VI READING

AT PRESENTAL AND TOTALS IN ENGINEERING

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All F = 10 Newton

# UNIT V

of messes and the property of a solution of grammers and a period of time as so many so the solution of divisions on a scale. Thus, a dock is a solic for measuring length and a thorough the solic for measuring length and a solic for measuri

Colaboración: ING. GABRIELA ELIZONDO

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Colaboración:

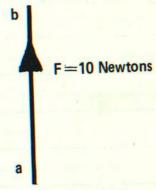
ING. GABRIELA ELIZONDO

V. 1 READING.

### PHYSICAL QUANTITIES IN ENGINEERING.

We deal with many different physical quantities in Engineering. They can be divided into two groups - scalar and vector quantities. Both have size or magnitude but only vector quantities possess direction. Force which we measure in newtons possesses magnitude and direction. Force then, is a vector quantity. Other examples are acceleration and

Any vector quantity can be represented by a vector. The straight line a - b in the diagram is a vector which represents a force. If we calculate its length we find that it's proportional to the magnitude of the force. The direction of the line indicates the direction of the force. It's important also to know in what sense of direction the force is acting. The arrow head of the line shows that the sense of direction of the force is upwards.



Scalar quantities are simply described by giving their magnitude in a suitable unit of measurement. For example, we can describe the mass of a body as a quantity of grammes, the capacity of a container as a number of cubic meters and a period of time as so many seconds. We can also illustrate scalar quantities by points or divisions on a scale. Thus, a clock is a scale for measuring time. Similary, a meter stick is a scale for measuring length and a thermometer is a scale for measuring heat.

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### A) COMPREHENSION EXERCISES

- V. 1.2. Briefly answer in Spanish the following questions according to the reading: "Physical Quantities in Engineering".
- 1. What group can physical quantities be divided into?

2. What are two examples of scalar quantities?

What are two examples of scalar quantities:

3. What units can we use in measuring force?

4. How are scalar quantities described?

5. What kind of scale is a thermometer?

V. 1.3. Complete the following diagram to make the classification of physical quantities.

Use the information from the reading to help you.

| Physical' 9 | quantities: |
|-------------|-------------|
|             |             |
|             | vector      |
|             | quantities  |
| mass        | velocity    |

|      | 4. Write true (T) or false (F) in the following sentences.  |                |
|------|---|----------------|
|      | Scalar quantities have direction.   | Marie<br>Lantu |
|      |   |                |
| 2.   | Force is an example of a scalar quantity.   |                |
|      | We measure force in meters.   |                |
| 4.   | Physical quantities can be divided into vector and scalar quantities.   | 1100019        |
|      | A meter stick is a scale for measuring length.  |                |
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|      | THE REAL PROPERTY OF THE PARTY |                |
| 17 1 | .5. Choose the corresponding letter and place it in the parenthesis.  |                |
| ٧. ١ |   |                |
| 1.   | An example of a scalar quantity is  |                |
|      | a) force.   |                |
|      | b) weight.  |                |
|      | c) acceleration.  |                |
| 2.   | A meter stick is a scale for measuring  |                |
|      | a) weight.  |                |
|      | b) length.  |                |
|      | c) capacity.  |                |
| 3.   | We can describe the capacity of a container as a number of (  | )              |
|      | a) cubic meters.  |                |
|      | b) seconds.   |                |
|      | c) pounds.  |                |
| 4.   | Scalar quantities have magnitude, but they don't have   |                |
|      | a) weight.  |                |
|      | b) scale.   |                |
|      | c) direction.   |                |

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### V. 2. READING.

### B) ELECTRICITY - THE FORCE THAT TRANSFORMED THE WORLD.

In order to talk about electricity, it's necessary first to talk about the atom. Ancient Greeks believed that all matter was made up atoms. The word "atom" in fact comes from the Greek word "atoms" which means indivisible. It wasn't until 1897 that it was discovered that the atom is not indivisible but is composed of even smaller particles. Among these particles is one called the electron.

Electrons orbit around the center or nucleus of the atom, much as the planets in the solar system orbit around the sun. Electrons closer to the nucleus are held more tightly than those in the outer orbits. It is electrons in the outermost orbit of certain kinds of atoms that can be made to flow as electric current.

Electrons flow easily through certain kinds of materials called "conductors". Many metals such as silver, copper, gold, and aluminum are good conductors. Good conductors are used in electric circuits to provide a path for the current.

Other substances provide strong resistance to the flow of current. These substances are called "insulators", which are used to confine a current to the desired path. Substances such as hard rubber, glass, wax and certain kinds of plastics are good insulators. Thus the cord of an electric appliance consists of a piece of wire, generally copper, surrounded by a type of plastic or vinyl, which is the insulator.

The pressure that makes electrons flow along wires is called "voltage". Voltage may be created by a generator at a power plant or by an electric battery. When you turn on the light or an electric appliance, electrons are drown from a generator at a power plant. When you turn the light off, there will be electric pressure or voltage built up at a switch, but no current will flow. It is somewhat similar to the way a water system works.

maticales aprendidas con anterioridad que presenta la lectura: "Electrici-

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# El alumno, respondiendo por escrito a los ejercicios comprobará el grado de comprensión alcanzado sobre la información que presenta la lectura: "Electricidad la fuerza que transformó al mundo".

a) nucleus.b) flow.c) voltage.

# B) COMPREHENSION EXERCISES V. 2.2. Briefly answer in Spanish the following questions according to the reading: "Electricity - the force that transformed the world" 1. Who was the first that believed that all matter was made up of atoms? When was it discovered that atoms are composed by smaller particles? What's one of the principal atomic particles? 4. How is the material where electrons flow easily through called? 5. How are the substances that provide strong resistance to the flow of current called? V. 2.3. Choose the corresponding letter and place it in the parenthesis. 1. Electrons will flow easily through copper and silver because they are good. . . ( ) a) particles. b) conductors. c) insulators. 2. Electrons are smaller particles of .......................() a) circuits. b) voltage. c) atoms. 3. Similar to the way that planets orbit around the sun, electrons in the atom orbit around.....()

| 4.     | A substance that offers strong resistance to the flow of electric current is called  |
|--------|--|
| 9 - 14 |  |
|        | a) a conductor.  |
| ,      | b) an appliance.   |
|        | c) an insulator.   |
|        | to the second of |
| 5.     | Rubber, glass and wax, are good  |
|        | the state of the second state of the second  |
|        | a) generators.   |
|        | b) insulators.   |
|        | c) conductors.   |
|        |  |
| V      | 2.4. Write true (T) or false (F) in the following sentences.   |
|        |  |
| 1.     | With a light turned off no current will flow but there will be voltage at the switch.  |
|        |  |
| 2.     | Aluminum and gold can be used as conductors.   |
| 4.     |  |
| 3.     | An electric cord consists of wire surrounded by a conductor.   |
|        |  |
| 4.     | Plastic and vinyl are often used as good conductors.   |
| 22     | 1 les a hottowy  |
| 5.     | Voltage can be created by a battery.   |
|        |  |
| V      | . 2.5. Fill in the blanks in the following sentences.  |
| ٧      |  |
| 1.     | Substances such as rubber, glass and wax are good  |
|        | of wive (copper) surrounded  |
| 2      | The cord of an electric appliance consists on a piece of wire (copper), surrounded   |
|        | by   |
|        | . The pressure that makes electrons flow along wire is called  |
| 3      | . The pressure that makes electrons now along wife is called   |
|        | When you turn a light, no current will flow.   |
| 4      |  |
|        | The believed that all matter was made up of atoms.   |

2. Certain way.

) Wire.

3. Constructed of.

( ) Path.

4. Belonging to former times, very old.

( ) Insulator.

5. Thread of metal.

( ) Copper.

6. (Cu) Metallic element of reddish color.

( ) Ancient.

7. Non conductor of electricity.

# V. 3. READING. To so that he posites and vel decrease a passe article but animoral but be babble in guard, and " . It's combat but a little accordarily delegant."

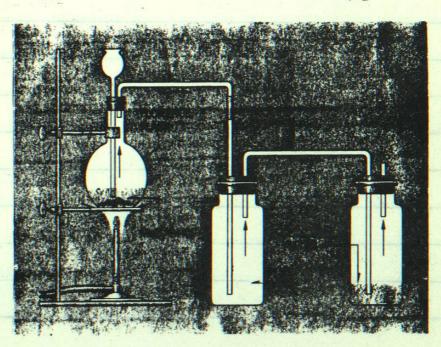
## C) THE HALOGENS. Wis scibed has saturated to not arraying sets not another periodic set.

Four elements different in their physical and chemical properties from the six noble gases are the diatomic element fluorine F<sub>2</sub>, chlorine Cl<sub>2</sub>, bromine Br<sub>2</sub>, and iodine I<sub>2</sub>. Fluorine is a violently active pale-yellow gas that can only be prepared and handled safely under strictly controlled conditions. Chlorine is a dense, choking, poisonous greenish-yellow gas of high chemical activity. Bromine is a redbrown highly corrosive volatile liquid at room temperature. Iodine exists as beautiful silver-black crystals of relatively high vapor pressure that yield a violet vapor.

The first halogen to be discovered was chlorine. Scheel obtained it in 1774. The gas made his nose and throat sting and almost blinded him. The method by which chlorine was first prepared is still the common laboratory method used today. Manganese dioxide Mn02 and hydrochloric acid HCL are mixed in a flask and heated resulting the liberation of chlorine gas Cl<sub>2</sub>. The chlorine gas is heavier than air and is normally collected as shown in Figure by displacing air from a second flask.

The equation of the reaction is:

$$Mn0_{2(s)}$$
 + 4 HCl  $\longrightarrow$  2H<sub>2</sub>0 + MnCl<sub>2(aq)</sub> + Cl<sub>2</sub>



Bromine and iodine are also prepared by the action of MnO<sub>2</sub> on water solutions of their acid hydrobromic HBr and hydrioic HI. The MnO<sub>2</sub> is added and the mixture heated. The final equations for the preparation of bromine and iodine are:

$$Mn0_2 + 4HBr \longrightarrow 2H_20 + MnBr_2 + Br_2$$
 $Mn0_2 + 4HI \longrightarrow 2H_20 + MnI_2 + I_2$ 

Fluorine cannot be prepared in the same way. In fact fluorine can only be prepared using specialized equipment not commonly found in most laboratories.

The first enloyers to be elected was chloring besided by in 192 plants of the part of the plants of the part of the component of the component

Ha02(s) + 4HCl = 2H20 + MaCl2(sq) + Cl2

PREPART AND THE CAMPACAN SECULATION OF A PROPERTY OF THE STATE OF THE

|            | halogens'.  |
|------------|---|
| *          | Which was the first halogen that was discovered?                                    |
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| à.         | How does roding exist at yours turpersture?   |
|            |   |
|            |   |
| 5,         | What's the chemical formula for appropriate Sicusde?                                |
|            |   |
| V. 8       | 3. Choose U.s corresponding letter th the correct answer and place it in the paren- |
|            |   |
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|            | b) iodine.  |
|            | Can note by pressure the action combatter and distance.                             |

V. 3.1. Translate to Spanish the reading: "The halogens".