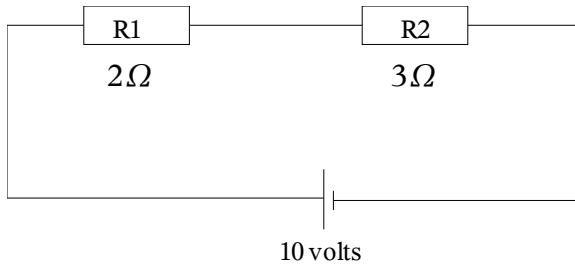


Exercises on DC Circuits, by Cecil Sie.

(1)



(a) R_1 and R_2 are arranged in _____ .
total resistance $R_{12} =$ _____ Ω .

(b) Write down the Ohm's Law formula :

Ohm's Law formula for R_{12} is $R_{12} = \frac{V_{12}}{I_{12}}$

Calculate I_{12} ! $I_{12} =$ _____ A.

How much is I_1 and I_2 ?

$I_1 =$ _____ A.

$I_2 =$ _____ A.

$I_2 = I_1 = I_2$ because R_1 and R_2 are arranged in _____ .

(c) Voltage across R_1 is V_1 . Voltage across R_2 is V_2 .

Formula to calculate V_1 is :

$$V_1 = I_1 R_1$$

Formula to calculate V_2 is :

Calculate V_1 and V_2 !

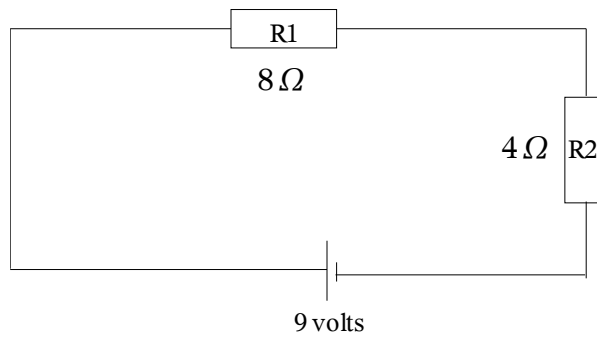
$V_1 =$ _____ volt.

$V_2 =$ _____ volt.

$V_1 + V_2 = V_{12}$, this is because in series connection, the voltage is _____ .

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(2)



(a) R_1 and R_2 are arranged in _____ .

total resistance, $R_{12} = \underline{\hspace{2cm}} \Omega$.

total current , $I_{12} = \underline{\hspace{2cm}} \text{A}$.

$I_1 = \underline{\hspace{2cm}} \text{A}$. $I_2 = \underline{\hspace{2cm}} \text{A}$.

Why $I_{12} = I_1 = I_2$? _____ .

(b) Use the formula $V_1 = I_1 R_1$ and $V_2 = I_2 R_2$ to calculate V_1 and V_2 .

$V_1 = \underline{\hspace{2cm}} \text{volt}$. $V_2 = \underline{\hspace{2cm}} \text{volt}$.

Why $V_1 + V_2 = V_{12}$? _____ .

(c) Calculate $\frac{R_1}{R_{12}}$! $\frac{R_1}{R_{12}} = \underline{\hspace{2cm}}$.

Calculate $\frac{V_1}{V_{12}}$! $\frac{V_1}{V_{12}} = \underline{\hspace{2cm}}$.

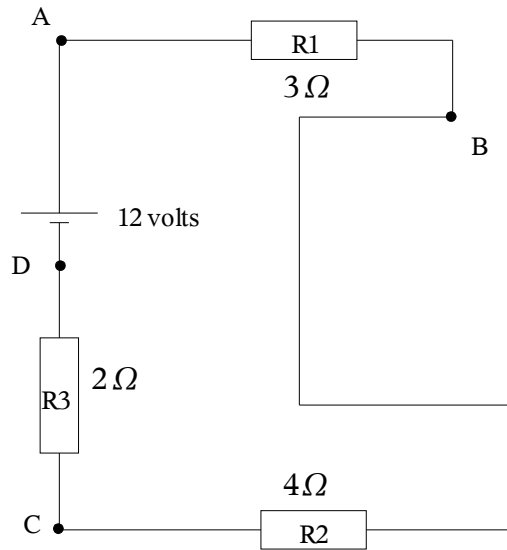
Is $\frac{V_1}{V_{12}} = \frac{R_1}{R_{12}}$? _____ .

$\frac{R_2}{R_{12}} = \underline{\hspace{2cm}}$. $\frac{V_2}{V_{12}} = \underline{\hspace{2cm}}$.

Is $\frac{V_2}{V_{12}} = \frac{R_2}{R_{12}}$? _____ .

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(3)



(a) R_1 , R_2 and R_3 are arranged in _____ .

$R_{123} = \text{_____ } \Omega$.

$I_{123} = \text{_____ } \text{A}$.

$I_1 = \text{_____ } \text{A}$.

$I_2 = \text{_____ } \text{A}$.

$I_3 = \text{_____ } \text{A}$.

Why $I_1 = I_2 = I_3 = I_{123}$? _____ .

(b) Calculate V_1 , V_2 , and V_3 ?

$V_1 = \text{_____ } \text{volt}$.

$V_2 = \text{_____ } \text{volt}$.

$V_3 = \text{_____ } \text{volt}$.

Why $V_1 + V_2 + V_3 = V_{123}$? _____ .

(c) Potential difference between A and B is V_{AB} .

Is $V_{AB} = V_1$? _____ .

Potential difference between B and C is V_{BC} .

Is $V_{BC} = V_2$? _____ .

$V_{AB} = \text{_____ } \text{volt}$.

$V_{BC} = \text{_____ } \text{volt}$.

$V_{CD} = \text{_____ } \text{volt}$.

(d) $V_{AC} = \text{_____ } \text{volt}$.

$V_{BD} = \text{_____ } \text{volt}$.

$V_{AD} = \text{_____ } \text{volt}$.

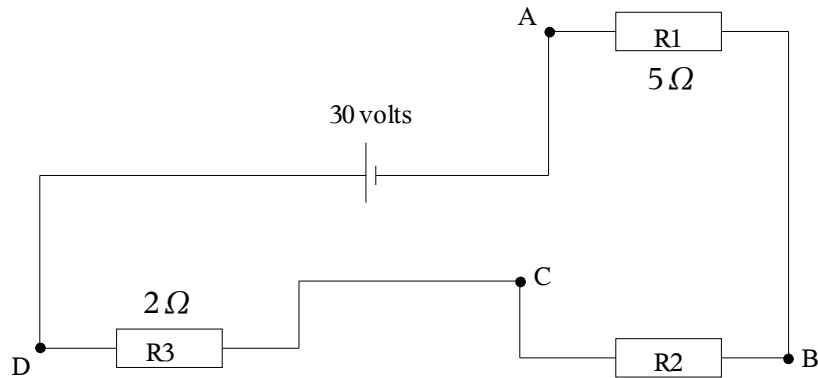
$V_{CA} = \text{_____ } \text{volt}$.

$V_{CB} = \text{_____ } \text{volt}$.

$V_{DB} = \text{_____ } \text{volt}$.

Physics is easy.

(4)



(a) R_1 , R_2 and R_3 are arranged in _____ .

$$R_{123} = \text{_____ } \Omega .$$

$$I_{123} = \text{_____ } \text{A} .$$

$$I_1 = \text{_____ } \text{A} . \quad I_2 = \text{_____ } \text{A} . \quad I_3 = \text{_____ } \text{A} .$$

(b) Calculate V_1 , V_2 and V_3 using these formulas :

$$\frac{V_1}{V_{123}} = \frac{R_1}{R_{123}} \quad , \quad \frac{V_2}{V_{123}} = \frac{R_2}{R_{123}} \quad ,$$

$$V_1 = \text{_____ } \text{volt} . \quad V_2 = \text{_____ } \text{volt} . \quad V_3 = \text{_____ } \text{volt} .$$

These formulas are also called “POTENTIAL DIVIDER” formulas.

(c) Calculate V_1 , V_2 and V_3 using the Ohm's Law formula :

$$V_1 = \frac{I_1}{R_1} \quad , \quad V_2 = \frac{I_2}{R_2} \quad , \quad \boxed{\quad \quad \quad}$$

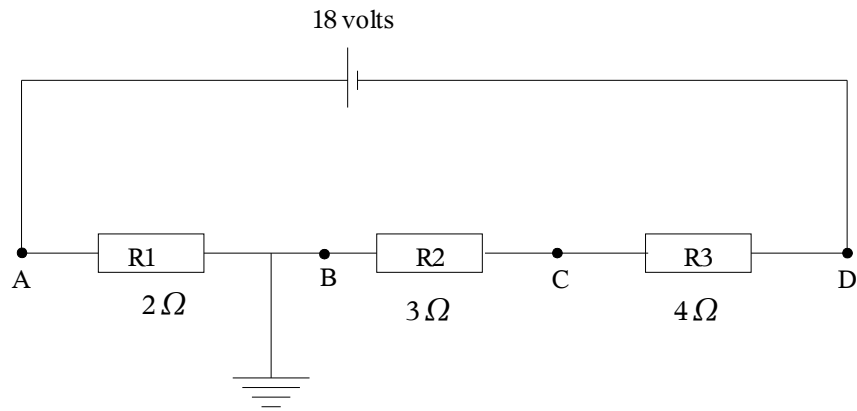
$$V_1 = \text{_____ } \text{volt} . \quad V_2 = \text{_____ } \text{volt} . \quad V_3 = \text{_____ } \text{volt} .$$

Do you get same result when you calculate V_1 , V_2 and V_3 using POTENTIAL DIVIDER formula and OHM's LAW formula ? _____ .

If you use POTENTIAL DIVIDER formula, do you need to calculate the current ? _____ .

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(5)



(a) Calculate V_1 , V_2 and V_3 using potential divider formula.

$V_1 =$ _____ volt. $V_2 =$ _____ volt. $V_3 =$ _____ volt.

$V_{AB} =$ _____ volt. $V_{BC} =$ _____ volt. $V_{CD} =$ _____ volt.

$V_{AC} =$ _____ volt. $V_{BD} =$ _____ volt. $V_{DA} =$ _____ volt.

(b) Since B is connected to Earth, $V_B =$ _____ volt.

$V_A =$ _____ volt. $V_C =$ _____ volt. $V_D =$ _____ volt.

(c) $R_{123} =$ _____ Ω . $I_{123} =$ _____ A .

$I_1 =$ _____ A. $I_2 =$ _____ A. $I_3 =$ _____ A.

(d) Using the formula $P = VI$, calculate P_1 , P_2 and P_3 .

$P_1 =$ _____ watts. $P_2 =$ _____ watts. $P_3 =$ _____ watts.

Using the formula $P = I^2 R$, calculate P_1 , P_2 and P_3 .

$P_1 =$ _____ watts. $P_2 =$ _____ watts. $P_3 =$ _____ watts.

Using the formula $P = \frac{V^2}{R}$,

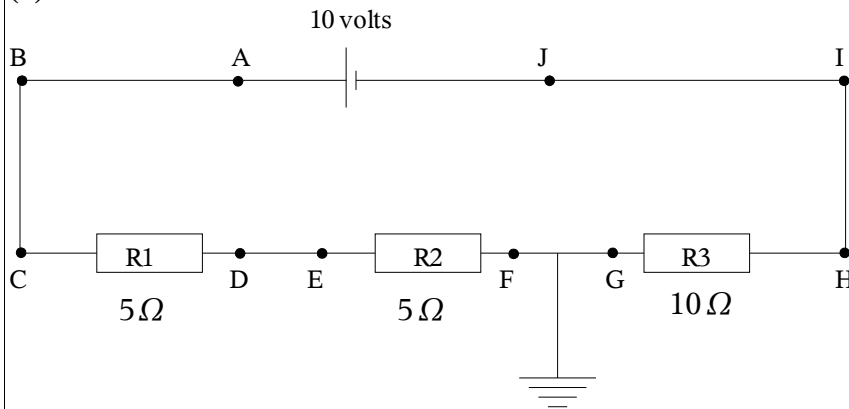
$$P_1 = \frac{18^2}{2} = 162 \text{ watts.}$$

Why the result is different with our previous calculation ? _____

Which one is correct ? _____ .

I like Physics

(6)



(a) R_1 , R_2 and R_3 are arranged in _____ .
Calculate V_1 , V_2 and V_3 using POTENTIAL DIVIDER formula.
 $V_1 =$ _____ volt. $V_2 =$ _____ volt. $V_3 =$ _____ volt.

(b) $V_{AB} =$ _____ volt. $V_{BC} =$ _____ volt. $V_{AD} =$ _____ volt.
 $V_{DE} =$ _____ volt. $V_{EF} =$ _____ volt. $V_{FI} =$ _____ volt.
 $V_{CF} =$ _____ volt. $V_{JE} =$ _____ volt. $V_{AJ} =$ _____ volt.

(c) Since F and G are connected to earth, $V_F =$ _____ volt. $V_G =$ _____ volt.
 $V_A =$ _____ volt. $V_B =$ _____ volt. $V_C =$ _____ volt.
 $V_D =$ _____ volt. $V_E =$ _____ volt. $V_H =$ _____ volt.
 $V_I =$ _____ volt. $V_J =$ _____ volt.

(d) $I_{123} =$ _____ A
 $I_1 =$ _____ A. $I_2 =$ _____ A. $I_3 =$ _____ A.

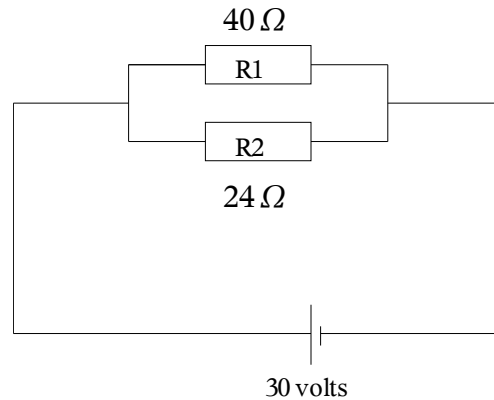
Using the formula $P = VI$, calculate P_1 , P_2 and P_3 .
 $P_1 =$ _____ watts $P_2 =$ _____ watts $P_3 =$ _____ watts

Using the formula $P_{123} = V_{123} I_{123}$, calculate P_{123} .
 $P_{123} =$ _____ watts

Is $P_{123} = P_1 + P_2 + P_3$? _____ .

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(7)



(a) R_1 and R_2 are arranged in _____ .

Total resistance, $R_{12} =$ _____ Ω .

(b) Voltage across R_{12} is V_{12} . Voltage across R_1 is V_1 . Voltage across R_2 is V_2 .

$V_{12} =$ _____ volt. $V_1 =$ _____ volt. $V_2 =$ _____ volt.

$V_{12} = V_1 = V_2$, because R_1 and R_2 are arranged in _____ .

In parallel circuit, the voltage of each resistors are _____ .

(c) Write down the Ohm's Law formula.

Calculate I_{12} . $I_{12} =$ _____ A.

I_1 and I_2 are not equal to I_{12} ,

because in parallel circuit, the currents are _____ .

Formula to calculate I_1 is :

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

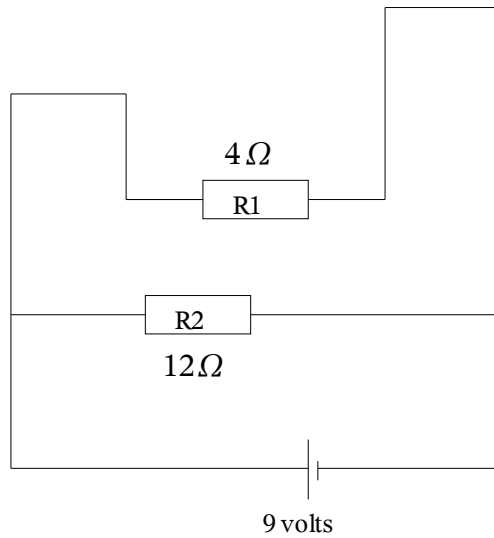
Formula to calculate I_2 is :

$I_1 =$ _____ A. $I_2 =$ _____ A.

Why $I_1 + I_2 = I_{12}$? _____ .

Study everyday, and get good result on your O level.

(8)



(a) R_1 and R_2 are arranged in _____ . $R_{12} =$ _____ Ω

(b) $V_{12} =$ _____ volt. $V_1 =$ _____ volt. $V_2 =$ _____ volt.
Why $V_{12} = V_1 = V_2$? _____ .

(c) Use Ohm's Law to calculate I_{12} , I_1 and I_2 .
 $I_{12} =$ _____ A. $I_1 =$ _____ A. $I_2 =$ _____ A.

Why $I_1 + I_2 = I_{12}$? _____ .

(d) Calculate $\frac{I_1}{I_{12}}$ and $\frac{R_{12}}{R_1}$.

$$\frac{I_1}{I_{12}} = \text{_____} . \quad \frac{R_{12}}{R_1} = \text{_____} .$$

Calculate $\frac{I_2}{I_{12}}$ and $\frac{R_{12}}{R_2}$.

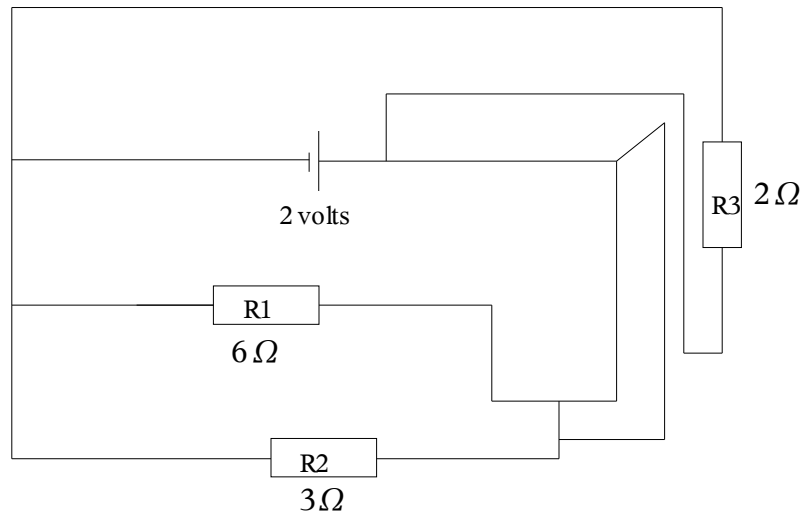
$$\frac{I_2}{I_{12}} = \text{_____} . \quad \frac{R_{12}}{R_2} = \text{_____} .$$

Is $\frac{I_1}{I_{12}} = \frac{R_{12}}{R_1}$? _____ . Is $\frac{I_2}{I_{12}} = \frac{R_{12}}{R_2}$? _____ .

$\frac{I_1}{I_{12}} = \frac{R_{12}}{R_1}$ and $\frac{I_2}{I_{12}} = \frac{R_{12}}{R_2}$ are called "CURRENT DIVIDER" formula.

Still don't understand ? Call me on 90885633.

(9)



(a) R_1 , R_2 and R_3 are arranged in _____ . $R_{123} =$ _____ Ω .

(b) Calculate total current, I_{123} . $I_{123} =$ _____ A.

Use “current divider” formula to calculate I_1 , I_2 and I_3 .

$I_1 =$ _____ A . $I_2 =$ _____ A . $I_3 =$ _____ A .

(c) $V_{123} =$ _____ volt.
 $V_1 =$ _____ volt. $V_2 =$ _____ volt. $V_3 =$ _____ volt.

Why $V_{123} = V_1 = V_2 = V_3$? _____ .

(d) Use the formula $P = VI$ to calculate P_1 , P_2 and P_3 .
 $P_1 =$ _____ watt. $P_2 =$ _____ watt. $P_3 =$ _____ watt.

Use the formula $P = \frac{V^2}{R}$ to calculate P_1 , P_2 and P_3 .

$P_1 =$ _____ watt. $P_2 =$ _____ watt. $P_3 =$ _____ watt.

Use the formula $P = I^2 R$ to calculate P_1 .

$$P_1 = (2^2)(6) = 24 \text{ watts.}$$

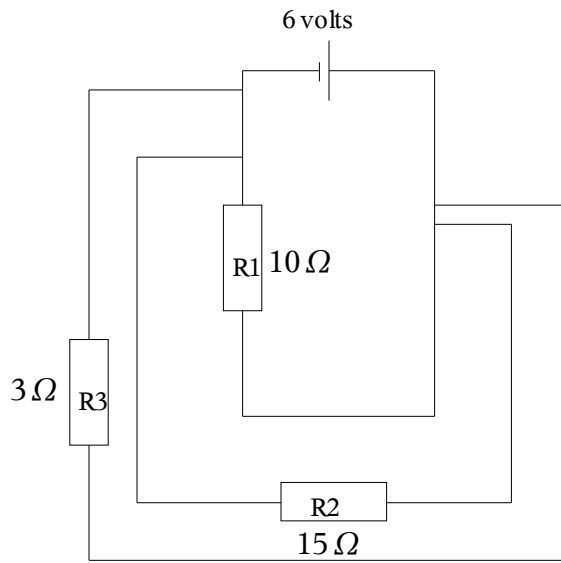
Why the answer is different to our previous calculation ?

_____ .

Which one is correct , $P_1 = \frac{2}{3}$ watts or $P_1 = 24$ watts ? _____ .

School is fun !

(10)



(a) R_1 , R_2 and R_3 are arranged in _____ . $R_{123} =$ _____ Ω

So the voltage are _____ . $V_{123} =$ _____ = _____ = _____

The current are _____ . $I_{123} =$ _____ + _____ + _____

Use “current divider” formula to calculate I_1 , I_2 and I_3 .

$I_1 =$ _____ A. $I_2 =$ _____ A. $I_3 =$ _____ A.

(b) Use the formula $P = VI$ to calculate P_1 , P_2 and P_3 .

$P_1 =$ _____ watt. $P_2 =$ _____ watt. $P_3 =$ _____ watt.

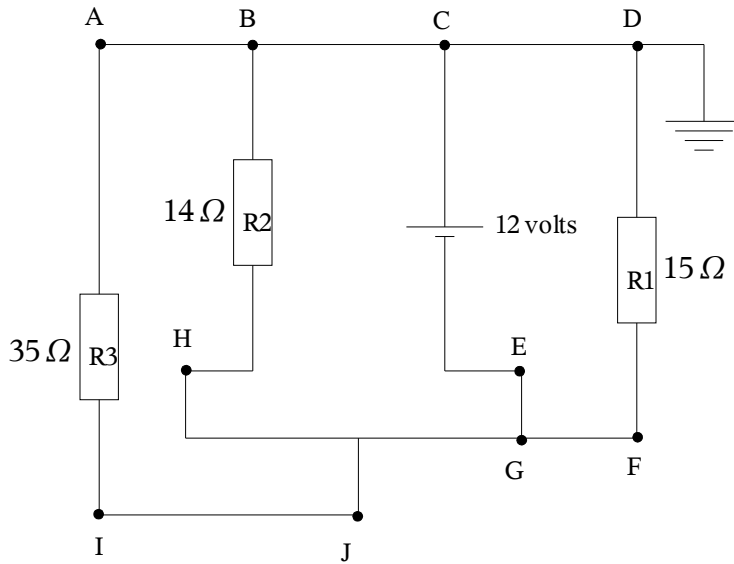
$P_1 + P_2 + P_3 =$ _____ watt.

Use the formula $P_{123} = V_{123} I_{123}$ to calculate P_{123} .

$P_{123} =$ _____ watt.

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(11)



(a) R_1 , R_2 and R_3 are arranged in _____ . $R_{123} = \text{_____ } \Omega$.

So the voltage across each resistors are _____ .

$$V_{123} = \text{_____} = \text{_____} = \text{_____}$$

The current that pass through each resistors are _____ .

$$I_{123} = \text{_____} + \text{_____} + \text{_____}$$

$$V_1 = \text{_____} \text{ volt.}$$

$$V_2 = \text{_____} \text{ volt.}$$

$$V_3 = \text{_____} \text{ volt.}$$

$$I_1 = \text{_____} \text{ A .}$$

$$I_2 = \text{_____} \text{ A .}$$

$$I_3 = \text{_____} \text{ A .}$$

(b) $V_{AI} = \text{_____} \text{ volt.}$ $V_{BH} = \text{_____} \text{ volt.}$ $V_{DJ} = \text{_____} \text{ volt.}$

$$V_{AB} = \text{_____} \text{ volt.}$$

$$V_{GF} = \text{_____} \text{ volt.}$$

$$V_{HD} = \text{_____} \text{ volt.}$$

Since D is connected to earth, $V_D = \text{_____} \text{ volt.}$

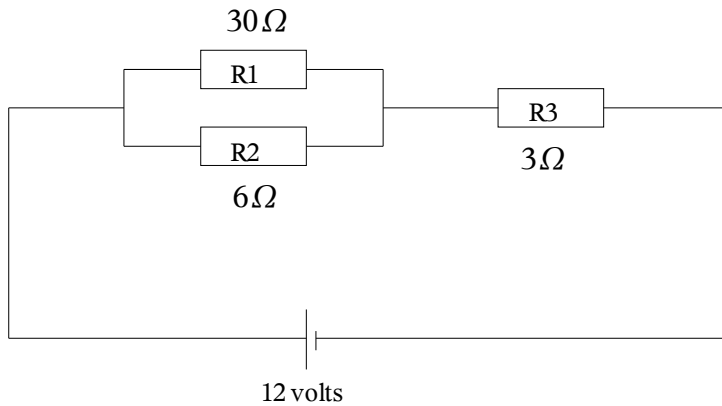
$$V_A = \text{_____} \text{ volt.} \quad V_B = \text{_____} \text{ volt.} \quad V_C = \text{_____} \text{ volt.}$$

$$V_E = \text{_____} \text{ volt.} \quad V_F = \text{_____} \text{ volt.} \quad V_G = \text{_____} \text{ volt.}$$

$$V_H = \text{_____} \text{ volt.} \quad V_I = \text{_____} \text{ volt.} \quad V_J = \text{_____} \text{ volt.}$$

I am very good at Physics.

(12)



(a) R_1 and R_2 are arranged in _____ . $R_{12} =$ _____ Ω .
 R_{12} and R_3 are arranged in _____ . $R_{123} =$ _____ Ω .

(b) $I_{123} =$ _____ A .
 I_{123} , I_{12} and I_1 are _____ , because R_{12} and R_3 are _____ .
 $I_{12} =$ _____ A. $I_3 =$ _____ A.

$V_{12} + V_3$ is equal to _____ ,
because in series connection the voltage is _____ .
 $V_{123} =$ _____ volt. $V_{12} =$ _____ volt. $V_3 =$ _____ volt.

(c) V_{12} , V_1 and V_2 are _____ ,
because R_1 and R_2 are arranged in _____ .
 $V_{12} =$ _____ volt. $V_1 =$ _____ volt. $V_2 =$ _____ volt.

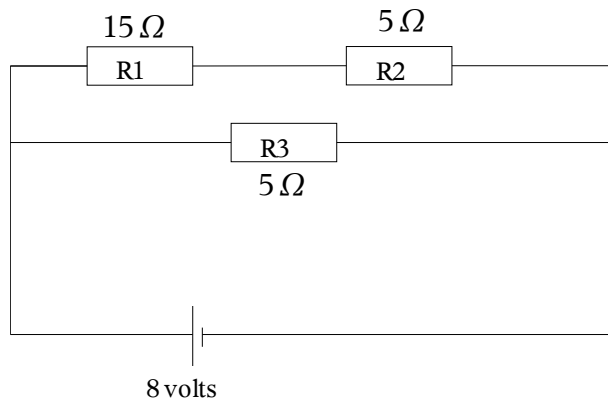
$I_1 + I_2$ is equal to _____ ,
because in parallel connection the current is _____ .
 $I_{12} =$ _____ A . $I_1 =$ _____ A . $I_2 =$ _____ A .

(d) $P_1 =$ _____ watt. $P_2 =$ _____ watt. $P_3 =$ _____ watt.
 $P_1 + P_2 + P_3 =$ _____ watt.

Use the formula $P_{123} = V_{123} I_{123}$ to calculate P_{123} .
 $P_{123} =$ _____ watt.

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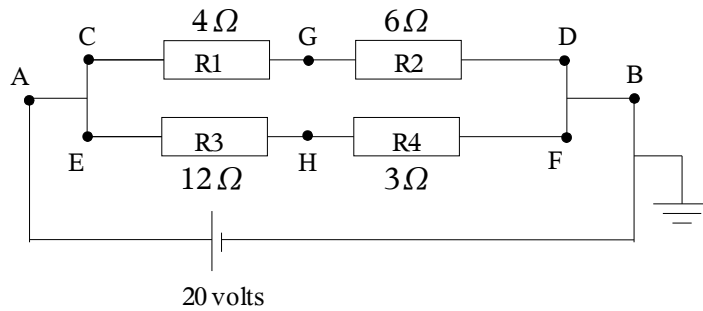
(13)



- (a) R_1 and R_2 are arranged in _____ . $R_{12} =$ _____ Ω
 R_{12} and R_3 are arranged in _____ . $R_{123} =$ _____ Ω
 $I_{123} =$ _____ A.
- (b) V_{12} , V_3 and V_{123} are _____ ,
because R_{12} and R_3 are arranged in _____ .
 $V_{123} =$ _____ volt. $V_{12} =$ _____ volt. $V_3 =$ _____ volt.
- (c) Why $I_{12} + I_3 = I_{123}$? _____ .
 $I_{12} =$ _____ A. $I_3 =$ _____ A.
- (d) I_{12} , I_1 and I_2 are _____ , because R_1 and R_2 are _____ .
 $I_1 =$ _____ A. $I_2 =$ _____ A.
- (e) Why $V_1 + V_2 = V_{12}$? _____ .
 $V_1 =$ _____ volt. $V_2 =$ _____ volt.
- (f) $P_1 =$ _____ watt. $P_2 =$ _____ watt. $P_3 =$ _____ watt.
 $P_1 + P_2 + P_3 =$ _____ watt.
Use the formula $P_{123} = V_{123} I_{123}$ to calculate P_{123} .
 $P_{123} =$ _____ watt.

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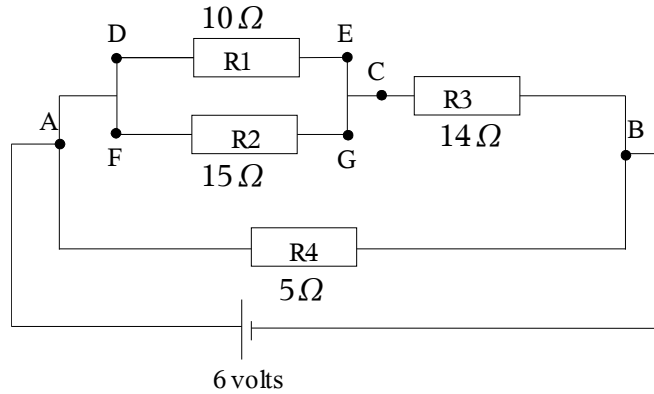
(14)



- (a) R_1 and R_2 are arranged in _____ . $R_{12} =$ _____ Ω .
 R_3 and R_4 are arranged in _____ . $R_{34} =$ _____ Ω .
 R_{12} and R_{34} are arranged in _____ . $R_{1234} =$ _____ Ω .
- (b) Why $V_{1234} = V_{12} = V_{34}$? _____ .
 $V_{1234} =$ _____ volt. $V_{12} =$ _____ volt. $V_{34} =$ _____ volt.
- (c) Calculate I_{12} and I_{34} . $I_{12} =$ _____ A . $I_{34} =$ _____ A .
Why $I_{12} + I_{34} = I_{1234}$? _____ .
- (d) $I_1 =$ _____ A. $I_2 =$ _____ A.
Why $I_1 = I_2 = I_{12}$? _____ .
 $V_1 =$ _____ volt. $V_2 =$ _____ volt.
Why $V_1 + V_2 = V_{12}$? _____ .
- (e) $I_3 =$ _____ A. $I_4 =$ _____ A.
Why $I_3 = I_4 = I_{34}$? _____ .
 $V_3 =$ _____ volt. $V_4 =$ _____ volt.
Why $V_3 + V_4 = V_{34}$? _____ .
- (f) $P_1 =$ _____ watt. $P_2 =$ _____ watt.
 $P_3 =$ _____ watt. $P_4 =$ _____ watt.
 $P_1 + P_2 + P_3 + P_4 =$ _____ watt.
Use the formula $P_{1234} = V_{1234} I_{1234}$ to calculate P_{1234} .
 $P_{1234} =$ _____ watt.
- (g) $V_{AB} =$ _____ volt. $V_{CD} =$ _____ volt. $V_{EF} =$ _____ volt.
 $V_{CG} =$ _____ volt. $V_{GD} =$ _____ volt. $V_{EH} =$ _____ volt.
 $V_{HF} =$ _____ volt. $V_{GH} =$ _____ volt. $V_{HD} =$ _____ volt.
 $V_{BA} =$ _____ volt. $V_{BF} =$ _____ volt.

Since B is connected to Earth, $V_B =$ _____ volt.
 $V_A =$ _____ volt. $V_C =$ _____ volt.
 $V_D =$ _____ volt. $V_E =$ _____ volt.
 $V_F =$ _____ volt. $V_G =$ _____ volt.
 $V_H =$ _____ volt.

(15)



- (a) $R_{12} =$ _____ Ω . $R_{123} =$ _____ Ω . $R_{1234} =$ _____ Ω
 $V_{1234} =$ _____ volt. $I_{1234} =$ _____ A.
- (b) $V_{123} =$ _____ volt. $V_4 =$ _____ volt.
 $I_{123} =$ _____ A . $I_4 =$ _____ A .
- (c) $I_{12} =$ _____ A . $I_3 =$ _____ A .
 $V_{12} =$ _____ volt. $V_3 =$ _____ volt.
- (d) $V_1 =$ _____ volt. $V_2 =$ _____ volt.
 $I_1 =$ _____ A . $I_2 =$ _____ A .
- (e) $P_1 =$ _____ watt. $P_2 =$ _____ watt. $P_3 =$ _____ watt.
 $P_4 =$ _____ watt.
 $P_1 + P_2 + P_3 + P_4 =$ _____ watt.
 Use the formula $P_{1234} = V_{1234} I_{1234}$ to calculate P_{1234} .
 $P_{1234} =$ _____ watt.

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