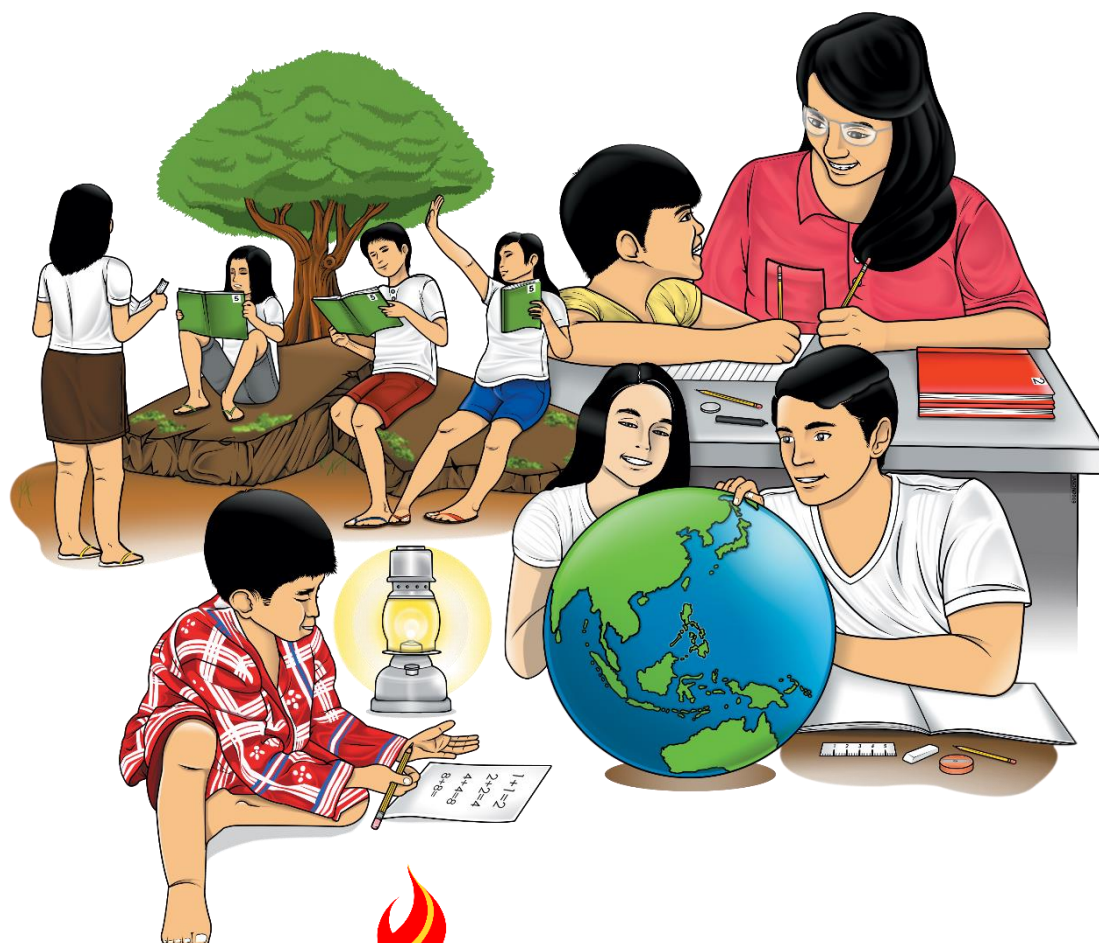


# Disaster Readiness and Risk Reduction

## Quarter 1 – Module 7: Vulnerabilities of Different Elements Exposed to Hazards



**Disaster Readiness and Risk Reduction**  
**Alternative Delivery Mode**  
**Quarter 1 – Module 7: Vulnerabilities of Different Elements Exposed to Hazards**  
**First Edition, 2020**

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# **Disaster Readiness and Risk Reduction**

## **Quarter 1 – Module 7: Vulnerabilities of Different Elements Exposed to Hazards**

# Introductory Message

For the facilitator:

Welcome to the Disaster Readiness and Risk Reduction 11/12 Alternative Delivery Mode (ADM) Module on Vulnerabilities of Different Elements Exposed to Hazards!

This module was collaboratively designed, developed, and reviewed by educators both from public and private institutions to assist you, the teacher or facilitator in helping the learners meet the standards set by the K to 12 Curriculum while overcoming their personal, social, and economic constraints in schooling.

This learning resource hopes to engage the learners into guided and independent learning activities at their own pace and time. Furthermore, this also aims to help learners acquire the needed 21st century skills while taking into consideration their needs and circumstances.

In addition to the material in the main text, you will also see this box in the body of the module:



## ***Notes to the Teacher***

This contains helpful tips or strategies that will help you in guiding the learners.

As a facilitator, you are expected to orient the learners on how to use this module. You also need to keep track of the learners' progress while allowing them to manage their own learning. Furthermore, you are expected to encourage and assist the learners as they do the tasks included in the module.

For the learner:

Welcome to the Disaster Readiness and Risk Reduction 11/12 Alternative Delivery Mode (ADM) Module on Vulnerabilities of Different Elements Exposed to Hazards!

The hand is one of the most symbolized parts of the human body. It is often used to depict skill, action and purpose. Through our hands we may learn, create, and accomplish. Hence, the hand in this learning resource signifies that you as a learner is capable and empowered to successfully achieve the relevant competencies and skills at your own pace and time. Your academic success lies in your own hands!

This module was designed to provide you with fun and meaningful opportunities for guided and independent learning at your own pace and time. You will be enabled to process the contents of the learning resource while being an active learner.

This module has the following parts and corresponding icons:



***What I Need to Know***

This will give you an idea of the skills or competencies you are expected to learn in the module.



***What I Know***

This part includes an activity that aims to check what you already know about the lesson to take. If you get all the answers correct (100%), you may decide to skip this module.



***What's In***

This is a brief drill or review to help you link the current lesson with the previous one.



***What's New***

In this portion, the new lesson will be introduced to you in various ways such as a story, a song, a poem, a problem opener, an activity or a situation.



***What is It***

This section provides a brief discussion of the lesson. This aims to help you discover and understand new concepts and skills.



***What's More***

This comprises activities for independent practice to solidify your understanding and skills of the topic. You may check the answers to the exercises using the Answer Key at the end of the module.



***What I Have Learned***

This includes questions or blank sentence/paragraph to be filled in to process what you learned from the lesson.



***What I Can Do***

This section provides an activity which will help you transfer your new knowledge or skill into real life situations or concerns.



### **Assessment**

This is a task which aims to evaluate your level of mastery in achieving the learning competency.



### **Additional Activities**

In this portion, another activity will be given to you to enrich your knowledge or skill of the lesson learned. This also tends retention of learned concepts.



### **Answer Key**

This contains answers to all activities in the module.

At the end of this module you will also find:

### **References**

This is a list of all sources used in developing this module.

The following are some reminders in using this module:

1. Use the module with care. Do not put unnecessary mark/s on any part of the module. Use a separate sheet of paper in answering the exercises.
2. Don't forget to answer *What I Know* before moving on to the other activities included in the module.
3. Read the instruction carefully before doing each task.
4. Observe honesty and integrity in doing the tasks and checking your answers.
5. Finish the task at hand before proceeding to the next.
6. Return this module to your teacher/facilitator once you are through with it.

If you encounter any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator. Always bear in mind that you are not alone.

We hope that through this material, you will experience meaningful learning and gain deep understanding of the relevant competencies. You can do it!



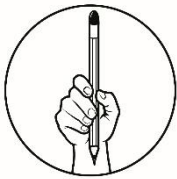
## ***What I Need to Know***

In this module, the learner will be able to recognize vulnerabilities of different elements exposed to hazards and at the same time, determine all those elements.

The Module is intended to equip you with knowledge on vulnerabilities of different elements exposed to specific hazards.

After going through this module, you are expected to:

1. comprehend the different elements that may be exposed to hazards;
2. differentiate vulnerabilities of different elements exposed to specific hazards;
3. explain how different elements can become exposed to hazard making it more vulnerable; and
4. integrate the different vulnerabilities to understand the its interconnection with one another.



## ***What I Know***

**Choose the letter of the best answer. Write the chosen letter on a separate sheet of paper.**

1. Which among the following is classified as social vulnerability?
  - a. fatalism
  - b. soil quality
  - c. health facilities
  - d. leadership qualities
2. What is the degree to which a population, system, service or geographic area is likely to be affected or disrupted by the impact of a particular hazard?
  - a. capacity
  - b. hazard
  - c. risk
  - d. vulnerability

3. What element is exposed to hazard during typhoon when the houses are destroyed?
  - a. economical
  - b. environmental
  - c. physical
  - d. social
  
4. What element is exposed when flood occurred due to deforestation?
  - a. economical
  - b. environmental
  - c. physical
  - d. social
  
5. COVID 19 pandemic affected the economy resulting to closure of many businesses during the enhanced community quarantine. What element is mostly affected?
  - a. economical
  - b. environmental
  - c. physical
  - d. social
  
6. Increased human population can sometimes result to \_\_\_\_\_.
  - a. lowered risk
  - b. less exposure
  - c. decreased hazard
  - d. increased vulnerability
  
7. Some areas in Cavite is situated within the fault lines stated at risk by PHILVOLCS. What element has least possibility of being exposed to hazard?
  - a. economical
  - b. environmental
  - c. physical
  - d. social
  
8. COVID 19 pandemic affected the operations of establishments such as malls and other leisure establishments which were prohibited from operating to prevent further community transmission. Which element is mostly exposed?
  - a. economical
  - b. environmental
  - c. physical
  - d. social
  
9. What factors determine the level of disaster risk?
  - I. nature of the hazard
  - II. exposure of the community at risk
  - III. vulnerability of the elements which are affected
  - IV. economic value of the elements which are affected



- a. I and II
- b. II and III
- c. III and IV
- d. II and IV

10. All of the following choices can least likely cause physical vulnerability EXCEPT \_\_\_\_\_.

- a. pandemic
- b. storm surge
- c. tsunami
- d. wild fire

11. Which among the following is considered as socio-economical hazard?

- a. volcanic eruption
- b. flooding and drought
- c. chemical contamination
- d. environmental degradation

12. Why is it important to quantify vulnerability?

- a. to identify the community that are at risk
- b. to determine the incoming hazardous events
- c. to estimate how much mitigation and preparedness is applicable
- d. to know the local government units to approach during hazardous event

13. How will you quantify the vulnerability of the people?

- a. get the ratio of the number of people died to the total population
- b. get the ratio of the number of people survived to the total population
- c. get the ratio of the total population to the number of people survived
- d. get the ratio of the number of casualties or injured to the total population

14. The vulnerability status of a structure or building depends on the following EXCEPT \_\_\_\_\_.

- a. cost of repair
- b. economic losses
- c. extent of damage
- d. degree of injury to the people

15. Kaingin is a human practice where in a forest is converted to farmland. In this case, what element is most likely exposed to hazard?

- a. economical
- b. environmental
- c. physical
- d. social

**Lesson****1****Recognize vulnerabilities of different elements exposed to specific hazards.**

The learners in this module will realize that recognizing the vulnerabilities of different elements exposed to hazard will help the community design to formulate strategies on prevention, mitigation, and immediate response and possible rehabilitations after a major event such as natural disasters, war and the other similar situations.

***What's In***

**Direction:** Classify the following words/phrase according to the given category below. Write your answer on a separate sheet of paper.

agricultural land

hospital

seashore

barangay response team

marine resources

social status

bridges

railroads

subdivision

fish pond

rainforest

telecommunications

government

schools

transportation

Category 1	Category 2	Category 3

If you are going to assign labels or headings for each category, what could it be?

Category 1 \_\_\_\_\_

Category 2 \_\_\_\_\_

Category 3 \_\_\_\_\_



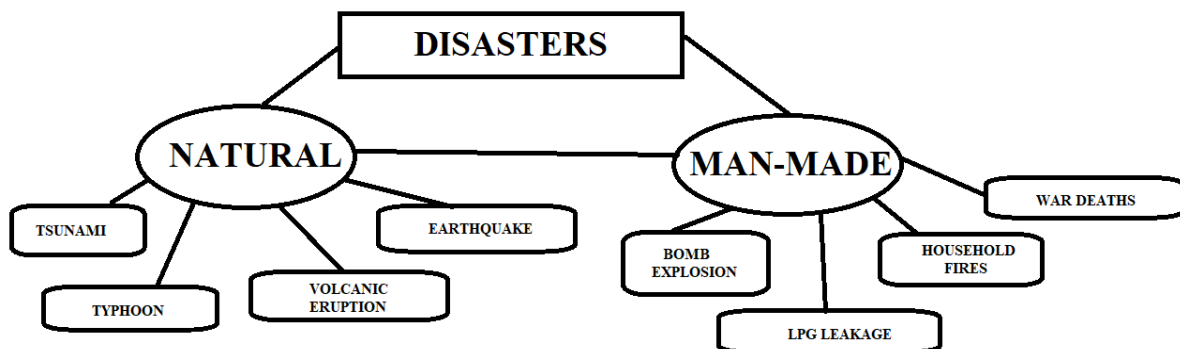
### ***Notes to the Teacher***

There are several possible answers. Consider answers that are relevant to the questions and could have been a possible answer but not included in the answer key.



### ***What's New***

**Direction:** Concept map is a visual representation that shows relationships between concepts. Arrange the following words or phrase into a concept map. Under the diagram, explain how did you come up with your output and cite your basis. (*see the sample concept map below*)



## GUIDE WORDS:

ecosystem  
elements  
environmental

exposed  
hazard  
physical

response and recovery  
risk  
socio-economic

tangible



## ***What is It***

Vulnerabilities of different elements are determined due to its exposure to particular and specific hazard.

**Physical vulnerability** includes population density levels, place of a settlement, the site design, and materials used for infrastructure and housing. When hazardous events occur, normally physical elements are severely damaged. For example, UP Visayas buildings were totally destroyed during the super typhoon Yolanda in 2008 leaving the structure totally damaged. Another example is the decreased in population density like what happened in Baguio during the 1990 earthquake in North Luzon when a lot of people were injured and died.

**Social vulnerability** happens due to inability of people, organization, and societies to prevent severe effects from hazards because of the expected behavior in social interactions, institutions, and system of cultural values. For example, during typhoon the line of

communications were cut off when cell sites shutdown or disruption of transport system due to inability of small vehicles to pass through the flooded areas or unpassable roads and bridges. With some difficulties in the delivery of services such as relief goods and medicines, a lot of problems occurred like shortage of food and spread of infectious diseases. Therefore, when social elements were exposed to hazard, these may lead to disruption of normal processes and activities in the community.

Level of **economic vulnerability** is based on the economic status of individuals, communities, and nations. The poorer the country, the more vulnerable to disasters because they lack the funds or budgets to build sturdy structures and put other engineering measures in place which protect them from being affected by disasters. So, we can say that Philippines is more vulnerable to an event such as earthquake compared to Japan. Though both countries are exposed to earthquake hazard because both are located in the Pacific ring of fire, but due to differences in economic status, Japan is more resilient because of its ability to afford changes in architectural and engineering designs of building and infrastructures to make them less vulnerable to earthquake. Another example is the Covid-19 pandemic wherein the most affected are those who belong to low income and informal workers.

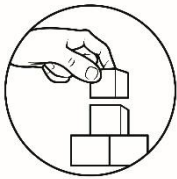
Social and economic vulnerability can be combined also known as **socioeconomic vulnerability**.

**Environmental vulnerability** is caused by natural resources depletion and destruction. Organisms like humans, animals, and plants are all dependent on the environment for survival. Human activities like deforestation, burning of fossil fuels, and kaingin affect the natural abilities of the environment to protect itself from any natural hazard due to absence of trees which may cause landslide and flashfloods. Sometimes the effects are irreversible.

Quantifying vulnerability is used in estimating how much mitigation and preparedness measures will be applied. Computation is based on the previous hazard events and severity of their effects. Vulnerability can be expressed as: 0 = lowest degree of vulnerability and 1 as the highest degree. Vulnerability of people is the ratio of casualties or injured to the total population. Vulnerability of buildings is expressed as a repair cost or degree of damage.

The Philippines has high vulnerability due to the following reasons:

- It lies in the Pacific typhoon belt and we are visited by an average of 20 typhoons every year.
- Rugged nature of the landscape makes it vulnerable to landslide, mudflows, and other disasters.
- It is an archipelagic country with many small islands where some areas are at below sea level.
- It has the longest shoreline in the world at 32,400 km making it vulnerable to storm surges.
- It is still a primary agricultural and fishing economy.
- With poor institutional and social capacity to manage, respond, and recover from natural hazard events.
- With high level of poverty
- Aside from typhoon, it is also at risk to volcanic eruptions, quakes, and floods.



## ***What's More***

**Direction:** Classify the following phrases and sentences whether it is PHYSICAL, SOCIOECONOMICAL OR ENVIRONMENTAL VULNERABILITY.

1. shutdown of telecommunication tower
2. houses built near fault lines
3. denudation of forests
4. rest houses near Boracay shoreline
5. Twenty-story building constructed on soil mainly made up of clay.
6. bridges with cracks and crevices
7. overfertilization of agricultural soil
8. Lost of job due to COVID-19 pandemic.
9. possible retrenchment of ABS CBN employees due to its shutdown
10. Destruction of coral reefs that serves as barriers against storm surge.



## ***What I Have Learned***

**Direction.** The following are different situational statements. Identify 3 elements that are vulnerable in each situation.

1. You are a secondary student. You are stranded in your school building. They have blocked off the entrances and exits because the grounds are flooded. You have been trying to call your family and trying to get news on your house, but the signal's down. You have only gotten your books, notebooks, and laboratory materials in your bag and locker. What elements of vulnerability are present in the situation?

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2. You and your family is living in an apartment. You knew that the location you are residing is a flood risk area. The radio reports anticipated flooding, and you heard the rain pouring, so you prepared water bottle, some clothes, canned goods, and cash. You placed all your electronic appliances on top of the cabinets and tables and encased them in plastic covers. You're ready to go out, but you don't know where the evacuation center is.

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3. You and your family are very creative and artistic. You have got two younger sisters and one younger brother. Your mother owns several vases and portraits she has made herself. It occurs that there is a 2-minute earthquake of magnitude 6 and intensity 4 in your hometown. Your family panicked and put all the vases and portraits down the floor to prevent this from braking.

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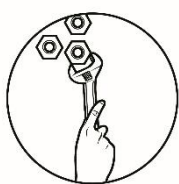
4. Your father's on his way to a Manila work event. The bus stops unexpectedly at Bacoar, Cavite and the bus driver declares that they will soon suspend the operations because most of the roads are flooded and they are unable to proceed. All the passengers take a negative reaction. Your father forgot his cellphone, and because the signal is failing, he cannot call his officemates and family.

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5. You are 84 years old and staying in your house in Quezon city. You are dependent on the house help which your daughter hired to take care of you. You have difficulty in talking and trying to tell the maid to turn on the radio and prepare food. You want to know what's going on. You hear that there is a pandemic and the whole Luzon is under Enhanced Community Quarantine. Since you are susceptible to the virus and with your health condition, it is not advisable to deal and have physical contact with your family members. You want to know how your daughter and grandkids are doing in Cebu.



### ***What I Can Do***

**Direction:** Read the situation below. The complete the task that follows.

You have got a rice store in your home. According to the news, Typhoon Ondoy will bring heavy rain to almost every part of Southern Luzon, including your location. At first, the rain seemed normal, but it's just not going to stop. There are fewer customers right now. With this rain, there may not be any more customers soon. It might flood in a bit, but if you close the store, you 're not going to be able to feed your three children. So, you've decided not to close the store. There's news from your neighbors that your residence is already overflowing, and in a few minutes your store and the rest of the community will be flooded. Your family has been instructed by barangay officials to evacuate the public elementary school in the vicinity of School. Your family has been instructed by the Barangay officials to evacuate to a public elementary school located in your municipality.

1. Identify all the elements exposed to hazard "Typhoon Ondoy" and identify the category (Physical, socioeconomical or environmental).

Elements exposed to hazard	Category



2. If you are in the same situation, what will be your immediate decision? Stay in the place that you consider as your way of living or prioritize the safety of your family?

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3. Why is it so important to determine the elements exposed to hazards in your community?

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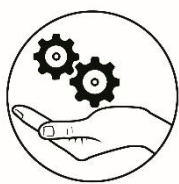
## ***Assessment***

**Choose the letter of the best answer. Write the chosen letter on a separate sheet of paper.**

1. Which among the following is classified as social vulnerability?
  - a. fatalism
  - b. soil quality
  - c. health facilities
  - d. leadership qualities
  
2. What is the degree to which a population, system, service or geographic area is likely to be affected or disrupted by the impact of a particular hazard?
  - a. capacity
  - b. hazard
  - c. risk
  - d. vulnerability
  
3. What element is exposed to hazard during typhoon when the houses are destroyed?
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  - c. physical
  - d. social

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6. Increased human population can sometimes result to \_\_\_\_\_.
  - a. lowered risk
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  - b. environmental
  - c. physical
  - e. social
  
9. What factors determine the level of disaster risk?
  - V. nature of the hazard
  - VI. exposure of the community at risk
  - VII. vulnerability of the elements which are affected
  - VIII. economic value of the elements which are affected
  - a. I and II
  - b. II and III
  - c. III and IV
  - d. II and IV

10. All of the following choices can least likely cause physical vulnerability EXCEPT \_\_\_\_\_.
- pandemic
  - storm surge
  - tsunami
  - wild fire
11. Which among the following is considered as socio-economical hazard?
- volcanic eruption
  - flooding and drought
  - chemical contamination
  - environmental degradation
12. Why is it important to quantify vulnerability?
- to identify the community that are at risk
  - to determine the incoming hazardous events
  - to estimate how much mitigation and preparedness is applicable
  - to know the local government units to approach during hazardous event
13. How will you quantify the vulnerability of the people?
- get the ratio of the number of people died to the total population
  - get the ratio of the number of people survived to the total population
  - get the ratio of the total population to the number of people survived
  - get the ratio of the number of casualties or injured to the total population
14. The vulnerability status of a structure or building depends on the following EXCEPT \_\_\_\_\_.
- cost of repair
  - economic losses
  - extent of damage
  - degree of injury to the people
15. Kaingin is a human practice where in a forest is converted to farmland. In this case, what element is most likely exposed to hazard?
- economical
  - environmental
  - physical
  - social



## ***Additional Activities***

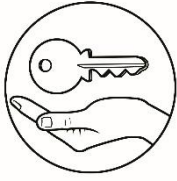
Hand-Made or Do-It-Yourself Information flyers

1. Observe a community (you can choose your own community or barangay).
2. Determine all the elements exposed to hazard in that particular locality.
3. Make an information flyer and include all the elements exposed to hazard. Also include hotlines in case of emergency. Be creative.
4. You will be graded based on the rubrics given below:

<b>Criteria's</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>TOTAL SCORE</b>
<b>Accuracy and Relevance</b>	All information is correct and all of the sources are listed	Most of the information is correct and most of the sources are listed	Some of the information is correct and some of the sources are listed	Very little of the information is correct and none of the sources are listed	
<b>Originality</b>	With exceptional degree of student creativity in their work.	One or two of the graphics reflects creativity of the students	Graphics made based on the designs of others	No graphics made by the student are included	
<b>Required Elements</b>	The flyer includes required elements as well as additional information	All required elements are included on the flyer	All but 1 are included on the flyer	Several required elements are missing	
<b>Neatness</b>	All writing is tidy, photos and artwork are precisely placed, and all sections are orderly	Most of the writing is tidy, photos and artwork are mostly placed carefully, and most of the sections are orderly	Some of the writing is tidy, photos and artwork are somewhat placed carefully, and some of the sections are orderly	Very little of the writing is tidy, photos and artwork are placed poorly, and the sections are disorderly	
<b>Creativity</b>	The brochure as a whole is interesting,	Most of the brochure is interesting, engaging,	Some of the brochure is interesting, engaging,	Very little of the brochure is interesting,	

	engaging, imaginative, and original	imaginative, and original	imaginative, and original	engaging, imaginative, and original	
<b>Colorful</b>	The brochure is eye catching and vibrant and/or coordinated colors are used	Most of the brochure is eye catching and bright colors and/or mostly coordinated colors are used	Some of the brochure is eye catching and average and/or some mismatched colors are used	Very little of the brochure is eye catching and dull and/or mismatched colors are used	

Kellie Hayden, "Teaching Ideas for Brochure-Making With a Rubric",  
Bright Hub Education, June 26, 2010  
<https://www.brighthubeducation.com/teaching-methods-tips/75435-rubric-for-brochure-project/>



## ***Answer Key***

<b>What I Know</b>	<b>What's More</b>	<b>Assessment</b>
16.C	1. Socioeconomic	1. C
17.C	2. Physical	2. C
18.C	3. Environmental	3. C
19.B	4. Physical	4. B
20.A	5. Physical	5. A
21.D	6. Physical	6. D
22.B	7. Environmental	7. B
23.A	8. Socioeconomic	8. A
24.B	9. Socioeconomic	9. B
25.A	10. Environmental	10.A
26.D		11.D
27.C		12.C
28.D		13.D
29.A		14.A
30.B		15.B

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- Kellie Hayden, "Teaching Ideas for Brochure-Making With a Rubric", June 26, 2010. <https://www.brighthubeducation.com/teaching-methods-tips/75435-rubric-for-brochure-project/>

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