| Probability and Statistics - Unit 2 Summarizing and Graphing Data | 20 - 25 Days<br>Established 14-15<br>Revised 20-21<br>Revised Nov 2021 |
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**Standard – NJSLS: S.ID and S.IC**
**Summarizing and Graphing Data**

**Strand**
**S-ID: Interpreting Categorical and Quantitative Data**

**Summarize, represent, and interpret data on a single count or measurement variable**

1. *Represent data with plots on the real number line (dot plots, histograms, and box plots).*
3. *Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).*

***Summarize, represent, and interpret data on two categorical and quantitative variables***

5. *Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.*

**S-IC: Making Inferences and Justifying Conclusions**

**Make inferences and justify conclusions from sample surveys, experiments, and observational studies.**

6. Evaluate reports based on data

*Curriculum aligned with: 2009 New Jersey Core Curriculum Content Standards for 21st Century Skills (9.1 A-F)*

***21st Century Theme:*** *Global Awareness ☐, Financial, economic, business and entrepreneurial literacy , , Civic literacy ☐, Health literacy ☐ Environmental Literacy ☐,*

***21st Century Skills:*** *Critical Thinking & Problem Solving , Creativity and Innovation ☐, Collaboration, Teamwork and Leadership ☐, Cross-Cultural Understanding and Interpersonal Communications ☐, Communication and Media Fluency ☐, Accountability, Productivity and Ethics ☐*

***Interdisciplinary Connection: Math=MA, English=ELA, Science=SCI, Social Studies=SS, Physical Education=PE, Art=ART, Music=MU, Technology=TECH, World Language=WL, Business = BU***

| Essential Questions | Enduring Understandings | Activities, Investigation, and Student Experiences |
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| 1. What information can be understood from data sets? | *Students will understand…* | ***Task 1:*** |

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| 2. How can statistics be misleading and to what extent?<br>3. What are real life examples of data sets that are better represented by graphs so that the data is more easily understood? | ● When investigating a data set, the characteristics of center, variation, distribution, outliers and changing patter over time are very important.<br>● Data can be summarized by constructing a frequency distribution or relative frequency distribution.<br>● A frequency distribution lists data values with their corresponding frequencies.<br>● A relative frequency distribution divides each class frequency by the total of all frequencies. | ● When investigating a data set, which is more effective: a frequency distribution or a histogram? Why<br>● When comparing two data sets, which is better: frequency distributions or relative frequency distributions? Why?<br>● A histogram is constructed from a set of sample values. What are two key features of the histogram that would suggest that the data have a normal distribution?<br>***Answer:***<br>● The histogram is generally more effective because it provides a picture, and the visual display is much easier to understand then the table of numbers.<br>● Relative frequency distributions would be more suitable because they can be represented by percentages. As a result, it would be easier to compare percents between data sets as opposed to actual values that may be very different in magnitude.<br>● The histogram would have to be symmetric about some maximum value and the bars of the histogram would have to start relatively low, increase to a maximum, and then decrease to lower values.<br><br>***Task 2:***<br>● A statistician drilled a hole in a die and filled it with a lead weight, then proceeded to roll it with a lead weight, then proceeded to roll it a 180 times. The results are given in the frequency distribution below.<br>Construct the frequency distribution for the outcomes that you would expect from a die that is perfectly fair and unbiased. Does the loaded die appear to differ significantly from a fair die that has not been loaded?<br><br>Outcome \| Frequency<br>1 \| 24<br>2 \| 28 |

- The cumulative frequency distribution shows the sum of the frequencies for a particular class plus all the frequencies for the previous class.
- Normal distributions maintain the characteristic that frequencies start low, increase to a maximum value, and then decrease to a low frequency. Additionally normal distributions are approximately symmetry about the maximum frequency.
- Histograms are bar charts that represent frequency

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| 3 | 39 |
| 4 | 37 |
| 5 | 25 |
| 6 | 27 |

***Answer:***

- The results differ from those expected with a perfectly fair die, but the differences do not appear to be substantial. The discrepancies appear to be consistent with those that can be explained by random chance.

| Outcome | Frequency |
|---|---|
| 1 | 30 |
| 2 | 30 |
| 3 | 30 |
| 4 | 30 |
| 5 | 30 |
| 6 | 30 |

***Task 3:***
**Interdisciplinary SS**

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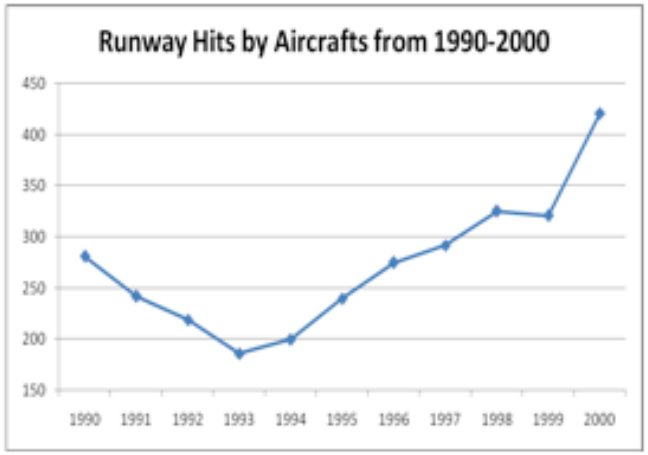
| | distributions. The horizontal scale shows the data values and the vertical scale represents frequencies.<br>● Other statistical graphs include frequency polygons, ogives, stem plots, pareto charts, dotplots, scatterplots, time-series graphs and pie charts.<br>● Graphs of data sets should draw attention to the nature of the distribution and should not be distracting.<br>● The graph chosen to represent the data should reveal some important characteristic of the values. | ● Given below are the numbers of runway near-hits by aircraft, listed in order for each year beginning with 1990 (based on data from the Federal Aviation Administration). Is there a trend? If so, what is it?<br>281 242 219 186 200 240 275 292 325 321 421<br><br>***Answer:***<br>There appears to be a recent trend of increasing numbers of runway near-hits.<br><br>  <br><br><br>**Modifications and/or Accommodations:**<br>● **Special Education:** Utilize a multi-sensory (VAKT) approach during instruction, provide alternate presentations of skills by varying the method (repetition, simple explanations, additional examples, modeling, etc.), modify test content and/or format, allow students to retake test for additional credit, provide additional times and preferential seating as needed, review, restate and repeat directions, |

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| **Content Statements** | **Cumulative Progress Indicators** |
| *Students will know…*<br>● How to use different methods for summarizing and graphing data<br>● How to represent data with time-series graphs, stem plots, dot plots, frequency polygons, pie charts and scatter plots<br>● How to develop a frequency distribution, relative frequency distribution, and cumulative frequency distribution<br>● How to represent a frequency distribution with a histogram<br>● How to determine if a graph shows a normal distribution | ● Tests<br>● Quizzes<br>● Practice problems for homework<br>● Workbook pages<br>● Worksheets |
| **Desired Results** | |

provide study guides, and/or break assignments into segments of shorter tasks.

- **English Language Learners:** Extend time requirements, preferred seating, positive reinforcement, check often for understanding/review, oral/visual directions/prompts when necessary, supplemental materials including use of online bilingual dictionary, and modified assessment and/or rubric.
- **Students at Risk of School Failure:** Deliver instruction utilizing varied learning styles including audio, visual, and tactile/kinesthetic, provide individual instruction as needed, modify assessments and/or rubrics, repeat instructions as needed.
- **Gifted Students:** Create an enhanced set of introductory activities, integrate active teaching/learning opportunities, incorporate authentic components, propose interest-based extension activities, and connect student to related talent development opportunities.

**Teacher Resources**

online achievethecore resource

online learnzillion resource

online khanacademy resource

online desmos resource

online ixl resource

- **Using different methods to graph and summarize data.**
- **Representing data.**
- **Develop frequency distributions**
- **Histograms**
- **Normal distribution**

1. **Make sense of problems and persevere in solving them.**
2. **Reason abstractly and quantitatively.**
3. **Construct viable arguments and critique the reasoning of others**
4. **Model with mathematics**
5. **Use appropriate tools strategically.**
6. **Attend to precision.**
7. **Look for and make use of structure.**

**Standards for Mathematical Practices**

8. **Look for and express regularity in repeated reasoning.**

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LGBT and Disabilities Law: *N.J.S.A. 18A:35-4.35*

Leonardo Da Vinci - Famous artist. Believed to be dyslexic as handwriting was often in reverse

The mission is to ensure that every student is able to see themselves in our rich and diverse history.

| **Social and Emotional Learning:** ***Competencies*** | **Social and Emotional Learning:** ***Sub-Competencies*** |
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| Self-Awareness<br><br>Social Awareness<br><br>Self-Management<br><br>Relationship Skills<br><br>Responsible Decision-Making | • Recognizing the importance of self-confidence in handling daily tasks and challenges.<br>• Demonstrate an awareness of the expectations for social interactions in a variety of ways.<br>• Demonstrate an understanding of the need for mutual respect when viewpoints differ.<br>• Recognize the skills needed to establish and achieve personal and educational goals.<br>• Utilize positive communication and social skills to interact effectively with others.<br>• Develop, implement, and model effective problem solving and critical thinking skills. |