



**MINNESOTA**  
**Academic Standards - Science Grade 6**  
***The Nature of Matter (K)***  
***Chemistry (L)***  
***Motion, Forces, and Energy (M)***  
***Electricity and Magnetism (N)***  
***Waves, Sound, and Light (O) © 2005***

OBJECTIVES	PAGE REFERENCES
<b>I. HISTORY AND NATURE OF SCIENCE</b>	
<b>A. Scientific World View</b> The student will understand that science is a way of knowing about the world that is characterized by empirical criteria, logical argument and skeptical review.	
1. The student will distinguish between scientific evidence and personal opinion.	(K) 135-136 (L) 5 <i>You Do It</i> 5 E 5 (O) 5
2. The student will explain why scientists often repeat investigations to be sure of the results.	(K) 128 (O) 2-5 <i>You Do It</i> 5 The instructor can expand on this objective with discussions of repeated investigations involved in clinical trials, safety testing, etc.
3. The student will recognize that scientists assume that the laws of nature are the same everywhere and that they are understandable and predictable.	Examples of laws: (K) 87 (M) 21, 38, 42, 44, 49, 132 <i>Integrate History</i> 43 <i>National Geographic</i> 51 (O) 101
4. The student will define scientific facts, laws and theories.	The instructor should lead a discussion of the differences and evolution of observations, theories, and laws.
<b>B. Scientific Inquiry</b> The student will understand that scientific inquiry is used in systematic ways to investigate the natural world.	
1. The student will identify questions that can be answered through scientific investigation and those that cannot.	(L) 5 E 5
2. The student will distinguish among observation, prediction and inference.	(K) 131, 135-136 <i>LAB</i> 117 (L) <i>LAB</i> 107, 116-117 (M) <i>LAB</i> 26-27, 103, 116-117 (N) <i>LAB</i> 27, 28-29, 56-57, 72 (O) <i>LAB</i> 26-27, 80, 86-87, 118-119

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3. The student will use appropriate tools and Système International (SI) units for measuring length, time, mass, volume and temperature with suitable precision and accuracy.	(K) 133-135, 156-158 <i>LAB 53, 62-63, 77</i> <i>MiniLAB 74</i> (L) <i>LAB 54-55</i> (M) 159-160 <i>Applying Math 160</i> <i>LAB 168-169, 174-175</i>
4. The student will present and explain data and findings from controlled experiments using multiple representations including tables, graphs, physical models and demonstrations.	(K) <i>LAB 53, 62-63, 88-89, 117</i> (L) <i>LAB 53, 54-55, 86-87, 116-117</i> (M) <i>LAB 26-27, 56-57, 116-117, 174-175</i> (N) <i>LAB 28-29, 44</i> (O) <i>LAB 26-27, 86-87, 118-119</i>
<b>C. Scientific Enterprise</b> The student will know that science and technology are human efforts that both influence and are influenced by society.	
1. The student will describe the types of questions asked, the products, and the methods of investigation used to distinguish science from technology.	(K) 2-5 <i>You Do It 5</i> <i>National Geographic 115</i> E 4 CD 10 (L) 2-3 D 3 (M) 73, 85-86, 169-173 <i>LAB 88-89</i> <i>National Geographic 171</i> AIL 116 (N) 53-55, 69-71 CD 53 (O) 81-85, 113-117 <i>Science and History 88</i> CU 25 SJ 82 CC 83
2. The student will explain why scientists may work in teams or work alone, can collaborate and, at times, compete.	(K) 2-5, 8-17 CD 10 TFYI 13 CC 14 (L) <i>Science and Society 118</i> HS 56 (M) DI 141 (N) 2-5 D 3 UA 5 (O) 2-5 <i>You Do It 5</i> CB 5

OBJECTIVES	PAGE REFERENCES
<b>II. PHYSICAL SCIENCE</b>	
A. Structure of Matter The student will understand that matter is made of small particles and this explains the properties of matter.	
1. The student will know that there are more than 100 different elements with unique properties.	(K) 18-23, 98-104, 105-111, 112-114 <i>LAB</i> 24, 117 <i>National Geographic</i> 115 A 20, 101 DI 22 SJ 102 LD 103 IL 110
2. The student will use evidence to explain that matter is made of small particles called atoms or molecules which are too small to see.	(K) 8-17, 18, 25-29 <i>MiniLAB</i> 15 A 14 (L) 19-21 <i>MiniLAB</i> 19 <i>LAB</i> 26-27 IL 20 LD 20 QD 21
3. The student will know that the mass of a substance remains constant whether it is together, in parts or in a different state.	(K) 87 <i>Section Review</i> 87 (L) 40-41 <i>MiniLAB</i> 40 <i>Applying Math</i> 42 VL 40 DI 41 A 41
4. The student will describe the states of matter in terms of the space between particles.	(K) 40-44, 45-52 <i>National Geographic</i> 48 A 42, 48 LD 43
5. The student will distinguish between volume, mass and density.	(K) 59, 74, 156-157 <i>MiniLAB</i> 74 A 59 DI 75 CA 77 (M) 19
6. The student will use the characteristic properties of density, melting point, boiling point and solubility to identify and distinguish mixtures and pure substances.	(K) 27-29, 74 <i>LAB</i> 30-31 <i>MiniLAB</i> 75 AIL 30 LD 74 (L) 64-66
7. The student will know that atoms are the smallest unit of an element that maintains the characteristics of the element.	(K) 8-9, 18, 21-22 DI 22

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<b>B. Chemical Reactions</b> The student will differentiate between chemical and physical changes.	
1. The student will define chemical and physical changes.	(K) 78-85 <i>MiniLAB</i> 81 <i>National Geographic</i> 86 <i>LAB</i> 88-89 QD 79, 80, 83 MM 79 IL 82 SJ 82
2. The student will observe that substances react chemically with other substances to form new substances with different characteristic properties.	(K) 80-85 <i>LAB</i> 88-89 IM 85 UA 85 (L) 16-21, 36-41 <i>LAB</i> 25 <i>National Geographic</i> 37 LD 20
3. The student will give examples and classify substances as mixtures or pure substances.	(K) 25-29 <i>Applying Science</i> 27 <i>LAB</i> 30-31 A 27 QD 28 (L) 64-66 VL 65 MM 65 QD 66 DI 67
<b>C. Energy Transformations</b> The student will understand that energy exists in many forms and can be transferred in many ways.	
1. The student will compare and contrast heat, chemical, mechanical and electrical energy and identify transformations of energy from one form to another in everyday situations.	(M) 126-130, 131-137 <i>MiniLAB</i> 133 <i>National Geographic</i> 134 <i>LAB</i> 138 IL 127 A 128 SJ 129 D 129, 135 QD 133
2. The student will recognize that heat is transferred by convection, conduction and radiation from warmer objects to cooler ones until both reach the same temperature.	(M) 162-166 <i>MiniLAB</i> 164, 165 <i>LAB</i> 168, 174-175 DI 165 VL 165 LD 166
3. The student will demonstrate that visible light from the sun or reflected by objects may be made up of a mixture of many different colors of light.	(O) 74, 98-100 <i>LAB</i> 80 A 98

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4. The student will recognize the relationship between light and heat.	(M) 129, 143-144 <i>MiniLAB</i> 143
5. The student will describe waves in terms of speed, frequency and wave length.	(O) 13-17 <i>LAB</i> 18, 26-27 D 15 A 16 QD 16 DI 16
6. The student will recognize that vibrations such as sound and earthquakes move in waves and that waves move at different speeds in different materials.	(O) 8-11, 13-17 <i>MiniLAB</i> 11 <i>LAB</i> 18, 26-27 A 15, 16
<b>D. Motion</b> The student will describe the motion of objects.	
1. The student will use a frame of reference to describe the position, speed, and acceleration of an object.	(M) 8-13, 14-18 <i>MiniLAB</i> 11, 17 <i>LAB</i> 26-27 A 9 R 13, 18
2. The student will measure and graph the positions and speed of an object.	(M) 12, 18 <i>Section Review</i> 13 A 12 DI 12 CU 18 CA 18
3. The student will recognize that unbalanced forces acting on an object change the object's speed and/or direction.	(M) 37, 42-46 <i>Applying Math</i> 45, 48 IM 34F VL 44, 46 SJ 45, 47 DI 47 UA 47
<b>E. Forces of Nature</b> The student will understand that a variety of forces govern the structure and motion of objects in the universe.	
1. The student will know that electric currents and magnets can exert a force on certain objects and each other.	(N) 38-43, 45-51 <i>MiniLAB</i> 42, 46 <i>LAB</i> 44, 56-57 DI 39 A 40 D 41 QD 48 LD 50 IL 51
2. The student will know that there are positive and negative charges and that like charges repel one another and opposite charges attract.	(N) 8-14 <i>National Geographic</i> 10 QD 9, 11 DI 9 D 13

## Codes Used for TWE Pages

A	Activity
AIL	Alternative Inquiry Lab
CA	Check Assessment
CB	Content Background
CC	Curriculum Connection
CD	Cultural Diversity
CU	Check for Understanding
D	Discussion
DI	Differentiated Instruction
E	Extension
HS	Historical Significance
IL	Inquiry Lab
IM	Identifying Misconceptions
LD	Lab Demonstration
MM	Make a Model
QD	Quick Demo
R	Reteach
SJ	Science Journal
TFYI	Teacher FYI
UA	Use an Analogy
VL	Visual Learning