

Why weight changes from planet to planet

Grade 7 science (Year 8 · Class 7) · Lab answers

These model answers use the sample table. Your own readings will differ slightly, but the graph should be a straight line through the origin with a gradient close to 9.8 N/kg.

Level: Grade 7 science (Year 8 · Class 7) · **Curriculum:** MS-PS2-4

Question 1 Quantities in the lab

You change the **mass** on the hanger and you measure the **weight** shown by the pointer. The same spring scale and the same location (so g does not change) stay fixed.

Question 2 Expected weights

$W = m \times 9.8$: 0.050 → **0.49 N**; 0.100 → **0.98 N**; 0.150 → **1.47 N**; 0.200 → **1.96 N**; 0.250 → **2.45 N**; 0.300 → **2.94 N**.

Question 3 Draw the graph

The points lie on a **straight line through the origin**, which shows that weight is directly proportional to mass.

Question 4 Gradient

Gradient = $2.9 \div 0.300 = \mathbf{9.7 \text{ N/kg}}$ (9.67).

The gradient equals the gravitational field strength g at the place of the experiment.

Question 5 Percentage difference

Difference = $(9.8 - 9.67) \div 9.8 \times 100 = \mathbf{1.4 \%}$. The result is very close to the accepted value.

Question 6 Prediction

$W = 0.450 \times 9.8 = \mathbf{4.41 \text{ N}}$, about 4.4 N.

This is close to the 5 N maximum, so a slightly larger load could overstretch the spring.

Question 7 On the Moon

The line would still pass through the origin but be much shallower, with a gradient of 1.6 N/kg.

$$\text{Reading} = 0.300 \times 1.6 = \mathbf{0.48 \text{ N}}.$$

Question 8 Zero error

All readings would be 0.1 N too high, so the line would cross the y-axis at 0.1 N instead of passing through the origin. **Subtract 0.1 N from every reading** or adjust the zero screw before starting.