

## Annually Assessed Science Benchmarks: Level 4, Grades 9-12

updated 2005Jul22

SSS #	Benchmarks	Test Item Type
SC.A.1.4.3	The student knows that a change from one phase of matter to another involves a <b>gain or loss of energy</b> .	MC, GR
SC.A.1.4.4	The student experiments and determines that the <b>rates of reaction</b> among atoms and molecules depend on the concentration, pressure, and temperature of the reactants and presence or absence of catalysts.	MC, GR, SR
SC.A.2.4.5	The student knows that <b>elements are arranged into groups</b> and families based on similarities in electron structure and that their physical and chemical properties can be predicted.	MC
SC.B.1.4.1	The student understands how knowledge of <b>energy</b> is fundamental to all the scientific disciplines.	MC, GR, SR
SC.C.1.4.1	The student knows that all <b>motion is relative</b> to whatever frame of reference is chosen and that there is no absolute frame of reference from which to observe all motion.	MC, GR
SC.C.2.4.1	The student knows that acceleration due to <b>gravitational force</b> is proportional to mass and inversely proportional to the square of the distance between the objects.	MC, GR
SC.D.1.4.1	The student knows how <b>climatic patterns</b> on Earth result from an interplay of many factors.	MC, SR
SC.D.1.4.2	The student knows that the solid crust of Earth consists of slow-moving, separate plates that float on a denser, molten layer of Earth and that these plates interact with each other, changing the <b>Earth's surface</b> in many ways.	MC, SR
SC.D.2.4.1	The student understands the <b>interconnectedness</b> of the systems on Earth and the quality of Life.	MC, SR
SC.E.1.4.1	The student understands the relationships between events on Earth and the <b>movements of the Earth</b> , its moon, the other planets, and the sun.	MC, SR
SC.F.1.4.1	The student knows that the <b>body processes</b> involve specific body biochemical reactions governed by biochemical principles.	MC, SR
SC.F.2.4.3	The student understands the <b>mechanisms of change</b> (e.g., mutation and natural selection) that lead to adaptations in a species and their ability to survive naturally in changing conditions and to increase species diversity.	MC, SR
SC.G.1.4.1	The student knows of the great <b>diversity and interdependence</b> of living things.	MC, SR
SC.G.2.4.2	The student knows that changes in a component of an <b>ecosystem</b> will have unpredictable effects on the entire system but that the components of a system tend to react in a way that will restore the ecosystem to its original condition	MC, SR, ER
SC.H.1.4.1	The student knows that <b>investigations</b> are conducted to explore new phenomena, to check on previous results, to test how well a theory predicts, and to compare different theories.	MC, GR, SR, ER
SC.H.2.4.1	The student knows that scientists assume that the universe is a vast system in which <b>basic rules</b> exist that may range from very simple to extremely complex, but that scientists operate on the belief that the rules can be discovered by careful, systematic study.	MC
SC.H.3.4.2	The student knows that technological problems often create a demand for <b>new scientific knowledge</b> and that new technologies make it possible for scientists to extend their research in a way that advances science.	MC, SR