Orange Public Schools

Office of Curriculum & Instruction

2020-2021Mathematics Curriculum Guide

Introduction to Statistics

Unit1: Descriptive Statistics

September 9, 2020 – November 13, 2020

Board Approved: 1.14.2020

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Contents

Curriculum Map

A STORY OF UNITS (Yearlong Pacing Guide)				
Marking Period	**Unit 1** (9/9/20 – 11/13/20)	**Unit 2** (11/14/20- 2/07/21)	**Unit 3** (2/08/21-4/30/10)	**Unit 4** (5/1/21-6/22/21)
Unit Topic	**Descriptive Statistics**	**Probability**	**Statistical Inference**	**More Statistical inference:**
Description	Distinguish between qualitative data and quantitative data Classify data with respect to the four levels of measurement: nominal, ordinal, interval, and ratio Compare Descriptive and Inferential Statistics Distinguish between parameter and statistics Create frequency Distribution, Histogram, Pareto Chart, Pie chart, Bar graph, Stem and Leaf, Dot plots. Compute measure of central tendency, Compute range, standard deviation, variance, Compute mean and standard deviation of grouped data, Compute weighted average, Understand and apply empirical rule, compute and interpret z score Create box whisker plot and interpret.	Basic concept of probability and counting, Conditional probability and the multiplication rule, Understand and apply Permutation and Combination Understand probability distribution, Identify and apply binomial distribution, Understand and use Poisson distribution Introduction to normal distribution and standard normal distribution Finding probability and values from normal distribution, Understand and apply sampling distribution and central limit theorem	Confidence interval for the mean of large sample and small sample Confidence Interval for population proportion Confidence interval for variance and standard deviation Introduction to Hypothesis testing, Hypothesis testing for the mean of large and small sample, Hypothesis testing for proportion, Hypothesis testing for variance and standard devition	Testing the difference between means of large and small Independent samples Testing the difference between means dependent samples Testing the difference between proportions Find correlation and Linear regression Measure of regression and prediction interval use the chi-square distribution to test whether a frequency distribution fits a claimed distribution use a contingency table to find expected frequencies use a chi-square distribution to test whether two variables are independent Interpret the F-distribution and use an F-table to find critical values perform a two-sample F-test to compare two variances

Unit Overview

Unit 1: Introduction To Statistics and Descriptive Statistics
Essential Questions
• How do we obtain data? Why is it important? • What is bias? How can it be identified? How can it be prevented? • To what extent is data biased? To what extent can data be purposely biased? • To what extent does data collection methodology affect results? • Does size matter? • What considerations should be made when designing an experiment? • Why is it important to organize and describe data? • How does one assess normality? • Why is the normal distribution essential to the study of statistics? • How does the normal distribution apply to the real world?
Enduring Understandings
• Careful planning is essential to obtaining valid data. • Clarifying the question leads to the appropriate methodology. • The analysis is only as good as the data. • Well-designed experiments can allow us to reach appropriate cause-and-effect conclusions. • Whether a statistical study has been carried out in an ethical manner. • Proper experimental design is necessary to ensure non-biased results • Graphs produce visual displays of data in meaningful ways. • Measuring the spread of data is essential for comparing data sets. • Scatterplots and other graphs are used to illustrate solutions and solve problems. The way that data is collected, organized and displayed influences interpretation. • Data is analyzed to understand relationships more clearly. • Data is analyzed to verify the truth. • The distribution of outcomes of many real life events can be approximated by the normal curve. • The normal distribution is a fundamental component of statistical inference. • The normal distribution is used to model the spread of data.
NJSLS
1. S.ID.1 Represent data with plots on the real number line (dot plots, histograms, and box plots). 2. S.ID.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets. 3. S.ID.3 Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers). 1. S.ID A.4 Summarize, represent, and interpret data on a single count or measurement variable Use the mean and standard deviation of a data set to fit it to a normal distribution 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 2. S.ID.5 Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and

conditional relative frequencies). Recognize possible associations and trends in the data.

3. S.IC.1. Understand statistics as a process for making inferences about population parameters based on a random sample from that population. Make inferences and justify conclusions from sample surveys, experiments, and observational studies
4. S.IC.3. recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.
5. S.IC.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.
6. S.IC.5. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. 6. Evaluate reports based on data.

M : Major Content S: Supporting Content A : Additional Content

Student Learning Material
Course: Elementary Statistics Picturing the world , 5TH Edition, Ron Larson and Betsy Farber http://doverdhs.ss5.sharpschool.com/UserFiles/Servers/Server_7591927/File/[Larson-Farber]%20Elementary%20Statistics.%20Picturing%20the%20World.pdf Useful Sites: http://www.100people.org/statistics_detailed_statistics.php http://learningtogive.org/lessons/unit137/lesson3.html http://www.gapminder.org/videos/the-joy-of-stats/ - video http://nationalatlas.gov/articles/mapping/a_statistics.html http://serc.carleton.edu/sp/cause/conjecture/examples/18164.html Data: http://www.census.gov/main/www/access.html http://www.cdc.gov/datastatistics/ Other Textbook: http://www.artofproblemsolving.com/LaTeX/Examples/statistics_firstfive.pdf There are 10 chapters and four units in the text book. Unit 1 Consist of chapter 1 and Chapter 2. In chapter 1 students will: Distinguish between qualitative data and quantitative data, Classify data with respect to the four levels of measurement: nominal, ordinal, interval, and ratio, Compare Descriptive and Inferential Statistics, Distinguish between parameter and statistics In chapter 2 students will: Create frequency Distribution, Histogram, Pareto Chart, Pie chart, Bar graph, Stem and Leaf, Dot plots, Compute measure of central tendency, Compute range, standard deviation, variance, Compute mean and standard deviation of grouped data, Compute weighted average, Understand and apply empirical rule, compute and interpret z score, and Create box whisker plot and interpret.

Modifications

Special Education/ 504:	English Language Learners:
-Adhere to all modifications and health concerns stated in each IEP. -Give students a MENU options, allowing students to pick assignments from different levels based on difficulty. -Accommodate Instructional Strategies: reading aloud text, graphic organizers, one-on-one instruction, class website (Google Classroom), handouts, definition list with visuals, extended time -Allow students to demonstrate understanding of a problem by drawing the picture of the answer and then explaining the reasoning orally and/or writing , such as Read-Draw-Write -Provide breaks between tasks, use positive reinforcement, use proximity -Assure students have experiences that are on the Concrete- Pictorial- Abstract spectrum by using manipulatives -Common Core Approach to Differentiate Instruction: Students with Disabilities (pg 17-18) -Strategies for Students with 504 Plans	- Use manipulatives to promote conceptual understanding and enhance vocabulary usage - Provide graphic representations, gestures, drawings, equations, realia, and pictures during all segments of instruction - During ALEKS lessons, click on “Español” to hear specific words in Spanish - Utilize graphic organizers which are concrete, pictorial ways of constructing knowledge and organizing information - Use sentence frames and questioning strategies so that students will explain their thinking/ process of how to solve word problems - Utilize program translations (if available) for L1/ L2 students - Reword questions in simpler language - Make use of the ELL Mathematical Language Routines (click here for additional information) -Scaffolding instruction for ELL Learners -Common Core Approach to Differentiate Instruction: Students with Disabilities (pg 16-17)
Gifted and Talented:	**Students at Risk for Failure:**
- Elevated contextual complexity - Inquiry based or open ended assignments and projects - More time to study concepts with greater depth - Promote the synthesis of concepts and making real world connections	- Assure students have experiences that are on the Concrete- Pictorial- Abstract spectrum - Modify Instructional Strategies, reading aloud text, graphic organizers, one-on-one instruction, class website (Google Classroom), inclusion of more visuals and manipulatives, Field Trips, Google Expeditions, Peer

- Provide students with enrichment practice that are imbedded in the curriculum such as: ● Application / Conceptual Development ● Are you ready for more? - Common Core Approach to Differentiate Instruction: Students with Disabilities (pg. 20) - Provide opportunities for math competitions - Alternative instruction pathways available	Support, one on one instruction - Assure constant parental/ guardian contact throughout the year with successes/ challenges - Provide academic contracts to students and guardians - Create an interactive notebook with samples, key vocabulary words, student goals/ objectives. - Always plan to address students at risk in your learning tasks, instructions, and directions. Try to anticipate where the needs will be and then address them prior to lessons. -Common Core Approach to Differentiate Instruction: Students with Disabilities (pg 19)

21st Century Life and Career Skills:

21st Century Life and Career Skills:	
Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study. https://www.state.nj.us/education/cccs/2014/career/9.pdf	
• **CRP1**. Act as a responsible and contributing citizen and employee. • **CRP2**. Apply appropriate academic and technical skills. • **CRP3**. Attend to personal health and financial well-being. • **CRP4**. Communicate clearly and effectively and with reason. • **CRP5**. Consider the environmental, social and economic impacts of decisions. • **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. • **CRP9**. Model integrity, ethical leadership and effective management. • **CRP10**. Plan education and career paths aligned to personal goals. • **CRP11**. Use technology to enhance productivity. • **CRP12**. Work productively in teams while using cultural global competence.
Students are given an opportunity to communicate with peers effectively, clearly, and with the use of technical language. They are encouraged to reason through experiences that promote critical thinking and emphasize the importance of perseverance. Students are exposed to various mediums of technology, such as digital learning, calculators, and educational websites.	

Technology Standards

Technology Standards:

All students will be prepared to meet the challenge of a dynamic global society in which they participate, contribute, achieve, and flourish through universal access to people, information, and ideas.

https://www.state.nj.us/education/cccs/2014/tech/

8.1 Educational Technology:

All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.

A. **Technology Operations and Concepts:** Students demonstrate a sound understanding of technology concepts, systems and operations.
B. **Creativity and Innovation:** Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.
C. **Communication and Collaboration:** Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.
D. **Digital Citizenship:** Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
E. **Research and Information Fluency:** Students apply digital tools to gather, evaluate, and use of information.
F. **Critical thinking, problem solving, and decision making:** Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

8.2 Technology Education, Engineering, Design, and Computational Thinking - Programming:

All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

A. **The Nature of Technology: Creativity and Innovation-** Technology systems impact every aspect of the world in which we live.
B. **Technology and Society:** Knowledge and understanding of human, cultural, and societal values are fundamental when designing technological systems and products in the global society.
C. **Design:** The design process is a systematic approach to solving problems.
D. **Abilities in a Technological World:** The designed world in a product of a design process that provides the means to convert resources into products and systems.
E. **Computational Thinking: Programming-** Computational thinking builds and enhances problem solving, allowing students to move beyond using knowledge to creating knowledge.

Interdisciplinary Connections:	
English Language Arts:	
ELA.Literacy.RI-9-10.4	Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the cumulative impact of specific word choices on meaning and tone (e.g., how the language of a court opinion differs from that of a newspaper).
NJSLS ELA-LITERACY.SL.9-10.4	Present information, findings, and supporting evidence clearly, concisely, and logically such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose, audience, and task.
NJSLS .ELA-LITERACY.W.9-10.2.A	Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.

Pacing Guide

Overview		
Lesson	Topic	Suggesting Pacing
1.1	An overview of statistics	2 days
1.2	Data Classification	2 days
1.3	Data collection and experimental design	3 days
1.4	Review exercise	2 days
	Chapter 1 test	1 days
2.1	Frequency Distribution and their graphs	3 days
2.2	More graphs and display	3 days
2.3	Measure of central Tendency	1 day
2.4	Measure of variation	3 days
2.5	Measure of position	3 days
2.6	Review exercise	2 days
	Chapter 2 test	1 day

Summary:

20 days on new content (9 lessons/topics)
2 task days
4 review day
4 quiz days
2 test day
2 Days Benchmark Assessment

34 days in Unit 1

Calendar

Please complete the pacing calendar based on the suggested pacing

September 2020						
Sun	**Mon**	**Tue**	**Wed**	**Thu**	**Fri**	**Sat**

October 2020						
Sun	Mon	Tue	Wed	Thu	Fri	Sat

November 2020						
Sun	Mon	Tue	Wed	Thu	Fri	Sat

Assessment Framework

Assessment	Estimated Time	Format	Graded
Quizzes (3 to 4)	1/2 period per quiz	Individual	No
Chapter tests (2 tests)	1 period per test	Individual	Yes
Authentic assessment	TBD	Individual	Yes
Mp1 Benchmark Assessment (Part A and B)	2 periods	Individual	Yes
Assessment check points (exit tickets)	5-10 minutes	Individual	Varies

Benchmark Assessment Window: Oct. 28 - Nov. 13, 20

Chapter 1: Lesson 1.1 – 1.4

Skills/Knowledge/Understandings:
Understandings:

1. Careful planning is essential to obtaining valid data.
2. Clarifying the question leads to the appropriate methodology.
3. The analysis is only as good as the data.
4. Well-designed experiments can allow us to reach appropriate cause-and-effect conclusions.

Learning Targets:

1. Determine the scope of inference for a statistical study.
2. Evaluate whether a statistical study has been carried out in an ethical manner.
3. Distinguish between an observational study and an experiment.
4. Explain confounding in an observational study
5. Describe a completely randomized design for an experiment.
6. Explain why random assignment is an important experimental design principle.
7. Distinguish between a completely randomized design and a randomized block design.
8. Know when a matched pairs experimental design is appropriate and how to implement such a design.
9. Identify the population and sample in a sample survey.
10. Identify voluntary response (y) samples and convenience samples. Explain how these bad sampling methods can lead to bias.
11. Describe how to use ***Table 1: Appendix B*** to select a simple random sample (***SRS***).
12. Distinguish a simple random sample from a stratified random sample or cluster sample. Give advantages and disadvantages of each sampling method.
13. Distinguish between qualitative data and quantitative data
14. Classify data with respect to the four levels of measurement: nominal, ordinal, interval, and ratio
15. Compare Descriptive and Inferential Statistics
16. Distinguish between parameter and statistics

Objectives:

- Using a set of world data, SWBAT apply the concept of the field of statistics and the influence statistics have on our world, as shown by a group discussion on the real-world data with a clear and reasonable explanation.
- Using various sets of real world data, SWBAT distinguish between a population and a sample, between a parameter and a statistic, between qualitative and quantitative data, and between descriptive and inferential statistics, as shown by classifying at least 4 / 5 sets of data.
- Using multiple sets of data, SWBAT classify data as being at the nominal / ordinal / interval / ratio levels of measurement, as shown by classifying at least 4 / 5 sets of data correctly.
- Using statistical studies, observational studies, experiments, surveys, and simulations, SWBAT collect data, as shown by collecting data in various forms from the class with at least 85% accuracy.
- Using random sampling, simple random sampling, stratified sampling, cluster sampling, and systematic sampling, SWBAT create a sample, as shown by creating a sample of class data with complete procedure and at least 85% accuracy.

Assessments:

Formative:	Summative:	Authentic:
a. Class Discussion on statistics in the real world b. Sides / corners of classroom (identifying population vs. sample, parameter vs. statistic, qualitative vs. quantitative, descriptive vs. inferential, nominal / ordinal / interval / ratio levels c. classwork problems (textbook chapter 1) d. Uses and Abuses discussion (pg. 27) e. Picturing the World: (U.S. Census Undercount, Top 5 Business Schools, President's Approval Ratings)	a. Chapter 1 Review exercises b. Intro to Statistics quiz (pg. 31) c. Putting it All Together: Real Statistics – Real Decisions (Pg. 32) (Quiz Day)  Stats Test.doc	a. Data Classification case study (ps. 15) b. Design an experiment – project (in groups), perform experiment

Literacy Connections:
The first chapter / unit, an introduction to statistics, will familiarize students to various statistical definitions that they will use throughout the course. In order to be literate in statistics, students must be able to distinguish between various characteristics and aspects of data.

Interdisciplinary Connections:
Understanding characteristics of data sets is useful not only in statistics, but also in science, other math classes, engineering, etc. Even medical, law, and business students will be exposed to various forms of data, which students will be able to understand and analyze through this course.

Technology Integration:
Random number generator: Excel, Minitab, Ti-84

Key Vocabulary: population, sample, statistic, parameter, qualitative, quantitative, descriptive, inferential, nominal, ordinal, interval, ratio, statistical study, survey, simulation, experiment, control, placebo, observational study, confounding, blind / double blind, randomization, blocks, replication, matched-pairs, stratified, cluster, systematic

Useful Sites:
http://www.100people.org/statistics_detailed_statistics.php
http://learningtogive.org/lessons/unit137/lesson3.html
http://www.gapminder.org/videos/the-joy-of-stats/ - video

Chapter 2: Lesson 2.1 – 2.6

Unit: Descriptive Statistics (Chapter 2)

Essential Questions:

1. Why is it important to organize and describe data?
2. How does one assess normality?
3. Why is the normal distribution essential to the study of statistics?
4. How does the normal distribution apply to the real world?

Learning Targets:

1. Create a frequency distribution
2. Construct and interpret histograms with a reasonable number of classes
3. Make a dotplot, stemplot, stem-and-leaf plot to display small sets of data (quantitative)
4. Create a pie chart, Pareto chart (qualitative data)
5. Create a scatter plot, time series chart (paired data)
6. Describe the overall pattern (shape, center, and spread) of a distribution and identify any major departures from the pattern (like outliers)
7. Identify the shape of a distribution as symmetric or skewed
8. Calculate and interpret measures of central tendency (mean, median, mode, weighted mean) in context
9. Calculate and interpret measures of position (***IQR***) in context
10. Identify outliers using the ***1.5 × IQR*** rule
11. Make a boxplot
12. Calculate and interpret measures of variation (variance, standard deviation)
13. Select appropriate measures of central tendency, position, variation
14. Use percentiles to locate individual values within distributions of data
15. Find and interpret the standardized value (*z*-score) of an observation
16. Use the ***68–95–99.7 Rule*** to estimate the percent of observations from a Normal Distribution that fall in an interval involving points one, two, or three standard deviations on either side of the mean

Objectives:

- Using various graphing models, SWBAT construct frequency distributions, as shown by correctly graphing and analyzing at least 4 out of 5 sets of data.
- Using various real-life data sets, SWBAT create Stem-and-Leaf / Scatter Plots, and Pie / Pareto Charts, as shown by correctly creating and analyzing at least 4 out of 5 sets of data.
- Using statistics data from the Census Bureau's American Community Survey, SWBAT collect, organize, and analyze data about the state where they live and compare their data with other states, as shown by completing a World Statistics Day activity.
- Using various data sets, SWBAT calculate the mean (and weighted mean) / median / mode of a population and sample, as shown by correctly analyzing at least 3 out of 4 data sets.
- Using histograms of real world data, SWBAT describe the shape of a distribution (symmetric, uniform, skewed), as shown by correctly creating a uniform, symmetric, and skewed data set.
- Using multiple real world data sets, SWBAT find the variance / standard deviation of a population and sample, as shown by correctly analyzing at least 4 out of 5 data sets.
- Using the Empirical Rule, SWBAT interpret standard deviation (estimating percent of observations that fall in a given interval), as shown by correctly creating and analyzing a normal distribution of data.
- Using data sets and box-and-whisker plots, SWBAT find quartiles and Interquartile Range, as shown by correctly labeling at least 3 / 4 data sets with first, second, and third quartile, as well as IQR.
- Using mean and standard deviation of a data set, SWBAT calculate and interpret standard score (z-score), as shown by analyzing z-scores of at least 2 / 3 data sets.

Assessments:

Formative:	Summative:	Authentic:
a. End-of-section classwork problems (Chapter 2) b. Picturing the World data exploration (Yellowstone Nat'l Park, Top Selling Video Games, Nat'l Association of Realtors, Nat'l Center for Health Statistics, Super Bowls) c. Mean vs. Median applet activity d. Uses and Abuses Discussion (prepare for discussion by completing exercise 1 for hw): pg. 113 e. Think-Pair-Share (choosing appropriate visuals for different data sets / desired information) f. 3-2-1 learning log (measures of variation section)	a. Descriptive Statistics Unit Test b. Putting it All Together (Unit Test Day) c. Descriptive Statistics Technology Activity (computer or graphing calculator – pg. 121)  Descriptive Stats Unit Test.doc	a. Earnings of Athletes Case Study (pg. 99) b. - Individual Project: find data set online, analyze using descriptive statistics (position, central tendency, variation)

Literacy Connections:
Math Literacy – In order to be literate in math, students must be able to represent information not only through equations and numbers, but also through visuals. Graphing is an important form of communication in statistics. Beyond simply collecting and organizing data, students will be literate through analyzing data (in this case, by using descriptive statistics).

Interdisciplinary Connections:
Analyzing data using descriptive statistics is important in many courses, such as other mathematics, sciences, engineering, etc. Once students are able to describe the data, they can begin to make informed decisions, which stretches beyond math classes, and is crucial in medicine, business, and everyday life.

Technology Integration:
Students will learn how to calculate measures of position, central tendency, and variation using multiple forms of technology, including Ti-84 calculator, Excel, and Minitab.
Applets:
http://www.stat.tamu.edu/~west/ph/stddev.html (standard deviation)
http://illuminations.nctm.org/LessonDetail.aspx?ID=L452 (central tendency)
Minitab:
http://www.minitab.com/uploadedFiles/MinitabHelp_DispStats_EN.pdf

Key Vocabulary:
Frequency, class width / limit, frequency distribution, midpoint, cumulative frequency, relative frequency, histogram, stem-and-leave plot, dot plot, pie chart, Pareto chart, scatter plot, central tendency, mean, median, mode, weighted mean, outlier, symmetric, uniform, skewed, range, deviation, variance, standard deviation, normal distribution, bell curve, quartile, interquartile range (IQR), box-and-whisker plot, standard score (z-score),

Useful Sites:
http://nationalatlas.gov/articles/mapping/a_statistics.html
http://serc.carleton.edu/sp/cause/conjecture/examples/18164.html
Data:
http://www.census.gov/main/www/access.html
http://www.cdc.gov/datastatistics/

Other Textbook:http://www.artofproblemsolving.com/LaTeX/Examples/statistics_firstfive.pdf

5 practices for Orchestrating Productive Mathematical Discussion

5 Practices for Orchestrating Productive Mathematics Discussions	
Practice	Description/ Questions
1. Anticipating	What strategies are students likely to use to approach or solve a challenging high-level mathematical task? How do you respond to the work that students are likely to produce? Which strategies from student work will be most useful in addressing the mathematical goals?
2. Monitoring	Paying attention to what and how students are thinking during the lesson. Students working in pairs or groups Listening to and making note of what students are discussing and the strategies they are using Asking students questions that will help them stay on track or help them think more deeply about the task. (Promote productive struggle)
3. Selecting	This is the process of deciding the *what* and the *who* to focus on during the discussion.
4. Sequencing	What order will the solutions be shared with the class?
5. Connecting	Asking the questions that will make the mathematics explicit and understandable. Focus must be on mathematical meaning and relationships; making links between mathematical ideas and representations.

Ideal Math Block

The following outline is the department approved ideal math block for grades 9-12.

1) Do Now (7-10 min)
    a. Serves as review from last class' or of prerequisite material
    b. Provides multiple entry points so that it is accessible by all students and quickly scaffolds up

2) Starter/Launch (5-10 min)
    a. Designed to introduce the lesson
    b. Uses concrete or pictorial examples
    c. Attempts to bridge the gap between grade level deficits and rigorous, on grade level content
    d. Provides multiple entry points so that it is accessible by all students and quickly scaffolds up

3) Mini-Lesson (15-20 min)
    a. Design varies based on content
    b. May include an investigative approach, direct instruction approach, whole class discussion led approach, etc.
    c. Includes CFU's
    d. Anticipates misconceptions and addresses common mistakes

4) Class Activity (25-30 min)
    a. Design varies based on content
    b. May include partner work, group work/project, experiments, investigations, game based activities, etc.

5) Independent Practice (7-10 min)
    a. Provides students an opportunity to work/think independently

6) Closure (5-10 min)
    a. Connects lesson/activities to big ideas
    b. Allows students to reflect and summarize what they have learned
    c. May occur after the activity or independent practice depending on the content and objective

7) DOL (5 min)
    a. Exit ticket

Ideal math block with Intervention Station

Whole Group Instruction	50 min	INSTRUCTION (Grades 9 – 12) Daily Routine: Mathematical Content or Language Routine Anchor Task: Anticipate, Monitor, Select, Sequence, Connect Collaborative Work* Guided Practice Independent Work (Demonstration of Student Thinking)	TOOLS Manipulatives RESOURCES Agile Mind	
Rotation Stations (Student Notebooks & Chromebooks Needed)	1-2X 35 min	STATION 1: Focus on current Grade Level Content STUDENT EXPLORATION* Independent or groups of 2-3 Emphasis on MP's 3, 6 (Reasoning and Precision) And MP's 1 & 4 (Problem Solving and Application) TOOLS/RESOURCES Agile Mind Math Journals	STATION 2: Focus on Student Needs TECH STATION Independent TOOLS/ RESOURCES Khan Academy Approved Digital Provider Fluency Practice	TEACHER STATION: Focus on Grade Level Content; heavily scaffolded to connect deficiencies TARGETED INSTRUCTION 4 – 5 Students TOOLS/ RESOURCES Agile Homework Manipulatives
	5 min	INSTRUCTION Exit Ticket (Demonstration of Student Thinking) TOOLS/RESOURCES Notebooks or Exit Ticket Slips		

ECR

Math Department ECR Protocol

ECR Protocol

(Extended Constructed Response)

Issuing

- Moving forward ECR'S will be disseminated by the first of each month and collected by the end of each month
- Method of Issuing: email and post on the website

Dissemination

- Teachers can elect to print copies for each student or use the Smartboard to project the ECR. (Note: Student work will be included in Student Portfolios)
- Students should be given up to 30 minutes depending on the complexity of the ECR
- Assure appropriate testing environment
- ECR should be completed independently

Scoring

- Conversion tables are available in the *Assessment & Data in Mathematics Bulletin* for genesis inputting purposes
- ECR's will count as Authentic Assessments
- Naming Protocol "Course Month ECR" (ex: Grade 6 October ECR)

Collection

- ECR's will be collected & kept in student portfolios
- Student work will be reviewed during CPT's

October ECR Link

https://www.dropbox.com/sh/1u8442j0c5enzah/AACUyak5wtNm5OO8z0InTCUJa?dl=0

November ECR Link

https://www.dropbox.com/sh/pwz2fqtga59m911/AAAUhMDJyiXPLBuXg3tPyczta?dl=0

ECR Conversion Chart

Points	Genesis Conversion	Points	Genesis Conversion	Points	Genesis Conversion
0	55	0	55	0	55
1	59	1	69	1	69
2	69	2	79	2	89
3	79	3	89	3	100
4	89	4	100		
5	100				