IGCSE PHYSICS • EXERCISE SHEET

1.3 Mass and weight

Name: _____ Class: _____ Date: _____ **Total: 10 marks**

KEY WORDS gravitational field strength 重力场强度 • mass and weight 质量与重力 • mass 质量 • weight 重力 • matter 物质

Objective

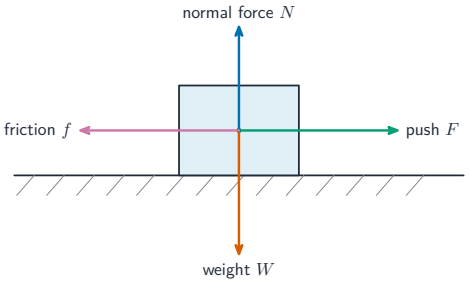
Build the skills to answer exam questions on **mass and weight** 质量与重力 — the difference between them, $W = mg$, and **gravitational field strength** 重力场强度.

You must be able to:

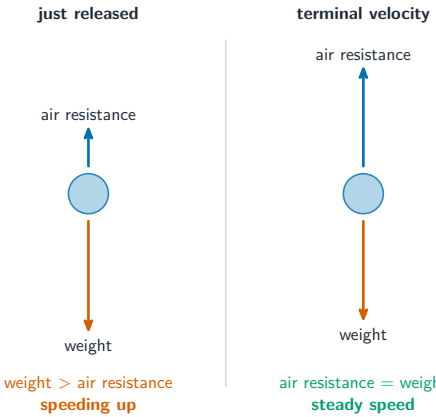
- distinguish mass (kg, constant) from weight (N, depends on gravity)
- use $W = mg$ and $g = \dfrac{W}{m}$
- explain why weight differs on the Moon

1 Worked examples

Mass vs weight



Weight is the downward force of gravity on a mass: $W = mg$



Weight is the downward force, balanced by drag at terminal velocity

- **mass** = amount of matter (kg), the **same** everywhere.
- **weight** = force of gravity (N); $W = mg$; smaller on the Moon (weaker gravity).
- **gravitational field strength** $g = \dfrac{W}{m}$ (≈ 10 N/kg on Earth).

2 Practice

2.1 Find the weight of a 6.0 kg bag on Earth ($g = 10$ N/kg). [2]

2.2 State the unit of weight and the unit of mass. [1]

3 Exam-style questions

3.1 When an astronaut goes to the Moon, their: [1]

- **A** mass and weight both decrease
- **B** mass stays the same but weight decreases
- **C** mass decreases but weight stays the same
- **D** mass and weight both stay the same

3.2 An object has a weight of 48 N on Earth, where $g = 10$ N/kg.

(a) Find its mass. [2]

(b) Find its weight on the Moon, where $g = 1.6$ N/kg. [2]

3.3 Explain why mass does not change when an object is taken to the Moon, but weight does. [2]

Solutions

Each answer shows the steps, then the **result**.

2.1

- $W = mg$

$$W = (6.0\text{ kg})(10\text{ N/kg}) = \mathbf{60}\text{ N}$$

2.2

- weight in newtons (N); mass in kilograms (kg)

3.1 B

- mass is unchanged; weight is less because the Moon's gravity is weaker

3.2

(a) $m = W/g$

$$m = \frac{48\text{ N}}{10\text{ N/kg}} = \mathbf{4.8}\text{ kg}$$

(b) $W = mg$

$$W = (4.8\text{ kg})(1.6\text{ N/kg}) = \mathbf{7.7}\text{ N}$$

3.3

- mass is the amount of matter, which does not change with location
- weight is the force of gravity, which is smaller on the Moon because its gravitational field strength is weaker