

1)

- (i) $I_1 + I_2 = I_3$ B1 [1]
 (ii) 1. $E_1 = I_1 R_1 + I_3 R_2$ B1
 2. $E_1 - E_2 = I_1 R_1 - I_2 R_3$ B1 [2]

2)

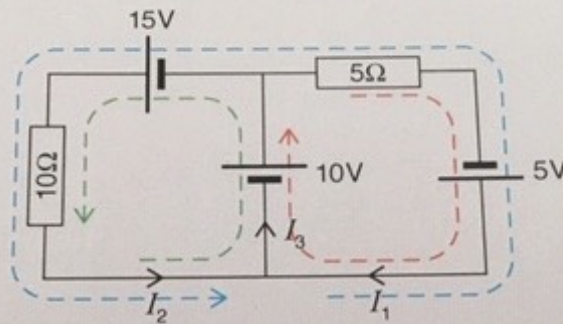
- (i) $I_1 + I_2 = I_3$ B1 [1]
 (ii) $E_2 = I_3 R + I_2 R$ B1 [1]
 (iii) $E_1 - E_2 = 2I_1 R - I_2 R$ B1 [1]

3)

03.1	$I_3 = I_1 + I_2$ ✓		1
03.2	10 V✓		1
03.3	$I_2 = (12 - 10) / 10$ ✓ = 0.2 A✓	Allow ce for 10 V The first mark is for the pd The second is for the final answer	1 1
03.4	pd across R2 increases As R1 increases, pd across R1 increases as $pd = I_1 R_1$ ✓ pd across R3 = 10 V – pd across R1 Therefore pd across R3 decreases✓ pd across R2 = 12 – pd across R3 Therefore pd across R2 increases✓	First mark is for identifying that pd across R1 increases (from zero). Second mark is for identifying that pd across R3 must decrease Third mark is for identifying that this means pd across R2 must increase	1 1 1

4)

Example Calculation:



Red loop	Green loop	Blue loop
Total emf = Total pd	Total emf = Total pd	Total emf = Total pd
$5 + 10 = V_{5\Omega}$	$10 + 15 = V_{10\Omega}$	$15 - 5 = V_{10\Omega} - V_{5\Omega}$
$15 = 5I_1$	$25 = 10I_2$	$10 = 10I_2 - 5I_1$
$I_1 = 3 \text{ Amps}$	$I_2 = 2.5 \text{ Amps}$	

Finding I_3

Total current entering junction = Total current leaving junction

$$I_1 + I_2 = I_3$$

$$3 + 2.5 = I_3$$

$$I_3 = 5.5 \text{ Amps}$$

5)

$$A1 = 8A$$

$$A2 = 1A$$

$$A3 = 3.5A$$