

**M1.D**

**[1]**

**M2.D**

**[1]**

**M3.A**

**[1]**

**M4.C**

**[1]**

**M5.B**

**[1]**

**M6.D**

**[1]**

**M7.A**

**[1]**

**M8.D**

**[1]**

**M9.B**

**[1]**

**M10.D**

**[1]**

**M11.C**

**[1]**

**M12. B**

**[1]**

**M13.** (i) C

B1

1

(ii) B

B1

1

[2]

**M14.** C

[1]

**M15.** (a) the (total) energy transferred/work done when one unit/coulomb of charge

B1

is moved around a circuit/provided by the supply

B1

2

(b) work is done inside the battery/there is resistance inside the battery

B1

so less energy is available for the external circuit/some voltage is lost between the terminal/mention of lost volts

B1

2

(c) (i) 9.00 V

c.a.o.

B1

(ii) lost voltage =  $E - V$  or  $E = I(R + r)$

C1

$$0.82r = 0.59$$

C1

5

internal resistance = 0.720  $\Omega$

A1

(iii) because the battery has to provide more energy/power

B1

[9]

**M16.C**

**[1]**

**M17.B**

**[1]**

**M18.A**

**[1]**

**M19.A**

**[1]**

**M20.C**

**[1]**

**M21.D**

**[1]**

**M22.B**

**[1]**

**M23.C**

**[1]**

**M24.B**

**[1]**

**M25.A**

**[1]**

**M26.C**

**[1]**