

Newton's Third Law

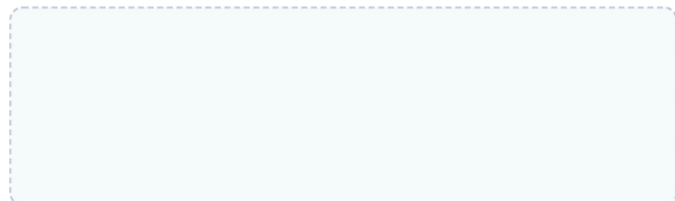
Instructions: Every force comes in a pair. For each example, name the **type** of force, its **size**, and the **direction** of each force in the pair.

Newton's Third Law — Complete the Statement

When _____ objects interact, they each experience the _____ size and _____ type of force, in _____ directions.

Example 1 — An Object Falling

draw a ball falling towards the Earth



Type of force _____

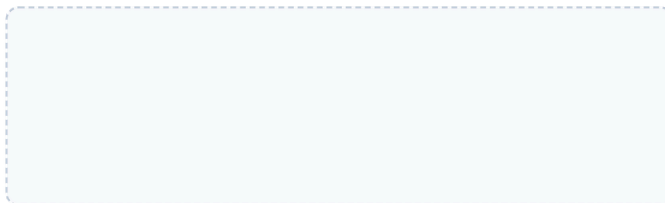
Size of force _____

Direction of force on _____ = _____

Direction of force on _____ = _____

Example 2 — Your Own

draw any two objects interacting



Type of force _____

Size of force _____

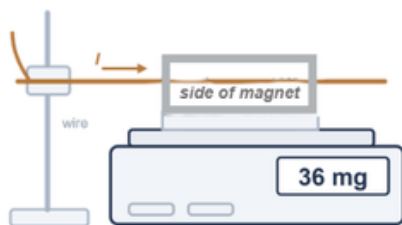
Direction of force on _____ = _____

Direction of force on _____ = _____

Exam-Style Question 1

[6]

A stiff copper wire is clamped between the poles of two magnets. The magnets sit on a top-pan balance, which is **zeroed before the current is switched on**. When the current flows the balance reads **36 mg**.



(a) In which direction does the force on the **wire** act? Explain your answer. [2]

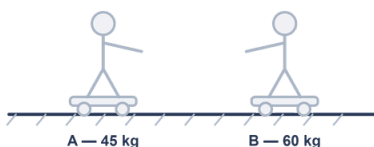
(b) Calculate the size of the force on the magnets. Use $g = 10 \text{ N/kg}$. [3]

(c) State the size of the force on the wire. [1]

Exam-Style Question 2

[7]

Two students stand on skateboards, facing each other. Student **A** has a mass of **45 kg** and student **B** has a mass of **60 kg**. Student A pushes student B with a force of **90 N**, and they move apart.



(a) State the size and direction of the force B exerts on A. [2]

(b) Calculate the acceleration of each student. [3]

(c) Explain why A speeds up more than B. [2]

Newton's Third Law Checklist

- 1 The two forces act on **two different objects**.
- 2 They are **equal in size**.
- 3 They act in **opposite directions**.
- 4 They are the **same type** of force — both contact, both gravitational, or both magnetic.
- 5 They **never cancel out**, because they act on different objects.

WATCH OUT

Two forces that **balance** on the **same** object (Newton's **first** law) are **not** a third-law pair.

TICK EVERY CORRECT NEWTON'S THIRD LAW PAIR

- ☐ **A** The **weight** of a book on a table, and the table pushing **up** on the book.
- ☐ **B** The book pushing **down** on the table, and the table pushing **up** on the book.
- ☐ **C** The weight of the book, and the **pull of the book on the Earth**.