Past-paper walk-through

Electrical quantities ▪ 4.2

eXercise

Questions in this set

- 0625/22 M24 Q23 ▪ 1 mark
- 0625/22 M24 Q24 ▪ 1 mark
- 0625/42 M24 Q7 ▪ 5 marks
- 0625/42 M23 Q3 ▪ 7 marks
- 0625/42 M22 Q7 ▪ 9 marks

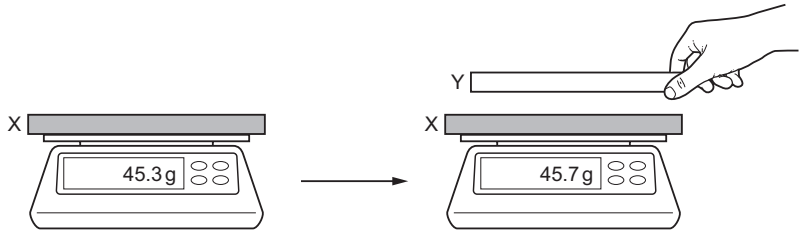
Reading the mark scheme

- **B1** a mark that stands on its own – the point is either made or not.
- **M1** a *method* mark: the right approach, even if the number is wrong.
- **A1** an *answer* mark, and it usually needs its M mark first.
- **C1** a working mark on the way to the answer.
- // separates answers the examiner accepts equally.
- **ecf** = error carried forward: a later part is marked on your own earlier answer.
- **owtte** = "or words to that effect" – the wording need not match.

Question 23

0625/22 M24 ▪ Q23 ▪ 1 mark

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

Question 23

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

Solution 23

Answer: **A**

Question 24

0625/22 M24 ▪ Q24 ▪ 1 mark

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

A ampere

B coulomb

C coulomb / second

Question 24

D volt

Solution 24

Answer: **D**

Question 7

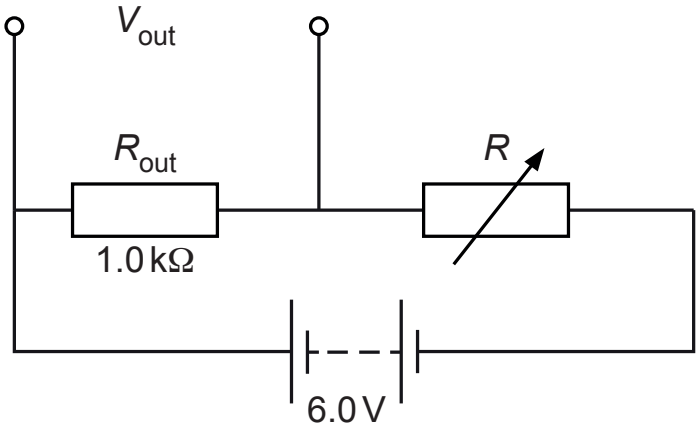
0625/42 M24 ▪ Q7 ▪ 5 marks

(a) Draw the circuit symbol for a potential divider.
[1]
(b) Fig. 7.1 shows a circuit. Vout 6.0 V Rout R 1.0 kΩ Fig. 7.1
(i) Calculate the value of Vout when the value of R is 3.0 kΩ.
Vout = ... [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]
(a) Draw the circuit symbol for a potential divider.
[1] **[1]**
(b)(i) Calculate the value of Vout when the value of R is 3.0 kΩ.
Vout = ... [2] **[2]**

Question 7

(b)(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] **[2]**

Question 7



Solution 7

(a)

Mark scheme

- B1

Solution 7

(b)(i)

Mark scheme

- 1.5 V A2
- Vout / VR = Rout / R OR VR = 3 Vout
- (C1)

Solution 7

(b)(ii)

Mark scheme

- 0.51 C A2
- I = Q / t OR (Q =) It OR 1.7 × 10–3 × 300
- (C1)

Question 3

0625/42 M23 ▪ Q3 ▪ 7 marks

(a) State the principle of conservation of energy.

(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 kW h.

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

energy = ... kW h [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.

(a) State the principle of conservation of energy. **[2]**

(b)(i) Define the unit kW h. **[1]**

Question 3

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

energy = ... kW h [2] **[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]**

Solution 3

(a)

Mark scheme

- energy cannot be created or destroyed B1
- energy can be transferred / transformed (between energy stores) B1

Solution 3

(b)(i)

Mark scheme

- energy transferred in one hour at a rate of transfer of 1 kW B1

(b)(ii)

Mark scheme

- 7200 (kWh) A2
- $(\Delta)E = Pt$ OR $(\Delta E) = Pt$ OR 1800×4.0 OR 1.8×4.0 OR $7.2 \times 10n$
- (C1)

Solution 3

(c)

Mark scheme

- any two from:
- ▪ geothermal
- ▪ nuclear
- ▪ tidal B2

Question 7

0625/42 M22 ▪ Q7 ▪ 9 marks

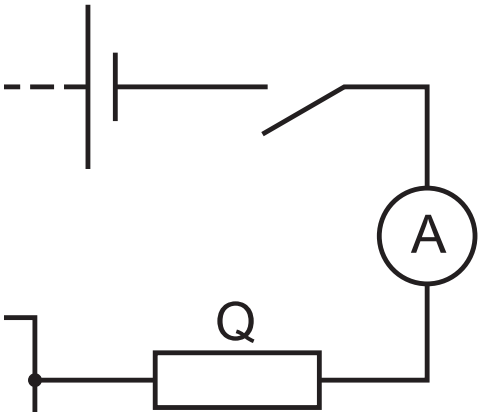
Fig. 7.1 shows a circuit including a 12 V battery and two identical lamps. A Q Fig. 7.1

(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] **[1]**

Question 7



Question 7

0625/42 M22 ▪ Q7 ▪ 9 marks

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

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

Calculate the total resistance of the circuit.

resistance = ... [2] **[2]**

(b)(ii) Each lamp has a resistance of 3.0 Ω.

Calculate the resistance of Q.

resistance of Q = ... [2] **[2]**

Question 7

0625/42 M22 ▪ Q7 ▪ 9 marks

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

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

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

power = ... [3] **[3]**

Solution 7

(a)

Mark scheme

- 8 (cells) **B1**

Solution 7

(b)(i)

Mark scheme

- (12 / 2.4 =) 5.0 Ω **A2**
- R = V / I in any form
- (C1)

Solution 7

(b)(ii)

Mark scheme

- (Resistance of Q = 5–1.5) = 3.5 Ω **A2**
- 1 / R = 1 / R1 + 1 / R2 OR R= R1R2 / (R1+R2)
- (C1)

Solution 7

(c)(i)

Mark scheme

- correct voltmeter symbol connected correctly across both lamps **B1**

Solution 7

(c)(ii)

Mark scheme

- 4.3 W **A3**
- (P =) IV in any form OR 1.2×3.6
- (C1)
- 3.6 V OR 1.2 A
- (C1)