ID the circuit

Parallel Circuits

= key words! circle

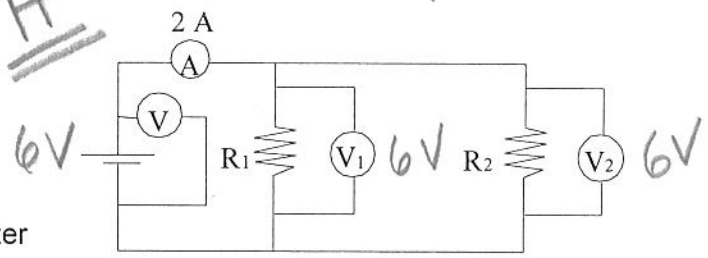
1 An electric circuit is composed of two identical resistors, R_1 and R_2, three voltmeters, V, V_1 and V_2, and one ammeter, A. Each of voltmeters V_1 and V_2 indicates a potential difference *V* of 6 V.

Voltage (V)

$V_T = V_1 = V_2$

P

The diagram to the right illustrates this circuit.



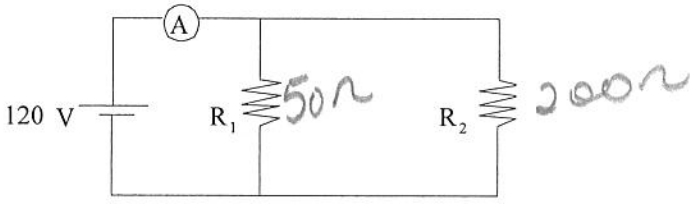
What is the potential difference indicated by voltmeter V in this circuit?

A) 3 V
B) 6 V
C) 12 V
D) 14 V

R_T or Req

2 An electric circuit is illustrated below. The value of the resistance of the resistors is

R_T = 40Ω which is < 50Ω!



R_1 = 50 Ω

R_2 = 200 Ω

$\frac{1}{R_T} = \frac{1}{50\Omega} \times 4 + \frac{1}{200\Omega}$

What is the value of the equivalent resistance of this circuit?

$\frac{1}{R_T} = \frac{5}{200\Omega} = \frac{200\Omega}{5} = 40\Omega$

3 A circuit consisting of 3 resistors R_1, R_2 and R_3, connected in parallel is illustrated below. The power supply is fixed at 24 V.

V_1 24V I_1 2A R_1 12Ω

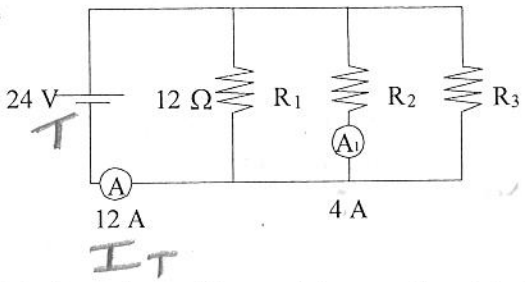
V_2 24V I_2 4A R_2 6Ω

V_3 24V I_3 6A R_3 4Ω

V_T 24V I_T 12A R_T 2Ω

P

$\frac{V_2}{I_2} = \frac{24V}{4A} = 6\Omega$



$A_1 = I_2$! you label!

According to this diagram, what is the value of the resistance of resistor R_3?

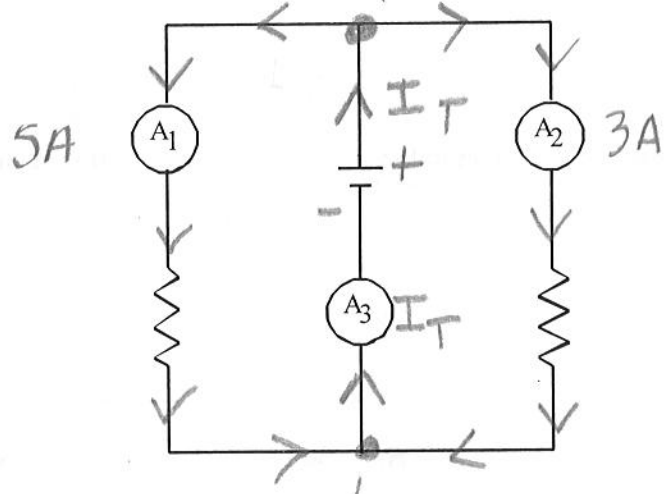
Show all your work. ANS: $R_3 = 4\Omega$

4 Given the following circuit diagram in which three ammeters have been installed:

Ammeter A_1 reads 5.0 A.

Ammeter A_2 reads 3.0 A.

split



meet back up

What is the reading of ammeter A_3?

A) 2.0 A

B) 3.0 A

C) 5.0 A

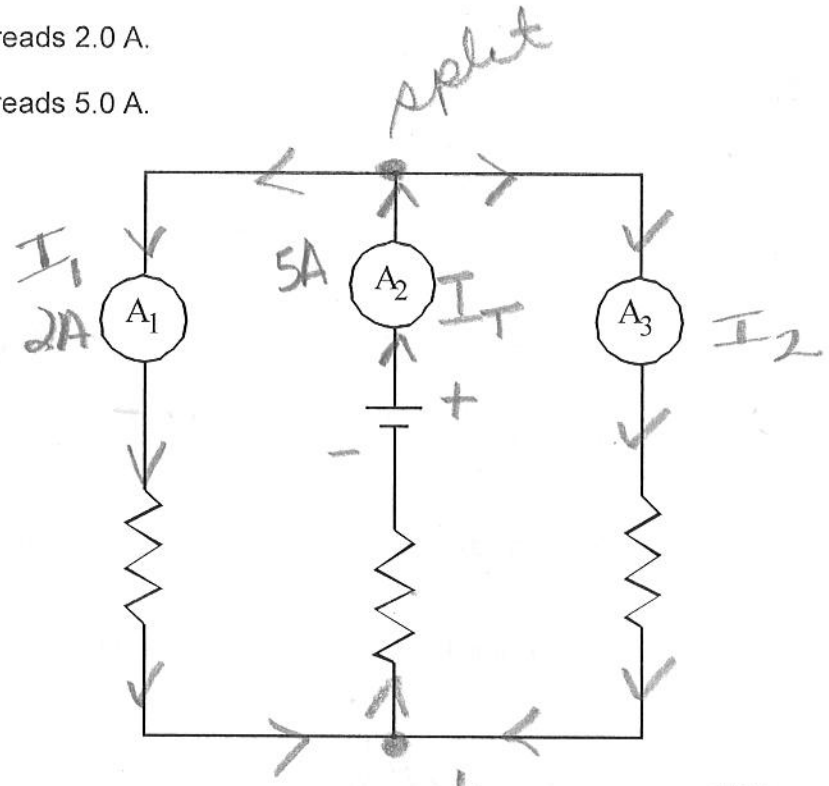
D) 8.0 A

$I_T = I_1 + I_2$

5 Given the following circuit diagram in which three ammeters have been installed:

Ammeter A_1 reads 2.0 A.

Ammeter A_2 reads 5.0 A.



What is the reading of ammeter A_3?

A) 7.0 A

B) 5.0 A

C) 3.0 A

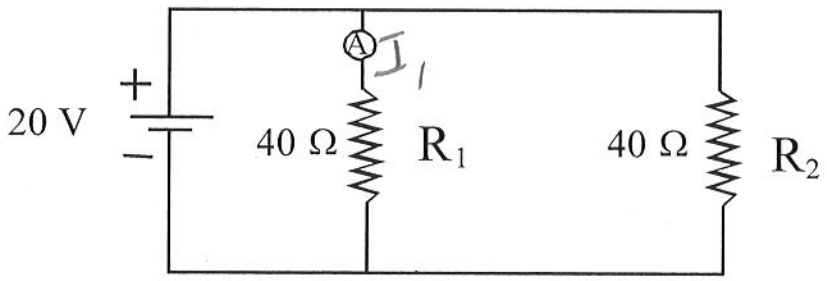
D) 2.0 A

$I_T = I_1 + I_2$

$I_T - I_1 = I_2$

$5A - 2A = 3A$

6 The electric circuit shown below consists of an ammeter A, a power supply, and resistors R_1 and R_2 connected in parallel.



$I_1 = \frac{V_1}{R_1}$

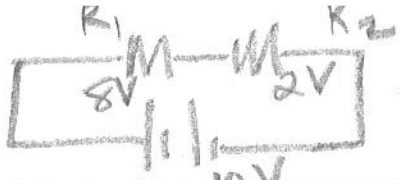
$= \frac{20V}{40\Omega}$

ANS: $I_1 = 0.5A$

What is the current intensity (*I*) flowing through the ammeter?

7 Two electric circuits each consists of a power supply and resistors R_1 and R_2.

circuit 1:



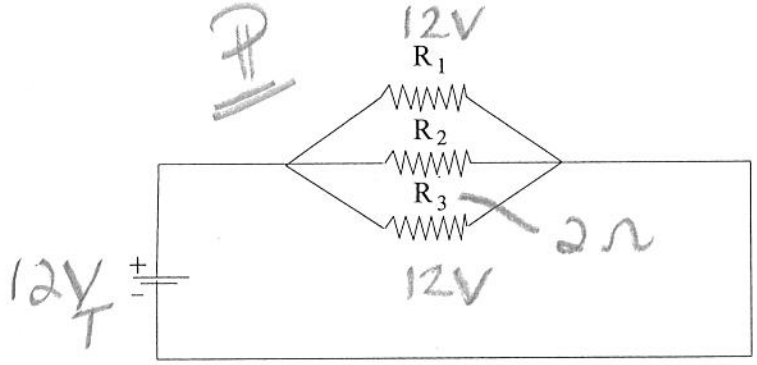
For each circuit, the following table gives the potential difference (voltage), V, across the terminals of the power supply; the potential difference V_1, across resistor R_1; and the potential difference, V_2, across resistor R_2.

circuit 2:

Circuit	V(V)	V_1(V)	V_2(V)
series 1	10 V	8 V	2 V
P 2	10 V	10 V	10 V

Draw a circuit diagram to illustrate each of these circuits. Give one reason to justify each of your diagrams.

8 The following diagram shows a parallel circuit consisting of three resistors.



$R_1 = 3\ \Omega$	$R_2 = 6\ \Omega$	$R_3 = ?$
$I_1 = 4$ A	$I_2 = 2$ A	$I_3 = 6$ A

$R_3 = \frac{V_3}{I_3} = \frac{12}{6A} = 2\Omega$

What is the value of resistor R_3?

$V_1 = I_1 R_1$

$= (4A)(3\Omega) = 12V = 12V_T$

A) 0.5 Ω

B) 2 Ω

C) 9 Ω

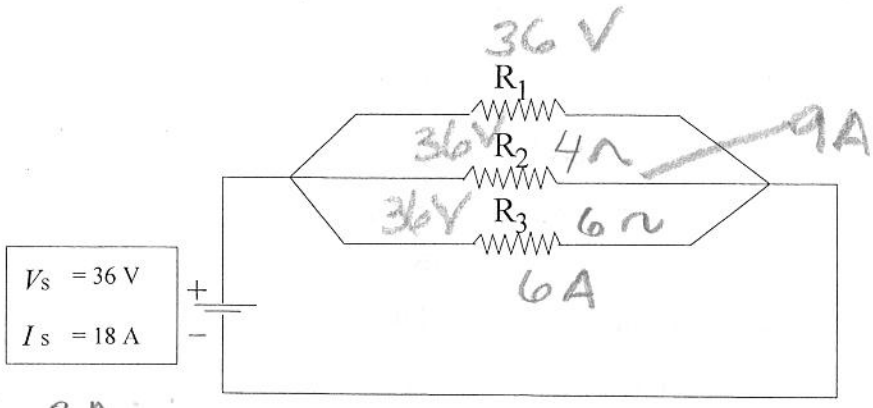
D) 12 Ω

9 The following circuit is connected to a source that can provide a current intensity of 18 A when the potential difference (voltage) is 36 V?

P1 ① $V_T = V_1 = V_2 = V_3$ ③ $I_T = I_1 + I_2 + I_3$

$I_1 = 18A - 9A - 6A$

$I_1 = 3A$

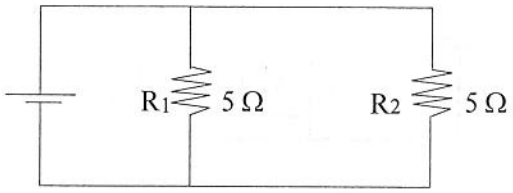


ANS = $I_1 = 3A$

What is the current intensity I_1 flowing through resistor R_1?

② $9A = \frac{V_2}{R_2}$ → $I_2 = \frac{36V}{4\Omega}$

10 A parallel circuit is illustrated below.



What is the equivalent resistance of this circuit?

$\frac{1}{R_T} = \frac{1}{5\Omega} + \frac{1}{5\Omega} = \frac{2}{5\Omega}$

A) 0.4 Ω

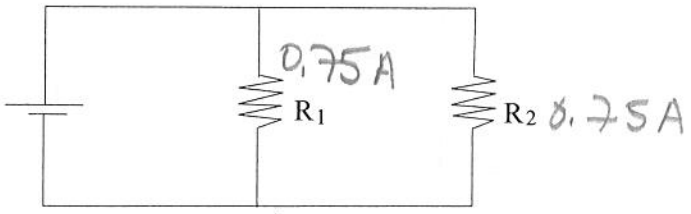
B) 2.5 Ω

C) 5 Ω

D) 10 Ω

$\frac{R_T}{1} = \frac{5\Omega}{2} = 2.5\Omega$

11 The following electric circuit consists of two resistors R_1 and R_2 and a power source.



Using an ammeter, you measured the current intensity (I) through each resistor. Here are the results:

$I_T = I_1 + I_2 = 0.75A + 0.75A$

$I_T = 1.5A$

R //

Resistor	Intensity (A)
R_1	0.75
R_2	0.75

Given this information, what is the current intensity provided by the power source I_s? $= I_T$?

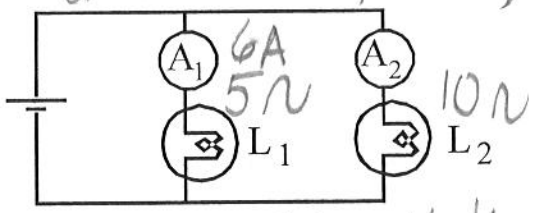
12 In the laboratory, you built an electric circuit consisting of a power source, two different light bulbs, L_1 and L_2, and two ammeters, (A1) and (A2). The resistance of light bulb L_2 is twice the resistance of light bulb L_1 ($R_2 = 2R_1$).

$R_{LB_2} = 2 R_{LB_1}$ → $L_2 = 10\Omega$

$L_1 = 5\Omega$ because I can!

$2 \times R = \frac{1}{2} I$!

$R \propto I$ = inverse!



∴ $I_2 = 3A = \frac{1}{2}$ the I bec twice the R !

If ammeter (A1) reads 0.6 A, what is the reading given by ammeter (A2)?

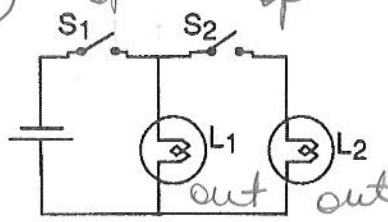
13 An electrical circuit consists of a power source, two switches (S_1 and S_2) and two light bulbs (L_1 and L_2).

The following table shows what happens to both light bulbs:

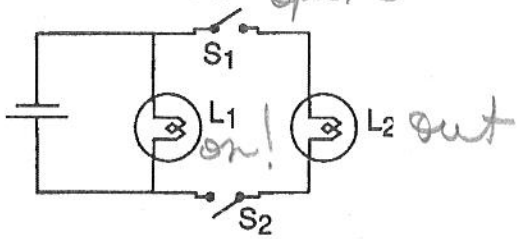
Switch		Light Bulb	
S_1	S_2	L_1	L_2
open	open	out	out
closed	open	bright	out

Which of the following circuit diagrams illustrates the results shown in the table above?

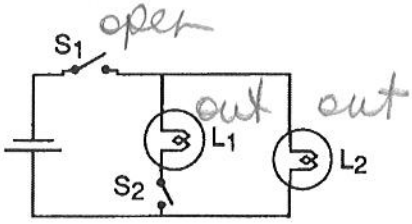
A)



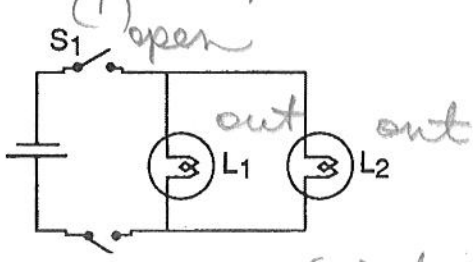
C)



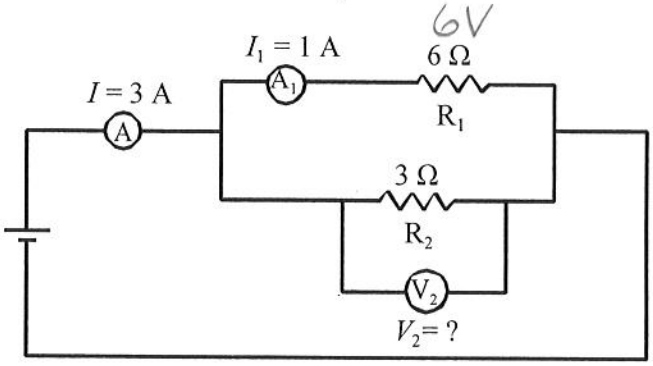
B)



D)



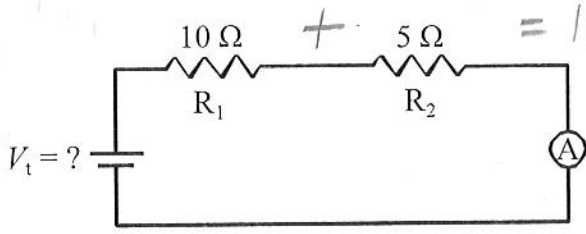
14 The following electric circuit consists of a power source, two ammeters (A and A_1), two resistors (R_1 and R_2) and a voltmeter (V_2). Ammeter A reads 3 A and ammeter A_1 reads 1 A.



What is the potential difference (voltage), V_2, across the terminals of resistor R_2?

A) 1.5 V
B) 6 V
C) 9 V
D) 27 V

15 The following circuit consists of a power source, two resistors (R_1 and R_2) and an ammeter (A). The ammeter reads 2 A.



$10\,\Omega + 5\,\Omega = 15\,\Omega = R_T$

$I = 2\text{ A} = I_T$

$V_T = I_T R_T$

$= (2\text{A})(15\Omega$

$V_T = 30\,V_T$

What is the potential difference (voltage), V_t, across the terminals of the power source?

A) 0.13 V

B) 7.5 V

C) 30 V

D) 60 V