

## 2.4 Newton's First Law

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Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_

**Total: 12 marks**

**KEY WORDS** equilibrium 平衡 • inertia 惯性 • net force 合力 • newton's first law 牛顿第一定律  
• force 力

### Objective

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Build the skills to answer exam questions on **Newton's first law**.

**You must be able to:**

- state **Newton's first law** 牛顿第一定律: an object keeps constant velocity unless a net force acts
- describe **inertia** 惯性 as the resistance to a change in motion
- apply the **equilibrium** 平衡 condition: net force zero means constant velocity (or rest)
- relate mass to inertia

### 1 Worked examples

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Study these first. Each one shows the method for a question type used later — follow the steps and you can do the Practice and Exam-style questions yourself.

#### ■ The law of inertia

With no net force, an object at rest stays at rest and a moving object keeps a constant velocity in a straight line. Motion needs no force to continue – only a *change* in motion needs one.

#### ■ Equilibrium

If the net force is zero, the object is in equilibrium: either at rest or moving at constant velocity. On a free-body diagram, the forces balance.

#### ■ Mass is inertia

More mass means more inertia – harder to start, stop, or turn. A loaded truck resists changes in motion far more than a bicycle.

## 2 Practice

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Now apply the methods above.

**2.1** State what happens to a moving object when no net force acts on it. [1]

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**2.2** Define inertia in one sentence. [1]

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**2.3** A crate moves at constant velocity. State the net force on it. [1]

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**2.4** Which has more inertia: a 1 kg ball or a 10 kg ball? [1]

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## 3 Exam-style questions

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**3.1** An object moves at constant velocity. The net force on it is [1]

|   |   |
|---|---|
| A | B |
| C | D |

**A** in the direction of motion

**B** opposite to the motion

**C** zero

**D** equal to its weight

**3.2** Inertia depends on an object's [1]

|   |   |
|---|---|
| A | B |
| C | D |

**A** velocity

**B** mass

**C** colour

**D** position

**3.3** A hovering drone stays perfectly still in mid-air.

(a) State the net force on it. [1]

(b) Name the two forces that must balance. [2]

**3.4** A passenger lurches forward when a bus suddenly brakes.

(a) Explain this using inertia. [2]

(b) State whether a force pushes the passenger forward. [1]