

# Playground Construction

## Introduction

Your class has been asked to design and build a model of a playground area for a new community recreational park. Each group will decide on one structure to build for the playground. Each structure should be different from the others. Using the Internet and other resources, find information on playground equipment

## Math Principles

Ratios

Perimeter/Circumference

Area

Units of measure

Draw/Measure angles

Properties of Polygons

Transformation

## Science Principles

Simple machines

Measurement

Data collection

Prediction

## Language Arts Principles

Organization

Summarization

Oral Presentation

Draw Conclusion

## Technology Principles

Materials

Problem solving

Design Process

Database/spreadsheet

Accessing/using network communication systems

Word processing/computer graphics

Use and maintain technological system

## Related Links

[peacefulplaygrounds.com](http://peacefulplaygrounds.com)

[vtea.org](http://vtea.org)

[playworldsystems.com/safety/standard/auditguide.pdf](http://playworldsystems.com/safety/standard/auditguide.pdf)

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## Design Challenge:

Design and build a structure for the playground. Write a short paragraph describing those geometric concepts that apply to your structure. Make a drawing of your structure labeling angles and giving their measurements. Be prepared to share your paragraph and structure drawing with the class.

## Criteria:

- Your structure must:
  - fit within your 10" by 10" coordinate square on the playground model
  - be no more than 12" high
  - be colorful and neat
  - contain examples of geometric shapes (circle, square, triangle, and rectangle)
  - contain examples of right, acute, and obtuse angles.

## Materials:

You may select from the items below

- 2 strips of balsa wood per student
- wooden dowels
- 10" by 10" cardboard base
- craft sticks
- tag board
- general art supplies
- glue
- any recycled materials

## Tools:

- ruler
- saw
- drill
- vice
- file
- jig
- safety glasses

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## Targeted Standards of Learning:

### Science

The student will plan and conduct investigations in which

- a) rocks, minerals, and organisms are identified using a classification key;
- b) estimations of length, mass, and volume are made.
- c) appropriate instruments are selected and used for making quantitative observations of length, mass, volume, and elapsed time;
- d) accurate measurements are made using basic tools (thermometer, meter stick, balance, graduated cylinder);
- e) data are collected, recorded, and reported using the appropriate graphical representation (graphs, charts, diagrams);
- f) predictions are made using patterns, and simple graphical data are extrapolated;
- g) manipulated and responding variables are identified; and
- h) an understanding of the nature of science is developed and reinforced.

### Mathematics

The student will describe and determine the perimeter of a polygon and the area of a square, rectangle, and right triangle, given the appropriate measures.

The student will identify and describe the diameter, radius, chord, and circumference of a circle.

The student will choose an appropriate measuring device and unit of measure to solve problems involving measurement of

- a) length – part of an inch ( $\frac{1}{2}$ ,  $\frac{1}{4}$ , and  $\frac{1}{8}$ ), inches, feet, yards, miles, millimeters, centimeters, meters, and kilometers;
- b) weight/mass—ounces, pounds, tons, grams, and kilograms;
- c) liquid volume—cups, pints, quarts, gallons, milliliters, and liters;
- d) area – square units; and
- e) temperature – Celsius and Fahrenheit units.

Problems also will include estimating the conversion of Celsius and Fahrenheit units relative to familiar situations (water freezes at  $0^{\circ}$  C and  $32^{\circ}$  F, water boils at  $100^{\circ}$  C and  $212^{\circ}$  F, normal body temperature is about  $37^{\circ}$  C and  $98.6^{\circ}$  F).

The student will measure and draw right, acute, and obtuse angles and triangles, using appropriate tools.

The student, using two-dimensional (plane) figures (square, rectangle, triangle, parallelogram, rhombus, kite, and trapezoid) will

- a) recognize, identify, describe, and analyze their properties in order to develop definitions of these figures;
- b) identify and explore congruent, noncongruent, and similar figures;
- c) investigate and describe the results of combining and subdividing shapes;
- d) identify and describe a line of symmetry
- e) recognize the images of figures resulting from geometric transformations such as translation (slide), reflection (flip), or rotation (turn).

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## English

The student will listen, draw conclusions, and share responses in subject- related group learning activities.

- a) Participate in and contribute to discussions across content areas.
- b) Organize information to present reports of group activities.
- c) Summarize information gathered in group activities.

The student will make planned oral presentations.

- a) Determine appropriate content for audience.
- b) Organize content sequentially or around major ideas.
- c) Summarize main points before or after presentation.
- d) Incorporate visual aids to support the presentation.
- e) Use grammatically correct language and specific vocabulary.

## Reading

The student will demonstrate comprehension of information from a variety of print resources.

- a) Develop notes that include important concepts, summaries, and identification of information sources.
- b) Organize information on charts, maps, and graphs.

## Writing

The student will write for a variety of purposes: to describe, to inform, to entertain, and to explain.

- a) Choose planning strategies for various writing purposes.
- b) Organize information.
- c) Demonstrate awareness of intended audience.
- d) Use precise and descriptive vocabulary to create tone and voice.
- e) Vary sentence structure.
- f) Revise writing for clarity.
- g) Use available technology to access information.

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## Lesson Plan

### Objective

To design and build a scale model of a playground area and equipment.

### Materials for Each Team

- copy of the design challenge / guided portfolio
- general art supplies
- building materials (balsa wood, craft sticks, wooden dowels, pipe cleaners)
- tape / glue
- tag board
- 10" x 10" cardboard base
- any recycled material
- tools (safety glasses, ruler, saw, drill, vice, scissors, etc.)

### Procedure

1. Organize students into teams and distribute a copy of the "Playground Construction" student handout to each team.
2. Discuss the guidelines for the playground design. They are minimal to allow for maximum student creativity.
3. As a class, have students decide on a protocol for designing the playground, such as age appropriateness, united theme, or individual structures.
4. Have students research playground designs and equipment as well as safety regulations.
5. Each group should produce a building materials list as well as a cost analysis of constructing their structure.
6. Set a reasonable deadline for the models to be built depending on whether the students can work at home or only during class time.
7. As students create their designs, mini-lessons on simple machines can be used where applicable.
8. Students keep a running vocabulary list.
9. Students should also keep current on their guided portfolio journal as the project progresses.

Adapted from VTEA Design Brief

*Children's Engineering: A Teacher Resource Guide for the study of Design and Technology in Grades K-5*

<http://www.vtea.org/ESTE/>



Presented by Teresa Baker  
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