

Science in Personal and Social Perspectives

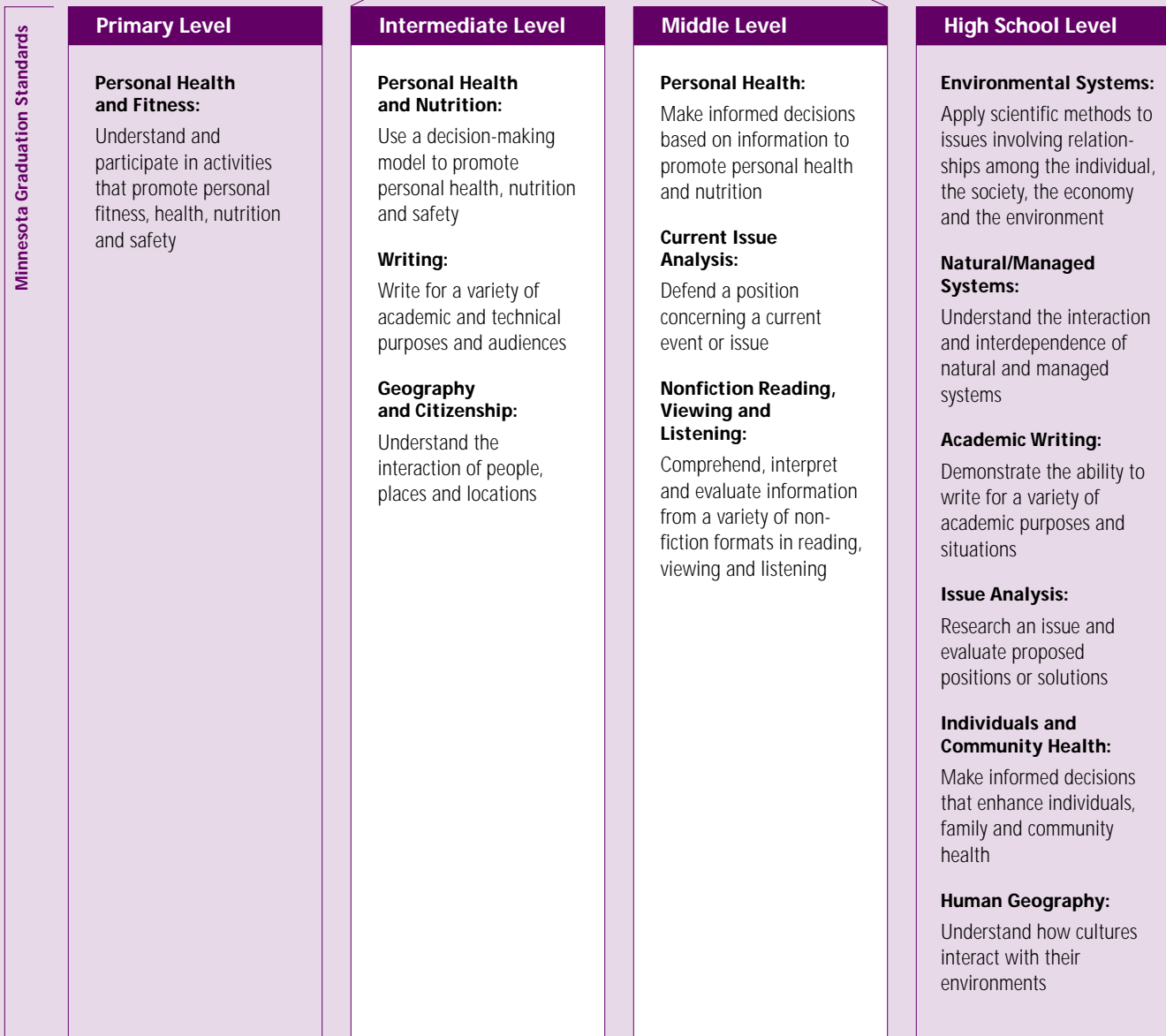
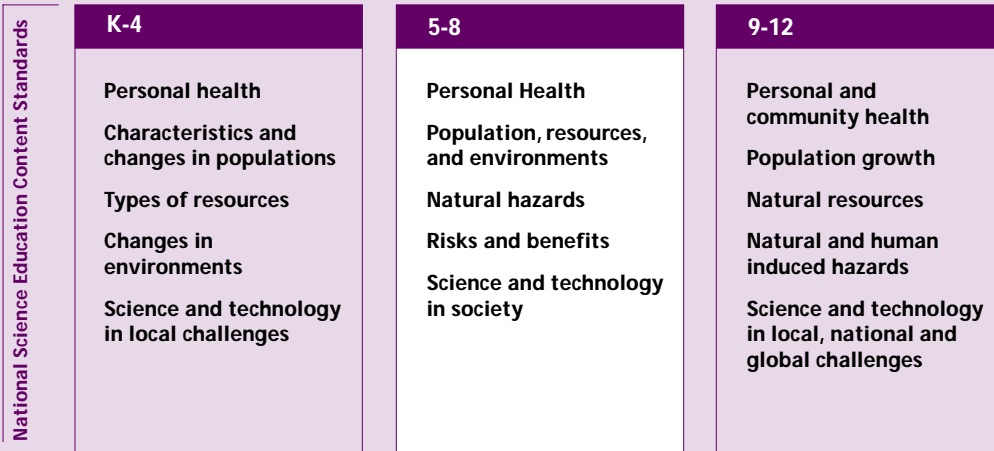
Content Standard F:

As a result of the activities in grades 5-8, all students should develop understanding of

- **Personal health**
- **Populations, resources, and environments**
- **Natural hazards**
- **Risks and benefits**
- **Science and technology in society**



Content Summary



Focus K-12

Grade	Early	Late
K-4	The focus of instruction early in this grade range is on providing opportunities for all students to develop initial understandings about the relationships between science, personal health, and the environment.	The focus of instruction later in this grade range is on providing opportunities for all students to develop understandings about science-related personal and societal challenges and engage in some personal actions in local challenges related to science and technology.
5-8	The focus of instruction early in this grade range is on providing opportunities for all students to develop a more conceptual understanding of science-related social issues, make connections, and engage in actions related to science and personal and social challenges in their community.	The focus of instruction for all students later in this grade range is on developing a scientific understanding of health and enabling students to make reasoned decisions and take relevant actions in personal and community challenges related to science, technology, and society.
9-12	The focus of instruction for all students at the high school level is on improving all students' scientific understandings of science, technology, and societal challenges, how they interact, and on developing their abilities to evaluate the consequences of associated actions or decisions.	The focus of instruction for students pursuing further study is on providing support for students as they engage in personal actions and inform and persuade others to make appropriate decisions relating to personal, community, and global actions.

Close-up 5-8

The focus of instruction early in this grade range is on providing opportunities for all students to develop a more conceptual understanding of science-related social issues, make connections, and engage in actions related to science and personal and social challenges in their community.

All students develop an understanding of natural and human-induced hazards and positive and negative roles of technology in personal and societal issues, and learn about risks and personal decisions. Students at this age associate health with food and fitness and learnings can help them begin to understand that many factors relating to health are within their control. The context of the science content they are learning is used to engage students in experiences that enable them to understand and participate in related issues. These include the use of resources or personal risks and benefits. Students and teachers observe established science safety procedures.

The focus of instruction for all students later in this grade range is on developing a scientific understanding of health and enabling students to make reasoned decisions and take relevant actions in personal and community challenges related to science, technology, and society.

As students develop a deeper understanding of the way the human system works, they increase their scientific understanding of health, including the idea that illness can be caused by many factors such as micro-organisms, genetics, malfunctioning of organs, health habits, and environmental conditions. This standard should be integrated into investigations in physical, life, and earth/space science. Because students at this age have differing views on risks and benefits in areas of health, natural hazards, and science and technology, the development of clear, scientifically based understandings of the issues is critical in order to make more informed decisions. As they develop a more conceptual understanding of ecological relationships, they realize the potential of science and technology to solve or not solve problems associated with improving the quality of the atmosphere, disposal of wastes, and the use of resources. Students and teachers observe established science safety procedures.

On Location 5-8

This exercise helps students look at several social perspectives that impinge on personal health, populations, resources, and environments. It also helps students to think about risks, benefits, and tradeoffs. While the teacher knows that she cannot do everything in one year, she can start her students thinking about some complex issues and how they relate to the science that they are learning. Some believe that teaching to this standard is not really science. However, applications of science concepts can give science learning meaning. This is the basis that has been used to include this vignette. Ideally this activity could be embedded in earth/space lessons, or in units that include the study of cycles or ecosystems.

Students in Ms. Y's class work on a service-learning recycling project which promotes environmental awareness for other students as well as the community. They begin with a field trip to a local recycling center. They visit the hazardous waste area and learn that there are many different ways in which hazardous waste is labeled. They discover that leftover paint, turpentine, and bug spray can be brought to the center to be reused by others. As part of the tour, students note materials that will go into a landfill. Students are surprised that there are many materials that could be recycled in the trash that is about to go to the landfill. As they note how difficult it is for workers to sort different types of plastics, they understand why it is necessary to presort materials as they recycle at home and in school. They also see how newspapers, cardboard, plastics, and aluminum are recycled. Students come away from the trip with a new realization of recycling and how important it is.

After the trip, students work in groups of two or three to research one area of recycling in order to make a presentation to educate the public. During the two weeks students have to prepare their presentations, the teacher makes suggestions on additional resources and helps students find appropriate information. She also monitors each group to ensure that every student is pulling his/her weight and that appropriate science concepts are included in their learnings.

One group of students looks at degradable plastics and discovers why recyclable materials instead of degradable materials should be used. Another group researches how much garbage is produced at the school, in the state, and in the country. They create a demonstration of plastic bags which represent the amount of trash reproduced in one week by students in the school and then extrapolate to show state and national use. Another group demonstrates alternative packing products in order to show that consumers can make positive choices for the environment.

Parents and grandparents are invited to the school for final team presentations. Each group takes about 10 to 15 minutes to present their learnings which also includes the logical and correct use of a related scientific concept.

National Science Education Content Standards

5-8 Content Standard F

Personal Health

- Regular exercise is important to the maintenance and improvement of health. The benefits of physical fitness include maintaining healthy weight, having energy and strength for routine activities, good muscle tone, bone strength, strong heart/lung systems, and improved mental health. Personal exercise, especially developing cardiovascular endurance, is the foundation of physical fitness.
- The potential for accidents and the existence of hazards imposes the need for injury prevention. Safe living involves the development and use of safety precautions and the recognition of risk in personal decisions. Injury prevention has personal and social dimensions.
- The use of tobacco increases the risk of illness. Students should understand the influence of short-term social and psychological factors that lead to tobacco use, and the possible long-term detrimental effects of smoking and chewing tobacco.
- Alcohol and other drugs are often abused substances. Such drugs change how the body functions and can lead to addiction.
- Food provides energy and nutrients for growth and development. Nutrition requirements vary with body weight, age, sex, activity, and body functioning.
- Sex drive is a natural human function that requires understanding. Sex is also a prominent means of transmitting diseases. The diseases can be prevented through a variety of precautions.
- Natural environments may contain substances (for example, radon and lead) that are harmful to human beings. Maintaining environmental health involves establishing or monitoring quality standards related to use of soil, water, and air.

Populations, Resources, and Environments

- When an area becomes overpopulated, the environment will become degraded due to the increased use of resources.
- Causes of environmental degradation and resource depletion vary from region to region and from country to country.

Natural Hazards

- Internal and external processes of the earth system cause natural hazards, events that change or destroy human and wildlife habitats, damage property, and harm or kill humans. Natural hazards include earthquakes, landslides, wildfires, volcanic eruptions, floods, storms, and even possible impacts of asteroids.
- Human activities also can induce hazards through resource acquisition, urban growth, land use decisions, and waste disposal. Such activities can accelerate many natural changes.
- Natural hazards can present personal and societal challenges because misidentifying the change or incorrectly estimating the rate and scale of change may result in either too little attention and significant human costs or too much cost for unneeded preventive measures.

National Science Education Content Standards

5-8 Content Standard F (continued)

Risks and Benefits

- Risk analysis considers the type of hazard and estimates the number of people that might be exposed and the number likely to suffer consequences. The results are used to determine the options for reducing or eliminating risks.
- Students should understand the risks associated with natural hazards (fires, floods, tornadoes, hurricanes, earthquakes, and volcanic eruptions), with chemical hazards (pollutants in air, water, soil, and food), with biological hazards (pollen, viruses, bacterial, and parasites), social hazards (occupational safety and transportation), and with personal hazards (smoking, dieting, and drinking).
- Individuals can use a systematic approach to thinking critically about risks and benefits. Examples include applying probability estimates to risks and comparing them to estimated personal and social benefits.
- Important personal and social decisions are made based on perceptions of benefits and risks.

Science and Technology in Society

- Science influences society through its knowledge and world view. Scientific knowledge and the procedures used by scientists influence the way many individuals in society think about themselves, others, and the environment. The effect of science on society is neither entirely beneficial nor entirely detrimental.
- Societal challenges often inspire questions for scientific research, and social priorities often influence research priorities through the availability of funding for research.
- Technology influences society through its products and processes. Technology influences the quality of life and the ways people act and interact. Technological changes are often accompanied by social, political, and economic changes that can be beneficial or detrimental to individuals and to society. Social needs, attitudes, and values influence the direction of technological development.
- Science and technology have advanced through contributions of many different people, in different cultures, at different times in history. Science and technology have contributed enormously to economic growth and productivity among societies and groups within societies.
- Scientists and engineers work in many different settings, including colleges and universities, businesses and industries, specific research institutes, and government agencies.
- Scientists and engineers have ethical codes requiring that human subjects involved with research be fully informed about risks and benefits associated with the research before the individuals choose to participate. This ethic extends to potential risks to communities and property. In short, prior knowledge and consent are required for research involving human subjects or potential damage to property.
- Science cannot answer all questions and technology cannot solve all human problems or meet all human needs. Students should understand the difference between scientific and other questions. They should appreciate what science and technology can reasonably contribute to society and what they cannot do. For example, new technologies often will decrease some risks and increase others.

Minnesota Graduation Standards

Intermediate Level

Personal Health and Nutrition:

Use a decision-making model to promote personal health, nutrition, and safety.

What students should know:

1. Know how to recognize and get help in situations involving abusive or harassing behaviors
2. Know the consequences of using drugs, alcohol and tobacco
3. Know strategies to prevent the spread of communicable diseases
4. Know strategies for preventing accidents
5. Know age-appropriate nutritional recommendations

What students should do:

1. Use a decision-making model to promote healthy behaviors
2. Use a decision-making model to prevent or reduce the risk of unhealthy behaviors
3. Demonstrate what to do in case of sudden illness or injury
4. Use a decision-making model to select foods that contribute to a healthy diet
5. Analyze issues of safety in a school or community situation

In Addition:

Adjust instruction or modify assignments in regard to an individual student's health status, culture and values.

Writing:

Write for a variety of academic and technical purposes and audiences.

What students should do:

1. Write a story based on direct experience or observation. Story must include:
 - a. a problem solved, a conflict resolved or a lesson learned
 - b. a description of setting using vivid details
 - c. a flow of action leading to a logical ending
 - d. an image of at least one character
 - e. dialogue that captures authentic oral expression
2. Write to request an action or a product. Final edit must be suitable for a real world audience and should include:
 - a. necessary information and detail using appropriate vocabulary
 - b. use of formal structures and courteous conventions
3. Edit finished products for correct mechanics and spelling

In Addition:

Performance package should include tasks which require multiple examples of writing.

Minnesota Graduation Standards

Intermediate Level

Geography and Citizenship:

Understand the interaction of people, places and locations.

What students should know:

1. Know how to locate regions of the United States and selected regions of the world
2. Identify geographic features and cultural characteristics of regions

What students should do:

1. Understand characteristics of various world regions:
 - a. interpret and use information based on maps and graphic representations
 - b. create mental maps or graphic representations showing knowledge of location
 - c. compare ways in which people from different cultures deal with their physical environment
2. Understand characteristics of the students' local community:
 - a. describe how local resources and products are used in the region or the world
 - b. research the origins of groups represented in the local community
 - c. participate in an activity which contributes to the improvement of your community

In Addition:

One of the cultures included in the performance task should be a Native American tribal culture.

Minnesota Graduation Standards

Middle Level

Personal Health:

Make informed decisions based on information to promote personal health.

What students should know:

1. Know the impact of nutrition, food selection, safety and eating patterns on health
2. Know how to recognize abusive or harassing behaviors
3. Know the consequences of using tobacco, alcohol and other drugs
4. Know how to prevent communicable diseases, HIV/STD infection and pregnancy
5. Know strategies for preventing accidents and environmental hazards
6. Know what to do in case of sudden illness or injury
7. Know signs and symptoms of health problems that affect adolescents (e.g., chemical abuse, infections, HIV, eating disorders)
8. Understand sexual responsibility
9. Know basic structures and systems of the human body

What students should do:

1. Analyze the relationship of physical, social and mental health
2. Apply a decision-making process to analyze health issues and attain personal goals
3. Analyze how health-related decisions are influenced by internal and external factors (e.g., ability, risk, family, peers)
4. Demonstrate communication skills (e.g., refusal, negotiation, listening) to express needs and enhance health
5. Create and implement a nutritional health plan using a decision-making process:
 - a. determine dietary recommendations with respect to age, gender and activity level for a specific person
 - b. create menus for a specified period of time
 - c. analyze and demonstrate food preparation and safety skills

In Addition:

1. Performance tasks may include role plays, timelines, scenarios, journaling, documentation, dietary or food preparation plans.
2. Teacher will specify amount of food to be prepared and time period for menu planning.
3. Tasks should include multicultural nutritional issues.

Minnesota Graduation Standards

Middle Level

Current Issue Analysis:

Defend a position concerning a current event or issue.

What students should know:

1. Know the history, facts and controversy regarding an issue
2. Know the values, beliefs and emotions surrounding an issue

What students should do:

1. Identify specific events or situations illustrating the impact of the issue
2. Describe a range of opinions or positions on the issue
3. Select and defend a position based on information
4. Describe the responsibilities of citizens involved with the issues
5. Summarize the findings in a written, oral or role-play presentation

Nonfiction Reading, Viewing, Listening:

Comprehend, interpret and evaluate information from a variety of nonfiction formats in reading, viewing and listening.

What students should do:

1. Comprehend information from selections which address some abstract or complex ideas:
 - a. identify main ideas and supporting details
 - b. interpret presentations of data in connection with other information in the text (e.g., tables, charts, drawings, graphs)
 - c. compare and contrast information on the same topic from different types of sources
 - d. given more than one selection on the same topic, identify differences in the point of view of the authors
 - e. identify statements of fact and opinion within a selection
 - f. use structural organizers within a selection to aid comprehension

In Addition:

1. Teacher may provide assistance with specialized vocabulary.
2. Teacher may provide background information when issues analyzed are outside of students' experience.
3. Performance packages must include tasks in reading, viewing and listening.