**Identifying Distributions – Algebra I/Math I**

Below are verbal descriptions of eight different variables. Match these data descriptions to their corresponding histogram, boxplot, and statistics.

|  |  |
| --- | --- |
| A1  **Winning scores in NCAA Basketball Tournament**  The distribution of winning scores for every NCAA Basketball Tournament game from 1939 to 1995. | A2  **Age when Bachelor’s Degree was Awarded**  The distribution of reported ages when a Bachelor’s Degree was awarded for a random sample of college graduates |
| A3  **Days in Office**  The distribution of days in office for the first 43 United States Presidents. (George Washington through George W. Bush) | A4  **Illinois Driver’s License**  The distribution of the age at time when a random sample of Illinois residents first received an Illinois driver’s license. |
| A5  **Weights of Euro Coins**  The distribution of the weights (in grams) of euro coins collected from a local bank and weighted by Herman Callaert and his team at Hasselt University in Belgium. | A6  **Gross Box Office Receipts**  The distribution of the total US gross box office receipts for 49 movies in millions of dollars. |
| A7  **Month of Birth of Best Actor/Actress**  The distribution of the months of birth for the Oscar recipients for Best Actor and Best Actress for the years 1929 to 2005. (January = 1) | A8  **The Number of Passengers on a Southwest Flight**  The distribution of total number of boarded passengers from a random sample of Southwest flights featuring the Boeing 737-800. |

List your matches in the table below by recording the number for B, C, and D

|  |  |  |  |
| --- | --- | --- | --- |
| A  Verbal Description | B  Histogram | C  Boxplot | D  Statistics |
| A1 **Winning scores in NCAA Basketball Tournament** |  |  |  |
| A2 **Age when Bachelor’s Degree was Awarded** |  |  |  |
| A3 **Days in Office** |  |  |  |
| A4 **Illinois Driver’s License** |  |  |  |
| A5 **Weights of Euro Coins** |  |  |  |
| A6 **Gross Box Office Receipts** |  |  |  |
| A7 **Month of Birth of Best Actor/Actress** |  |  |  |
| A8 **The Number of Passengers on a Southwest Flight** |  |  |  |

Identifying Distributions - Histograms

|  |  |
| --- | --- |
| B1 | B2 |
| B3 | B4 |
| B5 | B6 |
| B7 | B8 |

Identifying Distributions – Boxplots

|  |  |
| --- | --- |
| C1 | C2 |
| C3 | C4 |
| C5 | C6 |
| C7 | C8 |

Identifying Distributions - Statistics tables

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| D1   |  |  | | --- | --- | | Minimum | 26 | | Quartile 1 | 68 | | Median | 77 | | Quartile 3 | 86 | | Maximum | 149 | | Mean | 77.2 | | Standard Deviation | 14.3 | | D2   |  |  | | --- | --- | | Minimum | 16 | | Quartile 1 | 16 | | Median | 16 | | Quartile 3 | 17 | | Maximum | 58 | | Mean | 17.5 | | Standard Deviation | 4.8 | |
| D3   |  |  | | --- | --- | | Minimum | 31 | | Quartile 1 | 1460 | | Median | 1460 | | Quartile 3 | 2921 | | Maximum | 4452 | | Mean | 1866 | | Standard Deviation | 915 |   Statistics rounded to the nearest integer. | D4   |  |  | | --- | --- | | Minimum | 17 | | Quartile 1 | 22 | | Median | 24 | | Quartile 3 | 27 | | Maximum | 54 | | Mean | 26 | | Standard Deviation | 7 |   Statistics rounded to the nearest integer. |
| D5   |  |  | | --- | --- | | Minimum | 90 | | Quartile 1 | 138 | | Median | 151 | | Quartile 3 | 164 | | Maximum | 175 | | Mean | 149 | | Standard Deviation | 20 |   Statistics rounded to the nearest integer. | D6   |  |  | | --- | --- | | Minimum | 7.201 | | Quartile 1 | 7.498 | | Median | 7.520 | | Quartile 3 | 7.545 | | Maximum | 7.752 | | Mean | 7.521 | | Standard Deviation | 0.034 | |
| D7  One of the variables of interest is ordinal: the values of the variable are actually categories that have order as opposed to having actual numeric values. For this one ordinal variable, no statistics table has been provided. | D8   |  |  | | --- | --- | | Minimum | 1.28 | | Quartile 1 | 100.32 | | Median | 261.99 | | Quartile 3 | 321.01 | | Maximum | 600.79 | | Mean | 228.55 | | Standard Deviation | 155.30 | |

**Teacher Notes**

Common Core Standards addressed by this activity:

Content Standards

|  |  |  |  |
| --- | --- | --- | --- |
|  Additional Focus | S | ID.2 | Summarize, represent, and interpret data on a single count or measurement variable. Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.\* |
|  Additional Focus | S | ID.3 | Summarize, represent, and interpret data on a single count or measurement variable. Interpret differences in shape, center, and spread in the context of the data sets, accounting for possible effects of extreme data points (outliers).\* |

Primary Math Practices

MP 2 Reason abstractly and quantitatively.

MP 3 Construct viable arguments and critique the reasoning of others.

MP 4 Model with mathematics.

MP 6 Attend to precision.

**Acknowledgements**

Identifying Distributions is adapted from exercises found in *Activity-Based Statistics* by Schaeffer, Watkins, Gnanadesikan, Witmer and an exercise found in *Workshop Statistics: Discovery With Data and the Graphing Calculator* by Rossman, Chance, Von Oehsen.

Rossmann, A. J., Chance, B. L., & Von Oehsen, J.B. (2002). *Workshop Statistics Discovery with Data and the Graphing Calculator* (2nd ed.). New York, NY: Key College Publishing.

Scheaffer, R. L., Gnanadesikan, M., Watkins, A., & Witmer, J.A. (1996). *Activity-Based Statistics*. New York, NY: Springer-Verlag.

**Guidance for Class Activity**

Students should work in groups to match the verbal descriptions to their histograms, boxplots and statistics. The cards are arranged so that cards 1 – 4 may be done separately from cards 5 – 8. Teachers may choose to give all 8 situations to their students at one time, or may choose to give situations 1 – 4 as in class work and situations 5 – 8 as homework.

Students should discuss with their groups their reasoning for matching verbal descriptions to a histogram, boxplot and statistics. Once the cards have been matched, a poster should be created displaying the pairings. Students can then be asked to do a “walk around” critiquing the work of other groups by writing comments on post-it notes. Upon returning to their own poster, students should review the posted comments and determine if change is needed. The teacher wraps up the activity with a guided discussion about the reasoning used to determine the matches.

**Answer Key**

|  |  |  |  |
| --- | --- | --- | --- |
| A  Verbal Description | B  Histogram | C  Boxplot | D  Statistics |
| A1 **Winning scores in NCAA Basketball Tournament** | B4 | C2 | D1 |
| A2 **Age when Bachelor’s Degree was Awarded** | B1 | C3 | D4 |
| A3 **Days in Office** | B2 | C4 | D3 |
| A4 **Illinois Driver’s License** | B3 | C1 | D2 |
| A5 **Weights of Euro Coins** | B7 | C7 | D6 |
| A6 **Gross Box Office Receipts** | B5 | C6 | D8 |
| A7 **Month of Birth of Best Actor/Actress** | B6 | C8 | D7 |
| A8 **The Number of Passengers on a Southwest Flight** | B8 | C5 | D5 |

Note: Southwest Airlines Boeing 737-800 has 175 passenger seats.