Science – 8

Course #: M3802, M3807, M3808, M3809

Course Description:

Eight grade science provides students with a coordinated science course that integrates concepts in Life, Earth, and Physical Science through the use of a storyline approach - a logical sequence of lessons that are motivated by students' questions that arise from students' interactions with phenomena. Students examine phenomena dealing with Contact Forces, Sound Waves, Forces at a Distance, Earth in Space, Genetics, Natural Selection & Common Ancestry. Students will actively engage in scientific and engineering practices and apply crosscutting concepts to deepen their understanding of the core ideas. The learning experiences provided for students will engage them with fundamental questions about the world and in the role of scientists to investigate and find answers to those questions. Students will have ongoing opportunities to carry out scientific investigations and engineering design projects related to the disciplinary core ideas throughout the course.

Course Proficiencies:

The following is a list of skills and concepts that students will be proficient in upon successful completion of this course. These proficiencies form the basis of assessment of each student's achievement. Students will be able to:

1. Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects. ***(MS-PS2-1)***
2. Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. ***(MS-PS2-2)***
3. Construct and interpret graphical displays of data to describe the relationships of kinetic energy to the mass of an object and to the speed of an object. ***(MS-PS3-1)***
4. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. ***(MS-ETS1-2)***
5. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. ***(MS-ETS1-3)***
6. Gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for storage as memories. ***(MS-LS1-8)***

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7. Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave. ***(MS-PS4-1)***
8. Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials. ***(MS-PS4-2)***
9. Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. ***(MS-PS2-3)***
10. Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact. ***(MS-PS2-5)***
11. Develop a model to describe that when the arrangement of objects interacting at a distance changes, different amounts of potential energy are stored in the system. ***(MS-PS3-2)***
12. Construct, use, and present arguments to support the claim that when the kinetic energy of an object changes, energy is transferred to or from the object. ***(MS-PS3-5)***
13. Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. ***(MS-PS2-4)***
14. Develop and use a model of the Earth-sun-moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons. ***(MS-ESS1-1)***
15. Develop and use a model to describe the role of gravity in the motions within galaxies and the solar system. ***(MS-ESS1-2)***
16. Analyze and interpret data to determine scale properties of objects in the solar system. ***(MS-ESS1-3)***
17. Integrate qualitative scientific and technical information to support the claim that digitized signals are a more reliable way to encode and transmit information than analog signals. ***(MS-PS4-3)***
18. Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms. ***(MS-LS1-5)***
19. Develop and use a model to describe why structural changes to genes (mutations) located on chromosomes may affect proteins and may result in harmful, beneficial, or neutral effects to the structure and function of the organism. ***(MS-LS3-1)***
20. Develop and use a model to describe why asexual reproduction results in offspring with identical genetic information and sexual reproduction results in offspring with genetic variation. ***(MS-LS3-2)***
21. Gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms. ***(MS-LS4-5)***
22. Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.***(MS-LS1-4)***

23. Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past. ***(MS-LS4-1)***
24. Apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships. ***(MS-LS4-2)***
25. Analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy. ***(MS-LS4-3)***
26. Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment. ***(MS-LS4-4)***
27. Use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time. ***(MS-LS4-6)***
28. Identify questions and make predictions that can be addressed by conducting investigations. ***(Science and Engineering Practices – 1, 2)***
29. Collect and analyze data in order to evaluate the strength and weakness claims and arguments throughout the course. ***(Science and Engineering Practices – 3, 4, 6, 7)***
30. Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences. **(*Science and Engineering Practices – 7, 8)***
31. Identify laboratory equipment and demonstrate its appropriate safe use. ***(Science and Engineering Practice – 3)***
32. Use appropriate technology in construction of a simple spreadsheet, the design and production of basic multimedia projects, and in the creation of documents in word processing with advanced text formatting and graphics. ***(NJSLS – 8.1.8.A.2, 8.1.8.A.4)***
33. Select and use technology applications effectively and productively to gather, evaluate and use the information to explore a problem, develop a solution, and communicate ideas. ***(8.1.8.A.1, 8.1.8.A.2, 8.1.8.A.3, 8.1.8.A.4, 8.1.8.C.1, 8.1.8.E.1, 8.1.8.F.1)***
34. Develop an understanding of the nature and impact of technology, engineering, design, and computational thinking on the individual, global society, and the environment. ***(8.2.8.A.4, 8.2.8.A.5, 8.2.8.B.2, 8.2.8.C.8, 8.2.8.D.2, 8.2.8.D.3)***
35. Develop important attributes for career success including communication, collaboration, critical thinking, creativity, and leadership skills. ***(9.2.8.CAP.2)***

Assessment:

Evaluation of student achievement in this course will be based on the following assessment tools:
a. Tests and quizzes.

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b. Laboratory performance, reports, and journals.
c. Class participation.
d. Well-developed homework.
e. Maintaining a folder/notebook.
f. Projects, including oral presentations.
g. Teacher observation.

Board Adopted Textbook:

None

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