



♪ LET'S GET QUIZZICAL ♪ (QUIZ 11)

Questions 1 to 9 are multiple choice. Circle **only one letter** for the answer that you believe is correct. Each question is worth 4 points.

1. A simple series circuit is built with a motor. If there is a potential difference of **120 volts** across the motor and it is subjected to a current of **1.5 Amps**, what amount of **power** is generated by the motor?

- a. 80 W
- b. 80 Ω
- c. 180 W
- d. 180 Ω

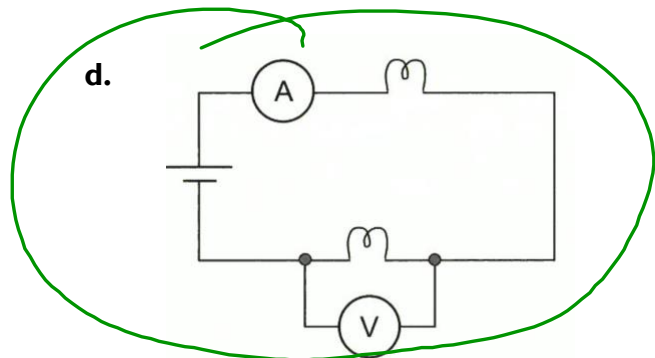
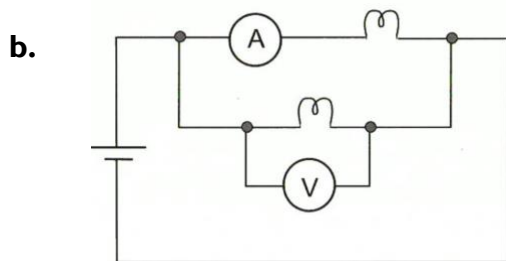
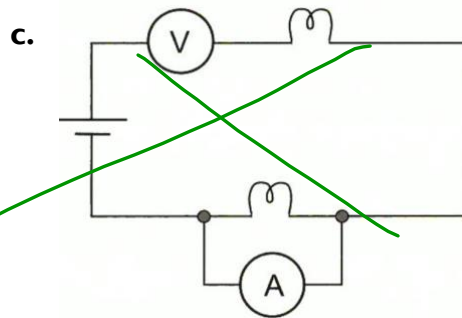
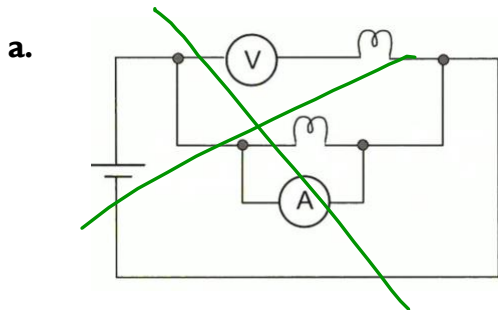
$P = V \times I$
 $120 \times 1.5 = 180 \text{ W}$

2. What is the symbol for a **boron ion**?

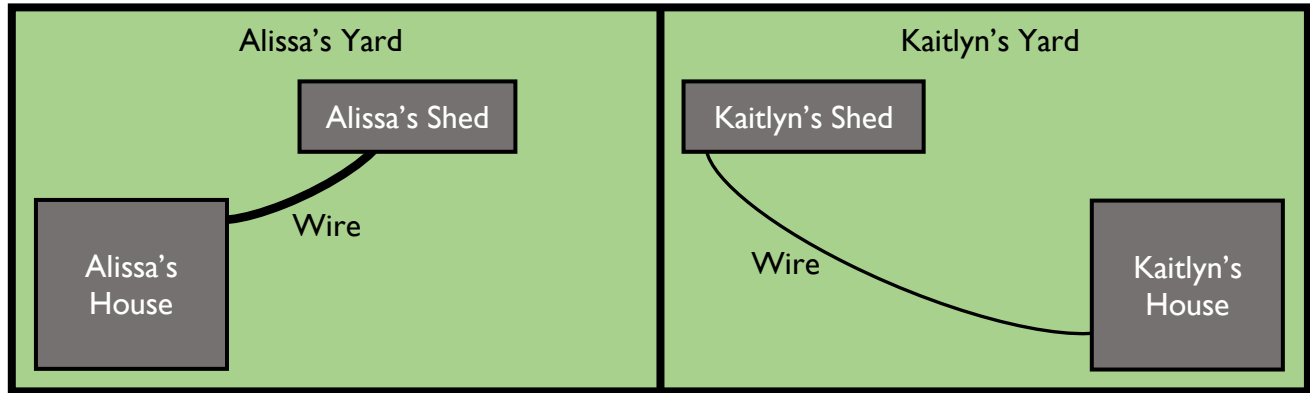
- a. B²⁺
- b. B²⁻
- c. B³⁺
- d. B³⁻

3. An electrical circuit consists of two light bulbs connected **in series**. In this circuit, Vishal wants to measure the voltage across the terminals of one light bulb and the ~~current~~ intensity in the other light bulb.

Based on this information, which of the following circuits is **correctly drawn**?



4. Alissa and Kaitlyn are neighbours. They each installed a backup electric heating system in their respective garden sheds. The two systems are identical, except for the type of electrical wire that connects each shed to its house. Both neighbours have chosen different wiring configurations, as illustrated below.



Which of these neighbours does not have the ideal setup for their heating system, and why?

- ~~a.~~ Alissa, because her garden shed is better insulated.
- ~~b.~~ Alissa, because the diameter of her wire is greater than that of Kaitlyn's.
- c. Kaitlyn, because her wire is longer than Alissa's.
- ~~d.~~ Kaitlyn, because her wire is made of copper.

5. At the recently concluded 2018 Winter Olympics, Russian mixed doubles curler Alexander Krushelnitsky tested positive for a banned substance called meldonium, which can increase blood flow and subsequently improve an athlete's stamina. As a result, Krushelnitsky and his partner Anastasia Bryzgalova were stripped of their bronze medals.



According to the *Court of Arbitration for Sport*, Krushelnitsky provided a 150 mL sample of urine that contained 1.2 mg of meldonium.

What is the concentration of meldonium in this urine sample, in parts per million?

- a. 0.0067 ppm
- b. 8 ppm
- c. 125 ppm
- d. 8000 ppm

$$\text{ppm} = \frac{\text{mg}}{\text{L}}$$

$$\frac{1.2 \text{ mg}}{0.15 \text{ L}}$$

6. A $20\ \Omega$ resistor is connected to a power source with a potential difference of 50 V.

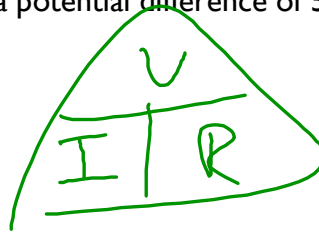
What is the **current intensity** in this resistor?

a. 0.4 A

c. 70 A

b. 2.5 A

d. 1000 A

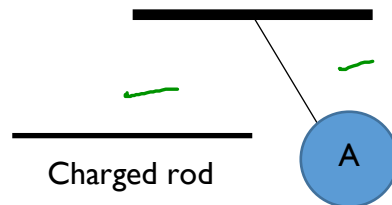


7. Two charged spheres (A and B) are suspended from a wire as shown in the diagram below. Sphere A is negatively charged, but you do not know the charge on sphere B.

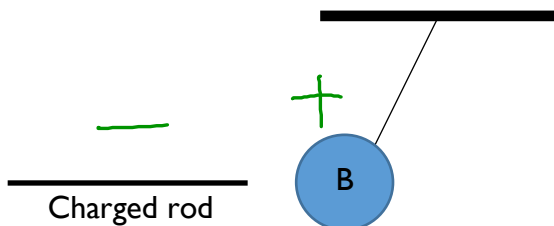


Saad carries out the following steps to see how the spheres will behave:

Step 1: He brings a charged rod close to sphere A.



Step 2: He brings the same rod close to sphere B.



Which of the following statements correctly describes the charge on the rod and the behavior of spheres A and B if Saad brings them close to each other?

- a. The rod is negatively charged, and spheres A and B will attract each other.
- b. The rod is negatively charged, and spheres A and B will repel each other.
- c. The rod is positively charged, and spheres A and B will attract each other.
- d. The rod is positively charged and spheres A and B will repel each other.

ACID + BASE \rightarrow SALT + WATER

8. Which of the following substances could be **produced** by an **acid-base neutralization reaction**?

a. $C_6H_{12}O_6$
Extremely complicated

c. HBr
acid

b. $Ca(OH)_2$
Base

d. LiCl
salt

9. John Travoltage scrapes his feet against a carpet and then receives an electric shock as he brings his finger near a metal doorknob.

Which of the following statements is **true**?

a. When he rubs his feet against the carpet, ~~positively~~ charged particles leave the carpet and accumulate on his body. This is charging by induction.

b. When he rubs his feet against the carpet, negatively charged particles leave the carpet and accumulate on his body. This is charging by induction.

c. When he rubs his feet against the carpet, ~~positively~~ charged particles leave the carpet and accumulate on his body. This is charging by friction.

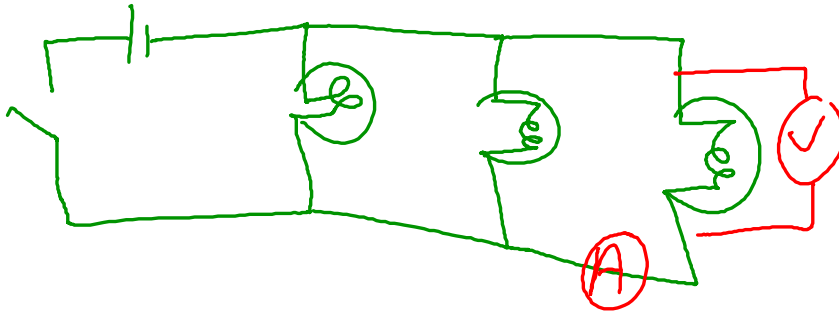
d. When he rubs his feet against the carpet, negatively charged particles leave the carpet and accumulate on his body. This is charging by friction.



Questions 10 to 14 are short and long answer questions. Answer each one in the space provided. Each question is worth 4 points.

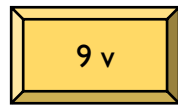
10. Draw an electrical circuit that includes the following:

- A power supply
- 3 light bulbs, connected in parallel of each other
- A switch that controls all 3 lights at once
- A voltmeter and ammeter to measure the voltage and current intensity across one light bulb.

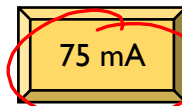


4

11. During a lab, Tiffany built a series circuit consisting of a power supply, resistor, voltmeter and ammeter. Her voltmeter and ammeter read as follows:



Voltmeter



Ammeter

$\rightarrow 0.075 \text{ A}$

Determine the resistance of the resistor for which these readings were taken. Show your work.

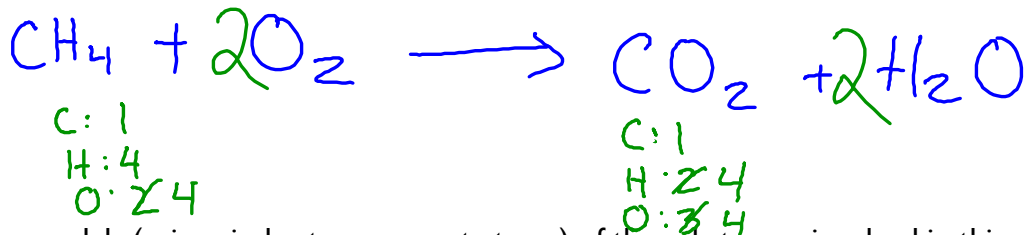
$$\begin{aligned}
 & \checkmark \\
 & I R \qquad R = \frac{V}{I} = \frac{9 \text{ v}}{0.075 \text{ A}} \\
 & \qquad \qquad \qquad = 120 \Omega
 \end{aligned}$$

4

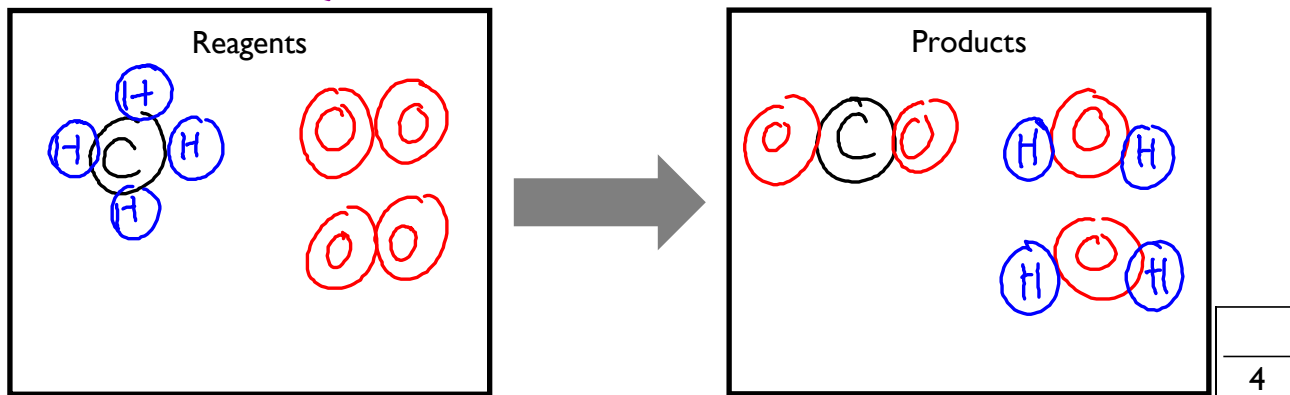
12. The combustion of methane gas (CH₄) occurs when methane reacts with oxygen (O₂) to produce carbon dioxide and water.



- a. Write a **balanced** chemical equation to represent this combustion reaction. Your equation must have the lowest integers possible to receive full marks.



- b. Draw Dalton models (using circles to represent atoms) of the substances involved in this reaction.



13. Canadian regulations require oil companies to put a specific percentage of ethanol (a non-fossil fuel) into their gasoline. Determine the **concentration** of ethanol if you have 900 g of ethanol in 20 L of gasoline.



$$m = 900 \text{ g}$$

$$V = 20 \text{ L} = 20\,000 \text{ mL}$$

$$\frac{m \text{ (g)}}{V \text{ (mL)}} \times 100\%$$

$$\frac{900 \text{ g}}{20\,000 \text{ mL}} \times 100\% = \boxed{4.5\%}$$

4

14. Name that element! ...or just write its symbol.

- A noble gas with 4 energy shells. last column
- Atoms of this element give up 2 electrons to be like neon. periods (= row)
- The only non-metal to the left of the staircase line. bordering staircase
- A metalloid that must acquire 2 more electrons to fill its valence shell. → Group 6

Kr

Mg

H

Te or Po

4



♪ LET'S GET QUIZZICAL ♪ (QUIZ 11)

Questions 1 to 9 are multiple choice. Circle **only one letter** for the answer that you believe is correct. Each question is worth 4 points.

1. A simple series circuit is built with a motor. If there is a potential difference of **150 volts** across the motor and it is subjected to a current of **1.2 Amps**, what amount of **power** is generated by the motor?

a. 180 W

c. 125 W

$$P = V \times I$$

b. 180 Ω

d. 125 Ω

$$= 150 \text{ v} \times 1.2 \text{ A}$$

$$= 180 \text{ W}$$

2. What is the symbol for a **nitrogen ion**?

a. N^{2+}

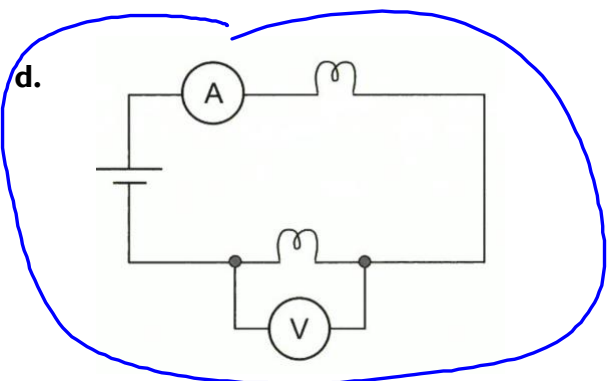
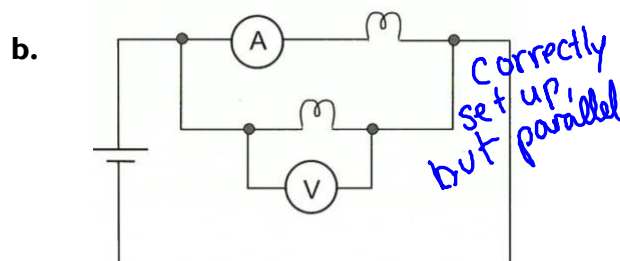
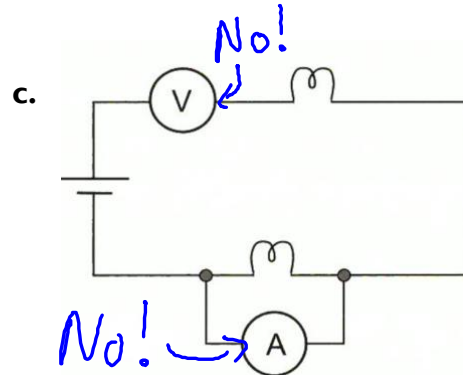
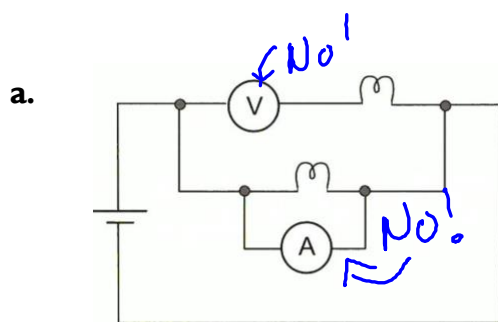
c. N^{3+}

b. N^{2-}

d. N^{3-}

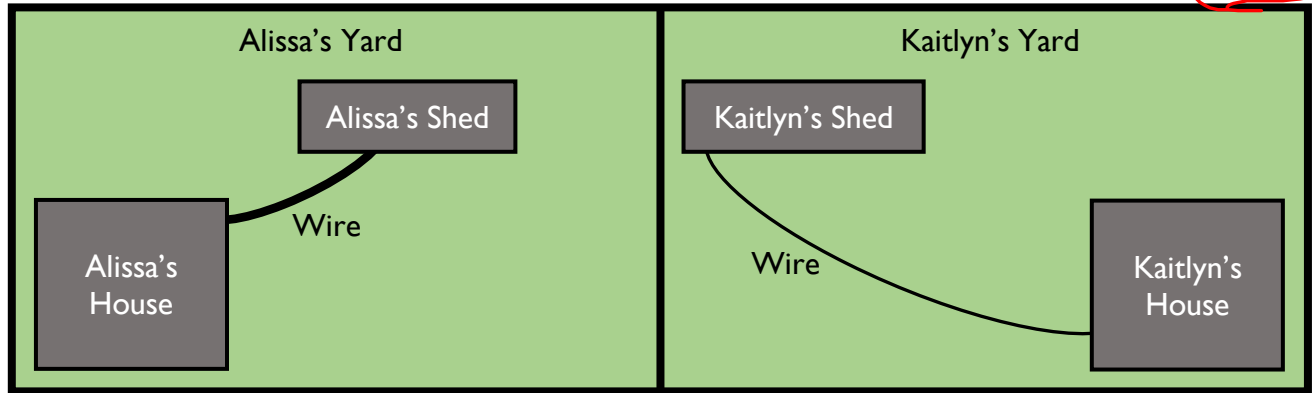
3. An electrical circuit consists of two light bulbs connected **in series**. In this circuit, Vishal wants to measure the voltage across the terminals of one light bulb and the current intensity in the other light bulb.

Based on this information, which of the following circuits is **correctly drawn**?



4. Alissa and Kaitlyn are neighbours. They each installed a backup electric heating system in their respective garden sheds. The two systems are identical, except for the type of electrical wire that connects each shed to its house. Both neighbours have chosen different wiring configurations, as illustrated below.

SANTA



Which of these neighbours **does not** have the ideal setup for their heating system, and why?

- a. Kaitlyn, because her wire is made of copper. *Huh? Who said anything about copper?*
- b. Kaitlyn, because her wire is longer than Alissa's.**
- c. Alissa, because her garden shed is better insulated. *Totally irrelevant information*
- d. Alissa, because the diameter of her wire is greater than that of Kaitlyn's, *That makes it better*

5. At the recently concluded 2018 Winter Olympics, Russian mixed doubles curler Alexander Krushelnitsky tested positive for a banned substance called meldonium, which can increase blood flow and subsequently improve an athlete's stamina. As a result, Krushelnitsky and his partner Anastasia Bryzgalova were stripped of their bronze medals.



According to the *Court of Arbitration for Sport*, Krushelnitsky provided a 150 mL sample of urine that contained 1.2 mg of meldonium. *150 mL* *✓*

What is the concentration of meldonium in this urine sample, in parts per million?

- a. 8 ppm**
- b. 8000 ppm
- c. 0.0067 ppm
- d. 125 ppm

$$\text{ppm} = \frac{\text{mg}}{\text{L}} = \frac{1.2 \text{ mg}}{0.15 \text{ L}} = 8 \text{ ppm}$$

6. A 25Ω resistor is connected to a power source with a potential difference of 75 V .

What is the **current intensity** in this resistor?

- a. 1875 A
- b. 0.33 A

- c. 3 A
- d. 100 A

$$V = I \times R$$

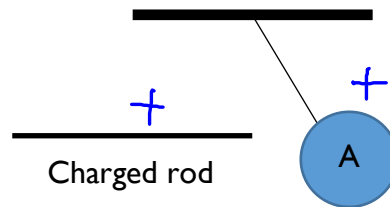
$$I = \frac{V}{R} = \frac{75 \text{ V}}{25 \Omega} = 3 \text{ A}$$

7. Two charged spheres (A and B) are suspended from a wire as shown in the diagram below. Sphere A is positively charged, but you do not know the charge on sphere B.

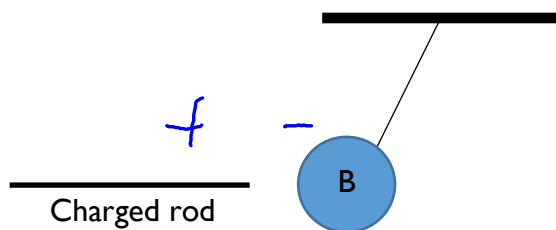


Saad carries out the following steps to see how the spheres will behave:

Step 1: He brings a charged rod close to sphere A.



Step 2: He brings the same rod close to sphere B.



So rod is +, $A = +$
 $B = -$

Which of the following statements correctly describes the charge on the rod and the behavior of spheres A and B if Saad brings them close to each other?

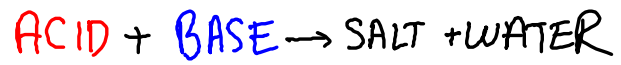
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- c. The rod is positively charged and spheres A and B will attract each other.
- d. The rod is positively charged and spheres A and B will repel each other.

must be a salt (or water)

8. Which of the following substances could be produced by an acid-base neutralization reaction?

a. KCl salt

c. HF acid



b. Mg(OH)₂ base

d. C₆H₁₂O₆
Extremely complex molecule

9. John Travoltage scrapes his feet against a carpet and then receives an electric shock as he brings his finger near a metal doorknob.

Which of the following statements is true?

a. When he rubs his feet against the carpet, negatively charged particles leave the carpet and accumulate on his body. This is charging by induction. No!!

b. When he rubs his feet against the carpet, positively charged particles leave the carpet and accumulate on his body. This is charging by induction. No!!

c. When he rubs his feet against the carpet, negatively charged particles leave the carpet and accumulate on his body. This is charging by friction. Yes!!

d. When he rubs his feet against the carpet, positively charged particles leave the carpet and accumulate on his body. This is charging by friction. No!!

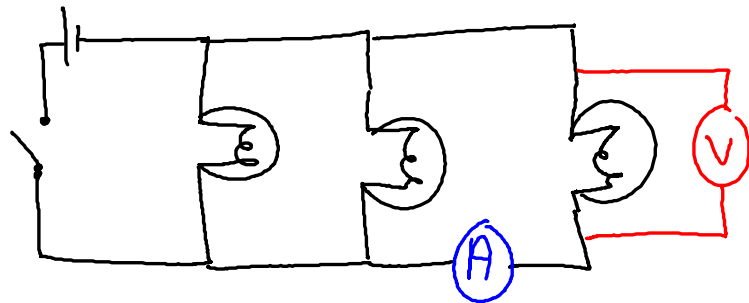


Remember, positive charges don't ever move!!
Only neg charges (electrons) can.

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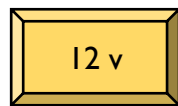
10. Draw an electrical circuit that includes the following:

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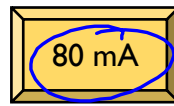


4

11. During a lab, Tiffany built a series circuit consisting of a power supply, resistor, voltmeter and ammeter. Her voltmeter and ammeter read as follows:



Voltmeter



Ammeter

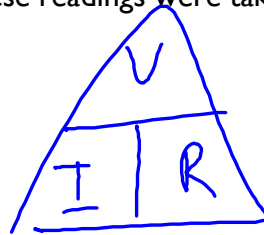
Must be in
AMPS

Determine the resistance of the resistor for which these readings were taken. Show your work.

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

$$I = 80 \text{ mA} = 0.08 \text{ A}$$

$$R = ?$$



$$R = \frac{V}{I} = \frac{12 \text{ V}}{0.08 \text{ A}} = \boxed{150 \Omega}$$

4

12. The combustion of methane gas (CH₄) occurs when methane reacts with oxygen (O₂) to produce carbon dioxide and water.



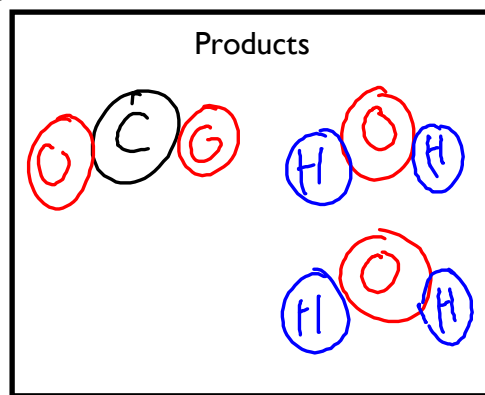
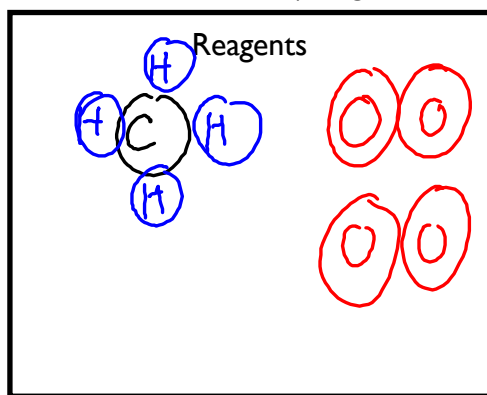
a. Write a **balanced** chemical equation to represent this combustion reaction. Your equation must have the lowest integers possible to receive full marks.



C = 1
H = 4
O = ~~2~~ 4

C = 1
H = ~~2~~ 4
O = ~~3~~ 4

b. Draw Dalton models (using circles to represent atoms) of the substances involved in this reaction.



4

13. Canadian regulations require oil companies to put a specific percentage of ethanol (a non-fossil fuel) into their gasoline. Determine the **concentration** of ethanol if you have 800 g of ethanol in 25 L of gasoline.

$m = 800 \text{ g}$
 $V = 25 \text{ L} = 25000 \text{ mL}$

$\%m/v = \frac{m(\text{g})}{V(\text{mL})} \times 100\%$



$\%m/v = \frac{800\text{g}}{25000\text{mL}} \times 100\% = 3.2\%$

4

14. Name that element! ...or just write its symbol.

- A noble gas with 5 energy shells.
- Atoms of this element gives up 2 electrons to be like argon.
- The only non-metal to the left of the staircase line.
- A metalloid that must acquire 3 more electrons to fill its valence shell.

Xe
Ca
H
As Sb

4