9. Electricity

9.2 Potential difference and power

Paper 2

Marking Scheme

Q1.

(b)	$P = IV$ **or** $P = VQ / t$ **or** $V = IR$ **and** $P = V^2/R$ **or** $P = I^2R$	**C1**
	$P = 3.3 \times 10^4 \times 3.0 \times 10^7$ **or** $P = (3.0 \times 10^7 \times 0.86) / (2.6 \times 10^{-5})$ **or** $P = (3.0 \times 10^7)^2 / 910$ **or** $P = (3.3 \times 10^4)^2 \times 910$ $P = 9.9 \times 10^{11}$ (W) = 990 GW	**A1**

Q2.

(a)	energy transferred per unit charge (from electrical to other forms)	**B1**
(b)(v)	$P = IV$ **or** $P = I^2R$ **or** $P = V^2 / R$	**C1**
	$P = 5.7 \times 210$ **or** $P = 5.7^2 \times (210 / 5.7)$ **or** $P = 210^2 / (210 / 5.7)$ $P = 1200$ W	**A1**

Q3.

(a)(iii)	$P = V^2 / R$ **or** $P = VI$ **or** $P = I^2R$	**C1**
	ratio = $(9^2 / 720) / (9^2 / 240)$ **or** ratio = $(9 \times 0.0125) / (9 \times 0.0375)$ **or** ratio = $(0.0125^2 \times 720) / (0.0375^2 \times 240)$ ratio = $0.1125 / 0.3375$ = 0.33	**A1**

Q4.

(b)(iv)	$P = I^2R$ **or** $P = VI$ **or** $P = V^2 / R$	**C1**
	ratio = $(6.4^2 / 1600) / [(4.0 \times 10^{-3})^2 \times 1400]$ = 1.1	**A1**

Q5.

(b)(i)	same potential difference (across X and Y as in parallel)	**B1**
	power = V^2 / R (and $R_X > R_Y$) **or** power = VI **and** $I_X < I_Y$	**M1**
	(so) Y (dissipates more power)	**A1**

Q6.

(c)(ii)	$P = VI$ **or** $P = I^2R$ **or** $P = V^2 / R$	**C1**
	= $6.0 \times 1.55 \times 2$ **or** $1.55^2 \times 3.87 \times 2$ **or** $(6.0^2 / 3.87) \times 2$ = 19 W	**A1**

Q7.

(a)	energy transferred per (unit) charge (from electrical to other forms)	**B1**
(b)	same/equal current (in X and Y)	**B1**
	$P = I^2R$ (and $R_X > R_Y$) **or** $P = VI$ **and** $V_X > V_Y$	**M1**
	(so) X (dissipates more power)	**A1**
(c)(ii)	$V = W / Q$ **or** W / It	**C1**
	$= 4800 / 650$ **or** $4800 / (1.2 \times 540)$ $= 7.4$ V	**A1**
	or	
	$V = P / I$ **and** $P = W / t$	**(C1)**
	$= 8.9 / 1.2$ $= 7.4$ V	**(A1)**

Q8.

(c)(ii)	$P = VI$ **or** I^2R **or** V^2 / R	**C1**
	$= 1.3 \times 5.0$ **or** $5.0^2 \times 0.26$ **or** $1.3^2 / 0.26$	**C1**
	$= 6.5$ W	**A1**

Q9.

(b)(ii)	(area is less so) more resistance/R	**M1**
	(I is the same, so) more power/P	**A1**
	or	
	($P = I^2\rho L / A$ so) $P \propto 1 / A$	**(M1)**
	(A is less so) more P	**(A1)**

Q10.

(c)(iii)	$P = I^2R$ **or** $P = I^2r$	**C1**
	$I = E / 2r$ (so) $P = E^2 / 4r$	**A1**

Q11.

(b)(iii)	$P = EI$ **or** $P = VI$ **or** $P = I^2R$ **or** $P = V^2 / R$	**C1**
	ratio $= (0.32^2 \times 2.5) / (5.6 \times 0.32)$ **or** $0.256 / 1.792$	**C1**
	$= 0.14$	**A1**

Q12.

(a)	work done / charge **or** energy (transferred from electrical to other forms) / charge	**B1**

Q13.

(c)(iii)	$P = VI$ **or** I^2R **or** V^2/R	**C1**
	$= 0.60 \times 7.5 \times 10^{-3}$ **or** $(7.5 \times 10^{-3})^2 \times 80$ **or** $0.60^2/80$ $= 4.5 \times 10^{-3}$ W	**A1**

Q14.

(a)	joule/coulomb	**B1**

Q15.

(b)(i)1.	$E = I^2Rt$ **or** $E = VIt$ **or** $E = (V^2/R)t$	**C1**
	$E = 2.5^2 \times 2.0 \times 5.0 \times 60$ **or** $5.0 \times 2.5 \times 5.0 \times 60$ **or** $(5.0^2/2.0) \times 5.0 \times 60$ $= 3800$ J	**A1**
(b)(i)2.	p.d. $= 8.0 - (2.0 \times 2.5)$ $= 3.0$ V	**A1**

Q16.

(b)(ii)	$P = V^2/R$ **or** $P = I^2R$ **or** $P = IV$	**C1**
	$P = 6.0^2/24$ **or** $2.5^2 \times 2.4$ **or** 6.0×2.5 $= 15$ W	**A1**