

Exercise walk-through

11.7

Kirchhoff's Junction Rule

AP Physics 2

You must be able to

- state **Kirchhoff's junction rule** : the current into a junction equals the current out
- explain the junction rule as a statement of **conservation of charge**
- apply it with the loop rule to find unknown currents

1

The method

Method — The junction rule

At any junction, $\sum I_{in} = \sum I_{out}$: charge is not created or destroyed, so what flows in must flow out.

Exercises 2.1-2.3

2.1 State Kirchhoff's junction rule.

[1]

2.2 State the conservation law that the junction rule expresses.

[1]

2.3 At a junction, 4.0 A enters and one branch carries 1.5 A out. Find the current in the other branch.

[2]

Exercises 2.1-2.3

2.1 State Kirchhoff's junction rule. [1]

2.1

- the total current into a junction equals the total current out of it
-

2.2 State the conservation law that the junction rule expresses. [1]

2.2

- conservation of charge
-

2.3 At a junction, 4.0 A enters and one branch carries 1.5 A out. Find the current in the other branch. [2]

2.3

- current in = current out: $I_{\text{in}} = I_1 + I_2$, so $I_2 = I_{\text{in}} - I_1 = 4.0 \text{ A} - 1.5 \text{ A}$
- $I_2 = \mathbf{2.5 \text{ A}}$

Exercises 3.1-3.2

3.1 Kirchhoff's junction rule states that the current into a junction equals the current [1]

☐

A stored there

B out of it

C squared

D halved

3.2 The junction rule is a statement of conservation of [1]

☐

A energy

B charge

C momentum

D power

Exercises 3.1-3.2

3.1 Kirchhoff's junction rule states that the current into a junction equals the current [1]

☐

A stored there

B out of it

C squared

D halved

3.1 B

- out of it.

3.2 The junction rule is a statement of conservation of [1]

☐

A energy

B charge

C momentum

D power

3.2 B

- charge.

Exercise 3.3 (a)

3.3 At a node, 6.0 A enters and two branches leave; one carries 2.5 A .

(a) Find the current in the other branch.

[2]

Exercise 3.3 (a)

3.3 At a node, 6.0 A enters and two branches leave; one carries 2.5 A.

(a) Find the current in the other branch.

[2]

(a)

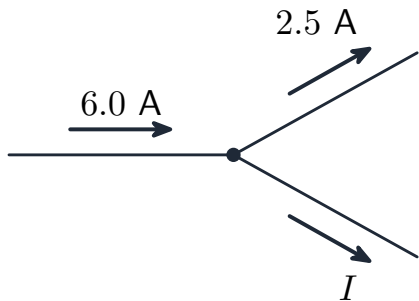
- current in = current out: $I = I_{\text{in}} - I_1 = 6.0 \text{ A} - 2.5 \text{ A}$
- $I = \mathbf{3.5 \text{ A}}$

Exercise 3.3 (b)

3.3 At a node, 6.0 A enters and two branches leave; one carries 2.5 A .

(b) State the conservation law you used.

[1]

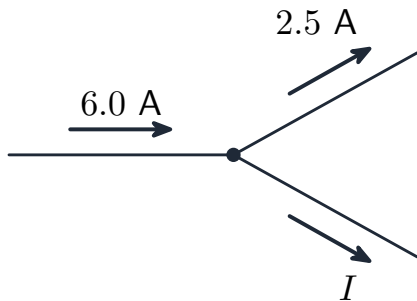


Exercise 3.3 (b)

3.3 At a node, 6.0 A enters and two branches leave; one carries 2.5 A .

(b) State the conservation law you used.

[1]



(b)

- conservation of charge