



San Carlos University of Guatemala

Faculty of Engineering

School of Sciences

Technical English: \_\_1\_\_

Section: \_\_A\_\_

Date: Thursday, April 04, 2022

Group Number

5

## Name of the assignment:

### Homework No. 1 (First Exam)

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Teacher : Calos Leonel Muñoz Lemus Date : 25/04/2022

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### Translate Algebraic Expressions

1) The sum of three-fifths of z, three-fourths of r, and 9  $\underline{9\frac{3}{5}z + \frac{3}{4}r + 9}$

2) z cubed minus the product of 7 and c plus 3  $\underline{z^3 - 7c + 3}$

3) g squared plus the product of 5 and f plus 3  $\underline{\sqrt{g} + 5f + 3}$

4) The sum of two-fifths of s and five-sixths of w, minus 8  $\underline{\frac{2}{5}s + \frac{5}{6}w - 8}$

5) One-third of p is added to the product of 5 and k  $\underline{\frac{1}{3}p + 5k}$

6) The product of n and 3 is subtracted from two-thirds of k  $\underline{n + 3 - \frac{2}{3}k}$

7) One-half of the sum of d and 7 plus the product of 2 and c  $\underline{\frac{1}{2}(7 + d) + 2c}$

8) One-third of the sum of 7 and y plus the product of 3 and k  $\underline{\frac{1}{3}(7 + y) + 3k}$

9) One-sixth of the sum of 8 and d minus the product of 6 and k  $\underline{\frac{1}{6}(8 + d) - 6k}$

10) One-fifth of the sum of c and 3 minus the product of 6 and q  $\underline{\frac{1}{5}(c + 3) - 6q}$



Date: 25/04/2022

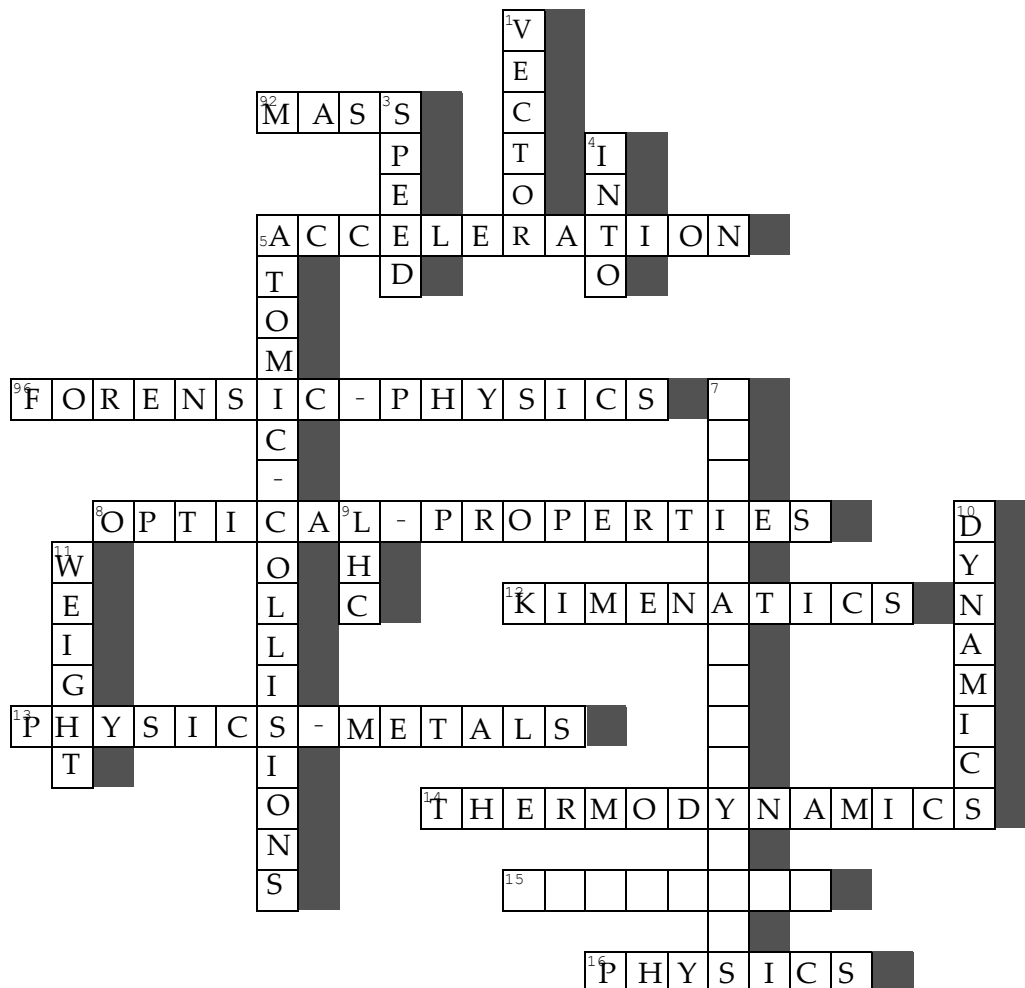
## Worksheet (Physics)

### Horizontal

2. Is a measure of the amount of matter in an object. Not related to gravity.
5. is the rate of change in the speed of an object.
6. They develop new techniques useful in the judicial forum.
8. Study of light and ultra-fast vibration at the nanoscale, and ultra-sensitive detection of molecules and pollutants.
12. The consequences of the motion of bodies
13. research is directed to the thermodynamic and mechanical properties of metal
14. All phenomena related to the temperature, not just with the heat
15. It has two parts: a number and a unit.
16. Is the science of natural phenomena based on their properties.

### Vertical

1. Is a quantity that has both magnitude and direction
3. You need to know the distance traveled and the time taken to travel that distance.
4. Described as something "per" something
5. Experimental and theoretical research on the interactions of Atomic particles
7. Development of techniques of cancer treatment: radiation therapy and brachytherapy.
9. The world's largest and highest-energy particle accelerator
10. The causes of the motion of bodies
11. Is a measure of the gravitational force between two objects.





## **Worksheet – Statistics**

### **1. Identify the population and the sample:**

- a) A survey of 1353 American households found that 18% of the households own a computer.  
Sample: households  
Population: 243.54 have a computer
- b) A recent survey of 2625 elementary school children found that 28% of the children could be classified obese.  
Sample: kids  
Population: 735 the children could be classified obese.
- c) The average weight of every sixth person entering the mall within 3 hour period was 146 lb.  
Sample: weight of person  
Population: 146

### **2. Determine whether the numerical value is a parameter or a statistics (and explain your choice):**

- a) A recent survey by the alumni of a major university indicated that
- b) the average salary of 10,000 of its 300,000 graduates was 125,000.  
Statistics, because of one measurement a statistical analysis was performed which gave us the data among all participants.
- c) The average salary of all assembly-line employees at a certain car manufacturer is \$33,000.

Parameter, because they are providing us with the manufacturing company data.

- d) The average late fee for 360 credit card holders was found to be \$56.75.

Parameter, because they are providing us with the data of the analysis they performed according to their data

**3. For the studies described, identify the population, sample, population parameters, and sample statistics:**

a) In a USA Today Internet poll, readers responded voluntarily to the question "Do you consume at least one caffeinated beverage every day?"

sample: readers

b) Astronomers typically determine the distance to galaxy (a galaxy is a huge collection of billions of stars) by measuring the distances to just a few stars within it and taking the mean (average) of these distance measurements.

Population: huge collection of billions of stars

Sample: just a few stars

Parameters: mean and distance

**4. Identify whether the statement describes inferential statistics or descriptive statistics (and explain your reasoning):**

a) The average age of the students in a statistics class is 21 years.

R// descriptive statistics: because it describes a parameter of a population

b) The chances of winning the California Lottery are one chance in twenty-two million.

R// inferential statistics: because it shows us a probability

c) There is a relationship between smoking cigarettes and getting emphysema.

R// inferential statistics: because it seeks a relationship between cause and effect

d) From past figures, it is predicted that 39% of the registered voters in California will vote in the June primary.

R// because it makes future predictions based on obtained data

## 5. Determine whether the data are qualitative or quantitative:

- a) The colors of automobiles on a used car lot **R// qualitative**
- b) The numbers on the shirts of a girls' soccer team **R// qualitative**
- c) The number of seats in a movie theater **R// quantitative**
- d) A list of house numbers on your street **R// qualitative**
- e) The ages of a sample of 350 employees of a large hospital **R// quantitative**

## 6. Decide which method of data collection you would use to collect data for the study (observational study, experiment, simulation, or survey):

- a) A study of the salaries of college professors in a particular state **R// observational study**
- b) A study where a political pollster wishes to determine if his candidate is leading in the polls **R// survey**
- c) A study where you would like to determine the chance getting three girls in a family of three **children R// simulation**
- d) A study of the effects of a fertilizer on a soybean crop **R// experiment**
- e) A study of the effect of koalas on Florida ecosystem **R// observational study**

## 7. Explain what bias there is in a study done

entirely online.

**R//** The entire population cannot be evaluated because not everyone knows how to use the technology to answer surveys, and it is limited to young people, children and very few adults.

## 8. A local newspaper ran a survey by asking, "Do you support the development of a weapon that could kill millions of innocent people?" Determine whether the survey questions are biased and why.

**R//** most people would not like to support a cause which involves the death of their fellow human beings, so the question should be better structured by not appealing to human morality to obtain a desired result.

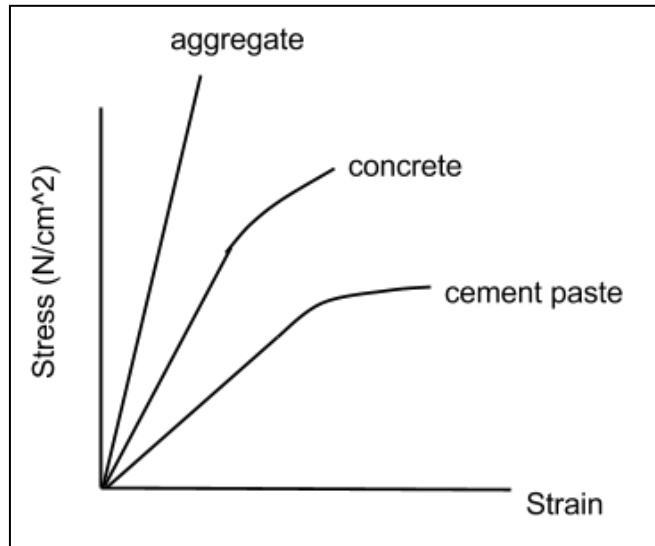
# Building a Stronger (Sweeter) New Orleans Activity

## Stress vs. Strain

### Worksheet

## Directions

Use the following graph to answer questions 1-7.



## Questions

For each of the following questions, please use complete sentences and explain your answers.

1. Research and explain the difference between aggregate, concrete and cement.

-The aggregate are minerals of a variable size such as gravel or sand that are used for a better finish and better resistance.  
-Concrete is the product of mixing various materials in different proportions such as cement, sand, gravel and all this is mixed with water.  
-Cement is the material that makes everything compact, for that it needs to be mixed with water to act as a glue.

2. Which of these is a composite material? Explain your answer.

Concrete is a composite material, because to create it requires different proportions of different materials such as cement, gravel or sand, water, among many others.

3. Which material has the largest value of Young's modulus? Explain.

Concrete is the one that has more value in Young's model because the aggregate has stress but not much strain, the cement has more strain but not much stress, and the concrete is level in both respects.

4. Which is the stiffer material? Explain.

The concrete once dry is the most stiffer because this, when it dries, becomes a solid material, as well

5.

Concrete, since it is the most used in constructions as well as being the only one that uses the other two materials.

6.

It is a plastic deformation, produced by removing the load, this produces residual changes in both the structure and properties of the material.

7.

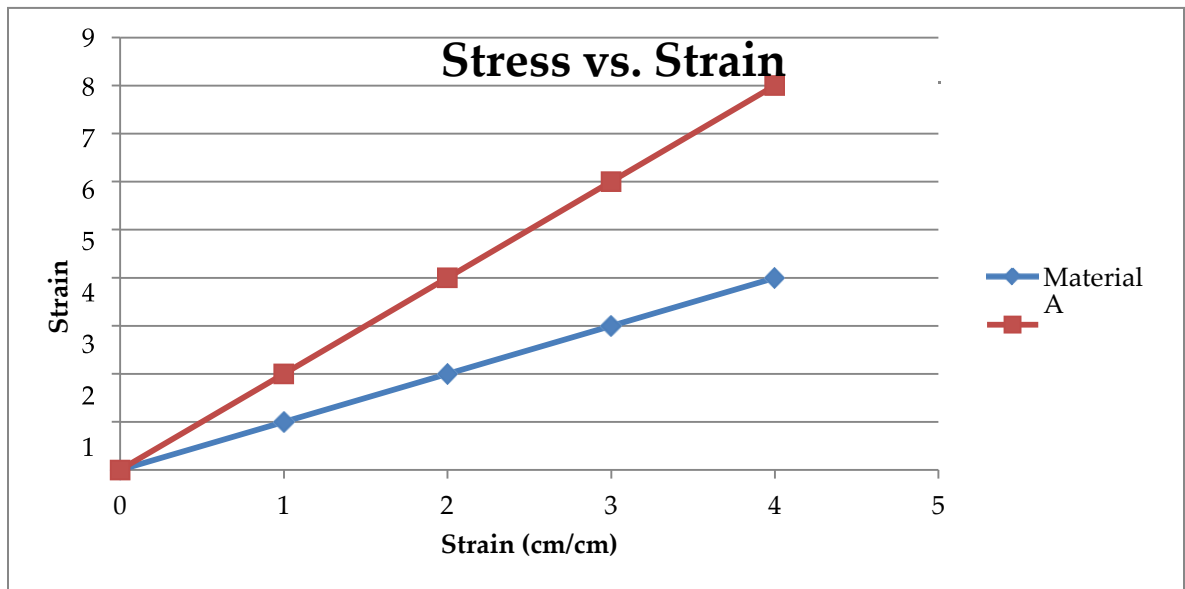
The sample of cement that was used to generate data for the graph above was 5 mm wide and 5 mm long. Imagine that you are given a sample that is wider and longer. Will the graph of stress vs. strain be different for this sample? Explain.

No, since it is properties of the cement that tell us this, like the density, these values will not change depending on the mass and length.

8.

You are given two unknown materials, labeled A and B. Material A has a Young's modulus of  $1 \text{ N/cm}^2$  and material B has a Young's modulus of  $2 \text{ N/cm}^2$ . Each material is initially 4 cm long.

- Sketch a graph of stress vs. strain for the two materials on the same set of axes.



Which material compresses more if a pressure of  $2 \text{ N/cm}^2$  is applied to it? Explain in words or show calculations to support your answer.

Material A compresses more as it has less resistance and material B, having greater resistance, requires a greater load or stress.





## **Worksheet – Economy**

### **Read this summary**

- ◆ Economists use the model of supply and demand to analyze competitive markets. In a competitive market, there are many buyers and sellers, each of whom has little or no influence on the market price.
- ◆ The demand curve shows how the quantity of a good demanded depends on the price. According to the law of demand, as the price of a good falls, the quantity demanded rises. Therefore, the demand curve slopes downward.
- ◆ In addition to price, other determinants of the quantity demanded include income, tastes, expectations, and the prices of substitutes and complements. If one of these other determinants changes, the demand curve shifts.
- ◆ The supply curve shows how the quantity of a good supplied depends on the price. According to the law of supply, as the price of a good rises, the quantity supplied rises. Therefore, the supply curve slopes upward.
- ◆ In addition to price, other determinants of the quantity supplied include input prices, technology, and expectations. If one of these other determinants changes, the supply curve shifts.
- ◆ The intersection of the supply and demand curves determines the market equilibrium. At the equilibrium price, the quantity demanded equals the quantity supplied.
- ◆ The behavior of buyers and sellers naturally drives markets toward their equilibrium. When the market price is above the equilibrium price, there is a surplus of the good, which causes the market price to fall. When the market price is below the equilibrium price, there is a shortage, which causes the market price to rise.
- ◆ To analyze how any event influences a market, we use the supply-and-demand diagram to examine how the event affects the equilibrium price and quantity. To do this we follow three steps. First, we decide whether the event shifts the supply curve or the demand curve (or both). Second, we decide which direction the curve shifts. Third, we compare the new equilibrium with the old equilibrium.
- ◆ In market economies, prices are the signals that guide economic decisions and thereby allocate scarce resources. For every good in the economy, the price ensures that supply and demand are in balance. The equilibrium price then determines how much of the good buyers choose to purchase and how much sellers choose to produce.

### Define these key concepts

- |                   |                             |                            |
|-------------------|-----------------------------|----------------------------|
| 1. market,        | 8.complements,              | 15supply curve,            |
| 2. competitive    | 9.demand                    | 16equilibrium,             |
| market,           | schedule                    | 17equilibrium price,       |
| 3. quantity       | 10demand curve,             | 18equilibrium              |
| demand,           | 11 <i>ceteris paribus</i> , | quantity                   |
| 4. law of demand  | 12quantity                  | 19surplus,                 |
| 5. normal good,   | supplied,                   | 20shortage,                |
| 6. inferior good, | 13law of supply,            | 21law of supply and demand |
| 7. substitutes,   | 14supply                    |                            |
|                   | schedule,                   |                            |

1. Is a place where two parties can gather to facilitate the exchange of goods and services. The parties involved are usually buyers and sellers.
2. Is a **structure in which no single consumer or producer has the power to influence the market.**
3. Is the **quantity of a commodity that people are willing to buy at a particular price at a particular point of time.**
4. The prices of the goods or services and their quantity demanded are inversely related when the other factors remain constant. In other words, when the price of any product increases, then its demand will fall, and when its price decreases, its demand will increase in the market.
5. Is a good that experiences an **increase in its demand due to a rise in consumers' income**
6. Describes a **good whose demand drops when people's incomes rise.**
7. Refers to a **product or service that consumers see as essentially the same or similar-enough to another product.**
8. **Complements** are goods or services that are frequently used together.
9. Is a **table that shows the quantity demanded of a good or service at different price levels.**
10. is a **visual representation of how many units of a good or service will be bought at each possible price**
11. Is often used in economics to describe a situation where one determinant of supply or demand changes while all other factors affecting supply and demand remain unchanged.
12. Describes the **number of goods or services that suppliers will produce and sell at a given market price**
13. States that, all other factors being equal, as the price of a good or service increases, the quantity of goods or services that suppliers offer will increase, and vice versa.
14. Is defined as a **tabular representation of the law of supply.** It represents the quantities of a product supplied by a supplier at different prices and time periods, keeping all other factors constant.
15. Is a representation of the relationship between the price of a good or service and the quantity supplied for a given period of time
- 16 Economic equilibrium is a condition or state in which economic forces are balanced. In effect, economic variables remain unchanged from their equilibrium values in the absence of external influences
- 17 Is where the supply of goods matches demand. When a major index experiences a period of consolidation or sideways momentum, it can be said that the forces of supply and demand are relatively equal and the market is in a state of equilibrium.
- 18 Is when there is no shortage or surplus of a product in the market
- 19 Describes the amount of an asset or resource that exceeds the portion that's actively utilized. A surplus can refer to a host of different items, including income, profits, capital, and goods
- 20 Is a condition where the quantity demanded is greater than the quantity supplied at the market price.
- 21 Is a theory that explains the interaction between the sellers of a resource and the buyers for that resource.

### Solve these questions for review

1. What is a competitive market? Briefly describe the types of markets other than perfectly competitive markets.
  - **A competitive market is one in which there are many buyers and many sellers so that each has a negligible impact on the market price.**
2. What determines the quantity of a good that buyers demand?
  - **The price of the goods, income, the prices of related goods, tastes, expectations, and the number of buyers.**
3. What are the demand schedule and the demand curve, and how are they related? Why does the demand curve slope downward?
  - **Shows that as price rises, quantity demanded decreases, and vice versa.**
  - **The demand curve shows how the quantity of a good demanded depends on the price**
  - **These 2 concepts are related because your behavior depends on the price**

- **The curve points down because if the low price implies that it is not so requested and therefore it should be reduced the cost**

4. Does a change in consumers' tastes lead to a movement along the demand curve or a shift in the demand curve? Does a change in price lead to a movement along the demand curve or a shift in the demand curve?

- **A change consumers' taste will only shift the demand curve, while a change in the price of the good itself will represent a movement along the demand curve. A curve shifts when there is a change in a relevant variable that is not measured on either axis.**

5. Popeye's income declines and, as a result, he buys more spinach. Is spinach an inferior or a normal good? What happens to Popeye's demand curve for spinach?

- **Popeye buys more spinach when his income declines. As such, spinach is an inferior good for him. His demand curve for spinach shifts out to the right as a result of the decrease in his income.**

6. What determines the quantity of a good that sellers supply?

- **Price is a factor and the cost of production**

7. What are the supply schedule and the supply curve, and how are they related? Why does the supply curve slope upward?

8. Does a change in producers' technology lead to a movement along the supply curve or a shift in the supply curve? Does a change in price lead to a movement along the supply curve or a shift in the supply curve?

**A change in producers' technology leads to a shift in the supply curve. A change in price leads to a movement along the supply curve.**

9. Define the equilibrium of a market. Describe the forces that move a market toward its equilibrium.

**are buyers making up the demand side of the market, sellers make up the supply side of the market**

10. Beer and pizza are complements because they are often enjoyed together. When the price of beer rises, what happens to the supply, demand, quantity supplied, quantity demanded, and the price in the market for pizza?

**Supply is unchanged, demand is decreased, quantity supplied and quantity demanded declines, and the price falls.**

11. Describe the role of prices in market economies.

**Thus prices help signal the market, i.e. suppliers and consumers of the need and availability of a good/service and help in effectively allocating resources as per demand and supply**

12.