

Super Moon Strength

Estimated Time: 30 minutes

SUMMARY

Weight is a measure of the force acting on an object due to gravity. Gravity is dependent on the size of the objects. The Earth, being incredibly massive, exerts a greater force on objects like you, your car, and buildings than on smaller planets. For instance, the Earth's moon, being much less massive than the Earth, cannot exert as much force on an object. This means weights in our standard units of kilograms (or pounds in America) are only 16.5% of that on Earth. So yes, you would have superhuman lifting abilities on the moon because everything weighs much less.

WHAT YOU'LL LEARN

- Mass is a conserved quantity while weight is dependent on your location to another object.
- How to convert proportions
- How the moon's smaller size allows us to do seemingly superhuman things

Materials Used	Helpful Links
<ul style="list-style-type: none">● The heaviest objects you can lift! (a milk jug, a hand weight, a package...)● Scale● Calculator● Writing utensil● Scratch paper● An imagination!	<ul style="list-style-type: none">● https://www.youtube.com/watch?v=PEQzAbizMYs

WHAT TO DO

1. Consider the heaviest objects members of your household can lift. What are they? How much do they weigh? A household scale can be useful to get exact weights for the objects.
2. While these objects seem heavy on Earth, they will weigh much less on the Moon. Discuss with your student why this is. The object does not change; it's still a dumbbell or a bag of potatoes on Earth or on the moon. While the mass of the object remains constant, its weight changes because the force exerted on the object by the moon is less than that of the Earth. Check out the [Astronimate video](#) linked in the Helpful Links box above.
3. While ten pounds on Earth may not be a large object, ten pounds on the moon can be much more massive. Use the following conversion factor below to determine how much objects weigh on the moon. Can you find the largest object you can lift, or the object with the same weight on Earth as on the moon?

$$\text{weight on Earth (lbs)} \times \frac{0.165 \text{ lbs on moon}}{1 \text{ lb on Earth}} \\ = \text{weight on moon (lbs)}$$

4. Or, if you know the heaviest object you can lift on Earth, use this conversion to determine the heaviest weight you can lift on the moon. A quick Internet search can help you determine objects with this weight! So, if you can lift a 20 pound object on Earth, you are able to lift something that weighs 120 “Earth pounds” while lifting it on the moon.

TIPS

- It is important to recognize that if you can lift 50 pounds on Earth, you will still max out at 50 pounds on the moon. The unit pound is a constant measure of the force of gravity acting on an object. But while the amount of weight you can lift is the same on Earth as it is on the moon, the mass, and likely the size of the object will be much greater on the moon as it is on the Earth. So suddenly, you can lift a gorilla on the moon because its weight is so much less than it is on Earth. Make sure to emphasize this distinction with your student as is age-appropriate.