

Data Analysis and Probability Standard

Students pose questions and collect, organize, represent, interpret and analyze data to answer those questions. Students develop and evaluate inferences, predictions and arguments that are based on data.

| | Grade K Indicators | Grade 1 |
|--|---|--|
| | <p>1. Collect and sort <u>data</u> about everyday situations and familiar objects; e.g., data collected from simple <u>surveys</u> (favorite colors, cookies, holidays, holidays), and data collected over a period of time (daily weather).</p> <p>2. Represent data in a floor or table graph using objects and pictures; e.g., <u>bar graphs</u> and <u>picture graphs</u>.</p> <p>3. <u>Sort</u> and <u>classify</u> objects by <u>attributes</u> such as size, color or shape and organize data into categories in a simple table or chart.</p> <p>4. Read and interpret information on charts and graphs; e.g., select categories that have the <u>most</u> or <u>fewest</u> objects, identify <u>main idea</u>, draw conclusions and make predictions.</p> <p>5. Read <u>time lines</u> to displaying a <u>sequence</u> of events.</p> <p>6. Discuss the probability of events related to students' experiences as <u>likely</u> or <u>unlikely</u>; e.g., sledding during the month of July, swimming during the month of July.</p> | <p>1. Collect data about everyday situations and familiar objects and organize into <u>tables</u> and <u>charts</u> using <u>tally marks</u>; e.g., data collected from <u>surveys</u> (favorite pets, favorite foods) and data collected over a period of time.</p> <p>2. Identify <u>multiple categories</u> for sorting objects and data.</p> <p>3. Display collected data in <u>bar graphs</u> and <u>picture graphs</u> with intervals of 1.</p> <p>4. Read and interpret information on <u>charts</u> and <u>graphs</u>; e.g. answer questions about the number of objects represented in a <u>picture graph</u>, <u>bar graph</u> or <u>table</u>; how many more in a category compared to another, or how many altogether in two categories.</p> <p>5. Construct a question that can be answered by using information from a graph.</p> <p>6. Read and use <u>time lines</u> to display a <u>sequence</u> of events.</p> <p>7. Discuss and describe the likelihood of simple events as <u>possible/impossible</u> and <u>more likely/less likely</u>; e.g., when using spinners or number cubes in classroom activities.</p> |

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| Grade K Indicators | Grade 1 Indicators | Grade 2 Indicators |
|---|--|---|
| <p>1. Collect and sort <u>data</u> about everyday situations and familiar objects; e.g., data collected from simple <u>surveys</u> (favorite colors, cookies, holidays, holidays), and data collected over a period of time (daily weather).</p> <p>2. Represent data in a floor or table graph using objects and pictures; e.g., <u>bar graphs</u> and <u>picture graphs</u>.</p> <p>3. <u>Sort</u> and <u>classify</u> objects by <u>attributes</u> such as size, color or shape and organize data into categories in a simple table or chart.</p> <p>4. Read and interpret information on charts and graphs; e.g., select categories that have the <u>most</u> or <u>fewest</u> objects, identify <u>main idea</u>, draw conclusions and make predictions.</p> <p>6. Read <u>time lines</u> to displaying a <u>sequence</u> of events.</p> <p>7. Discuss the probability of events related to students' experiences as <u>likely</u> or <u>unlikely</u>; e.g., sledding during the month of July, swimming during the month of July.</p> | <p>1. Collect data about everyday situations and familiar objects and organize into <u>tables</u> and <u>charts</u> using <u>tally marks</u>; e.g., data collected from <u>surveys</u> (favorite pets, favorite foods) and data collected over a period of time.</p> <p>2. Identify <u>multiple categories</u> for sorting objects and data.</p> <p>3. Display collected data in <u>bar graphs</u> and <u>picture graphs</u> with intervals of 1.</p> <p>4. Read and interpret information on <u>charts</u> and <u>graphs</u>; e.g. answer questions about the number of objects represented in a <u>picture graph</u>, <u>bar graph</u> or <u>table</u>; how many more in a category compared to another, or how many altogether in two categories.</p> <p>5. Construct a question that can be answered by using information from a graph.</p> <p>6. Read and use <u>time lines</u> to display a <u>sequence</u> of events.</p> <p>7. Discuss and describe the likelihood of simple events as <u>possible/impossible</u> and <u>more likely/less likely</u>; e.g., when using spinners or number cubes in classroom activities.</p> | <p>1. Pose questions and collect data through <u>observations</u>, <u>interviews</u> and <u>surveys</u>.</p> <p>2. Organize data into <u>tables</u> and <u>charts</u> using <u>tally marks</u>.</p> <p>3. Display collected data in picture graphs with units of 1 or 2 and <u>bar graphs</u> and <u>line plots</u> with intervals of 1 or 2.</p> <p>4. Recognize that data may vary from one <u>population</u> to another; e.g., favorite foods or favorite TV shows of parents and students.</p> <p>5. Read, interpret, compare, and make predictions from data represented in <u>charts</u>, <u>tables</u>, <u>bar graphs</u>, <u>picture graphs</u> and <u>line plots</u>.</p> <p>6. Write sentences to describe and compare categories of data represented in a chart or graph, and make statements about the data as a whole.</p> <p>7. Read, use and construct <u>time lines</u> to display a <u>sequence</u> of events.</p> <p>8. Identify <u>untrue</u> or <u>inappropriate</u> statements about a given set of data.</p> <p>9. List some of the possible <u>outcomes</u> of a simple experiment, and predict whether given outcomes are <u>more</u>, <u>less</u>, or <u>equally likely</u> to occur.</p> <p>10. Use physical models and pictures to represent possible <u>arrangements</u> of 2 or 3 objects.</p> |

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| Grade 1 Indicators | Grade 2 Indicators | Grade 3 Indicators |
|--|---|--|
| <p>1. Collect data about everyday situations and familiar objects and organize into <u>tables</u> and <u>charts</u> using <u>tally marks</u>; e.g., data collected from <u>surveys</u> (favorite pets, favorite foods) and data collected over a period of time.</p> <p>2. Identify <u>multiple categories</u> for sorting objects and data.</p> <p>3. Display collected data in <u>bar graphs</u> and <u>picture graphs</u> with intervals of 1.</p> <p>4. Read and interpret information on <u>charts</u> and <u>graphs</u>; e.g. answer questions about the number of objects represented in a <u>picture graph</u>, <u>bar graph</u> or <u>table</u>; how many more in a category compared to another, or how many altogether in two categories.</p> <p>5. Construct a question that can be answered by using information from a graph.</p> <p>6. Read and use <u>time lines</u> to display a <u>sequence</u> of events.</p> <p>7. Discuss and describe the likelihood of simple events as <u>possible/impossible</u> and <u>more likely/less likely</u>; e.g., when using spinners or number cubes in classroom activities.</p> | <p>1. Pose questions and collect data through <u>observations</u>, <u>interviews</u> and <u>surveys</u>.</p> <p>2. Organize data into <u>tables</u> and <u>charts</u> using <u>tally marks</u>.</p> <p>3. Display collected data in picture graphs with units of 1 or 2 and <u>bar graphs</u> and <u>line plots</u> with intervals of 1 or 2.</p> <p>4. Recognize that data may vary from one <u>population</u> to another; e.g., favorite foods or favorite TV shows of parents and students.</p> <p>5. Read, interpret, compare, and make predictions from data represented in <u>charts</u>, <u>tables</u>, <u>bar graphs</u>, <u>picture graphs</u> and <u>line plots</u>.</p> <p>6. Write sentences to describe and compare categories of data represented in a chart or graph, and make statements about the data as a whole.</p> <p>7. Read, use and construct <u>time lines</u> to display a <u>sequence</u> of events.</p> <p>8. Identify <u>untrue</u> or <u>inappropriate</u> statements about a given set of data.</p> <p>9. List some of the possible <u>outcomes</u> of a simple experiment, and predict whether given outcomes are <u>more</u>, <u>less</u>, or <u>equally likely</u> to occur.</p> <p>10. Use physical models and pictures to represent possible <u>arrangements</u> of 2 or 3 objects.</p> | <p>1. Collect and organize data from an experiment, such as recording and classifying observations or measurements in response to a question posed.</p> <p>2. Interpret and construct <u>picture graphs</u> in which a symbol or picture represents more than one object.</p> <p>3. Interpret and construct <u>bar graphs</u> with intervals greater than one; e.g., intervals of 2, 5, or 10.</p> <p>4. Support a <u>conclusion</u> orally and in writing, using information in a table or a graph.</p> <p>5. Match a set of data with a <u>graphical representation</u> of that data.</p> <p>6. Fluently translate data among <u>charts</u>, <u>tables</u>, <u>line plots</u>, <u>picture graphs</u>, and <u>bar graphs</u>.</p> <p>7. Analyze and interpret information represented on a <u>time line</u>.</p> <p>8. Identify the <u>mode</u> of a data set and describe the information it gives about the data set.</p> <p>9. Conduct a simple experiment, record the results in a chart, table or graph. Use results to draw conclusions about <u>possible outcomes</u>.</p> <p>10. Use physical models, pictures, diagrams, and lists to solve problems involving possible <u>arrangements</u> or <u>combinations</u> of two to four objects.</p> |

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| Grade 2 Indicators | Grade 3 Indicators | Grade 4 Indicators |
|---|--|--|
| <p>1. Pose questions and collect data through <u>observations</u>, <u>interviews</u> and <u>surveys</u>.</p> <p>2. Organize data into <u>tables</u> and <u>charts</u> using <u>tally marks</u>.</p> <p>3. Display collected data in picture graphs with units of 1 or 2 and <u>bar graphs</u> and <u>line plots</u> with intervals of 1 or 2.</p> <p>4. Recognize that data may vary from one <u>population</u> to another; e.g., favorite foods or favorite TV shows of parents and students.</p> <p>5. Read, interpret, compare, and make predictions from data represented in <u>charts</u>, <u>tables</u>, <u>bar graphs</u>, <u>picture graphs</u> and <u>line plots</u>.</p> <p>6. Write sentences to describe and compare categories of data represented in a chart or graph, and make statements about the data as a whole.</p> <p>7. Read, use and construct <u>time lines</u> to display a <u>sequence</u> of events.</p> <p>8. Identify <u>untrue</u> or <u>inappropriate</u> statements about a given set of data.</p> <p>9. List some of the possible <u>outcomes</u> of a simple experiment, and predict whether given outcomes are <u>more</u>, <u>less</u>, or <u>equally likely</u> to occur.</p> <p>10. Use physical models and pictures to represent possible <u>arrangements</u> of 2 or 3 objects.</p> | <p>1. Collect and organize data from an experiment, such as recording and classifying observations or measurements in response to a question posed.</p> <p>2. Interpret and construct <u>picture graphs</u> in which a symbol or picture represents more than one object.</p> <p>3. Interpret and construct <u>bar graphs</u> with intervals greater than one; e.g., intervals of 2, 5, or 10.</p> <p>4. Support a <u>conclusion</u> orally and in writing, using information in a table or a graph.</p> <p>5. Match a set of data with a <u>graphical representation</u> of that data.</p> <p>6. Fluently translate data among <u>charts</u>, <u>tables</u>, <u>line plots</u>, <u>picture graphs</u>, and <u>bar graphs</u>.</p> <p>7. Analyze and interpret information represented on a <u>time line</u>.</p> <p>8. Identify the <u>mode</u> of a data set and describe the information it gives about the data set.</p> <p>9. Conduct a simple experiment, record the results in a chart, table or graph. Use results to draw conclusions about <u>possible outcomes</u>.</p> <p>10. Use physical models, pictures, diagrams, and lists to solve problems involving possible <u>arrangements</u> or <u>combinations</u> of two to four objects.</p> | <p>1. Create a plan for collecting data for a specific purpose.</p> <p>2. Represent and interpret data using <u>tables</u>, <u>bar graphs</u>, <u>line plots</u> and <u>line graphs</u>.</p> <p>3. Interpret and construct <u>Venn diagrams</u> to sort and describe data.</p> <p>4. Compare different <u>representations</u> of the same data to evaluate orally and in writing how well each representation shows important aspects of the data.</p> <p>5. Identify the <u>median</u> of a set of data and describe what it indicates about the data.</p> <p>6. Identify the <u>range</u> of a set of data.</p> <p>7. Use <u>range</u>, <u>median</u> and <u>mode</u> to make comparisons about related sets of data.</p> <p>8. Describe the characteristics of a set of data based on <u>graphical representations</u>; e.g., <u>range of the data</u>, <u>clumps of data</u> and <u>holes in the data</u>.</p> <p>9. Represent the likelihood of <u>possible outcomes</u> for <u>chance situations</u>; e.g., probability of selecting a red marble from a bag containing 3 red and 5 white marbles.</p> <p>10. Place events in order of likelihood and use a diagram of appropriate language to compare the chance of each event occurring; e.g., <u>impossible</u>, <u>unlikely</u>, <u>equally likely</u>, <u>certain</u>.</p> <p>11. Conduct simple <u>probability experiments</u> and draw conclusions from the results; e.g., rolling number cubes</p> |

| Grade 2 Indicators | Grade 3 Indicators | Grade 4 Indicators |
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| | | <p>or drawing marbles from a bag.</p> <p>12. List and count all <u>possible combinations</u> using one member from each of several sets; e.g., make a <u>tree diagram</u> to show the number of possible outfits from 3 shirts, 2 shorts and 2 pairs of shoes.</p> <p>13. Relate the concepts of <u>impossible</u> and <u>certain-to-happen</u> events to the numerical values of 0 (impossible) and 1 (certain).</p> |

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| Grade 3 Indicators | Grade 4 Indicators | Grade 5 Indicators |
|--|---|---|
| <p>1. Collect and organize data from an experiment, such as recording and classifying observations or measurements in response to a question posed.</p> <p>2. Interpret and construct picture graphs in which a symbol or picture represents more than one object.</p> <p>3. Interpret and construct bar graphs with intervals greater than one; e.g., intervals of 2, 5, or 10.</p> <p>4. Support a conclusion orally and in writing, using information in a table or a graph.</p> <p>5. Match a set of data with a graphical representation of that data.</p> <p>6. Fluently translate data among charts, tables, line plots, picture graphs, and bar graphs.</p> <p>7. Analyze and interpret information represented on a time line.</p> <p>8. Identify the mode of a data set and describe the information it gives about the data set.</p> <p>9. Conduct a simple experiment, record the results in a chart, table or graph. Use results to draw conclusions about possible outcomes.</p> <p>10. Use physical models, pictures, diagrams, and lists to solve problems involving possible arrangements or combinations of two to four objects.</p> | <p>1. Create a plan for collecting data for a specific purpose.</p> <p>2. Represent and interpret data using tables, bar graphs, line plots and line graphs.</p> <p>3. Interpret and construct Venn diagrams to sort and describe data.</p> <p>4. Compare different representations of the same data to evaluate orally and in writing how well each representation shows important aspects of the data.</p> <p>5. Identify the median of a set of data and describe what it indicates about the data.</p> <p>6. Identify the range of a set of data.</p> <p>7. Use range, median and mode to make comparisons about related sets of data.</p> <p>8. Describe the characteristics of a set of data based on graphical representations; e.g., range of the data, clumps of data and holes in the data.</p> <p>9. Represent the likelihood of possible outcomes for chance situations; e.g., probability of selecting a red marble from a bag containing 3 red and 5 white marbles.</p> <p>10. Place events in order of likelihood and use a diagram of appropriate language to compare the chance of each event occurring; e.g., impossible, unlikely, equally likely, certain.</p> <p>11. Conduct simple probability experiments and draw conclusions from the results; e.g., rolling number cubes or drawing marbles from a bag.</p> | <p>1. Design investigations to address a question and consider how data collection methods affect the nature of the data set.</p> <p>2. Select and use a graph that is appropriate for the type of data to be displayed; e.g. numerical vs. categorical data, discrete vs. continuous data).</p> <p>3. Read, interpret and represent data using frequency tables, bar graphs, line graphs, line plots, and circle graphs.</p> <p>4. Read and interpret increasingly complex displays of data, such as double bar graphs.</p> <p>5. Identify and use measures of central tendency, including mean, median, mode and range, to evaluate and analyze data.</p> <p>6. List and explain all possible outcomes of simple experiments or problems situations using methods such as lists, arrays and tree diagrams; e.g., number of arrangements for 3 or 4 items; number of possible sandwiches combinations from 4 meats, 2 cheeses, 3 bread choices.</p> <p>*7. Describe the probability of an event using ratios in all three forms; e.g., $\frac{1}{2}$, 1 to 2, 1:2.</p> <p>8. Use 0, 1 and ratios between 0 and 1 to represent the probability of outcomes for an event, and associate the ratio with the likelihood of the outcome; e.g., probability of rolling a six with a single die.</p> <p>9. Compare the theoretical results with the experimental results of a simple experiment; e.g., what should happen (theoretical/expected results) compared to what actually did happen (experimental/actual</p> |

| Grade 3 Indicators | Grade 4 Indicators | Grade 5 Indicators |
|--------------------|---|--|
| | <p>12. List and count all possible combinations using one member from each of several sets; e.g., make a tree diagram to show the number of possible outfits from 3 shirts, 2 shorts and 2 pairs of shoes.</p> <p>13. Relate the concepts of impossible and certain-to-happen events to the numerical values of 0 (impossible) and 1 (certain).</p> | <p>results).</p> <p>10. Make predictions, in oral and written form, based on experimental and theoretical probabilities.</p> |

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| Grade 4 Indicators | Grade 5 Indicators | Grade 6 Indicators |
|---|---|--|
| <p>1. Create a plan for collecting data for a specific purpose.</p> <p>2. Represent and interpret data using <u>tables</u>, <u>bar graphs</u>, <u>line plots</u> and <u>line graphs</u>.</p> <p>3. Interpret and construct <u>Venn diagrams</u> to sort and describe data.</p> <p>4. Compare different <u>representations</u> of the same data to evaluate orally and in writing how well each representation shows important aspects of the data.</p> <p>5. Identify the <u>median</u> of a set of data and describe what it indicates about the data.</p> <p>6. Identify the <u>range</u> of a set of data.</p> <p>7. Use <u>range</u>, <u>median</u> and <u>mode</u> to make comparisons about related sets of data.</p> <p>8. Describe the characteristics of a set of data based on <u>graphical representations</u>; e.g., <u>range of the data</u>, <u>clumps of data</u> and <u>holes in the data</u>.</p> <p>9. Represent the likelihood of <u>possible outcomes</u> for <u>chance situations</u>; e.g., probability of selecting a red marble from a bag containing 3 red and 5 white marbles.</p> <p>10. Place events in order of likelihood and use a diagram of appropriate language to compare the chance of each event occurring; e.g., <u>impossible</u>, <u>unlikely</u>, <u>equally likely</u>, <u>certain</u>.</p> <p>11. Conduct simple <u>probability experiments</u> and draw conclusions from the results; e.g., rolling number cubes or drawing marbles from a bag.</p> | <p>1. Design investigations to address a question and consider how data collection methods affect the nature of the data set.</p> <p>2. Select and use a graph that is appropriate for the type of data to be displayed; e.g. <u>numerical vs. categorical data</u>, <u>discrete vs. continuous data</u>).</p> <p>3. Read, interpret and represent data using <u>frequency tables</u>, <u>bar graphs</u>, <u>line graphs</u>, <u>line plots</u>, and <u>circle graphs</u>.</p> <p>4. Read and interpret increasingly complex displays of data, such as <u>double bar graphs</u>.</p> <p>5. Identify and use <u>measures of central tendency</u>, including <u>mean</u>, <u>median</u>, <u>mode</u> and <u>range</u>, to evaluate and analyze data.</p> <p>6. List and explain all possible outcomes of simple experiments or problems situations using methods such as <u>lists</u>, <u>arrays</u> and <u>tree diagrams</u>; e.g., number of arrangements for 3 or 4 items; number of possible sandwiches combinations from 4 meats, 2 cheeses, 3 bread choices.</p> <p>*7. Describe the <u>probability</u> of an event using <u>ratios</u> in all three forms; e.g., $\frac{1}{2}$, 1 to 2, 1:2.</p> <p>8. Use 0, 1 and ratios between 0 and 1 to represent the probability of outcomes for an event, and associate the ratio with the likelihood of the outcome; e.g., probability of rolling a six with a single die.</p> <p>9. Compare the <u>theoretical results</u> with the <u>experimental results</u> of a simple experiment; e.g., what should happen (theoretical/expected results) compared to what actually did happen (experimental/actual</p> | <p>1. Read, interpret and construct <u>picture</u>, <u>bar</u>, <u>line</u>, <u>circle</u> and <u>coordinate graphs</u>, <u>tables</u>, and <u>histograms</u>.</p> <p>2. Select, create and use graphical representations that are appropriate for the type of data collected.</p> <p>3. Compare orally and in writing representations of the same data in different types of graphs, such as a bar graph and circle graph.</p> <p>4. Give an oral and written analysis of a set of data by using and comparing <u>measures of central tendency</u> (<u>mean</u>, <u>median</u> and <u>mode</u>) and <u>measures of spread</u> (<u>range</u>).</p> <p>5. Describe the <u>frequency distribution</u> of a set of data, as shown in a histogram or frequency table, by general appearance or shape; e.g., number of <u>modes</u>, <u>middle of data</u>, and <u>level of symmetry</u>, <u>outliers</u>.</p> <p>6. Read, develop, interpret, and use tables, charts, and graphs to identify patterns, note trends, draw conclusions, make predictions, and explore effect of <u>changing scale</u>.</p> <p>7. Design an experiment to test a <u>theoretical probability</u> and explain how the results may vary.</p> <p>8. Use conjectures to formulate new questions, plan new studies, and detect misuses of <u>statistical</u> or <u>numerical information</u>.</p> <p>9. List and explain all possible outcomes of simple experiments or problems situations using methods such as <u>lists</u>, <u>arrays</u> and <u>tree diagrams</u>.</p> <p>*10. Develop an understanding of the difference between the between <u>single events</u> and <u>compound</u></p> |

| Grade 4 Indicators | Grade 5 Indicators | Grade 6 Indicators |
|---|---|-----------------------|
| <p>12. List and count all <u>possible combinations</u> using one member from each of several sets; e.g., make a <u>tree diagram</u> to show the number of possible outfits from 3 shirts, 2 shorts and 2 pairs of shoes.</p> <p>13. Relate the concepts of <u>impossible</u> and <u>certain-to-happen</u> events to the numerical values of 0 (impossible) and 1 (certain).</p> | <p>results).</p> <p>10. Make predictions, in oral and written form, based on experimental and <u>theoretical probabilities</u>.</p> | <p><u>events</u>.</p> |

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| Grade 5 Indicators | Grade 6 Indicators | Grade 7 Indicators |
|---|--|---|
| <p>1. Design investigations to address a question and consider how data collection methods affect the nature of the data set.</p> <p>2. Select and use a graph that is appropriate for the type of data to be displayed; e.g. <u>numerical vs. categorical data</u>, <u>discrete vs. continuous data</u>).</p> <p>3. Read, interpret and represent data using <u>frequency tables</u>, <u>bar graphs</u>, <u>line graphs</u>, <u>line plots</u>, and <u>circle graphs</u>.</p> <p>4. Read and interpret increasingly complex displays of data, such as <u>double bar graphs</u>.</p> <p>5. Identify and use <u>measures of central tendency</u>, including <u>mean</u>, <u>median</u>, <u>mode</u> and <u>range</u>, to evaluate and analyze data.</p> <p>6. List and explain all possible outcomes of simple experiments or problems situations using methods such as <u>lists</u>, <u>arrays</u> and <u>tree diagrams</u>; e.g., number of arrangements for 3 or 4 items; number of possible sandwiches combinations from 4 meats, 2 cheeses, 3 bread choices.</p> <p>*7. Describe the <u>probability</u> of an event using <u>ratios</u> in all three forms; e.g., $\frac{1}{2}$, 1 to 2, 1:2.</p> <p>8. Use 0, 1 and ratios between 0 and 1 to represent the probability of outcomes for an event, and associate the ratio with the likelihood of the outcome; e.g., probability of rolling a six with a single die.</p> <p>9. Compare the <u>theoretical results</u> with the <u>experimental results</u> of a simple experiment; e.g., what should happen (theoretical/expected results) compared to what actually did happen (experimental/actual</p> | <p>1. Read, interpret and construct <u>picture</u>, <u>bar</u>, <u>line</u>, <u>circle</u> and <u>coordinate graphs</u>, <u>tables</u>, and <u>histograms</u>.</p> <p>2. Select, create and use graphical representations that are appropriate for the type of data collected.</p> <p>3. Compare orally and in writing representations of the same data in different types of graphs, such as a bar graph and circle graph.</p> <p>4. Give an oral and written analysis of a set of data by using and comparing <u>measures of central tendency</u> (<u>mean</u>, <u>median</u> and <u>mode</u>) and <u>measures of spread</u> (<u>range</u>).</p> <p>5. Describe the <u>frequency distribution</u> of a set of data, as shown in a histogram or frequency table, by general appearance or shape; e.g., number of <u>modes</u>, <u>middle of data</u>, and <u>level of symmetry</u>, <u>outliers</u>.</p> <p>6. Read, develop, interpret, and use tables, charts, and graphs to identify patterns, note trends, draw conclusions, make predictions, and explore effect of <u>changing scale</u>.</p> <p>7. Design an experiment to test a <u>theoretical probability</u> and explain how the results may vary.</p> <p>8. Use conjectures to formulate new questions, plan new studies, and detect misuses of <u>statistical</u> or <u>numerical information</u>.</p> <p>9. List and explain all possible outcomes of simple experiments or problems situations using methods such as <u>lists</u>, <u>arrays</u> and <u>tree diagrams</u>.</p> <p>*10. Develop an understanding of the difference between the between <u>single events</u> and <u>compound</u></p> | <p>1. Read, interpret, and construct <u>picture</u>, <u>bar</u>, <u>line</u>, <u>circle</u> and <u>coordinate</u> (all four quadrants) <u>graphs</u>, <u>tables</u> and <u>histograms</u>. Include <u>double bar</u> and <u>double line graphs</u>.</p> <p>2. Read, interpret and construct <u>box-and-whisker plots</u>, and <u>stem-and-leaf plots</u>.</p> <p>3. Analyze how decisions about graphing affect the graphical representation; e.g., scale, size of classes in a histogram, number of categories in a circle graph.</p> <p>4. Find the <u>mean</u>, <u>median</u>, <u>mode</u>, and <u>range</u> and determine which <u>measure of central tendency</u> is most appropriate.</p> <p>5. Analyze a set of data by using and comparing measures of central tendency (mean, median and mode) and measures of spread (<u>range</u>, <u>quartile</u>, <u>interquartile range</u>), and describe how the inclusion or exclusion of <u>outliers</u> affects those measures.</p> <p>6. Compare data from two or more samples to determine how sample selection can influence results.</p> <p>7. Identify misuses of statistical data in articles, advertisements, and other media.</p> <p>8. Collect data to design a statistical experiment to study a problem.</p> <p>9. Construct convincing arguments based on analysis of data and interpretation of graphs.</p> <p>10. Explain the difference between <u>single events</u> and <u>compound events</u> and find the probability of single events or compound events occurring.</p> |

| Grade 5 Indicators | Grade 6 Indicators | Grade 7 Indicators |
|---|-----------------------|---|
| <p>results).</p> <p>10. Make predictions, in oral and written form, based on experimental and <u>theoretical probabilities</u>.</p> | <p><u>events</u>.</p> | <p>11. Make predictions, test the predictions and compare the <u>actual results</u> to the <u>predicted results</u>.</p> <p>*12. Identify <u>permutations</u> and <u>combinations</u> and the relationships between them.</p> <p>*13. Perform calculations and simplify <u>factorials</u> expressions; e.g., $4! = 4 \times 3 \times 2 \times 1 = 24$.</p> <p>*14. Explain and define the <u>fundamental counting principle</u>.</p> <p>*15. Determine the number of possible permutations and/or combinations for a situation using the fundamental counting principle.</p> |

Data Analysis and Probability Standard

Students pose questions and collect, organize, represent, interpret and analyze data to answer those questions. Students develop and evaluate inferences, predictions and arguments that are based on data.

| Grade 6 Indicators | Grade 7 Indicators | Grade 8 Indicators |
|--|---|--|
| <p>1. Read, interpret and construct <u>picture</u>, <u>bar</u>, <u>line</u>, <u>circle</u> and <u>coordinate graphs</u>, <u>tables</u>, and <u>histograms</u>.</p> <p>2. Select, create and use graphical representations that are appropriate for the type of data collected.</p> <p>3. Compare orally and in writing representations of the same data in different types of graphs, such as a bar graph and circle graph.</p> <p>4. Give an oral and written analysis of a set of data by using and comparing <u>measures of central tendency</u> (<u>mean</u>, <u>median</u> and <u>mode</u>) and <u>measures of spread</u> (<u>range</u>).</p> <p>5. Describe the <u>frequency distribution</u> of a set of data, as shown in a histogram or frequency table, by general appearance or shape; e.g., number of <u>modes</u>, <u>middle of data</u>, and <u>level of symmetry</u>, <u>outliers</u>.</p> <p>6. Read, develop, interpret, and use tables, charts, and graphs to identify patterns, note trends, draw conclusions, make predictions, and explore effect of <u>changing scale</u>.</p> <p>7. Design an experiment to test a <u>theoretical probability</u> and explain how the results may vary.</p> <p>8. Use conjectures to formulate new questions, plan new studies, and detect misuses of <u>statistical</u> or <u>numerical information</u>.</p> <p>9. List and explain all possible outcomes of simple experiments or problems situations using methods such as <u>lists</u>, <u>arrays</u> and <u>tree diagrams</u>.</p> <p>*10. Develop an understanding of the difference between the between <u>single events</u> and <u>compound events</u>.</p> | <p>1. Read, interpret, and construct <u>picture</u>, <u>bar</u>, <u>line</u>, <u>circle</u> and <u>coordinate</u> (all four quadrants) <u>graphs</u>, <u>tables</u> and <u>histograms</u>. Include <u>double bar</u> and <u>double line graphs</u>.</p> <p>2. Read, interpret and construct <u>box-and-whisker plots</u>, and <u>stem-and-leaf plots</u>.</p> <p>3. Analyze how decisions about graphing affect the graphical representation; e.g., scale, size of classes in a histogram, number of categories in a circle graph.</p> <p>4. Find the <u>mean</u>, <u>median</u>, <u>mode</u>, and <u>range</u> and determine which <u>measure of central tendency</u> is most appropriate.</p> <p>5. Analyze a set of data by using and comparing measures of central tendency (mean, median and mode) and measures of spread (<u>range</u>, <u>quartile</u>, <u>interquartile range</u>), and describe how the inclusion or exclusion of <u>outliers</u> affects those measures.</p> <p>6. Compare data from two or more samples to determine how sample selection can influence results.</p> <p>7. Identify misuses of statistical data in articles, advertisements, and other media.</p> <p>8. Collect data to design a statistical experiment to study a problem.</p> <p>9. Construct convincing arguments based on analysis of data and interpretation of graphs.</p> <p>10. Explain the difference between <u>single events</u> and <u>compound events</u> and find the probability of single events or compound events occurring.</p> | <p>1. Read, interpret, and construct <u>picture</u>, <u>bar</u>, <u>line</u>, <u>circle</u> and <u>coordinate</u> (all four quadrants) <u>graphs</u>, <u>tables</u> and <u>histograms</u>. Include <u>double bar</u> and <u>double line graphs</u>.</p> <p>2. Read, interpret and construct <u>box-and-whisker plots</u>, <u>stem-and-leaf plots</u> and <u>scatterplots</u>.</p> <p>3. Make <u>conjectures</u> about possible relationships in a scatterplot and approximate <u>line of best fit</u>.</p> <p>4. Read, develop, interpret, and use tables, charts, and graphs to identify patterns, note trends, draw conclusions, make predictions, and explore effect of <u>changing scale</u>.</p> <p>5. Evaluate different graphical representations of the same data to determine which one is the most appropriate representation for an identified purpose; e.g., line graph for change over time, circle graph for part to whole comparison, scatterplot for relationship between two <u>variants</u>.</p> <p>6. Find the mean, median, mode, and range and determine which measure of central tendency is most appropriate.</p> <p>7. Explain the mean's sensitivity to <u>extremes</u> and its use in comparison with the median and mode.</p> <p>8. Compare two sets of data using measures of central tendency (mean, mode, median) and measures of spread (<u>range</u>, <u>quartiles</u>, <u>interquartile range</u>, <u>percentiles</u>).</p> <p>9. Use conjectures to formulate new questions, plan new studies, and detect misuses of statistical or numerical information.</p> |

| Grade 6 Indicators | Grade 7 Indicators | Grade 8 Indicators |
|--------------------|---|--|
| | <p>11. Make predictions, test the predictions and compare the <u>actual results</u> to the <u>predicted results</u>.</p> <p>*12. Identify <u>permutations</u> and <u>combinations</u> and the relationships between them.</p> <p>*13. Perform calculations and simplify <u>factorials</u> expressions; e.g., $4! = 4 \times 3 \times 2 \times 1 = 24$.</p> <p>*14. Explain and define the <u>fundamental counting principle</u>.</p> <p>*15. Determine the number of possible permutations and/or combinations for a situation using the fundamental counting principle.</p> | <p>10. Collect data to design a statistical experiment to study a problem.</p> <p>11. Identify different ways of selecting samples, such as <u>survey response</u>, <u>random sample</u>, <u>representative sample</u> and <u>convenience sample</u>.</p> <p>12. Describe how the relative size of a sample compared to the target population affects the validity of predictions.</p> <p>13. Differentiate between <u>discrete</u> and <u>continuous data</u> and appropriate ways to represent each.</p> <p>14. Find the probability of <u>single events</u> or <u>compound events</u> occurring.</p> <p>15. Explain the difference between <u>independent</u> and <u>dependent events</u>.</p> <p>16. Demonstrate an understanding that the probability of either of two <u>disjoint events</u> occurring can be found by adding the probabilities; e.g., "What is the probability of drawing a heart or a diamond from a deck of cards?", and that the probability of one independent or dependent event following another can be found by multiplying the probabilities; e.g., "What is the probability of drawing a heart then a diamond from a deck of cards."</p> <p>*17. Perform calculations and simplify <u>factorial expressions</u>; e.g., $5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$, $8!/6! = 8 \times 7 = 56$</p> <p>*18. Identify <u>permutations</u>, <u>combinations</u>, the <u>counting principle</u> and the relationships among them.</p> <p>*19. Use formulas to calculate combinations and permutations</p> <p>*20. Calculate the number of possible outcomes for a situation, recognizing and accounting for when items may occur more than once or when order is important.</p> |

Data Analysis and Probability Standard

Students pose questions and collect, organize, represent, interpret and analyze data to answer those questions. Students develop and evaluate inferences, predictions and arguments that are based on data.

| Grade 7 Indicators | Grade 8 Indicators | |
|--|---|--|
| <p>1. Read, interpret, and construct <u>picture</u>, <u>bar</u>, <u>line</u>, <u>circle</u> and <u>coordinate</u> (all four quadrants) <u>graphs</u>, <u>tables</u> and <u>histograms</u>. Include <u>double bar</u> and <u>double line graphs</u>.</p> <p>2. Read, interpret and construct <u>box-and-whisker plots</u>, and <u>stem-and-leaf plots</u>.</p> <p>3. Analyze how decisions about graphing affect the graphical representation; e.g., scale, size of classes in a histogram, number of categories in a circle graph.</p> <p>4. Find the <u>mean</u>, <u>median</u>, <u>mode</u>, and <u>range</u> and determine which <u>measure of central tendency</u> is most appropriate.</p> <p>5. Analyze a set of data by using and comparing measures of central tendency (mean, median and mode) and measures of spread (<u>range</u>, <u>quartile</u>, <u>interquartile range</u>), and describe how the inclusion or exclusion of <u>outliers</u> affects those measures.</p> <p>6. Compare data from two or more samples to determine how sample selection can influence results.</p> <p>7. Identify misuses of statistical data in articles, advertisements, and other media.</p> <p>8. Collect data to design a statistical experiment to study a problem.</p> <p>9. Construct convincing arguments based on analysis of data and interpretation of graphs.</p> <p>10. Explain the difference between <u>single events</u> and <u>compound events</u> and find the probability of single events or compound events occurring.</p> <p>11. Make predictions, test the predictions and compare the <u>actual results</u> to the <u>predicted results</u>.</p> | <p>1. Read, interpret, and construct <u>picture</u>, <u>bar</u>, <u>line</u>, <u>circle</u> and <u>coordinate</u> (all four quadrants) <u>graphs</u>, <u>tables</u> and <u>histograms</u>. Include <u>double bar</u> and <u>double line graphs</u>.</p> <p>2. Read, interpret and construct <u>box-and-whisker plots</u>, <u>stem-and-leaf plots</u> and <u>scatterplots</u>.</p> <p>3. Make <u>conjectures</u> about possible relationships in a scatterplot and approximate <u>line of best fit</u>.</p> <p>4. Read, develop, interpret, and use tables, charts, and graphs to identify patterns, note trends, draw conclusions, make predictions, and explore effect of <u>changing scale</u>.</p> <p>5. Evaluate different graphical representations of the same data to determine which one is the most appropriate representation for an identified purpose; e.g., line graph for change over time, circle graph for part to whole comparison, scatterplot for relationship between two <u>variants</u>.</p> <p>6. Find the mean, median, mode, and range and determine which measure of central tendency is most appropriate.</p> <p>7. Explain the mean's sensitivity to <u>extremes</u> and its use in comparison with the median and mode.</p> <p>8. Compare two sets of data using measures of central tendency (mean, mode, median) and measures of spread (<u>range</u>, <u>quartiles</u>, <u>interquartile range</u>, <u>percentiles</u>).</p> <p>9. Use conjectures to formulate new questions, plan new studies, and detect misuses of statistical or numerical information.</p> <p>10. Collect data to design a statistical experiment to study a problem.</p> | |

| Grade 7 Indicators | Grade 8 Indicators | |
|--|--|--|
| <p>*12. Identify <u>permutations</u> and <u>combinations</u> and the relationships between them.</p> <p>*13. Perform calculations and simplify <u>factorials</u> expressions; e.g., $4! = 4 \times 3 \times 2 \times 1 = 24$.</p> <p>*14. Explain and define the <u>fundamental counting principle</u>.</p> <p>*15. Determine the number of possible permutations and/or combinations for a situation using the fundamental counting principle.</p> | <p>11. Identify different ways of selecting samples, such as <u>survey response</u>, <u>random sample</u>, <u>representative sample</u> and <u>convenience sample</u>.</p> <p>12. Describe how the relative size of a sample compared to the target population affects the validity of predictions.</p> <p>13. Differentiate between <u>discrete</u> and <u>continuous data</u> and appropriate ways to represent each.</p> <p>14. Find the probability of <u>single events</u> or <u>compound events</u> occurring.</p> <p>15. Explain the difference between <u>independent</u> and <u>dependent events</u>.</p> <p>16. Demonstrate an understanding that the probability of either of two <u>disjoint events</u> occurring can be found by adding the probabilities; e.g., "What is the probability of drawing a heart or a diamond from a deck of cards?", and that the probability of one independent or dependent event following another can be found by multiplying the probabilities; e.g., "What is the probability of drawing a heart then a diamond from a deck of cards."</p> <p>*17. Perform calculations and simplify <u>factorial expressions</u>; e.g., $8!/6! = 8 \times 7 = 56$</p> <p>*18. Identify <u>permutations</u>, <u>combinations</u>, the <u>counting principle</u> and the relationships among them.</p> <p>*19. Use formulas to calculate combinations and permutations</p> <p>*20. Calculate the number of possible outcomes for a situation, recognizing and accounting for when items may occur more than once or when order is important.</p> | |