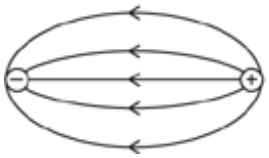
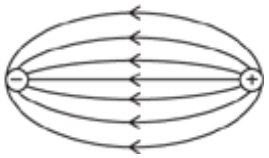
1(a). The diagrams show the electric fields between different charges. The charges are the **same distance** apart in both electric fields.

Electric field **A**



Electric field **B**



An identical charged particle is placed in each electric field.

Explain in which electric field, **A** or **B**, the particle experiences the **strongest** force.

[2]

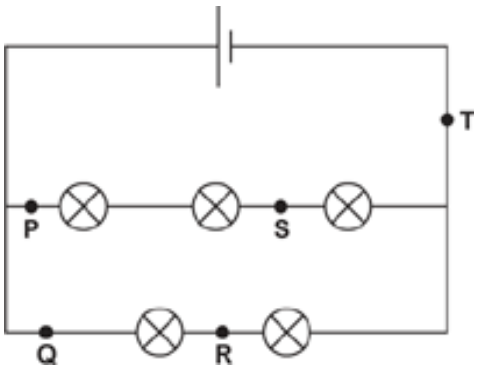
(b). Which conditions are needed for charge to flow?

Tick (✓) **two** boxes.

closed circuit	☐
open circuit	☐
source of potential difference	☐
source of resistance	☐

[2]

2. A student makes a circuit using five identical lamps



A current of 5A is measured at point **P**.

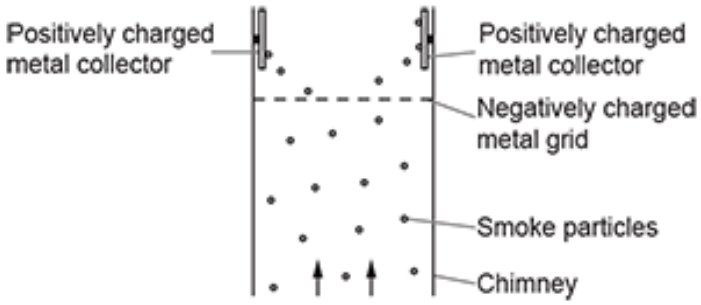
At which other point in the circuit is the current 5 A?

A Point **Q**
B Point **R**
C Point **S**
D Point **T**

Your answer ☐ **[1]**

3(a). An electrostatic dust precipitator uses static electricity to remove smoke particles from gases before the gases are released from a chimney in a factory.

The diagram shows an electrostatic dust precipitator in a chimney.



The smoke particles at the bottom of the chimney initially have a neutral charge. The smoke particles move upwards and pass through a negatively charged metal grid in the chimney.

i. Explain how the precipitator removes the smoke particles when the gases move upwards through the chimney.

Use ideas about charges.

--- **[3]**

ii. Suggest why many scientists think these precipitators should be fitted to all factory chimneys.

--- **[1]**

(b). The precipitator uses high voltages.

Why are high voltages dangerous?

---**[1]**

(c). The collectors receive 360 C of charge every two minutes.

Calculate the current in the collectors.

Use the equation: charge flow = current × time

Current = ... A **[3]**

4. Which row describes properties of electric fields and gravitational fields?

	Electric fields	**Gravitational fields**
A	attractive only	attractive only
B	attractive only	attractive and repulsive
C	attractive and repulsive	attractive only
D	attractive and repulsive	attractive and repulsive

Your answer ☐ **[1]**

5. A student holds a balloon near a narrow stream of water from a tap. The water is attracted to the balloon.

Why does this happen?

A The water and the balloon are both negatively charged.
B The water and the balloon are both positively charged.
C The water and the balloon are not charged.
D The water is positively charged and the balloon is negatively charged.

Your answer ☐ **[1]**

6. A current of 2A flows in a circuit.

How much charge is transferred in 3 minutes?
Use the Data sheet_J249 01/02/03/04, June 2022.

A 1.5 C
B 6.0 C
C 120 C
D 360 C

Your answer ☐ **[1]**

END OF QUESTION PAPER