Statistics
Overview
2023-2024

This document is designed to provide parents/guardians/community an overview of the curriculum taught in the FBISD classroom. This document supports families in understanding the learning goals for the course, and how students will demonstrate what they know and are able to do. The overview offers suggestions or possibilities to reinforce learning at home.

Included at the end of this document, you will find:

- A glossary of curriculum components
- The content area instructional model
- Parent resources for this content area

To advance to a particular grading period, click on a link below.

At Home Connections

The following are suggestions for reinforcing number sense and mathematical reasoning at home. These ideas can be used throughout the school year. You will find additional ideas to reinforce learning at home within each unit below.

- Ask questions that require students to describe and elaborate on their thinking and reasoning. Topics can be about everyday things as well as mathematics.
- Engage students in situations that challenge them to inquire and persevere through questioning.
- Play card games with students
- Play games with students such as Mancala, Yahtzee, Blokus, Rack-O, Mastemind, etc.
- Work number puzzles such as Sudoku, KenKen, Kakuro, or Numbrix.

Process Standards

The process standards describe ways in which students are expected to engage in the content. The process standards weave the other knowledge and skills together so that students may be successful problem solvers and use knowledge learned efficiently and effectively in daily life.

S.1A Apply mathematics to problems arising in everyday life, society, and the workplace
S.1B Use a problem-solving model that incorporates analyzing given information, formulating a plan or strategy, determining a solution, justifying the solution, and evaluating the problem-solving process and the reasonableness of the solution
S.1C Select tools, including real objects, manipulatives, paper and pencil, and technology as appropriate, and techniques, including mental math, estimation, and number sense as appropriate, to solve problems
S.1D Communicate mathematical ideas, reasoning, and their implications using multiple representations, including symbols, diagrams, graphs, and language as appropriate
S.1E Create and use representations to organize, record, and communicate mathematical ideas
S.1F Analyze mathematical relationships to connect and communicate mathematical ideas
S.1G Display, explain, and justify mathematical ideas and arguments using precise mathematical language in written or oral communication

Grading Period 1

Unit 1: Analyzing One-Variable Data

Estimated Date Range: Aug. 9 – Sept. 1
Estimated Time Frame: 18 days

Unit Overview:
In this unit, students will extend their knowledge of statistical representations for categorical and quantitative data. Content covered will include representing and analyzing both categorical and quantitative data. Students will analyze the data in context of the situation using appropriate statistical language. Students will also compare multiple sets of data using statistical representations of the distributions.

At home connections:

- Have students collect categorical data and create percent bar graphs to represent the data. Ex: survey their friends and family of their favorite type of desert. Ask them questions and have them make predictions about the data.
- Have students collect numerical data and create a representation of the data using a dot plot, stem plot, histogram or box plot of the data. Ex: Survey their friends and family to determine how many they have of an object or their height. Ask them questions and have them make predictions about their data.

Concepts within Unit #1 Link to TEKS	Success Criteria for this concept
Establishing a Positive Mathematics TEKS: S.1A, S.1B, S.1C, S.1D, S.1E, S.1G, S.1G	• Demonstrate active listening skills while sharing in the community circle. • Make positive and supportive connections with my peers. • Engage in circle dialogues using the circle guidelines. • Share my math ideas and strategies when given a problem during the number sense routine. • Explain what a Respect Agreement is and why it is created. • Work in a group to solve a mathematical problem. • Describe strategies that I can use to solve math problems. • Provide feedback to my peers using guidelines and a protocol.
Concept #1: Displaying Categorical Data TEKS: S.4A, S.4B, S.4D, S.4F	• Determine if data is categorical or quantitative • Display categorical data using frequency tables, relative frequency tables, bar charts and relative frequency bar charts. • Explain how to determine marginal and joint frequencies using two-way tables • Describe the variability of a distribution of categorical data • Compare data sets using bar charts
Concept #2: Displaying Quantitative Data TEKS:S.4A, S.4B, S.4C, S.4D, S.4E	• Represent quantitative data using stem plots, dot plots, box plots and histograms • Describe the center, shape and spread of data distributions • Analyze data distributions in the context of the situation
Concept #3: Comparing Sets of Data TEKS: S.4B, S.4C, S.4E	• Create comparative data distributions using dot plots, stem plots, histograms, and box plots • Compare data sets in the context of the situation

Unit 2: The Normal Curve

Estimated Date Range: Sept. 5 – Sept. 21
Estimated Time Frame: 13 days

Unit Overview:
In this unit, students will continue their study of one-variable statistics. They will begin by using z-scores to standardize data in order to make comparisons among data with different means and standard deviations. Students then will be introduced to density

curves with a special focus on the Normal Curve. Students will first make predictions using the 68-95-99.7 Rule. Then students will use the normal models and z-scores to normalize data in order to make predictions. Students will use technology in order to determine percentiles and z-cores from data.

At home connections:

- Research and discuss real life applications of the normal curve.

Concepts within Unit # 2 Link to TEKS	**Success Criteria for this concept**
Concept #1: z-scores and the Normal Curve TEKS: S.3A, S.3B, S.3D	• Explain which variables are affected by scaling and rescaling. • Explain how data is standardized. • Use a density curve to solve a problem. • Define z-scores • Understand how z-scores standardize data • Use z-scores to standardized data
Concept #2: Utilizing the Normal Curve TEKS: S.3A, S.3B, S.3C, S.3D	• Understand the features of a normal model. • Explain and apply the 68-95-99.7 Rule. • Discuss how z-scores can be calculated. • Find normal percentiles using z-tables. • Find normal percentiles using technology • Solve problems using the normal curve. • Explain normality • Explain how to use the normal probability plot to determine normality

Unit 3: Analyzing Two-Variable Data

Estimated Date Range: Sept. 22– Oct. 6 and Oct. 11 – Oct. 18
Estimated Time Frame: 16 days (continued in Grading Period 2)

Unit Overview:

In this unit, students will extend their study of bivariate data and linear regression from previous courses including Algebra 1 and Algebra 2. Students will compare different methods and models for determining lines of best fit. Students will explore lines of best fit with and without technology.

At home connections:

- Have students determine a linear situation and then collect data, create a table, create a graph and make predictions.

Concepts within Unit # 3 Link to TEKS	**Success Criteria for this concept**
Concept #1: Scatterplots and Lines of Best Fit TEKS: S.7A, S.7B, S.7F	• Analyze data for linearity. • Create a scatterplot given a set of data. • Determine the line of best fit using regression with technology. • Determine the line of best fit by transforming the linear parent • Identify the slope and y-intercept of the line of best fit. • Determine the reasonableness of the slope and y-intercept of the line of best fit in the context of the situation.
Concept #2: Determining and Comparing Linear Models TEKS: S.7B, S.7C, S.7D, S.7F	• Analyze data for linearity. • Determine the line of best fit by transforming the linear parent • Determine the line of best fit by using regression. • Determine the line of best fit using median-median • Determine the line of best fit using absolute value • Compare different linear models for the same set of data

	• Explain how outliers affect the line of best fit. • Interpret the reasonableness of the slope and y-intercept of the line of best fit.
Concept #3: Analyzing Lines of Best Fit TEKS: S.7A, S.7E, S.7F	• Analyze data for linearity. • Determine the line of best fit by the most appropriate method. • Use the line of best fit to make predictions.

Grading Period 2

Unit 3: Analyzing Two-Variable Data (continued)

Estimated Date Range: Sept. 22– Oct. 6 and Oct. 11 – Oct. 18
Estimated Time Frame: 16 days (continued from Grading Period 1)
Note: For detail on this unit, see Grading Period 1

Unit 4: Study Design

Estimated Date Range: Oct. 19 – Nov. 18
Estimated Time Frame: 21 days

Unit Overview:

In this unit students will now address where the data that they have been analyzing comes from. The unit begins with the concept of randomness, focusing on using random numbers as a tool for being "fair" and investigating real-world situations. Simulations are encouraged during this unit. The unit then moves into discussing sample surveys. Both ideas of sampling error and bias are discussed here. Discussion about observational studies and experiments will close out the unit, with emphasis on controlled randomized experiments to establish cause-and-effect relationships.

At home connections:

- Research the use of sampling and surveys and their effectiveness, such as exit polls, phone surveys, etc.

Concepts within Unit # 4 Link to TEKS	Success Criteria for this concept
Concept #1: Sampling Methods TEKS: S.2A, S.2D, S.2G, S.3C	• Compare and apply different types of sampling • Explain the advantages and disadvantages to types of sampling • Explain why SRS is the standard for sampling • Explain the effect of bias on sampling • Determine the type of bias when given a description of a situation • Determine which type of sampling was used in the published report. • Explain if the type of sampling used is most appropriate for the situation • Determine any bias that was created as a result of the sampling method chosen.
Concept #2: Experiments and Observational Studies TEKS: S.2B, S.2C, S.2D, S.2E, S.2G	• Explain the difference between sample surveys, observational studies and randomized experiments • Explain the components of a well-designed experiment • Explain the principles of experimental design • Determine if the principles of statistical design are incorporated in the study • Determine if the correct statistics were applied to the finding • Explain if and what any adjustments need to be made to the experiment
Concept #3: Designing a Study TEKS: S.2E, S.2F	• Determine an appropriate statistical question. • Design an appropriate study • Collect data • Analyze data • Present my analysis and conclusions.

Unit 5: Probability

Estimated Date Range: Nov. 27 – Dec. 15
Estimated Time Frame: 15 days
Note: Includes 6 days for semester exams and review

Unit Overview:

In this unit students will review probability. Much of what is covered in this unit students have seen in middle school and Geometry. The fundamental idea of probability is formalized in this unit to help lay the foundation for understanding statistical inference. Students will revisit the ideas centered around complementary events, unions of disjoint events, and intersections of

independent events. The understanding of probability in this unit will help students answer the question of "how unusual must the observed results be in order to be considered statistically significant?" The use of Venn diagrams, two-way tables, and tree diagrams should be utilized to help students organize their thinking.

At home connections:

- Play games that involve probability and then figure out the theoretical probability and compare the experimental probability when you played the game. Ex: Rock, Paper, Scissors; Yahtzee, etc.

Concepts within Unit # 5 **Link to TEKS**	**Success Criteria for this concept**
Concept #1: Foundation to Probability TEKS: S.2B, S.5A	• Create a sample space using a list and tree diagram. • Organize information in a Venn diagram and a two-way table. • Find the probability of an event using a list, tree diagram, Venn diagram, and two-way table. • Determine theoretical probability of an event. • Use dice, cards, chips, etc. to determine experimental probability. • Compare the experimental and theoretical probability of an even. • Explain the law of large numbers
Concept #2: Probability Rules TEKS: S.5A	• Use probability rules to determine the probability of an event. • Find conditional probability using a Venn diagram or tree diagram. • Find conditional probability using a two-way table. • Make connections between visual models (Venn diagrams, Tree diagrams and Two-way tables) to the rule for conditional probability. • Use probability rules to determine conditional probability.

Grading Period 3

Unit 6: Random Variables and Distributions

Estimated Date Range: Jan. 4 – Jan. 26
Estimated Time Frame: 16 days

Unit Overview:
In this unit students will explore random variables with probability models. Students will explore the difference between discrete and continuous random variables utilizing mean and standard deviation for discrete random variables and mean and median for continuous random variables. The discussion of continuous random variables will set the stage for Normal Standard Distributions. Expected values and standard deviations are discussed. Students will be introduced to the Central Limit Theorem and its relation to sampling distributions.

At home connections:
- Research and discuss real world applications of probability distributions.

Concepts within Unit # 5 Link to TEKS	Success Criteria for this concept
Concept #1: Random Variables TEKS: S.5A, S.5B, S.5C	• Determine if a random variable is discrete or continuous. • Create a probability distribution for a given discrete • Use the probability distribution to solve problems. • Find the expected value and standard deviation of a probability distribution
Concept #2: Probability Models TEKS: S.5A, S.5C, S.5D	• Define the conditions for a Bernoulli Trial. • Define the properties of binomial experiment. • Solve binomial distribution problems with and without technology. • Define the properties of a geometric experiment. • Solve geometric distribution problems with and without technology.
Concept #3: Sampling Distributions TEKS: S.5C, S.5D	• Calculate sample sizes to satisfy the CLT • Calculate means and standard deviations with different sample sizes • Navigate the normal model to find probabilities of large samples

Unit 7: Inference and Confidence Intervals - Proportions

Estimated Date Range: Jan. 29 – Feb. 29
Estimated Time Frame: 22 days

Unit Overview:
In this unit, students will be introduced to statistical inference. This unit focusses on proportions. Students will create and interpret confidence intervals for proportions given statistical data. Students will also create and interpret 1-sample and 2-sample tests for proportions. By studying and interpreting statistical inference students become better consumers of information.

At home connections:
- Discuss and research statistical inference and examine studies that have been published.

Concepts within Unit # 6 Link to TEKS	Success Criteria for this concept
Concept #1: Confidence Intervals for Proportions TEKS: S.6A, S.6B, S.6D, S.6E	• Explain how a confidence interval is constructed using the sample statistics, confidence level and standard deviation of the sample statistic. • Explain how changes in the sample size, confidence level and standard deviation affect the margin of error. • Verify the assumptions of a problem prior to calculating the confidence interval. • Calculate a confidence interval using technology. • Interpret the meaning of a confidence interval in context of the situation.
Concept #2: Hypothesis Testing for One-Sample Proportions TEKS: S.6F, S.6G, S.6H, S.6I, S.6J	• Write null and alternative hypotheses for a given problem. • Verify the assumptions of a problem prior to calculating the p-value. • Calculate the p-value using technology. • Explain the relationship between the p-value and the significance level of a test. • Interpret the results of a hypotheses test in context of the situation. • State the Type I and Type II errors for a particular problem. • Describe the impact of the Type I and Type II errors for a problem in the context of the situation.
Concept #3: Hypothesis Testing for Difference Between Two Proportions TEKS: S.6F, S.6G, S.6H, S.6I	• Write null and alternative hypotheses for a given problem. • Verify the assumptions of a problem prior to calculating the p-value. • Calculate the p-value using technology. • Explain the relationship between the p-value and the significance level of a test. • Interpret the results of a hypotheses test in context of the situation.
Unit 8: Inference and Confidence Intervals - Means Estimated Date Range: Mar. 4 – Mar. 8 and Mar. 18 – April 15 Estimated Time Frame: 24 days (continued in Grading Period 4) Note: For details for this unit, see Grading Period 4	

Grading Period 4

Unit 8: Inference and Confidence Intervals – Means (continued)

Estimated Date Range: Mar. 4 – Mar. 8 and Mar. 18 – April 15
Estimated Time Frame: 24 days (continued from Grading Period 3)

Unit Overview:

In this unit, students will continue to apply statistical inference. This unit focusses on means. Students will create and interpret confidence intervals for means given statistical data. Students will also create and interpret 1-sample and 2-sample tests for means. By studying and interpreting statistical inference students become better consumers of information.

At home connections:

- Discuss and research statistical inference and examine studies that have been published.

Concepts within Unit # 7 Link to TEKS	Success Criteria for this concept
Concept #1: Confidence Intervals for Means TEKS: S.6A, S.6B, S.6C, S.6E	• Explain how a confidence interval is constructed using the sample statistics, confidence level and standard deviation of the sample statistic. • Explain how changes in the sample size, confidence level and standard deviation affect the margin of error. • Verify the assumptions of a problem prior to calculating the confidence interval. • Calculate a confidence interval using technology. • Interpret the meaning of a confidence interval in context of the situation.
Concept #2: Hypothesis Testing for One-Sample Means TEKS: S.6F, S.6G, S.6H, S.6I, S.6J	• Write null and alternative hypotheses for a given problem. • Verify the assumptions of a problem prior to calculating the p-value. • Calculate the p-value using technology. • Explain the relationship between the p-value and the significance level of a test. • Interpret the results of a hypotheses test in context of the situation.
Concept #3: Hypothesis Testing for Difference Between Two Means TEKS: S.6F, S.6G, S.6H, S.6I	• Write null and alternative hypotheses for a given problem. • Verify the assumptions of a problem prior to calculating the p-value. • Calculate the p-value using technology. • Explain the relationship between the p-value and the significance level of a test. • Interpret the results of a hypotheses test in context of the situation.

Unit 9: Statistical Studies

Estimated Date Range: April 16 – May 23
Estimated Time Frame: 28 days
Note: Includes 7 days for semester exams and review

Unit Overview:

In this unit, students will synthesize their understanding of statistics by designing, performing and analyzing a statistical study or experiment. Students will design the experiment, collect data, analyze the data, run the appropriate tests, and then present their study.

At home connections:

- Students will be applying their learning to design, perform and analyze a statistical study. Discuss their work with them.

Concepts within Unit # 7 **Link to TEKS**	**Success Criteria for this concept**
Concept #1: Design a Study TEKS: S.2B, S.2E	• Choose a topic to study • Write a statistical question • Determine what data I will collect • Determine how I will collect the data
Concept #2: Collect Data TEKS: S.2E	• Run an experiment or survey • Collect data • Organize and represent data
Concept #3: Analyze the Data and Interpret the Results TEKS: S.2E, S.3C, S.4B, S.4C, S.4E, S.6C, S.6D, S.6I	• Determine the appropriate statistical test • Write null and alternative hypotheses for my problem. • Verify the assumptions of a problem prior to calculating the p-value. • Calculate the p-value using technology. • Explain the relationship between the p-value and the significance level of a test. • Interpret the results of a hypotheses test in context of the situation.
Concept #4: Present Your Findings TEKS: S.2C, S.2E, S.2F	• Create a presentation to present my findings. • Present my finding to a statistical question

Glossary of Curriculum Components

Overview– The content in this document provides an overview of the pacing and concepts covered in a subject for the year.
TEKS – Texas Essential Knowledge and Skills (TEKS) are the state standards for what students should know and be able to do.
Unit Overview – The unit overview provides a brief description of the concepts covered in each unit.
Concept – A subtopic of the main topic of the unit.
Success Criteria—a description of what it looks like to be successful in this concept.

Parent Resources

The following resources provide parents with ideas to support students' understanding. For sites that are password protected, your child will receive log-in information through their campus.

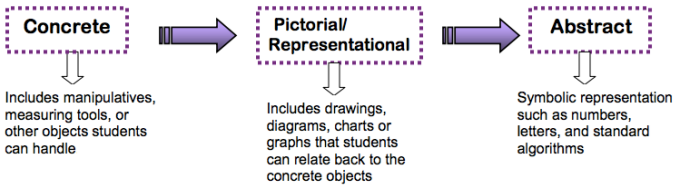
Resource	How it supports parent and students
Pearson – Stats: Modeling the World	This is the state adopted textbook for Statistics. Students will receive login information from their teacher.
Didax Virtual Manipulatives Math Learning Center Math Apps Polypad: Mathigon – Virtual Manipulatives	These online resources provide access to virtual manipulatives.
Parent Resources from youcubed.org	This resource from youcubed.org includes articles for parents on ways to support their students in learning and understanding mathematics.
Student Resources from youcubed.org	This resource from youcubed.org includes videos concerning growth mindset in mathematics.
Math: Why Doesn't Yours Look Like Mine?	This resource provides an explanation of why math looks different now as opposed to how parents learned mathematics and how to support students in learning mathematics.

Supplemental Resource and Tool Designation:

- The TI Nspire CX calculator is a standardized technology integration tool used for Mathematics and Science in FBISD.

Instructional Model

The structures, guidelines or model in which students engage in a particular content that ensures understanding of that content.



The instructional model for mathematics is the Concrete-Representational-Abstract Model (CRA).

The CRA model allows students to access mathematics content first through a concrete approach ("doing" stage) then representational ("seeing" stage) and then finally abstract ("symbolic" stage). The CRA model allows students to conceptually develop concepts so they have a deeper understanding of the mathematics and are able to apply and transfer their understanding across concepts and contents. The CRA model is implemented in grades K-12 in FBISD.