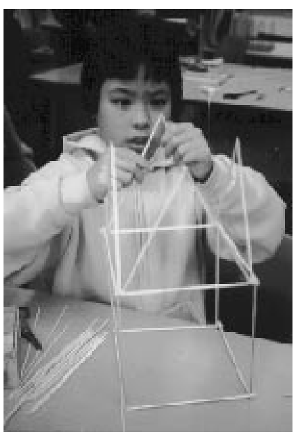
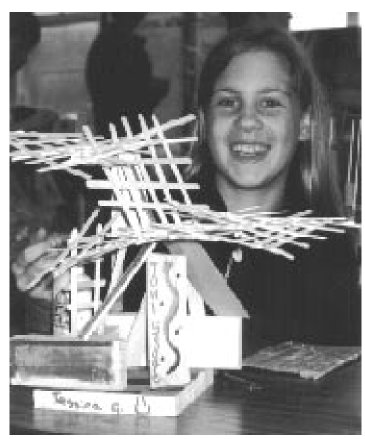
BEEP

Built Environment Education Program

A Handbook for
Teachers and
Architects





California Architectural Foundation

BEEP
Built **E**nvironment **E**ducation **P**rogram

A Handbook for Teachers and Architects

published by:
California Architectural Foundation

This handbook could not have been possible withoutthe contributions of time and expertise of dozens of volunteer architects, teachers and related organizations.

The California Architectural Foundation wishes to express its deepest appreciation to The American Insitute of Architects, College of Fellows for its generous contribution which helped make the revision of this handbook possible.

Foreword

In keeping with its mission to enhance architectural education in California and build bridges to our communities and the public, the California Architectural Foundation is proud to present this new and improved Built Environment Education Program (BEEP) Handbook for Teachers and Architects. BEEP is a project funded and by the California Architectural Foundation (CAF) and generous contributions from individuals, members, and private and public organizations. In addition, BEEP education efforts are supported by the state component of the American Institute of Architects (AIA), The AIA California Council (AIACC), and are implmeented by AIA members at the local chapter level. The revision of this manual was made possible by a special grant awarded by the AIA College of Fellows.

The Foundation feels that one of its most important responsibilities is to teach an awareness of the relationship between the built and natural environments to young people. BEEP is an effective way to meet this responsibility through a cooperative effort between California educators and architects in a classroom setting. BEEP has the potential to educate the city builders of tomorrow about the importance of responsible urban development and the preservation of our natural environment.

In the words of the *Boyer Report,* commissioned by the AIA and developed by the Carnegie Foundation, "perhaps never in history have the talents, skills, the broad vision and the ideals of the architecture profession been more urgently needed. The profession could be powerfully beneficial at a time when the lives of families and entire communities have grown increasingly fragmented, when cities are in an era of decline and decay rather than limitless growth, and when the value of beauty in daily life is often belittled." The BEEP program is a powerful tool which can bring the many benefits of architecture into the worlds of thousands of young minds, who will then grow up with a much greater appreciation of their surroundings, both built and environmental.

This program provides training, resource materials and public awareness tools and helps BEEP teachers keep in touch with statewide and national developments in the built environment education field. It is implemented on the local chapter level via volunteer architects and teachers, who plan curriculum spanning architecture, urban planning, engineering, natural science, social studies, and art. Depending upon the learning level of the students, projects can range from basic geometric identification to complicated urban planning and design projects.

Other programs wanting to use BEEP materials or receive the CAF endorsement should contact 916/448-9082. Materials have been developed by the CAF in conjunction with other environmental education programs, groups and agencies, some of which have granted permission for the use of their materials. Reprinting of the *BEEP Handbook* and its materials is by permission only.

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Introduction

> "Democratic responsibility can be acquired only through practice and involvement. It does not arise suddenly in adulthood through simple maturation; it must be fostered directly from an early age. I believe that the environments we occupy as children and the extent to which we feel involved in shaping them, or caring for them, is a particularly important domain for such learning." [1]

What were the most powerful educational experiences you had as a child? Chances are those experiences happened outside the classroom, or they involved some kind of hands-on creative engagement such as touching, building, or making.

Many of the great elementary school teachers understand the power of hands-on project-based learning. To this end, they often bring architectural projects into their classrooms to create opportunities for children to use their intellectual, visual, and kinesthetic sensibilities in a new way. Inspired by materials available through the organizations such as the Center for Understanding the Built Environment (CUBE) in Kansas, the Cooper Hewitt National Design Museum in New York, and the Architecture and Children Program in New Mexico, teachers throughout the country are involving children in architecture-based projects with astounding success.

Many teachers have had the good fortune to work with local architects in programs sponsored by AIA chapters throughout the country. In programs such as the Built Environment Education Program (BEEP) in California, or Learning by Design in New York, architects go into the classroom to work with children in multi-week residencies.

Architects working with children and youth often say they are "hooked." They say working with young people helps them remember why they love architecture. With children they are able to freely engage in the creative process without the constraints of professional practice. They can work with the children on projects that are spatial and tactile, instead of toiling for long hours in front of a computer. And they can explore ideals about the built environment and community life while sharing the vibrancy and vitality of young peoples' imagination.

The Carnegie Foundation for the Advancement of Teaching and the American Architectural Foundation are aware of the power of this educational experience for both architects and children. They have joined forces to study just what it is about the design studio process that can help children's learning in the nation's schools. On the heels of the *Boyer Report*, the report, *Building Connections*, outlines ways in which the power of the architectural design process can be more thoroughly integrated into the K-12 educational curriculum. This report advocates the idea that methods found in the best design studios — critical thinking, problem-solving, teamwork and integrative learning can help students draw more sophisticated connections between subjects such as math, science and the arts.

[1] Hart, Roger. "Children's Participation in Planning and Design." In *Spaces for Children* edited by Carol Weinstein and Thomas David. New York: Plenum Press, 1987.

Teaching an awareness of the environment to young people is one of the Foundation's most important responsibilities. BEEP is an effective way for the California Architectural Foundation to meet this responsibility. BEEP programs use architecture as a framework within which to stimulate the intellectual, political and social development of young people. The general objective of each BEEP residency is to promote environmental learning and activism among children. Through a series of exercises, projects and field trips, architects expose children to the inter-relationship of the built, natural and cultural environments. Blending the skills and imagination of the architects, teachers and students, architectural projects can augment and amplify the academic and social curriculum. The Foundation encourages students to gain a better understanding of built environment education concepts through a multi-disciplinary, cross-curricular approach to learning about subjects such as math, science, art and literature.

Teaching about architecture also offers an opportunity to connect the classroom curriculum with real life issues. Through participatory activities focused on the built environment, children become engaged in projects of interest and value to themselves and their communities. Architectural themes create a context within which children collectively problem solve, plan projects, and conduct explorations based on the issues surrounding that theme. During BEEP residencies, architects and students create innovative design proposals for homes, schools, neighborhoods and communities. They grapple with local urban development issues and come up imaginative proposals to solve difficult physical problems. They also tackle social issues such as homelessness and environmental sustainability as they create complex and thoughtful design-based proposals for their local communities. In so doing, young people begin to understand the socio-political dynamics of the city.

The collaborative model for an architecture-based curriculum enables children from different backgrounds to be co-investigators and co-learners on projects. They also have the opportunity to work intimately with adults who are architects, design and planning professionals, parents, politicians and artists. In the collaboration everyone pools their skills, talents and resources to create a project in which they all have pride. They learn to respect each other's differences in culture, gender, age, and class background while they work together toward a common goal.

During BEEP programs, children also learn technical skills that are transferable to other areas of their lives. An architectural curriculum can introduce the students to public speaking, problem solving, meeting facilitation, budget making, policy making, troubleshooting, negotiation, and consensus building. When young people speak out, or facilitate groups their voices become stronger. When they capture their ideas on paper or in models, their hands become stronger. As their visual and political literacy develops, they see themselves as artists, professionals, public speakers, technicians and civic actors.

Children are natural designers, builders and entrepreneurs. They are our most active, our most enthusiastic and our most optimistic citizens. When they have opportunities to design, control or change their physical environments, they learn skills, but more importantly, they learn an attitude. By actively participating in educational programs which support and nurture their creativity and activism, young people learn to take a posture of entitlement and involvement. When young people are truly engaged in the process of planning and designing environments, they experience personal transformations in other areas of their intellectual, social and political lives. As the children's visual and political literacy develops, they begin to see themselves as vital, engaged citizens, who have a greater understanding of quality environments and community living.

History

In 1983 the Task Force on Environmental Awareness for the AIACC proposed an environmental education program to AIACC's Board of Directors. The proposal gave impetus to an idea that had been considered for some time by both educators and architects.

The idea originated from a variety of sources and programs: *A Book of Cities* by June McFee, the *Source Book* (which was concerned with the natural more than the built environment), the National Endowment for the Arts Architects in the Schools program, the City Building Program in Los Angeles, the Art in the Built Environment Program in England, and a project in Portland, Oregon for the Washington County Educational Service District. Although these programs focused on specific environmental issues, AIACC wanted to establish a curriculum that related to the total environment, and administered by the California Architectural Foundation (CAF).

In 1983, architect Jim Tremaine, AIA, formulated a model program for the Santa Barbara area. With direction from the Children's Creative Project, the AIA Santa Barbara Chapter, and the Community Environmental Council, Tremaine began a program which eventually encompassed more than eight school districts in Santa Barbara County.

Under the direction of the Environmental Awareness Education Committee, the Foundation continued to plan an environmental awareness program for public schools. The program, as envisioned by the Committee, would give students an understanding and awareness of the built environment. The goal of the program was to combine a concern for people and nature with the realization that people's actions have a lasting impact on the environment. The program would be infused into the regular curriculum of math, geography, social studies, science, and English and would expose students to real, identifiable situations while teaching the importance of natural resources, the necessity of environmental quality maintenance, and the consequences of individual environmental choices.

With the Santa Barbara program as a model, the Foundation applied for and received a grant from the State Department of Education to begin the project, which was designated as "BEEP"—the Built Environment Education Program. Using the grant and additional funds from CAF and its donors, a pilot program began in four schools in January of 1986.

The four pilot elementary schools included three schools in the San Luis Obispo area and one in Bakersfield. Each program included a classroom team of a teacher and at least one architect. In the three pilot schools near San Luis Obispo, graduate students in architecture from California Polytechnic State University (Cal Poly) joined the teaching team. Each school in the pilot program chose its own topic for study and related it to a familiar environment, culminating in a class project. Based on the success of the pilot programs, an institute for teachers, administrators and interested architects was established in June 1986. The initial seminar at Cal Poly included lectures, workshops and laboratory sessions. The institute instructors not only informed teachers about BEEP, but also provided examples of how to effectively integrate it into school curriculums. Successive institutes were held at UC Santa Cruz, Cal Poly and Consumnes River College, Sacramento. Approximately 120 teachers and design professionals were trained at these statewide workshops. In 1989, the CAF began a program of regional workshops for cities with strong local BEEP programs. These workshops, often held on a weekend, have trained 150 BEEP team leaders in Los Angeles, San Diego, Santa Rosa and Modesto.

For several years now the BEEP program has been administered at the local AIA chapter level and supported by the CAF through the distribution of the *BEEP Manual* and the implementation of training workshops for teachers and architects. In 1995, the CAF joined forces with the AIA San Francisco chapter and its affiliate program, called LEAP, a multi-faceted program with an architectural element that is virtually synonymous to BEEP. These allied organizations developed and implemented a successful two day teacher/architect seminar in San Francisco, geared to train "beginners" and more "advanced" BEEP enthusiasts on how to implement the program in the classroom.

In 1998, the CAF held a BEEP training seminar in conjunction with the national AIA convention in San Francisco. This event was funded through a special grant awarded by the AIA College of Fellows. A KIDstruction Activity was held following the seminar to demonstrate an activity highlighted in the manual that teaches the importance of city planning. This a fun, hands-on activity geared to engage young students in a collaborative approach to how construction relates to the built and natural environments. Students build structures and plan cities with recycled materials (including plastic containers, cardboard tubes, fast food containers, aluminum foil, egg cartons, aluminum cans, and cardboard boxes).

The BEEP program continues to operate at the local AIA chapter level through a network of architects and teachers. To support these local efforts, the California Architectural Foundation continues to provide supportive learning materials such as this newly revised *BEEP Handbook* as well as conduct workshops to train teachers and architects how to implement BEEP in school classrooms.

How to Use This Book

This book is designed to be used by architects, teachers and others who want to introduce children to the world of architecture. It includes a series of participatory projects that have been used in AIA BEEP programs in schools throughout California for the past two decades. The activities in this book use architecture to create a framework within which to catalyze critical thinking, creative problem solving and visual literacy. Most of the projects emphasize multi-disciplinary, "hands-on" understanding about ideas and issues in the built environment. The activities encourage children to investigate, invent and explore. They also challenge children to apply and synthesize their skills in math, science, social studies, history and language as they engage in collaborative project-based learning.

The activities included in this book can guide and inspire architects and teachers to design customized architecture-based programs of their own. Those who are launching BEEP residencies in the schools can choose their favorite ideas from the activities and handouts in this book. They can then design a curriculum sequence tailored to their own interests, talents and needs. Architects and teachers can select activities and projects from this book that best support or complement their academic and social goals for their students. The menu of activities in this book can be used for short-terms charrettes, or long-term residencies in a classroom. They can be used with small groups of children, or for classes of 40. Most projects are geared for students in grades 3-6, but they can be tailored to students in middle schools and even high schools.

The book is organized into 4 major sections: **1) Introducing Architecture, 2) Critical Thinking, 3) Skill Building, 4) Designing, Creating and Transforming.** Each section contains a series of participatory activities described in simple straightforward terms. Each activity is contained on one page, with visual illustrations, a set of goals, a description of the activity, and suggestions about how to extend the activity in future sessions. Many of the activities refer to accompanying handouts, which are located in the back of the book. A bibliography and glossary are included as resources. Tips for architects and teachers in BEEP residencies are also located in the back section. The book is bound in a 3-ring binder, so that users can add their own favorite activities, and remove ones that aren't of use.

Section 1- Introducing Architecture

The first section sets the stage for a multi-week exploration of architecture. It features activities that introduce architecture in an accessible and familiar way to young students. Some of the activities are "architectural icebreakers" — ways for adults and children to get to know each other while they are thinking about the built environment. Many projects in this section are about people and animals, and their relationships to their physical surroundings. Through these introductory activities, children can start to make connections between human need, culture, elements of nature and architectonic form.

Section 2 - Critical Thinking

The second section of this handbook contains activities designed to create opportunities for young people to think critically about their environment. Many of the projects featured in this section allow the children to document, observe, analyze and reflect on their surroundings. They encourage students to articulate what they like and don't like about the environments they occupy and see everyday. The activities create a context within which children can represent their observations and feelings through photography, collage, texture rubbings, writing, drawing, or collecting. These projects help children analyze the meaning and content of different environmental settings. More importantly, they help children understand elements of design such as form, color, materials and function. Projects in this section explore ways in which architecture expresses social, political and economic relations. As they engage in these activities, the children realize that the built environment isn't just something that happens, but that elements were deliberately designed by people with goals, values and visions.

Section 3 - Skill Building

Architecture is multi-disciplinary field and requires a sophisticated application of skills that children often learn in the abstract. This section features "hands-on," "minds-on" activities that enable students to internalize mathematical and scientific concepts. It contains a series of activities about geometry, structure, scale and blueprint making. A series of exercises about geometry helps children to apply their knowledge of volumes, form and shape. Other activities explore how structural systems work to create buildings. Students can investigate principles of stability, strength and structural integrity. In the activities about scale, students use the human body to study measurement, ratio and proportion. Projects about mapping and blueprint reading highlight concepts such as circulation, mass, density and spatial relations. All activities in this section stress the use of scientific methods: hypothesis, observation, abstract reasoning, invention and testing.

Section 4 - Designing, Creating, and Transforming

The most exciting challenge for architects and educators is help young people to translate their knowledge into action. This section contains examples of culminating projects that allow children to put it all together in more complex design and building projects. Most of the projects in this section have been facilitated by architects in elementary school classrooms. These hands on model-making projects are usually collaborative, large-scale efforts completed during a 2-4 week time period. These projects require brainstorming, organizing, planning and construction. Most involve building models of homes, schools, neighborhoods, or communities. Children must employ teamwork, negotiation and consensus building as they bring the projects to completion. Because many of the projects are related to "real-life" problems, they also include opportunities for the children to communicate their ideas in forums, exhibitions, newsletters, posters, presentations to community groups and city officials.

Introducing Architecture

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“Bio Boards”

Goals

- ◆ To introduce architects, teachers and the students to each other.
- ◆ To stimulate thinking about the relationship between self and the built environment.

Activity

For a first activity, everyone can make introductory “Bio Boards.” On a piece of stiff 11" x 17" paper make a poster about yourself. Use magazine clippings, found objects, photographs, colored paper, and marking pens to construct a composition introducing you to the group. Include images that communicate something about your history, favorite pastimes, favorite buildings or places etc. When completed, each person (architects, teachers and students) can stand up and introduce themselves to the group through the “Bio-Board”.

Extensions

Construct 3-D "Bio-Boards" (i.e., fold-up pyramid) with symbolic images about exteriors and interiors. Use “Bio-Boards” as the cover of portfolios, or combine them in a quilt.

Architectural Name Tags

Goals

- ◆ To introduce everyone and start them thinking about architecture.
- ◆ To help the students start to design collaboratively.

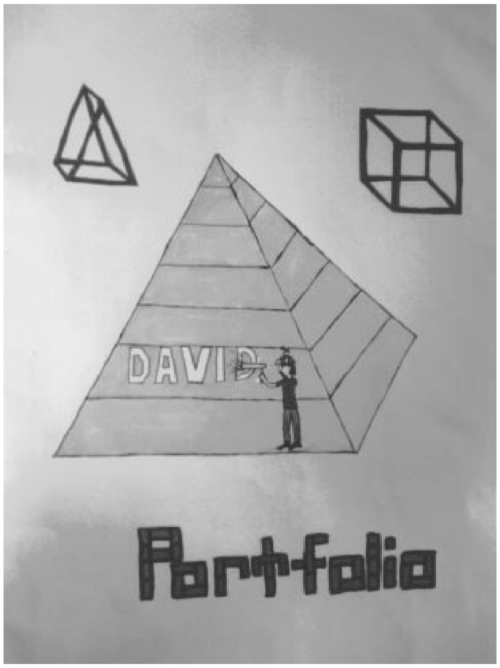
Activity

There are several fun techniques for designing name tags. Divide students into pairs. Each child should design a name tag for his/her partner. The name tag should represent something about the other student, and include a representation of a place or building the student likes. Or the pair can design both name tags to represent something they have in common. Name tags can be made from paper and embellished with simple collage materials (magazine clippings, colored paper, buttons, cutout letters, marking pens). Students can hang them around their necks with string, affix with safety pins, or wear as hats.

Extension

Using 2 pieces of colored paper, design a 3-D structure that stands up, and contains your name. (Show them how to make folds, curls, cuts, rips, slots and grooves.)

Personal Portfolios



Goals

- To provide a place for children to collect images, drawings and other records of their work.
- To allow students to record their growth during the course of an architecture residency.

Activity

Portfolios should be at least 11" x 17" to accommodate work that children collect. Give each student tag board or heavy paper to create a cover. Bind portfolios with pipe cleaners, or join them with "accordion style" inserts on the sides. Include blank pages for sketching or a pocket for a sketch book. Students can decorate the cover with colored paper, marking pens and images cut from old architecture magazines. Ask them to include their name and the word "architecture" in their composition.

Extensions

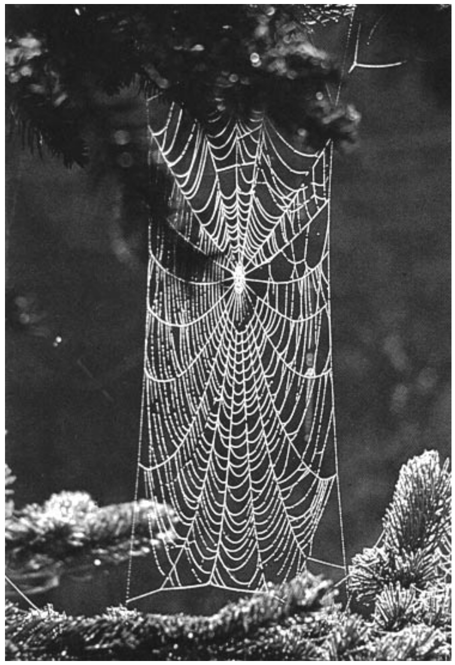
Children can decorate the cover by drawing a building from each letter of their name, or including their name in a drawing of a building.

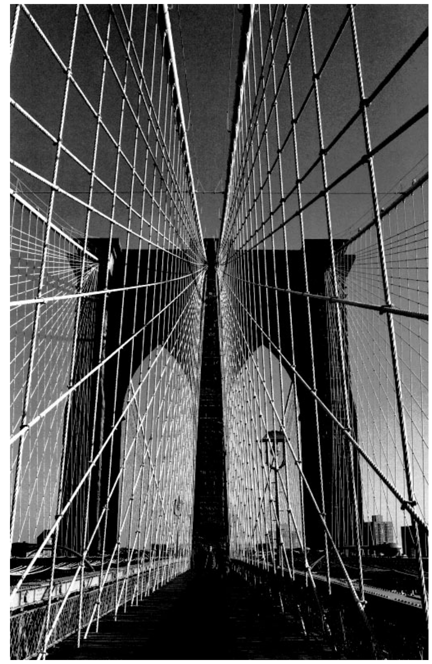
Architecture Center

Many architectural learning experiences in the classroom will be an total class collaboration, with children working individually at their desks or together in small groups. However, it is a good idea to have an Architecture Center in the classroom as a display space and resource center. It can also be a place for students to go to work after school, or during free time when they have finished other projects. The architecture center can contain:

1. A drafting board and equipment.
2. A computer with SimCity, Kid CAD or other appropriate software.
3. Architectural tools, supplies.
4. A storage system for portfolios and projects.
5. A display area to display images of adult architecture.
6. A pin-up board or an exhibition space for children's work.
7. Clip boards or sketch books hanging on hooks.

Animal Architecture





Goals

- To introduce ideas about architecture in a way that is easily accessible, familiar and understandable.
- To help children think about issues in architecture: materials, form, function, topography, weather, site.

Activity

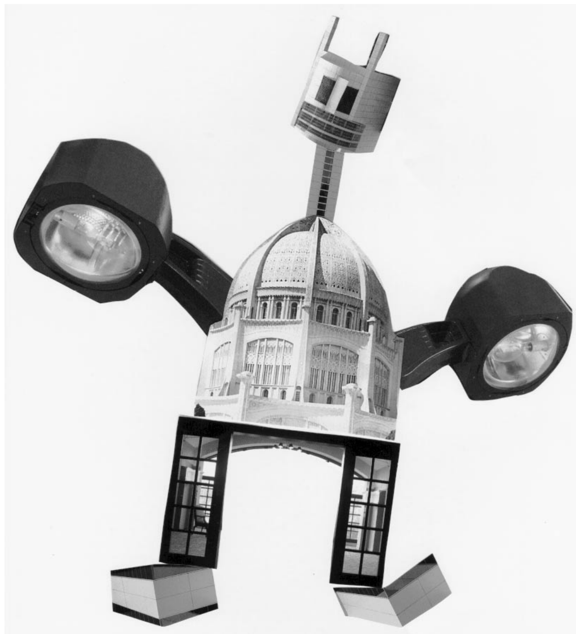
Show children's images of animal architecture: beehives, bird nests, beaver lodges, spider webs, turtle shells and termitaries. Ask questions to provoke discussion and thinking: "Why is the bird nest in the tree?" "Why is it constructed of sticks?", Show images of human architecture with similar characteristics: spider web-Brooklyn Bridge. Have children compare and contrast: "How are these structures the same?" " How are they different?" "Why?"

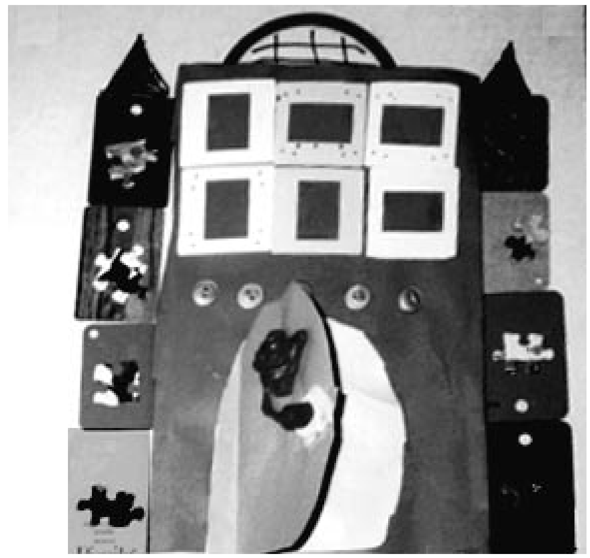
Extensions

Have children design a game about animal architecture.

Using similar materials, build a different type of habitat for an animal, i.e. recombine sticks for bird nest into a different structure.

Architectonic Creatures





Goals

- To understand the relationship between user and architectural form.
- To introduce students to architecture in a fanciful, fun way.
- To encourage students to start to see architectural elements.

Activity

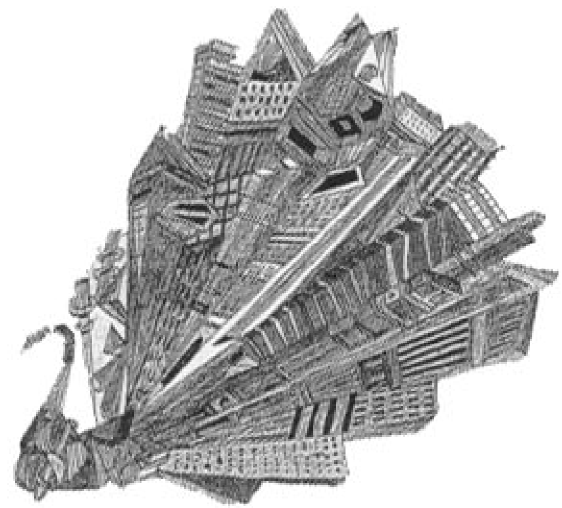
Cut out images from old architectural magazines to construct a collage of an imaginary creature. Use glue sticks to adhere the cut-out components of the creature on an 11" x 17" paper. As the students are designing the creature, they can be thinking about that creature's special needs: how does it sleep? eat? move?

Extensions

After they have designed the creature, students can use various materials to represent the facade of that creature's habitat. Encourage them to respond to the special needs of their creature. For example, if the creature has wheels for feet, the habitat should feature special ramps.

Write a story about the creature and its habitat.

Architectural Animals



Goals

- ◆ To start children thinking about structure, form and detail.
- ◆ To introduce simple drawing techniques.
- ◆ To observe, understand and play with architecture.

Activity

In early sessions children can begin to have some fun with architecture while they are developing their observational and design skills. Ask children to think of some of their favorite animals, and find or draw images of them. Begin to deconstruct the animals: what shapes are their wings, legs, bodies? Do these parts remind you of any part of a building you have seen? Can you re-draw that animal from parts of buildings? i.e. legs = columns, back = arch, windows = eyes, etc. Draw your favorite animal again, substituting building elements for their different body parts.

Extensions

Design an architectural animal zoo.

Global Architecture

Goals

- To introduce children to the range of architectural expression
- To explore architectural structures in different countries, cultures and periods of time

Activity

Show images of architecture ranging from indigenous structures to well-known monuments: igloos, teepees, log cabins, stone houses, Falling Water, Taj Mahal, Guggenheim Bilbao. Select images that highlight issues such as: materials, climate, form, cultural expression, and technology. Choose buildings that are fun for the children look at and think about. Discuss. Xerox images of these buildings. Have the children find their favorite buildings and try to find their location on a world map.

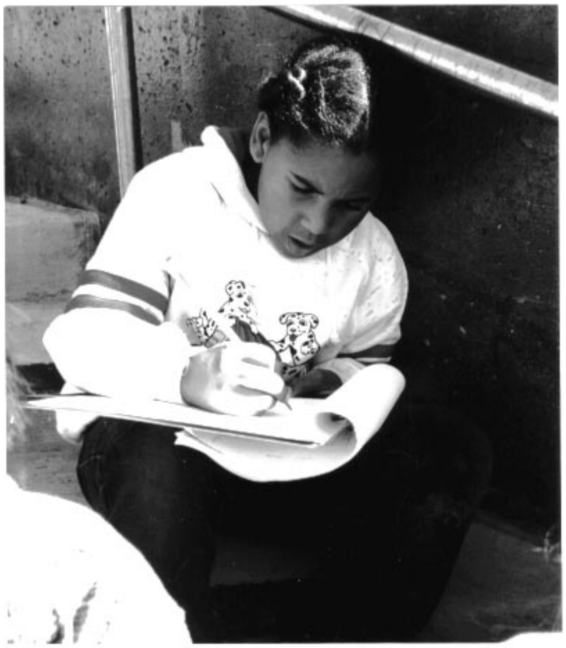
Extensions

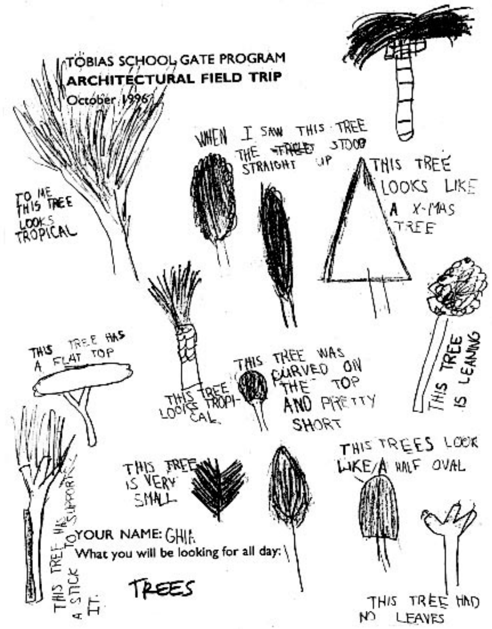
Select a favorite image, and write a story (or conduct research) about the people who made or live in that structure: why did they use that form? why did they build with certain materials? where do they sleep? where do they eat? what do they believe?

Critical Thinking

The second section of this handbook contains activities designed to create opportunities for young people to think critically about their environment. Many of the projects featured in this section allow the children to document, observe, analyze and reflect on their surroundings. They encourage students to articulate what they like and don't like about the environments they occupy and see everyday. The activities create a context within which children can represent their observations and feelings through photography, collage, texture rubbings, writing, drawing, or collecting. These projects help children analyze the meaning and content of different environmental settings. More importantly, they help children understand elements of design such as form, color, materials and function. Projects in this section explore ways in which architecture expresses social, political and economic relations. As they engage in these activities, the children realize that the built environment isn't just something that happens, but that elements were deliberately designed by people with goals, values and visions.

Neighborhood Walk





Goals

- To begin to see and think critically about the built environment.
- To use different tools to document, observe and reflect on architecture.

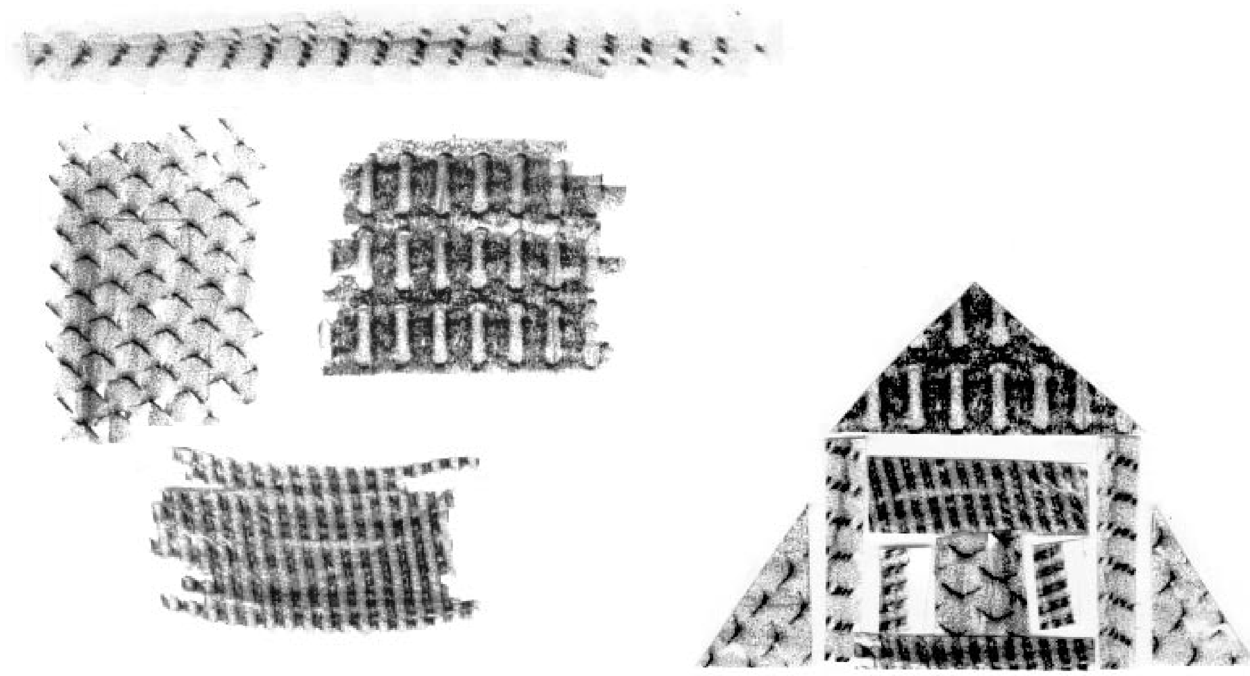
Activity

Organize a walk through the neighborhood or school. Give children sketching tools and collecting bags. If possible, bring a Polaroid camera. Ask each student to focus on an aspect of the built environment: windows, doors, trees. Have them represent their observations through sketches, photography, texture rubbings, writing, or collecting. Ask a series of questions such as "What do you like about the environment?" "What don't you like?" "How do the buildings respond to the land? the wind? the sun?" "Find a place that feels friendly." "Find the loneliest place." see handouts

Extensions

Imagine or write about how different people experience the environment: seniors, blind people, folks in wheelchairs, animals. Interview various users.

Texture Rubbings



Goals

- To see patterns, textures in everyday environments.
- To engage with the built environment in a tactile way.
- To begin to understand different historical eras, styles, values.

Activity

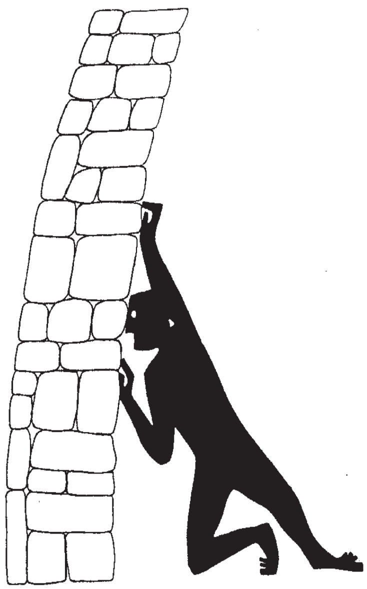
Give the students plenty of white paper sheets, soft pencils or crayons. Walk through the school, or better yet through a neighborhood. Show them how to make an impression of the textured pattern on a wall, on the ground, a street lamp or over metalwork. Lay the paper over the pattern and rub back and forth with the pencil or crayon. Continue to walk until the children have collected a variety of rubbings. Return to the class for a sharing session about what the children discovered.

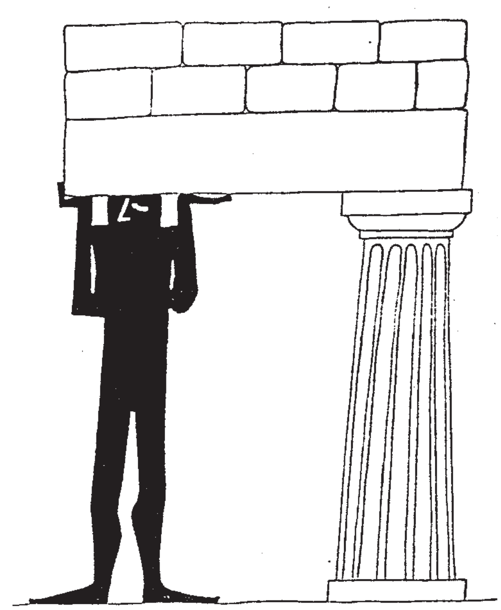
Extensions

Create a collage of a building by cutting out columns, pediments, doors, windows from the collected texture rubbings.

Design an "architecture detective" game using textures as clues.

Essential Elements





Goals

- To begin to identify the primary elements of architecture.
- To understand how elements work together to form a building.

Activity

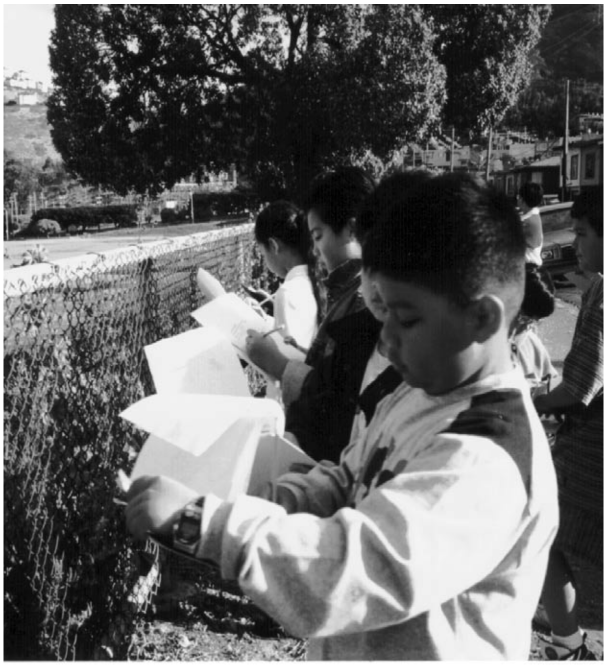
The book, *What It Feels Like to Be A Building* introduces children to architectural elements in a fun and accessible way. They can begin to understand architecture by imagining what it feels like to be each element. Use images from the book to introduce: column, post and lintel, arch, dome, pyramid, buttress, tower, bridge, etc. Then work in groups to act out, paying attention to how forces travel through the different pieces, and how work together to make a building. Collect images of each element from old architecture magazines. Contrast these images with historic examples of the same element. see handouts

Extensions

Use the book, *Bridges Go From Here to There,* and repeat the same exercises to understand the elements and structural forces in a bridge.

Images from What It Feels Like to Be a Building, by Forrest Wilson

Architectural Treasure Hunt



Goals

- ◆ To apply academic knowledge in a local "real life" context.
- ◆ To draw and describe function and location of architectural elements.
- ◆ To understand how elements work together in a building.

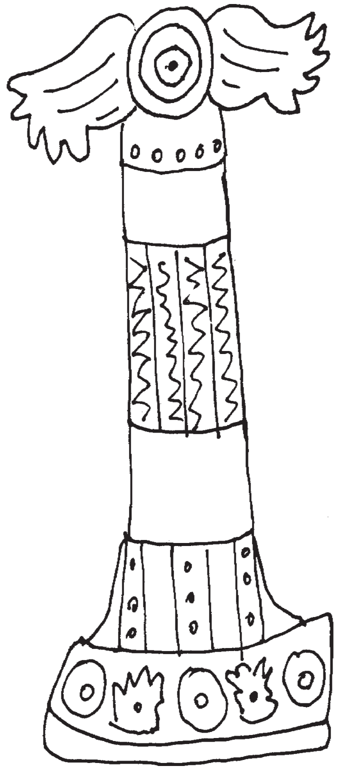
Activity

After children are introduced to the basic elements of architecture (see "Essential Elements"), challenge them to find as many elements as they can in their school, neighborhood or block. Have them create a "check list" of each element they think they will find. Then go on a neighborhood, or school yard walk for 20-30 minutes. Record visually and verbally the location of each element found on the walk. i.e. "column under awning in playground." After the hunt, trade lists with a partner. Try to locate each other's list of found elements. The "winner" is the one whose partner finds the most items on their list.

Extension

Draw a "map" identifying the location of all architectural elements in the school or neighborhood.

Crazy Columns



Goals

- To understand the meaning of style.
- To learn how to create a column detail.

Activity

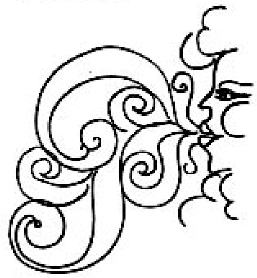
Once children have collected images of columns (see Essential Elements), compare different types. Study the details. Show early column styles: Doric, Ionic and Corinthian. Discuss issues such as color, size, form and function. Find images of unusual column applications such as Moss' "bent" columns or Venturi, Scott Brown's "children caryatids". Have each child design their own column style-including base, shaft and capital. Give all the same dimensions (i.e. paper towel or wrapping paper tube) and materials (colored paper, pipe cleaners, ribbon, foam, buttons, clay, paint, glitter etc.) Have a column fashion show.

Extensions

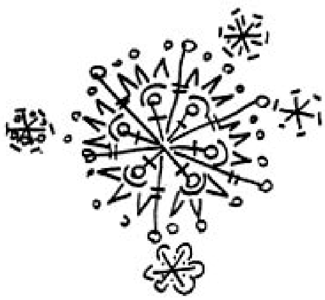
Give each child a large piece of paper of the same dimension (8 1/2" x 11", or 11" x 17" turned horizontally) and have them design, draw and color their own capital.

Building with the Land

Coast



Mountains



Goals

◆ To understand the architectural opportunities and constraints in different geographic and climatic regions

Activity

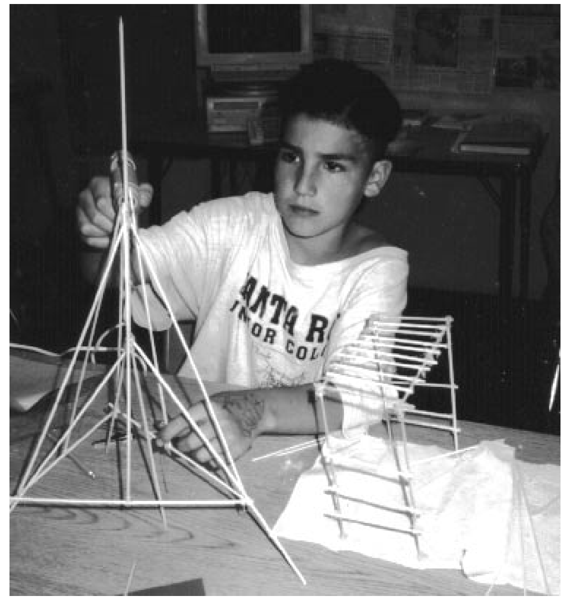
Make a cardboard topographic base model with various regions represented: mountains, desert, valleys, ocean, river. Honeycomb cardboard can create higher elevations. Blue paint or paper can represent water. Let each student select a site on the base map. Provide "natural" materials such as sticks, clay, rocks, leather, bark and glue. Using these materials, design a habitat to respond to the geographic conditions for each site. To add complexity, give students a climatic condition to design for: sun, wind, rain, snow. Build models on a separate base and set on the larger base when done.

Extensions

Cut the base into puzzle pieces, have each child build their habitat on a selected piece of "land." Work together to re-assemble the group model. Students can also draw maps, or write about the project.

Images drawn by Fran Halperin, AIA Built Designs

Manipulating Materials



Goals

- ◆ To explore the opportunities and limitations of different building materials.
- ◆ To work cooperatively within a tight set of constraints.

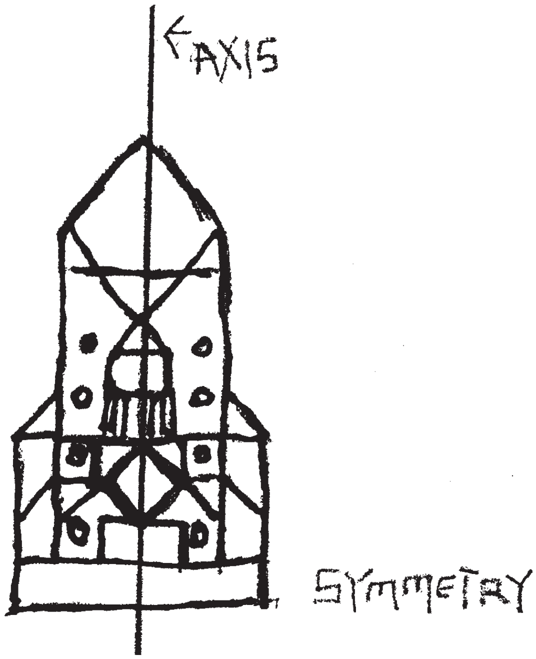
Activity

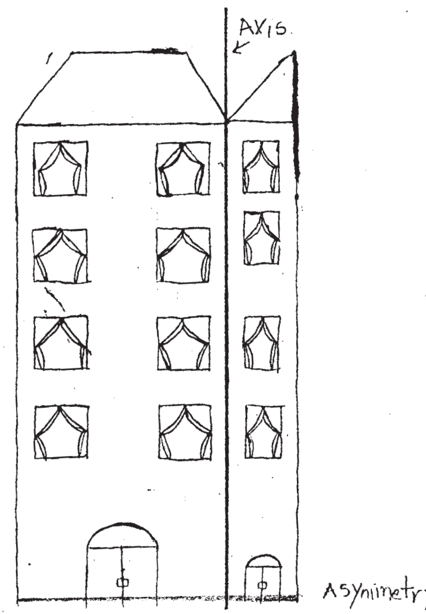
Divide students into groups of four. Give each group an 18" x 18" cardboard base, glue, two paper cups, and scissors. Give each a pack of materials to represent a distinct "building system": toothpicks-jelly beans, wire-tin foil, sugarcubes-white tag board, colored paper-tape, straws-pins-rubber bands, balloons-string, clay-pop sticks, etc. Challenge each group to make 4 structures to meet these requirements: 1) tall and freestanding, 2) span a distance between two paper cups, 3) strong, and 4) beautiful. The students may struggle with how to divide the labor, or they may ask if they can have different materials. (No) When complete, discuss results. Compare opportunities and limitations inherent in each building system.

Extensions

Measure height and span. Test strength. Vote on beauty.

Symmetry/Assymetry





Goals

- To understand simple bilateral symmetry.
- To apply understanding of symmetry and asymmetry to design.

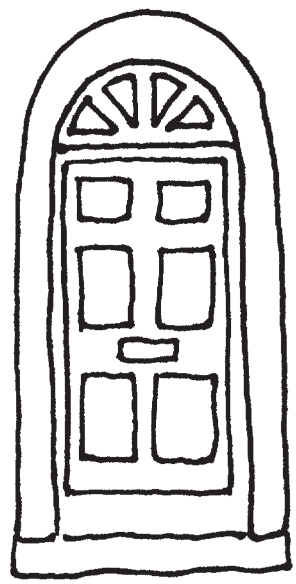
Activity

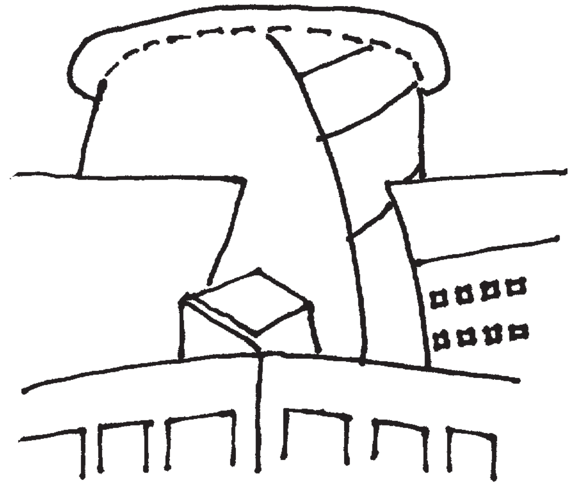
Fold a piece of paper in half. Open, and draw a thick line along the fold. Label it with the word "axis". On the left side draw half of a house facade. Then on the right side, draw the other half of the house exactly like the first half. Label that sheet, "symmetric". Repeat the exercise, but make the second half of the house completely different from the first. Label that sheet, "asymmetric." Put the examples up on a wall and discuss. Ask the children if they can think of symmetrical objects, such as snowflakes. Look at images of great architecture, Taj Mahal, Parthenon, challenge the students to find examples of symmetry and asymmetry.

Extension

Take sketch books on a neighborhood walk. Find examples of symmetry and assymetry.

The Power of Color





- To start to understand the importance of color in architecture.
- To explore the range of emotions and sensations evoked by color.

Activity

To begin a session about color, you might want to ask students to name their favorite color. Ask them why it is their favorite color. Many students will say, "I just like it." This will be a good starting place to help them further understand and articulate why certain colors evoke emotions or sensations. To start a discussion, show slides of places or buildings that use strong colors to make a statement (Ricardo Legoretta, Michael Graves, the Golden Gate Bridge). Give the students line drawings of a door, a building, a room and ask them to color it with their favorite colors. Then ask them to color it again with colors they don't like. Ask them why they chose the colors they did.

Extensions

Use the same drawing to further refine their understanding of color. Ask them to color the door, room or building to evoke a certain emotion: sad, angry, happy, scared etc. Or introduce the concept of warm and cool, and ask them to color the building or scene with warm and cool colors.

Behavioral Traces

Goals

- To explore issues of form and function.
- To think critically about the social functions of architecture.

Activity

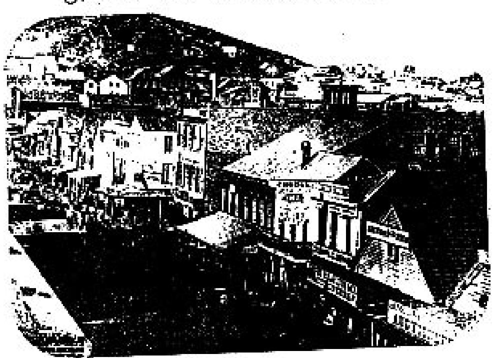
Behavioral traces, or evidence of human activity in the built environment, is a topic of special relevance to children. Since few buildings are designed with their needs in mind, they respond well to this topic. Show images of human activities that diverge from the intended use of a building or space: dirt shortcuts through a lawn, handwritten signs directing people to a hard-to-find entrance, makeshift curtains over a south-facing window. This can spark a spirited discussion. Give students an assignment to find and document behavioral traces in the environments they occupy. They can sketch, write, or photograph their findings. Share with the class. Be prepared to discuss issues such as graffiti, "illegal" skateboard ramps and no tresspassing signs.

Extensions

Select one of the examples of buildings being used in an unintended way, and redesign the building to accommodate that usage.

History Sleuths

CHUCK'S DAY IN SAN FRANCISCO



SAN FRANCISCO 1850's

One day in San Francisco, a man named Chuck C. Wells was building his own store. It was a peaceful day in the city. Chuck's store was named the "Auction Room." Well, Chuck went for a walk. He was new to the city, so he wanted to take a walk. Chuck really didn't like San Francisco. He thought it was ugly and poor. He wanted to explore San Francisco on a little walk. So, he went. When he saw all the buildings, He said to himself "If I can build San Francisco I'll make it better than ever." So, he asked the Mayor if he can build San Francisco. The Mayor said "Absolutely Yes." Chuck was so smart. He had good ideas to build buildings like we have now. He told the people to use concreet to build their buildings, it worked! The people were so happy that they made Chuck official archetict. Now Chuck felt better. Thanks to Chuck buildings are like ours now.

THE END

Goals

- To observe clues in the built environment that reveal information about the history of a neighborhood or city.
- To show how the built environment reflects social relations.

Activity

Find photos showing scenes of your city during different historical eras. The best images are ones that include buildings and social intercourse. Photocopy as many different images as possible - at least 40. Let the children look at all the photos. They should select one or two of their favorites. Ask the students to search for visual clues in the photo that reveal something about life in that time: building sizes, materials, doors, windows, decoration, transportation and graphic symbols. Based upon the clues, ask them guess when the photo was taken. Then ask them to imagine living in that scene during that time. Write a story about the scene.

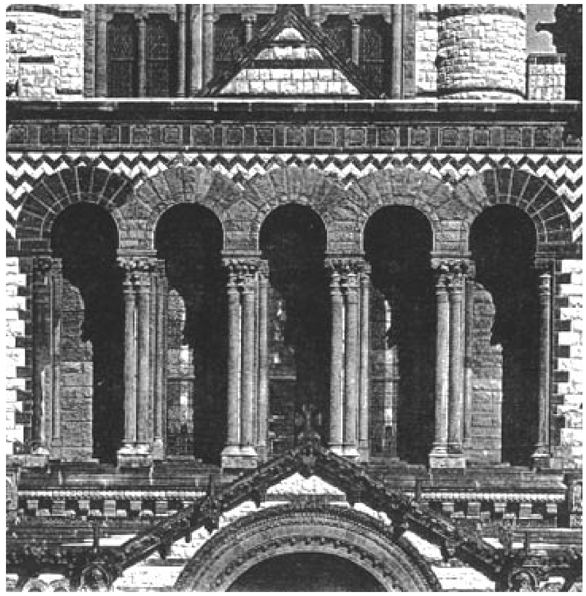
Extensions

Compare two historic views of the same site. What changes do you observe?

Skill Building

Architecture is multi-disciplinary field and requires a sophisticated application of skills that children often learn in the abstract. This section features "hands-on," "minds-on" activities that enable students to internalize mathematical and scientific concepts. It contains a series of activities about geometry, structure, scale and blueprint making. A series of exercises about geometry helps children to apply their knowledge of volumes, form and shape. Other activities explore how structural systems work to create buildings. Students can investigate principles of stability, strength and structural integrity. In the activities about scale, students use the human body to study measurement, ratio and proportion. Projects about mapping and blueprint reading highlight concepts such as circulation, mass, density and spatial relations. All activities in this section stress the use of scientific methods: hypothesis, observation, abstract reasoning, invention and testing.

Finding the Shapes



Goals

- ◆ To learn about basic geometric shapes.
- ◆ To locate and understand how geometry is used in architecture.

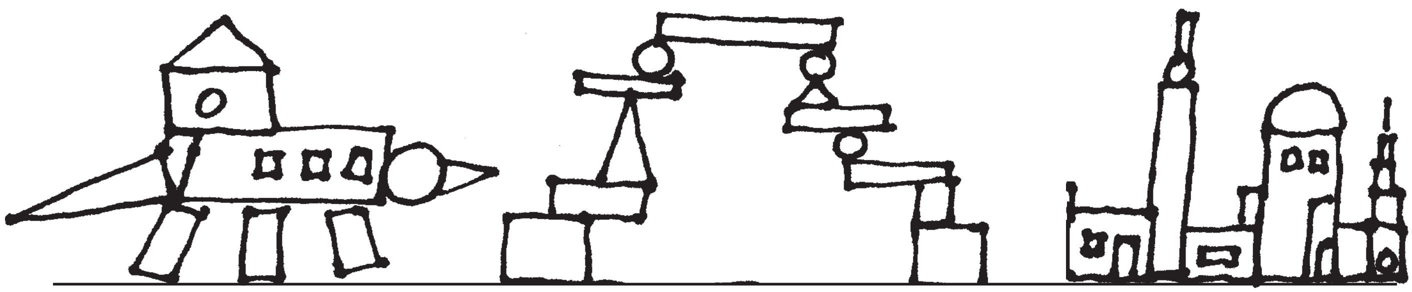
Activity

Cover the wall of the classroom with a horizontal strip of butcher paper. Place it at the children's eye level. Show slides of buildings that have strong geo-metric forms: Capitol Building, Taj Mahal, Pyramid, Transamerica Tower, St. Louis Arch, a Victorian House. During each slide, find basic shapes (square, circle, triangle, cylinder, cone, cube, arch, rectangle). Use marking pens to trace the shapes off the projection. Move the projector along as you fill the butcher paper with tracings. Turn off projector. Review and label the shapes on the butcher paper.

Extensions

Cut out the geometric shapes on the butcher paper and reassemble them as a new building. Children can make small sketches of the geometric shapes and label them in their sketchbooks.

Geometric Additives



Goals

- To identify geometric shapes in architecture.
- To work collaboratively.

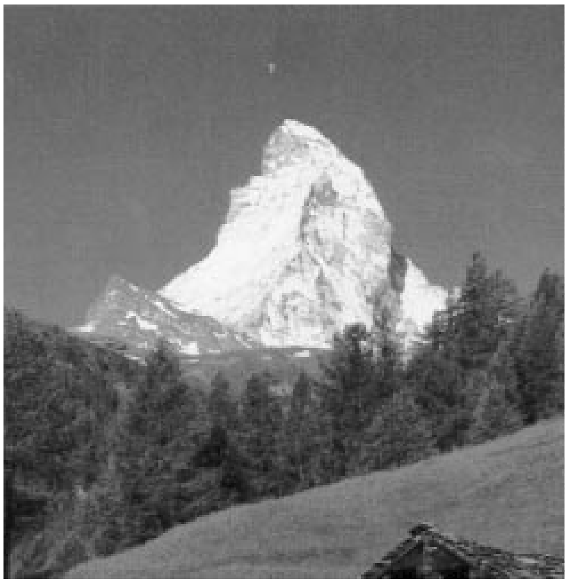
Activity

Cut out an assortment of colored geometric shapes. Include different sizes and types of triangles, rectangles, semicircles, and squares. Let each child select at least five shapes. Mount a large black sheet of paper on the wall. One by one have the children bring a shape up and tape to the black paper. Each child should identify their shape and explain what it adds to the "scene". For example, the first student may start with a large rectangle. She says it is a house. The next child adds a semicircle, and declares that it is now a hotel. The third adds a long triangle to the side and states that it is an amusement park. Repeat until every child has added at least one shape to the composition.

Extensions

Give some constraints: "Build a streetscape." "Build a bridge, etc."

Geometric and Organic



Goals

- To compare and contrast geometric shapes and organic forms.
- To create a composition that explores the relationship between organic form and geometric architectural constructions.

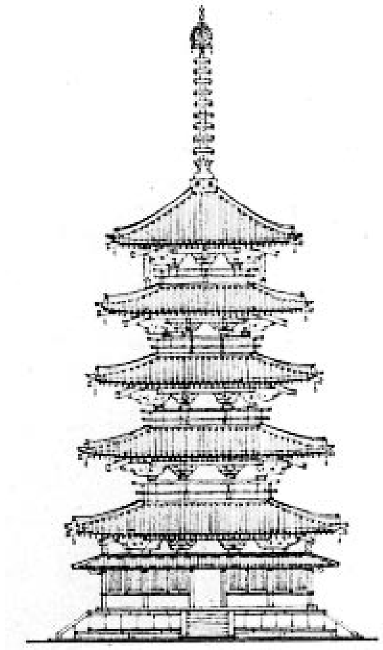
Activity

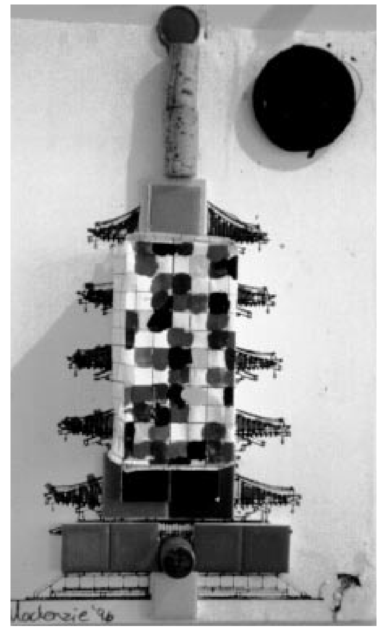
Have each child cut out an image of an organic form: tree, animal, water, cloud. Cut out, or have them cut out a range of geometric shapes in various sizes: circles, triangles, semi-circles, diamonds, octagons, squares, rectangles. These shapes should be cut from bright colors (i.e., geo-brite colors from Office Depot). Create an architectural composition using the geometric shapes. These shapes must respond to the selected organic form. The geometric collage may mimic the natural form, i.e., a fish shaped house for a fish. Or the geometric forms may contrast with the natural form, i.e. a cloud floating inside a rigid geometric structure.

Extensions

Create a "quilt" from the images. Write a story or haiku poem about the images.

Global Geometry Collage





Goals

- ◆ To see and understand different geometries and patterns in architecture.
- ◆ To expose children to great works of architecture from around the world.

Activity

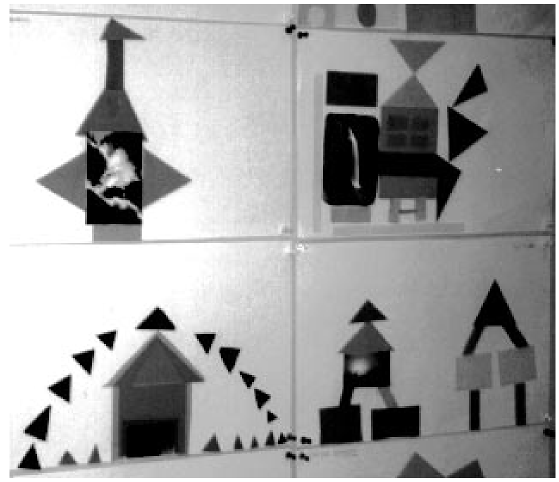
Xerox images of monumental buildings from around the world onto 11" x 17" sheets. Select buildings with strong or recognizable geometries. Francis D. K. Ching's images of architecture from Asia, the Americas, Europe and Africa are particularly wonderful for this exercise. Discuss each building, and point out geometric properties. Have the children select their favorite building and mount its image on cardboard. Give students materials with 3-d geometric qualities such as tiles, corks, buttons, small boxes, dowels, etc. Have them find patterns in each building. They can then highlight or re-express these patterns in the third dimension by gluing materials directly onto the mounted image of buildings.

Extensions

Select two of the completed building collages and write about their similarities and differences.

Image from Architecture: Form, Space & Order, by Francis D. K. Ching

Shapes Collage



Goals

- To reinforce familiarity with geometric shapes.
- To combine geometric shapes and create architectonic forms.

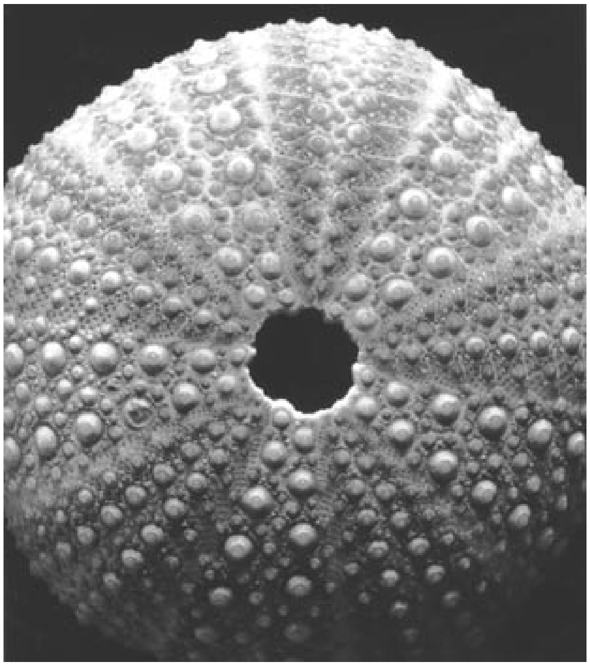
Activity

Cut out, or have the students cut out, a range of geometric shapes in various sizes: circles, triangles, semi-circles, diamonds, octagons, squares, rectangles. These shapes should be cut from bright colors (i.e., geo-brite colors from Office Depot). Let each child select 20-25 of the cut out shapes. Give each child a black piece of paper, scissors and a glue stick. Then have them assemble the cut out shapes into the black background. Direct them to create an architectural scene composed of the facades of houses, schools, stores, bridges. Once they have the desired scene, they can paste it down.

Extensions

Display the different streetscapes in a horizontal band around the room. Add three dimensional geometric solid shapes (cylinders, cones, pyramids) to the facades.

Shapes in Nature, Shapes in Architecture



Goals

- ◆ To expose children to the power of shapes and forms in nature.
- ◆ To see how natural shapes and principles inspire architecture.

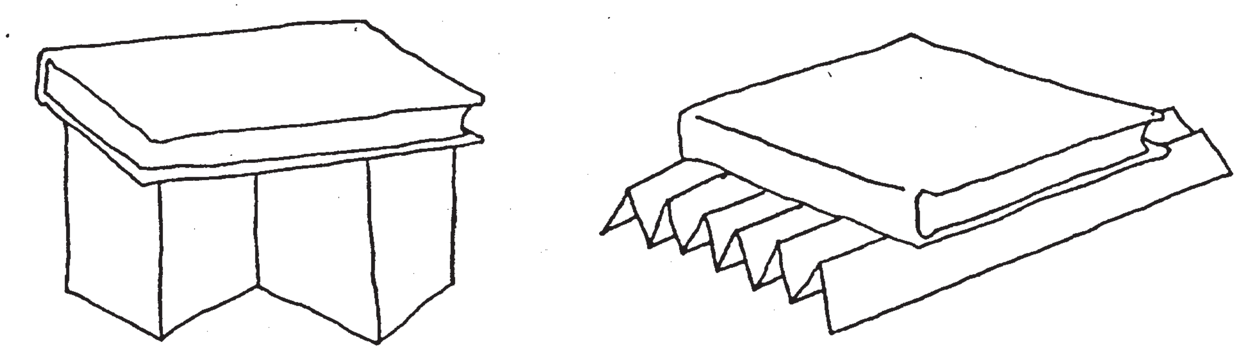
Activity

There are fabulous books such as *By Nature's Design*, showing powerful images of nature. These images may have a universal quality, or they may have directly inspired a piece of architecture. Show images of nature and of buildings with similar characteristics: Chambered nautilus (Guggenheim NY), grape vine tendril (spiral staircase), snowflake (stained glass window), fly's eye (geodesic dome), snake skin(roof shingles), bird wings (Sydney Opera House). Ask the children to select a natural element or image: a leaf, a cloud, a flower, an animal. Then use that image as a source of inspiration to create (draw or make a clay model of) a building.

Extensions

On a neighborhood walk, or in books find buildings that remind you of something in nature.

Shapes for Strength



Goals

◆ To determine which shapes best support weight.

Activity

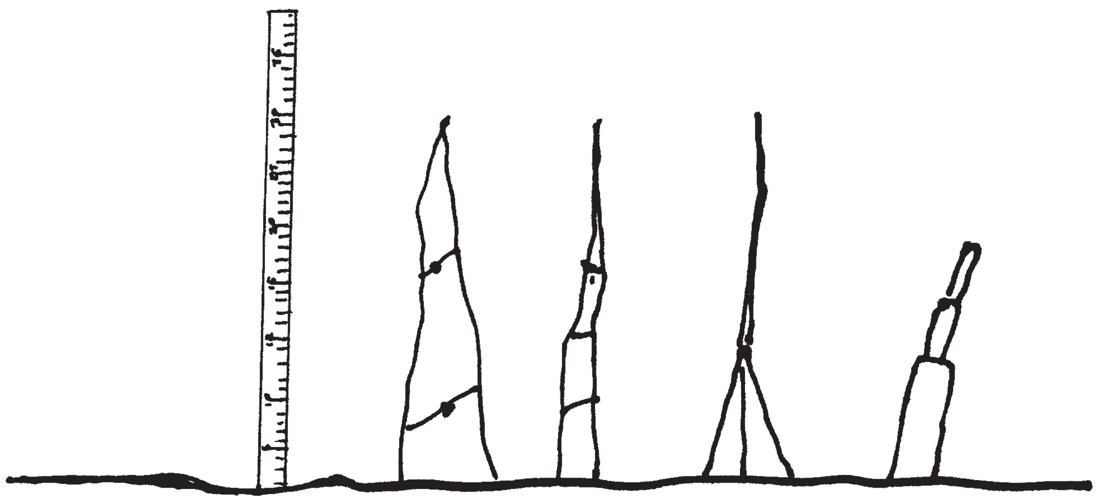
Distribute scissors, tape and 5 sheets of heavy paper to each student. Show a few examples: triangle, cylinder, square. Give the children approximately 10 minutes to fold each of the 5 papers into a different shape. This is a silent activity-no talking. Once they have folded their paper, ask them to secure each shape to tape to their desk. Then take a book out (all students should use the same size book). Try to carefully set the book on top of each paper shape. Silently observe and record the results for each try, even if it fails or crushes the paper. Repeat process for each shape. Determine which supports the book best. Record results. Share conclusions with the group.

Extensions

Make a building or sculpture, using all five shapes. Test it again and share conclusions.

Images from Architecture in Education, Edited by Marcy Abhau

Testing Towers



Goals

- To gain an understanding of how materials and form give a structure stability.
- To encourage creative thinking within constrained set of conditions.
- To encourage collaboration and cooperation.

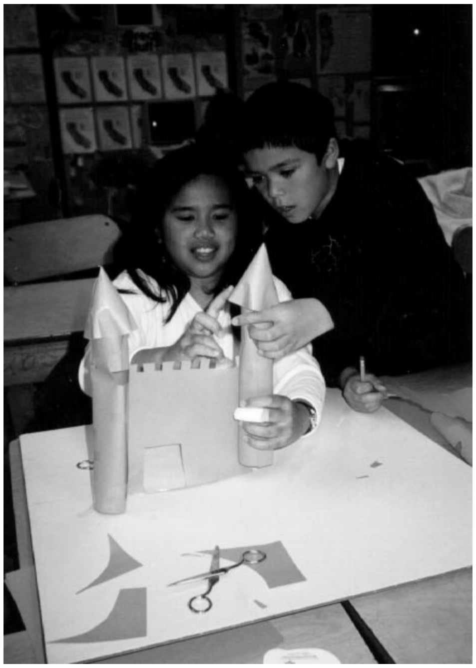
Activity

Divide the students into pairs or groups of three. Give each group 2-3 pieces of paper, and 10-15 paper clips or a roll of scotch tape and scissors. Challenge them to see who can make the tallest tower. Their towers are to be free-standing and transportable. They cannot use any other tools or materials to construct the towers. When the towers are complete, line them up to compare. Measure each one against a ruler taped to the wall and mark each group's tower height. Record results. Discuss design strategies.

Extensions

Use the same materials to build the strongest tower; the most beautiful tower. Build a bridge spanning the widest distance.

Creative Castles



Goals

- To use 2-d materials to construct a 3-d structure with strength, balance and beauty.
- To collaborate as a team, and solve problems collectively.

Activity

Show images of architectural elements, especially those used in castles: towers, columns, doors, and windows. Divide students into teams of 3-4. Give each team 20-30 sheets of 8/1/2" x 11" paper, an 18" x 18" cardboard base, scotch tape and scissors. For interest, each team can get a different color paper. Instruct each team to construct a castle using only the supplies given, and within a set time (30-40 minutes). To allow ideas to flow smoothly, tell the students to work silently.

Extensions

Identify the different architectural elements or geometric forms used in each castle. To start to understand scale, make pipe cleaner people. Castles can be source of inspiration for creative writing.

Toothpick Structures

Goals

- To experiment with different structural configurations.
- To understand the relationship between strength and triangulation.

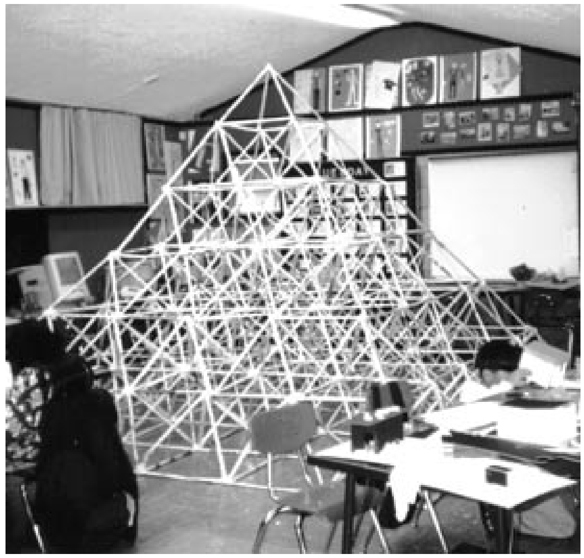
Activity

Divide students into groups of 3 or 4. Give each group a limited number of toothpicks (50), gumdrops (25) and a cardboard base. Demonstrate how to join toothpicks by using the gumdrop as a "gusset" or joint. Challenge each group to build a tall, strong structure within 20 minutes. Encourage them to explore different methods of combining the bars and joints. This can be a silent exercise. To inspire the students, you can circulate about the room and hold up examples of tetrahedrons, trusses, and pyramids as they are building them. After 20 minutes compare and contrast the structures. Take them apart, change groups, and repeat. see handouts

Extensions

Repeat exercise, but challenge the students to span a certain distance. Save the completed trusses, and use them in a later model making exercise.

Newspaper Pyramids



Goals

- To discover properties of strength and lightness.
- To understand mathematics of pyramids.

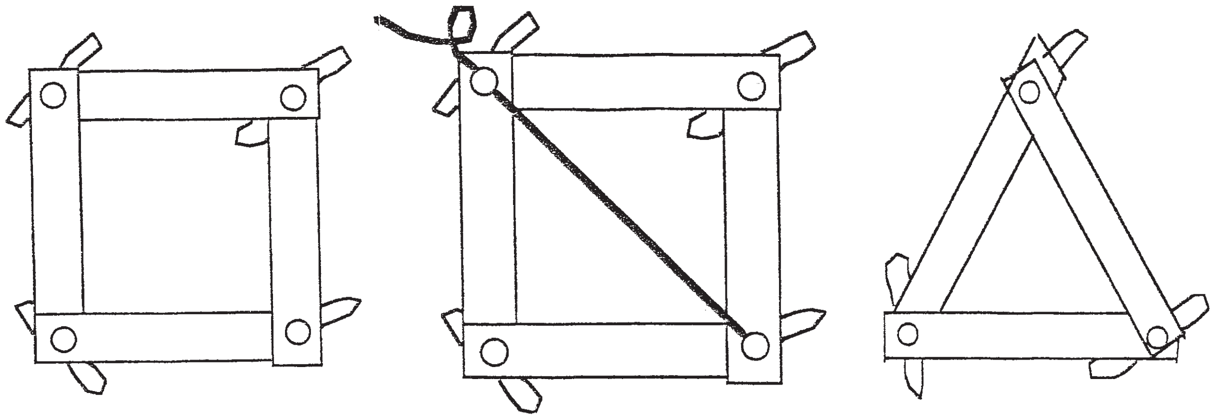
Activity

To construct a newspaper "bar", use one sheet of newspaper (27 1/4" x 24"). Fold in half along crease. Roll up VERY TIGHTLY along the long dimension (24"). Secure with masking tape. The finished bar should be 24" long, and 3/4" diameter. Eight bars make a mini-pyramid. Repeat until you have enough bars to create a large pyramid. Approximately 310 bars = 39 mini-pyramids = one 6 foot pyramid. Tape bars into a square. Add bars at corners. Tape into a point to make one mini-pyramid. The next level is made of 4 mini-pyramids. WHERE PYRAMIDS ABUT EACH OTHER-SHARE BARS, DO NOT DOUBLE. Lift the first pyramid and affix on top of the 4-pyramid level. Continue, to reach the desired height. Third layer = 9. Fourth layer = 25. Use lots of masking tape at each joint.

Extensions

Experiment with newspaper trusses and pyramids to create new forms, and sculptural configurations.

Tough Triangles



Goals

- To understand the structural integrity and stability of the triangle.

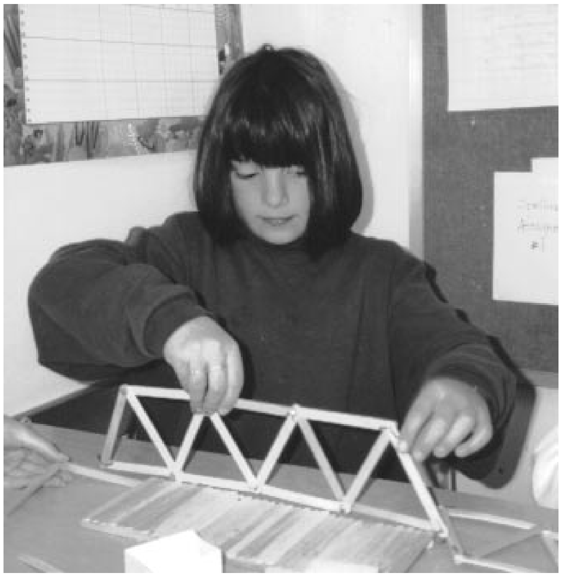
Activity

Cut seven strips of paper, 3" long and 1/2" wide. Join three strips to make a triangle. Use four strips to make a square. Connect sides with brass fasteners at the corners. First test the square. Hold the bottom of the square with one hand. Move the top from side to side. Does the square hold its shape? Next test the triangle. Show how it is *a stable* figure. Then use a piece of string to create a diagonal across your square. Wrap or tie the ends of the string around the fasteners. **Make sure the string is tight.** Now try moving the sides of the square. It should be more stabile. Notice how the string divides the square into two triangles.

Extensions

Make a list of buildings, towers, or bridges that contain structural triangles.

Pop Stick Bridges



Goals

- ◆ To learn how to design and construct bridge-like structures.
- ◆ To understand how materials and form give a structure tensile and compressive strength.

Activity

Show images of different types of bridges from around the world. Discuss the elements of bridge strength. see handouts Divide students into pairs or threes. Have each team draw and build a bridge using the following criteria:

- use no more than 40 pop sticks or tongue depressors, two feet of string, glue, scissors
- span a distance of at least 12 inches (between desks)
- include a roadway (not necessarily solid)

When the bridges are complete, let them dry overnight. In the next session, line the bridges up to compare for length, strength, and beauty.

Extensions

Measure each bridge to compare span. Measure strength by stacking books, or sealed 14 ounce food cans on the roadbed to determine bridge strength.

Truss Building

Goals

- ◆ To expose students to different truss types.
- ◆ To understand truss construction and structural forces.

Activity

Show images of bridges. Point out how trusses are used for support and strength. Have the students work in pairs. Give each a handout showing truss types. Select a truss type to build. Draw a 12 " long truss on an 8 1/2" x 11" sheet of grid paper. Once the truss is drawn, place a piece of waxed paper over it. Using long wooden coffee stir sticks (the lightweight kind that can be easily cut with scissors), cut out all the pieces. Lay out the truss and glue. Repeat for a second truss. After dry, use the trusses to build a bridge spanning a 10" gulf (between desks, or paper cups). Use tag board and more stir sticks to complete structure. see handout

Extensions

Write about or draw the completed bridge.

Earthquake!

Goals

- To learn about forces released during an earthquake.
- To understand how buildings resist quakes.

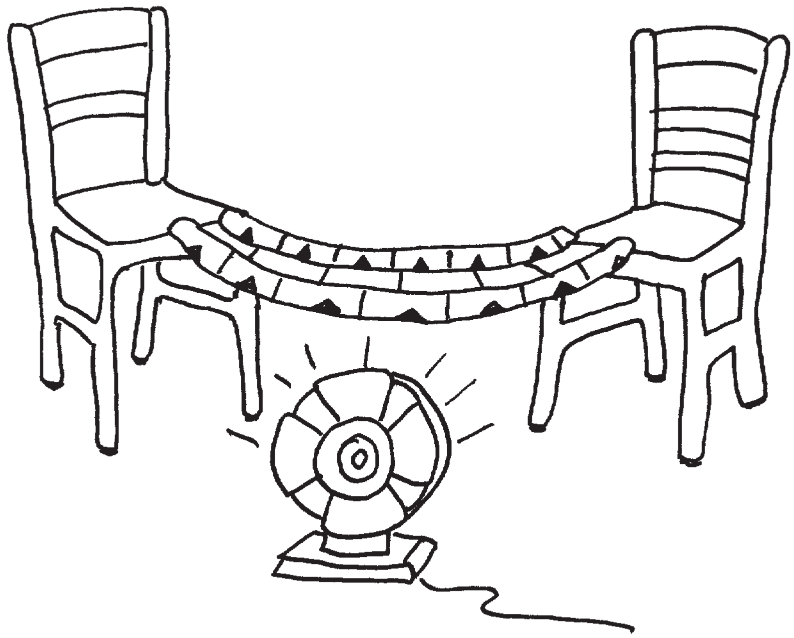
Activity

Talk about earthquakes and the motions they cause: rolling quakes, slip faults, upthrusts, liquefaction. Demonstrate if possible. Show images of structural damage after real earthquakes, and try to guess why each building or bridge failed. Talk about why some buildings had little damage: base isolation, truss construction, moment frames, sheer walls. Demonstrate if possible. Work in teams to build a structure on an 8" x 8" cardboard base. Structures can be made out of toothpicks and gumdrops, slotted tagboard, or notched popsticks etc. Fill a pyrex baking pan (9" x 9" x 2") with instant jello. When jello is set, test structures by setting them on top. Gently shake pan. Increase motion. Discuss or record results.

Extensions

See who can build the tallest, strongest structure from the given materials.

Winds Across the Bridge



Goals

- To learn about stability and the effect of wind forces on suspension bridges.
- To use the scientific process (predict, observe, classify, record data, hypothesize, apply, generalize).

Activity

Show images of different bridges. Provide background information about bridges and wind forces from handout. Using templates, fold, cut and construct a suspension bridge from 15-20 sheets of 8 1/2" x 11" paper. Suspend bridge No. 1(without triangular decking) between two chairs by tying two strings to each chair and fastening to the sides of the bridge. Fasten a metric ruler under the center and perpendicular to the bridge. Use 2-speed hair dryers or fans to create wind source. Observe amount of movement or sway at each speed and angle. Record on chart. Repeat with bridge No. 2 (with triangular decking). Compare predictions and results. Discuss and generalize. see handouts

Extensions

Read and write poems about the wind.

Egg Drop

Goal

- To design a structure that will protect a raw egg from breaking when dropped from a high place.
- To better understand the relationship between physics and structure.

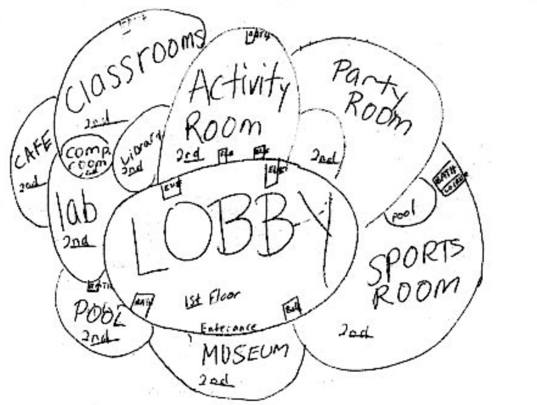
Activity

Build a "container" using materials such as cardboard, newspaper, styrofoam, cotton, feathers, cloth, or toilet paper tubes. The overall size of the structure is not to exceed 6" x 6" x 12". When students are ready, seal a raw egg inside a small plastic bag and place inside each structure. Beneath a ladder or balcony cover the floor with the large piece of plastic. Drop each container one by one from a designated point. Repeat drops for survivors. After the drops, compare successful designs, materials and shapes.

Extensions

Point out the relationship between the protective environment the container provided the egg and the protective environment buildings provide humans. Translate observations into a design for an earthquake resistant building.

Bubble Diagrams



Goals

- ◆ To show how architects communicate functions and relationships in the built environment.
- ◆ To use a method to brainstorm, organize, plan and design.

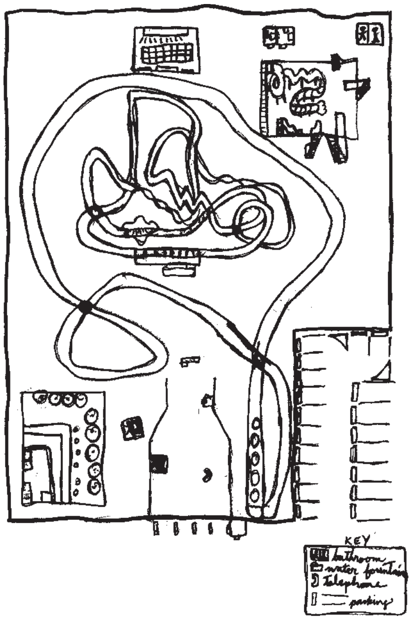
Activity

Demonstrate how bubble diagrams can represent ideas, things, or spaces. Bubbles can represent rooms, furniture, or pathways. Show how bubble diagrams can represent relationships or sequences. Although each bubble has no definite geometry or size, they may vary according to importance. Show students the relationship between a bubble diagram and a completed blueprint. After the students have seen and understood some examples, have them represent their own home using bubble diagrams. Each bubble is to represent a room, hallway, yard, play area etc. see handout

Extensions

Students can then graphically represent the inside of their room — the bubbles now represent furniture, objects or toys. They can also create a bubble diagram for a dream house or dream amusement park.

Fun with Maps



Goals

- To create maps to better understand them.
- To explore diverse perspectives and forms of visual representation.

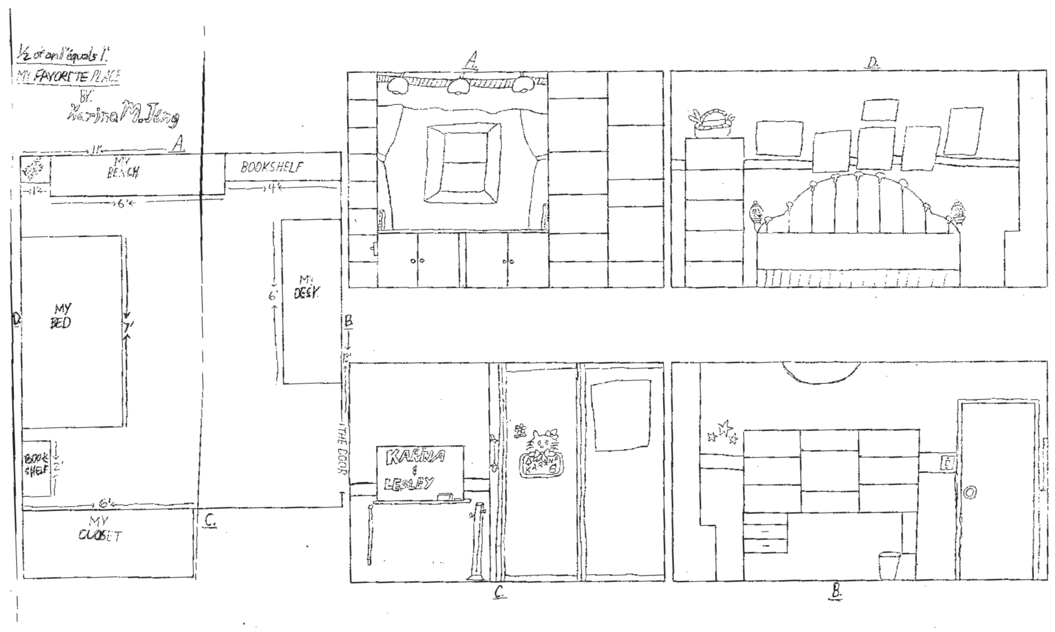
Activity

My Map Book, written and illustrated by a 7 year old girl, is a wonderful way to introduce mapping. It shows how children can create maps of anything: a room, a neighborhood, their daily schedule, the family tree and even their own stomach! Another great source of inspiration is *The Dictionary of Imaginary Places,* a compilation of literary excerpts describing fantastic and mythical places. Using bright colored markers and 11" X 17" paper, children can draw a map of their own neighborhood or a mythical place (from the air, from the sidewalk, of one block, or a whole community). Encourage them to include all places and landmarks of importance.

Extensions

Share or trade maps and discuss the many ways a site can be represented visually.

Plans, Sections, Elevations



Goals

- To show how plans, sections, elevations represent 3-d objects.
- To help students apply their knowledge of scale
- To create an accurate representation of a building.

Activity

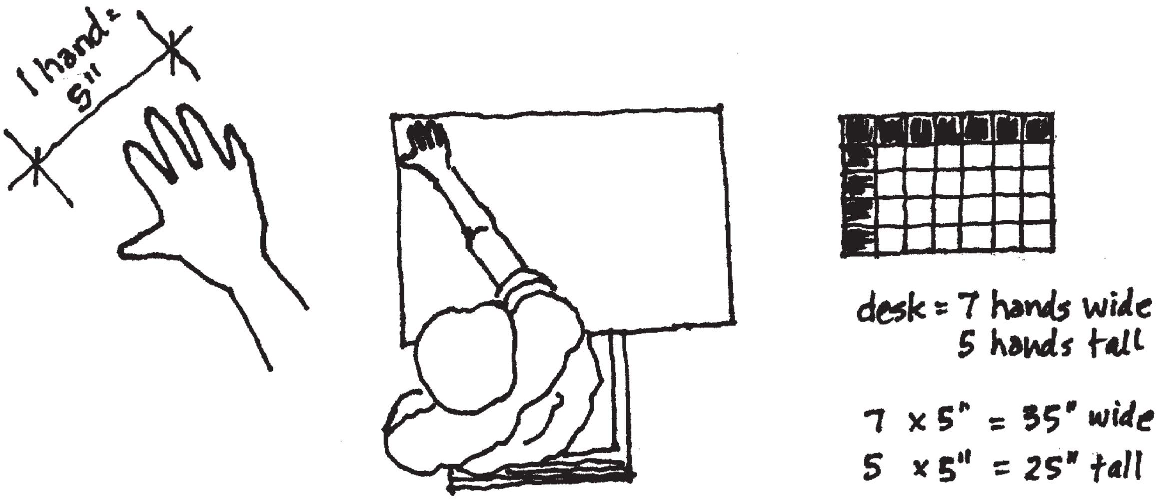
Show plans, sections, elevations and a model of a real building. Use drawings of a building familiar to the children, such as their school or a public building. Cut up a shoe box to demonstrate how each drawing "cuts through" a building. Show the interior and exterior elevations of the shoe box. Affix a piece of tracing paper over a piece of graph paper. Ask the students to draw their classroom on the tracing paper. Each square can represent one foot. Make sure the children understand how walls, doors, and windows are represented.

see handouts

Extensions

Have the students draw an elevation of one wall of the classroom. Ask them to measure and draw their own bedroom, including interior elevations, to scale.

Hand and Foot Pacing



Goals

- To introduce measurement and relative lengths.
- To provide the students with their own measuring "tools" as units of measurement.
- To visually represent measurement.

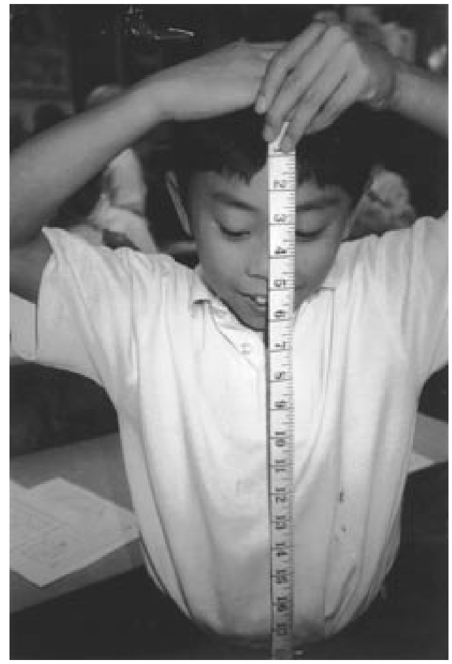
Activity

Show the students how the "spread hand" is measured from thumb to little finger. With "spread hand" pace the width and length of the desktop. Record dimensions on graph paper. Use one graph square to represent one hand "pace." Introduce the walking pace length as a measuring tool. Pace the perimeter dimensions of the classroom or a basketball court. Record these dimensions on the graph paper. Use one graph square for every pace. Determine the length of each student's hand pace or foot pace. Convert pace numbers to units of feet/inches or centimeters and meters.

Extensions

Pace bedroom and one other room in the house. Keep a record of the measurements. Graph dimensions and convert paces to feet/inches or centimeters.

Scaling Our Bodies



Goals

- ◆ To introduce and apply the concept of measurement.
- ◆ To translate measurements into scale drawings.

Activity

Divide students into pairs. Have each child measure and record the dimensions of their partner's body (See handout). After they have recorded their measurements. Ask each to use these measurements to draw themselves to scale. Use an 11" x 17" piece of paper, lined in a 1/4" grid pattern. Orient the paper in a vertical position. It is very important to use the scale: 1 square = 1". This will enable the students to easily understand a 1:1 correspondence between their body measurement and the grid paper. see handout

Extensions

Once they have a proportional drawing of themselves, the children can have fun with it: coloring, adding clothing or accessories. They can also add other scaled objects to the composition.

Object Transformation

Goal

- To introduce children to concepts of scale, proportion and measurement in a dramatic and fun way.
- To understand conversion.

Activity

Show the same image or object (paper clips, socks) in different scales (small, medium, large). Show how an object can be represented in the same proportions with different dimensions. Ask the children to think of other examples. Pick a small object such as a match book or a quarter. Measure and record the dimensions of that object. Now draw or build the object at 10 times its original size. The student can get the new dimension by multiplying by 10, by "pacing" the object, or by any other improvised method.

Extensions

Multiply the original dimensions by 5 or 20. Or select a large object such as a car, refrigerator or desk. Draw or build it at a scale 10 times smaller than the original.

Building at Different Scales

Goals

- To explore concepts of scale-visually and kinesthetically.
- To design and construct a model at a consistent scale.

Activity

Divide students into groups of four. Give each group a pipe cleaner person and a ruler sized to a different scale: for example, 1/8" = 1", 1/4" = 1" etc. Give each group the same size cardboard base. Give them some simple materials appropriate for building at their scale. Ask each group to build a simple model of a community at their assigned scale. Compare and contrast. Discuss how at a smaller scale they can build a larger community with less detail; and at a larger scale they can show more detail, but have room for fewer buildings.

see handouts

Extensions

Trade scales and repeat. Write about all of the differences they observe. Ask them to choose their favorite scale and articulate why they like it.

Designing, Creating, Transforming

The most exciting challenge for architects and educators is help young people to translate their knowledge into action. This section contains examples of culminating projects that allow children to put it all together in more complex design and building projects. Most of the projects in this section have been facilitated by architects in elementary school classrooms. These hands on model-making projects are usually collaborative, large-scale efforts completed during a 2-4 week time period. These projects require brainstorming, organizing, planning and construction. Most involve building models of homes, schools, neighborhoods, or communities. Children must employ teamwork, negotiation and consensus building as they bring the projects to completion. Because many of the projects are related to "real-life" problems, they also include opportunities for the children to communicate their ideas in forums, exhibitions, newsletters, posters, presentations to community groups and city officials.

Boomtown

Goals

- To work in teams to create a spontaneous city from "junk".
- To analyze the city and reconstruct in a more conscious and deliberate way.

Activity

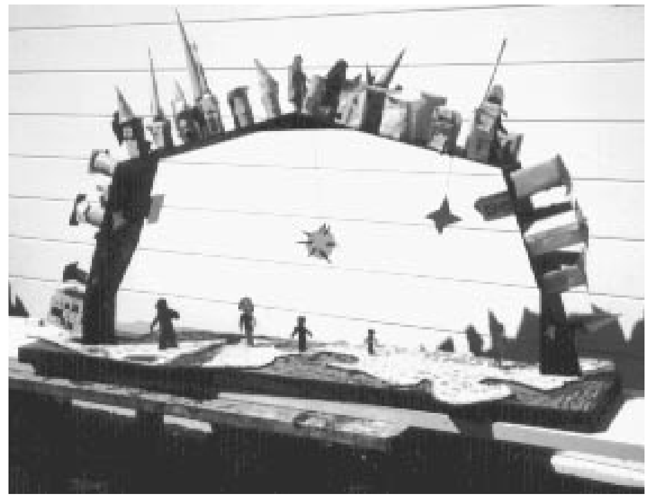
Collect bags of recycled materials (plastic, cardboard tubes, aluminum foil, egg cartons, cans, boxes, magazines and cloth). Give pairs of students 12" squares of cardboard, tape, glue and scissors. First ask them to construct a building for a city. When all are complete, put them on the floor in a random fashion. Ask each team to present their building. This can spark discussion about scale, building types, overdevelopment, infrastructure, open space and planning.

During a second session, ask the students to use what they learned to plan a more liveable city. They can rebuild that city on new 12" squares, or they can merely rearrange the original city.

Extensions

The city can have a theme: city with no cars, underwater city , city of the future etc.

Bridging



Goals

- ◆ To explore the science and technology of bridges.
- ◆ To explore social and cultural themes related to bridge building.

Activity

This theme is rich with possibilities for extended projects. Start off by showing slides, photos or handouts of different types of bridges: draw, cable stayed, suspension, etc. To explore technical aspects of bridges, the children can build different types of trusses out of coffee stir sticks. Use the lightweight wooden ones that the children can cut with scissors. They can draw their truss on graph paper, then put wax paper over the top. They can lay the trusses out on the wax paper, using the drawing as a guide. Once laid out, the students can glue the sticks together to form the various parts of the truss. Later they can add roadbeds or other decorative elements to form a bridge. see handouts

Extensions

Students can explore the symbolic meaning of bridges by drawing or building spans to link disparate groups (boys and girls, blacks and whites, different countries). There are exciting possibilities for creative writing on this theme.

California in Different Centuries

Goals

- ◆ To study the cultural meaning of architecture at different times in history.
- ◆ To understand technological and material constraints of each era.

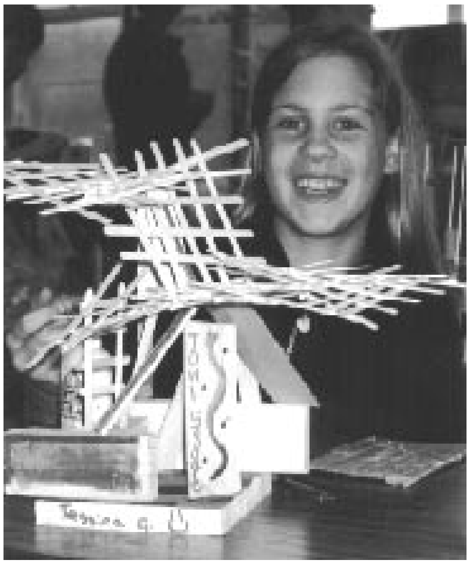
Activity

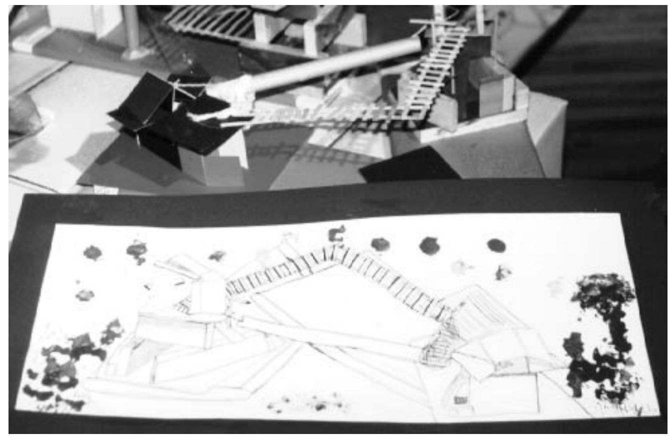
In conjunction with their studies of California history (4th grade), children can build structures from different eras. Construct base maps of California from cardboard, showing major topographic elements (approximately 6 feet long). Using a small scale ("people are the size of a grain of rice!"), children can design buildings from 18th, 19th and 20th centuries. They can conduct research, or draw upon their knowledge of materials, technology, and social customs for each era. For the 1700s they might build from natural materials using rudimentary technologies. For the 1800s they might build from adobe, and show the influence of the Spanish missionaries. The 1900s might be represented by highrises, bridges, and complex transportation and communication systems.

Extensions

Compare and contrast the accomplishments and dynamics of each century and discuss issues such as density, geography, technology, religion etc.

Constructing and Deconstructing





Goals

- ◆ To create architecture – adding progressively more complex layers of detail over time.
- ◆ To look at, analyze, and draw a piece of architecture after it is built.

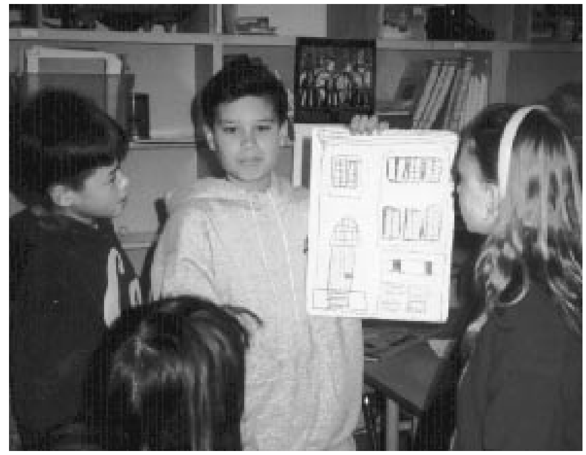
Activity

Give each student a cardboard base (approx 6" x 6"), small wooden blocks and cut pieces of matte board. Build a structure from those materials using white glue. In the next session use more delicate materials (stir sticks, smaller pieces of matte board) and add more detail to each structure. The following week, use a new base and materials with different qualities to build another structure. Put both structures on a larger base, and use tubes, strings, mesh, paper strips to make a bridge to join the two structures. After further embellishment, temporarily bring the structures together in a community. Each child can then use a soft pencil and large paper to study and draw his or her structure.

Extensions

Write about the structure each week (how it is use, what it looks like). Read the whole story at the end to see how it changes during construction.

Dream Classrooms



Goals

- To apply an understanding of design, scale, and blueprint reading to a real life situation.
- To begin to envision imaginative possibilities for ideal school design.

Activity

After students have participated in exercises about design, scale, and plan reading, they may be ready for an extended project about their own school. Tape together enough grid paper together so that the children can measure and draw their own classroom (or even the school) at 1/2" scale. After drawing the classroom or school as it is, spend some time looking critically at the existing design. Make a list of what they don't like about its design. Brainstorm about qualities that would be included in a "dream classroom or school." Redraw the plan incorporating the ideal elements into the scheme.

Extensions

Add additional possibilities or constraints to this exercise: design a classroom in a forest, a school in the year 2050, a school for children and their pets etc. Write about and illustrate in elevation, the ideal school. Build it.

Entering Adult Competitions

Goals

- ◆ To actively engage children in the civic arena.
- ◆ To create opportunities for children to present their work and ideas to a wider (adult) audience.

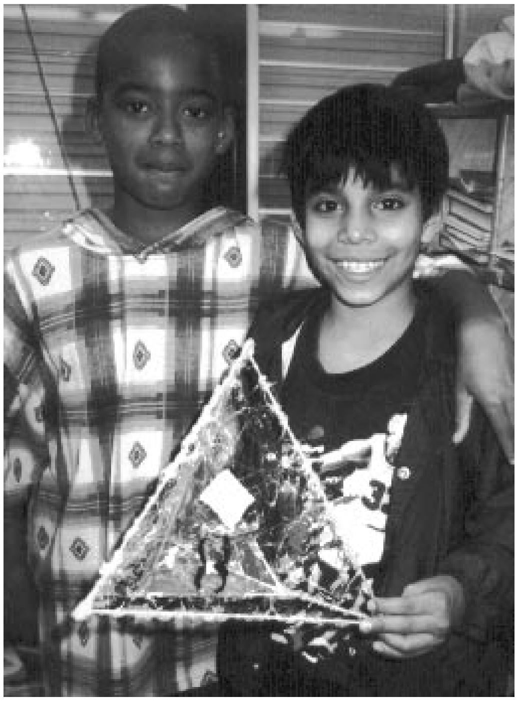
Activity

Many communities and organizations sponsor design competitions for public works or private projects. It is often quite easy to actually enter children in the competition. Even if they are not officially involved, the students can take on the project, and design their own solutions,They can conduct research about the building or site. They can grapple with the program. And they can develop models or drawings expressing their design ideas. For example in San Francisco, two 4th grade classes participated in the Union Square design competition in 1997. Their model was displayed along with the top adult entries, and the students made presentations about their work to several "juries".

Extensions

When youths become involved in a project of interest to the larger community, they may have opportunities to lobby for more child friendly architecture.

Literary Inspirations



Goals

- To use literature as an inspiration for design.
- To help children see the relationship between description and visualization.

Activity

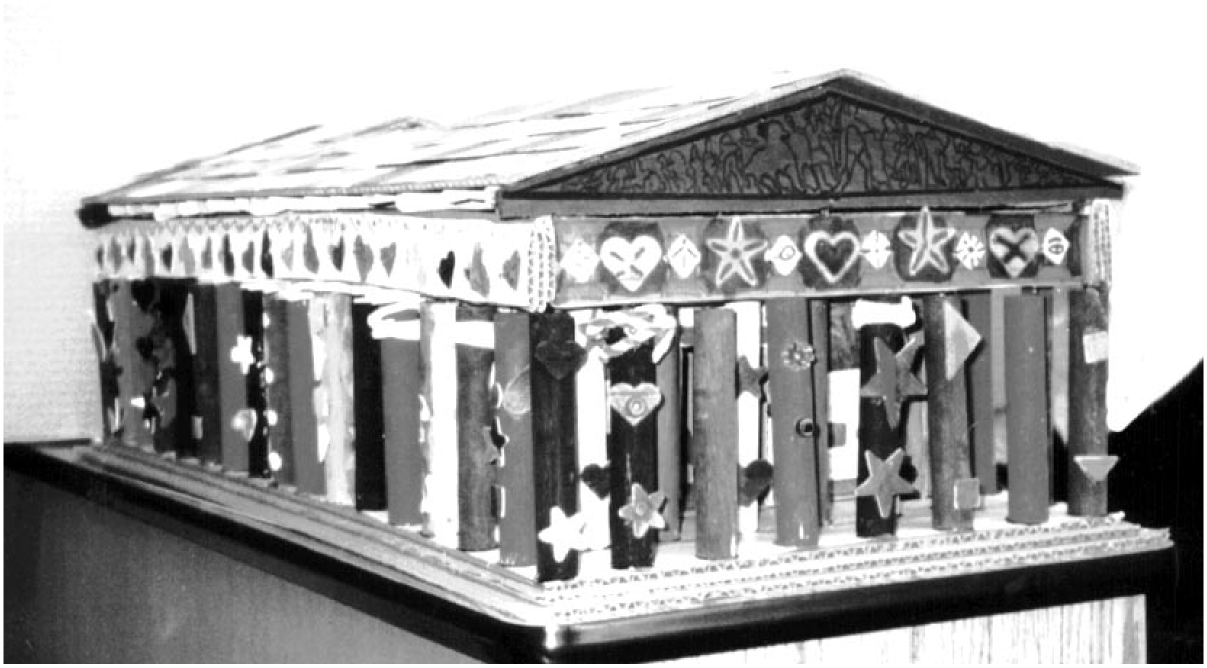
It is exciting to begin an architectural project by reading from literary pieces such as Italo Cavalo's *Invisible Cities* or the *Dictionary of Imaginary Places.* This approach often helps children visualize buildings and places with more imaginative, rich, detail and complexity. Students can read individually, or better yet, read the pieces together as a class. The children can then create drawings of the places they envisioned as they read or listened. After the students complete their drawings, encourage them to share their work with each other. Discuss how the same reading can inspire entirely different visualizations.

Ultimately the students can create models representing their ideas about the places described in the literature.

Extensions

After they have completed their drawings or models, the students can write a new passage or chapter for the story that inspired their creation.

Re-visiting History



Goals

- To study architectural history and the history of culture in a way that is fun and relevant to young people.
- To revisit and "reinvent" history through the lens of the 20th century.

Activity

Select a building or architectural monument from a historical era, preferably from a time and place the students are studying. Use a building with strong geometry, and components that can be easily constructed and assembled by children e.g. the Parthenon, a Chinese Pagoda, a Mayan Pyramid. Study the geometry, structure and form of that building. Discuss how the building is in part shaped by the opportunities and constraints of that time in history: socially and technologically. Draw a footprint of the building to scale and lay out its plan. Work together to build a model of the building, staying true to the original parti-but adding contemporary youthful decorative flourishes and references such as color and "graffiti".

Extensions

Select a building from a different time and place and repeat. Compare.

"Streetwork"-Urban Designs

Goals

- To work collaboratively on a complex project.
- To apply an understanding of scale, structure to a city planning project.

Activity

After students have studied design, scale, and structure they will be ready for a more complex urban design project. Show slides or photos of different ways cities are configured: grid, axial, radial etc. Discuss why cities look the way they do: geography, economics, cultural values, even human greed. Select a theme for the project: city of the future, city underwater, city of monuments etc. Brainstorm and build a list of elements to be included. Put ideas on "post-its", so that later they can be rearranged into categories or zones, and as you lay out the city plan. Decide on a scale (usually 1/8" or 1/16"). Always make people first-even if they are only the size of a grain of rice-so that the children understand the scale. Assign each student a component from the master plan, then use clay, paper, beads, feathers etc to construct the community or city.

Extensions

Write about the process of making decisions and working together.

Sustainable Communities

Goals

- To explore connections between built, cultural and natural environments.
- To investigate issues of sustainability and ecological health at different scales: the home, the neighborhood, the city, the region.

Activity

Many 3rd-6th grade classes study environmental sustainability with a focus on the "4 R's: Reduce, Reuse, Recycle, Rot." Architectural projects can amplify these themes. Show slides of animal architecture and vernacular architecture. Discuss how to build in harmony with nature. Show images of "green architecture" with ecologically sustainable practices and materials such as straw bale walls, solar collectors, water reuse systems, and reusable materials. Design a house constructed of recycled materials. Plan and design self-contained neighborhoods where residents generate their own food, water and energy, and dispose of their own waste. Design model communities with sustainable energy production and conservation systems such as solar, wind, or biomass.

Extensions

Make presentations about these projects to children in other classes. Take a field trip to a recycling center.

Handouts

Things to Look for on a Neighborhood Walk

1. Best building to keep
2. Warmest place
3. Safest place
4. Best, most interesting view
5. Best place for an entry
6. Most unusual smell
7. Worst building
8. Most unidentifiable object
9. Cleanest spot
10. Best architectural element
11. Most unsafe place
12. Building with your favorite colors
13. Busiest spot
14. Most interesting texture
15. Best spot to take a nap
16. Best place to skateboard
17. The most beautiful place
18. The old place
19. The friendliest place
20. A place for children

Created by Brian Ten, AIA, Carde Ten Architects

Site Analysis

Natural Resources/ Topography

Hills

Water

Vegetation (trees, flowers, grass, etc.)

Drainage

Improvements

Buildings (bathrooms, offices, playgrounds)

Lighting

Signage

Sounds

Street noise

Airplanes

Adjacent uses

Freeway

Elements (orientation)

Sun

Winds

Rain

Temperature

Context

Architecture (style, colors, height, etc.)

Streets

Adjacent uses (commercial, residential, etc.)

Miscellaneous

Size of site

Current users

Handicap accessible

Perceptions

How does the site make you feel?
(i.e., safe, secure, happy, etc.)

Smells? (flowers, nearby restaurants,
trash, etc.)

Gut-level feelings

Kid-friendly

Transportation

Traffic patterns

Pedestrian

Bus

Car

Bicycle

Parking

Existing

Above, at grade, underground

Utilize adjacent parking facilities

Street parking

Utilities

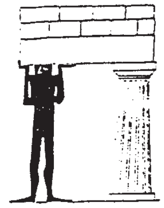
Gas

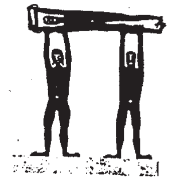
Water

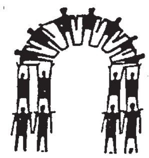
Sewer

Electrical

Created by Brian Ten, AIA, Carde Ten Architects

Column 

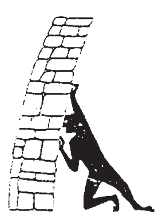
Post (column) and Beam 

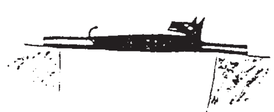
Arch 

Dome 

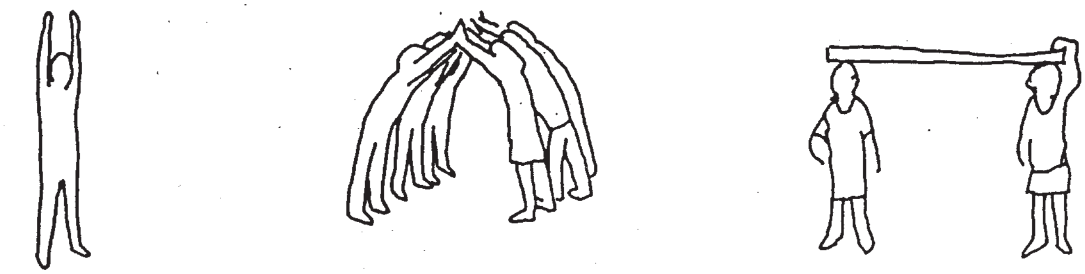
Pyramid 

Tower 

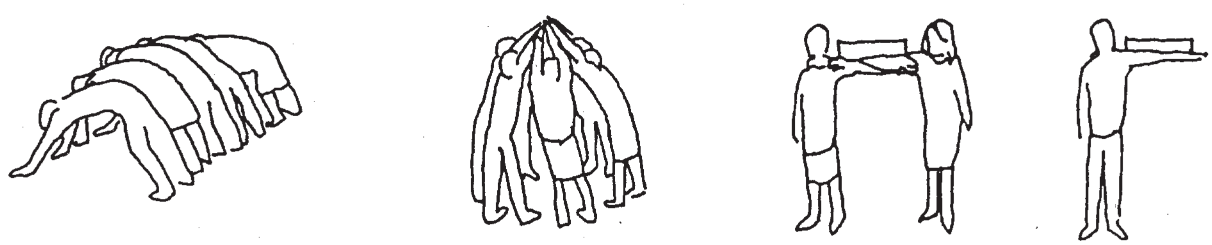
Buttress 

Bridge 

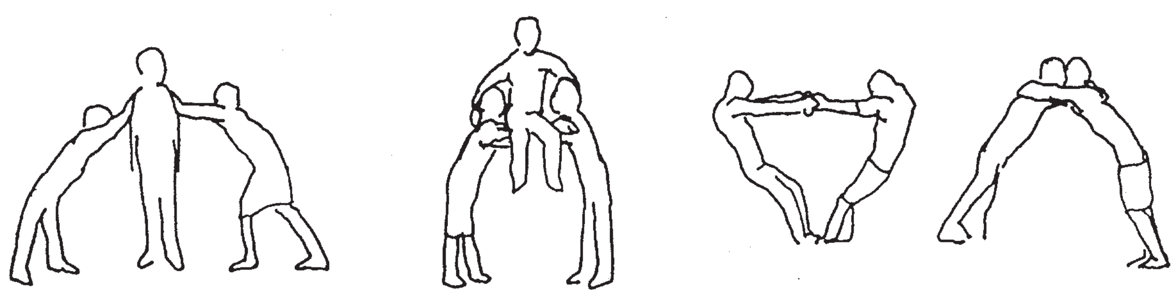
Images from What It Feels Like To Be A Building, by Forrest Wilson



COLUMN ARCH POST AND LINTEL

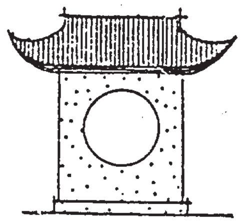


VAULT-TUNNEL DOME COLUMN AND BEAM CANTILEVER



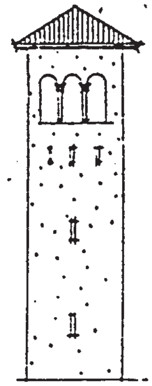
FLYING BUTTRESSES LOAD AND SUPPORT TENSION COMPRESSION

Reprinted from Architecture in Education,
Edited by Marcy Abhau, Foundation for Architecture, Philadelphia



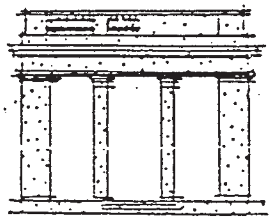
GATEWAYS

location:



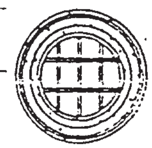
TOWERS

Location:



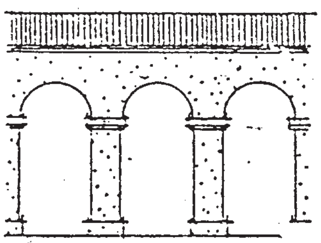
COLONNADES

Location



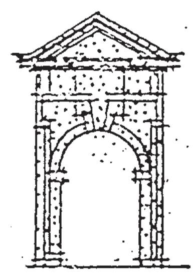
WINDOWS

Location



ARCADES

Location:



DOORWAYS

Location:

Where are the most interesting architectural elements located in your neighborhood?

(please answer in space above next to sample elements)

Created by Barbara Brown, AIA Barbara Brown Architects

Toothpick Structures

Basic Forms

1. Single Pole

Weakest form ... can be strengthened only by sinking far into honeycomb cardboard "ground", or secured in some manner so as to create a rigid frame.

2. Two Poles

Strongest in two directions, due to triangular shape, but weak in perpendicular direction.

3. Three Poles

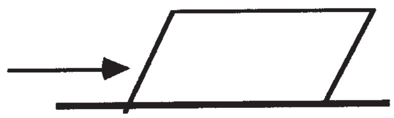
Strongest configuration based on an arrangement of a tripod, i.e. three triangles. The triangle opposes force in all directions.

4. Four Poles

Another form of tripod, strong in all directions.

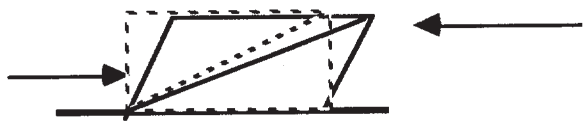
Resisting Forces

1. No support



Weak in all directions, with no means of resisting horizontal forces.

2. One Diagonal Support



Weak in all directions without horizontal support. One triangular support resists forces in only that one direction.

3. Two Diagonal Supports

Strong in two directions only, with the two diagonals working with one another.

4. Additional Diagonal Supports

Strong only in the directions of the diagonals. Will still be weak in the roof plane and any other unreinforced plane.

"Winds Across the Bridge"

BACKGROUND INFORMATION

Suspension bridges are supported by tall towers and suspended cables attached to a decking. These bridges are very graceful and must support much weight. Engineers must be knowledgeable of weather of conditions, types of metals used, wind forces as well as other factors when they design and construct such a bridge.

The greatest enemy of a suspension bridge is wind. As this investigation shows, it is not necessarily how strong a wind may be, but the combination of the wind force and the direction it takes. At times a strong, steady wind can do less damage than lighter gusts coming from several directions at once.

Modern suspension bridge design and construction must consider safety in all sorts of weather. The decking is designed to give stability to the entire suspension bridge structure. Box girders and trusses are used as stiffening supports for stability. Triangular shapes and girders are frequently used since the triangle is the strongest shape and cannot be twisted easily.

Modern decking and girders are often prefabricated, made in factories, and then hoisted into place above a river or bay. This method saves builders materials, money, and time. Modern decking is shaped more like the body of an aircraft, permitting wind to move freely around the deck and thus adding stability to the entire bridge structure.

Discussion Questions

A. What will happen to bridge Number 1 when the wind blows at different speeds and from different directions?

B. Why do you think this happened?

C. What do you think will happen when the triangular decking is added, and why?

D. What were the results when you tested bridge Number 2?

E. What happens when two wind sources are used from opposite directions?

F. Make some generalizations about wind force and its effect on a suspension bridge.

NAME________________________

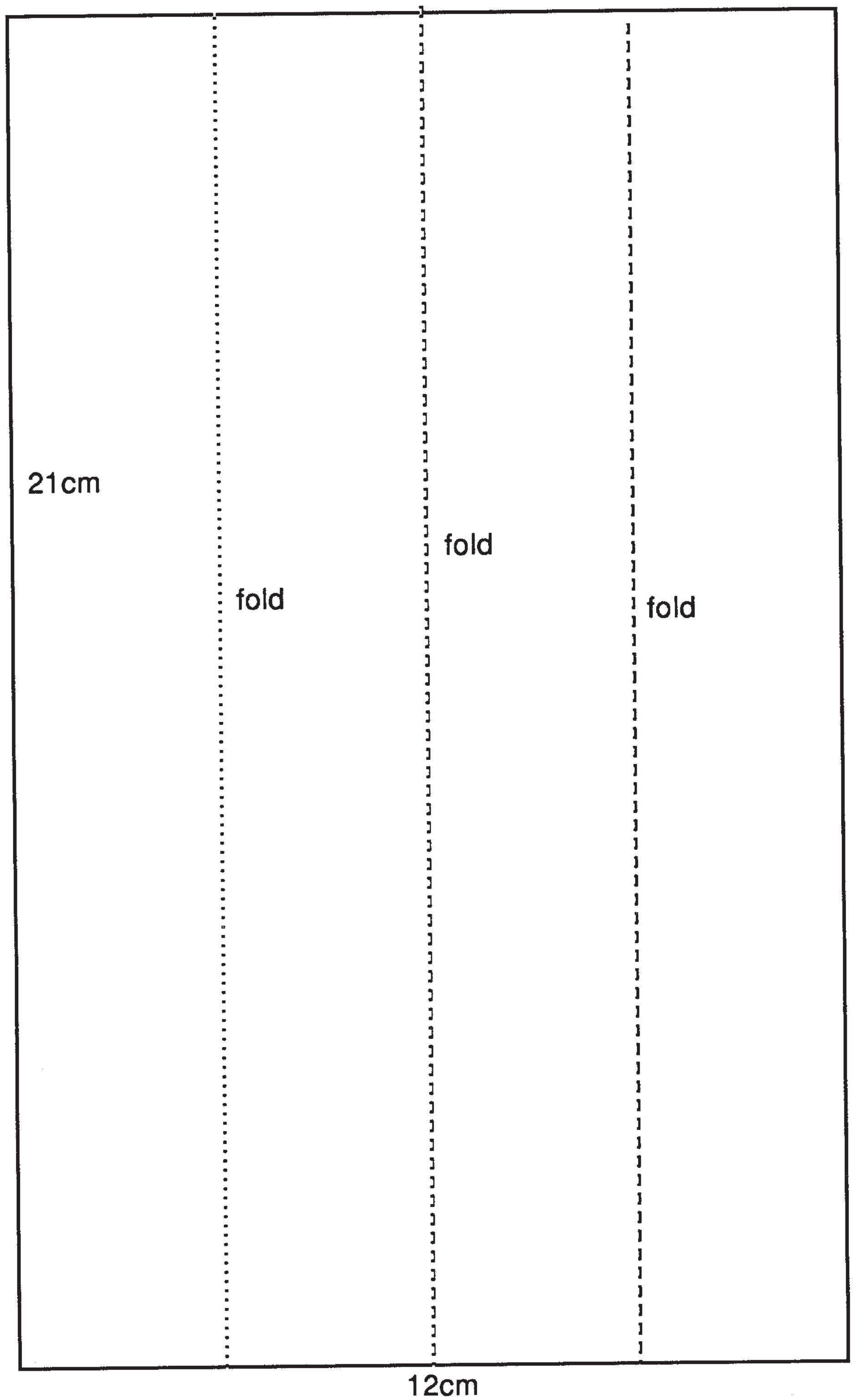
WINDS ACROSS THE BRIDGE

RECORD YOUR DATA

SPEED /	ANGLE OF WIND SOURCE	BRIDGE 1 NO DECKING	BRIDGE 2 WITH DECKING ESTIMATES	BRIDGE 2 WITH DECKING ACTUAL
HIGH	STRAIGHT ON	CM	CM	CM
LOW		CM	CM	CM
HIGH	LEFT 45°	CM	CM	CM
LOW		CM	CM	CM
HIGH	RIGHT 45°	CM	CM	CM
LOW		CM	CM	CM
HIGH	ABOVE BRIDGE	CM	CM	CM
LOW		CM	CM	CM
HIGH	BELOW BRIDGE	CM	CM	CM
LOW		CM	CM	CM
HIGH	2 FANS AT OPPOSITE SIDES	CM	CM	CM
LOW		CM	CM	CM

Write five sentences to tell what happened to the bridge. Which angle and speed damaged the bridge most?

Triangular Decking Pattern



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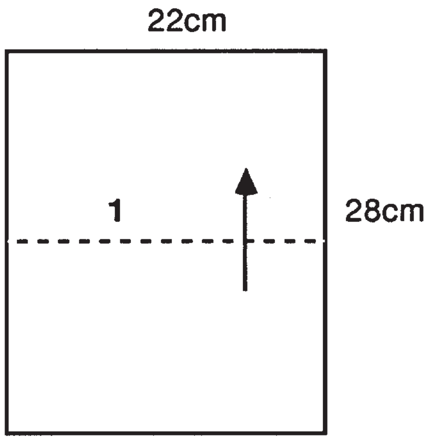
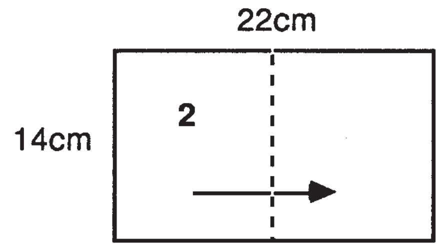
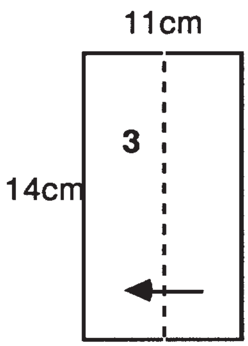
BRIDGE CONSTRUCTION DIRECTIONS



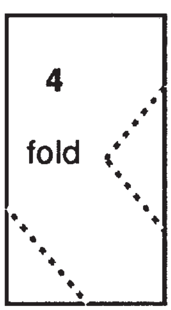
Fold from bottom to top



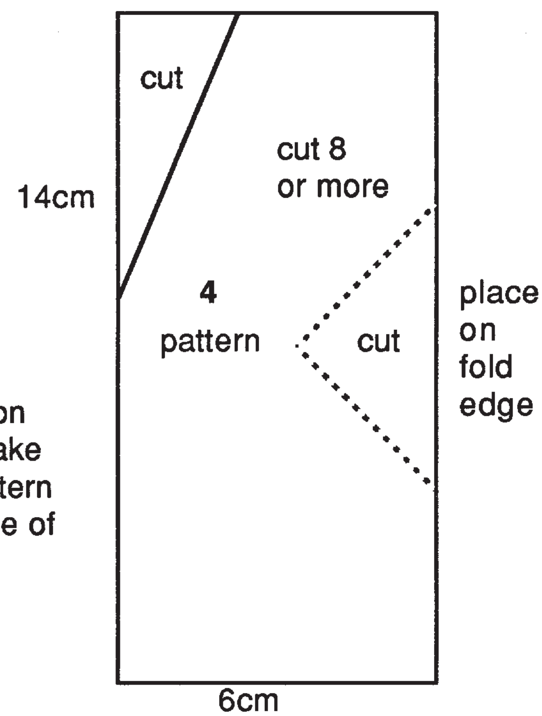
Fold sheet in half from left to right.

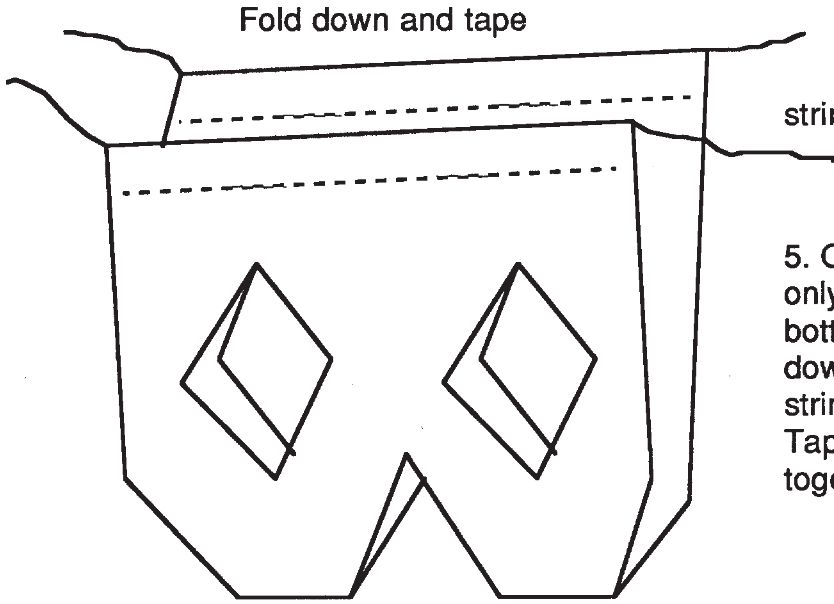


Fold sheet in half, from right to left



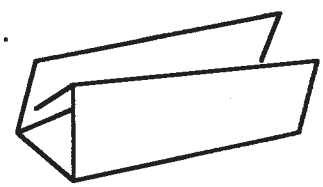
Place pattern 4 on folded paper. Make sure V-cut of pattern is along fold edge of paper. Cut out.

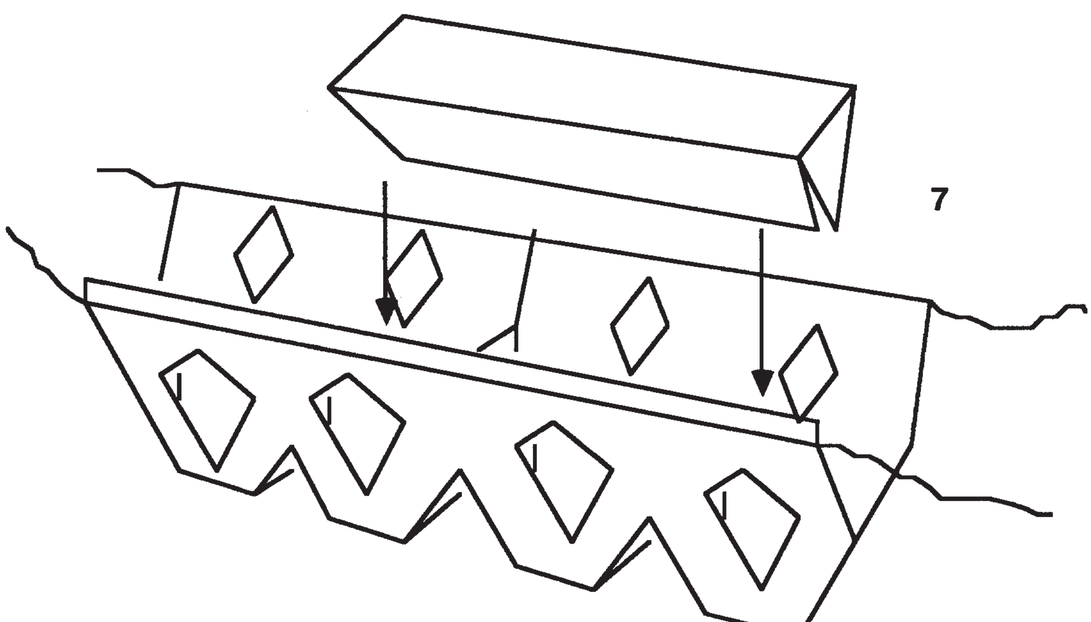


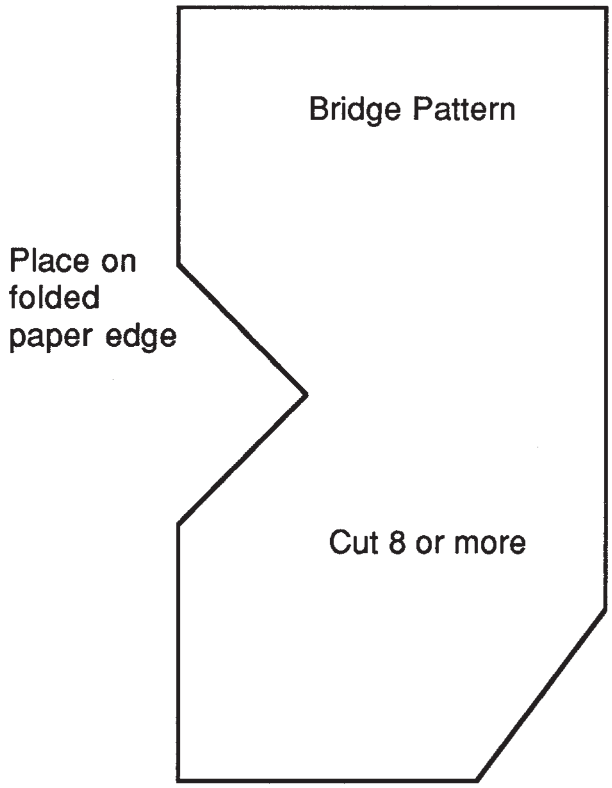


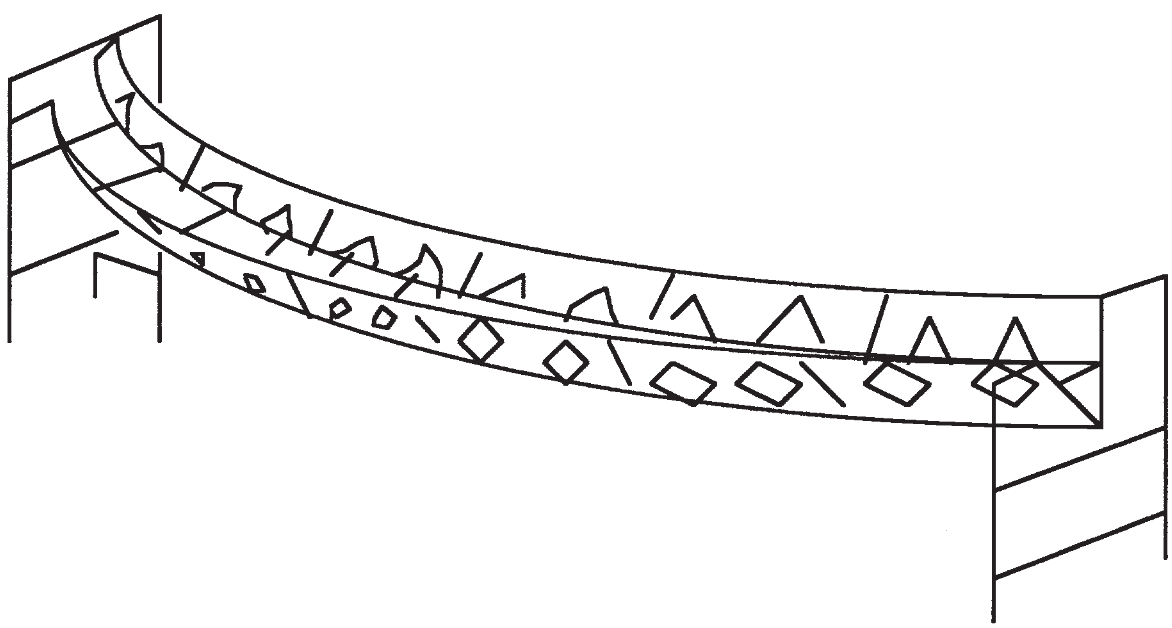
5. Open paper until there is only one fold left at the bottom. Fold side edges down and tape. Thread string thru folded edge. Tape bridge sections together to desired length.

6. Fold small sheet of paper into fourths as shown. Tape into triangular shapes, tape edges. Position across joints of bridge to make bridge 2.



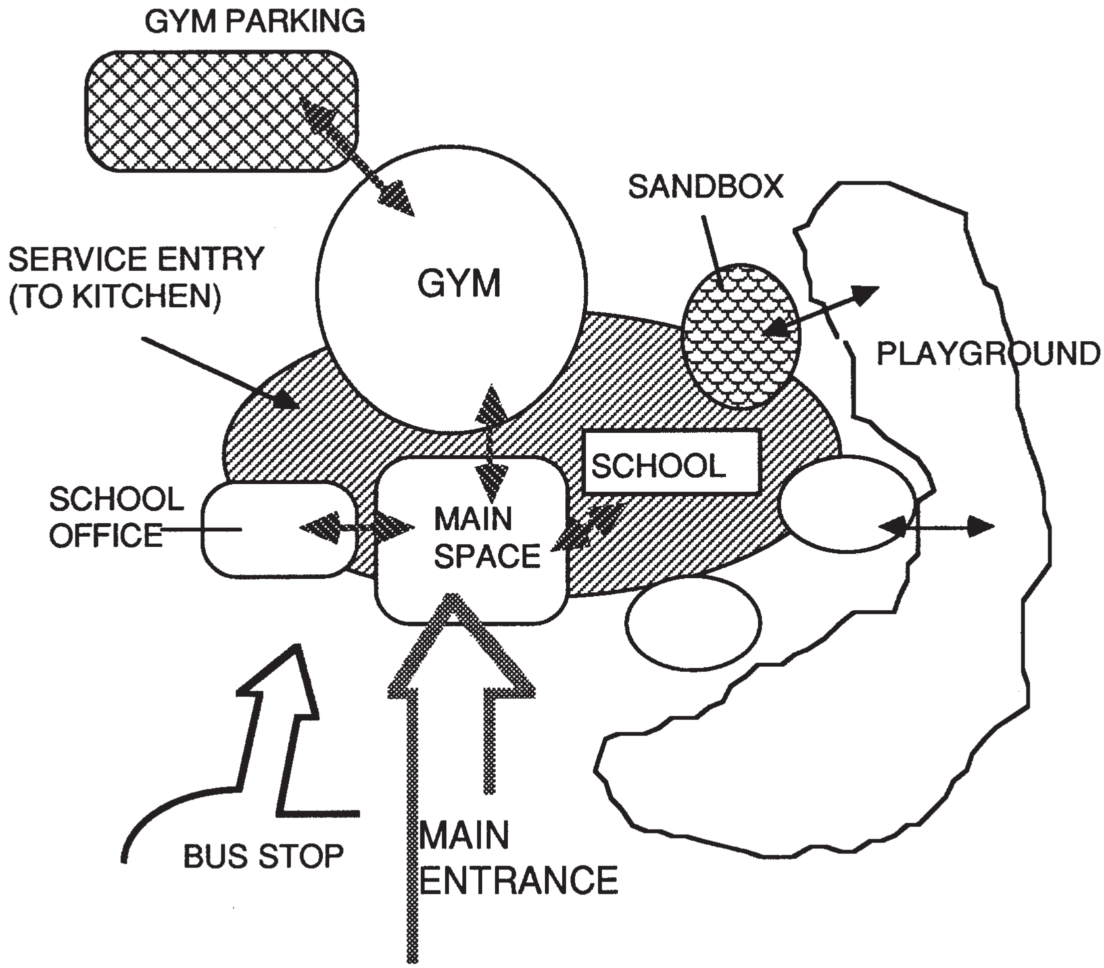



Bridge Pattern
Place on folded paper edge
Cut 8 or more



EXAMPLE OF BUBBLE DIAGRAM

BASIC EXIT AND ENTRY SCHEMATIC



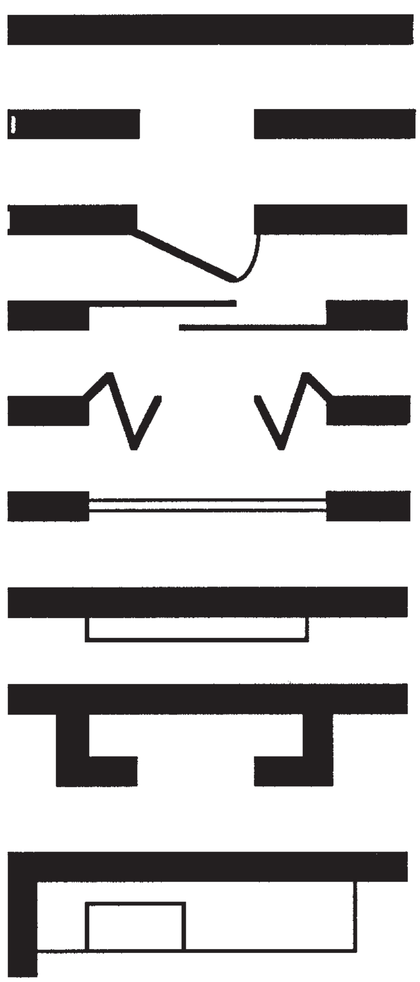
Symbols to Use When Drawing a Floor Plan

Floor plans show walls, doors, windows, furniture, lights etc.

A floor plan is a "birds-eye" view looking straight down.

The floor plan usually shows what is below an adults arm level- three to four feet off the floor.

This is a floor plan symbol key:
1/4" wide represents 1" wide in real life.



Walls have thickness so they are drawn with 2 lines about 6" apart.

Doors leave an open space to walk through.

Some doors swing.

Some doors slide.

Some doors fold.

Windows are closed and the glass is shown as a line in the middle.

Chalk and bulletin boards are shown as a line on the side of the wall.

Cupboards and closets are shown as such.

Only the tops of counters, sinks or furniture are shown.

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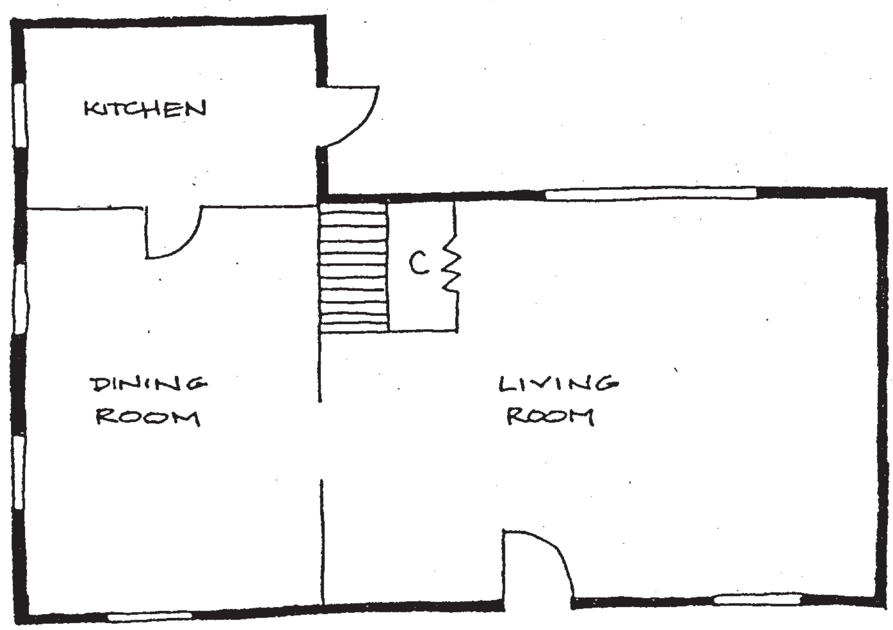
FLOOR PLAN



HOW MANY ROOMS ARE THERE? ___________

NAME THE ROOMS FROM LARGEST TO SMALLEST

1) ______________________ (biggest)

2) ______________________

3) ______________________

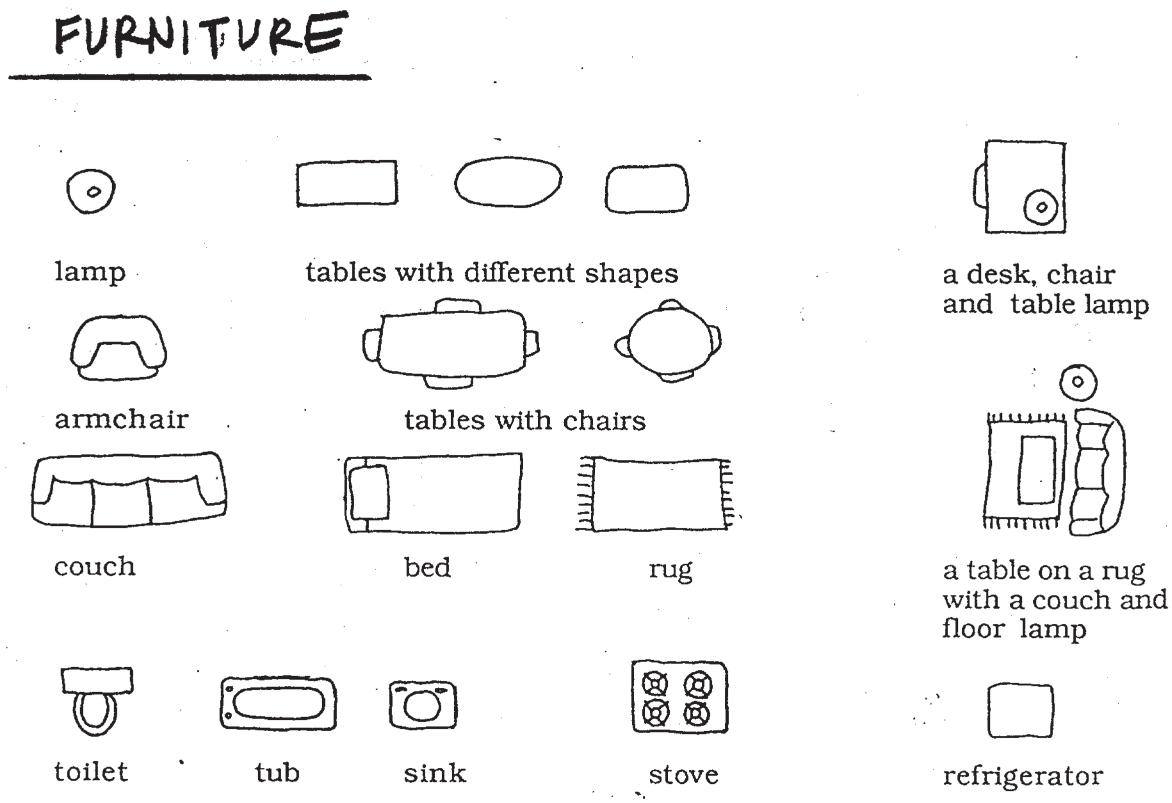
4) ______________________ (smallest)

HOW MANY WINDOWS ARE THERE? ________

HOW MANY DOORS ARE THERE? ________

USE FURNITURE SYMBOLS TO SHOW HOW YOU WOULD DECORATE THESE ROOMS.

Adapted from Architecture in Education, Edited by Marcy Abhau,



Adapted from Architecture in Education, Edited by Marcy Abhau,

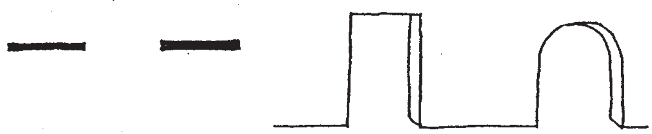
WALLS

a thick line shows an exterior (outside) wall

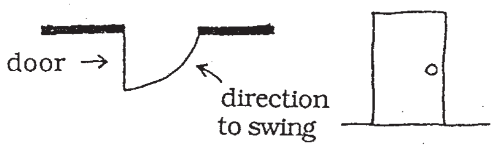
a thin line shows an interior (inside) wall

DOORS

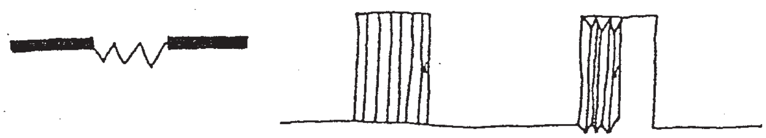
Some doorways are open:



Some doors swing open and shut in one direction:



Some doors fold up to one side like an accordion:

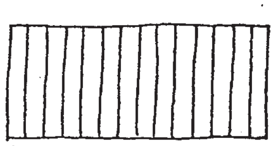


WINDOWS

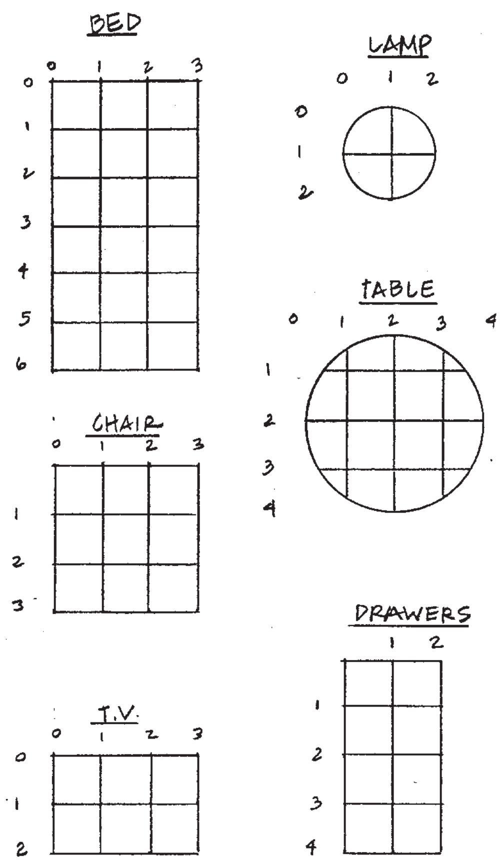
two narrow windows

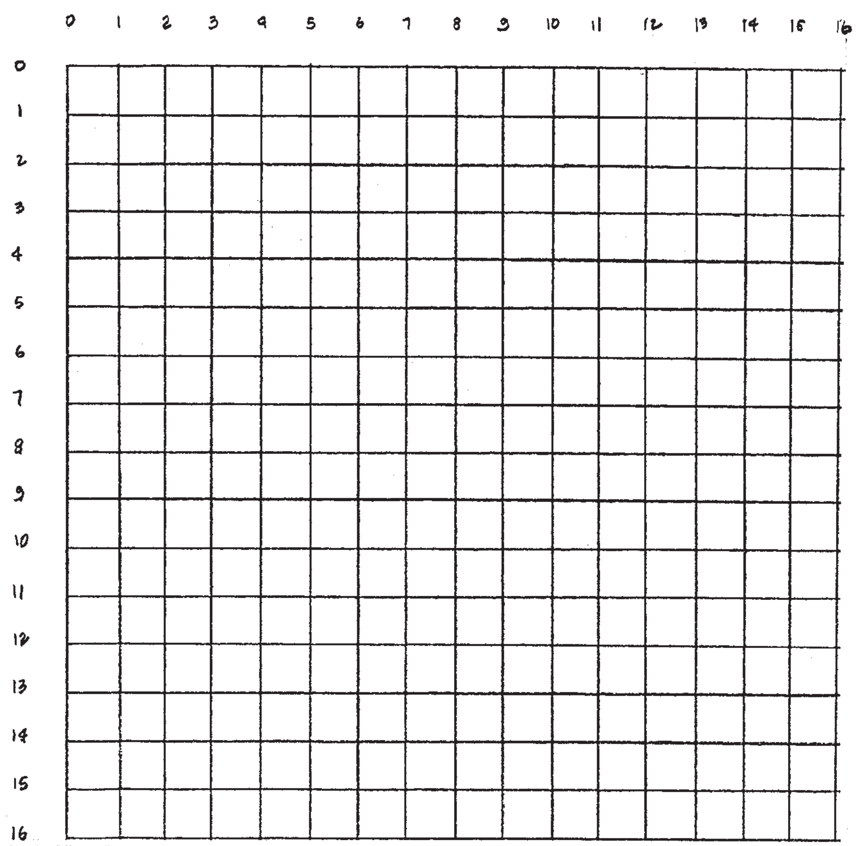
one wide window

STAIRS

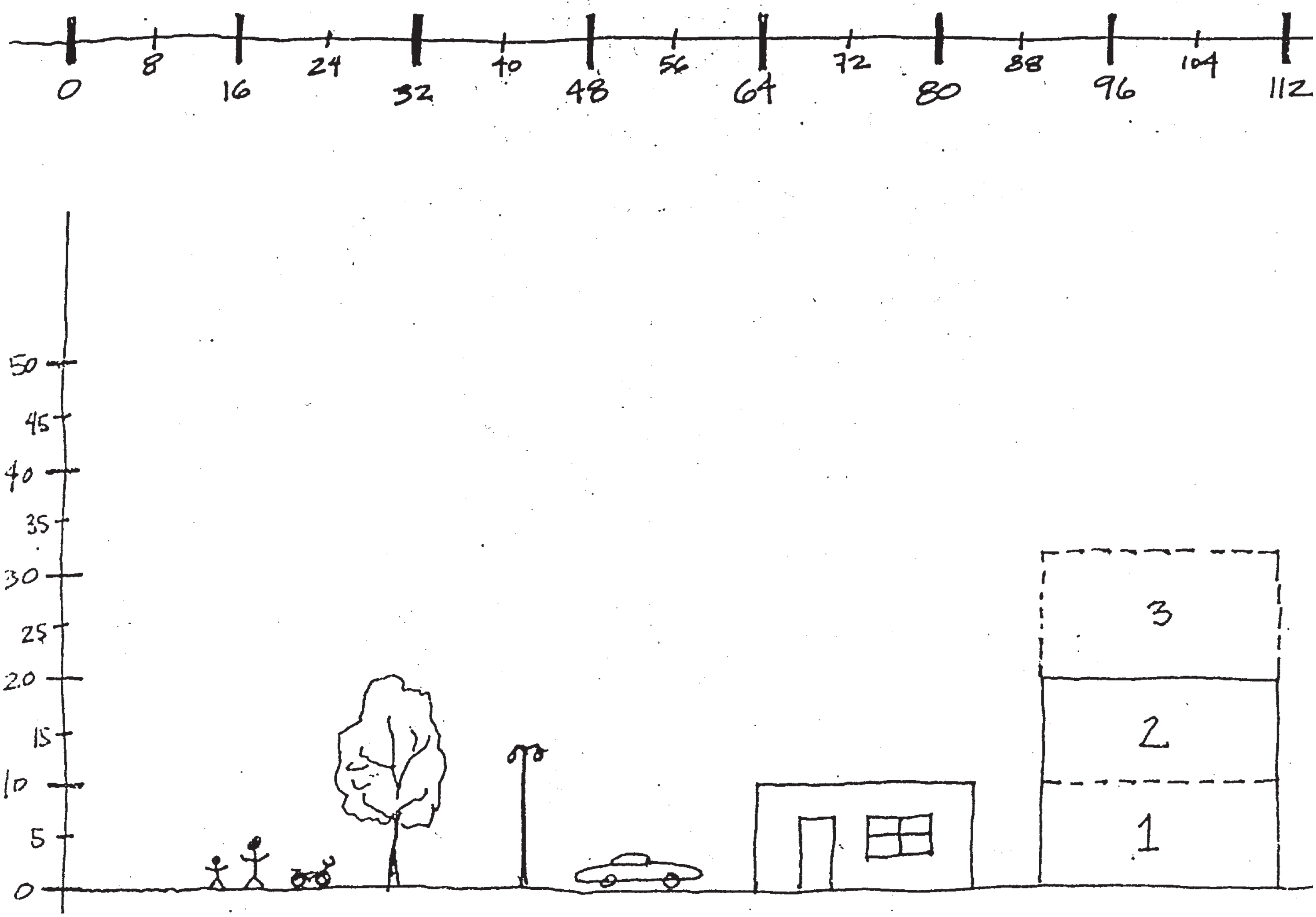


Adapted from <u>Architecture in Education</u>, Edited by Marcy Abhau,

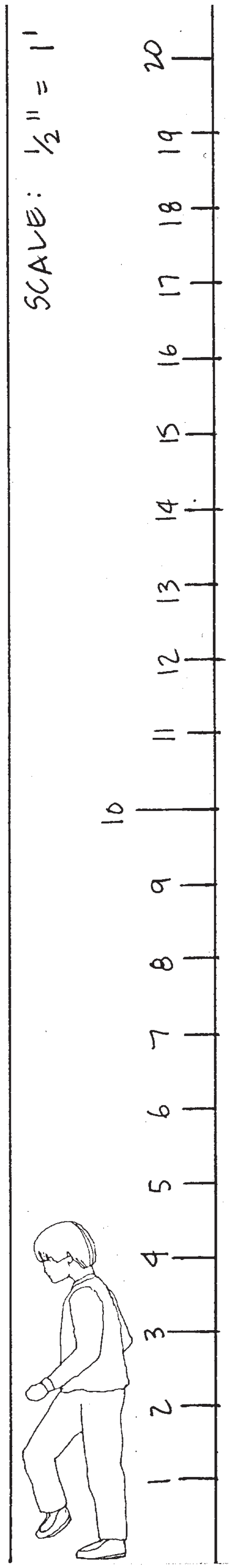

BED
LAMP
TABLE
CHAIR
T.V.
DRAWERS


0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

SCALE: 1/16" = 1'-0" or 1" = 16'-0"



Created by Patricia Alarcón, Leap/ AIASF Architects in Schools Program


SCALE: 1/2" = 1'
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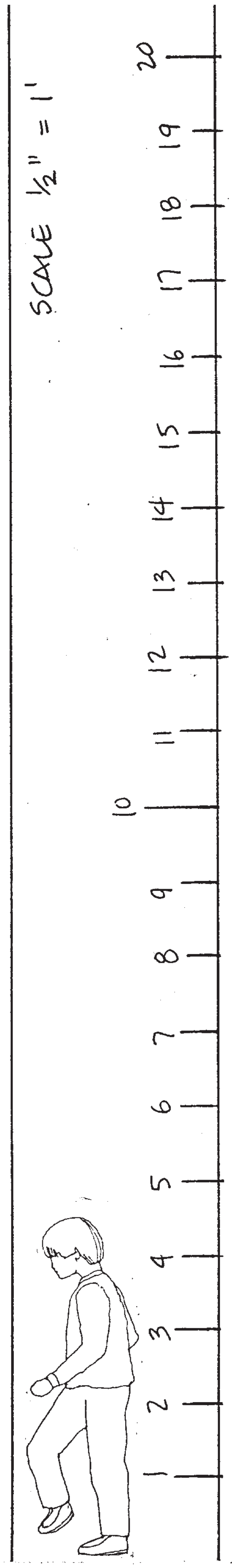
20


SCALE 1/2" = 1'
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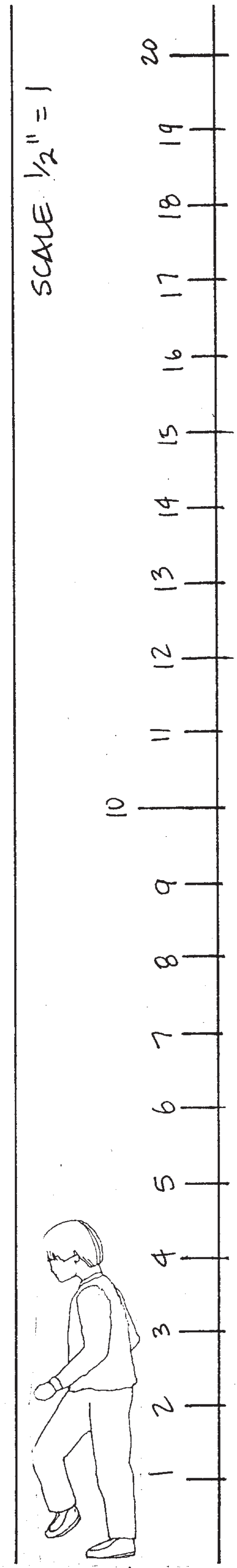
SCALE 1/2" = 1
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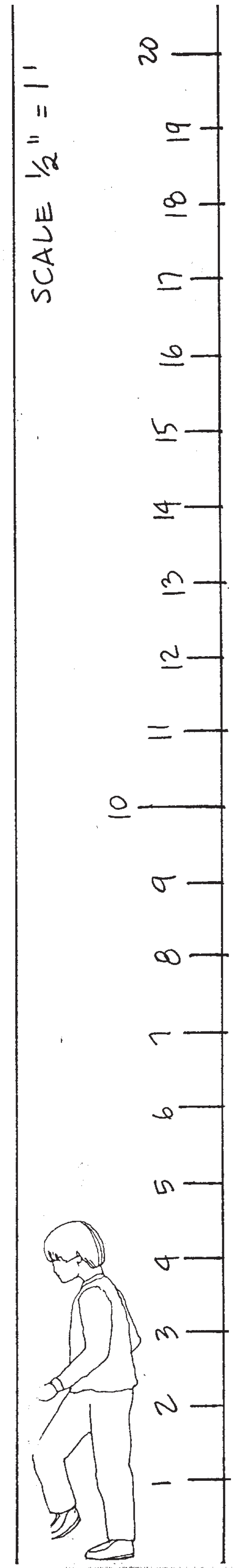
20


SCALE 1/2" = 1'
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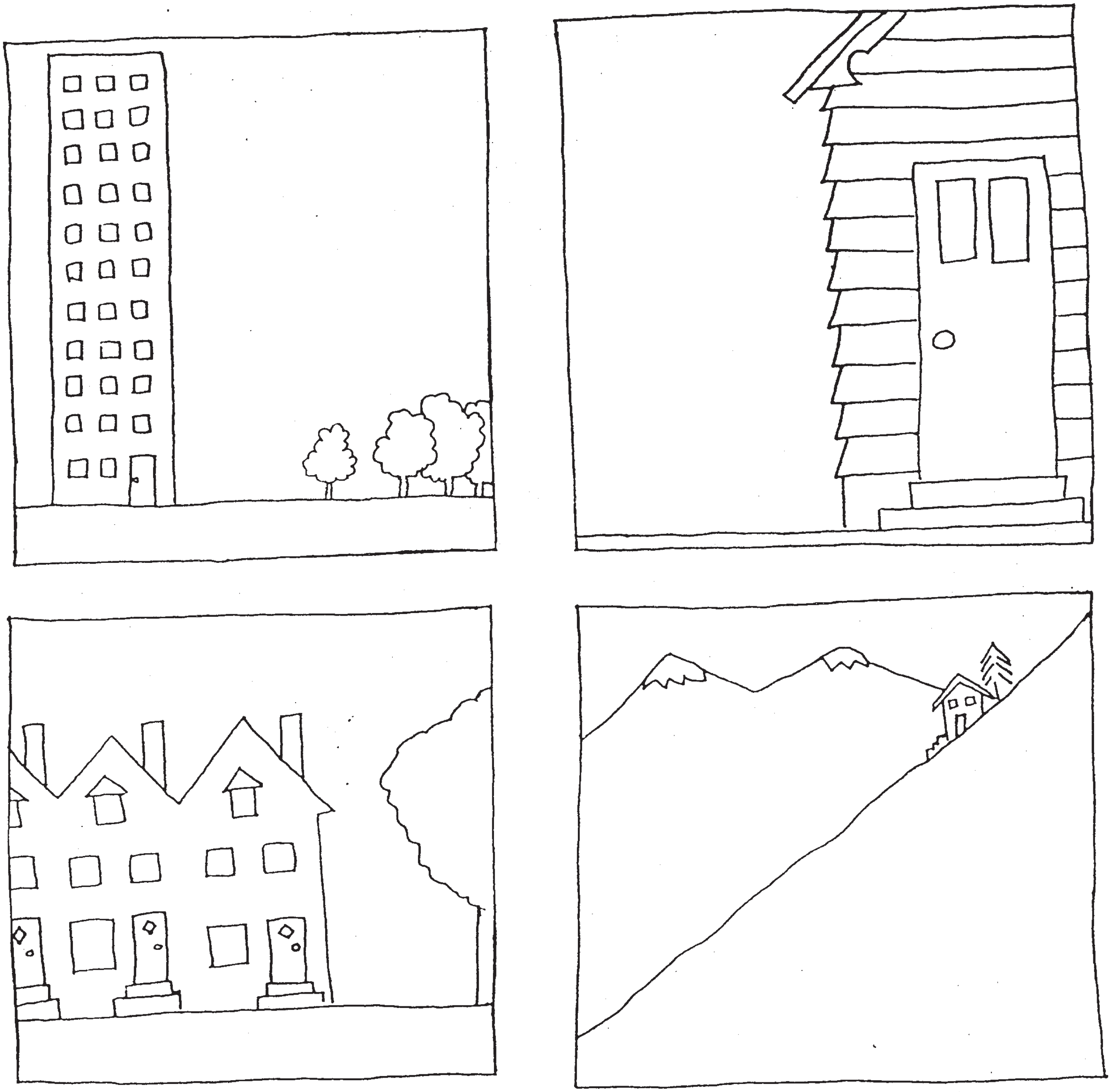
20

MAKE A PERSON TO FIT EACH BUILDING

Show how BIG or LITTLE a person would be for each of these homes.



From Architecture in Education, Edited by Marcy Abhau, Foundation for Architecture, Philadelphia

ARCHITECTURE

Names ______________________________

____

What kind of structure did you build?

____

How wide is your structure?

________ inches ________ centimeters

How tall is your structure?

________ inches ________ centimeters

Is your structure strong? ______

Is your structure beautiful? ______

What else do you notice about your structure?

____

____

NAME:

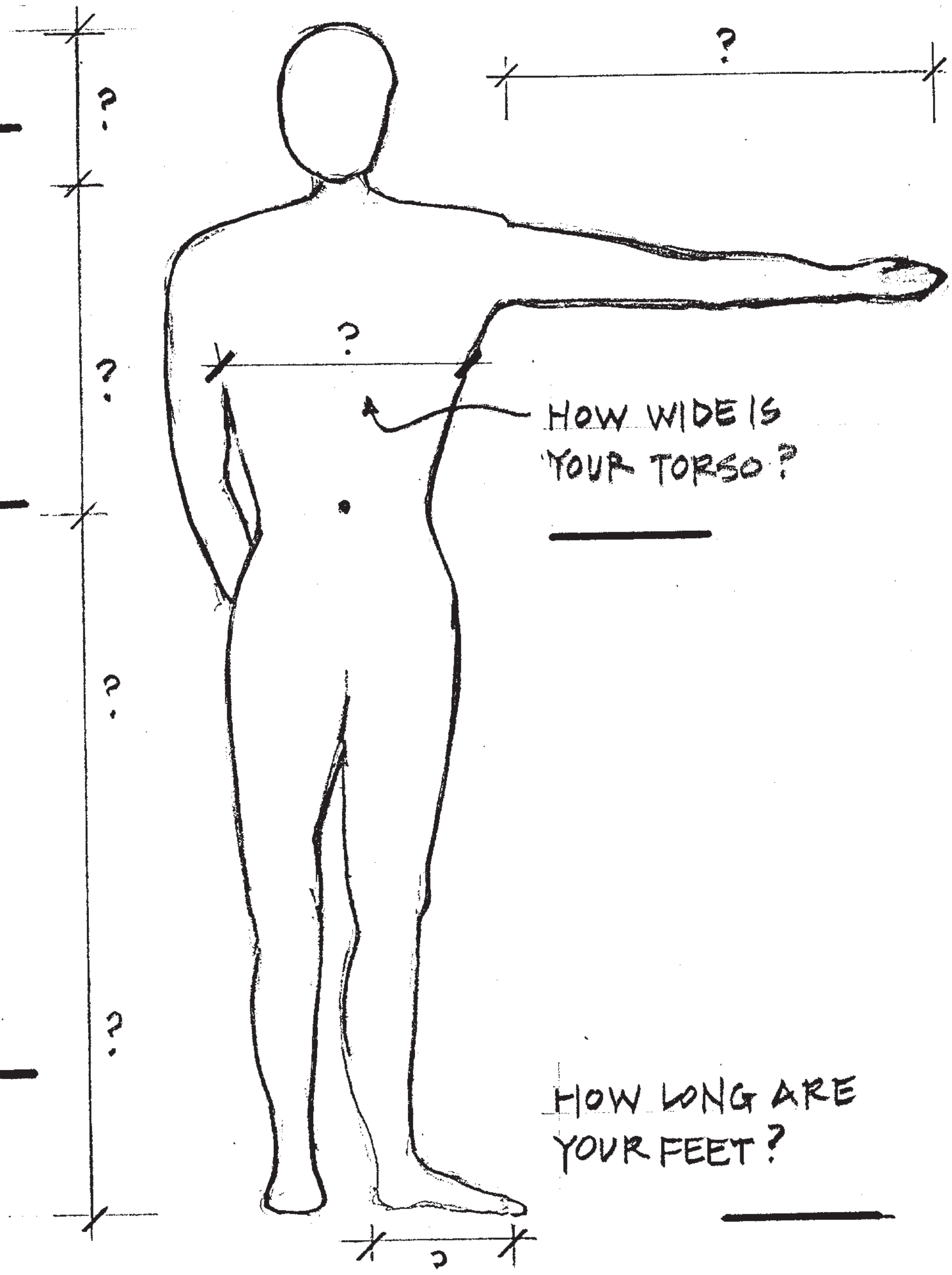
SCALE

HOW TALL ARE YOU? ________

HOW LONG IS YOUR ARM? ________

HOW LONG IS YOUR HEAD? ________

HOW MANY INCHES FROM YOUR CHIN TO YOUR BELLY-BUTTON? ________



HOW WIDE IS YOUR TORSO? ________

HOW MANY INCHES FROM YOUR BELLY-BUTTON TO THE BOTTOM OF YOUR FEET? ________

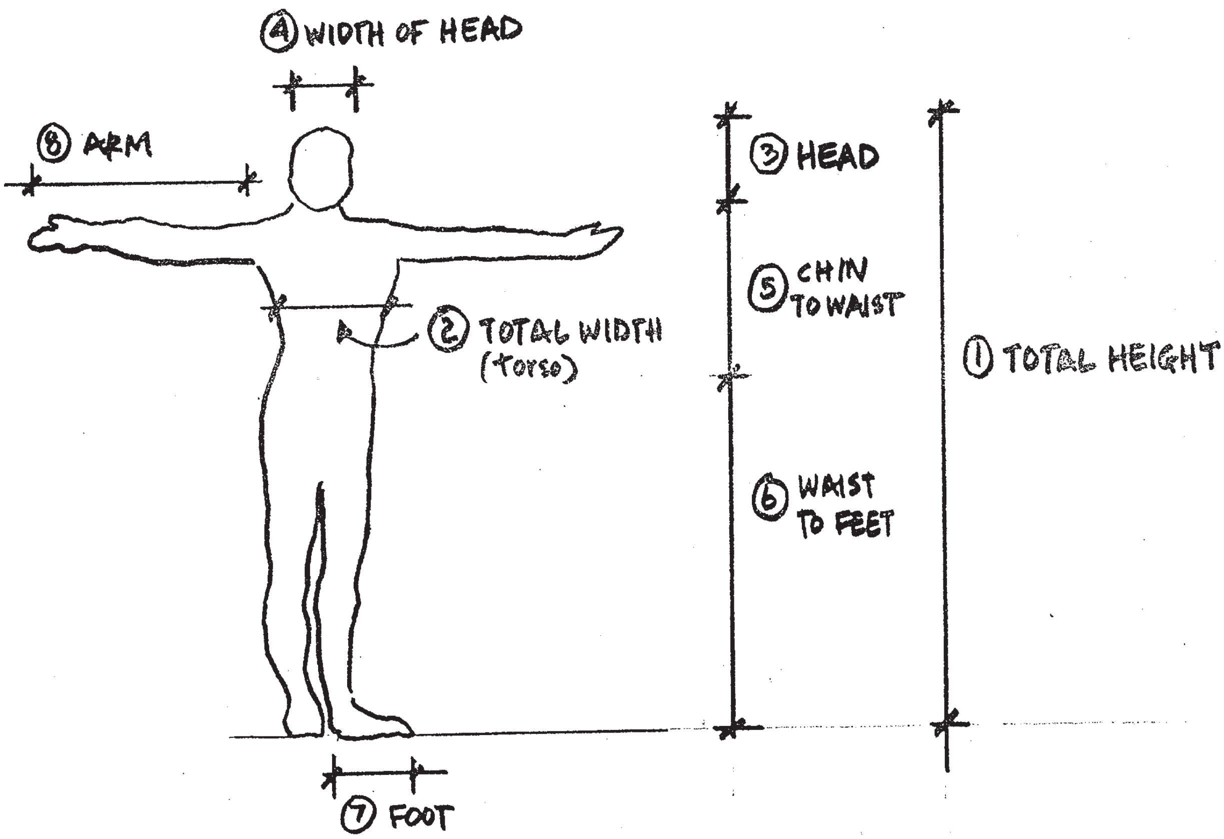
HOW LONG ARE YOUR FEET? ________

Adapted from handout by Fran Halperin, AIA Built Designs

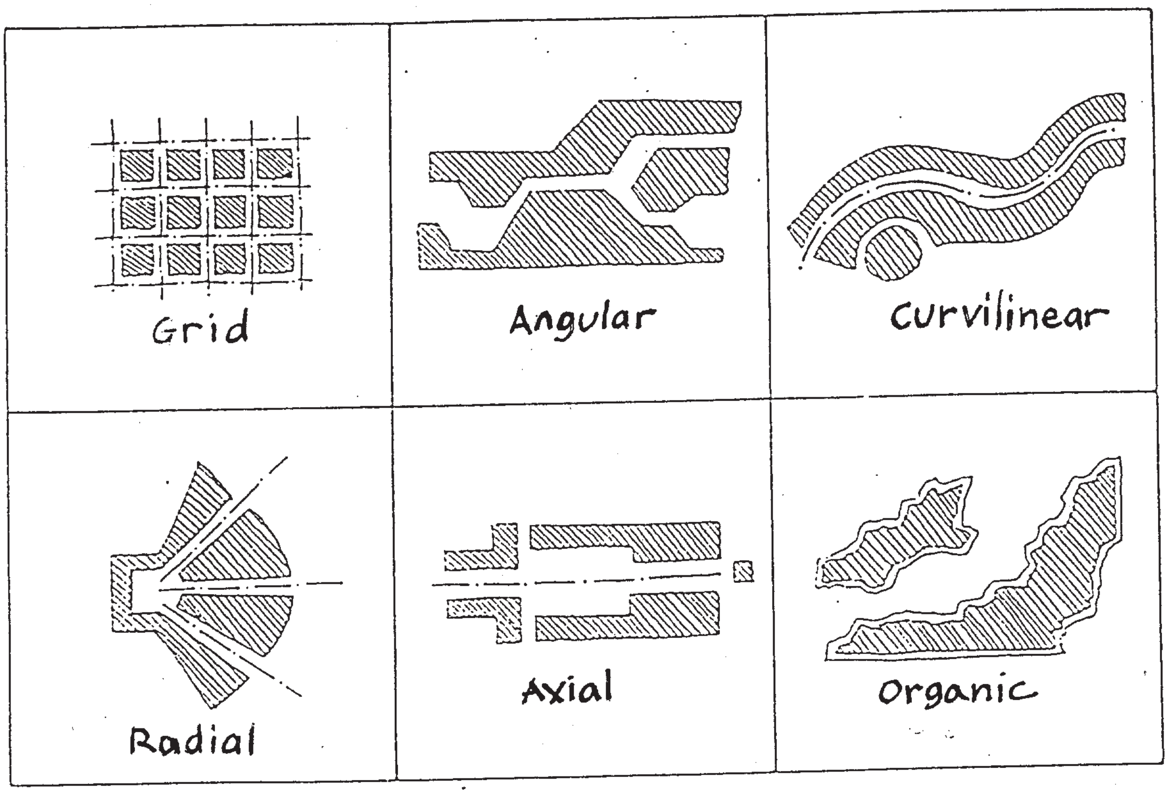
SCALE

YOUR NAME ______________________________

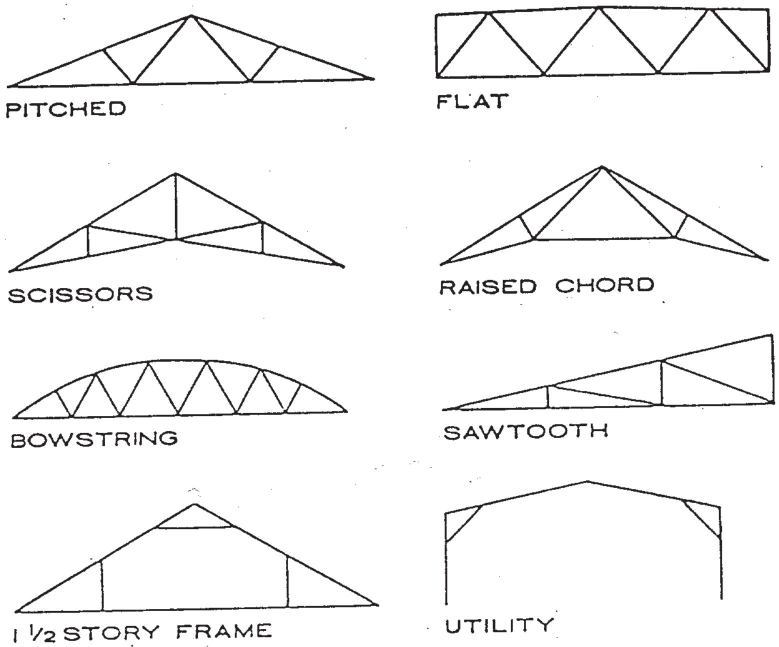
① TOTAL HEIGHT	_____ inches	or	___ ft.	_____ inches
② TOTAL WIDTH (torso)	_____ inches	or	___ ft.	_____ inches
③ HEAD (top to chin)	_____ inches	or	___ ft.	_____ inches
④ WIDTH OF HEAD	_____ inches	or	___ ft	_____ inches
⑤ CHIN TO WAIST	_____ inches	or	___ ft	_____ inches
⑥ WAIST TO BOTTOM OF FEET	_____ inches	or	___ ft	_____ inches
⑦ LENGTH OF FEET	_____ inches	or	___ ft.	_____ inches
⑧ LENGTH OF ARM	_____ inches	or	___ ft.	_____ inches



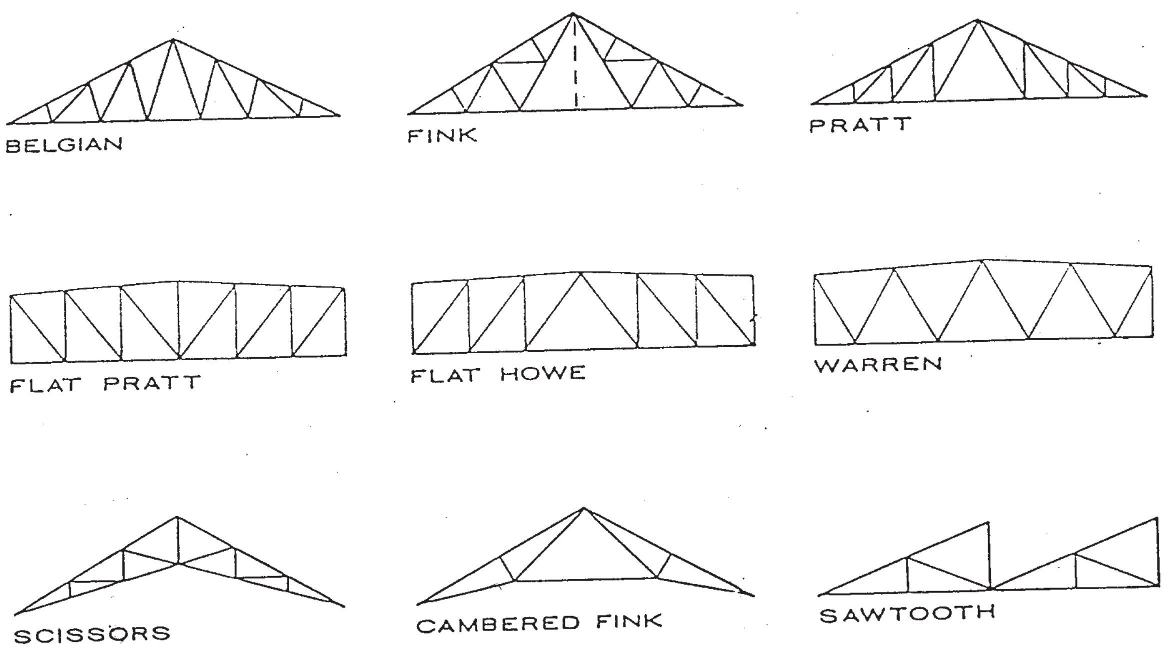
CITY PATTERNS



Adapted from Finding Lost Space by Roger Trancik, 1986.



LIGHT TRUSSES

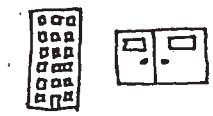
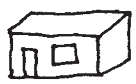
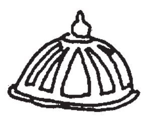
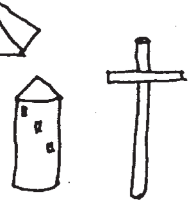


HEAVY TRUSSES

From Architectural Standards,

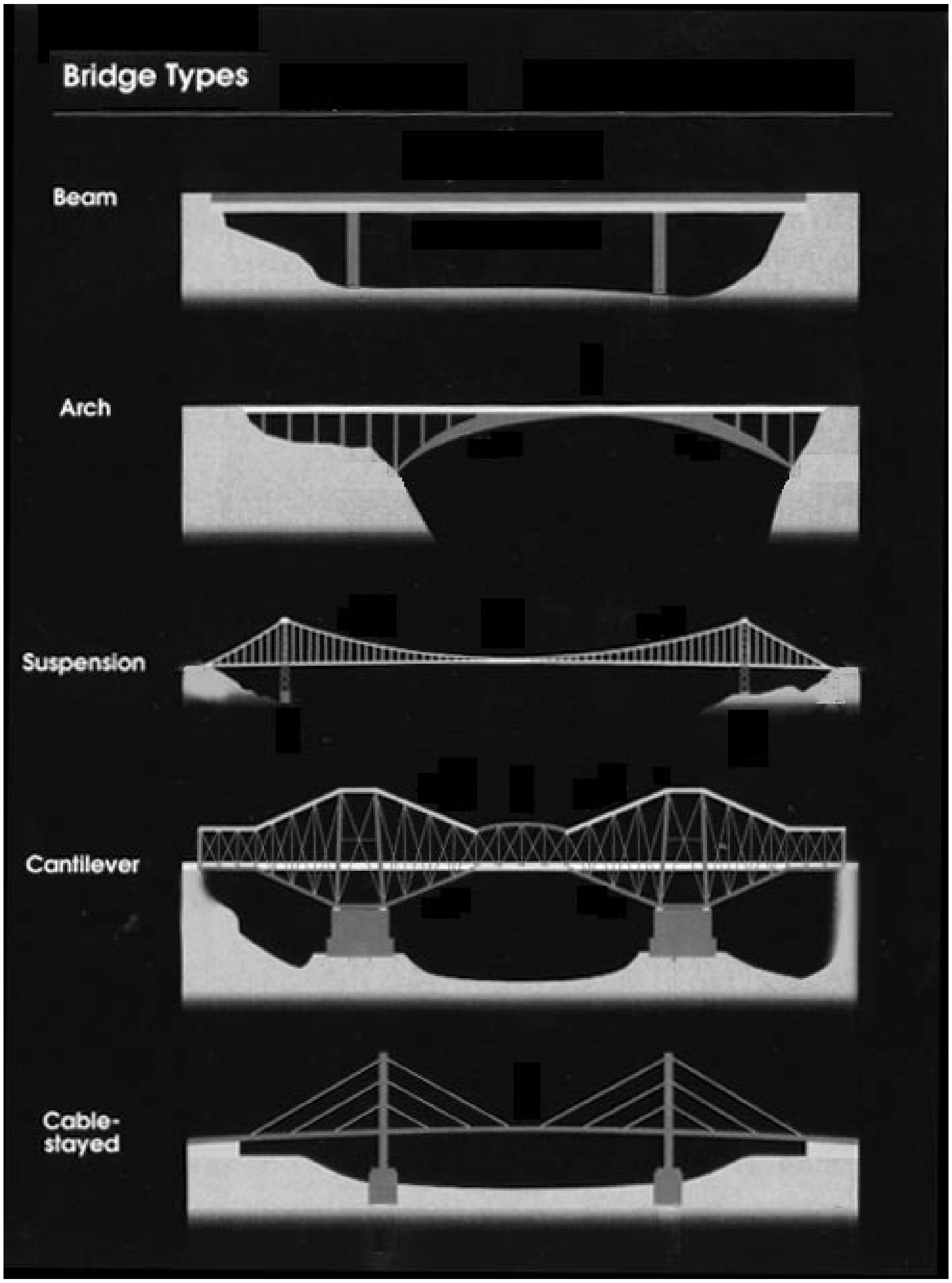
8. GEOMETRIC SHAPES IN THE BUILT ENVIRONMENT

Show slides of the built environment and have students find examples of both two- and three-dimensional shapes.

SQUARE		--- window, city block
RECTANGLE		--- door, skyscraper
CIRCLE		--- clock face, porthole
TRIANGLE		--- pediment, roof peak
CUBE, RECTANGLE		--- building, room
SEMI-CIRCLE		--- arch, fanlight tunnel
SEMI-SPHERE		--- dome
PYRAMID		--- Egyptian pyramids
CYLINDER		--- tower telephone pole
CYLINDER AND SEMI-SPHERE		--- silo
CONE		--- teepee

Using pictures of the built environment from magazines, students find geometric shapes and outline them in thick black marker. These shapes are then traced onto tracing paper to form an abstract pattern, illustrating the names of the shapes.

From Architecture in Education, Edited by Marcy Abhau, Foundation for Architecture, Philadelphia



From The Builders, National Geographic Society

Glossary of Terms

Acoustics
The reaction of sound waves within spaces and to surfaces, whether reflective or absorptive.

Architecture
The creative process of designing the constructed environment. Architecture affects everyone in their daily lives, consciously or unconsciously. The objective in teaching about architecture is to raise awareness and encourage young people to participate in decisions about the built environment.

Boomtown
A frenzied approach toward the construction of a model of the student's choosing. The model should be some structure or element of a typical city. The students are given a certain amount of time to construct their model with many different kinds of materials.

Brainstorming
A brainstorming session is an informal, creative conference for the purpose of generating ideas which can later be evaluated as possible solutions to a given problem.

Bubble diagrams
A graphic aid, in the form of free-hand bubbles, used in the process of abstract ideation. It is used for quick representation and evaluation of relationships, and as an organizing, planning, and design tool.

Built Environment
Everything that human's make, from parks and playgrounds to skyscrapers, from roads and highways to desks and chairs.

Career Day
Fairs or special days at schools where students can meet professionals in a number of fields. Sometimes each professional gives a formal speech, with questions and answers. Or sometimes students meet more informally with the professionals to find out about how to train for and make future career choices.

Circulation
In architecture this term refers to the movement of people, goods, and services through space. Halls, pathways, streets, sidewalks are all part of a building circulation system.

Ecology
The relationship between the built, natural and cultural environments.

Elevation
A scaled, two-dimensional graphic representing a plane, such as a wall or building facade. The elevation is a vital tool in communicating to others one's ideas about doors, windows and other details.

Field trips
Extracurricular trips provide an opportunity to relate that which has been taught in the classroom to the real world. The students exhibit a higher enthusiasm for learning when they are able to learn within the context of three-dimensional, life situations. In the field the students can observe, explore, touch and more thoroughly comprehend ideas which may have been introduced to them in the abstract.

Model building
Model making allows students to express ideas in three dimensions. They can translate 2-dimensional plans, sections and elevations into a solid multi-sided representation. For many kinesthetic and tactile learners, this may provide the opportunity to understand a concept or idea more fully. Models can be an important tool for presentation to others.

Plans
Plans are two-dimensional representations of ideas, concepts, and relationships in a horizontal plane. Plans are often transmitted to others in a set of blueprints. The blueprints may contain the floor plan of a room or house, the site plan of a yard or park, or an urban design scheme for a neighborhood or community. Students use plan drawings as an additional communication and planning tool.

Presentation
Presentations provide an opportunity to communicate to others, in a written, graphic, or oral form. They may include observations, ideas, concepts, and justifications. Most architectural projects are presented to the clients, to various stakeholders or to building departments in cities where they will be built.

Scenario writing
A written communication tool used to illustrate a logical and sequential thought process responding to and dealing with various problems. It is a vital tool in planning, designing,

organizing and presenting ideas, and in justifying solutions. The scenario is illustrated as a detailed sequential descriptive story or documentation of student activities, perceptions, responses, and thought in relation to the subject of their scenario.

Sections
A two-dimensional representation of a "slice" or cut through a building, wall, or site. For example a wall section would show its internal elements such as studs, insulation, siding and interior wall covering. A section would show methods of construction and how the various parts are related to each other.

Site analysis
A site analysis contains observations about the conditions of a site. The analysis considers elements such as climate, slope, soils, water run-off, surrounding structures, shading, utilities, sun exposure, view, access, noise, etc. These observations are recorded verbally and graphically, and are the foundation upon which design decisions are made.

Structural elements
Arch: a structural device forming the curved or pointed upper edge of an opening or support as in a bridge or doorway.
Beam: any horizontal structural element supported at each of its ends by any vertical structural elements
Buttress: a structure, usually brick or stone, built against a wall for support or reinforcement.
Cantilever: any horizontal structural member which is supported at one of its ends and at an intermediary point by vertical structural elements.
Column: any vertical structural element
Dome: a hemispherical roof or vault.
Pediment: the wide, low-pitched gable surmounting the facade of a building.
Tower: a tall building, framework, or structure.
Wall: a series of columns, also acting as vertical structural elements

Structural forces
Load: the force which is applied horizontally to a beam or cantilever
Tension: the force which is illustrated by a pulling action. (For example, the ropes of a circus tent, or the guide-wires that hold a pole vertical.)
Compression: the force which is illustrated by a pushing action

Topography

Topography is the three-dimensional characteristic of land/water terrain. Topographic contours are determined by the degree of the change in elevation. The characteristics of topography can be described as one or more, in combination, of the following: flatlands or plains, undulating hills, worn mountains, deep ravines, craters, and other elements that characterize shallowness and/or steepness.

Tips During a BEEP Residency

PROJECT PROCEDURES FOR A TYPICAL BEEP RESIDENCY

1. Teachers and architects connect and form a team.
2. A teacher meets with the team before the project starts to:
   - A. Discuss the project theme chosen by the teacher
   - B. Define roles and responsibilities of each team member: teacher, architect, student teacher, architecture students, consultants
   - C. Develop a schedule and plan special events: field trips, demonstrations, community presenta tions, media coverage
   - D. Determine if any other consultants are needed: planner, contractor, landscape architect, artist, interior designer
   - E. Determine the desired end project: model, map, artwork, presentation
   - F. Develop a materials list and identify sources
3. The teacher introduces the project to students:
   - A. Describes the project theme, anticipated process, schedule and end product
   - B. Introduces the team
   - C. Conducts warm-up exercise: Boomtown, slide show, field trip
4. The following activities continue over approximately a 6 to 10 week period:
   - A. Architects and other team members visit classrooms: discussions, presentations, consultations
   - B. Students work singly or in teams on their projects
   - C. Field trips or other special events as a class or a team
   - D. Team meets outside of class to review progress and plan adjustments
5. Completion of models, maps, drawings or other end projects include:
   - A. Final presentation, evaluation and discussion
6. Ongoing documentation of process and progress:
   - A. Black and white photographs, color slides, video tape
   - B. Correspondence and reports
   - C. Newspaper articles, radio/television coverage
7. Final team meeting after completion for evaluation and sharing of projects with other BEEP partici pants, educators and the community

ROLES AND RESPONSIBILITIES IN A TYPICAL BEEP RESIDENCY

The Educator

The responsibilities of the educator include the following:

• Attend a BEEP workshop
• Responsible for the BEEP program and is the team leader
• Supervise project and maintain continuity between professional visits
• Establish a classroom atmosphere conducive to project participation, which promotes the free flow of ideas and the freedom to explore and seek alternative solutions
• Set guidelines for, and enforce, student behavior
• Arrange schedules with school and district transportation facilities for field trips
• Make sure the sequential order of activities teach a process, not just a series of interesting experiences
• Keep records of the project, for example, in student journals, teacher's log, slides and photos, letters, reports, drawings, etc.
• Provide school-supplied materials for notebooks, art work, models, etc. Coordinate with the architect for the purchase or donation of specialized professional materials such as blueprints, or overlay tracing paper.
• Attend area-wide pre-project, interim, and post-project meetings
• Arrange for the sharing of project ideas, concepts, details, and results with other BEEP participants, other educators, and community officials

The Architect

The responsibilities of the architect include the following:

• Attend a BEEP workshop
• Assist the teacher in establishing the scope and scheduling of the project, and the level and timing of professional involvement
• Provide the ability to synthesize all the necessary outside components to produce comprehensive "real world" resources for the project
• Locate and coordinate with other architects and built environment professionals to participate in the project
• Visit the classroom, consult with students, present "real world" work, lead discussions and field trips, assist in project documentation

TIPS FOR ARCHITECTS AND TEACHERS IN BEEP RESIDENCIES

ARCHITECT

- Learn the students' names
- Lecture presentations should not exceed 20 minutes without hand-on activity.
- Establish definite procedures or format in the presentation of a lesson.
- State and write the lesson's main objective on the chalkboard.
- Write vocabulary terms on the board as they are presented in the lesson.
- Review previous learnings with the students before proceeding to the next lesson.
- Be courteous, positive, and responsive to the students' questions, answers, and completed activities.
- Develop students' self-confidence through your response to their work.
- Ask questions that require more than a "yes" or "no" response from the students.
- Involve as many students as possible in classroom discussion.
- Pre-plan for the roles of the classroom teacher, volunteers, and the students.
- Use vocabulary appropriate to the comprehension level of the students.
- Be aware of storage issues (most classrooms are small and crowded)

TEACHER

- Prepare large, readable name tags for the students.
- Design appropriate methods of lesson presentation with the architect.
- Discuss how lessons can use time efficiently.
- Discuss accomplished objectives and the scope and sequence of the next lesson(s).
- Provide tips for interacting with various students.
- Discuss questioning techniques, and help facilitate a lesson, once it is in progress.
- Encourage class participation of all students.
- Discuss with the architect the importance of identifying and telling the students what should be accomplished during a given lesson.
- Have the students prepare VOCABULARY DICTIONARIES with the words and definitions learned during the lessons.
- Remind the architect of the students' learning characteristics so that he/she can relate to them in a positive manner.
- Familiarize the architect with the subject matter, text books, and learning materials used in class.

General

When architects work with children, materials can enhance or detract from the process as well as the product. For example, an architect once used tempera paint at the end of the model making process. The painted foam core model warped beyond recognition, until the project had to be entirely rebuilt. Another architect taught children how to make elaborate trees for their model of a city near a forest. After the children spent nearly 20 labor hours making trees, the architect came to the conclusion that production work was not a learning objective, and used a more stylized tree type. While such experiences may be valuable, architects and teachers may want to avoid "materials disasters". It is important to remember that the children are not in architecture school, but rather are using architecture as a framework within which to investigate their own ideas and creativity. Materials should facilitate that process and enable them to express ideas clearly, quickly and creatively.

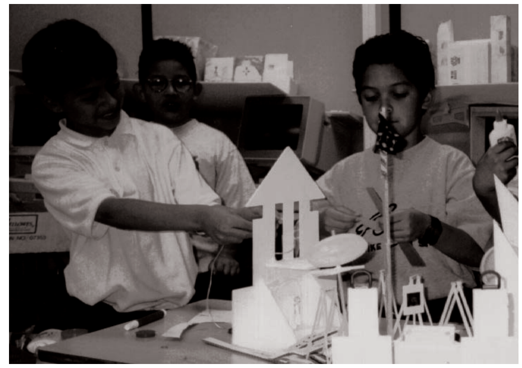
Preparation

When planning and preparing for a project, spend some time thinking about materials. Do you have enough for 25-30 children? How will you transport, display and distribute items? Do you have enough support equipment such as scissors or tape measures? What type of adhesives will be the most effective for the result you are trying to achieve? Will you need to prepare base models for the students beforehand? Do you need lessons to introduce tools or materials to the students? Do you want to use popular, but messy materials such as glitter or paint in a carpeted room?

Scale

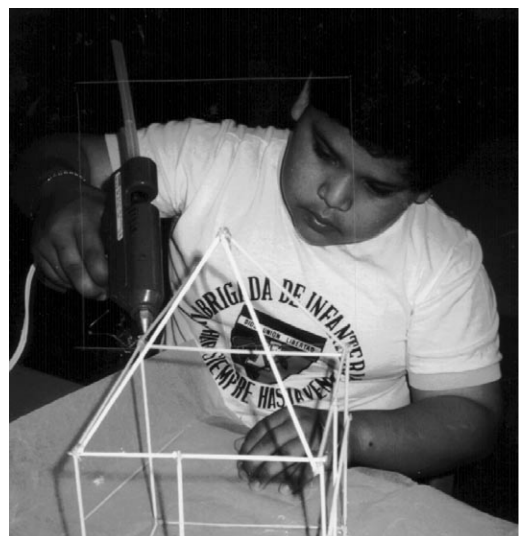
When working on architectural projects with children, especially models, it is important to use materials that are conducive to building at the desired scale. Children understand more if the materials lend themselves to building at that scale. For example, you may want to use small boxes rather than shoe boxes to achieve appropriate massing for buildings if you are creating a model at 1/8" scale.

Or you may want to have wood dowels, rather than toilet paper tubes available to use for columns. For projects at smaller scales, it is useful to provide a range of tiny materials such as beads, beans, lentils or bits of paper for detailing or decoration.



Adhesives

Hot glue, scotch tape, tacky glue, Elmers glue, carpenters glue, masking tape. All are good adhesives to use on projects with children, depending upon the desired results. When selecting an adhesive, think about how difficult it will be for (impatient) children to use. Tacky glue or carpenters glues dry the quickest, but can be difficult to handle. Children love to use tape, but can get carried away with it. Small hot glue guns with "low temperature" glue work best with children, but some schools do not allow them. Sometimes it helps to have a "hot glue station" in the corner of the room, where an adult can assist the children. However, students can be seduced by hot glue, and can spend all of their time waiting in line for the gluegun. Masking tape also is a quick way to join parts together. If you don't like the "junky" look of plain masking tape, use some of the new multi-colored masking tapes now on the market.

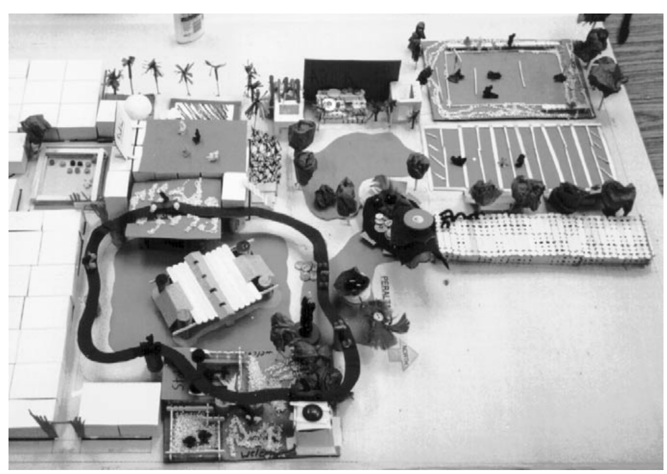


Paint

Paint can often enhance a project, but just as often it can destroy it. Architects tell stories about children who, in their enthusiasm to apply paint to a project, have muddled it beyond recognition. If children don't receive strong guidance while mixing colors, they can sometimes end up frustrated with the results of their mixing. Water-based paint can also warp foam core and cardboard. Some architects have used paint with great success when working with children. They spend time teaching how to mix paint, use brushes, and apply it to various materials. Others set up carefully controlled "paint stations" where children can work with an adult and can apply paint to selected projects. Again, tempera paint is cheap, plentiful and easy to clean, but it can detract from the craftship of an architectural model. Acrylics and oil based paints give nicer results, but are costly and hard to clean. Many architects recommend using clay, paper, even fabric instead of paint to add vitality and color to a model or project.

Landscaping

Landscaping can unify, finish off and beautify children's models in dramatic fashion. Students who have had difficulty working on a group project, can successfully tie together disparate parts of a model with landscaping. It is best to shy away from labor-intensive landscape making techniques. Teach children how to make quick trees from green sponges, crumpled green tissue paper wrapped around a toothpick or pipecleaner, or green feathers stuck into styrofoam balls. Use pins or t-pins to affix trees to the base. Grass can be easily represented by green paper. Water can be created with shiny blue paper or saran. Topographic elements can be made from cardboard, honeycomb packaging material, or plaster bandages stretched over crumpled newspaper.



Materials (continued)

Clay

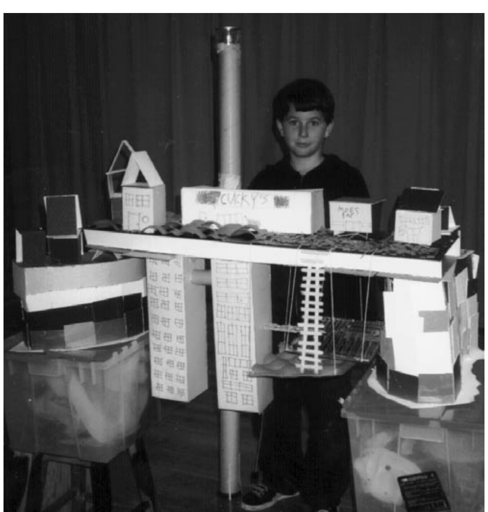
Malleable materials such as clay, plaster or even paper maché are wonderful for certain architectural projects and are very popular with children. A highly recommended type of clay is *plastolina*. It is a brightly colored oil-based clay. It can be easily cut and modeled by children. It never dries, but is solid. It can be glued. And it can be reused after a project is over. However it is expensive. Air dried clay or ceramics clay may work for some applications, but when dry becomes brittle and fragile unless properly glazed.

Bases

A project can often be more successful if the architect provides the proper base upon which to build. A clear and sturdy base from cardboard or wood can help children create more freely within a set of constraints. If a project has strong topography, or is of a real site, the architects can make the base ahead of time. A base also helps children to work at scale.

Recycled Items

Tubes, cardboard flats, boxes, film cannisters, old earrings and other everyday items can be incorporated into children's architectural projects. A few words of warning: remember the scale, use items that are easy to cut and manipulate, and watch out for ants!



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