

HEALTH ACCORDING TO THE EARTH SCIENCES

Performance Standards 12E/11A/13B.J

Students will apply the concepts, principles and processes of scientific issue investigation to analyze meteorological or oceanographic research with respect to health and everyday life.

- *Knowledge*: understand the meteorological or oceanographic interrelationships which affect human health.
- *Application*: investigate meteorological/oceanographic research from the perspective of human health implications, job markets and everyday life.
- *Communication*: report findings from issue investigation related to human health impact from meteorological and/or oceanographic factors.

Procedures

1. ***In order to know and apply concepts that explain the composition and structure of the universe and Earth's place in it (12E); the concepts, principles and processes of scientific inquiry (11A); and concepts that describe the interaction between science, technology and society (13B)***, students should experience sufficient learning opportunities to develop the following:

- Formulate an issue hypothesis associated with the impact on human health, job markets and everyday life resulting from meteorological or oceanographic interrelationships, such as:
 - Weather and climatic effects on allergic responses,
 - Effect of solar ultraviolet radiation,
 - Viral or microbial population growth impact from meteorological factors,
 - Mining of potential oceanic medical resources,
 - Future projections for fresh-water supplies and demands, etc.
- Review meteorological/oceanographic and health research literature as primary reading sources.
- Differentiate between subjective/objective data and their usefulness to the issue.
- Examine applicable existent surveys, impact studies, models or simulations.
- Conduct an issue investigation about meteorological or oceanographic health impact.
- Project possible viewpoints, variables, applicable data sets and formats for interview instruments and methodologies for opinion surveys.
- Interview associated experts.
- Test models or simulations for validity.
- Substantiate basis of inferences, deductions and perceptions.
- Distinguish opinion from supported theory.
- Report, display and defend the process and findings of issue investigation.
- Evaluate issue resolutions or action responses from research synthesis.
- Generalize public opinion responses.
- Generate further questions or issues extensions about human health and meteorological or oceanographic research.

Note to teacher: This activity relates to knowledge associated with Standard 12E, while addressing Performance Descriptors for Stage J within Standards 11A and 13B. According to the National Health Care Skill Standards, health care workers will apply knowledge of life sciences such as biology, chemistry, physics and human growth and development. They shall also use written, oral and keyboarding skills to produce reports.

2. Have students review and discuss the assessment task and how the rubric will be used to evaluate their work.
3. Begin investigation with brainstorming ideas about the relationship of weather, climate, oceanic and earth-to-solar interrelationships with human health and everyday life. Assign research to address assigned or selected topics. Students could work in groups, each researching different topic components. Begin the investigation of the topics by looking at current research. Have students list their sources and discuss the validity, reliability or potential bias of each source. Have students generate questions about the topic. Simulations or models may be accessed to demonstrate quantitative projections. Surveys or interviews may be used to gather more information. The project findings should be reported for class discussion and comparison of issue resolutions or action responses. They should conclude with further questions for possible research.

4. Evaluate each student's work using the Science Rubric as follows and add the scores to determine the performance level:
- *Knowledge:* Oceanographic and/or meteorological interrelationships with human health and everyday life are described accurately with sufficient detail.
 - *Application:* The investigation included appropriate models, simulations and surveys to demonstrate the meteorological or oceanographic effect on human health and was thorough, well organized and well detailed.
 - *Communication:* The findings were presented well as a written or oral report and questions or issues for future consideration were generated.

Examples of Student Work

- [Meets](#)
- [Exceeds](#)

Time Requirements

- 1-2 class periods for foundations for oceanographic or meteorological research, possible human health implications and investigation requirements; sufficient time for research (1-2 weeks out of class); 1-2 days for presentations and reflections

Resources

- Internet access to web sites such as: www.bbsr.edu/Ocean_Human_Health/
- Access to research materials
- Science Rubric

EARTH SCIENCES AND HUMAN HEALTH
Student Worksheet

Recent studies about the climatic, weather, earth-to-solar interrelationships and ocean resources have demonstrated significant effects on human health. These research findings are to be explored and critiqued by use of scientific inquiry. Conduct an issue investigation about a meteorological or oceanographic health impact. The final paper or presentation should include, but is not limited to, the following:

- Review meteorological/oceanographic and health research literature.
- Differentiate between subjective/objective data and their usefulness to the issue.
- Examine applicable existent surveys, impact studies, models or simulations.
- Project possible viewpoints, variables, applicable data sets and formats for interview instruments and methodologies for opinion surveys.
- Interview associated experts.
- Test models or simulations for validity.
- Substantiate basis of inferences, deductions and perceptions.
- Distinguish opinion from supported theory.
- Report, display and defend the process and findings of issue investigation.
- Evaluate issue resolutions or action responses from research synthesis.
- Generalize public opinion responses.
- Generate further questions or issues extensions about human health and meteorological and/or oceanographic research.

SCIENCE RUBRIC

Exceeds - must receive no more than one 3 and the rest 4s in the other areas of the rubric.

Meets - may receive no more than one 2 and a combination of 3s and 4s in the other areas of the rubric.

Approaches - may receive no more than one 1 and a combination of 2s, 3s or 4s, in the other areas of the rubric.

Begins - must receive at least a 1 in all 3 areas of the rubric.

	KNOWLEDGE	APPLICATION	COMMUNICATION
	Knows and understands scientific terms, facts, concepts, principles, theories and methods.	Applies scientific knowledge, skills and methods to manipulate, analyze, synthesize, create and evaluate.	Communicates scientific knowledge and applications through writing, speech and visual displays.
4	<ul style="list-style-type: none"> • Descriptions of scientific terms, facts, concepts, principles, theories and methods are complete and correct. 	<ul style="list-style-type: none"> • Applications are thorough, appropriate and accurate. 	<ul style="list-style-type: none"> • Written, oral and/or visual communication is well organized and effective.
3	<ul style="list-style-type: none"> • Descriptions of scientific terms, facts, concepts, principles, theories and methods are mostly complete and correct. 	<ul style="list-style-type: none"> • Applications are mostly thorough, appropriate and accurate. 	<ul style="list-style-type: none"> • Most of the written, oral and/or visual communication is well organized and effective.
2	<ul style="list-style-type: none"> • Descriptions of scientific terms, facts, concepts, principles, theories and methods are somewhat complete and correct. 	<ul style="list-style-type: none"> • Applications are somewhat appropriate and accurate. 	<ul style="list-style-type: none"> • Some of the written, oral and/or visual communication is organized and effective.
1	<ul style="list-style-type: none"> • Descriptions of scientific terms, facts, concepts, principles, theories and methods are minimally present or correct. 	<ul style="list-style-type: none"> • Applications are minimally appropriate and accurate. 	<ul style="list-style-type: none"> • Little of the written, oral and/or visual communication is organized and effective.
0	<ul style="list-style-type: none"> • All descriptions of scientific terms, facts, concepts, principles, theories and methods are missing and/or incorrect. 	<ul style="list-style-type: none"> • All applications are missing and/or incorrect. 	<ul style="list-style-type: none"> • All of the written, oral or visual communication is missing and/or lacks organization.
Score			