



MINNESOTA
Academic Standards - Science Grade 6
***Introduction to Physical Science* © 2005**

OBJECTIVES	PAGE REFERENCES
I. HISTORY AND NATURE OF SCIENCE	
A. Scientific World View 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.	SE: 27-30, 678 <i>LAB</i> 31 TWE: D 28 QD 29 The Teacher can expand on this objective with analyses of current science news, advertising claims, etc.
2. The student will explain why scientists often repeat investigations to be sure of the results.	SE: 28-29, 670 TWE: D 29 The Teacher can expand on this objective with discussions of 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.	SE: 7 TWE: TPK 6 D 7 CA 11
4. The student will define scientific facts, laws and theories.	SE: 7 TWE: D 7 CA 11 Specific laws as examples: 74, 312, 316, 323, 555, 597
B. Scientific Inquiry 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.	SE: 6-7 <i>LAB</i> 31 TWE: IM 10, 15 TFYI 16 CD 18
2. The student will distinguish among observation, prediction and inference.	SE: 13-14, 16, 670, 673-674, 678 <i>MiniLAB</i> 14, 16 TWE: LD 14 QD 23
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.	SE: 42-49, 50-54, 675-676 <i>MiniLAB</i> 44, 52 <i>National Geographic</i> 46 <i>LAB</i> 55, 115 TWE: IL 48 A 51

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4. The student will present and explain data and findings from controlled experiments using multiple representations including tables, graphs, physical models and demonstrations.	SE: 56-59 <i>LAB</i> 32-33, 60-61, 92-93, 180-181, 208-209, 330-331, 450-451, 572-573
C. Scientific Enterprise 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.	SE: 11 Products of technology: 360, 445-449, 499, 526-527, 539, 567-571 <i>Applying Science</i> 496 <i>Science and History</i> 542 <i>Accidents in Science</i> 574
2. The student will explain why scientists may work in teams or work alone, can collaborate and, at times, compete.	SE: 9-11, 17 Analysis of shared data is covered <i>Communicating Your Data</i> 125, 151, 209, 271, 331 TWE: D 9 IM 10 DI 10
II. PHYSICAL SCIENCE	
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.	SE: 80-85 <i>National Geographic</i> 82 <i>LAB</i> 86 TWE: A 82 TFYI 82 VL 83 QD 84 CA 85
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.	SE: 72-79, 170-175 <i>MiniLAB</i> 74 <i>LAB</i> 179, 180-181 TWE: A 73 IL 77 MM 78
3. The student will know that the mass of a substance remains constant whether it is together, in parts or in a different state.	SE: 53, 194 <i>MiniLAB</i> 194 TWE: D 53 USW 53 VL 194 DI 195
4. The student will describe the states of matter in terms of the space between particles.	SE: 102-106 <i>National Geographic</i> 110 TWE: A 104 LD 105 QD 106

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5. The student will distinguish between volume, mass and density.	SE: 52-53, 121, 134, 352 <i>MiniLAB</i> 52 <i>Applying Math</i> 121, 135 TWE: A 121 QD 135
6. The student will use the characteristic properties of density, melting point, boiling point and solubility to identify and distinguish mixtures and pure substances.	SE: 109, 112, 134-136, 227, 352 <i>MiniLAB</i> 136 <i>Applying Science</i> 352 TWE: IL 226
7. The student will know that atoms are the smallest unit of an element that maintains the characteristics of the element.	SE: 73-80, 83-85 <i>LAB</i> 86 TWE: USW 86
B. Chemical Reactions The student will differentiate between chemical and physical changes.	
1. The student will define chemical and physical changes.	SE: 143-148 <i>MiniLAB</i> 145 <i>LAB</i> 149 TWE: LD 145 DI 146 QD 146 MM 147 A 147
2. The student will observe that substances react chemically with other substances to form new substances with different characteristic properties.	SE: 145-148, 190-194 <i>LAB</i> 179, 207 TWE: UA 146 MM 194
3. The student will give examples and classify substances as mixtures or pure substances.	SE: 87-91, 218-220 <i>MiniLAB</i> 88 <i>Applying Science</i> 89 <i>LAB</i> 92-93 TWE: D 89 QD 90 A 90 AIL 92 QD 220
C. Energy Transformations 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.	SE: 374-378, 379-385 <i>National Geographic</i> 382 <i>LAB</i> 386 TWE: IL 375 A 376 SJ 377 DI 377 D 377
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.	SE: 438-441 <i>MiniLAB</i> 441 <i>LAB</i> 444 TWE: IL 439 LD 442

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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.	SE: 475, 528, 550-554 LAB 534 MiniLAB 551 TWE: VL 475 TFYI 528 A 552
4. The student will recognize the relationship between light and heat.	SE: 377, 391-392 MiniLAB 391 TWE: QD 381
5. The student will describe waves in terms of speed, frequency and wave length.	SE: 476-471 LAB 472, 480-481 TWE: D 469 A 470 QD 470 DI 470
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.	SE: 492 LAB 480-481 MiniLAB 492 TWE: AIL 480
D. Motion 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.	SE: 282-287, 289-292 Applying Math 284, 290 MiniLAB 285, 291 TWE: A 283, 286 IL 286
2. The student will measure and graph the positions and speed of an object.	SE: 282-286 Chapter Review (30) 305 TWE: A 286 CC 286 DI 286 CA 287
3. The student will recognize that unbalanced forces acting on an object change the object's speed and/or direction.	SE: 310-312, 316-318 LAB 330-331 TWE: USW 311 QD 312 VL 318 IM 318

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E. Forces of Nature 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.	SE: 621-627 <i>MiniLAB 622</i> <i>LAB 632-633</i> TWE: VL 622, 624 QD 624 TFYI 624 LD 626 USW 626 IL 627
2. The student will know that there are positive and negative charges and that like charges repel one another and opposite charges attract.	SE: 584-589 <i>National Geographic 586</i> TWE: QD 585, 587 DI 585

Codes Used for TWE Pages

A	Activity
AIL	Alternative Inquiry Lab
CA	Check Assessment
CC	Curriculum Connection
CD	Cultural Diversity
D	Discussion
DI	Differentiated Instruction
IL	Inquiry Lab
IM	Identifying Misconceptions
LD	Lab Demonstration
MM	Make a Model
QD	Quick Demo
SJ	Science Journal
TFYI	Teacher FYI
TPK	Tie to Prior Knowledge
UA	Use an Analogy
USW	Use Science Words
VL	Visual Learning