

Playground Construction



Background: Your school has decided to build a new playground. Your class has been asked to design and build a model of a playground area that students would enjoy. Each person 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 school playground equipment.

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.

- | | | |
|---|--|--|
| <ul style="list-style-type: none">• 2 strips of balsa wood per student• wooden dowels• 10" by 10" cardboard base• craft sticks | <ul style="list-style-type: none">• tag board• general art supplies• glue• any recycled materials | Tools: <ul style="list-style-type: none">• ruler• saw• drill• vice• file• jig• safety glasses |
|---|--|--|

Targeted Standards of Learning: Mathematics 5.8, 5.11, 5.13
Supporting Standards of Learning: Science 5.1
Mathematics 5.9, 5.15
English 5.1, 5.3, 5.7, 5.8
Computer/Technology 5.4

Targeted Standard for Technological Literacy: 12
Supporting Standards for Technological Literacy: 11, 20

Playground Construction



Targeted Standards of Learning: Mathematics 5.8, 5.11, and 5.13

- The student will describe and determine the perimeter of a polygon and area of a square, rectangle, and right triangle given the appropriate measures.
- 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°C and 32°F , water boils at 100°C and 212°F , normal body temperature is about 37°C and 98.6°F).

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

Targeted Standard for Technological Literacy: Standard 12

- Students will develop the abilities to use and maintain technological products and systems.

| Prior Knowledge & Skill | Materials & Preparation | Safety Issues | Class Management | Materials Provided | Time Management |
|---|---|---|---|--|--|
| <ul style="list-style-type: none"> • Understanding of targeted Mathematics Standards of Learning 5.8, 5.11, and 5.13 • Basic understanding of the design process • Introduction to the safe use of tools (if using wood strips and dowels) | <ul style="list-style-type: none"> • See Design Brief for recommended materials. Teachers may substitute materials. • Elementary tools as found in tool list • Recycled and found objects may be used in place of wood strips. | <ul style="list-style-type: none"> • Always wear safety glasses when sawing or drilling. • Have an adult present when student is using saw. | <ul style="list-style-type: none"> • Individual or pairs | <ul style="list-style-type: none"> • Design Brief • Guided Portfolio • Rubric Assessment • KWL | <ul style="list-style-type: none"> • Session 1: Introducing Design Brief and Portfolio (30 min.) • Sessions 2-4: Building (30 min. each) • Session 5: Completing Portfolio (30 min.) • Session 6: Sharing and evaluating (45 min.) |

Name _____

Playground Construction



Group Members: _____

1. What is the problem? State the problem in *your own words*.

2. Research: Use the Internet, encyclopedias, or other reference books to research the structure you will design and build. Write down any information you find.

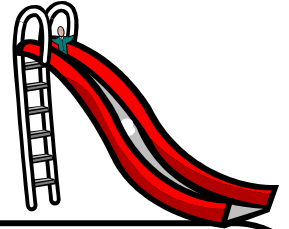
Targeted Standards of Learning: Mathematics 5.8, 5.11, 5.13
Supporting Standards of Learning: Science 5.1
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Targeted Standard for Technological Literacy: 12
Supporting Standards for Technological Literacy: 11, 20

Name _____

3. Brainstorm solutions.

Draw or describe some possible solutions.

A large graphic organizer consisting of four rounded rectangular boxes arranged in a 2x2 grid. In the center, where the four boxes meet, is a black and white illustration of a lit lightbulb with radiating lines, symbolizing an idea or solution.

Name _____

4. Planning: Playground Construction

Choose your favorite playground structure and make a drawing that shows how the design will work.

Draw the working parts.

Label the materials you will use on each part of the structure.



A large, empty rounded rectangular box intended for drawing and labeling the playground structure.

Name _____

6. Test your solution.

- Does your structure fit on the 10" by 10" base? YES NO
- Is your structure no more than 12" high? YES NO
- Does your structure contain geometric shapes? YES NO
- Does your structure contain right, acute, or obtuse angles? YES NO
- Is your project neat and colorful? YES NO



Name _____



7. Evaluate your solution.

Was it the best solution? Would one of your other ideas have been better? Why or why not?

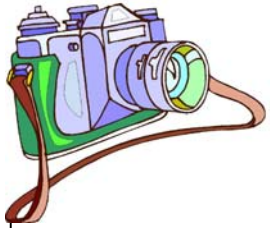
What would you have done differently?

Could you add to it to make it better? What would you add to it?

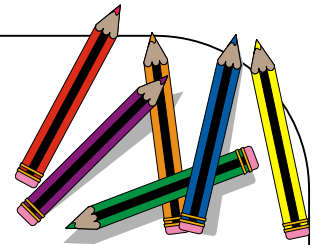
Guided Portfolio—8

Name _____

Attach a photograph of your final project here. If you do not have a photograph, draw a picture of your final project.

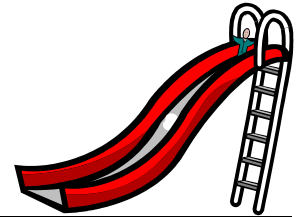


How would you make your project better? Draw a picture showing how it would look after you have made changes to it.



Name _____

KWL: Playground Construction



| What we <u>K</u> now. | What we <u>W</u> ant to know. | What we <u>L</u> earned. |
|-----------------------|--|--------------------------|
| | <p style="text-align: center;">Sample Questions</p> <p>What safety issues are related to playground construction?</p> <p>What materials should be used?</p> <p>What are popular playground structures?</p> | |

Targeted Standards of Learning:
Supporting Standards of Learning:

Mathematics 5.8, 5.11, 5.13
Science 5.1
Mathematics 5.9, 5.15
English 5.1, 5.3, 5.7, 5.8
Computer/Technology 5.4

Targeted Standard for Technological Literacy: 12
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Rubric for *Playground Construction*

Name _____

Date _____

| Design Brief Rubric | no evidence | limited understanding | some understanding with room for improvement | good understanding with room for improvement | substantial understanding |
|--|-------------|-----------------------|--|--|---------------------------|
| | 0 | 1 | 2 | 3 | 4 |
| The student restated the problem in his/her own words. | | | | | |
| The student brainstormed more than one idea. | | | | | |
| The student created and labeled a sketch to use as a "blueprint." | | | | | |
| The student included notes about problems that occurred and their solutions. | | | | | |
| The student tested the structure to make sure <ul style="list-style-type: none"> it fit the 10" by 10" base it was no more than 12" high it contained identified geometric shapes it had right, acute, or obtuse angles that were measured it was colorful and neat. | | | | | |
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| | | | | | |
| The student made a drawing that <ul style="list-style-type: none"> showed names and measurements of angles. | | | | | |
| | | | | | |
| The student wrote a paragraph that <ul style="list-style-type: none"> described the structure described geometric concepts. | | | | | |
| | | | | | |
| The student evaluated how he/she could make it better next time. | | | | | |



Rubric for *Playground Construction*

Name _____

Date _____



| Oral Communication Rubric | no evidence | limited understanding | some understanding with room for improvement | good understanding with room for improvement | substantial understanding |
|--|-------------|-----------------------|--|--|---------------------------|
| | 0 | 1 | 2 | 3 | 4 |
| 5.1 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. | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| 5.2 The student will use effective nonverbal communication skills. a) Maintain eye contact with listeners. b) Use gestures to support, accentuate, and dramatize verbal message. c) Use posture appropriate for communication setting. | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| 5.3 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. | | | | | |
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Standards of Learning

English (2002)

Oral Language

- 5.1 The student will listen, draw conclusions, and share responses in subject-related group learning activities.
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 - b) Organize information to present reports of group activities.
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- 5.3 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

- 5.7 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

- 5.8 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.

Science (2003)

Scientific Investigation, Reasoning, and Logic

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

Mathematics (2001)

Measurement

- 5.8 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.
- 5.9 The student will identify and describe the diameter, radius, chord, and circumference of a circle.
- 5.11 The student will choose an appropriate measuring device and unit of measure to solve problems involving measurement of
- length-part of an inch ($\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$), inches, feet, yards, miles, millimeters, centimeters, meters, and kilometers;
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- 5.13 The student will measure and draw right, acute, and obtuse angles and triangles, using appropriate tools.

Geometry

- 5.15 The student, using two-dimensional (plane) figures (square, rectangle, triangle, parallelogram, rhombus, kite, and trapezoid) will
- recognize, identify, describe, and analyze their properties in order to develop definitions of these figures;
 - identify and explore congruent, noncongruent, and similar figures;
 - Investigate and describe the results of combining and subdividing shapes;
 - identify and describe a line of symmetry; and
 - recognize the images of figures resulting from geometric transformations such as translation (slide), reflection (flip), or rotation (turn).

Computer Technology (2001)

C/T5.4 The student will communicate through application software.

- a) Create a 1-2 page document using word processing skills, writing process steps, and publishing programs.
- b) Use simple computer graphics and integrate graphics into word-processed documents.
- c) Create simple databases and spreadsheets to manage information and create reports.
- d) Use local and worldwide network communication systems.

Standards for Technological Literacy

Standard 11: Students will develop the abilities to apply the design process.

Standard 12: Students will develop the abilities to use and maintain technological products and systems.

Standard 20: Students will develop an understanding of and be able to select and use construction technologies.