Pennsylvania Governor's Institute for Mathematics Educators 2004

Names of Group Members:

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Topic/Theme: Statistics and Graphing

This is a culminating project used as an assessment after a unit on statistics. Skills covered by the unit: graphing techniques, data display, and measures of central tendency and range.

Level: Grades 6-8 Math

Time Element: 2-3 class periods

NCTM Standards Addressed:

Number and Operations:

Expectations - All students should

Work flexibly with fractions, decimals, and percents to solve problems.
Understand and use ratios and proportions to represent quantitativerelationships.
Understand the meaning and effects of arithmetic operations with fractions, decimals, and integers.

Algebra:

Expectations - All students should

Represent, analyze, and generalize a variety of patterns with tables, graphs, words, and, when possible, symbolic rules.
Relate and compare different forms of representation for a relationship.

Data Analysis and Probability:

Expectations – All students should

Formulate questions, design studies, and collect data about a characteristic shared by two populations or different characteristics within one population.
Select, create, and use appropriate graphical representations of data including histograms, box plots, and scatter plots.
Find, use, and interpret measures of center and spread, including mean and interquartile range.
Discuss and understand the correspondence between data sets and their
graphical representations, especially histograms, stem-and-leaf plots, box plots, and scatter plots.

PA Math Standards Addressed:

2.1.8 Numbers, Number Systems and Number Relationships

A. Represent and use numbers in equivalent forms (e.g., integers, fractions, decimals, percents, exponents, scientific notation, square roots).

2.2.8 Computation and Estimation

B. Add, subtract, multiply and divide different kinds and forms of rational numbers including integers, decimal fractions, percents and proper and improper fractions.

2.4.8 Mathematical Reasoning and Connections

D. Construct, use and explain algorithmic procedures for computing and estimating with whole numbers, factions, decimals and integers.

2.5.8 Mathematical Problem Solving and Communication

C. Verify and interpret results using precise mathematical language notation and representations, including numerical tables and equations and simple algebraic equations and formulas, charts, graphs and diagrams.

2.6.8 Statistics and Data Analysis

A. Compare and contrast different plots of data using values of mean, median, mode, quartiles and range.

E. Analyze and display data in stem-and-leaf and box-and-whisker plots.

F. Use scientific and graphing calculators and computer spreadsheets to organize and analyze data.

2.7.8 Probability and Predictions

B. Present the results of an experiment using visual representations (e.g., tables, charts, graphs).

D. Compare and contrast results from observations and mathematical models.

Math Assessment Anchors Addressed:

M6.A.3.2 Solve problems with and without the use of a calculator.

M6.C.3.1 Identify points or match points to an ordered pair.

M6.D.2.2 Represent and/or analyze mathematical situations using numbers, symbols, words, tables and/or graphs.

M6.E.1.1 Interpret data shown in frequency tables, histograms, circle graphs, bar or double bar graphs, line or double line graphs or line plots.

M6.E.2.1 Describe data sets using mean, median, mode and/or range.

Reading Assessment Anchors Addressed:

R6.A.1.5 Retell or summarize the major ideas or themes of the text

R6.A.2.2 Demonstrate the ability to understand and interpret nonfiction text, including informational, e.g., textbooks and print media (magazines, brochures, etc.); autobiography; and biography appropriate to grade level.

Objectives:

1. The student will gather data.
2. The student will record the information on a data chart. The student will convert data from a fraction to decimal to percent.
3. The student will display the data on the stem-and-leaf plot.
4. The student will calculate the measures of central tendency and range.
5. The student will use a graphing calculator to create a box-and-whisker plot.

Instructional Strategies and Plan (include strategies used to help different types of learners, i.e. auditory, visual, etc.):

1. Write directions on the board or on a transparency.
2. Read directions aloud.
3. Student can repeat directions to the teacher.
4. Underline or highlight key words in the directions and on worksheets.
5. Teacher will check progress of students frequently.
6. Allow students to work where they are most comfortable.

Materials/Resources:

Materials:
. Gym Facilities
. Basketballs
. Practice Sheets
. Scoring Guide
. Trade Book
. Pencils
. Scrap Paper
Resources:
. Physical Education Teacher

Interdisciplinary Connections:

- **Reading**
  Read biographies about various NBA and WNBA players in extension activities.
  Read poems about basketball in extension activities.
- **Technology**
  Use of graphing calculators.
  Use of computers in extension activities.

- **Other**
  Physical Education – foul shots

Assessment Strategies:

- **Formative Evaluation (checking student understanding during the lesson):**
  Teacher will complete authentic performance-based assessments during the activity by asking questions, observing students work, and checking for understanding.
- **Summative Evaluation (how will it be determined that the objectives were achieved?):**
  Teacher will use a scoring guide based on the lesson objectives to assess student learning and assure that students have met the assessment targets.

Correctives/Remediation:

The teacher will provide or arrange for after school tutoring for remediation, instruction, and review with an emphasis placed on problem solving and graphing for students who do not meet proficiency level.

Extensions/Enrichment:

1. The student will make a prediction of a 'second try' at the foul line. The student will then go back to the gym and record 20 more foul shots. He/She will then compare and contrast the results to the original data to the second try. The student will then check their prediction.
2. The student will use the internet to research several NBA or WNBA players. The student will find the player's foul shot statistics. They will create a stem-and-leaf and/or a box-and-whisker plot to display the data.
3. The student will compare and contrast the professional players statistics that they chose to display.
4. The student will use a spreadsheet to create an appropriate representation for the data that they have researched.

Special Accommodations (special needs students)

- **Description of the Special Needs Student Selected:**
  The special needs student is functioning three years below grade level. She is receiving learning support services for language arts and math and has difficulty following direction in all instructional areas. She has difficulties in language comprehension, vocabulary, direction following, event-sequencing and working memory. She can answer literal comprehension questions in all content areas and usually answers 1 out of 5 inferential questions correctly. She tends to jump into reading tasks without previewing material but has success when instructions are broken down and accompanied by modeling. She has

difficulty with basic math facts for multiplication and division as well as problems involving multiple steps.

- **Accommodations to Use with this Student:**
  The special needs student will gather her data with a partner.
  She will complete a set of modified worksheets. (attached)
  She will use a scientific calculator for all calculations.
  She will present her data in a box and whisker plot.