{2.2 \text{ lbs}}{1 \text{ kg}} = 158.4 \text{ lbs}$$

B) Use this mass to solve for your weight on these other planets.

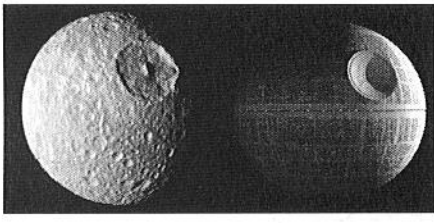
$$F_g = mg$$

$$= (71.8 \text{ kg})(9.8 \frac{\text{m}}{\text{s}^2})$$

$$F_g = 703.64 \text{ N}$$

↑  
\* 1 sample calculation only! \*

Planet / Moon	Your Mass Here (kg)	Gravitational Acceleration Here (m/s <sup>2</sup> )	Your Weight Here (N)
Earth	71.8	9.8	703.64
Moon	"	1.6	114.88
Sun	"	274	19673.20
Jupiter	"	25.9	1859.62
Pluto	"	0.61	43.80
Mercury	"	3.73	267.81
Neptune	"	11.28	809.90
Saturn	"	11.19	803.44
Mimas	"	0.8	57.44



Saturn's moon Mimas is on the left; the Death Star is on the right.

6) The mass of your new motorcycle is 250 kg.



What is:

A) Its weight on Earth in Newtons?

$$F_g = mg = (250 \text{ kg}) (9.8 \frac{\text{m}}{\text{s}^2}) = 2450 \text{ N}$$

B) Its weight on the moon (in Newtons)?

$$F_g = mg = (250 \text{ kg}) (1.6 \frac{\text{m}}{\text{s}^2}) = 400 \text{ N}$$

C) The mass of your motorcycle on the moon?

250 kg!

7) Somewhere you place a 7.5 kg pumpkin on a spring scale.

If the scale reads 78.4 N, what is the acceleration due to gravity at that location?



$$\frac{F_g}{m} = \frac{mg}{m} = \frac{78.4 \text{ N}}{7.5 \text{ kg}} = 10.5 \frac{\text{m}}{\text{s}^2}$$

8) The weight of a pony standing still on Earth is 1025 N.

A) What is the pony's mass?

$$\frac{F_g}{g} = \frac{mg}{g} = \frac{1025 \text{ N}}{9.8 \frac{\text{m}}{\text{s}^2}} = m = 105 \text{ kg}$$

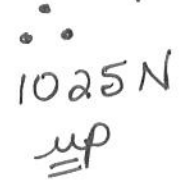
*= down.*

B) What is the size of the normal force acting on the pony?

not necessary! *this year* but normal F is equal & opposite to the weight

C) How strong is the attractive force between the pony and the Earth?

$$\underline{1025 \text{ N}} = F_{\text{att}} = F_g = \text{weight}$$



D) Where will the pony weigh less (Moon, Jupiter, impossible)

E) Where will the pony have less mass (Moon, Jupiter, impossible)?

mass never changes

9) In the physics sense, when a person goes on a diet, do they really want to lose weight or mass? Explain.

lose mass! lose matter = lose atoms

10) The general rule is that you will weigh more on the bigger Planets (like Jupiter, Saturn etc), and less on the smaller planets (like the moon).

*meaning more massive  
but big could be less dense!*

11) What is a "really easy" way to lose weight without losing mass? fly to the moon.