



SPRINGFIELD PUBLIC SCHOOLS
ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21st-Century GLOBAL SKILLS

Springfield Public Schools Springfield, New Jersey 07081

Statistical Concepts and Methods

Curriculum Guide

2024

This curriculum may be modified through varying materials, techniques, and strategies per an individual student's IEP.

Springfield Board of Education
Approved on August 26, 2024



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**Springfield Public Schools
Springfield, New Jersey**

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Unit Overview Template

Content Area: Math

Grade Level: 11-12

Unit Title: Data Analysis and Statistics

Unit Summary: Students will use means and standard deviations to analyze data sets. Students will analyze data sets to interpret if they are consistent with previously known analyses.

Primary Interdisciplinary Connections: *Science and Engineering*

21st-Century Themes ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ ICT Literacy
☒ Information Literacy ☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy

Unit Rationale: The ability to analyze and interpret data sets allows students to explore further real-life applications of math.

Career Readiness (Standard 9):

9.2.8.CAP.1: Identify offerings such as high school and county career and technical school courses, apprenticeships, military programs, and dual enrollment courses that support career or occupational areas of interest.

9.2.8.CAP.2: Develop a plan that includes information about career areas of interest.

9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.

9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.

9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.

9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).

9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).

9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.

9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.

9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S.ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8).

Learning Targets

Standards: S.ID; S.IC

Content Statements: Summarize, represent, and interpret data on a single count or measurement variable; Summarize, represent, and interpret data on two categorical and quantitative variables; Understand and evaluate random processes underlying statistical experiments; Make inferences and justify conclusions from sample surveys, experiments, and observational studies

CPI#:

Cumulative Progress Indicator (CPI):

S.ID.A.4

Use the mean and standard deviation of a data set to fit it to a normal distribution



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	and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.
S.ID.B.6a	Represent data on two quantitative variables on a scatter plot, and describe how the variables are related. a. Fit a function to the data (including with the use of technology); use functions fitted to data to solve problems in the context of the data. Use given functions or choose a function suggested by the context. Emphasize linear and exponential models.
S.IC.A.1	(+) Understand statistics as a process for making inferences about population parameters based on a random sample from that population.
S.IC.A.2	(+) Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. For example, a model says a spinning coin falls heads up with a probability 0.5. Would a result of 5 tails in a row cause you to question the model?
S.IC.B.3	(+) Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
S.IC.B.4	(+) Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.
S.IC.B.5	(+) Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant.
S.IC.B.6	(+) Evaluate reports based on data (e.g. interrogate study design, data sources, randomization, the way the data are analyzed and displayed, inferences drawn and methods used; identify and explain misleading uses of data; recognize when arguments based on data are flawed).
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
SEL.PK-12.5.2	Utilize positive communication and social skills to interact effectively with others.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Unit Essential Questions:

- What questions can you answer by using statistics and normal distribution?
- What kinds of questions about quantities and relationships among quantities can be answered with statistics?
- How can you choose the best type of study to answer a given statistical question and choose a reasonable sample?
- How can you interpret the distribution of data in a data set?
- How can you use the normal distribution to explain where data values fall within a population?
- How can you determine how far a statistic is likely to be from a parameter?
- How do you formulate and test a hypothesis using statistics?



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Unit Enduring Understandings:

- Statistics allows the expression and communication of ideas.
- The rules of statistics ensure a common basis for understanding mathematics.

Unit Learning Targets:

- Students will be able to analyze and interpret a variety of data sets.
- Students will be able to model real-life applications using algebraic expressions.
- Climate Change Example: Students may represent geoscience data on two quantitative variables on a scatter plot and describe how the variables are related in order to analyze the data and the results from global climate models.
- Climate Change Example: Students may use linear or exponential functions fitted to geoscience data to solve problems and analyze the results from global climate models to make an evidence-based forecast of the current rate of global climate change.



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Evidence of Learning

Summative Assessment: Quizzes, one unit test, project

Equipment Needed: Teacher laptop, student laptop or iPad, graphing calculator

Teacher Resources: Laptop, graphing calculator, Stats Medic

Formative Assessments:

- Homework check
- Lesson opener or daily quiz
- Guided practice exercises
- Closure activity



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Lesson Plans

Lesson	Time Frame
Lesson 1 Statistical Questions and Variables	1 - 2 days
Lesson 2 Statistical Studies and Sampling Methods	1 - 2 days
Lesson 3 Data Distributions	1 - 2 days

Teacher Notes:

Frequently break students into small groups to work on problem-solving at the whiteboards. During this time, meet with groups for mini-lessons and formative assessments.

Curriculum Development Resources/Technology Resources:

Click the links below to access additional resources used to design this unit:

www.kutasoftware.com

<https://tasks.illustrativemathematics.org/content-standards>

<https://www.desmos.com/>

<https://nj.digitalitemlibrary.com/home>

<https://nj.mypearsonsupport.com/practice-tests/math/>

<https://resources.newmeridiancorp.org/released-items/>

<https://www.deltamath.com/>

<https://statsmedic.com/intro-stats>



Lesson Plan 1 Template

Content Area: Math Lesson Title: Statistical Questions and Variables Time Frame: 1 - 2 days

Lesson Components

21st-Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☐ Health Literacy

21st-Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☐ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing calculators, Desmos, DeltaMath

Equipment Needed:

Graphing calculator, laptop, or iPad

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: Use vocabulary related to statistical questions and variables	Lesson Sequence - The students will look at a histogram and determine what questions are answered from the data and who would be interested in those answers. - In groups, the students will determine what a statistical question is and how the answers to a statistical question can be displayed. - In groups, the students will discuss the difference between statistical variables, categorical variables, and quantitative variables.	- Students respond to verbal prompts during the initial discussion. - Circle the room as students are working to check for understanding - Talk to each pair during the process or after they finish to assess understanding - Have students present solutions - Consolidate the lesson - DeltaMath



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| | <ol style="list-style-type: none">4. In groups, the students will determine what a population is and what a sample is.5. In groups, the students will distinguish between parameters and statistics.6. Students will work on problems in DeltaMath | |
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Differentiation:

Students will be grouped so that they are working with partners at similar ability levels.

The teacher meets with small groups based on the formative assessment.

The DeltaMath activity provides reinforcement or enrichment based on students' needs.

Resources Provided:

- DeltaMath activity
- Consolidation notes
- Reference notes and examples



Lesson Plan 2 Template

Content Area: Math Lesson Title: Statistical Studies and Sampling Methods Time Frame: 1-2 days

Lesson Components

21st-Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☐ Health Literacy

21st-Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing calculators, Desmos, DeltaMath

Equipment Needed:

Graphing calculator, laptop, or iPad

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: Design a statistical study	Lesson Sequence - The teacher gives the students a study and they will determine the population and sample to review from yesterday. - Working in groups, the students will determine what type of study 3 different examples represent. - As a class, the students will discuss what bias in a study is. Then in groups, the students will determine if other studies show bias. - As a class, the teacher will lead a discussion on the different types of sampling for a study. Then in groups, the	- Students respond to verbal prompts during the initial discussion. - Circle the room as students are working to check for understanding - Talk to each pair during the process or after they finish to assess understanding - Have students present solutions - Consolidate the lesson - DeltaMath



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students will determine the best type of sampling method for a given situation.

5. In small groups, the students will discuss what a control group is, and what an experimental group is. They will then design an experiment to test whether drinking coffee improves memory and how the control and experimental groups are chosen.
6. Students will work on problems in DeltaMath.

Differentiation:

Students will be grouped so that they are working with partners at similar ability levels.

The teacher meets with small groups based on the formative assessment.

The DeltaMath activity provides reinforcement or enrichment based on students' needs.

Resources Provided:

- DeltaMath activity
- Consolidation notes
- Reference notes and examples



Lesson Plan 3 Template

Content Area: Math

Lesson Title: Data Distributions

Time Frame: 1 -2 days

Lesson Components

21st-Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☐ Civic Literacy ☐ Health Literacy

21st-Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing calculators, Desmos, Google Sheets, DeltaMath

Equipment Needed:

Graphing calculator, laptop or iPad

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: Evaluate data distributions	Lesson Sequence - The teacher starts the class by giving the students a set of data and having them find the mean and median of the data. - The teacher circulates the room while students solve the problem. The teacher then asks the students to debate whose solution is correct. - The groups then create their order of operations problem to pose to another group. Each group solves their new problem. - The students then work through the Desmos	- Students respond to verbal prompts during the initial discussion. - Circle the room as students are working to check for understanding - Talk to each pair during the process or after they finish to assess understanding - Have students present solutions - Consolidate the lesson - DeltaMath



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activity. The teacher monitors students' progress and meets with small groups.

Differentiation:

Students will be grouped so that they are working with partners at similar ability levels.

The teacher meets with small groups based on the formative assessment.

The DeltaMath activity provides reinforcement or enrichment based on students' needs.

Resources Provided:

- DeltaMath activity
- Consolidation notes
- Reference notes and examples



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Lesson Reflection

Reflect on the lesson you have developed and rate the degree to which the lesson *Strongly*, *Moderately* or *Weakly* meets the criteria below.

Lesson Activities	Strongly	Moderately	Weakly
Are challenging Strongly and require higher order thinking and problem solving skills	☒	☐	☐
Allow for student choice	☒	☐	☐
Provide scaffolding for acquiring targeted knowledge/skills	☒	☐	☐
Integrate global perspectives	☐	☒	☐
Integrate 21st-Century skills	☒	☐	☐
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills	☐	☒	☐
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills	☒	☐	☐
Are varied to address different student learning styles and preferences	☒	☐	☐
Are differentiated based on student needs	☒	☐	☐
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process	☒	☐	☐
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives	☒	☐	☐
Provide opportunities for student reflection and self- assessment	☒	☐	☐
Provide data to inform and adjust instruction to better meet the varying needs of learners	☒	☐	☐

Curriculum Design Template

Content Area: Math	Grade Level: 11-12	Unit Title: Data Analysis and Statistics
Created: 2024	Board Approved on:	



Unit Overview Template

Content Area: Math

Grade Level: 11-12

Unit Title: Probability

Unit Summary: Students will apply concepts of basic probability to real-life scenarios.

Primary Interdisciplinary Connections: *Science and Engineering*

21st-Century Themes ☑ Creativity and Innovation ☑ Critical Thinking and Problem Solving ☑ ICT Literacy
 ☑ Information Literacy ☑ Life and Career Skills ☑ Communication and Collaboration ☑ Media Literacy

Unit Rationale: The ability to find the probability of events and combinations of events allows students to explore further real life applications of math.

Career Readiness (Standard 9):

9.2.8.CAP.1: Identify offerings such as high school and county career and technical school courses, apprenticeships, military programs, and dual enrollment courses that support career or occupational areas of interest.

9.2.8.CAP.2: Develop a plan that includes information about career areas of interest.

9.2.12.CAP.2: Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.

9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.

9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.

9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12.prof.CR2b, 2.2.12.LF.8).

9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).

9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.

9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S.ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8).

Learning Targets

Standards: S.CP

Content Statements: Understand independence and conditional probability and use them to interpret data; Use the rules of probability to compute probabilities of compound events in a uniform probability model

CPI#:	Cumulative Progress Indicator (CPI):
S.CP.A.1	(+) Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes or as unions, intersections, or complements of other events (“or,” “and,” “not”).
S.CP.A.2	(+) Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.



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S.CP.A.3	(+) Understand the conditional probability of A given B as $P(A \text{ and } B)/P(B)$, and interpret the independence of A and B as saying that the conditional probability of A given B is the same as the probability of A, and the conditional probability of B given A is the same as the probability of B.
S.CP.A.4	(+) Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and approximate conditional probabilities. For example, collect data from a random sample of students in your school on their favorite subjects among math, science, and English. Estimate the probability that a randomly selected student from your school will favor science given that the student is in tenth grade. Do the same for other subjects and compare the results.
S.CP.A.5	(+) Recognize and explain the concepts of conditional probability and independence in everyday language and everyday situations. For example, compare the chance of having lung cancer if you are a smoker with the chance of being a smoker if you have lung cancer.
S.CP.B.6	(+) Find the conditional probability of A given B as the fraction of B's outcomes that also belong to A, and interpret the answer in terms of the model.
S.CP.B.7	(+) Apply the Addition Rule, $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$, and interpret the answer in terms of the model.
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
SEL.PK-12.5.2	Utilize positive communication and social skills to interact effectively with others.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Unit Essential Questions:

- How can you find the probability of events and combinations of events?
- How does describing events as mutually exclusive or independent affect how you find probabilities?
- How are conditional probability and independence related in real-world experiments?
- How are permutations and combinations useful when finding probabilities?
- What does a probability distribution tell you about an experiment?
- What does expected value tell you about situations involving probability?
- How can you use probability to make decisions?

Unit Enduring Understandings:

- Probability builds our understanding of chance and variation in life.
- Probability is a part of mathematics that enriches the subject by its interactions with other uses of mathematics and mathematical modeling.



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Unit Learning Targets:

- Students will be able to use relationships among events to find probabilities.
- Students will be able to find the probability of an event given that another event has occurred.
- Students will be able to use permutations and combinations to find the number of outcomes in a probability experiment.
- Students will be able to define probability distributions to represent experiments and solve problems.
- Students will be able to calculate, interpret, and apply expected value.
- Students will be able to use probability to make decisions.



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Evidence of Learning

Summative Assessment: Quizzes, one unit test, project

Equipment Needed: Teacher laptop, student laptop or iPad, graphing calculator

Teacher Resources: Laptop, graphing calculator, Stats Medic

Formative Assessments:

- Homework check
- Lesson opener or daily quiz
- Guided practice exercises
- Closure activity



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Lesson Plans

Lesson	Time Frame
Lesson 1 Probability Events	1 - 2 days
Lesson 2 Conditional Probability	1 - 2 days
Lesson 3 Permutations and Combinations	1 - 2 days

Teacher Notes:

Frequently break students into small groups to work on problem-solving at the whiteboards. During this time, meet with groups for mini-lessons and formative assessments.

Curriculum Development Resources/Technology Resources:

Click the links below to access additional resources used to design this unit:

www.kutasoftware.com

<https://tasks.illustrativemathematics.org/content-standards>

<https://www.desmos.com/>

<https://nj.digitalitemlibrary.com/home>

<https://nj.mypearsonsupport.com/practice-tests/math/>

<https://resources.newmeridiancorp.org/released-items/>

<https://www.deltamath.com/>

<https://statsmedic.com/intro-stats>



Lesson Plan 1 Template

Content Area: Math

Lesson Title: Probability Events

Time Frame: 1 -2 days

Lesson Components

21st-Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☐ Health Literacy

21st-Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☐ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing calculators, Desmos, DeltaMath

Equipment Needed:

Graphing calculator, laptop or iPad

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: Determine probabilities of mutually exclusive events, non-mutually exclusive events, and independent events	Lesson Sequence - The teacher will display an example of a mutually exclusive event, a non-mutually exclusive event, and an independent event. In small groups, the students will discuss which example is an example of which event. - In their groups, the students will determine the probability of each of the examples. - Ask students to write solutions on the board. - Students will work on more problems in their groups on the boards. - The teacher will consolidate the lesson.	- Students respond to verbal prompts during the initial discussion. - Circle the room as students are working to check for understanding - Talk to each pair during the process or after they finish to assess understanding - Have students present solutions - Consolidate the lesson - DeltaMath



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6. Students then work on the DeltaMath activity.

Differentiation:

Students will be grouped so that they are working with partners at similar ability levels.
The teacher meets with small groups based on the formative assessment.
The DeltaMath activity provides reinforcement or enrichment based on students' needs.

Resources Provided:

- DeltaMath activity
- Consolidation notes
- Reference notes and examples



Lesson Plan 2 Template

Content Area: Math Lesson Title: Conditional Probability Time Frame: 1 - 2 days

Lesson Components

21st-Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☒ Civic Literacy ☐ Health Literacy

21st-Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☒ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing calculators, Desmos, DeltaMath

Equipment Needed:

Graphing calculator, laptop or iPad

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: Find the probability of an event given that another event has occurred	Lesson Sequence - The teacher gives the students an entrance ticket on solving mutually exclusive events, a non-mutually exclusive event, and an independent event. - Students will work in groups to determine the probability of conditional events. - The teacher circulates the room as students work and meets with small groups based on the results from the entrance ticket. - The teacher will consolidate the lesson. - Students then work on the DeltaMath activity.	- Students respond to verbal prompts during the initial discussion. - Circle the room as students are working to check for understanding - Talk to each pair during the process or after they finish to assess understanding - Have students present solutions - Consolidate the lesson - DeltaMath



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Differentiation:

Students will be grouped so that they are working with partners at similar ability levels.
The teacher meets with small groups based on the formative assessment.
The DeltaMath activity provides reinforcement or enrichment based on students' needs.

Resources Provided:

- DeltaMath activity
- Consolidation notes
- Reference notes and examples



Lesson Plan 3 Template

Content Area: Math Lesson Title: Permutations and Combinations Time Frame: 1 - 2 days

Lesson Components

21st-Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☐ Civic Literacy ☐ Health Literacy

21st-Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing calculators, Desmos, DeltaMath

Equipment Needed:

Graphing calculator, laptop or iPad

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: Use permutations and combinations to find the number of outcomes in a probability experiment.	Lesson Sequence - The teacher starts the class by giving the students a menu from a pizzeria (size, crusts, toppings). In groups, the students will create a display to show all of the possible 1 topping pizzas that can be created. - The teacher asks if the students can find an easy way to determine the total number of possible pizzas (fundamental counting principle). - The groups then work on the stats medic activities on combinations and permutations.	- Students respond to verbal prompts during the initial discussion. - Circle the room as students are working to check for understanding - Talk to each pair during the process or after they finish to assess understanding - Have students present solutions - Consolidate the lesson - DeltaMath



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| | <ol style="list-style-type: none">4. The teacher monitors students' progress and meets with small groups then consolidates the lesson.5. The students will work on a DeltaMath activity | |
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Differentiation:

Students will be grouped so that they are working with partners at similar ability levels.

The teacher meets with small groups based on the formative assessment.

The DeltaMath activity provides reinforcement or enrichment based on students' needs.

Resources Provided:

- DeltaMath activity
- Consolidation notes
- Reference notes and examples



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Lesson Reflection

Reflect on the lesson you have developed and rate the degree to which the lesson *Strongly*, *Moderately* or *Weakly* meets the criteria below.

Lesson Activities	Strongly	Moderately	Weakly
Are challenging Strongly and require higher order thinking and problem solving skills	☒	☐	☐
Allow for student choice	☒	☐	☐
Provide scaffolding for acquiring targeted knowledge/skills	☒	☐	☐
Integrate global perspectives	☐	☒	☐
Integrate 21st-Century skills	☒	☐	☐
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills	☐	☒	☐
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills	☒	☐	☐
Are varied to address different student learning styles and preferences	☒	☐	☐
Are differentiated based on student needs	☒	☐	☐
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process	☒	☐	☐
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives	☒	☐	☐
Provide opportunities for student reflection and self- assessment	☒	☐	☐
Provide data to inform and adjust instruction to better meet the varying needs of learners	☒	☐	☐

Curriculum Design Template

Content Area: Math	Grade Level: 11-12	Unit Title: Probability
Created: 2024	Board Approved on:	



Unit Overview Template

Content Area: Math **Grade Level:** 11-12 **Unit Title:** The Trigonometric Functions

Unit Summary: Students will review angles and angle measurement in degrees and explore trigonometric functions. Students will examine trigonometric ratios defined using right triangles and investigate the trigonometric functions for an angle in standard position on the unit circle. Students then will solve right triangles. Students will also use the Law of Sines and the Law of Cosines to solve other triangles and to find the areas of triangles.

Primary Interdisciplinary Connections: *Science and Engineering*

21st Century Themes ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ ICT Literacy
☒ Information Literacy ☒ Life and Career Skills ☒ Communication and Collaboration ☐ Media Literacy

Unit Rationale: In this unit, students will learn how to convert decimal measures to degrees, minutes, and seconds and vice versa; how to solve triangles; how to find the values of trigonometric functions; how to find the area of triangles

Career Readiness (Standard 9):

9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.

9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.

9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).

9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).

9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.

9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8).

Learning Targets

Standards: G.SRT

Content Statements: Define trigonometric ratios and solve problems involving right triangles; Apply trigonometry to general triangles



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CPI#:	Cumulative Progress Indicator (CPI):
G.SRT.C.6	Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.
G.SRT.C.7	Explain and use the relationship between the sine and cosine of complementary angles.
G.SRT.C.8	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.
G.SRT.D.9	Derive the formula $A = \frac{1}{2}ab\sin C$ for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.
G.SRT.D.10	Prove the Laws of Sines and Cosines and use them to solve problems.
G.SRT.D.11	Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
SEL.PK-12.5.2	Utilize positive communication and social skills to interact effectively with others.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Unit Essential Questions:

- How are decimal degree measures converted to degrees, minutes, and seconds and vice versa?
- How are coterminal angles found?
- How are reference angles found?
- How can the lengths of missing sides and the measurements of missing angles in a right triangle be found?
- How can the lengths of missing sides and the measurements of missing angles in any triangle be found?
- What are alternative methods to find the area of a triangle and how are they used?

Unit Enduring Understandings:

- There is a strong connection between the formulas we learned in geometry and trigonometry
- Sometimes you can use trigonometry to find the area of a regular polygon or a triangle

Unit Learning Targets:

Students will....

- Convert decimal degree measures to degrees, minutes, and seconds and vice versa.
- Find the number of degrees in a given number of rotations; identify angles that are coterminal with a given angle.
- Find the values of trigonometric ratios for acute angles of right triangles.
- Find the values of the six trigonometric functions using the unit circle.



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- Use trigonometry to find the measures of the sides of a right triangle.
- Evaluate inverse trigonometric functions; find missing angle measurements; solve right triangles.
- Solve triangles by using the Law of Sines; find the area of a triangle.
- Determine whether a triangle has zero, one, or two solutions.
- Solve triangles by using the Law of Cosines
- Find the area of triangles if the measures of three sides are given.



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Evidence of Learning

Summative Assessment: Quizzes, one unit test, project

Equipment Needed: Teacher laptop, student laptop or iPad, graphing calculator

Teacher Resources: Laptop, graphing calculator, Math Medic

Formative Assessments:

- Homework check
- Lesson opener or daily quiz
- Guided practice exercises
- Closure activity



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Lesson	Time Frame
Lesson 1 Applying Trigonometric Functions	1 class period
Lesson 2 Solving Right Triangles	1 class period
Lesson 3 The Law of Sines	2 - 3 class periods
Teacher Notes: Ask students to explain the triangle congruence shortcuts from Geometry to each other prior to solving right triangles.	
Curriculum Development Resources/Technology Resources: <i>Click the links below to access additional resources used to design this unit:</i> https://www.mathmedic.com/course/Precalculus www.kutasoftware.com https://tasks.illustrativemathematics.org/content-standards https://www.desmos.com/ https://nj.digitalitemlibrary.com/home https://nj.mypearsonsupport.com/practice-tests/math/ https://resources.newmeridiancorp.org/released-items/ https://www.deltamath.com/ https://tutorial.math.lamar.edu/Extras/AlgebraTrigReview/AlgebraTrig.aspx	



Lesson Plan 1 Template

Content Area: Math Lesson Title: Applying Trigonometric Functions Time Frame: 1 class period

Lesson Components

21st Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☐ Civic Literacy ☐ Health Literacy

21st Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☐ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing Calculators, Desmos, DeltaMath

Equipment Needed:

Laptops, graphing calculators

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: Apply trigonometry to find the measures of the sides of right triangles	Lesson Sequence - Review sine, cosine, and tangent ratios students have learned in Geometry. - Ask students to work through examples where we can use these ratios to calculate the distance between two objects, the angle formed by two sides, etc. - In groups, have students discover how to calculate the area of a regular polygon by finding its apothem and perimeter. - Students will be asked to work in groups on leveled problems.	- Students respond to verbal prompts during the initial discussion. - Circle the room as students are working to check for understanding - Talk to each pair during the process or after they finish to assess understanding - Have students present solutions - Consolidate the lesson - DeltaMath



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5. The teacher circulates the room as students work and meets with small groups based on the results from the entrance ticket.
6. The teacher will consolidate the lesson.
7. Students then work on the DeltaMath activity.

Differentiation:

Students will be grouped so that they are working with partners at various ability levels.

The teacher meets with small groups based on the formative assessment.

The DeltaMath activity provides reinforcement or enrichment based on students' needs.

Resources Provided:

- DeltaMath activity
- Consolidation notes
- Reference notes and examples



Lesson Plan 2 Template

Content Area: Math Lesson Title: Solving Right Triangles Time Frame: 1 class period

Lesson Components

21st Century Themes

- ☐ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☐ Civic Literacy ☐ Health Literacy

21st Century Skills

- ☐ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☐ Life and Career Skills ☐ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing Calculators, Desmos, DeltaMath

Equipment Needed:

Laptops, graphing calculators

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Evaluate inverse trigonometric functions - Solve for missing angle measurements - Solve right triangles	Lesson Sequence - Present “A security light installation” problem and discuss the importance of an angle it will be installed at. - Ask students to give some examples of similar problems from “real life” where they will need to use inverse trigonometric functions - Ask students to derive how to apply the inverse trigonometric functions to find angle measurements. - In groups, the students will complete leveled problems where they need to find the angle	- Students respond to verbal prompts during the initial discussion. - Circle the room as students are working to check for understanding - Talk to each pair during the process or after they finish to assess understanding - Have students present solutions - Consolidate the lesson - DeltaMath



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measurements in a right triangle.

5. The teacher circulates the room as students work and meets with small groups based on the results from the entrance ticket.
6. The teacher will consolidate the lesson.
7. Students then work on the DeltaMath activity.

Differentiation:

Students will be grouped so that they are working with partners at various ability levels.

The teacher meets with small groups based on the formative assessment.

The DeltaMath activity provides reinforcement or enrichment based on students' needs.

Enrichment: solving triangles, as it requires an organized approach to piecing together given information to find missing parts.

Students will be asked to solve a triangle in more than one way.

Resources Provided:

- DeltaMath activity
- Consolidation notes
- Reference notes and examples



Lesson Plan 3 Template

Content Area: Math Lesson Title: The Law of Sines Time Frame: 2 -3 class periods

Lesson Components

21st Century Themes

- ☐ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☐ Civic Literacy ☐ Health Literacy

21st Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☐ Life and Career Skills ☒ Communication and Collaboration ☐ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing Calculators, Desmos, DeltaMath

Equipment Needed:

Laptops, graphing calculators

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Solve triangles by using the Law of Sines if the measures of two angles and a side are given - Calculate the area of a triangle if the measures of two sides and the included angle or the measures of two angles and a side are give	Lesson Sequence - Have students derive the Law of Sines using Desmos. Ask when the Law of Sines can be applied (AAS and ASA). - In groups, the students will work out solutions. - In groups, the students will work out an activity problem with 3 objects on the floor which form large triangles. They will use a ruler and a protractor to determine a side and two angles of the triangles. Then solve the triangles using the Law of Sines.	- Students respond to verbal prompts during the initial discussion. - Circle the room as students are working to check for understanding - Talk to each pair during the process or after they finish to assess understanding - Have students present solutions - Consolidate the lesson - DeltaMath



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4. The groups will then measure the other sides and angles to verify the solution.
5. The groups will continue to solve similar problems at the boards.
6. Ask students to derive two formulas to calculate the area of a triangle.
7. In groups, the students will complete leveled problems where they need to find the area of a triangle.
8. The teacher circulates the room as students work and meets with small groups based on the results from the entrance ticket.
9. The teacher will consolidate the lesson.
10. Students then work on the DeltaMath activity.

Differentiation:

We will place 3 objects on the floor so that they form a large triangle. We will use a ruler and a protractor to determine a side and two angles of the triangles. Then we will solve the triangles using the Law of Sines. We will measure the other sides and angles to verify the solution.

Students will be grouped so that they are working with partners at various ability levels.

The teacher meets with small groups based on the formative assessment.

The DeltaMath activity provides reinforcement or enrichment based on students' needs.

Enrichment: We will discuss the ambiguous case.

Resources Provided:

- DeltaMath activity
- Consolidation notes
- Reference notes and examples



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Lesson Reflection

Reflect on the lesson you have developed and rate the degree to which the lesson *Strongly*, *Moderately* or *Weakly* meets the criteria below.

Lesson Activities	Strongly	Moderately	Weakly
Are challenging Strongly and require higher order thinking and problem solving skills	☒	☐	☐
Allow for student choice	☒	☐	☐
Provide scaffolding for acquiring targeted knowledge/skills	☒	☐	☐
Integrate global perspectives	☐	☒	☐
Integrate 21st century skills	☒	☐	☐
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills	☐	☒	☐
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills	☒	☐	☐
Are varied to address different student learning styles and preferences	☒	☐	☐
Are differentiated based on student needs	☒	☐	☐
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process	☒	☐	☐
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives	☒	☐	☐
Provide opportunities for student reflection and self- assessment	☒	☐	☐
Provide data to inform and adjust instruction to better meet the varying needs of learners	☒	☐	☐

Curriculum Design Template

Content Area: Math	Grade Level: 11-12	Unit Title: The Trigonometric Functions
Created: 2024	Board Approved on:	



Unit Overview Template

Content Area: Math **Grade Level:** 11-12 **Unit Title:** Graphs of Trigonometric Functions

Unit Summary: Students will review graphs of trigonometric functions and their inverses using degree measure and radian measure. Students will learn about amplitude, period, phase shift, and vertical shift. Applications include finding linear and angular velocity and writing trigonometric equations to model real-life situations.

Primary Interdisciplinary Connections: *Science and Engineering*

21st Century Themes ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ ICT Literacy
☒ Information Literacy ☒ Life and Career Skills ☒ Communication and Collaboration ☐ Media Literacy

Unit Rationale: In this unit, students will learn how to convert from degrees to radians and vice versa; how to draw the graph of different trigonometric functions; and how to find the amplitude, period, phase shift, and vertical shift of the given trigonometric function.

Career Readiness (Standard 9):

- 9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.
- 9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.
- 9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.
- 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12.prof.CR2b, 2.2.12.LF.8).
- 9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).
- 9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.
- 9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.
- 9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).
- 9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8).

Learning Targets

Standards: F.TF; F.IF; N.Q

Content Statements: Extend the domain of trigonometric functions using the unit circle; Model periodic phenomena with trigonometric functions; Analyze functions using different representations; Reason quantitatively and use units to solve problems

CPI#:	Cumulative Progress Indicator (CPI):
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F.TF.A.1	(+) Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
F.TF.A.2	(+) Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
F.TF.A.3	Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$, and use the unit circle to express the values of sine, cosines, and tangent for πx , $\pi+x$, and $2\pi-x$ in terms of their values for x , where x is any real number.
F.TF.A.4	Use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions.
F.IF.C.7e	Graph exponential and logarithmic functions, showing intercepts and end behavior.
F.TF.B.5	(+) Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline. ★
F.TF.B.6	Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.
F.TF.B.7	Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.
N.Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
SEL.PK-12.5.2	Utilize positive communication and social skills to interact effectively with others.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.

Unit Essential Questions:

- How are degree measurements converted to radian measurements and vice versa?
- How can the length of an arc or the area of a sector be found given the measure of the central angle?
- How are linear and angular velocities calculated?
- How are graphs of sine, cosine, tangent, cotangent, secant, and cosecant functions produced?
- How are equations of trigonometric functions written?

Unit Enduring Understandings:

- There is a strong connection between the formulas we learned in geometry and trigonometry
- We can use trigonometric functions to model real- life data such as sound waves, seasonal temperature change, etc.



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Unit Learning Targets:

Students will....

- Find the amplitude, period, phase shift, and vertical shift for sine, cosine, tangent, cotangent, secant, and cosecant functions.
- Write equations of trigonometric functions given the amplitude, period, phase shift, and vertical shift.
- Model real-life data using sine and cosine functions.
- Graph inverse trigonometric functions.
- Find principal values of inverse trigonometric functions.
- Climate Change Example: Students may use units to guide the solution of multi-step problems about how variations in the flow of energy into and out of the Earth's systems result in climate change. Note: Changes in climate are limited to changes in surface temperatures, precipitation patterns, glacial ice volumes, sea levels, and biosphere distribution.



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Evidence of Learning

Summative Assessment: Quizzes, one unit test, project

Equipment Needed: Teacher laptop, student laptop or iPad, graphing calculator

Teacher Resources: Laptop, graphing calculator, Math Medic

Formative Assessments:

- Homework check
- Lesson opener or daily quiz
- Guided practice exercises
- Closure activity



Lesson Plans

Lesson	Time Frame
Lesson 1 Angles and Radian Measures	1 class period
Lesson 2 Linear and Angular Velocity	1 class period
Lesson 3 Graphing Sine and Cosine Functions	2 class periods

Teacher Notes: Ask students to plot the hourly temperature in Hawaii for 2 days from weather.com. Notice the shape.

Curriculum Development Resources/Technology Resources:

Click the links below to access additional resources used to design this unit:

<https://www.mathmedic.com/course/Precalculus>

www.kutasoftware.com

<https://tasks.illustrativemathematics.org/content-standards>

<https://www.desmos.com/>

<https://nj.digitalitemlibrary.com/home>

<https://nj.mypearsonsupport.com/practice-tests/math/>

<https://resources.newmeridiancorp.org/released-items/>

<https://www.deltamath.com/>

<https://tutorial.math.lamar.edu/Extras/AlgebraTrigReview/AlgebraTrig.aspx>



Lesson Plan 1 Template		
Content Area: Math	Lesson Title: Angles and Radian Measures	Time Frame: 1 class period
Lesson Components		
<u>21st Century Themes</u> ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy ☐ Civic Literacy ☐ Health Literacy		
<u>21st Century Skills</u> ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy ☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy		
Interdisciplinary Connections: Science and Engineering		
Integration of Technology: Graphing Calculators, Desmos, DeltaMath		
Equipment Needed: Laptops, graphing calculators		

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Change from radian measure to degree measure, and vice versa • Find the length of an arc given the measure of the central angle. • Find the area of a sector	Lesson Sequence 1. Define the radian (use string cut to the length of the circle radius). 2. Have students derive the connection between radian and degree measures using Desmos. 3. In groups, have students use dimensional analysis to convert radians to degrees and degrees to radians. 4. Review how to find reference angles. 5. In groups, have students determine values of trigonometric functions using reference angles. 6. In groups, have students find the length of an arc	• Students respond to verbal prompts during the initial discussion. • Circle the room as students are working to check for understanding • Talk to each pair during the process or after they finish to assess understanding • Have students present solutions • Consolidate the lesson • DeltaMath



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- and the area of a circular sector using proportions.
7. The teacher circulates the room as students work and meets with small groups based on the results from the entrance ticket.
 8. The teacher will consolidate the lesson.
 9. Students then work on the DeltaMath activity.

Differentiation:

Students will be grouped so that they are working with partners at various ability levels.
The teacher meets with small groups based on the formative assessment.
The DeltaMath activity provides reinforcement or enrichment based on students' needs.

Resources Provided:

- DeltaMath activity
- Consolidation notes
- Reference notes and examples



Lesson Plan 2 Template

Content Area: Math Lesson Title: Linear and Angular Velocities Time Frame: 1 class period

Lesson Components

21st Century Themes

- ☐ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☐ Civic Literacy ☐ Health Literacy

21st Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing Calculators, Desmos, DeltaMath

Equipment Needed:

Laptops, graphing calculators

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Find linear and angular velocities - Determine angular displacement	Lesson Sequence - Present “The Children’s Museum carousel” problem - Ask students to derive how to calculate angular displacement - Discuss definitions of Angular Velocity and Linear Velocity and show some examples on Desmos. - In groups, the students will work to determine the angular and linear velocities of someone riding an animal in the inner circle and someone riding an animal in the same row in the outer	- Students respond to verbal prompts during the initial discussion. - Circle the room as students are working to check for understanding - Talk to each pair during the process or after they finish to assess understanding - Have students present solutions - Consolidate the lesson - DeltaMath



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circle (“Carousel Problem”).

5. In groups, the students will continue to work on leveled problems.
6. The teacher circulates the room as students work and meets with small groups based on the results from the entrance ticket.
7. The teacher will consolidate the lesson.
8. Students then work on the DeltaMath activity.

Differentiation:

Extension problem:

Joe is running one lap on the outside of a circular track with a diameter of 1000 ft. His constant rate of speed is 12 mph. Sunil is running one lap on the outside of a nearby circular track with a diameter of 1125 ft. He too is running at 12 mph. Find the time in minutes for each of the two runners, and compare their times with the radius of each other circle.

Students will be grouped so that they are working with partners at various ability levels.

The teacher meets with small groups based on the formative assessment.

The DeltaMath activity provides reinforcement or enrichment based on students’ needs.

Resources Provided:

- DeltaMath activity
- Consolidation notes
- Reference notes and examples



Lesson Plan 3 Template

Content Area: Math Lesson Title: Graphing Sine and Cosine Functions Time Frame: 2 class periods

Lesson Components

21st Century Themes

- ☐ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☐ Civic Literacy ☐ Health Literacy

21st Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☐ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing Calculators, Desmos, DeltaMath

Equipment Needed:

Laptops, graphing calculators

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Generate the graphs of the sine and cosine functions • Generate the amplitude, phase shift, vertical shift, and period of a sine or cosine function • Generate the graph of a sine or cosine function from a graph • Use sine functions to model naturally occurring phenomena	Lesson Sequence 1. Discuss the “Meteorology” problem. 2. Have students access climate data for two US cities: Baltimore, Maryland, and Asheville, North Carolina 3. As a class, discuss what a periodic function is. 4. Discuss with the class what makes these functions periodic, then find the period. 5. Ask students to give examples of periodic functions in real life. 6. Show students a graph of sine and its connection with the unit circle.	• Students respond to verbal prompts during the initial discussion. • Circle the room as students are working to check for understanding • Talk to each pair during the process or after they finish to assess understanding • Have students present solutions • Consolidate the lesson • DeltaMath



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7. Review properties of the sine functions.
8. Show students a graph of cosine and its connection with the unit circle.
9. Review properties of the cosine functions.
10. In groups, the students will continue to work on leveled problems.
11. The teacher circulates the room as students work and meets with small groups based on the results from the entrance ticket.
12. The teacher will consolidate the lesson.
13. Students then work on the DeltaMath activity.

Differentiation:

Students will research and observe what the graph of the sound pattern of a person's live voice, a song recorded by Frank Sinatra, a rock concert, and a healthy and unhealthy heart would look like.

Students will be asked to decide whether these patterns are periodic functions.

Students will be grouped so that they are working with partners at various ability levels.

The teacher meets with small groups based on the formative assessment.

The DeltaMath activity provides reinforcement or enrichment based on students' needs.

Resources Provided:

- DeltaMath activity
- Consolidation notes
- Reference notes and examples



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Lesson Reflection

Reflect on the lesson you have developed and rate the degree to which the lesson *Strongly*, *Moderately* or *Weakly* meets the criteria below.

Lesson Activities	Strongly	Moderately	Weakly
Are challenging Strongly and require higher-order thinking and problem-solving skills	☒	☐	☐
Allow for student choice	☒	☐	☐
Provide scaffolding for acquiring targeted knowledge/skills	☒	☐	☐
Integrate global perspectives	☐	☒	☐
Integrate 21st-century skills	☒	☐	☐
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills	☐	☒	☐
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills	☒	☐	☐
Are varied to address different student learning styles and preferences	☒	☐	☐
Are differentiated based on student needs	☒	☐	☐
Are student-centered with the teacher acting as a facilitator and co-learner during the teaching and learning process	☒	☐	☐
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives	☒	☐	☐
Provide opportunities for student reflection and self-assessment	☒	☐	☐
Provide data to inform and adjust instruction to better meet the varying needs of learners	☒	☐	☐

Curriculum Design Template

Content Area: Math	Grade Level: 11-12	Unit Title: Graphs of Trigonometric Functions
Created: 2024		Board Approved on:



Unit Overview Template

Content Area: Math **Grade Level:** 11-12 **Unit Title:** Trigonometric Identities and Equations

Unit Summary: Students will review the basic trigonometric identities, and use sum and difference identities. Students will also solve trigonometric equations.

Primary Interdisciplinary Connections: *Science and Engineering*

21st Century Themes ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ ICT Literacy

☒ Information Literacy ☒ Life and Career Skills ☒ Communication and Collaboration ☐ Media Literacy

Unit Rationale: In this unit, students will learn how to use different trigonometric identities and solve trigonometric equations.

Career Readiness (Standard 9):

9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.

9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.

9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).

9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).

9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.

9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8).

Learning Targets

Standards: F.TF; A.REI

Content Statements: Prove and apply trigonometric identities; Represent and solve equations and inequalities graphically

CPI#:	Cumulative Progress Indicator (CPI):
F.TF.C.8	(+) Prove the Pythagorean identity $\sin^2(\theta) + \cos^2 \theta = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$ or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$ or $\tan(\theta)$ and the quadrant of the angle.



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F.TF.C.9	Prove the addition and subtraction formulas for sine, cosine, and tangent and use them to solve problems.
A.REI.D.11	Explain why the x-coordinates of the points where the graphs of the equations of $y=f(x)$ and $y=g(x)$ intersect are the solutions of the equation $f(x) = g(x)$; find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations.
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement, and model effective problem-solving, and critical thinking skills.
SEL.PK-12.5.2	Utilize positive communication and social skills to interact effectively with others.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.
Unit Essential Questions: - What does it mean to verify a trigonometric identity and what are some methods for simplifying the process? - How are trigonometric equations solved?	
Unit Enduring Understandings: - There is a strong connection between the formulas we learned in geometry and trigonometry. - We can use trigonometric functions to model real-life data such as sound waves, seasonal temperature change, etc.	
Unit Learning Targets: <i>Students will....</i> - Identify and use reciprocal, quotient, Pythagorean, symmetry, and opposite-angle identities - Use the basic trigonometric identities to verify other identities - Find numerical values of trigonometric functions - Use the sum and difference identities for the sine, cosine, and tangent functions - Identify equivalent values for trigonometric functions involving quadrantal angles - Solve trigonometric equations and inequalities	



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Evidence of Learning

Summative Assessment: Quizzes, one unit test, project

Equipment Needed: Teacher laptop, student laptop or iPad, graphing calculator

Teacher Resources: Laptop, graphing calculator, Math Medic

Formative Assessments:

- Homework check
- Lesson opener or daily quiz
- Guided practice exercises
- Closure activity



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Lesson Plans

Lesson	Time Frame
Lesson 1 Basic Trigonometric Identities	2 class periods
Lesson 2 Verifying Trigonometric Identities	1 class period
Lesson 3 Solving Trigonometric Equations	2 class periods

Teacher Notes: When solving trigonometric proofs, utilize a two-column proof to help students see which identity is being applied.

Curriculum Development Resources/Technology Resources:

Click the links below to access additional resources used to design this unit:

<https://www.mathmedic.com/course/Precalculus>

www.kutasoftware.com

<https://tasks.illustrativemathematics.org/content-standards>

<https://www.desmos.com/>

<https://nj.digitalitemlibrary.com/home>

<https://nj.mypearsonsupport.com/practice-tests/math/>

<https://resources.newmeridiancorp.org/released-items/>

<https://www.deltamath.com/>

<https://tutorial.math.lamar.edu/Extras/AlgebraTrigReview/AlgebraTrig.aspx>



Lesson Plan 1 Template

Content Area: Math Lesson Title: Basic Trigonometric Identities Time Frame: 2 class periods

Lesson Components

21st Century Themes

- ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☐ Civic Literacy ☐ Health Literacy

21st Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing Calculators, Desmos, DeltaMath

Equipment Needed:

Laptops, graphing calculators

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: Be able to identify and use reciprocal, quotient, Pythagorean, symmetry, and opposite-angle identities	Lesson Sequence - Introduce students to the “polarized lenses” problem. - Explain what an identity is and give some examples from Algebra 2, then ask students, in groups, to derive a trigonometric identity. Work through other identities as a whole class. - In groups, have students prove that a given statement is not an identity. - Introduce students to Reciprocal, Quotient, and Pythagorean Identities. - Use the Unit Circle to present Symmetry and	- Students respond to verbal prompts during the initial discussion. - Circle the room as students are working to check for understanding - Talk to each pair during the process or after they finish to assess understanding - Have students present solutions - Consolidate the lesson - DeltaMath



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Opposite-Angle
Identities.

6. Ask students to use these basic identities and give information to find the exact value of other trigonometric functions.
7. In groups, the students will continue to work on leveled problems.
8. The teacher circulates the room as students work and meets with small groups based on the results from the entrance ticket.
9. The teacher will consolidate the lesson.
10. Students then work on the DeltaMath activity.

Differentiation:

Students will be grouped so that they are working with partners at various ability levels. The teacher meets with small groups based on the formative assessment. The DeltaMath activity provides reinforcement or enrichment based on students' needs.

Resources Provided:

- DeltaMath activity
- Consolidation notes
- Reference notes and examples



Lesson Plan 2 Template

Content Area: Math Lesson Title: Verifying Trigonometric Identities Time Frame: 1 class period

Lesson Components

21st Century Themes

- ☐ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☐ Civic Literacy ☐ Health Literacy

21st Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing Calculators, Desmos, DeltaMath

Equipment Needed:

Laptops, graphing calculators

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Use the basic trigonometric identities to verify other identities • Find numerical values of trigonometric functions	Lesson Sequence 1. Introduce the students to the “ladder problem.” 2. Students will work in groups to derive an expression for the length of a ladder. 3. Choose two different (correct) formulas and show students that they are equivalent. 4. In groups, the students will continue to work on leveled problems. 5. The teacher circulates the room as students work and meets with small groups based on the results from the entrance ticket.	• Students respond to verbal prompts during the initial discussion. • Circle the room as students are working to check for understanding • Talk to each pair during the process or after they finish to assess understanding • Have students present solutions • Consolidate the lesson • DeltaMath



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| | <ol style="list-style-type: none">6. The teacher will consolidate the lesson.7. Students then work on the DeltaMath activity. | |
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Differentiation:

Kinesthetic: Students will work in groups to model signs of trigonometric functions. Each group should use masking tape or rope on the ground to model the x- and y-axis. One student will place a meter stick on the coordinate plane with one end on the origin. Other students will state the signs of the six trigonometric functions for the angle formed.

Students will be grouped so that they are working with partners at various ability levels.

The teacher meets with small groups based on the formative assessment.

The DeltaMath activity provides reinforcement or enrichment based on students' needs.

Resources Provided:

- DeltaMath activity
- Consolidation notes
- Reference notes and examples



Lesson Plan 3 Template

Content Area: Math Lesson Title: Solving Trigonometric Equations Time Frame: 2 class periods

Lesson Components

21st Century Themes

- ☐ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☐ Civic Literacy ☐ Health Literacy

21st Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☐ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing Calculators, Desmos, DeltaMath

Equipment Needed:

Laptops, graphing calculators

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Solve trigonometric equations - Solutions using a graphing calculator	Lesson Sequence - Have students conduct internet searches to find the size and period for a famous Ferris wheel such as the London Eye. - In groups, ask students how to solve an equation for the principal values of x. - In groups, ask students how to solve an equation for x between 0 and 360 degrees. - In groups, ask students how to solve an equation for all real values of x. - Discuss the difference and also show that the answer can be presented either in degrees or radians.	- Students respond to verbal prompts during the initial discussion. - Circle the room as students are working to check for understanding - Talk to each pair during the process or after they finish to assess understanding - Have students present solutions - Consolidate the lesson - DeltaMath



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6. In groups, the students will continue to work on leveled problems.
7. The teacher circulates the room as students work and meets with small groups based on the results from the entrance ticket.
8. The teacher will consolidate the lesson.
9. Students then work on the DeltaMath activity.

Differentiation:

Students will create a set of trigonometric equations and inequalities and provide solutions for each. Students will be grouped so that they are working with partners at various ability levels. The teacher meets with small groups based on the formative assessment. The DeltaMath activity provides reinforcement or enrichment based on students' needs.

Resources Provided:

- DeltaMath activity
- Consolidation notes
- Reference notes and examples



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Lesson Reflection

Reflect on the lesson you have developed and rate the degree to which the lesson *Strongly*, *Moderately* or *Weakly* meets the criteria below.

Lesson Activities	Strongly	Moderately	Weakly
Are challenging Strongly and require higher-order thinking and problem-solving skills	☒	☐	☐
Allow for student choice	☒	☐	☐
Provide scaffolding for acquiring targeted knowledge/skills	☒	☐	☐
Integrate global perspectives	☐	☒	☐
Integrate 21st-century skills	☒	☐	☐
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills	☐	☒	☐
Foster student use of technology as a tool to develop critical thinking, creativity and innovation skills	☒	☐	☐
Are varied to address different student learning styles and preferences	☒	☐	☐
Are differentiated based on student needs	☒	☐	☐
Are student-centered with teacher acting as a facilitator and co-learner during the teaching and learning process	☒	☐	☐
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives	☒	☐	☐
Provide opportunities for student reflection and self-assessment	☒	☐	☐
Provide data to inform and adjust instruction to better meet the varying needs of learners	☒	☐	☐

Curriculum Design Template

Content Area: Math	Grade Level: 11-12	Unit Title: Trigonometric Identities and Equations
Created: 2024	Board Approved on:	



Unit Overview Template

Content Area: Math **Grade Level:** 11-12 **Unit Title:** Exponential and Logarithmic Functions

Unit Summary: This unit introduces exponential and logarithmic functions. Students will simplify and evaluate exponential expressions with rational and irrational exponents and graph exponential functions and inequalities. In addition, they model real-world situations using common and natural logarithms.

Primary Interdisciplinary Connections: *Science and Engineering*

21st Century Themes ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ ICT Literacy
☒ Information Literacy ☒ Life and Career Skills ☐ Communication and Collaboration ☐ Media Literacy

Unit Rationale: In this unit, students will learn various methods to analyze exponential and logarithmic functions.

Career Readiness (Standard 9):

9.2.12.CAP.3: Investigate how continuing education contributes to one's career and personal growth.

9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.

9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas.

9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).

9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).

9.4.12.CT.1: Identify problem-solving strategies used in the development of an innovative product or practice.

9.4.12.TL.2: Generate data using formula-based calculations in a spreadsheet and draw conclusions about the data.

9.4.12.TL.4: Collaborate in online learning communities or social networks or virtual worlds to analyze and propose a resolution to a real-world problem (e.g., 7.1.AL.IPERS.6).

9.4.12.IML.3: Analyze data using tools and models to make valid and reliable claims, or to determine optimal design solutions (e.g., S-ID.B.6a., 8.1.12.DA.5, 7.1.IH.IPRET.8).

Learning Targets

Standards: N.RN; N.Q; A.SSE; F.IF; F.BF; F.LE

Content Statements: Extend the properties of exponents to rational exponents; Use properties of rational and irrational numbers; Reason quantitatively and use units to solve problems; Interpret the structure of expressions; Write expressions in equivalent forms to solve problems; Interpret functions that arise in applications in terms of the context; Analyze functions using different representations; Build new functions from existing functions; Construct and compare linear and exponential models and solve problems



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CPI#:	Cumulative Progress Indicator (CPI):
N.RN.A.1	Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5^{(1/3)3}$ to hold, so $(5^{1/3})^3$ must equal 5.
N.RN.A.2	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
N.RN.A.3	Simplify radicals, including algebraic radicals (e.g. $\sqrt[3]{54} = 3\sqrt[3]{2}$, simplify $\sqrt{32x^2}$).
N.Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.
N.Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
A.SSE.A.1b	Interpret complicated expressions by viewing one or more of their parts as a single entity.
A.SSE.B.3b	Use the properties of exponents to transform expressions for exponential functions.
F.IF.B.4	For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship.
F.IF.C.7e	Graph exponential and logarithmic functions, showing intercepts and end behavior.
F.IF.C.8b	Use the properties of exponents to interpret expressions for exponential functions.
F.BF.B.5	Understand the inverse relationship between exponents and logarithms and use this relationship to solve problems involving logarithms and exponents.
F.LE.A.1c	Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.
F.LE.A.2	Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (including reading these from a table).
F.LE.A.4	Understand the inverse relationship between exponents and logarithms. For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where a , c , and d are numbers and the base b is 2, 10, or e ; evaluate the logarithm using technology.
SEL.PK-12.2.2	Recognize the skills needed to establish and achieve personal and educational goals.
SEL.PK-12.4.1	Develop, implement and model effective problem-solving, and critical thinking skills.
SEL.PK-12.5.2	Utilize positive communication and social skills to interact effectively with others.
HS-ETS1-2	Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering.



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Unit Essential Questions:

- How are expressions containing rational and irrational exponents simplified and evaluated?
- How are exponential functions and inequalities graphed?
- How are logarithmic expressions evaluated?
- How are logarithmic equations graphed and solved?
- How can real-world situations be modeled and solved using common and natural logarithms?

Unit Enduring Understandings:

- There are many methods that help analyze exponential and logarithmic functions
- Many real-world problems can be modeled using exponential and logarithmic functions

Unit Learning Targets:

Students will....

- Use the properties of exponents.
- Evaluate and simplify expressions containing rational exponents.
- Solve equations containing rational exponents.
- Graph exponential functions and inequalities.
- Solve problems involving exponential growth and decay.
- Use the exponential function $y = e^x$.
- Evaluate expressions involving logarithms.
- Solve equations and inequalities involving logarithms.
- Graph logarithmic functions and inequalities.
- Find common logarithms and antilogarithms of numbers.
- Solve equations and inequalities using common logarithms.
- Solve real-world applications with common logarithmic functions.
- Find natural logarithms of numbers.
- Solve equations and inequalities using natural logarithms.
- Solve real-world applications with natural logarithmic functions.
- Find the doubling time of exponential quantities.
- Find exponential and logarithmic functions to model real-world data.
- Linearize data.
- Climate Change Example: Students may define appropriate quantities for a descriptive model of how variations in the flow of energy into and out of Earth's systems result in climate change. Note: changes in climate are limited to changes in surface temperatures, precipitation patterns, glacial ice volumes, sea levels, and biosphere distribution.
- Climate Change Example: Students may, when reporting quantities related to how variations in the flow of energy into and out of the Earth's systems result in climate change, choose a level of accuracy appropriate to limitations on how quantities were measured.



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Evidence of Learning

Summative Assessment: Quizzes, one unit test, project

Equipment Needed: Teacher laptop, student laptop or iPad, graphing calculator

Teacher Resources: Laptop, graphing calculator, Math Medic

Formative Assessments:

- Homework check
- Lesson opener or daily quiz
- Guided practice exercises
- Closure activity



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Lesson Plans

Lesson	Time Frame
Lesson 1 Real Exponents	1 class period
Lesson 2 Exponential Functions	1 class period
Lesson 3 The Number e	1 class period

Teacher Notes: As an extension, ask students to look up different ways that e has been calculated historically.

Curriculum Development Resources/Technology Resources:

Click the links below to access additional resources used to design this unit:

<https://www.mathmedic.com/course/Precalculus>

www.kutasoftware.com

<https://tasks.illustrativemathematics.org/content-standards>

<https://www.desmos.com/>

<https://nj.digitalitemlibrary.com/home>

<https://nj.mypearsonsupport.com/practice-tests/math/>

<https://resources.newmeridiancorp.org/released-items/>

<https://www.deltamath.com/>

<https://tutorial.math.lamar.edu/Extras/AlgebraTrigReview/AlgebraTrig.aspx>



Lesson Plan 1 Template		
Content Area: Math	Lesson Title: Real Exponents	Time Frame: 1 class period
Lesson Components		
<u>21st Century Themes</u> ☒ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy ☐ Civic Literacy ☐ Health Literacy		
<u>21st Century Skills</u> ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy ☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy		
Interdisciplinary Connections: Science and Engineering		
Integration of Technology: Graphing Calculators, Desmos, DeltaMath		
Equipment Needed: Laptops, graphing calculators		

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Apply properties of exponents • Evaluate and simplify expressions containing rational exponents • Solve equations containing rational exponents	Lesson Sequence 1. Present students the “aerospace” problem. 2. Show some power definitions. 3. Use the “aerospace” problem to discuss scientific notation. 4. Ask students to review the properties of exponents. 5. In groups, the students will continue to work on leveled problems. 6. The teacher circulates the room as students work and meets with small groups based on the results from the entrance ticket.	• Students respond to verbal prompts during the initial discussion. • Circle the room as students are working to check for understanding • Talk to each pair during the process or after they finish to assess understanding • Have students present solutions • Consolidate the lesson • DeltaMath



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| | <ol style="list-style-type: none">7. The teacher will consolidate the lesson.8. Students then work on the DeltaMath activity. | |
|--|--|--|

Differentiation:

Students will explain to others in class how to change a number written in scientific notation to standard notation.

Students will be grouped so that they are working with partners at various ability levels.

The teacher meets with small groups based on the formative assessment.

The DeltaMath activity provides reinforcement or enrichment based on students' needs.

Resources Provided:

- DeltaMath activity
- Consolidation notes
- Reference notes and examples



Lesson Plan 2 Template

Content Area: Math Lesson Title: Exponential Functions Time Frame: 1 class period

Lesson Components

21st Century Themes

- ☐ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy
☐ Civic Literacy ☐ Health Literacy

21st Century Skills

- ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy
☒ Life and Career Skills ☒ Communication and Collaboration ☒ Media Literacy ☐ ICT Literacy

Interdisciplinary Connections:

Science and Engineering

Integration of Technology:

Graphing Calculators, Desmos, DeltaMath

Equipment Needed:

Laptops, graphing calculators

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: - Graph exponential functions and inequalities - Solve problems involving exponential growth and decay	Lesson Sequence - Ask students to graph a series of exponential functions. Compare and contrast the graphs. - Discuss real-world problems of exponential functions. Use the graphing calculators to help visualize. - In groups, the students will continue to work on leveled problems. - The teacher circulates the room as students work and meets with small groups based on the results from the entrance ticket.	- Students respond to verbal prompts during the initial discussion. - Circle the room as students are working to check for understanding - Talk to each pair during the process or after they finish to assess understanding - Have students present solutions - Consolidate the lesson - DeltaMath



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| | <ol style="list-style-type: none">5. The teacher will consolidate the lesson.6. Students then work on the DeltaMath activity. | |
|--|--|--|

Differentiation:

Students will be asked to find out whether some factories' accountants use exponential functions to calculate the depreciation of their machines and other assets used in production.

Students will write and present short reports to the class on their findings.

Students will be grouped so that they are working with partners at various ability levels.

The teacher meets with small groups based on the formative assessment.

The DeltaMath activity provides reinforcement or enrichment based on students' needs.

Resources Provided:

- DeltaMath activity
- Consolidation notes
- Reference notes and examples



Lesson Plan 3 Template		
Content Area: Math	Lesson Title: The Number e	Time Frame: 1 class period
Lesson Components		
<u>21st Century Themes</u> ☐ Global Awareness ☒ Financial, Economic, Business and Entrepreneurial Literacy ☐ Civic Literacy ☐ Health Literacy		
<u>21st Century Skills</u> ☒ Creativity and Innovation ☒ Critical Thinking and Problem Solving ☐ Information Literacy ☒ Life and Career Skills ☒ Communication and Collaboration ☐ Media Literacy ☐ ICT Literacy		
Interdisciplinary Connections: Science and Engineering		
Integration of Technology: Graphing Calculators, Desmos, DeltaMath		
Equipment Needed: Laptops, graphing calculators		

Goals/Objectives	Learning Activities/ Instructional Strategies	Formative Assessment Tasks
Students will: • Use the exponential function $y=e^x$ • Solve problems involving population growth • Solve problems involving continuously compounded interest	Lesson Sequence 1. Discuss the “medicine” problem. 2. Ask students to pair together to determine example formulas for exponential growth and exponential decay. 3. In groups, work out the Continuously Compounded Interest problems. 4. In groups, the students will continue to work on leveled problems.	• Students respond to verbal prompts during the initial discussion. • Circle the room as students are working to check for understanding • Talk to each pair during the process or after they finish to assess understanding • Have students present solutions • Consolidate the lesson • DeltaMath



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5. The teacher circulates the room as students work and meets with small groups based on the results from the entrance ticket.
6. The teacher will consolidate the lesson.
7. Students then work on the DeltaMath activity.

Differentiation:

Present the formula for compound interest and have groups of students calculate the value of an account with a principal of \$1000 after three years at 6% interest when compounded annually, quarterly, monthly, daily, and hourly.

Students will be grouped so that they are working with partners at various ability levels.

The teacher meets with small groups based on the formative assessment.

The DeltaMath activity provides reinforcement or enrichment based on students' needs.

Resources Provided:

- DeltaMath activity
- Consolidation notes
- Reference notes and examples



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Lesson Reflection

Reflect on the lesson you have developed and rate the degree to which the lesson *Strongly*, *Moderately*, or *Weakly* meets the criteria below.

Lesson Activities	Strongly	Moderately	Weakly
Are challenging Strongly and require higher-order thinking and problem-solving skills	☒	☐	☐
Allow for student choice	☒	☐	☐
Provide scaffolding for acquiring targeted knowledge/skills	☒	☐	☐
Integrate global perspectives	☐	☒	☐
Integrate 21st-century skills	☒	☐	☐
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills	☐	☒	☐
Foster student use of technology as a tool to develop critical thinking, creativity, and innovation skills	☒	☐	☐
Are varied to address different student learning styles and preferences	☒	☐	☐
Are differentiated based on student needs	☒	☐	☐
Are student-centered, with the teacher acting as a facilitator and co-learner during the teaching and learning process	☒	☐	☐
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives	☒	☐	☐
Provide opportunities for student reflection and self-assessment	☒	☐	☐
Provide data to inform and adjust instruction to meet the varying needs of learners better	☒	☐	☐

Curriculum Design Template

Content Area: Math	Grade Level: 11-12	Unit Title: Exponential and Logarithmic Functions
Created: 2024	Board Approved on:	



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IEP AND 504 ACCOMMODATIONS AND MODIFICATIONS FOR EARLY CHILDHOOD AND ELEMENTARY SCHOOL STUDENTS:

Large print textbooks
Textbooks for at-home use
Additional time for assignments
Review of directions
Use of mnemonics
Have student restate information
Concrete examples
Adaptive writing utensils
Support auditory presentations with visuals
Use of a study carrel
Assistance in maintaining uncluttered space
Weekly home-school communication tools (notebook, daily log, phone calls or email messages)
Space for movement or breaks
Study sheets and teacher outlines
Extra visual and verbal cues and prompts
Math sheets with highlighted instructions
Graph paper to assist in organizing or lining up math problems
Use of computers and calculators
Books on tape
Graphic organizers
Quiet corner or room to calm down and relax when anxious
Preferential seating
Alteration of the classroom arrangement
Reduction of distractions
Answers to be dictated
Hands-on activities
Use of manipulatives
No penalty for spelling errors or sloppy handwriting
Follow a routine/schedule
Alternate quiet and active time
Teach time management skills
Rest breaks
Verbal and visual cues regarding directions and staying on task
Agenda book and checklists
Adjusted assignment timelines
Visual daily schedule



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**ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY
GLOBAL SKILLS**

Varied reinforcement procedures
Immediate feedback
Work-in-progress check
Personalized examples

TESTING AND ASSESSMENT ACCOMMODATIONS AND MODIFICATIONS:

Answers to be dictated
Frequent rest breaks
Additional time
Oral testing
Untimed tests
Choice of test format (multiple-choice, essay, true-false)
Alternate ways to evaluate (projects or oral presentations instead of written tests)
Accept short answers
Open-book tests
Read test and directions to student
Provide study outline prior to tests
Highlight key directions
Test in alternative site
Use of calculator
Extra credit option
Preview test procedures
Simplified test wording; rephrased test questions and/or directions

GENERAL ACCOMMODATIONS AND MODIFICATIONS:

Use of alternative books or materials on the topic being studied
Computerized spell-check support
Word bank of choices for answers to test questions
Provision of calculator and/or number line for math tests
Reworded questions in simpler language
Projects instead of written reports
Highlighting important words or phrases in reading assignments
Modified workload or length of assignments/tests
Modified time demands
Modified grades based on IEP

BEHAVIOR ACCOMMODATIONS MODIFICATIONS:



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GLOBAL SKILLS**

Breaks between tasks
Cue expected behavior
Daily feedback to student
Have contingency plans
Use de-escalating strategies
Use positive reinforcement
Use proximity/touch control
Use peer supports and mentoring
Model expected behavior by adults
Have parent sign homework
Have parent sign behavior chart
Set and post class rules
Chart progress and maintain data



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GLOBAL SKILLS

IEP AND 504 ACCOMODATIONS AND MODIFICATIONS FOR MIDDLE AND HIGH SCHOOL STUDENTS:

Large print textbooks
Textbooks for at-home use
Additional time for assignments
A locker with adapted lock
Review of directions
Review sessions
Use of mnemonics
Have student restate information
Provision of notes or outlines
Concrete examples
Adaptive writing utensils
Support auditory presentations with visuals
Weekly or bi-weekly home-school communication
Space for movement or breaks
Study sheets and teacher outlines
Extra visual and verbal cues and prompts
Lab and math sheets with highlighted instructions
Graph paper to assist in organizing or lining up math problems
Use of tape recorder for lectures
Use of Interactive notebook
Use of a scribe
Use of computers and calculators
Books on tape
Graphic organizers
Quiet corner or room to calm down and relax when anxious
Preferential seating
Alteration of the classroom arrangement
Reduction of distractions
Answers to be dictated
Hands-on activities
Ability to type all assignments
Follow a routine/schedule
Teach time management and organizational skills
Rest breaks
Verbal and visual cues regarding directions and staying on task
Agenda book and checklists
Daily check-in with case manager or special education teacher
Adjusted assignment timelines
Visual daily schedule



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**ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY
GLOBAL SKILLS**

Varied reinforcement procedures
Immediate feedback
Work-in-progress check
Personalized examples

TESTING AND ASSESSMENT ACCOMMODATIONS AND MODIFICATIONS:

Answers to be dictated
Frequent rest breaks
Additional time
Oral testing
Choice of test format (multiple-choice, essay, true-false)
Alternate ways to evaluate (projects or oral presentations instead of written tests)
Accept short answers
Open-book or open-note tests
Read test and directions to student
Provide study guides prior to tests
Highlight key directions
Test in alternative site
Use of calculator
Extra credit option
Pace long-term projects
Preview test procedures
Simplified test wording; rephrased test questions and/or directions

GENERAL ACCOMMODATIONS AND MODIFICATIONS:

Allow outlining, instead of writing for an essay or major project
Use of alternative books or materials on the topic being studied
Computerized spell-check support
Word bank of choices for answers to test questions
Provision of calculator for math tests
Film or video supplements in place of reading text
Reworded questions in simpler language
Projects instead of written reports
Highlighting important words or phrases in reading assignments
Modified workload or length of assignments/tests
Modified time demands



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**ENGAGING STUDENTS • FOSTERING ACHIEVEMENT • CULTIVATING 21ST CENTURY
GLOBAL SKILLS**

Pass/no pass option
Modified grades based on IEP

BEHAVIOR ACCOMMODATIONS FOR STUDENTS:

- Breaks between tasks
- Cue expected behavior
- Daily feedback to student
- Have contingency plans
- Use de-escalating strategies
- Use positive reinforcement
- Use proximity/touch control
- Use peer supports and mentoring
- Model expected behavior by adults
- Have parent sign homework
- Set and post class rules
- Chart progress and maintain data



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GLOBAL SKILLS

Accommodations and Modifications for ESL Students

- Give tests orally
- Give instructions/directions in writing and orally
- Assign a peer tutor, same language or English speaking
- Allow use of bilingual/translation dictionary
- Provide summaries of text or study guides of particular chapters
- Allow errors in speaking
- Allow errors in writing
- Accept writing in first language
- Highlight key vocabulary
- Reduce amount of work required
- Assess comprehension through demonstration or other alternative means (gestures, drawings)
- Rephrase questions, directions, and explanations
- Reduce multiple choices on assessments
- Provide study guides and/ or outlines
- Shorten reading assignments
- Allow extended time for test/project completion
- Use of audio books
- Use of graphic organizers
- Use reduced text, so that print is not dense
- Use visuals/pictures throughout lesson/unit/assignment
- Adapt homework to reflect language proficiency/home support
- Adapt homework to reflect home support
- Provide hands-on activities and explanations
- Allow extended time to answer questions, and permit drawing, as an explanation
- Use of translation dictionaries to locate words in the native language
- Use anecdotal records and portfolio of work as forms of assessment
- Use story retellings to assess comprehension

What Does the Gifted and Talented Experience Look Like? *Springfield Public Schools*

Mission Statement

The Gifted and Talented Program of the Springfield Public Schools aims to provide a meaningful and rigorous education that instills the value of lifelong learning and empowers all students to reach their full potential and become self-fulfilled creative leaders in accordance with the comprehensive standards of our state. We accomplish this by offering challenging, real-world experiences in a student-centered environment.

We recognize that students come from diverse socioeconomic, cultural, and ethnic backgrounds, and the mission of the gifted and talented program is to provide opportunities for students to explore their intellectual, creative, and artistic gifts and talents within the classroom and with beyond-the-classroom experiences. It is essential to provide diverse, appropriate, and ongoing learning experiences and environments that incorporate students' academic, psychological, and social needs. Our responsibility is to provide students with educational alternatives that teach, challenge, and expand their knowledge, while simultaneously stressing the development of independent and self-directed learners who continuously generate questions, analyze, synthesize, and evaluate information and ideas.

New Jersey Administrative Code 6A:8-3.1 defines students who are gifted and talented as those students who possess or demonstrate high levels of ability in one or more content areas when compared to their chronological peers in the local district and who require modification of their educational program if they are to achieve in accordance with their capabilities.

Goals:

To support our mission, we have established the following goals to guide our work:

- To infuse into the general education program a broad range of activities for high-level learning that will challenge all students to perform at advanced levels, and provide extended opportunities, resources, and support in particular areas where student interest or talent is demonstrated.
- To provide a continuum of gifted education services that will strengthen the total school program, offer enriching and challenging learning opportunities for all students, and provide specialized learning experiences
- To promote achievement of students' best potentials and increased ability.

Through a productive and collaborative relationship among the building principals, classroom teachers, and the Gifted and Talented teacher, our schools can create programming that will enhance the learning experience for every student and serve the unique and specialized needs of students currently demonstrating gifted behaviors.

Elements of the Schoolwide Enrichment Model, W.I.N (What I Need), differentiated instruction, advanced classes, or individual programs into a student's regular instruction program are integral to this overarching framework for gifted education in the Springfield School District.

Reference Board Policy and Regulation 2464 – Gifted and Talented Pupils (M)

Early Childhood Center **Edward V. Walton**

Schoolwide Virtual Enrichment

All first and second grade students have access to the [Gifted and Talented Virtual Classroom](#). This virtual classroom is a space for students to complete various challenges and enrichment opportunities at their own pace. Students can receive feedback and additional adaptable resources to meet their individual learning needs. The virtual classroom design expands accessibility to enrichment resources and allows students to choose learning activities according to their unique interests and abilities. The purpose of the activities is to encourage problem-solving, develop critical thinking

skills, and expand curiosity and imagination. Activities are aligned to the New Jersey Student Learning Standards.

Gifted and Talented Teacher as a Resource

The Gifted and Talented teacher serves as a resource to all teachers within Edward V. Walton School. Teachers seeking resources for their high-ability learners will receive additional support from the Gifted and Talented teacher in various ways. This support may include additional units of study, challenging resources, and student projects.

Elementary Schools **James Caldwell** **Thelma L. Sandmeier**

The goal is to engage small groups of students in intensive learning experiences through standards-based, rigorous, and relevant units of study that supplement, not supplant, the grade-level curriculum and support students' unique learning needs.

Enrichment Experience Grade 3

Beginning in third grade, the G&T teacher will cycle through all classrooms to work on problem-solving and enrichment tasks with students. Driven by assessment data, academic performance, student interest, and teacher observation, small groups of students will meet with the G&T teacher during W.I.N. (What I Need) periods throughout the week that the teacher is assigned to their classroom teacher. Groupings will be flexible and monitored to best meet each student's needs throughout the school year. Activities will include brain teasers, puzzles, strategic thinking, problem-solving, and STEM challenges.

Targeted Gifted and Talented Programing Grades 4-5

Students may become identified as Gifted and Talented in fourth grade. Students that are identified may receive support from the G&T Teacher for up to five periods (200 minutes) a week during W.I.N. (What I Need) periods. Identified students will meet to explore grade-level content while incorporating depth and complexity in a student-centered, problem-based environment. The Gifted and Talented Program aims to provide students with various advanced and challenging learning experiences across content areas to promote independent thinking skills, refine critical thinking and communication skills, cultivate joy in learning, and expand student interests through problem-solving. The instruction that students receive incorporates 21st Century Skills and advanced content that is challenging, hands-on, and relevant to the real world.

Strategies and Practices that Support Gifted and Talented Students

- Adjusted Pace of Lessons
- Inquiry-Based Instruction
- Higher-Order Thinking Activities
- Interest-Based Content
- Real World Problem Solving/Problem Based Learning
- Independent Study/Passion Projects
- Units of Study with Like-Minded Peers

Schoolwide Virtual Enrichment

All JCS and TLS students have access to grade level-specific [Gifted and Talented Virtual Classrooms](#). These virtual classrooms are a space for students to complete various challenges and enrichment opportunities at their own pace. Students are able to receive feedback and additional opportunities based on their needs. The virtual classrooms have expanded the accessibility of enrichment resources directly to the students and allows for students to choose opportunities according to their interests and abilities. The purpose of the activities is to encourage problem solving, develop critical thinking skills, and expand curiosity and imagination in conjunction with the New Jersey Student Learning Standards.

Gifted and Talented Teacher as a Resource

In addition to classroom support, the Gifted and Talented teacher also serves as a resource to all teachers in the building. Teachers that are seeking resources for their high ability learners will receive additional support from the Gifted and Talented teacher in various ways. This may include additional units of study, challenging resources, student projects, and meeting with the G&T teacher as needed.

Additional Enrichment Opportunities

Across all grade levels 3-5, as recommended by the classroom teacher, students exhibiting a need for additional enrichment may have the opportunity to meet with the G&T teacher as the schedule allows. Groupings will be flexible and monitored to best meet the students' needs throughout the school year. Activities will include, brain teasers, puzzles, strategic thinking activities, problem-solving challenges, and STEM challenges. Students engage in an extended process of asking questions, using resources, and developing answers that lead to thinking about what and how they are learning. Students are held accountable for how they work and use their time by demonstrating their learning through products or presentations.

Students self-select to participate in individual and/or group projects based on interest and commitment. The classroom teacher and/or the enrichment teacher will help guide and monitor student exploration of chosen topics, facilitating their learning with resources and teaching of needed skills.

Secondary Schools
Florence M. Gaudineer Middle School
Jonathan Dayton High School

Grades 6-12: Access to specific content programs with higher levels of academic challenges (i.e. Pre-Algebra, Accelerated Communication Arts, and Advanced Placement Classes)

Dual Credit Courses provide students the opportunity to obtain high school credit, and college credit, simultaneously through partnerships with several institutions.

Project Lead the Way (PLTW) students become builders of technology by engaging in real world activities. Students are empowered as design thinkers collaborating on real world projects.

Gifted and Talented Identification Criteria

The Springfield Schools Gifted and Talented Program recognizes that students require differentiated learning experiences beyond the core curriculum being taught because of their advanced abilities in one or more content areas. These students may also have other cognitive qualities such as curiosity, creativity, motivation, leadership, and passion that require modifications to their academic experience.

Multiple Measures of Eligibility

Kindergarten through grade twelve identification process for gifted and talented students includes multiple measures. Multiple measures may include but are not limited to: achievement test scores; grades; student performance or products; intelligence testing; parent, student, and/or teacher recommendation; and other appropriate measures. The identification methodology is developmentally appropriate, non-discriminatory, and related to the programs and services offered by the Springfield School District. The identification procedures are reviewed annually.

According to N.J.A.C. 6A:8-3.1, all public school districts must have a board-approved gifted and talented identification process and provide services for identified students enrolled in the grades of that school district. The regulations require that identification and services be made available to students in grades K-12.

When students are recommended for the Gifted and Talented Program there are multiple measures that are considered to determine if services are necessary and appropriate. The assessments used are as follows:

- Cognitive Abilities Test (CogAT)
- Classroom Performance/Student Portfolios
- DRA2 Level
- iReady Diagnostic Scores
- Gifted Indicators Checklist
- Start Strong/NJSLA Assessment Data

The N.J.A.C. requires that students be compared to their chronological peers in the local school district. The New Jersey Department of Education has not established state-level criteria for identifying students who are gifted, such as mandated tests or assessments, grade point averages, or IQ scores. Local school districts must use multiple measures to identify students.

Procedures

<https://www.straussesmay.com/seportal/Public/DistrictPolicy.aspx?policyid=2464&id=b8a33a9f505e4998a6db3fb8e1de778b>

Gifted and Talented Program Identification Matrix

Minimum Score Required for Consideration: 14 Points

1 Point	2 Points	3 Points
Cogat Assessment Overall Stanine Score of a 7	Cogat Assessment Overall Stanine Score of an 8	Cogat Assessment Overall Stanine Score of a 9
iReady Math Assessment Just Below Current Grade Level	iReady Math Assessment On Grade Level	iReady Math Assessment ½ Year + Above Current Level
iReady ELA On Grade Level	iReady ELA ½ Year Above Current Level	iReady ELA One Full Grade Level + Above Current Level
NJSLA Math Approaching Expectations	NJSLA Math Met Expectations	NJSLA Math Exceed Expectations
NJSLA ELA Approaching Expectations	NJSLA ELA Met Expectations	NJSLA ELA Exceed Expectations
HOPE Teacher Rating Scale Raw Score: 11 - 29	HOPE Teacher Rating Scale Raw Score: 30 - 49	HOPE Teacher Rating Scale Raw Score: 50-66

Team meetings present the opportunity to review data and assess the educational needs of all students. Teacher provides examples of student work exhibiting above and beyond grade level expectations, creativity, leadership, critical and abstract thinking. Programs for gifted and talented students will be periodically evaluated for their continuing efficacy and adjusted accordingly. The parent of any student identified as gifted or talented shall be consulted regarding any program designed to address the student's particular needs.

Resource Links

https://riversideinsights.com/cognitive_abilities_test

<https://www.curriculumassociates.com/programs/i-ready-learning>

<https://www.nj.gov/education/assessment/resources/>

<https://www.routledge.com/HOPE-Teacher-Rating-Scale-Involving-Teachers-in-Equitable-Identification/Gentry-Pereira-Peters-McIntosh-Fugate/p/book/9781618214522#:~:text=The%20HOPE%20Teacher%20Rating%20Scale,making%20it%20easy%20to%20use.>

Gifted and talented student: The “*[Strengthening Gifted and Talented Education Act](#)*” defines a gifted and talented student as a “student who possesses or demonstrates a high level of ability in one or more content areas when compared to their chronological peers in the school district and who require modifications of their educational program if they are to achieve in accordance with their capabilities.”

Twice-exceptional (2E) students: A twice-exceptional (2E) student is defined as “a student who is both gifted and a student with a disability. These students may also be referred to as having dual exceptionalities or as being gifted with learning disabilities (GT/LD). This also applies to students who are gifted with ADHD or gifted with autism” (New Jersey Association for Gifted Children, www.nagc.org).

Instructional adaptation: An adjustment or modification to instruction enabling a student who is gifted and talented to participate in, benefit from, and demonstrate knowledge and application of the New Jersey Student Learning Standards in one or more content areas at the instructional level of the student, not just the student's grade level.

Identifying gifted and talented students: The focus of identification is to provide programming and services in which students' specific learning needs and potential are appropriately addressed and met. In every New Jersey school district, there are students who require modifications to the general education curriculum if they are to achieve in accordance with their abilities. By identifying a student's general intellectual ability, creativity, or specific academic area aptitudes, we are acknowledging that they need programming and services outside of the general education/grade level curriculum to advance their learning.

NJDOE Fast Facts

<https://www.nj.gov/education/standards/gifted/>

<https://www.nj.gov/education/standards/gifted/legislation.shtml>

Supplemental Resources/Programming for Gifted Students

Edward V. Walton

- PETS Program – Primary Education Thinking Skills
- Group Solutions/Group Solutions 2 – Cooperative Logic Activities
- Lollipop Logic
- Beginning Thinking Skills
- AIMS Education Programming

James Caldwell and Thelma L. Sandmeier

Math/ELA

- Project M3: Mentoring Mathematical Minds
- Junior Great Books
- AIMS Education Programming
- Borenson Hands on Equations
- BizWorld
- Perplexors
- Advanced Math Explorations grade 3-5
- Challenging Units for Gifted Learners (ELA and Math)
- Creative Curriculum Extenders
- Differentiated Lessons & Projects
- Challenge Math Grades 4+
- Differentiating Instruction with Menus (All Content Areas)
- Jacob's Ladder
- Genius Hour/Passion Project
- Spatial Reasoning
- Logic Puzzles, Brain Games, Analogies

STEM

- Engineering is Elementary
- Engineer Throughout the Year
- PBS Design Squad
- DefinedSTEM
- Project Lead the Way (PLTW)

Enrichment Events

Experience for all students to be enriched through events related to the curricular or extracurricular activities. Examples include after school clubs, PTA-sponsored events, leadership opportunities, visual and performing arts, and community service opportunities.