

Archdiocese of Chicago: Mathematics Curriculum Framework

State Goal 10: Collect, organize and analyze data using statistical methods; predict results; and interpret uncertainty using concepts of probability

Learning Standard/Outcome	Sample Assessment	Connections
<p><i>Critical for Mastery at Kindergarten:</i></p> <p>K.10.01 Organize, describe and label simple data displays such as pictographs, and tallies. (10A)</p> <p>K.10.02 Identify possible and impossible results of probability events using concrete materials (10C)</p>	<p>Have each student count the type of shoes that they are wearing. Display this information in a pictograph and/or using tallies. Make a pictograph for the monthly weather.</p> <p>Place several picture books on the table. Ask the students to choose a book from the table. Ask if this is possible. Ask the students to select a block from the table. Ask if this is possible. Name something that is possible. Name something that is impossible.</p>	<p>Connect to religion: Students may wish to make a graph of how many days they attend Mass in a given time period or how many times they pray.</p> <p>Connect to life: Pose a question such as “Will Christmas come this year?” (Possible) Pose a question such as “What is the probability that a cow will fly by the window?” (Impossible) Ask students to make up questions to ask each other demonstrating that an event is possible or impossible.</p> <p>Connect to language arts: Read <i>Mother Goose</i> and discuss whether the stories are possible.</p>

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<p><i>Critical for Mastery at Grade 1:</i></p> <p>01.10.01 Organize, describe, and label simple data displays such as pictographs, tallies, tables, and bar graphs (10A)</p> <p><i>Significant to Develop at Grade 1:</i></p> <p>01.10.02 Determine all possible outcomes of a given situation (10C)</p> <p>01.10.03 Compare numerical information derived from tables and graphs (10A)</p>	<p>Select an attribute such as birth month. Have the students stand in these groups. Represent these people groups on paper with pictographs, tallies, tables, bar graphs.</p> <p>Put several pairs of different colored socks in a bag. Show the students what you are putting in the bag. Ask the students if you could reach in the bag and pull out a mitten. Determine all the possible outcomes for this situation.</p> <p>Put a ball, two cubes and a hat in a bag. Discuss what can happen if you reach in the bag. Draw a picture of the outcomes.</p> <p>Create a bar graph of the birthdays of the students. Compare the number of birthdays in each month.</p>	<p>Connect to religion: Make a pictograph display of the animals Noah took on the Ark.</p> <p>Connect to science: Ask students if it is possible for certain objects to float or sink, then place the objects in water and let them see if their prediction was correct.</p> <p>Discuss certain scenarios to see if they are Possible or not, for example “Is it possible for a rabbit to swim?”</p>

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<p><i>Useful to Work on at Grade 1:</i></p> <p>01.10.04 Gather data to answer a simple question (10B)</p>	<p>Ask a question about an attribute such as, Who is wearing the color red today? Collect information and display the data.</p>	<p>Connect to reading: Discuss the attributes of a certain book and vote if the class wants the teacher to read that book during quiet time.</p>

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<p><i>Critical for Mastery at Grade 2:</i></p> <p>02.10.01 Organize and interpret simple data displays such as pictographs, tallies, tables, and bar graphs (10A)</p> <p>02.10.02 Communicate and display results of probability events in order to make predictions of future events. (10B)</p> <p><i>Significant to Develop at Grade 2:</i></p> <p>02.10.03 Identify and discuss likely, unlikely, and impossible probability events (10C)</p> <p><i>Useful to Work on at Grade 2:</i></p> <p>02.10.04 Gather data by creating and using interview questions (10B)</p> <p>02.10.05 Make predictions from simple data (10A)</p>	<p>Collect information on how many sisters and brothers each student has and make appropriate graphs to display the information.</p> <p>Look outside. Predict whether it will rain, snow or be sunny tomorrow and next week. What is likely and what is unlikely?</p> <p>Discuss what type of weather is likely, unlikely or impossible for the current season.</p> <p>Ask students questions such as, “Do you have a sister?” or “Do you have a pet?” Display the answers using an appropriate graph. Ask the students if they can predict whether the next person entering the room will have a sister or a pet based on the data collected from the class.</p>	<p>Connect to life: Predict whether your family will go to Church on Sunday or Saturday. Why is this likely or unlikely?</p> <p>Connect to geography: Discuss the likelihood of having snow in the Sahara Desert, or high temperatures in the Arctic.</p>

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<p><i>Critical for Mastery at Grade 3:</i></p> <p>03.10.01 Organize, describe and make predictions from existing data. (10A)</p> <p>03.10.02 Represent data using tables and graphs such as tallies and bar graphs. (10A)</p> <p>03.10.03 Describe the important features of a set of data displayed by a graph. (10A)</p> <p>03.10.04 Explain probability as a fractional part of a group to the whole group (e.g., A tossed coin can land on heads or tails; therefore, it should land on heads $\frac{1}{2}$ of the time). (10C)</p> <p><i>Significant to Develop at Grade 3:</i></p> <p>03.10.05 Make predictions based on the results received from a probability experiment. (10C)</p>	<p>Make a graph that shows how many students in class write with their right hand and how many write with their left hand. Use this information to predict how many students write with their left hand in the classroom across the hall. Represent this data using an appropriate graph. What is important about this information? (for outcomes 01, 02, 03)</p> <p>Display a spinner with 6 equal sections. Put one number in each section. Ask what the probability is of the spinner landing on a specific number. Change the number of sections in the spinner. Ask the questions again.</p> <p>Use a game like “Rock, Paper, Scissors”.</p> <p>Toss a die. How many times does it take to throw a six? Is this always true? Try this 10 times. Make a graph to show the results. What can you predict from using this graph?</p>	<p>Connect to religion: What is the probability that the sun will come up in the morning? How else does God take care of us? What can we count on in God’s world?</p> <p>Connect to making predictions in science experiments.</p>

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<p>03.10.06 Understand that the measure of the likelihood of an event can be represented by a number from zero to one inclusive. (10C)</p> <p>03.10.07 Determine the median of data on a graph. (10A)</p> <p><i>Useful to Work on at Grade 3:</i></p> <p>03.10.08 Create and administer a survey considering which questions will be asked and how the answers will be recorded. (10B)</p> <p>03.10.09 Propose a follow-up survey to investigate questions that arise from the initial survey. (10B)</p> <p>03.10.10 Describe events as likely or unlikely and discuss the degree of likelihood using such words as certain, equally likely, and impossible. (10C)</p>	<p>Name an event that will always happen, that will never happen and that may happen (half the time, one fourth of the time, etc.). Give each event a number.</p> <p>Make graph that displays the scores from each student's spelling test. (Do not use students' names.) Find the median.</p> <p>Develop a survey based on questions proposed by the students. Administer the survey and record the results on a graph. Analyze what the graph means, and what predictions can be made from the data.</p> <p>Develop questions that will follow up on the initial survey described above.</p> <p>Describe the data using words such as likely, unlikely, etc.</p>	<p>Connect to religion: God always loves us; He never abandons us.</p> <p>Connect to science: Find the median temperature given the data for one week.</p> <p>Connect to language arts: Present an oral report to share results with the class.</p>

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03.10.11 Create and perform a probability experiment and record the results. (10C)	Have the students play Tic Tac Toe with three different partners. Keep track of the winner and display the results. Predict what would happen with the next partner.	

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<p><i>Critical for Mastery at Grade 4:</i></p> <p>04.10.01 List all possible outcomes of a single event and tell whether an outcome is certain, impossible, likely, or unlikely. (10C)</p> <p>04.10.02 Describe the probability of an event using terminology such as “5 chances out of 8”. (10C)</p> <p>04.10.03 Represent data using tables and graphs such as line plots and line graphs. (10A)</p> <p>04.10.04 Arrange given data in order, least to greatest or greatest to least, and determine minimum value, maximum value, range, mode and median for an odd number of data points. (10A)</p> <p>04.10.05 Compare different representations of the same data and evaluate how well each representation shows important aspects of the data. (10A)</p>	<p>If there are two types of ice cream cones and four flavors of ice cream, list all the possible outcomes. Determine the probability of a customer choosing a specific flavor of ice cream.</p> <p>There are 8 girls and 10 boys in a class. Ask what the chances are that a girl will arrive first to class tomorrow.</p> <p>Plot the favorite flavor of ice cream for all students in the class.</p> <p>Without using student names, obtain a class set of test scores for a spelling or math test; arrange the data in order and determine the minimum value, maximum value, range, mode, median.</p> <p>Determine each student’s favorite class. Display this data in at least two different graphs. Explain which graph is a better representation.</p>	<p>Look at the prizes in a given brand of cereal. What information do you need to predict what is the probability that you can obtain all the different prizes</p> <p>Look at a vending machine that uses a crane to pick up toys and put them down the shoot. Predict which toy will be chosen. Predict if you will win or not and/or how many tries it will take to win a prize.</p> <p>Connect to social studies: Discuss which types of graphs are most appropriate to evaluate/interpret given data.</p>

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<p><i>Significant to Develop at Grade 4:</i></p> <p>04.10.06 Describe the shape and important features of a set of data and compare related data sets. (10A)</p> <p>04.10.07 Propose and justify conclusions and predictions that are based on data. (10A)</p> <p><i>Useful to Work on at Grade 4:</i></p> <p>04.10.08 Collect data using observations and experiments. (10B)</p> <p>04.10.09 Propose a further investigation to verify or refute a prediction. (10B)</p>	<p>Find a graph in the newspaper and tell what it means.</p> <p>Look at standings for your favorite team and its competitors. Predict the winner of the next four competitions. Justify the answer.</p> <p>Observe the colors of cars in the parking lot. Predict the color of the next car to enter the lot. Develop other predictions using this data.</p> <p>Change one variable and predict how this might alter the investigation.</p>	

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<p><i>Critical for Mastery at Grade 5:</i></p>		
<p>05.10.01 List all possible outcomes of compound, independent events (e.g., toss a coin and spin a spinner). (10C)</p>	<p>Label three blue marbles #1, #2, #3 and two orange marbles #1, #2. Put all the marbles in a bag. List all the possible outcomes for drawing two marbles without replacing any marbles.</p>	<p>Connect to life: Predict the outcome of a baseball, basketball or soccer game. How is this different from drawing marbles from a bag?</p>
<p>05.10.02 Assign a value of zero to probabilities that are impossible and a value of one to probabilities that are certain (10C)</p>	<p>Using the bag of marbles described above, determine the probability of drawing one orange and one blue, one green, one marble, two orange, etc.</p>	
<p>05.10.03 Express simple probabilities as a fraction between zero and one. (10C)</p>	<p>Express the probabilities from the bag of marbles (described above) as fractions.</p>	
<p><i>Significant to Develop at Grade 5:</i></p>		
<p>05.10.04 Predict the probability of outcomes of simple experiments and test the predictions. (10C)</p>	<p>Design simple experiments such as tossing dice, flipping coins, and or drawing a card from a deck. Predict the outcomes. Determine if the predictions are accurate.</p>	<p>Connect to science: Use in conjunction with genetics (e.g., eye color).</p>
<p>05.10.05 Represent given data using double bar graphs, double line graphs, and stem and leaf plots with</p>	<p>Gather data on two sets of test scores. Display the information using double bar graphs, double line</p>	<p>Connect to life: Collect batting averages from two teams and display them with</p>

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and without technology. (10A) 05.10.06 Read, interpret, infer, predict, draw conclusions, and evaluate data from any graph. (10A)	graphs and back-to-back stem and leaf plots. Find a graph in a newspaper that is misleading or wrong. Explain.	an appropriate graph. Connect to values: Discuss why a graph may be designed to intentionally mislead the viewer or reader.

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<p><i>Critical for Mastery at Grade 6:</i></p> <p>6.10.01 Represent given data using double bar graphs, double line graphs, and stem and leaf plots with and without technology (10A)</p> <p>6.10.02 Read, interpret, infer, predict, draw conclusions and evaluate data from any graph (10A)</p> <p>6.10.03 Determine mean, median, mode, minimum value, maximum value, and range, and discuss what each does to help interpret a given set of data (10A)</p>	<p>Represent data from science or social studies texts in various graphs. Draw conclusions and explain what the graphs mean.</p> <p>Collect population figures from two countries over a period of 5 years. Draw the graph. Explain.</p> <p>Have students measure and record the outside temperatures at the same time each day for 2 weeks. Determine if there is an outlier and find the mean, median, and mode. Write a paragraph explaining which value best identifies the data.</p> <p>Go bowling and calculate bowling averages.</p>	<p>Look at the average income for families in the US and Mexico. Draw appropriate graphs to display the data. Explain what the graphs mean.</p> <p>Connect to technology: Use a spreadsheet to find the mean and median of a set of data.</p>

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<p><i>Significant to Develop at Grade 6:</i></p> <p>6.10.04 Select an appropriate graph format to display given data (10A)</p> <p><i>Useful to work on at Grade 6:</i></p> <p>6.10.05 Design investigations to address a question and consider how data-collection methods affect the nature of a data set. (10B)</p>	<p>Choose an appropriate display to show the number of students in the class who are boys, who are girls and who are in band and/or choir.</p> <p>Develop a question such as “How much sugar is in your favorite cereal?” or “What is your favorite sports drink?” or “What is your favorite candy?” Survey the students in your class on these questions and collect the answers. Graph the data. Explain why this data set would not produce accurate predictions for the world’s population.</p>	<p>Find the number of different major Religions in the United States, France, England and Egypt. Display this information on an appropriate graph and draw conclusions.</p> <p>Connect to other subjects: Given various data, students select an appropriate graph to represent the data. Share graphs and reasons for choosing them with class.</p> <p>Connect to technology: Create graphs on the computer to display data.</p>

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<p>6.10.06 Propose and justify conclusions and predictions that are based on data, and design studies to further investigate the conclusions of predictions. (10B)</p>	<p>Analyze the data from the survey in 6.10.05. Explain. Use the data to make predictions about the answers to the questions if all the students in the school were asked. What predictions could you make about the teacher's answers to these questions?</p> <p>Expand on conclusions, predictions, etc. from the data gathered above. What is the effect of adding new populations? New questions?</p>	

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<p><i>Critical to Mastery at Grade 7:</i></p> <p>7.10.01 Construct, read, interpret, infer, predict, draw conclusions, and evaluate data from various displays, including circle graphs. (10A)</p> <p>7.10.02 Recognize and explain misleading displays of data due to inappropriate intervals on a scale. (10A)</p>	<p>Collect data appropriate to construct a circle graph. From the graph, read, interpret, predict and evaluate the data.</p> <p>Find a graph in the newspaper that is misleading or incorrect. Explain.</p>	<p>Computer connection: Put results onto the computer and print. Glue results onto a poster board for an oral presentation.</p> <p>Kinesthetic learning: Make a human circle graph. Have each student choose their favorite basketball team in the final four of the NCAA Tournament. Have the students whochoose the same team stand together in groups. Form a circle for the outside boundary. Cut lengths of yarn that will reach from the center of the circle to the outside of the circle. Tape one end of the string in the center. Position the other end of the string to mark the division between the groups of students. What does this pie chart mean? Can you assign numerical values to the groups?</p>

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<p>7.10.03 Record probabilities as fractions, decimals, or percents. (10C)</p> <p>7.10.04 Demonstrate that the sum of all probabilities equals one. (10C)</p> <p>7.10.05 Determine empirical probabilities from a set of data provided. (10C)</p>	<p>Develop a pie graph of the number of hours spent on various activities during the day for each student. Using the pie graph, determine different probabilities such as, “what is the probability that someone spends time watching TV?” Write these responses as fractions, decimals, and percents.</p> <p>Using the same pie graph as above, or a new one, determine the probabilities of each section of the pie graph. Have students add all these probabilities together.</p> <p>Survey the class and collect data to one question asked. Keep track of responses. Create 2 types of graphs (bar, circle, line, etc.) Use technology to illustrate conclusions.</p>	

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<p>7.10.06 Set up a simulation to model the probability of a single event. (10C)</p> <p>7.10.07 List outcomes by a variety of methods (e.g., tree diagram). (10C)</p> <p>7.10.08 Make and test conjectures about the results of experiments and simulations using proportionality and basic understanding of probability. (10C)</p>	<p>Give each student 6 pieces of string of the same length. Work in partners. One partner should hold all the pieces of string in one hand in about the middle of the length of string, the other partner should tie two ends together and two ends together and two ends together so as to form 3 knots at the top and 3 knots at the bottom. What is the probability that when the student lets go of the string the string will be in one large circle? Three small circles? Two circles? List all the possibilities and determine probabilities for each possibility.</p> <p>Use several methods to list the possible outcomes for different sandwiches if one item from each category must be chosen. The categories could be bread (white, rye, wheat); filling (ham, turkey, peanut butter and jelly) and condiments (ketchup, mustard, mayonnaise).</p> <p>Using a six-sided die and a 52 card deck of cards, design a simulation for tossing a six on the die and drawing a club from the deck of cards.</p>	<p>Connect to the lottery game. Are the odds good? Why would people play?</p>

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<p><i>Significant to Develop at Grade 7:</i></p> <p>7.10.09 Determine theoretical probabilities of simple events. (10C)</p> <p><i>Useful to work on at Grade 7:</i></p> <p>7.10.10 Discuss the effect of sample size on the empirical probability compared to the theoretical probability. (10C)</p> <p>7.10.11 Gather data by conducting simple simulations. (10B)</p> <p>7.10.12 Collect data over time with or without technology. (10B)</p>	<p>Determine the probability of a student selecting a sandwich with turkey using the data from the assessment above.</p> <p>Take a single die. Predict, theoretically, how many times a “one” should appear on the die if you roll the die 60 times. Record your outcomes for the 60 rolls of the die. How was does this empirical probability compare to the theoretical probability? What happens as you roll the die 100 or 1,000 times?</p> <p>Set up a simulation and gather the data to draw conclusions and make predictions.</p> <p>Record how fast a cup of coffee cools. Draw the graph. What does it mean? Use the TI-83 CBL to record the information.</p>	<p>Connect to weather predictions. Meteorologists have to study patterns in order to make predictions.</p> <p>Create fair games using math concepts.</p> <p>Connect to life: Design a survey asking students about spending habits. Create survey sheets to record data; display results on an appropriate graph.</p>

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<p><i>Critical for Mastery at Grade 8:</i></p> <p>8.10.01 Construct, read, interpret, infer, predict, draw conclusions, and evaluate data from various displays, including box and whiskers plots. (10A)</p> <p>8.10.02 Compute probabilities for simple compound events using methods such as organized lists and tree diagrams. (10C)</p> <p>8.10.03 Discuss odds versus probability. (10C)</p>	<p>Gather data represented in graphs from the internet, magazines or textbooks. Analyze the graph for measures of central tendencies. Determine the appropriate scale. Display the data in a different graph. Explain the meaning of the information.</p> <p>Design a course schedule for high school freshman year. Compute the probability that you will have at least one of your classmates in each of your classes.</p> <p>Predict the winner of an event such as the events of a track meet, spelling bee, etc. and explain why or why not the answer is reasonable. Discuss the odds of winning versus the probability of winning.</p>	<p>Connect to current events: Look for tables, charts, graphs, etc. in the newspaper and interpret their meaning.</p>

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<p><i>Significant to Develop at Grade 8:</i></p> <p>8.10.04 Find, use, and interpret measures of center and spread, including inter-quartile range. (10A)</p> <p><i>Useful to Work on at Grade 8:</i></p> <p>8.10.05 Select and use appropriate data gathering techniques. (10B)</p> <p>8.10.06 Formulate new questions using conjectures, and plan new studies to answer them. (10B)</p>	<p>Gather a set of data from the class, for example determine heart beats per minute of each student. Have each student write his/her result on a note card. Have students tape their cards to the board in order from smallest to biggest. Calculate the measures of spread and the inter-quartile range. Discuss the results.</p> <p>Design a question or survey. Conduct the survey. What do the results mean? What new questions does the information lead to? Display this information.</p> <p>Working in teams, have students come up with their own questions regarding some topic applicable to the students. (For example, “Does our class do better on tests when we review at home or in class?”) Have the teams determine a method to answer the question and have them try out their method.</p>	<p>Connect to history: Look at data sets from different time periods (for example, population or income) and compare the measures of spread and the inter-quartile ranges.</p>

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<p>8.10.07 Construct an equivalent data representation given data in a different form. (10A)</p> <p>8.10.08 Recognize potential bias in data collection methods or data presentation. (10A)</p>	<p>Represent the results of a survey in several different graphs.</p> <p>Describe how the above survey may be biased. Describe how the results may be displayed in a misleading manner.</p> <p>Bring in different forms of media, for example, a daily newspaper, a women’s magazine, a men’s magazine, a news journal, a sport’s magazine, etc. Give one form to each group of students. Have students gather and analyze similar data from the various media forms. Have them determine the potential bias in the collection of data and in its presentation.</p>	<p>Connect to religion: Discuss other forms of media that encourage students to accept or choose certain styles, behaviors and even values. (For example, TV and movies)</p>

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<p><i>Critical for Mastery at Grade 9:</i></p> <p>09.10.01 Construct, read, interpret, infer, predict, draw conclusions, and evaluate data from various displays, including histograms and scatter plots. (10A)</p> <p>09.10.02 Analyze graphical displays of data for possible misleading characteristics. (10A)</p> <p>09.10.03 Determine the best measure of central tendency from mean, median, or mode. (10A)</p> <p>09.10.04 Solve problems of chance using the principles of probability including conditional settings. (10C)</p> <p>09.10.05</p>	<p>Obtain a set of test scores for a class. Display the scores by creating a list, a stem and leaf plot, a scatterplot, and a box plot.</p> <p>Have each student bring in a data display from a magazine or book. Analyze the data and make predictions. Look at the graphs for errors in scale, display or interpretation.</p> <p>Use ACT scores from the last few years to find mean, median, mode. Compare and contrast the information communicated by each measure and draw some conclusions.</p> <p>There are two Algebra classes at your high school. Ms. T's class has 12 girls and 8 boys, while Mr. B's class has 10 girls and 15 boys. If an Algebra student chosen at random happens to be a girl, what is the probability that she is from Ms. T's class?</p>	<p>Look at a school's budget (available on the web) and determine how to represent the information to show what portion of the budget is used for instruction.</p> <p>Connect to values: How do we ethically represent data?</p> <p>Connect to life: How is data displayed to influence decision making? Give examples.</p>

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<p>Determine probabilities using simple counting techniques. (10C)</p> <p><i>Significant to Develop at Grade 9:</i></p> <p>09.10.06 Describe and explain complementary and mutually exclusive events using appropriate terminology.</p> <p>09.10.07 Discuss the difference in empirical and theoretical probability. (10C)</p> <p>09.10.08 Compute probabilities for simple compound events using a variety of methods, including area models. (10C)</p> <p>09.10.09 Identify situations where dependent and independent events occur. (10C)</p>	<p>Determine the probability of rolling a total of 5 on a pair of dice. Use a tree diagram to organize the sample space and count the outcomes.</p> <p>Collect data on the height of the male adults in the school. What can you determine from this information? [mutually exclusive]</p> <p>Have a bag of different colored socks. Talk about the probability of drawing two socks of the same color in two consecutive draws with and without replacement of the sock.</p> <p>Flip a coin 12 times. Do you have exactly 6 heads and 6 tails each round. Why?</p> <p>Obtain a bag of 6 marbles of different colors and have a set of two or more dice; develop the sample set for all the possible outcomes and then determine given probabilities.</p> <p>Classify the assigning of schedules to students as dependent and which are independent</p>	<p>Connect to life: Create a schedule for a job. Identify which events are dependent</p>

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<p>09.10.10 Make conjectures about the possible correlation between two characteristics of a sample on the basis of scatter plots of the data and approximate lines of fit. (10A)</p> <p><i>Useful to work on at Grade 9:</i></p> <p>09.10.11 Discuss how data can be manipulated to represent different points of view based on the use of different measures of central tendency and based on different graphical displays. (10A)</p> <p>09.10.12 Discuss biased reporting of data and questions that should be asked when data is viewed. (10A)</p>	<p>Gather data on the number of hours of sleep that a student gets per night and the student’s score on a chapter test. Is there any correlation?</p> <p>Bring in several examples of the same data set displayed in several different ways. Which display is the truest to the data set? Discuss the meaning conveyed by each display.</p> <p>Look at the “Numbers” column in Time magazine. Is the data biased? How was it collected?</p>	<p>and which are independent.</p> <p>Connect to values: Discuss the ethics of data reporting.</p>

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<p><i>Significant to Develop at Grade 10:</i></p> <p>10.10.01 Determine geometric probability based on area. (10C)</p> <p><i>Useful to Work On at Grade 10:</i></p> <p>10.10.02 Discuss situations where permutations and combinations should be used in counting outcomes. (10C)</p>	<p>Calculate the probability for regional area.</p> <p>Look at the number of ways points can divide lines. Look at the number of ways lines can divide the plane. Look at the most number of regions that can be determined from the least number of lines. What can you predict from these outcomes?</p>	<p>Connect to values: Discuss how statistics can be used to persuade people to make decisions that are counter to Christian beliefs and values.</p>

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<p><i>Useful to Work on at Grade 11:</i></p> <p>11.10.01 Analyze two-variable data for linear or quadratic fit. (10A)</p> <p>11.10.02 Make decisions based on data, including the relationships of correlation and causation.(10A)</p> <p>11.10.03 Develop an understanding of permutations and combinations as counting techniques. (10C)</p> <p>11.10.04 Describe the concepts of conditional probability. (10C)</p>	<p>Collect data on average family incomes from 1965 – 2000. Compute appropriate statistics to determine if the gap between wealthy families and poor families increased, decreased or remained constant.</p> <p>Collect data on tuition over the past ten years. What predictions can you make from this information? What is the appropriate way to display the information?</p> <p>Determine the probability of winning various games of chance or the different Illinois Lottery games.</p> <p>Read about studies designed to test new drugs and determine if the study was biased. Explain the role of conditional probability in these studies.</p>	<p>Connect to values: What implications does this information have for issues involving social justice?</p> <p>Connect to religion: How do we use statistics ethically in our world? What is important to know about any given set of statistics in order to use them ethically? How can statistics help us to make the world a better place?</p>

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<p>11.10.05 Evaluate published reports that are based on data by examining the design of the study, the appropriateness of the data analysis, and the validity of conclusions. (10A)</p> <p>11.10.06 Describe the characteristics of well-designed studies, including the role of randomization in surveys and experiments. (10B)</p> <p>11.10.07 Discuss informally different populations and sampling techniques. (10B)</p> <p>11.10.08 Decide if a survey was “successful” in gathering intended data and justify the decision.(10B)</p>	<p>Gather reports including significant data sets and evaluate the report. (Annual reports from major companies or universities, etc.)</p> <p>Develop an appropriate question to ask students; construct survey incorporating the characteristics of well-designed studies; administer the survey and evaluate the results. (A good place to gather information is the school cafeteria or an athletic event.)</p> <p>Determine if the above study was well designed or if there could be improvements. Give reasons.</p> <p>Using the “Numbers Column” of <i>Time</i> magazine, discuss where the numbers could have come from and what they mean.</p>	

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<p><i>Critical For Mastery at Grade 12:</i></p> <p>12.10.01 Describe the differences among various kinds of studies and which types of inferences can legitimately be drawn from each other (10A)</p> <p>12.10.02 Describe how sample statistics reflect the values of population parameters and use sampling distributions as the basis for informal inference.(10A)</p> <p>12.10.03 Determine the theoretical probability for a chance event using the binomial probability model. (10C)</p> <p>12.10.04</p>	<p>Gather various data displays from newspapers, textbooks, and magazines and interpret the graphs and charts. From the data displays gathered determine which displays are inappropriate or misleading and how they could be improved.</p> <p>Survey the students in your class with a question such as “What do you eat for lunch?” Collect the results. What conclusions can you draw from this sample? How is the population skewed? What would be a better population to use to predict the lunch menu for a restaurant in the shopping mall?</p> <p>Given a data set such as the number of teams in the NCAA, compute appropriate probabilities such as: What is the probability that a team that has a name that starts with a vowel will win the championship game?</p>	<p>Connect to life: Gather statistics on the graduates of college in terms of salaries. What inferences can be drawn about societal values?</p> <p>Connect to religion: Gather data related to studies involving tests on new drugs or medical procedures and discuss how ethical the studies based on Catholic beliefs, traditions and morals.</p>

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<p>Identify patterns from a sample space. (10C) Describe the meaning of measurement data and categorical data, of univariate and bivariate data, and of the term variable.</p> <p>12.10.05 Present results and conclusions from given data using basic statistics (e.g., measures of central tendencies, standard deviation).</p> <p>12.10.06 Display a scatter plot, describe its shape and determine regression coefficients, regression equations and correlation coefficients for bivariate measurement data using technological tools.</p> <p>12.10.07 Formulate a question, design a study to answer the</p>	<p>Gladys has a personal rule never to enter the lottery (picking 6 numbers between 1 and 49) until the payoff reaches 4 million dollars. When it does reach 4 million, she always buys ten different \$1 tickets. What are the probability distributions for Gladys’s possible payoffs? Show the sample space and identify any patterns that appear</p> <p>Look at test data from a recent unit test from a science class or another discipline and display and analyze the data appropriately.</p> <p>Find data on grade point averages from several surrounding schools and make predictions about the school.</p> <p>Collect data on average family incomes from 1965 – 2000. (Or the number of shopping centers built in this time period, or the rise in cost of tuition, etc.). Compute appropriate statistics to determine if the gap between wealthy families and poor families increased, decreased or remained constant. Describe the line of best fit or the regression line. Explore similar questions about other graphs that have been created using other data.</p> <p>Formulate a question regarding generating</p>	<p>Connect to technology: Use the TI 83 calculator to compute the statistics.</p> <p>Connect to values: Gather data on</p>

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<p>question, and collect data. (10B)</p> <p>12.10.08 Analyze potential methods of collecting information and decide which methods would produce the most reliable and accurate data. (10B)</p> <p>12.10.09 Analyze instruments used for surveys for errors and bias. (10B)</p> <p>12.10.10 Design and conduct experiments or simulations for probability, including the possible use of technology to simulate events. (10C)</p> <p><i>Significant to Develop at Grade 12:</i></p> <p>12.10.11</p>	<p>fractals. Collect information regarding the question, display the data, and analyze.</p> <p>Gather data about the population in the school using a variety of methods. Evaluate the data and explain the reliability of data collection methods..</p> <p>Look at experiments performed in science class or surveys from magazines, and determine whether there are errors or biases in the collection, interpretation, or presentation of the data.</p> <p>Set up a simulation to model the following problem. Determine the best answer based on probability. Problem: Jo drives a minibus in her town. The bus has eight seats. People buy tickets in advance, but, on average, 10% of those who buy tickets do not show up. So Jo sells 10 tickets for each trip. Sometimes more than eight people show up with tickets. Estimate the probability that this will happen. What should Jo do?</p>	<p>missionaries in foreign countries and their affect on the populations that they serve.</p>

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<p>Design a statistical experiment to answer a question about a realistic situation, conduct the experiment, use statistics to interpret the data, and communicate the results, individually and as members of a team. (10B)</p> <p>12.10.12 Explore the variability of a sample statistics from a known population and construct sampling distributions using simulations. (10B)</p> <p>12.10.13 Carry out a simulation to estimate probabilities, and if possible, compare it to the theoretical probability.</p> <p><i>Useful to Work On at Grade 12:</i></p> <p>12.10.14 Interpolate, extrapolate, and make predictions</p>	<p>Design an experiment to model a situation such as: You are going camping. You need to pack as efficiently as possible. You will be gone for three weeks. You know that where you are going. There is a 30% chance of rain each day. You also know that it takes 2 consecutive dry days to dry a pair of jeans. How many pairs of jeans should you take? Be able to display your answer and explain your conclusions to the class.</p> <p>Look at the grade point average of this year's basketball team. Look at the grade point average of the teams over the past 10 years. What conclusions can you draw?</p> <p>Devote class time to presentations given by students that show the results of a student designed and administered topic/survey. The survey should meet the expectations/requirements set forth in advance.</p> <p>Use the presentation described above to make</p>	

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<p>from given information. (10A)</p> <p>12.10.15 Evaluate survey results for conformity to simple distributions. (10A)</p> <p>12.10.16 Create a survey from a critical question and decide which sampling technique to use for the survey. (10B)</p>	<p>predictions.</p> <p>Suppose that this newspaper report is correct: 40% of the American public believe school children have too many rights and privileges. If you have a random sample of 20 Americans, then make the following estimates: Estimate the probability that exactly 8 people will believe school children have too many rights and privileges. Estimate the probability that 6 or fewer people believe it. Estimate the probability that the sample proportion believing the statement will be from .30 to .50, inclusive. Estimate the probability that all 20 Americans will believe the statement. Can you think of another situation where you could develop a sampling distribution with the same characteristics?</p> <p>Look at survey results obtained from a data set (from a magazine or off the web) and analyze what the data means.</p> <p>Develop a question appropriate for gathering data and design a survey such based on that question. For example, What is the value of Catholic education? What should be the core requirements</p>	

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<p>12.10.17 Evaluate surveys for clarity, bias, return rate, and specialized audiences. (10B)</p>	<p>for graduation? Administer the survey at a school function that includes parents, relatives, and students. Analyze the results applying the appropriate methods; display and communicate the results. Display the information in a chart.</p>	<p>Connect to technology: Use computers to analyze the results and to create appropriate displays.</p>