

## Minnesota High Standards/Frameworks - High School Level Sample Report Profile

### Mathematical Concepts and Applications

**Students will ask questions and collect, organize, interpret, and transform data related to those questions to communicate information and make predictions and decisions.**

- Predicts shadow length at a particular time of day, using a table of values.
- Predicts environmental problems caused by a hydroelectric power station.
- Uses software to predict the height of a model rocket.
- Navigates around a database to make predictions about model rocket flights.
- Approximates the predicted altitude of a model rocket.
- Compares predictions made about model rocket launches with results obtained from real launches.
- Calculates the error of rocket flight predictions from given data.
- Examines the impact of measurement errors on predictions about rocket flights.
- Uses altitude readings to make predictions about aerial photography.
- Uses gear ratios to predict changes in gear speed.
- Makes predictions about systems that combine different rotary power transmission systems.
- Predicts the output motion produced by cams.
- Predicts the effects of changing input variables when using route planning software.

**Students will experience numbers in contextual situations and use them flexibly to solve problems, gradually moving to a more abstract understanding of number concepts, relationships and procedures.**

- Calculates the number of worktops to fit in a wet area.
- Converts decimal numbers to hexadecimal numbers.
- Calculates the total number of cards in a database.
- Converts numbers from decimal to binary.
- Converts decimal and binary numbers to ASCII.
- Converts ASCII to decimal numbers.
- Uses the 'Divide by Two' method to convert decimal numbers into binary.
- Converts binary numbers to decimal.
- Calculates number of samples at a given frequency.
- Interprets a flowchart to identify even numbers.
- Identifies different number systems used in computing.
- Converts from one computer number system into another.
- Recognizes and manipulates numbering and coding systems used in computing.
- Calculates a number of print impressions using simple arithmetic.
- Calculates the number of dots per square inch of an image scanner.
- Calculates the maximum number of different shades of gray that can occur in an image.
- Uses software to write a control program to loop a specified number of times.
- Uses a flowchart to design a program to move the robot and run the conveyor a specified number of times.

**Students will represent, compare, and analyze mathematical patterns, relationships, and functions to model and solve problems.**

- Identifies and uses patterns of bits to interpret and produce binary codes.
- Interprets tire codes and tire tread wear patterns.

Uses simple mathematic formulae to calculate area, wind speed and drag.  
Applies mathematical formulae to the motion of rockets.  
Interprets flowcharts to solve mathematical problems.  
Creates a digital filter using a mathematical matrix.

## **Inquiry and Research**

### **Students shall access information and use a variety of sources to answer a question or support a position.**

Makes informed decisions based on both given and researched information.  
Interprets information to relate mass of water and applied force.  
Interprets information on heat insulating materials presented graphically.  
Maintains and organizes a record of work.  
Maintains and organizes a record of work.  
Maintains and organizes a record of work.  
Maintains and organizes a record of work.  
Uses information technology to support a weather presentation.  
Outlines how satellite technology is used to gather weather data.  
Recognizes important information that must be contained in a drawing.  
Interprets technical information from a design brief.  
Interprets information from a table in a CAD manual.

### **Students shall design and conduct a controlled experiment or investigation and interpret the results.**

Uses the concept of momentum to investigate collisions.  
Uses data from a spreadsheet to create a chart of results.  
Evaluates the results of a chart.  
Interprets the results of genetic finger prints.  
Devises an experiment to test an aerodynamic principle.  
Records results from a model rocket launch using a database.  
Compares predictions made about model rocket launches with results obtained from real launches.  
Calculates acceleration caused by gravity from experimental results.  
Performs an experiment to investigate the reflection of microwaves on different materials.  
Uses a computer and electronic simulation to investigate binary signals used by modems.  
Applies gear ratio formula to observed results.  
Uses results to calculate the work done pulling loads up inclined planes.  
Uses a flight simulator to investigate instruments in an aircraft cockpit.  
Experiments with the balance and sound controls of an AM/FM radio cassette player to discover their function.  
Uses a troubleshooting flow chart to investigate problems in a car's starting and ignition systems.  
Uses a multimeter to investigate problems in a car's cooling system electronics.  
Uses computer simulation to investigate the use of two and three lamp lighting set-ups by following floor plans.

### **Students will demonstrate the ability to gather information to answer a scientific or social science question.**

States the relationship between science and technology.  
States the scientific principles of importance to space technology.  
Outlines how satellite technology is used to gather weather data.

Uses software to write a quality control program which uses information automatically gathered from sensors.

Uses an interactive program to gather technical data about modern cars.

Makes informed decisions based on both given and researched information.

Recalls information from a model rocket instruction sheet.

Interprets information to relate mass of water and applied force.

Interprets information on heat insulating materials presented graphically.

Extracts information from the Beaufort Scale.

Uses information technology to support a weather presentation.

Recognizes important information that must be contained in a drawing.

Accurately interprets information given for a drawing.

Interprets technical information from a design brief.

Comprehends historic information on the discovery of magnetism.

Extracts historical information about electrical devices from a text book.

Selects information from text relating to technological systems.

Uses analog sensors to monitor conditions and provide data to control information systems.

Interprets information given in a flowchart relating to a transportation control system.

### **Scientific Concepts and Applications**

**Students will develop an understanding of the processes of life by using inquiry to find evidence to explain phenomena; solve problems; and predict probable outcomes specific to the structures, functions and interactions of organisms.**

Describes conventions for quantifying weather phenomena.

States magnetic phenomenon.

**Students will develop an understanding of the physical and chemical nature of matter by using inquiry to explain the relationships between structure and properties, determine patterns, predict outcomes of chemical reactions, and analyze the impact of scientific enterprise.**

States the relationship between science and technology.

Relates the radioactive half-life of an isotope to the name of the element.

Identifies the effect that water vapor has on visible light.

Investigates the concept of microwave polarisation, used in satellite television systems.

Interprets polar coordinates on a Radar plot as flight paths of aircraft.

Examines the combustion process inside a car engine.

Recognizes inputs and products of the four stroke cycle combustion process.

Interprets tags and labels found on cosmetic products.

States how exercise affects the body.

States the importance of nutrients in a healthy diet.

Researches information from text relating to nutrients.

States the importance of calorie intake in a healthy diet.

Uses a database to retrieve information regarding the calorific value of foods.

Extracts information from text relating to the calorific value of food.

Calculates the calorific values of food.

States the importance of diet for a healthy life.

Defines the advantages of good health and fitness.

Investigates the risks to health from drinking alcohol.

Interprets information from charts on Alcohol Consumption.

Extracts information from text regarding the dangers of excessive alcohol consumption.  
Calculates BAC levels from units of alcohol consumed.  
Investigates the risks to health from smoking tobacco.  
Researches the dangers of smoking, using a text book.  
Investigates the risks to health from misusing drugs.

**Students will develop an understanding of the relationships between and among Earth and space systems by using inquiry to find evidence to explain phenomena, solve problems, and predict probable outcomes of future Earth/space related events.**

Calculates how long it takes light to travel the circumference of the Earth.  
Identifies phases of the 'Earth's water cycle'.  
Describes characteristics of the Earth's climate.  
Classifies areas of the Earth into climate types.  
Describes some issues affecting the Earth's climate.  
Calculates potential energy of space vehicles.  
Recognizes different needs when returning space vehicles to earth.  
Identifies support processes which are vital to space technology.  
Compares images of the earth taken from different distances.  
States the benefits and costs associated with space technology.  
States similarities and differences between model rocketry and space technology.  
Identifies the forces that are important in space technology.  
States the factors that are necessary to achieve space flight.  
Identifies propulsion systems of importance to space technology.  
Identifies support processes related to space technology.  
Shows basic technical ability in the field of Space Technology.  
Solves math problems for space systems.  
Writes a report on Space Technology.  
Makes a presentation to a group on Space Technology.  
Identifies and describes ground waves, sky waves and space waves.

**Students will come to a scientific understanding of the relationships among matter, energy, motion, and forces, by using inquiry to actively find patterns that explain day-to-day experiences in their physical world.**

Identifies the energy sources in use today.  
Interprets data from a graph relating to energy costs.  
Interprets data from text relating to energy sources.  
States why the world needs alternative energy.  
Converts between different units of energy.  
Calculates and compares the amount of work done and energy requirements of a team of workers.  
Calculates work done using the formula  $\text{work} = \text{force} \times \text{distance}$ .  
Calculates the potential energy and kinetic energy of a model rocket.  
Interprets information to relate mass of water and applied force.  
Calculates the potential energy stored in 1kg of water held in a dam.  
States some of the options available to relieve the energy problems facing society today.  
Identifies locations where it would be suitable to use renewable energy sources.  
Identifies the effect of population size on the cost effectiveness of forms of energy.  
States how heat can be conserved in energy production.  
Identifies the problem of cost in trying to conserve energy.  
States the difference in energy consumption by the industrialized and developing countries.

Determines the total cost of installing energy efficient devices.  
Calculates the power saved by an energy efficient house.  
Evaluates energy saving appliances.  
Plans an energy efficient house.  
Determines the total cost of installing energy efficient devices.  
Calculates the value of power saved by an energy efficient house.  
Compares energy, work and power.  
Describes the methods by which energy transformation can be measured.  
Identifies why energy conservation is important.  
States how alternative energy can be used in building designs.  
Identifies why some alternative energy sources are more suitable than others.  
Writes a report on Alternative Energy.  
Recognizes that forces cause structures to deform.  
Describes the process of converting mechanical energy into electrical energy.  
States how energy is used and transferred in the maglev vehicular system.  
States the definition of energy and the type of energy sources used in transportation systems.  
Recognizes different types of force.  
Investigates how force, mass and acceleration are related.  
Recognizes different forms of energy.  
Performs an energy analysis on a transportation system.  
Investigates how engines convert energy and transform motion.  
Calculates the energy production of a solar cell.  
States the forms and types of energy.  
Describes the link between forces and motion and their relationship to energy.  
Identifies how to measure forces using the Aerostream Monitor.  
Identifies how down force is produced by various objects.  
Determines down force and drag forces on a sports car model.  
Identifies greatest lift force produced for various wing designs.  
Describes how lift force is dependent on wing span and chord length.  
Calculates lift coefficient and lift force.  
Investigates the effect of turbulent air flow on down force production.  
Measures turning forces produced by propellers.  
Compares the force of wind against buildings at different angles.  
Measures aerodynamic forces on a ballistic object.  
States the effect of down force.  
Indicates how lift force is produced, and used by aircraft.  
Demonstrates forces acting on model rockets.  
Examines the forces acting on rockets in flight.  
Performs a test to demonstrate forces acting on a projectile.  
Describes energy changes that occur in a rocket during flight.  
Calculates kinetic energy of rockets.  
Calculates potential energy of space vehicles.  
Uses potential energy to determine the velocity of rockets on landing.  
Identifies the forces that are important in space technology.

## Write and Speak

### **Students will write effectively to share information and knowledge for specific audiences and purposes.**

- Writes a report on Alternative Energy.
- Uses information technology to support a weather presentation.
- Completes a weather presentation.
- Writes a report on Weather Monitoring.
- Writes a report on Construction Technology.
- Writes a report on Computer Aided Design.
- Writes a report on Basic Electricity.
- Writes a control program from a flowchart.
- Writes a report on the tests carried out, and an evaluation of, design work.
- Writes an interactive program to test an RTS.
- Writes a report on Research & Design.
- Writes a report on Health Management.
- Writes a report on Biomedical Technology.
- Writes a report on Aerodynamics Technology.
- Writes a report on Space Technology.
- Writes a report on Electronic Communications.
- Writes a report on Digital Sound Technology.
- Writes a report on Computer Applications.
- Writes a computer program.
- Writes and presents a personal profile.
- Writes a report on Computer Aided Publishing.
- Writes a report on Robotics and Automation.
- Writes a report on Mechanisms.
- Writes a report on Pneumatics.
- Writes a report on Hydraulics.
- Writes a report on Industrial Control Technology.
- Writes a design brief to plan an animated cartoon.
- Writes a report on Graphics and Animation.
- Write a report on Multimedia Production.
- Writes a report on Electronics Technology.
- Writes a report on Materials and Processes.
- Writes a report on Navigation and GPS.
- Writes a report on Digital Photography.
- Writes a report on Automotive Technology.

### **Students will communicate effectively in an interpersonal and group setting.**

- Recognizes effective ways to communicate in multimedia presentations from written text.
- Designs a personal profile.
- Writes and presents a personal profile.

### **Students will develop skills to become effective public speakers.**

- Makes a presentation to a group on Alternative Energy.
- Uses information technology to support a weather presentation.
- Completes a weather presentation.
- Makes a weather presentation in a professional manner.

Makes a presentation to a group on Weather Monitoring.  
Makes a presentation to a group on Construction Technology.  
Makes a presentation to a group on Computer Aided Design.  
Makes a presentation to a group on Basic Electricity.  
Makes a presentation to a group on Research & Design.  
Makes a presentation to a group on Health Management.  
Makes a presentation to a group on Biomedical Technology.  
Makes a presentation to a group on Aerodynamics Technology.  
Makes a presentation to a group on Space Technology.  
Makes a presentation to a group on Electronic Communications.  
Identifies the format of an audio presentation.  
Identifies a strategy for creating an audio presentation.  
Identifies the function of tools used in creating a digital sound presentation.  
Makes a presentation to a group on Digital Sound Technology.  
Makes a presentation to a group on Computer Applications.  
Makes a presentation to a group on Computer Aided Publishing.  
Makes a presentation to a group on Robotics and Automation.  
Makes a presentation to a group on Mechanisms.  
Makes a presentation on troubleshooting in a professional manner.  
Makes a presentation to a group on Pneumatics.  
Makes a presentation to a group on Hydraulics.  
Makes a presentation to a group on Industrial Control Technology.  
Makes a presentation to a group on Graphics and Animation.  
Investigates the uses of multimedia presentations.  
Researches the elements of graphic design for use in a multimedia presentation.  
Researches the principles of graphic design for use in a multimedia presentation.  
Recognizes effective ways to communicate in multimedia presentations.  
Edits text in a multimedia presentation editor.  
Scans and inserts images into a multimedia presentation.  
Applies settings to make a self running presentation.  
States the use of multimedia presentations.  
Makes a presentation to a group on Materials and Processes.  
Makes a presentation to a group on Electronics Technology.  
Makes a presentation to a group on Navigation and GPS.  
Makes a presentation to a group on Digital Photography.  
Makes a presentation to a group on Automotive Technology.

**Students will write for a specific audience to request or deliver concise and clear information to meet an intended purpose.**

Writes a report on Alternative Energy.  
Writes a report on Weather Monitoring.  
Writes a report on Construction Technology.  
Writes a report on Computer Aided Design.  
Writes a report on Basic Electricity.  
Writes a report on the tests carried out, and an evaluation of, design work.  
Writes an interactive program to test an RTS.  
Writes a report on Research & Design.  
Writes a report on Health Management.

Writes a report on Biomedical Technology.  
Writes a report on Aerodynamics Technology.  
Writes a report on Space Technology.  
Writes a report on Electronic Communications.  
Writes a report on Digital Sound Technology.  
Writes a report on Computer Applications.  
Writes a computer program.  
Writes and presents a personal profile.  
Writes a report on Computer Aided Publishing.  
Writes a report on Robotics and Automation.  
Writes a report on Mechanisms.  
Writes a report on Pneumatics.  
Writes a report on Hydraulics.  
Writes a report on Industrial Control Technology.  
Writes a report on Graphics and Animation.  
Write a report on Multimedia Production.  
Writes a report on Electronics Technology.  
Writes a report on Materials and Processes.  
Writes a report on Navigation and GPS.  
Writes a report on Digital Photography.  
Writes a report on Automotive Technology.