Doing What Works
ED.gov

SAMPLE MATERIAL

Physical Education Lessons for Mathematics Practice

Worthington Hooker School, Connecticut

Topic: National Math Panel: Critical Foundations for Algebra
Practice: Comprehensive Instruction

This packet describes the New Haven school district's commitment to including mathematics practice into physical education activities. Physical education teachers in grades 3-8 are required to integrate two math power standards per grade level into daily lessons in physical education. The first three pages identify the applicable math power standards. The fourth page is the format teachers use for documenting lessons, including provisions for review of prior knowledge, presentation of new material, lesson closure, and assessment of learning objectives.

Two lessons are included as examples. The final two pages are materials from the lessons similar to those that Kathy Mirando, Worthington Hooker School's physical education teacher, describes on the video: documentation recording sheets for fractions in a bowling game, percents in basketball shooting, and calculation of calories burned by exercise.

NEW HAVEN PUBLIC SCHOOLS
PHYSICAL EDUCATION DEPARTMENT

ADDENDUM TO TIER I AND TIER II DOCUMENTS

INTEGRATION OF MATH POWER STANDARDS INTO PHYSICAL EDUCATION

***Physical Education teachers of students in grades 3-8 will integrate two math power standards per grade level into daily lessons in physical education. Listed below, please find a breakdown of grade levels and related mathematics "Power Standards":

Grade 3

Recognize when an estimate is appropriate and determine whether an estimation strategy will result in an over-or underestimate.

Examples of integration: Averages associated with sport trials.
Computing free throw percentages.

Predicting fitness test results.

Develop and explain strategies for using nonstandard and standard referents to estimate measurements of length, area, weight, temperature, volume and capacity.

Examples of integration: Computing track and field measurements.
Measures taken of selected sport field areas.
Body measurements, ie…heart rate, temperature, weight.
Measures taken of physical plant of school buildings to be utilized in "20 minute caloric expenditure walks".

Grade 4

Use models, pictures and number patterns to solve simple problems involving ratios and proportions.

Examples of integration: Preparing scaled models of sport fields.
Score keeping and averaging
computing win-loss ratio

Explore converting inches to feet and feet into yards.

Examples of integration: Conversion of sport field dimensions from inches to feet and feet to yards.
Conversion of sporting events in track and swimming from inches to feet and feet to yards.

Grade 5

Describe how a change in one variable relates to a change in a second variable in context.

Examples of integration: Monitoring the change in heart rate as the intensity of exercise increases.

Monitoring the time needed to complete designated Track running distances from week to week in response to practice/training.

Solve length problems involving conversion within the customary and metric systems.

Examples of integration: Conversion of customary values utilized in sports to metric system measures.

For homework have students collect and bring in magazine clippings that compare the customary with the metric system.

Grade 6

Solve problems involving ratios, proportions and percents.

Examples of integration: Computing ratios when comparing game statistics from selected sporting activities.

Have students for an ongoing homework assignment calculate daily batting averages for their favorite professional baseball team. Graphing can also be added to this assignment.

Express probabilities as fractions, ratios, decimals and percents.

Examples of integration: To express sport activity or physical activity probabilities as fractions, ratios, decimals and percents.
ie… game result tabulations conversions, free throw result conversions.

Grade 7

Solve problems using concrete, verbal, symbolic, graphical and tabular representations.

Examples of integration: Developing graphs and tables of physical fitness testing results.

Representation of batting averages and free throw percentages.

Develop, describe and use a variety of methods to estimate and calculate with very large numbers.

Examples of integration: Change of inches into feet and yards of selected sport fields/courts

Estimation of ounces, quarts, gallons in a swimming pool utilizing formulas for volume.

Grade 8

Compare, locate, label and order rational numbers on number lines, scales, coordinate grids and measurement tools.

Examples of integration: Use of pedometers for measuring walked distances and representing data on through the use on number lines, scales, grids, etc…

Use of transits to solve mathematical problems involving measured distances in sport areas.

Collect, organize, display, compare and analyze large data sets.

Examples of integration: Representation of fitness testing results.

Comparison of nutritional food values in one's diet.

NEW HAVEN PUBLIC SCHOOLS
PHYSICAL EDUCATION DEPARTMENT

PHYSICAL EDUCATION – MATHEMATICS INTEGRATON

LESSON PLAN

School:
Teacher:
Grade:

Power Standard:

Objective:

Date:

Review of Prior Knowledge (What the students already know.):

Introduction of new material:

Activities:

Closure of lesson:

How objectives will be assessed

Integrated Physical Education Lesson Plan: Math
Michele Trionero

Grade Level: For anyone taking the Connecticut Physical Fitness Assessment.

Focus: Metric System

Objective:
TSW convert metric units, (meters, centimeters, millimeters, decimeters, kilometers) based on the number of centimeters the students stretched during the flexibility test.

Activity:
All students will test their flexibility using the trunk flexor box. There will be two lines of students. Two students can be active at a time, one stretching and one reading the box. While students are waiting they can read the standards sheet to determine their healthy goal standard, and their challenge goal standard in centimeters. Then write the appropriate standards on the individual student record sheet.

The students will be given 2 trials to stretch both the right and left sides. Once the student determines the farthest distance he/she reached in centimeters that number will be converted to millimeters, multiplying by 10, then into meters, by dividing by 100 and creating a decimal number, and continuing to with decimeters, dividing by 10, and kilometers, dividing by 1000. Each student is expected to write the unit of measurement with the proper abbreviation for each calculation, the students are also expected to show their work.

Power Standard:

The teacher can verbally ask students how to convert from one unit to another during the closure, to check for understanding and at the beginning of class for review of previously learned material.

*For younger students the number of conversions can be limited.

Name of Activity: Card Play

Academic content: Math

Purpose of Activity: To help children practice addition, subtraction, multiplication, and division in a creative way.

Prerequisites: Students will need to know how to add and subtract and/or multiply and divide.

Suggested Grade Level: 2-4

Materials Needed: one deck of playing cards for twenty students

Physical activity: locomotor movement, pathways

Description of Idea

Take out the Kings, Queens and Jacks from the deck of playing cards. (You will have 40 cards left.) Distribute two cards to each student and have the students spread out in general space. Explain that they must travel around the gym by different means (walking, skipping, jogging) and in different pathways (straight, zig-zagged, curved) to a cue, such as music or one blast of a whistle. When the music stops or the whistle blasts three times, the teacher will call out a number and a student must find another student and make an equation out of two of their cards, using a card from each student that equals the number called out. (The number called should be from 2 to 20 so it's not too difficult. The Ace card equals one.)

Addition, subtraction, division, or multiplication can be used in this activity. For example, if you call out the number six the two students will get together and examine their cards. If one student has a 2 and a 9 in their hand and the other child has a 3 then they can either use the 2 and 3 by multiplying to get 6 or they can use the 9 and 3 and subtract to get the number 6.

If you have a child that does not have a partner simply ask them, "What number could you have found to make an equation?" This way they can still participate and learn from the activity. Once everyone makes an equation, repeat the activity by varying the locomotor skill and the pathway used each time.

Teaching Suggestions:

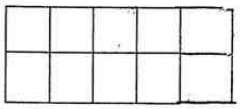
If playing cards aren't available, one could write out 4 sets of 1-10 cards.

Name _____

BOWLING OVER FRACTIONS

Directions: Shade in the boxes based on the number of bowling pins you knock down.

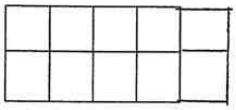
1.



What fraction of the pins are knocked down? _____ num / den

What fraction of the pins are standing up? _____ num / den

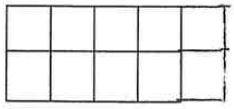
2.



What fraction of the pins are knocked down? _____ num / den

What fraction of the pins are standing up? _____ num / den

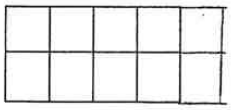
3.



What fraction of the pins are knocked down? _____ num / den

What fraction of the pins are standing up? _____ num / den

4.



What fraction of the pins are knocked down? _____ num / den

What fraction of the pins are standing up? _____ num / den

BASKETBALL SCORING SHEET

10 shots: made ________ missed ________ = $\frac{___}{10}$ = ☐ %

Multiply the numerator and denominator.

*example

10 shots: made __3__ = $\frac{3}{10}$ = 30 %

- -

CALORIE BURN

10 minutes of exercise: = 10 calories burned

1 candy = 10 calories

________ minutes of exercise

________ pieces of candy

*example 20 minutes of exercise = 2 candies

$$\begin{array}{r|l} & 2 \\ \hline 10 & 20 \\ & 20 \\ \hline & 0 \end{array}$$