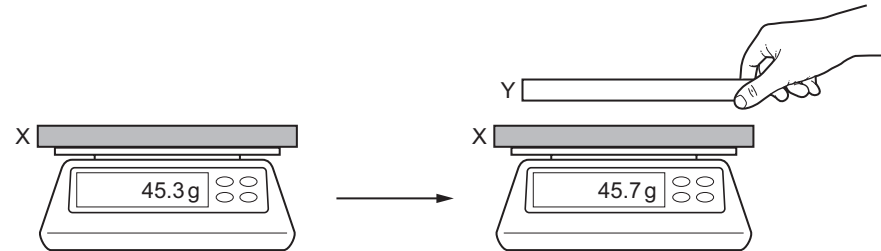


23 A charged rod X is placed on a balance and another rod Y is brought close to it, as shown.



Which combination of charges would cause the change in the balance reading shown?

	X	Y
A	negative charge	negative charge
B	negative charge	positive charge
C	negative charge	no charge
D	positive charge	no charge

24 What is the unit of potential difference (p.d.)?

- A ampere
- B coulomb
- C coulomb / second
- D volt

7 (a) Draw the circuit symbol for a potential divider.

[1]

(b) Fig. 7.1 shows a circuit.

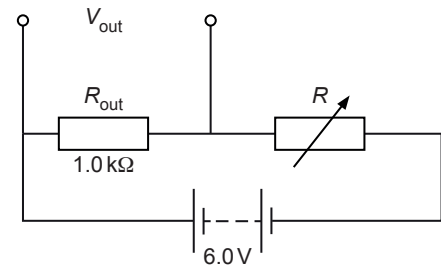


Fig. 7.1

(i) Calculate the value of V_{out} when the value of R is $3.0\text{ k}\Omega$.

$V_{out} =$ [2]

(ii) The value of R is adjusted until the current in the circuit is 1.7 mA .

Calculate the charge that flows through the circuit in 300 s .

charge = [2]

[Total: 5]

3 (a) State the principle of conservation of energy.

.....

 [2]

(b) A wind turbine has a maximum output power of 1.8 MW. The turbine operates at maximum power for 4.0 h.

(i) Define the unit kWh.

.....

 [1]

(ii) Calculate the energy produced by the wind turbine operating at maximum power for 4.0 h. Give your answer in kWh.

energy = kWh [2]

(c) Radiation from the Sun is the main source of energy for most of our energy resources.

State **two** energy resources that are **not** due to radiation from the Sun.

.....
 [2]

[Total: 7]

7 Fig. 7.1 shows a circuit including a 12 V battery and two identical lamps.

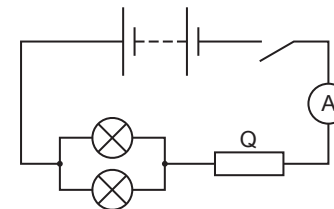


Fig. 7.1

(a) The 12 V battery consists of cells connected in series. Each cell in the battery has an electromotive force (e.m.f.) of 1.5 V.

Determine how many cells are in the battery.

number of cells = [1]

(b) (i) When the switch is closed, the ammeter reading is 2.4 A.

Calculate the total resistance of the circuit.

resistance = [2]

(ii) Each lamp has a resistance of $3.0\ \Omega$.

Calculate the resistance of Q.

resistance of Q = [2]

(c) (i) On Fig. 7.1, draw the symbol for a voltmeter that measures the potential difference (p.d.) across the two lamps. [1]

(ii) Calculate the power supplied to **one** lamp.

④ power = [3]