MIDLAND PARK PUBLIC SCHOOLS
Midland Park, New Jersey
CURRICULUM

Exploratories Creative Math Grade 6

Prepared by:
Shawn Savage

Superintendent of Schools:
Marie C. Cirasella, Ed.D.

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Creative Math Exploratory

Course Description:

Creative Math will utilize students' knowledge and skills gained in their general 5th and 6th grade math classes. This course is more projects based than general 6th grade math. This course is designed to help students develop knowledge about statistics and data analysis through their own research and studies. This course will also help students explore concepts such as logic and probability and develop critical and analytical thinking skills. Students will participate in a variety of in class learning activities designed to take math concepts they know and further apply them to real world situations. Students will further immerse themselves into the mathematical world around them, show a deeper understanding to recognize it in their lives, and incorporate this learning in future math endeavors.

Suggested Course Sequence:

Unit 1: *Data Displays* – 10 classes

Unit 2: *Probability and Gaming* – 10 classes

Unit 3: *Mathematician Research Project* – 8 classes

Unit 4: *Personal finance, value and discounts* – 10 classes

Unit 5: *Problem Solving* – 8 classes

Unit Overview

Content Area: Math

Unit Title: Data Displays – UNIT 1

Grade Level: 6

Unit Summary: Students will be introduced to the course. Students will conduct surveys of their classmates and display this data in various forms such as bar and line graphs. Students will then be introduced to dot plots and histograms and will use new data to display.

Interdisciplinary Connections: English (writing surveys), Science (data collection), and Art (data display)

21st Century Themes and Skills:

CRP4. Communicate clearly and effectively and with reason.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP11. Use technology to enhance productivity.

9.3.ST-SM.4 – Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.

Learning Targets

Standards (Content and Technology): Common Core State Standards

CPI#:	Statement:
CC.6.SP.1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.
.6.SP.5	Summarize numerical data sets in relation to their context, such as by: Reporting the number of observations, Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
CC.6.SP.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
8.1.5.F.1	Apply digital tools to collect, organize, and analyze data that support a scientific finding.
8.1.8.A.4	Graph and calculate data within a spreadsheet and present a summary of the results
8.1.5.A.4	Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data.

Unit Essential Question(s):

- **How do you identify a statistical question?**
- **How can you use dot plots and frequency tables to display data?**

Unit Enduring Understandings:

- The way data is collected, organized and displayed can vary.
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Unit Learning Targets/Objectives:

Students will…

- **Use frequency tables and dot plots to organize data.**
- **Describe a data set by stating what quantity was measured and how it was measured.**
- **Recognize a statistical question.**
- **Display data in histograms.**
- **Summarize a data set by using mean, median and mode.**
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Evidence of Learning

Formative Assessments: Part of daily instruction. Done through observing students and examining their work. Observe students visual representations.

Summative/Benchmark Assessment(s): Final unit assessment based on completion and understanding of project. Based on the accuracy and creativity of their data display.

Resources/Materials: Powerpoint, examples of data displays, pre-gathered data, student generated data.

Modifications:

- Special Education Students - Allow errors, Rephrase questions, directions, and explanations, Allow use of calculator
- English Language Learners - Allow errors in speaking, Rephrase questions, directions, and explanations
- At-Risk Students - Consult with Guidance Counselors and follow I&RS procedures/action plans
- Gifted and Talented Students – Make Peer Leaders, Provide extension activities

Lesson Plans

Lesson #	Lesson Name	Time frame (hours/days)
1	**Course introduction**	1 day – Introduction to the course. Explain class rules and expectations. Supplies needed for class. Difference between creative math and regular math class.
2	**Statistical Questions**	1 day – Explain what a statistical question is. Identify them. Write your own.
3	**Bar/Line Graphs**	2 days – Describe the difference between a bar and line graph. When is one more appropriate than the other. Read them for pertinent information. Make their own.
	Dot Plots/Histograms	2 days – Introduce dot plots and histograms. Again, when is one more useful than the other. Be able to gather information from them and create your own.
5	**Student Surveys**	3 days – Students will conduct surveys of their fellow classmates. Brainstorm a good survey question. Gather data from classmates. Choose best way to visually represent data. Make a data display of their choosing. Share results with class.

Teacher Notes: Collaborate with other teachers in regards to grouping. Consult with enrichment, special education, ELL teachers.

Additional Resources

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

https://www.khanacademy.org/math/pre-algebra/applying-math-reasoning-topic/reading_data/v/histograms

https://www.mathsisfun.com/data/dot-plots.html

Unit Overview

Content Area: Math

Unit Title: Probability – UNIT 2

Grade Level: 6

Unit Summary: Students will be introduced to the concept of probability. Students will understand what it means that an event is likely or unlikely to occur. Topics will include theoretical probability, experimental probability, and predicting outcomes.

Interdisciplinary Connections: Science (hypothesis and experimentation), Art (game board creation)

21st Century Themes and Skills:

CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and with reason.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP11. Use technology to enhance productivity.

Critical Thinking and Problem Solving, Creativity and Innovation, Communication and Collaboration

Learning Targets

Standards (Content and Technology): Common Core State Standards

CPI#:	Statement:
CC.6.SP.5a-b	Summarize numerical data sets in relation to their context, such as by: Reporting the number of observations, Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
CC.7.SP.5	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
CC.7.SP.6	Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability.
8.1.P.A.4	Use basic technology terms in the proper context in conversation with peers and teachers (e.g., camera, tablet, Internet, mouse, keyboard, and printer).

Unit Essential Question(s):

- **How can predictions be made based on data?**
- **When and why do I use proportional comparisons?**
- **How do you use probability in real life situations?**

Unit Enduring Understandings:

- The probability of an event's occurrence can be predicted with varying degrees of confidence.
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Unit Learning Targets/Objectives:

Students will...

- **Use spinners, dice, and coins to determine an events probability.**
- **Find outcomes of events with and without replacement.**
- **Understand the relationship between probability and the likelihood of that event occurring.**
- **Create their own game that must include 'chance'.**
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Evidence of Learning

Formative Assessments: Part of daily instruction. Done through observing students and questioning. Class discussion. Use kinesthetic assessments during games of chance.

Summative/Benchmark Assessment(s): Final unit assessment based on student created board game with a partner.

Resources/Materials: Powerpoint, interactive games on the SmartBoard, dice, spinners, cards, coins.

Modifications:

- Special Education Students - Consult with Case Managers and follow IEP accommodations/modifications, Provide a vocabulary list, Rephrase questions, directions, and explanations
- English Language Learners - Allow errors in speaking, Allow extended time to answer questions, and permit drawing, as an explanation
- At-Risk Students - Provide extended time to complete tasks, Consult with Guidance Counselors and follow I&RS procedures/action plans
- Gifted and Talented Students – Make Peer Leaders, Provide extension activities, Build on students' intrinsic motivations

Lesson Plans

Lesson #	Lesson Name	Time frame (hours/days)
1	**Probability Introduction**	1 day – Where do students see probability around them? What does an event mean when it is likely? Unlikely? How can probability be expressed? All expressions are a part to whole relationship.
2	**Theoretical Probability**	1 day – Explain that theoretical probability is the number of ways an event can occur divided by the total number of outcomes. Examples of theoretical probability such as tossing a coin or spinning a spinner. Play a game to highlight this.
3	**Experimental Probability**	1 day – Explain that experimental probability is the number of times an event occurs to the total possible outcomes.
4	**Games of chance**	1 day – Play games of chance (board games, cards, etc) to see the math involved and understand the probability of certain events occuring.
5	**Make Your Own Game**	6 days – Students will make their own game of chance from scratch. This includes a board game, any pieces, gaming cards, etc. They can and should use dice, spinners, coins, etc. Game must involve chance.
6	**Play your classmates games**	1 day – Students will play their classmates games and see how 'fair' their games are.

Teacher Notes: Collaborate with other teachers in regards to pairing. Consult with enrichment, special education, ELL teachers.

Additional Resources

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

Unit Overview

Content Area: Math

Unit Title: Mathematician Research Project – UNIT 3

Grade Level: 6

Unit Summary: Students will complete a research project on the mathematician of their choosing.

Interdisciplinary Connections: English (research, writing, citation), Social studies (world events during mathematicians lifetime), Computers (web navigation for research, creation of project)

21st Century Themes and Skills:

CRP2. Apply appropriate academic and technical skills.
CRP4. Communicate clearly and effectively and with reason.
CRP6. Demonstrate creativity and innovation.
CRP7. Employ valid and reliable research strategies.
CRP11. Use technology to enhance productivity.

Creativity and Innovation, Basic Literacy, Information Literacy, ICT Literacy

Learning Targets

Standards (Content and Technology): Common Core State Standards

CPI#:	Statement:
8.1.P.A.5	Demonstrate the ability to access and use resources on a computing device.
8.1.P.A.4	Use basic technology terms in the proper context in conversation with peers and teachers (e.g., camera, tablet, Internet, mouse, keyboard, and printer).
8.1.5.A.2	Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.
CC.6.RI.6.2	Determine a central idea of a text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgments.
CC.6.RI.6.7	Integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue.
CC.6.W.6.8	Gather relevant information from multiple print and digital sources; assess the credibility of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and providing basic bibliographic information for sources.

Unit Essential Question(s):

- **Who are some of the most important mathematicians of all time?**
- **What is their contribution to the world?**

Unit Enduring Understandings:

- Famous mathematicians come from varied backgrounds and can leave a lasting legacy on the world.

Unit Learning Targets/Objectives:

Students will...

- **Create a research project about a mathematician of their choosing such as Einstein, Da Vinci, Newton, etc.**
- **Complete a "Let Me Introduce You" questionnaire about their mathematician.**
- **Students can choose to make a mobile, collage, powerpoint presentation or give an oral report.**
- **Students may also create a Facebook or Instagram profile of their mathematician.**

Evidence of Learning

Formative Assessments: Part of daily instruction. Done through observing students and questioning.

Summative/Benchmark Assessment(s): Final unit assessment based on student created mathematician research project.

Resources/Materials: Computer lab/Cows, printer

Modifications:

- Special Education Students - Consult with Case Managers and follow IEP accommodations/modifications, Allow errors, Write shorter paper
- English Language Learners – Work with a partner, Rephrase questions, directions, and explanations
- At-Risk Students - Provide extended time to complete tasks, Consult with Guidance Counselors and follow I&RS procedures/action plans
- Gifted and Talented Students - Provide extension activities

Lesson Plans

Lesson #	Lesson Name	Time frame (hours/days)
1	**Mathematician Project**	1 Day – Introduction of the project. Students will be given 20 different mathematicians to choose from: Einstein, Da Vinci, Newton, etc. Students will choose one to do their research project on or they can choose their own with approval. Students will be shown examples of the project.
	In Class Research	3 days – Students will complete a questionnaire about their mathematician with vital life information. They will research the life, death and notable achievements of their mathematician.
3	**In Class Work**	3 days – Students will choose a way to display their findings. Class time will be spent constructing their mobile, collage, powerpoint, etc.
4	**Present Projects**	2 days – Students will present their finding to the class. Introduce their mathematician, interesting facts, achievements, legacy, etc.

Teacher Notes:

Additional Resources

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

Unit Overview

Content Area: Math

Unit Title: Personal Finance – UNIT 4

Grade Level: 6

Unit Summary: Students will be introduced to the concept of personal finance. Students will learn how to work with a budget, a checking/saving account, and the value of a discount.

Interdisciplinary Connections: Reading (vocabulary), Health (personal responsibility and decision making)

21st Century Themes and Skills:

CRP2. Apply appropriate academic and technical skills.
CRP3. Attend to personal health and financial well-being.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
CRP9. Model integrity, ethical leadership and effective management.
CRP10. Plan education and career paths aligned to personal goals.
CRP11. Use technology to enhance productivity.

9.1.4.B.2-Identify age-appropriate financial goals. 9.1.8.B.1 - Distinguish among cash, check, credit card, and debit card. 9.1.8.C.1 - Compare and contrast credit cards and debit cards and the advantages and disadvantages of using each.

Learning Targets

Standards (Content and Technology): Common Core State Standards

CPI#:	Statement:
CC.6.RP.3c	Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.
CC.6.NS.7c-d	Understand ordering and absolute value of rational numbers. Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. Distinguish comparisons of absolute value from statements about order.
8.1.P.A.5	Demonstrate the ability to access and use resources on a computing device.
8.1.2.A.5	Enter information into a spreadsheet and sort the information.

Unit Essential Question(s):

- **How can understanding effective personal finance strategies improve my life?**
- **How do you create and maintain a budget?**
- **How can the student become a knowledgeable consumer?**

Unit Enduring Understandings:

- Financial responsibility can have a major effect on your life, even as a young adult.
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Unit Learning Targets/Objectives:

Students will…

- **Create a budget for a 'class party'**
- **Describe a checking account and what it means to withdraw and deposit money.**
- **Recognize a bargain and what it means to have 'value'.**
- **Compare items that are on sale and understand the 'savings'.**

Evidence of Learning

Formative Assessments: Part of daily instruction. Done through observing students and examining their work. Utilize an exit/admit slip. Use individual whiteboards to display answers and recognize understanding.

Summative/Benchmark Assessment(s): Final unit assessment based on maintaining a budget. Students will take a vocabulary quiz on terms learned throughout the unit: value, withdraw, percent, budget, debt, balance, interest,

Resources/Materials: Powerpoint, online checkbook, newspaper circulars.

Modifications:

- Special Education Students - Allow errors, Consult with Case Managers and follow IEP accommodations/modifications
- English Language Learners - Allow errors in speaking, Allow extended time to answer questions, and permit drawing, as an explanation
- At-Risk Students - Consult with Guidance Counselors and follow I&RS procedures/action plans, Consult with classroom teacher(s) for specific behavior interventions
- Gifted and Talented Students - Provide extension activities

Lesson Plans

Lesson #	Lesson Name	Time frame (hours/days)
1	**Checking Account**	2 days – Students will be introduced to a checking account/saving account and the difference between them. Discuss terms like withdraw, deposit, overdraft etc. Use absolute value to describe situations.
2	**Budget**	2 days – Explain how to maintain/plan a budget. Move students into groups. Give each group a different budget and a different scenario to plan for. Cannot go over budget and must show a detailed report of finances.
3	**Debit/Credit Cards**	2 days – Discuss advantages and disadvantages of debit and credit cards. Watch clip from 'Confessions of a Shopaholic'. Discuss financial responsibility. Give scenarios to decide when it is better to use a debit/credit card.
4	**Interest rates, taxes and discounts.**	3 days – Discuss interest rates and spending $300 for a $200 tablet. Review sales tax and how it is calculated. How discounts work and if they are really discounts at all.
5	**Go Shopping**	1 day - Students will have a budget to maintain. They can use a 'credit card' or 'debit card' on certain purchases. They will need to calculate tax and tip if necessary.

Teacher Notes: Collaborate with other teachers in regards to grouping. Consult with enrichment, special education, ELL teachers.

Additional Resources

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

https://www.youtube.com/watch?v=xfPuQLbnsu8

Unit Overview

Content Area: Math

Unit Title: Problem Solving – UNIT 5

Grade Level: 6

Unit Summary: Students will complete a PARCC like question per day. Students will create a method for reading a problem, understanding what it is asking, and what steps they can do to solve them.

Interdisciplinary Connections: Science (hypothesis and problem solving), English (reading and interpreting directions carefully)

21st Century Themes and Skills:

CRP4. Communicate clearly and effectively and with reason.
CRP6. Demonstrate creativity and innovation.
CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

Learning Targets

Standards (Content and Technology): Common Core State Standards

CPI#:	Statement:
CC.MP1	Make sense of problems and persevere in solving them.
CC.MP2	Reason abstractly and quantitatively.
CC.MP5	Use appropriate tools strategically.
9.3.ST-SM.4	Apply critical thinking skills to review information, explain statistical analysis, and to translate, interpret and summarize research and statistical data.

Unit Essential Question(s):

- **How does a student know where to begin when problem solving?**
- **How does having a process help when problem solving?**
- **Is my answer reasonable?**
-

Unit Enduring Understandings:

- A problem solver understands what has been done, knows why the process was appropriate, and can support it with reasons and evidence.
- There are different strategies for problem solving but some or more effective than others.

Unit Learning Targets/Objectives:

Students will...

- **Develop a method for answering critical thinking questions**
- **Practice various types of PARCC-like questions**
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Evidence of Learning

Formative Assessments: Part of daily instruction. Done through observing students and questioning. Class discussion.

Summative/Benchmark Assessment(s): Final unit assessment based on a quiz involving critical thinking and problem solving skills.

Resources/Materials: Powerpoint, PARCC practice questions

Modifications:

- Special Education Students – Use a timer to help with time management, Give questions written and orally
  English Language Learners – Repeat and rephrase the question, Encourage participation, Use visuals
- At-Risk Students - Provide rewards as necessary, Consult with Guidance Counselors and follow I&RS procedures/action plans
- Gifted and Talented Students – Use peer leaders, Ask higher level questions,

Lesson Plans		
Lesson #	**Lesson Name**	Time frame (hours/days)
1	**PARCC Practice Test**	1 day – Students will take a 6th grade sample PARCC test.
2	**Practice Test Review**	1 day – Students will review the PARCC sample test they took. Address any questions they may have.
3	**Critical Thinking Problem of the Day**	5 days – Students will work in pairs or groups to solve a critical thinking problem each day. Directions will be crucial to their success. The problem may not be a skill they have directly learned before and will need to think logically to solve. Certain problems will require collaboration with other students/groups. Students should develop a plan of attack when it comes to questions they are unsure of: what is the question asking, what do I know, what do I need to know, how can I go about solving this problem?

Teacher Notes: Collaborate with other teachers in regards to grouping/pairing. Consult with enrichment, special education, ELL teachers.

Additional Resources

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