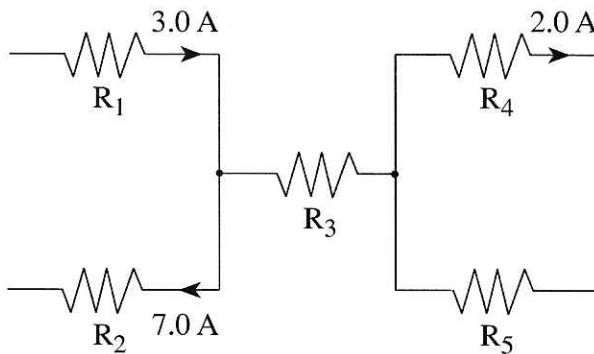# CIRCUITRY

## PROVINCIAL EXAM ASSIGNMENT

1. The diagram below shows part of an electrical circuit.

What are the magnitude and direction of the current passing through resistor R_5 ?

A. 6.0 A towards the left
B. 12.0 A towards the left
C. 2.0 A towards the right
D. 8.0 A towards the right

2. A 12 V battery is connected to a 60 Ω resistor. How much charge will flow through the resistor in 20 s?

A. 0.010 C
B. 0.20 C
C. 4.0 C
D. 48 C

3. A cell whose emf is 1.5 V and internal resistance is 0.60 Ω is charged by supplying a 0.50 A current in the direction shown.
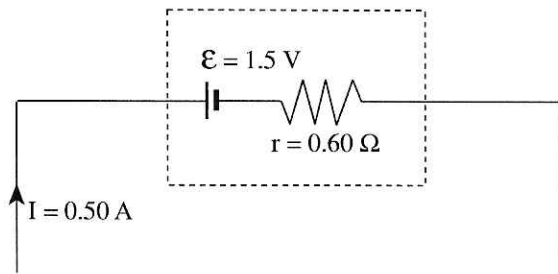
What is the terminal voltage of the cell while being charged?

A. 0.30 V
B. 1.2 V
C. 1.5 V
D. 1.8 V

4. A 12 V battery supplies a 5.0 A current to two light bulbs as shown below.

$$V = 12 \text{ V}$$

5.0 A
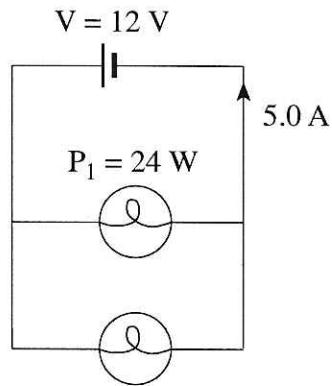
$$P_1 = 24 \text{ W}$$

The power output of one of the bulbs is $P_1 = 24$ W. What is the power output of the other bulb?

A. 14 W
B. 24 W
C. 36 W
D. 60 W

5. A student measures the current through the resistor R_2 to be 3.0 A, as shown in the left-hand diagram.

$R_1 = 4.0 \ \Omega$ $R_2 = 6.0 \ \Omega$
                        $I_2 = 3.0$ A

$R_1 = 4.0 \ \Omega$ $R_2 = 6.0 \ \Omega$
 $I_2 = 1.0$ A
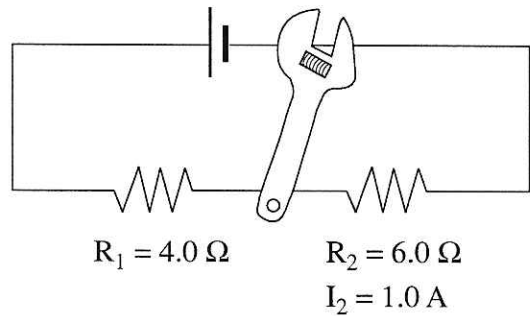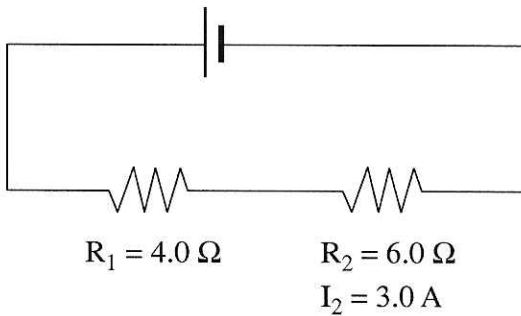
When a wrench that has a small resistance is dropped on the circuit as shown, the current through R_2 is reduced to 1.0 A. What is the current flowing through the wrench? (Assume the supply voltage remains constant.)

A. 1.0 A
B. 2.0 A
C. 5.0 A
D. 7.5 A

6. A battery whose emf is 6.0 V is connected to a 2.0 Ω resistor. The voltage drop across the 2.0 Ω resistor is 5.0 V. What is its internal resistance?

   A. 0.40 Ω
   B. 1.7 Ω
   C. 2.4 Ω
   D. 2.5 Ω

7. A voltmeter is connected across a 3.0 Ω resistor in the circuit shown below.

12.0 V

$R_1 = 6.0\ \Omega$ $R_2 = 6.0\ \Omega$

$R_3 = 3.0\ \Omega$

V
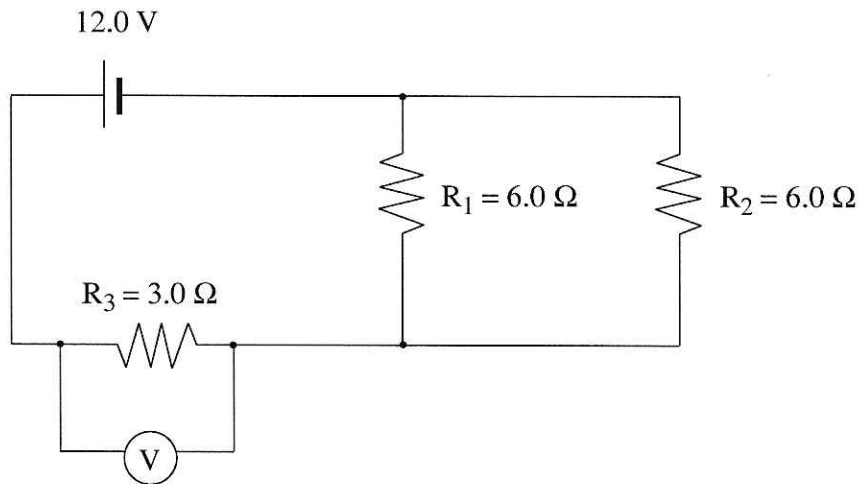
What is the reading on the voltmeter?

   A. 4.0 V
   B. 6.0 V
   C. 8.0 V
   D. 12.0 V

8. Find the current through the battery in the circuit shown below.

12 V

R_1
$V_1 = 3.0$ V

$R_2 = 9.0 \ \Omega$

$R_3 = 18.0 \ \Omega$
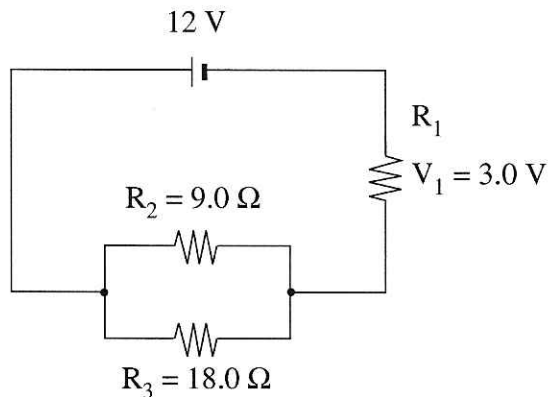
A. 0.33 A
B. 1.5 A
C. 2.0 A
D. 2.5 A

9. A flashlight contains two batteries in series with a bulb of resistance 12 Ω. Each battery has an emf of 1.5 V and an internal resistance of 0.26 Ω. What is the potential difference across the bulb?

A. 0.12 V
B. 1.5 V
C. 2.9 V
D. 3.0 V

10. Calculate the power dissipated by the 8.0 Ω resistor in the circuit below.

18 V   8.0 Ω

16.0 Ω
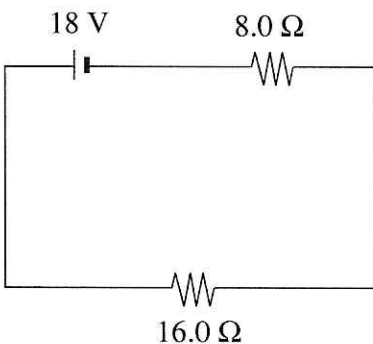
A. 4.5 W
B. 6.0 W
C. 10 W
D. 41 W

11. A circuit is made from two resistors and a light bulb as shown on the left. A short time later a copper wire is connected across points X and Y as shown on the right diagram.

$V_T = 23.0$ V   X   15.0 Ω   10.0 Ω $R = 21.0$ Ω   Y

$V_T = 23.0$ V   X   15.0 Ω   10.0 Ω $R = 21.0$ Ω   Y
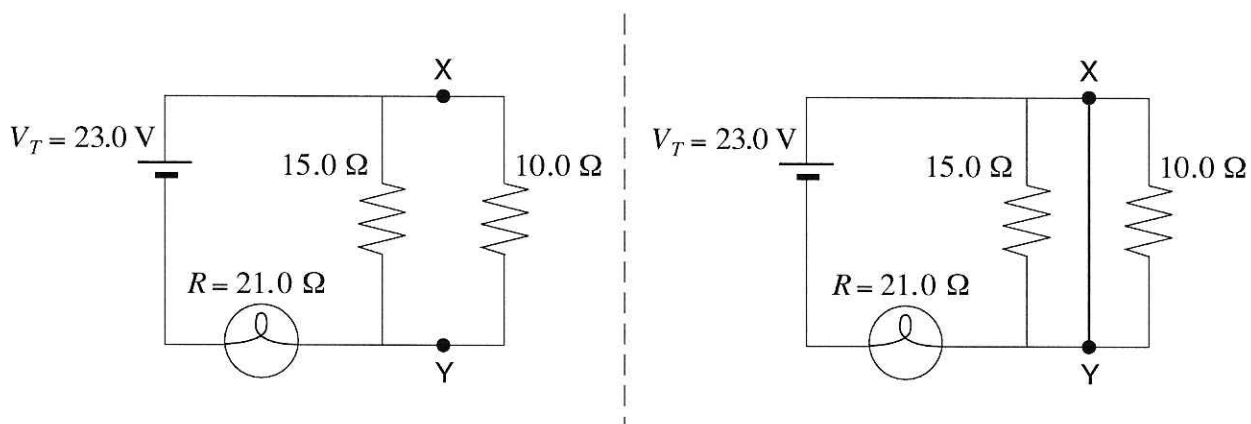
What is the current through the light bulb and what happens to the brightness of the bulb when the wire is connected?

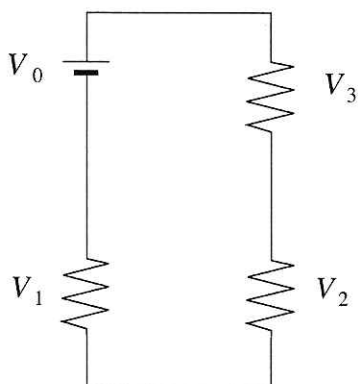|	CURRENT	BRIGHTNESS OF BULB
A.	0.64 A	dimmer
B.	0.64 A	brighter
C.	1.10 A	dimmer
D.	1.10 A	brighter

12. In the diagram below, which arrows represent the direction of conventional current and electron flow?

x   y

+   −
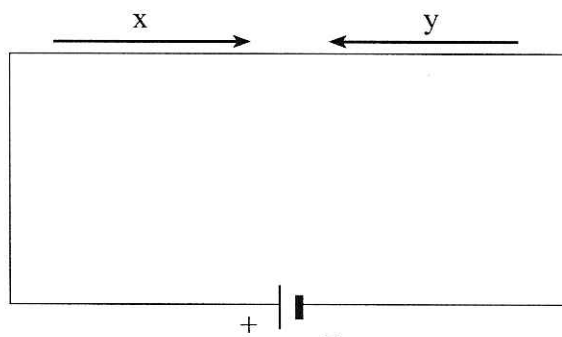
	CONVENTIONAL CURRENT	ELECTRON FLOW
A.	x	x
B.	x	y
C.	y	x
D.	y	y

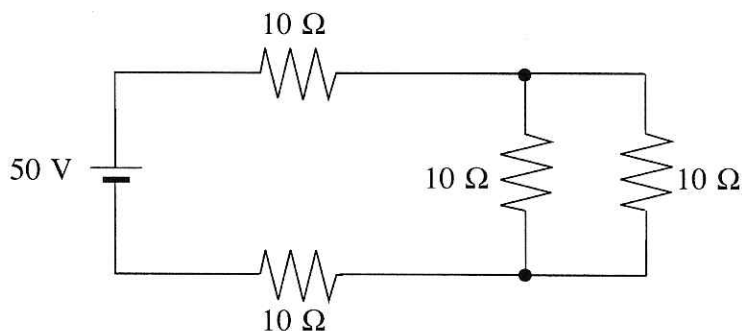13. Which of the following relationships correctly applies to the circuit shown below?

A. $V_0 = V_1 + V_2 + V_3$

B. $V_0 + V_1 = V_2 + V_3$

C. $V_0 = V_1 = V_2 = V_3$

D. $\dfrac{1}{V_0} = \dfrac{1}{V_1} + \dfrac{1}{V_2} + \dfrac{1}{V_3}$

14. A 9.0 V battery was recharged with a current of 1.2 A in 1.8×10^4 s. How much charge was transferred during that time?
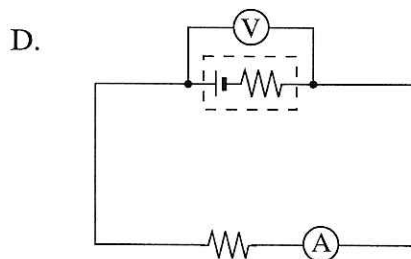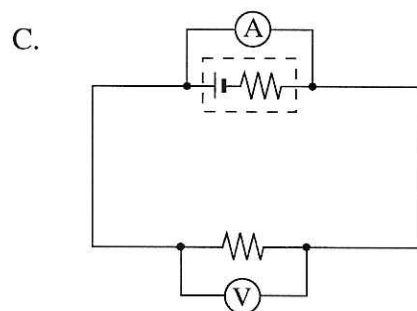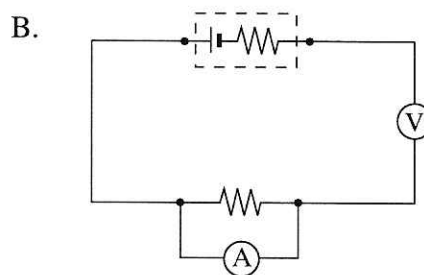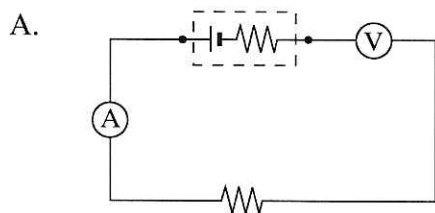
A. 1.1×10^1 C
B. 2.2×10^4 C
C. 1.6×10^5 C
D. 1.9×10^5 C

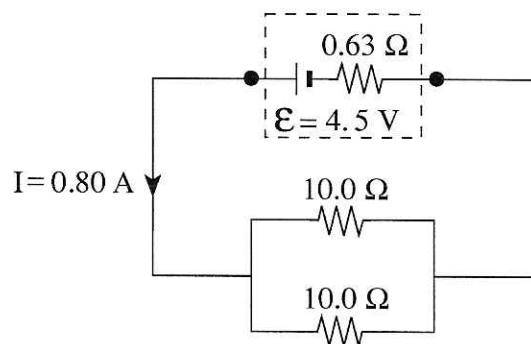15. In the following circuit, what current is drawn from the battery?

A. 1.3 A
B. 1.7 A
C. 2.0 A
D. 5.0 A

16. Which of the following diagrams shows meters correctly placed to measure the circuit current and the terminal voltage of the battery?

A.

B.

C.

D.

17. What is the terminal voltage of the cell in the circuit shown in the diagram below?

0.63 Ω
$\mathcal{E} = 4.5$ V

I = 0.80 A

10.0 Ω

10.0 Ω

A. 0.50 V
B. 3.5 V
C. 4.0 V
D. 4.5 V

19. Which of the following correctly states Kirchhoff's first rule or junction rule?

    A. The magnitude of the current in each wire leaving a junction is always equal.
    B. In a complete circuit, the current leaving the battery must be lost in the circuit.
    C. The sum of the currents leaving the junction is equal to the sum of the currents entering the junction.
    D. The sum of the currents leaving the junction is less than the sum of the currents entering the junction.

20. A 12 V battery is connected to a 20 Ω resistor. How much charge flows through the battery in 3.5 s ?

    A. 2.7×10^{-8} C
    B. 0.60 C
    C. 2.1 C
    D. 25 C

21. In the following circuit, what is the power loss in the battery?

$\mathcal{E} = 9.0$ V
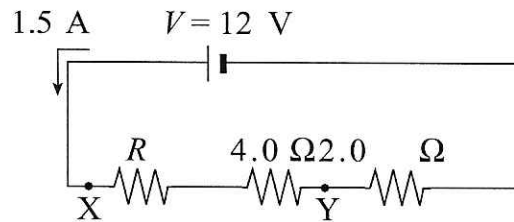
r

5.0 Ω

10.0 Ω

$I = 0.58$ A
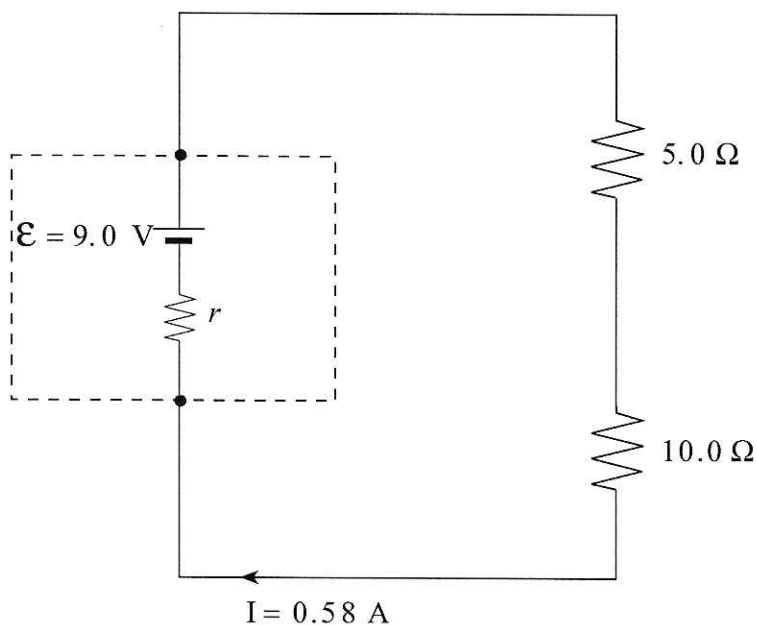
    A. 0 W
    B. 0.17 W
    C. 5.0 W
    D. 5.2 W

22. In the following circuit, what current flows through $4.0\,\Omega$ resistor?
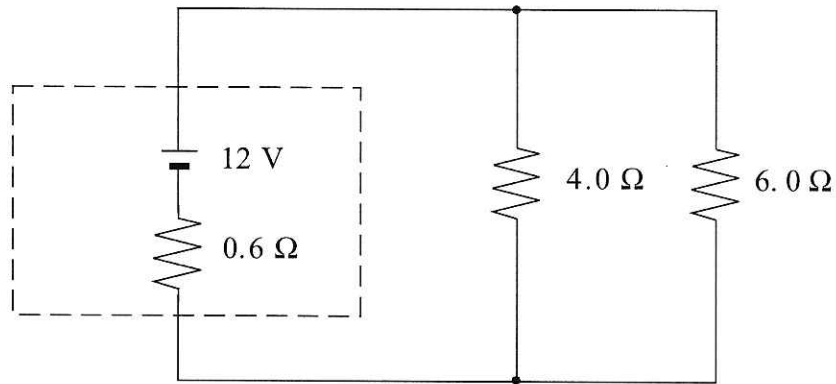
A. 2.4 A
B. 2.6 A
C. 3.0 A
D. 4.0 A

23. In the following circuit, what is the magnitude of the potential difference between **X** and **Y** ?

A. 3.0 V
B. 6.0 V
C. 9.0 V
D. 12 V

24. Which of the following arrangements would draw the largest current when connected to a potential difference? All resistors have the same value.

A.

B.

C.

D.