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Grade Level(s): 8-12

**Standards Map – Basic Comprehensive Program  
Science  
Grade – Eight  
Focus on Physical Sciences**

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|               |            |  |                                |                      | Y                 | N |                |
| <b>MOTION</b> |            |  |                                |                      |                   |   |                |
| 8             | 1          | <b><u>The velocity of an object is the rate of change of its position. As a basis for understanding this concept:</u></b>  |                                |                      |                   |   |                |
| 8             | 1.a        | <i>Students know</i> position is defined in relation to some choice of a standard reference point and a set of reference directions.                                       | SE/TE: 47                      |                      |                   |   |                |
| 8             | 1.b        | <i>Students know</i> that average speed is the total distance traveled divided by the total time elapsed and that the speed of an object along the path traveled can vary. | SE/TE: 48-56                   |                      |                   |   |                |
| 8             | 1.c        | <i>Students know</i> how to solve problems involving distance, time, and average speed.  | SE/TE: 47-49, 57-58, 62, 64-65 |                      |                   |   |                |

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| 8             | 1.d        | <i>Students know</i> the velocity of an object must be described by specifying both the direction and the speed of the object.         | SE/TE: 50, 59, 62, 63, 65 |                      |                   |   |                |
| 8             | 1.e        | <i>Students know</i> changes in velocity may be due to changes in speed, direction, or both.   | SE/TE: 50, 59, 62, 63, 65 |                      |                   |   |                |
| 8             | 1.f        | <i>Students know</i> how to interpret graphs of position versus time and graphs of speed versus time for motion in a single direction. | SE/TE: 57-58, 62-63, 64   |                      |                   |   |                |
| <b>FORCES</b> |            |  |                           |                      |                   |   |                |
| 8             | 2          | <b><u>Unbalanced forces cause changes in velocity. As a basis for understanding this concept:</u></b>                                  |                           |                      |                   |   |                |
| 8             | 2.a        | <i>Students know</i> a force has both direction and magnitude.   | SE/TE: 13-15              |                      |                   |   |                |
| 8             | 2.b        | <i>Students know</i> when an object is subject to two or more forces at once, the result is the cumulative effect of all the forces.   | SE/TE: 13-22              |                      |                   |   |                |
| 8             | 2.c        | <i>Students know</i> when the forces on an object are balanced, the motion of the object does not change.                              | SE/TE: 33-39              |                      |                   |   |                |

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| 8                          | 2.d        | <i>Students know</i> how to identify separately the two or more forces that are acting on a single static object, including gravity, elastic forces due to tension or compression in matter, and friction. | <i>The opportunity to address this standard is found on the following pages:</i><br>SE/TE: 53-56, 59, 90-97, 107-116, 132-134 |                      |                   |   |                |
| 8                          | 2.e        | <i>Students know</i> that when the forces on an object are unbalanced, the object will change its velocity (that is, it will speed up, slow down, or change direction).                                    | SE/TE: 87-97  |                      |                   |   |                |
| 8                          | 2.f        | <i>Students know</i> the greater the mass of an object, the more force is needed to achieve the same rate of change in motion.   | SE/TE: 87-89, 110-116   |                      |                   |   |                |
| 8                          | 2.g        | <i>Students know</i> the role of gravity in forming and maintaining the shapes of planets, stars, and the solar system.  | SE/TE: 251-253  |                      |                   |   |                |
| <b>STRUCTURE OF MATTER</b> |            |  |   |                      |                   |   |                |
| 8                          | 3          | <b><u>Each of the more than 100 elements of matter has distinct properties and a distinct atomic structure. All forms of matter are composed of one or more of the elements. As a basis for</u></b>        |   |                      |                   |   |                |

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|       |            | <b>understanding this concept:</b>  |   |                      |                   |   |                |
| 8     | 3.a        | <i>Students know</i> the structure of the atom and know it is composed of protons, neutrons, and electrons.   | SE/TE: 324-329, 331-335, 645-647, 782-784 |                      |                   |   |                |
| 8     | 3.b        | <i>Students know</i> that compounds are formed by combining two or more different elements and that compounds have properties that are different from their constituent elements.   | SE/TE: 331                                |                      |                   |   |                |
| 8     | 3.c        | <i>Students know</i> atoms and molecules form solids by building up repeating patterns, such as the crystal structure of NaCl or long-chain polymers.   | SE/TE: 344-345                            |                      |                   |   |                |
| 8     | 3.d        | <i>Students know</i> the states of matter (solid, liquid, gas) depend on molecular motion.  | SE/TE: 337, 450-461                       |                      |                   |   |                |
| 8     | 3.e        | <i>Students know</i> that in solids the atoms are closely locked in position and can only vibrate; in liquids the atoms and molecules are more loosely connected and can collide with and move past one another; and in gases the atoms and molecules are free to move independently, colliding frequently. | SE/TE: 345, 346, 362-365, 382-385         |                      |                   |   |                |
| 8     | 3.f        | <i>Students know</i> how to use the periodic table to identify elements   | <i>The opportunity to</i>                 |                      |                   |   |                |

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|   |            |   |   |                      | Y                 | N |                |
|   |            | in simple compounds.  | <i>address this standard is found on the following pages:<br/>SE/TE: 336</i>                                  |                      |                   |   |                |
| <b>EARTH IN THE SOLAR SYSTEM (EARTH SCIENCES)</b> |            |   |   |                      |                   |   |                |
| 8   | 4          | <b><u>The structure and composition of the universe can be learned from studying stars and galaxies and their evolution.</u></b> As a basis for understanding this concept: |   |                      |                   |   |                |
| 8   | 4.a        | <i>Students know</i> galaxies are clusters of billions of stars and may have different shapes.  | <i>The opportunity to address this standard is found on the following pages:<br/>SE/TE: 249-251, 253, 293</i> |                      |                   |   |                |
| 8   | 4.b        | <i>Students know</i> that the Sun is one of many stars in the Milky Way galaxy and that stars may differ in size, temperature, and color.                                   | <i>The opportunity to address this standard is found on the following pages:<br/>SE/TE: 249-</i>              |                      |                   |   |                |

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|       |            |  |   |                      | Y                 | N |                |
|       |            |  | 251   |                      |                   |   |                |
| 8     | 4.c        | <i>Students know</i> how to use astronomical units and light years as measures of distances between the Sun, stars, and Earth.   | <i>The opportunity to address this standard is found on the following pages:<br/>SE/TE: 284-293, 534-536</i>  |                      |                   |   |                |
| 8     | 4.d        | <i>Students know</i> that stars are the source of light for all bright objects in outer space and that the Moon and planets shine by reflected sunlight, not by their own light.                 | <i>The opportunity to address this standard is found on the following pages:<br/>SE/TE: 249-251, 253, 293</i> |                      |                   |   |                |
| 8     | 4.e        | <i>Students know</i> the appearance, general composition, relative position and size, and motion of objects in the solar system, including planets, planetary satellites, comets, and asteroids. | <i>The opportunity to address this standard is found on the following pages:<br/>SE/TE: 246-</i>              |                      |                   |   |                |

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|                  |            |   | 247, 252-253, 270-272, 273-275   |                      |                   |   |                |
| <b>REACTIONS</b> |            |   |  |                      |                   |   |                |
| 8                | 5          | <b><u>Chemical reactions are processes in which atoms are rearranged into different combinations of molecules. As a basis for understanding this concept:</u></b>   |  |                      |                   |   |                |
| 8                | 5.a        | <i>Students know</i> reactant atoms and molecules interact to form products with different chemical properties.   | SE/TE: 330-331   |                      |                   |   |                |
| 8                | 5.b        | <i>Students know</i> the idea of atoms explains the conservation of matter: In chemical reactions the number of atoms stays the same no matter how they are arranged, so their total mass stays the same. | <i>The opportunity to address this standard is found on the following pages:</i><br>SE/TE: 330-331 |                      |                   |   |                |
| 8                | 5.c        | <i>Students know</i> chemical reactions usually liberate heat or absorb heat.   | <i>The opportunity to address this standard is found on the following pages:</i><br>SE/TE: 330-    |                      |                   |   |                |

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|  |            |   | 331  |                      |                   |   |                |
| 8  | 5.d        | <i>Students know</i> physical processes include freezing and boiling, in which a material changes form with no chemical reaction.   | SE/TE: 337, 450-461  |                      |                   |   |                |
| 8  | 5.e        | <i>Students know</i> how to determine whether a solution is acidic, basic, or neutral.  |  |                      |                   |   |                |
| <b>CHEMISTRY OF LIVING SYSTEMS (LIFE SCIENCES)</b> |            |   |  |                      |                   |   |                |
| 8  | 6          | <b><u>Principles of chemistry underlie the functioning of biological systems. As a basis for understanding this concept:</u></b>  |  |                      |                   |   |                |
| 8  | 6.a        | <i>Students know</i> that carbon, because of its ability to combine in many ways with itself and other elements, has a central role in the chemistry of living organisms. | <i>The opportunity to address this standard is found on the following pages:<br/>SE/TE: 160-161, 325-326, 328, 330-331</i> |                      |                   |   |                |
| 8  | 6.b        | <i>Students know</i> that living organisms are made of molecules consisting largely of carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur.                        | <i>The opportunity to address this standard is found on the following</i>  |                      |                   |   |                |



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|                       |            |   | <i>pages:</i><br>SE/TE: 160-161, 325-326, 328, 330-331  |                      |                   |   |                |
| 8                     | 6.c        | <i>Students know</i> that living organisms have many different kinds of molecules, including small ones, such as water and salt, and very large ones, such as carbohydrates, fats, proteins, and DNA. | <i>The opportunity to address this standard is found on the following pages:</i><br>SE/TE: 160-161, 325-326, 328, 330-331 |                      |                   |   |                |
| <b>PERIODIC TABLE</b> |            |   |   |                      |                   |   |                |
| 8                     | 7          | <b><u>The organization of the periodic table is based on the properties of the elements and reflects the structure of atoms. As a basis for understanding this concept:</u></b>                       |   |                      |                   |   |                |
| 8                     | 7.a        | <i>Students know</i> how to identify regions corresponding to metals, nonmetals, and inert gases.   | <i>The opportunity to address this standard is found on the</i>   |                      |                   |   |                |

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|                             |            |   | <i>following pages:</i><br>SE/TE: 335-336   |                      |                   |   |                |
| 8                           | 7.b        | <i>Students know</i> each element has a specific number of protons in the nucleus (the atomic number) and each isotope of the element has a different but specific number of neutrons in the nucleus. | SE/TE: 331-333, 645, 783-784, 788-789   |                      |                   |   |                |
| 8                           | 7.c        | <i>Students know</i> substances can be classified by their properties, including their melting temperature, density, hardness, and thermal and electrical conductivity.                               | <i>The opportunity to address this standard is found on the following pages:</i><br>SE/TE: 324-331, 344-356, 362-365, 416-417, 419-422, 431-432 |                      |                   |   |                |
| <b>DENSITY AND BUOYANCY</b> |            |   |   |                      |                   |   |                |
| 8                           | 8          | <b><u>All objects experience a buoyant force when immersed in a fluid.</u></b><br><b>As a basis for understanding this concept:</b>   |   |                      |                   |   |                |
| 8                           | 8.a        | <i>Students know</i> density is mass per unit volume.   | SE/TE: 346-348, 363-364, 369-370, 383,  |                      |                   |   |                |

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|  |            |   | 384-385, 389  |                      |                   |   |                |
| 8  | 8.b        | <i>Students know</i> how to calculate the density of substances (regular and irregular solids and liquids) from measurements of mass and volume.  | SE/TE: 346-348, 360-361   |                      |                   |   |                |
| 8  | 8.c        | <i>Students know</i> the buoyant force on an object in a fluid is an upward force equal to the weight of the fluid the object has displaced.  | SE/TE: 366-372  |                      |                   |   |                |
| 8  | 8.d        | <i>Students know</i> how to predict whether an object will float or sink.   | SE/TE: 369-370  |                      |                   |   |                |
| <b>INVESTIGATION AND EXPERIMENTATION</b> |            |   |   |                      |                   |   |                |
| 8  | 9          | <b><u>Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations. Students will:</u></b> |   |                      |                   |   |                |
| 8  | 9.a        | Plan and conduct a scientific investigation to test a hypothesis.   | <i>In addition to activities in the lab manual, the opportunity</i> |                      |                   |   |                |

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|       |            |                  | <i>to address this standard is found on the following pages of the text:</i><br>SE/TE: 12, 32, 45, 46, 55, 67, 68, 75, 86, 88, 97, 105, 106, 109, 124, 132, 143, 144, 147, 169, 170, 173, 179, 188, 190, 200, 211, 212, 215, 231, 232, 253, 262, 267, 282, 302, 324, 326, 344, 352, 364, 369, 381, 382, 387, 403, 406, 409, 419, 430, 433, 435, 436, 449, 455, 467, 468, 471, 478, 490, 494, 513, 514, 531, 532, 539, 544, 554, 559, 563, 577, 578, 582, 590, 601, 602, 615, 621, 622, |                      |                   |   |                |

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|       |            |  | 627, 632, 641, 644, 701, 719, 739  |                      |                   |   |                |
| 8     | 9.b        | Evaluate the accuracy and reproducibility of data. | <i>In addition to activities in the lab manual, the opportunity to address this standard is found on the following pages of the text:</i><br>SE/TE: 12, 32, 45, 46, 55, 67, 68, 75, 86, 88, 97, 105, 106, 109, 124, 132, 143, 144, 147, 169, 170, 173, 179, 188, 190, 200, 211, 212, 215, 231, 232, 253, 262, 267, 282, 302, 324, 326, 344, 352, 364, 369, 381, 382, 387, 403, 406, 409, 419, 430, 433, 435, 436, 449, 455, 467, 468, 471, |                      |                   |   |                |

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|       |            |   | 478, 490, 494, 513, 514, 531, 532, 539, 544, 554, 559, 563, 577, 578, 582, 590, 601, 602, 615, 621, 622, 627, 632, 641, 644, 701, 719, 739  |                      |                   |   |                |
| 8     | 9.c        | Distinguish between variable and controlled parameters in a test. | <i>In addition to activities in the lab manual, the opportunity to address this standard is found on the following pages of the text:</i><br>SE/TE: 12, 32, 45, 46, 55, 67, 68, 75, 86, 88, 97, 105, 106, 109, 124, 132, 143, 144, 147, 169, 170, 173, 179, 188, 190, 200, 211, 212, 215, 231, 232, 253, 262, 267, 282, 302, 324, |                      |                   |   |                |

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|       |            |   | 326, 344, 352, 364, 369, 381, 382, 387, 403, 406, 409, 419, 430, 433, 435, 436, 449, 455, 467, 468, 471, 478, 490, 494, 513, 514, 531, 532, 539, 544, 554, 559, 563, 577, 578, 582, 590, 601, 602, 615, 621, 622, 627, 632, 641, 644, 701, 719, 739 |                      |                   |   |                |
| 8     | 9.d        | Recognize the slope of the linear graph as the constant in the relationship $y=kx$ and apply this principle in interpreting graphs constructed from data. | SE/TE: 57-58, 62-64   |                      |                   |   |                |
| 8     | 9.e        | Construct appropriate graphs from data and develop quantitative statements about the relationships between variables.                                     | SE/TE: 57-58, 62-64   |                      |                   |   |                |
| 8     | 9.f        | Apply simple mathematic relationships to determine a missing quantity in a mathematic expression, given the two remaining terms (including speed =        | SE/TE: 48-49, 51-54, 62-67, 86-91, 100-105, 125, 145-149, 158-159,  |                      |                   |   |                |

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|          |            | distance/time, density = mass/volume, force = pressure x area, volume = area x height). | 165-169, 219, 534   |                      |                   |   |                |
| 8        | 9.g        | Distinguish between linear and nonlinear relationships on a graph of data.              | <i>The opportunity to address this standard is found on the following pages<br/>SE/TE: 57-58, 62-64</i> |                      |                   |   |                |
| Appendix |            |   |   |                      |                   |   |                |