

Landing on a Comet

Key Stage 3

Topics covered: Weight and mass, standard form, comets, spacecraft, solar system

Watch the video "The Rosetta Mission", <https://vimeo.com/141524496>



On 12th November 2014 a lander called Philae detached from the ESA spacecraft Rosetta and landed on Comet 67P/Churyumov-Gerasimenko. On the comet, Philae (the size of a washing machine) weighed as much as an AAA battery. Equation 1 shows the relationship between mass, m (kilograms) and weight, W (Newtons):

$$W = mg \quad (1)$$

where g is the gravitational field strength (N/kg).

Your mass would be the same whether you're on Earth or on the Moon, but the Moon has a gravitational field strength $1/6^{\text{th}}$ of the Earth. So, on the Moon you would **weigh** a sixth of what you would on Earth.

1. Rearrange equation 1 so that m is the subject.
2. For comet 67P/Churyumov-Gerasimenko, $g = 0.0001$ N/kg. Write this down in standard form.
3. The weight of Philae on the comet is 0.01 N. Calculate the mass of Philae in kg.
4. How much does Philae weigh on Earth? Use $g = 10$ N/kg and use your answer from question 3 for m .

Landing on a Comet: **ANSWERS**

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1. $m = \frac{W}{g}$

2. $1 \times 10^{-4} \text{ N/kg}$

3. 100 kg

4. 1000 N