

Exercise 1: Fall attempt on the moon

You drop a stone on the moon and find that after 5.0 s the stone has fallen 20 m.

a) What is the gravity acceleration on the moon?

b) Was the free fall? Justify the answer.

A car is dropped in the same way on the moon. The mass of the car is 2000 times the mass of the stone.

c) How far does the car fall in 5.0 s?

a)

Assume  $g_m$  is the gravity acceleration on the moon. Then we have:

$$\frac{1}{2} g_m t^2 = 20$$

$$\frac{1}{2} g_m 25 = 20$$

$$g_m = \frac{40}{25} = 1.6 \text{ m/s}^2$$

b) Yes, since there is no atmosphere and thus no friction on the moon, gravity was the only force working on the stone, and this is a free fall

c)

The equation for a free fall is:

$$x = \frac{1}{2} a t^2 + v_0 t + x_0$$

We see that the distance  $x$  is not depending on the mass, so the car will fall the same distance in 5.0 s, which was 20 meters.