

NY Math, Science & Tech. Learning Standards

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Math & the Cosmos - Multimedia

use inductive reasoning to construct, evaluate, and validate conjectures and arguments, recognizing that patterns and relationships can assist in explaining and extending mathematical phenomena

Standard 1 Analysis, Inquiry, and Design : Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions. : Intermediate Students: : MATHEMATICAL ANALYSIS : 2. Deductive and inductive reasoning are used to reach mathematical conclusions.

Component: Graphs

Reference:

Required: - Suggested: 8 Interested: -

apply mathematical knowledge to solve real-world problems and problems that arise from the investigation of mathematical ideas, using representations such as pictures, charts, and tables

Standard 1 Analysis, Inquiry, and Design : Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions. : Intermediate Students: : MATHEMATICAL ANALYSIS : 3. Critical thinking skills are used in the solution of mathematical problems.

Component: Angles

Reference:

Required: - Suggested: 8 Interested: -

design charts, tables, graphs and other representations of observations in conventional and creative ways to help them address their research question or hypothesis

Standard 1 Analysis, Inquiry, and Design : Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions. : Intermediate Students: : SCIENTIFIC INQUIRY : 3. The observations made while testing proposed explanations, when analyzed using conventional and invented methods, provide new insights into phenomena.

Component: Motion

Reference:

Required: - Suggested: 8 Interested: -

use algebraic and geometric representations to describe and compare data

Standard 1 Analysis, Inquiry, and Design : Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions. : Commencement Students: : MATHEMATICAL ANALYSIS : 1. Abstraction and symbolic representation are used to communicate mathematically.

Component: Graphs

Reference:

Required: - Suggested: 9-12 Interested: -

apply algebraic and geometric concepts and skills to the solution of problems

Standard 1 Analysis, Inquiry, and Design : Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions. : Commencement Students: : MATHEMATICAL ANALYSIS : 3. Critical thinking skills are used in the solution of mathematical problems.

Component: Angles

Reference:

Required: - Suggested: 9-12 Interested: -

Component: Trigonometry

Reference:

Required: - Suggested: 9-12 Interested: -

Component: Motion

Reference:

Required: - Suggested: 9-12 Interested: -

NY Math, Science & Tech. Learning Standards

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derive and apply formulas to find measures such as length, area, volume, weight, time, and angle in real-world contexts

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying

mathematics in real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : MATHEMATICAL REASONING : Students use mathematical reasoning to analyze mathematical situations, make conjectures, gather evidence, and construct an argument. Students will: : COMMENCEMENT

Component: Angles

Reference:

Required: -

Suggested: 9-12

Interested: -

choose the appropriate tools for measurement

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying

mathematics in real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : MATHEMATICAL REASONING : Students use mathematical reasoning to analyze mathematical situations, make conjectures, gather evidence, and construct an argument. Students will: : COMMENCEMENT

Component: Angles

Reference:

Required: -

Suggested: 9-12

Interested: -

use trigonometry as a method to measure indirectly

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying

mathematics in real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : MATHEMATICAL REASONING : Students use mathematical reasoning to analyze mathematical situations, make conjectures, gather evidence, and construct an argument. Students will: : COMMENCEMENT

Component: Trigonometry

Reference:

Required: -

Suggested: 9-12

Interested: -

apply proportions to scale drawings, computer-assisted design blueprints, and direct variation in order to compute indirect measurements

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying

mathematics in real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : MATHEMATICAL REASONING : Students use mathematical reasoning to analyze mathematical situations, make conjectures, gather evidence, and construct an argument. Students will: : COMMENCEMENT

Component: Angles

Reference:

Required: -

Suggested: 9-12

Interested: -

relate absolute value, distance between two points, and the slope of a line to the coordinate plane

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying

mathematics in real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : MATHEMATICAL REASONING : Students use mathematical reasoning to analyze mathematical situations, make conjectures, gather evidence, and construct an argument. Students will: : COMMENCEMENT

Component: Graphs

Reference:

Required: -

Suggested: 9-12

Interested: -

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use geometric relationships in relevant measurement problems involving geometric concepts

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying

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Component: Trigonometry

Reference:

Required: -

Suggested: 9-12

Interested: -

understand, represent, and use numbers in a variety of equivalent forms (integer, fraction, decimal, percent, exponential, expanded and scientific notation)

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in real-world

settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : NUMBER & NUMERATION : Students use number sense and numeration to develop an understanding of multiple uses of numbers in the real world, use of numbers to communicate mathematically, and use of numbers in the development of mathematical ideas. Students will: : INTERMEDIATE

Component: Scientific Notation

Reference:

Required: -

Suggested: 8

Interested: -

use the coordinate plane to explore geometric ideas

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in real-world

settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : MODELING/MULTIPLE REPRESENTATION : Students use mathematical modeling/multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships. Students will: : INTERMEDIATE

Component: Graphs

Reference:

Required: -

Suggested: 8

Interested: -

represent numerical relationships in one and two-dimensional graphs

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settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : MODELING/MULTIPLE REPRESENTATION : Students use mathematical modeling/multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships. Students will: : INTERMEDIATE

Component: Graphs

Reference:

Required: -

Suggested: 8

Interested: -

model vector quantities both algebraically and geometrically

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settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : MODELING/MULTIPLE REPRESENTATION : Students use mathematical modeling/multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships. Students will: : FOUR-YEAR SEQUENCE

Component: Angles

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Reference:

Required: -

Suggested: 9-12

Interested: -

Component: Motion

Reference:

Required: -

Suggested: 9-12

Interested: -

use polynomial, rational, trigonometric, and exponential functions to model real-world relationships

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in real-world

settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and

trigonometry. : MODELING/MULTIPLE REPRESENTATION : Students use mathematical modeling/multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships. Students will: :

FOUR-YEAR SEQUENCE

Component: Trigonometry

Reference:

Required: -

Suggested: 9-12

Interested: -

illustrate spatial relationships using perspective, projections, and maps

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settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and

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FOUR-YEAR SEQUENCE

Component: Graphs

Reference:

Required: -

Suggested: 9-12

Interested: -

select appropriate standard and nonstandard measurement units and tools to measure to a desired degree of accuracy

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in

real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis,

probability, and trigonometry. : MEASUREMENT : Students use measurement in both metric and English measure to provide a major link between the abstractions of mathematics and the real world in order to describe and compare objects and data.. Students will: :

INTERMEDIATE

Component: Angles

Reference:

Required: -

Suggested: 8

Interested: -

derive and apply formulas to find measures such as length, area, volume, weight, time, and angle in real-world contexts

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COMMENCEMENT

Component: Angles

Reference:

Required: -

Suggested: 9-12

Interested: -

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the appropriate tools for measurement

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Component: Angles

Reference:

Required: -

Suggested: 9-12

Interested: -

use trigonometry as a method to measure indirectly

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Component: Trigonometry

Reference:

Required: -

Suggested: 9-12

Interested: -

apply proportions to scale drawings, computer-assisted design blueprints, and direct variation in order to compute indirect measurements

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Component: Trigonometry

Reference:

Required: -

Suggested: 9-12

Interested: -

relate absolute value, distance between two points, and the slope of a line to the coordinate plane

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Component: Graphs

Reference:

Required: -

Suggested: 9-12

Interested: -

use geometric relationships in relevant measurement problems involving geometric concepts

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : MEASUREMENT : Students use measurement in both metric and English measure to provide a major link between the abstractions of mathematics and the real world in order to describe and compare objects and data.. Students will: :

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COMMENCEMENT

Component: Trigonometry

Reference:

Required: -

Suggested: 9-12

Interested: -

define the trigonometric functions in terms of the unit circle

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in real-world

settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and

trigonometry. : MEASUREMENT : Students use measurement in both metric and English measure to provide a major link between the abstractions of mathematics and the real world in order to describe and compare objects and data.. Students will: : FOUR-YEAR

SEQUENCE

Component: Trigonometry

Reference:

Required: -

Suggested: 9-12

Interested: -

relate trigonometric relationships to the area of a triangle and to the general solutions of triangles

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settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and

trigonometry. : MEASUREMENT : Students use measurement in both metric and English measure to provide a major link between the abstractions of mathematics and the real world in order to describe and compare objects and data.. Students will: : FOUR-YEAR

SEQUENCE

Component: Trigonometry

Reference:

Required: -

Suggested: 9-12

Interested: -

recognize, describe, and generalize a wide variety of patterns and functions

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in

real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability,

and trigonometry. : PATTERNS/FUNCTIONS : Students use patterns and functions to develop mathematical power, appreciate the true beauty of mathematics, and construct generalizations that describe patterns simply and efficiently Students will: . : INTERMEDIATE

Component: Motion

Reference:

Required: -

Suggested: 8

Interested: -

apply the concept of similarity in relevant situations

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in

real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability,

and trigonometry. : PATTERNS/FUNCTIONS : Students use patterns and functions to develop mathematical power, appreciate the true beauty of mathematics, and construct generalizations that describe patterns simply and efficiently Students will: . : INTERMEDIATE

Component: Trigonometry

Reference:

Required: -

Suggested: 8

Interested: -

develop and apply the Pythagorean principle in the solution of problems

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in

real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability,

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and trigonometry. : PATTERNS/FUNCTIONS : Students use patterns and functions to develop mathematical power, appreciate the true beauty of mathematics, and construct generalizations that describe patterns simply and efficiently Students will: . : INTERMEDIATE

Component: Trigonometry

Reference:

Required: -

Suggested: 8

Interested: -

explore and develop basic concepts of right triangle trigonometry

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in

real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : PATTERNS/FUNCTIONS : Students use patterns and functions to develop mathematical power, appreciate the true beauty of mathematics, and construct generalizations that describe patterns simply and efficiently Students will: . : INTERMEDIATE

Component: Trigonometry

Reference:

Required: -

Suggested: 8

Interested: -

use patterns and functions to represent and solve problems

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in

real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : PATTERNS/FUNCTIONS : Students use patterns and functions to develop mathematical power, appreciate the true beauty of mathematics, and construct generalizations that describe patterns simply and efficiently Students will: . : INTERMEDIATE

Component: Trigonometry

Reference:

Required: -

Suggested: 8

Interested: -

develop methods to solve trigonometric equations and verify trigonometric functions

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in real-world

settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : PATTERNS/FUNCTIONS : Students use patterns and functions to develop mathematical power, appreciate the true beauty of mathematics, and construct generalizations that describe patterns simply and efficiently Students will: . : FOUR-YEAR SEQUENCE

Component: Trigonometry

Reference:

Required: -

Suggested: 9-12

Interested: -

describe different patterns of motion of objects

Standard 4 - Science : Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. : Intermediate Students: : PHYSICAL SETTING : 5. Energy and matter interact through forces that result in changes in motion.

Component: Motion

Reference:

Required: -

Suggested: 8

Interested: -

observe, describe, and compare effects of forces (gravity, electric current, and magnetism) on the motion of objects

Standard 4 - Science : Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. : Intermediate Students: : PHYSICAL SETTING : 5. Energy and matter interact through forces that result in changes in motion.

Component: Motion

Reference:

Required: -

Suggested: 8

Interested: -

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explain complex phenomena, such as tides, variations in day length, solar insolation, apparent motion of the planets, and annual traverse of the constellations

Standard 4 - Science : Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. : Commencement Students: : PHYSICAL SETTING : 1. The Earth and celestial phenomena can be described by principles of relative motion and perspective.

Component: Star Charts

Reference:

Required: - Suggested: 9-12 Interested: -

explain and predict different patterns of motion of objects (e.g., linear and angular motion, velocity and acceleration, momentum and inertia)

Standard 4 - Science : Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. : Commencement Students: : PHYSICAL SETTING : 5. Energy and matter interact through forces that result in changes in motion.

Component: Angles

Reference:

Required: - Suggested: 9-12 Interested: -

Component: Star Charts

Reference:

Required: - Suggested: 9-12 Interested: -

Component: Motion

Reference:

Required: - Suggested: 9-12 Interested: -

use computer-aided drawing and design (CADD) software to model realistic solutions to design problems

Standard 5 - Technology : Students will apply technological knowledge and skills to design, construct, use, and evaluate products and systems to satisfy human and environmental needs. : COMPUTER TECHNOLOGY : Computers, as tools for design, modeling, information processing, communication, and system control, have greatly increased human productivity and knowledge. Students will: : COMMENCEMENT

Component: Angles

Reference:

Required: - Suggested: 9-12 Interested: -

describe the differences between dynamic systems and organizational systems

Standard 6 - Interconnectedness: Common Themes : Students will understand the relationships and common themes that connect mathematics, science, and technology and apply the themes to these and other areas of learning. : SYSTEM THINKING : Through systems thinking, people can recognize the commonalities that exist among all systems and how parts of a system interrelate and combine to perform specific functions. Students will: : INTERMEDIATE

Component: Star Charts

Reference:

Required: - Suggested: 8 Interested: -

describe the differences and similarities between engineering systems, natural systems, and social systems

Standard 6 - Interconnectedness: Common Themes : Students will understand the relationships and common themes that connect mathematics, science, and technology and apply the themes to these and other areas of learning. : SYSTEM THINKING : Through systems thinking, people can recognize the commonalities that exist among all systems and how parts of a system interrelate and combine to perform specific functions. Students will: : INTERMEDIATE

Component: Star Charts

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Reference:

Required: -

Suggested: 8

Interested: -

use powers of ten notation to represent very small and very large numbers

Standard 6 - Interconnectedness: Common Themes : Students will understand the relationships and common themes that connect mathematics, science, and technology and

apply the themes to these and other areas of learning. : MAGNITUDE & SCALE : The grouping of magnitudes of size, time, frequency, and pressures or other units of measurement into a series of relative order provides a useful way to deal with the immense range and the changes in scale that affect the behavior and design of systems. Students will: : INTERMEDIATE

Component: Scientific Notation

Reference:

Required: -

Suggested: 8

Interested: -

extend their use of powers of ten notation to understanding the exponential function and performing operations with exponential factors

Standard 6 - Interconnectedness: Common Themes : Students will understand the relationships and common themes that connect mathematics, science, and technology and

apply the themes to these and other areas of learning. : MAGNITUDE & SCALE : The grouping of magnitudes of size, time, frequency, and pressures or other units of measurement into a series of relative order provides a useful way to deal with the immense range and the changes in scale that affect the behavior and design of systems. Students will: : COMMENCEMENT

Component: Scientific Notation

Reference:

Required: -

Suggested: 9-12

Interested: -

observe common themes

Standard 7-Interdisciplinary Problem Solving : Students will apply the knowledge and thinking skills of mathematics, science, and technology to address real-life problems and make

informed decisions. : STRATEGIES : Solving interdisciplinary problems involves a variety of skills and strategies, including effective work habits; gathering and processing information; generating and analyzing ideas; realizing ideas; making connections among the common themes of mathematics, science, and technology; and presenting results. :

ELEMENTARY--INTERMEDIATE--COMMENCEMENT

Component: Motion

Reference:

Required: -

Suggested: 8-12

Interested: -

Observing examples of common unifying themes, applying them to the problem, and using them to better understand the dimensions of the problem

Standard 7-Interdisciplinary Problem Solving : Students will apply the knowledge and thinking skills of mathematics, science, and technology to address real-life problems and make informed decisions. : SKILLS & STRATEGIES FOR

INTERDISCIPLINARYPROBLEM SOLVING : ELEMENTARY--INTERMEDIATE--COMMENCEMENT : Common Themes:

Component: Motion

Reference:

Required: -

Suggested: 8-12

Interested: -

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construct explanations independently for natural phenomena, especially by proposing preliminary visual models of phenomena
Standard 1 Analysis, Inquiry, and Design : Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions. : Intermediate Students: : **SCIENTIFIC INQUIRY** : 1. The central purpose of scientific inquiry is to develop explanations of natural phenomena in a continuing, creative process.

Component: Observing the Sky

Reference:

Required: -

Suggested: 8

Interested: -

use algebraic and geometric representations to describe and compare data

Standard 1 Analysis, Inquiry, and Design : Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions. : Commencement Students: : **MATHEMATICAL ANALYSIS** : 1.

Abstraction and symbolic representation are used to communicate mathematically.

Component: Observing the Sky

Reference:

Required: -

Suggested: 9-12

Interested: -

Component: Mapping the Stars

Reference:

Required: -

Suggested: 9-12

Interested: -

relate absolute value, distance between two points, and the slope of a line to the coordinate plane

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying

mathematics in real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : **MATHEMATICAL REASONING** : Students use mathematical reasoning to analyze mathematical situations, make conjectures, gather evidence, and construct an argument. Students will: : **COMMENCEMENT**

Component: Observing the Sky

Reference:

Required: -

Suggested: 9-12

Interested: -

Component: Mapping the Stars

Reference:

Required: -

Suggested: 9-12

Interested: -

understand the concept of infinity.

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in real-world settings,

and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : **NUMBER & NUMERATION** : Students use number sense and numeration to develop an understanding of multiple uses of numbers in the real world, use of numbers to communicate mathematically, and use of numbers in the development of mathematical ideas.

Students will: : **FOUR-YEAR SEQUENCE**

Component: Understanding the Motions of Stars and Planets

Reference:

Required: -

Suggested: 9-12

Interested: -

use the coordinate plane to explore geometric ideas

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in real-world

settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : **MODELING/MULTIPLE REPRESENTATION** : Students use mathematical modeling/multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships. Students will: : **INTERMEDIATE**

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Component: Observing the Sky

Reference:

Required: -

Suggested: 8

Interested: -

Component: Mapping the Stars

Reference:

Required: -

Suggested: 8

Interested: -

represent numerical relationships in one and two-dimensional graphs

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in real-world

settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : MODELING/MULTIPLE REPRESENTATION : Students use mathematical modeling/multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships. Students will: : INTERMEDIATE

Component: Observing the Sky

Reference:

Required: -

Suggested: 8

Interested: -

Component: Mapping the Stars

Reference:

Required: -

Suggested: 8

Interested: -

justify the procedures for basic geometric constructions

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settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : MODELING/MULTIPLE REPRESENTATION : Students use mathematical modeling/multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships. Students will: :

COMMENCEMENT

Component: Observing the Sky

Reference:

Required: -

Suggested: 9-12

Interested: -

Component: Mapping the Stars

Reference:

Required: -

Suggested: 9-12

Interested: -

develop and apply the concept of basic loci to compound loci

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settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : MODELING/MULTIPLE REPRESENTATION : Students use mathematical modeling/multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships. Students will: :

COMMENCEMENT

Component: Mapping the Stars

Reference:

Required: -

Suggested: 9-12

Interested: -

use graphing utilities to create and explore geometric and algebraic models

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in real-world

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settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : MODELING/MULTIPLE REPRESENTATION : Students use mathematical modeling/multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships. Students will: :

COMMENCEMENT

Component: Mapping the Stars

Reference:

Required: -

Suggested: 9-12

Interested: -

illustrate spatial relationships using perspective, projections, and maps

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in real-world

settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : MODELING/MULTIPLE REPRESENTATION : Students use mathematical modeling/multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships. Students will: :

FOUR-YEAR SEQUENCE

Component: Observing the Sky

Reference:

Required: -

Suggested: 9-12

Interested: -

Component: Mapping the Stars

Reference:

Required: -

Suggested: 9-12

Interested: -

analyze spatial relationships using the Cartesian coordinate system in three dimensions

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in real-world

settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : MODELING/MULTIPLE REPRESENTATION : Students use mathematical modeling/multiple representation to provide a means of presenting, interpreting, communicating, and connecting mathematical information and relationships. Students will: :

FOUR-YEAR SEQUENCE

Component: Mapping the Stars

Reference:

Required: -

Suggested: 9-12

Interested: -

explore and produce graphic representations of data using calculators/ computers

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in

real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : MEASUREMENT : Students use measurement in both metric and English measure to provide a major link between the abstractions of mathematics and the real world in order to describe and compare objects and data.. Students will: :

INTERMEDIATE

Component: Observing the Sky

Reference:

Required: -

Suggested: 8

Interested: -

Component: Mapping the Stars

Reference:

Required: -

Suggested: 8

Interested: -

relate absolute value, distance between two points, and the slope of a line to the coordinate plane

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Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : MEASUREMENT : Students use measurement in both metric and English measure to provide a major link between the abstractions of mathematics and the real world in order to describe and compare objects and data.. Students will: : COMMENCEMENT

Component: Observing the Sky

Reference:

Required: -

Suggested: 9-12

Interested: -

Component: Mapping the Stars

Reference:

Required: -

Suggested: 9-12

Interested: -

understand and apply the relationship between rectangular form and polar form of a complex number

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : PATTERNS/FUNCTIONS : Students use patterns and functions to develop mathematical power, appreciate the true beauty of mathematics, and construct generalizations that describe patterns simply and efficiently Students will: . : FOUR-YEAR SEQUENCE

Component: Mapping the Stars

Reference:

Required: -

Suggested: 9-12

Interested: -

use the limiting process to analyze infinite sequences and series

Standard 3 - Mathematics : Students will understand mathematics and become mathematically confident by communicating and reasoning mathematically, by applying mathematics in real-world settings, and by solving problems through the integrated study of number systems, geometry, algebra, data analysis, probability, and trigonometry. : PATTERNS/FUNCTIONS : Students use patterns and functions to develop mathematical power, appreciate the true beauty of mathematics, and construct generalizations that describe patterns simply and efficiently Students will: . : FOUR-YEAR SEQUENCE

Component: Understanding the Motions of Stars and Planets

Reference:

Required: -

Suggested: 9-12

Interested: -

explain daily, monthly, and seasonal changes on earth

Standard 4 - Science : Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. : Intermediate Students: : PHYSICAL SETTING : 1. The Earth and celestial phenomena can be described by principles of relative motion and perspective.

Component: Viewing Nature

Reference:

Required: -

Suggested: 8

Interested: -

Component: Observing the Sky

Reference:

Required: -

Suggested: 8

Interested: -

Component: Understanding the Motions of Stars and Planets

Reference:

Required: -

Suggested: 8

Interested: -

Component: Connecting Astronomy, Mythology, and History

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Reference:

Required: - Suggested: 8 Interested: -

observe and describe the properties of sound, light, magnetism, and electricity

Standard 4 - Science : Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. : Intermediate Students: : PHYSICAL SETTING : 4. Energy exists in many forms, and when these forms change energy is conserved.

Component: Investigating Deep Space

Reference:

Required: - Suggested: 8 Interested: -

describe different patterns of motion of objects

Standard 4 - Science : Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. : Intermediate Students: : PHYSICAL SETTING : 5. Energy and matter interact through forces that result in changes in motion.

Component: Understanding the Motions of Stars and Planets

Reference:

Required: - Suggested: 8 Interested: -

Component: Investigating Deep Space

Reference:

Required: - Suggested: 8 Interested: -

observe, describe, and compare effects of forces (gravity, electric current, and magnetism) on the motion of objects

Standard 4 - Science : Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. : Intermediate Students: : PHYSICAL SETTING : 5. Energy and matter interact through forces that result in changes in motion.

Component: Viewing Nature

Reference:

Required: - Suggested: 8 Interested: -

Component: Observing the Sky

Reference:

Required: - Suggested: 8 Interested: -

Component: Understanding the Motions of Stars and Planets

Reference:

Required: - Suggested: 8 Interested: -

Component: Investigating Deep Space

Reference:

Required: - Suggested: 8 Interested: -

explain complex phenomena, such as tides, variations in day length, solar insolation, apparent motion of the planets, and annual traverse of the constellations

Standard 4 - Science : Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. : Commencement Students: : PHYSICAL SETTING : 1. The Earth and celestial phenomena can be described by principles of relative motion and perspective.

Component: Viewing Nature

Reference:

Required: - Suggested: 9-12 Interested: -

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Component:	Observing the Sky		
Reference:	Required: -	Suggested: 9-12	Interested: -
Component:	Understanding the Motions of Stars and Planets		
Reference:	Required: -	Suggested: 9-12	Interested: -
Component:	Investigating Deep Space		
Reference:	Required: -	Suggested: 9-12	Interested: -
Component:	Connecting Astronomy, Mythology, and History		
Reference:	Required: -	Suggested: 9-12	Interested: -

describe current theories about the origin of the universe and solar system

Standard 4 - Science : Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. : Commencement Students: : PHYSICAL SETTING : 1. The Earth and celestial phenomena can be described by principles of relative motion and perspective.

Component:	Viewing Nature		
Reference:	Required: -	Suggested: 9-12	Interested: -
Component:	Observing the Sky		
Reference:	Required: -	Suggested: 9-12	Interested: -
Component:	Understanding the Motions of Stars and Planets		
Reference:	Required: -	Suggested: 9-12	Interested: -
Component:	Investigating Deep Space		
Reference:	Required: -	Suggested: 9-12	Interested: -

use the concepts of density and heat energy to explain observations of weather patterns, seasonal changes, and the movements of the Earth's plates

Standard 4 - Science : Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. : Commencement Students: : PHYSICAL SETTING : 2. Many of the phenomena that we observe on Earth involve interactions among components of air, water, and land.

Component:	Investigating Deep Space		
Reference:	Required: -	Suggested: 9-12	Interested: -

explain how incoming solar radiations, ocean currents, and land masses affect weather and climate

Standard 4 - Science : Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. : Commencement Students: : PHYSICAL SETTING : 2. Many of the phenomena that we observe on Earth involve interactions among components of air, water, and land.

Component:	Investigating Deep Space		
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Reference:

Required: -

Suggested: 9-12

Interested: -

explain and predict different patterns of motion of objects (e.g., linear and angular motion, velocity and acceleration, momentum and inertia)

Standard 4 - Science : Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. : Commencement Students: : PHYSICAL SETTING : 5. Energy and matter interact through forces that result in changes in motion.

Component: Viewing Nature

Reference:

Required: -

Suggested: 9-12

Interested: -

Component: Understanding the Motions of Stars and Planets

Reference:

Required: -

Suggested: 9-12

Interested: -

Component: Investigating Deep Space

Reference:

Required: -

Suggested: 9-12

Interested: -

compare energy relationships within an atom's nucleus to those outside the nucleus

Standard 4 - Science : Students will understand and apply scientific concepts, principles, and theories pertaining to the physical setting and living environment and recognize the historical development of ideas in science. : Commencement Students: : PHYSICAL SETTING : 5. Energy and matter interact through forces that result in changes in motion.

Component: Investigating Deep Space

Reference:

Required: -

Suggested: 9-12

Interested: -

describe the differences between dynamic systems and organizational systems

Standard 6 - Interconnectedness: Common Themes : Students will understand the relationships and common themes that connect mathematics, science, and technology and apply the themes to these and other areas of learning. : SYSTEM THINKING : Through systems thinking, people can recognize the commonalities that exist among all systems and how parts of a system interrelate and combine to perform specific functions. Students will: : INTERMEDIATE

Component: Viewing Nature

Reference:

Required: -

Suggested: 8

Interested: -

Component: Observing the Sky

Reference:

Required: -

Suggested: 8

Interested: -

Component: Mapping the Stars

Reference:

Required: -

Suggested: 8

Interested: -

Component: Understanding the Motions of Stars and Planets

Reference:

Required: -

Suggested: 8

Interested: -

Component: Investigating Deep Space

Reference:

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Required: - Suggested: 8 Interested: -

describe the differences and similarities between engineering systems, natural systems, and social systems

Standard 6 - Interconnectedness: Common Themes : Students will understand the relationships and common themes that connect mathematics, science, and technology and apply the themes to these and other areas of learning. : SYSTEM THINKING : Through systems thinking, people can recognize the commonalities that exist among all systems and how parts of a system interrelate and combine to perform specific functions. Students will: : INTERMEDIATE

Component: Viewing Nature

Reference:

Required: - Suggested: 8 Interested: -

Component: Observing the Sky

Reference:

Required: - Suggested: 8 Interested: -

Component: Mapping the Stars

Reference:

Required: - Suggested: 8 Interested: -

Component: Understanding the Motions of Stars and Planets

Reference:

Required: - Suggested: 8 Interested: -

Component: Investigating Deep Space

Reference:

Required: - Suggested: 8 Interested: -

Component: Connecting Astronomy, Mythology, and History

Reference:

Required: - Suggested: 8 Interested: -

describe the differences between open and closed-loop systems

Standard 6 - Interconnectedness: Common Themes : Students will understand the relationships and common themes that connect mathematics, science, and technology and apply the themes to these and other areas of learning. : SYSTEM THINKING : Through systems thinking, people can recognize the commonalities that exist among all systems and how parts of a system interrelate and combine to perform specific functions. Students will: : INTERMEDIATE

Component: Investigating Deep Space

Reference:

Required: - Suggested: 8 Interested: -

describe how the output from one part of a system (which can include material, energy, or information) can become the input to other parts

Standard 6 - Interconnectedness: Common Themes : Students will understand the relationships and common themes that connect mathematics, science, and technology and apply the themes to these and other areas of learning. : SYSTEM THINKING : Through systems thinking, people can recognize the commonalities that exist among all systems and how parts of a system interrelate and combine to perform specific functions. Students will: : INTERMEDIATE

Component: Observing the Sky

Reference:

Required: - Suggested: 8 Interested: -

use models to study processes that cannot be studied directly (e.g., when the real process is too slow, too fast, or too dangerous for

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direct observation)

Standard 6 - Interconnectedness: Common Themes : Students will understand the relationships and common themes that connect mathematics, science, and technology and apply the themes to these and other areas of learning. : MODELS : Models are simplified representations of objects, structures, or systems used in analysis, explanation, interpretation, or design. : INTERMEDIATE

Component: Observing the Sky

Reference:

Required: - Suggested: 8 Interested: -

collect information about the behavior of a system and use modeling tools to represent the operation of the system

Standard 6 - Interconnectedness: Common Themes : Students will understand the relationships and common themes that connect mathematics, science, and technology and apply the themes to these and other areas of learning. : MODELS : Models are simplified representations of objects, structures, or systems used in analysis, explanation, interpretation, or design. : COMMENCEMENT

Component: Observing the Sky

Reference:

Required: - Suggested: 9-12 Interested: -

Component: Mapping the Stars

Reference:

Required: - Suggested: 9-12 Interested: -

Component: Connecting Astronomy, Mythology, and History

Reference:

Required: - Suggested: 9-12 Interested: -

describe and explain phenomena by designing and conducting investigations involving systematic observations, accurate measurements, and the identification and control of variables; by inquiring into relevant mathematical ideas; and by using mathematical and technological tools and procedures to assist in the investigation

Standard 7-Interdisciplinary Problem Solving : Students will apply the knowledge and thinking skills of mathematics, science, and technology to address real-life

problems and make informed decisions. : CONNECTIONS : The knowledge and skills of mathematics, science, and technology are used together to make informed decisions and solve problems, especially those relating to issues of science/technology/ society, consumer decision making, design, and inquiry into phenomena. Students will: : INTERMEDIATE

Component: Observing the Sky

Reference:

Required: - Suggested: 8 Interested: -

Component: Mapping the Stars

Reference:

Required: - Suggested: 8 Interested: -

explain and evaluate phenomena mathematically and scientifically by formulating a testable hypothesis, demonstrating the logical connections

between the scientific concepts guiding the hypothesis and the design of an experiment, applying and inquiring into the mathematical ideas relating to investigation of phenomena, and using (and if needed, designing) technological tools and procedures to assist in the investigation and in the communication of results

Standard 7-Interdisciplinary Problem Solving : Students will apply the knowledge and thinking skills of mathematics, science, and technology to address real-life

problems and make informed decisions. : CONNECTIONS : The knowledge and skills of mathematics, science, and technology are used together to make informed decisions and solve problems, especially those relating to issues of science/technology/ society, consumer decision making, design, and inquiry into phenomena. Students will: : COMMENCEMENT

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Component: Observing the Sky

Reference:

Required: -

Suggested: 9-12

Interested: -

Component: Mapping the Stars

Reference:

Required: -

Suggested: 9-12

Interested: -

gather and process information

Standard 7-Interdisciplinary Problem Solving : Students will apply the knowledge and thinking skills of mathematics, science, and technology to address real-life problems and make

informed decisions. : STRATEGIES : Solving interdisciplinary problems involves a variety of skills and strategies, including effective work habits; gathering and processing information; generating and analyzing ideas; realizing ideas; making connections among the common themes of mathematics, science, and technology; and presenting results. :

ELEMENTARY--INTERMEDIATE--COMMENCEMENT

Component: Investigating Deep Space

Reference:

Required: -

Suggested: 8-12

Interested: -

Component: Connecting Astronomy, Mythology, and History

Reference:

Required: -

Suggested: 8-12

Interested: -

present results

Standard 7-Interdisciplinary Problem Solving : Students will apply the knowledge and thinking skills of mathematics, science, and technology to address real-life problems and make

informed decisions. : STRATEGIES : Solving interdisciplinary problems involves a variety of skills and strategies, including effective work habits; gathering and processing information; generating and analyzing ideas; realizing ideas; making connections among the common themes of mathematics, science, and technology; and presenting results. :

ELEMENTARY--INTERMEDIATE--COMMENCEMENT

Component: Connecting Astronomy, Mythology, and History

Reference:

Required: -

Suggested: 8-12

Interested: -

Accessing information from printed media, electronic databases, and community resources and using the information to develop a definition of the problem and to research possible solutions

Standard 7-Interdisciplinary Problem Solving : Students will apply the knowledge and thinking skills of mathematics, science, and technology to address real-life problems and make informed decisions. : SKILLS & STRATEGIES FOR

INTERDISCIPLINARYPROBLEM SOLVING : ELEMENTARY--INTERMEDIATE--COMMENCEMENT : Gathering and Processing Information:

Component: Investigating Deep Space

Reference:

Required: -

Suggested: 8-12

Interested: -

Component: Connecting Astronomy, Mythology, and History

Reference:

Required: -

Suggested: 8-12

Interested: -

Observing examples of common unifying themes, applying them to the problem, and using them to better understand the dimensions of the problem

Standard 7-Interdisciplinary Problem Solving : Students will apply the knowledge and thinking skills of mathematics, science,

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and technology to address real-life problems and make informed decisions. : SKILLS & STRATEGIES FOR INTERDISCIPLINARYPROBLEM SOLVING : ELEMENTARY--INTERMEDIATE--COMMENCEMENT : Common Themes:

Component: Connecting Astronomy, Mythology, and History

Reference:

Required: -

Suggested: 8-12

Interested: -