

Drafting: Architectural Design



Introduction

People who design homes and commercial buildings are called **architects**. Architects use drawings to communicate technical information to the various workers and tradespeople who will be involved in the construction of the buildings they have designed. Architectural drawing uses the same principles as in engineering drafting, and the skills of an engineering drafter are useful in architectural drafting as well. However, because architects have more freedom of expression in their drawings, architectural drawings may appear somewhat more artistic in appearance. While most of the tools and techniques are the same or similar, many of the symbols are different. Architectural drawings contain lines and symbols that are used to represent the walls, windows, doors, and other fixtures on a plan.

There are several types of architectural drawings used to explain the different parts of the building being constructed. The **floor plan** explains the layout of the rooms, as well as the position of the walls, doors, windows, and fixtures in a building. Floor plans contain all the dimensions describing the size of the building and its parts. **Elevations** show the walls of the buildings as seen from the exterior or interior. Materials, windows, doors, and the building style are shown by the elevations. **Wall sections** describe the structural elements of the building, including materials used, the sizes and specifications for materials, and dimensions on elevations like the distance between the floor and ceiling. **Detail drawings** show all the technical information that is necessary to build a structure. They are also used to show construction of staircases, cabinets, floor, and roof structures; window and door construction; and other information that will be needed to build a structure.

Architects use pictorial drawings such as **perspectives** to show what a building will look like once it is finished. **Interior designers** also use interior perspectives to explain the interior decoration and/or finish of interiors of buildings.

Today architects and draftspersons involved in architectural drafting do much of their work on **Computer-Assisted Drafting** systems. CAD systems use the speed, accuracy, and memory of a computer to enhance the drafting process.

Job Description

For this activity, you will be an architect and interior designer. Your job is to design an apartment for a college dormitory. It should be designed to accommodate two people, providing living space that includes an entertainment center, a bathroom with a compartmented bath, a small kitchenette, dining area, and two bedrooms. Each bedroom must have access to the bathroom, contain a large closet, and a study area. The study area must accommodate a desk, computer center, bookshelves, and a worktable that could be converted into a design area or drafting table.

The college has hired your firm to develop several different design solutions for this problem. Each member of your firm will develop his or her own individual design solution. In order to present your ideas to the college board, you will have to develop a set of drawings that include a "presentation style" floor plan, a working drawing floor plan, and elevations of the interior walls. A small model will also be built to show the relationship of space, traffic flow, storage areas, and interior design.

Materials and Supplies

To complete this activity, you will need the following materials:

1/4" grid graph paper, 12" x 18"
drafting paper, 12" x 18"
tracing paper, 12" x 18"
illustration board
white glue
rubber cement
X-acto knife
metal edge ruler
architect's scale
T-square
triangles, 30-60 & 45
drafting pencils (4H, 2H, & HB grades)
eraser

Making Room Templates

1. Reread the job description. Remember in this assignment you are planning a small apartment for a college campus. The apartment must have two bedrooms, a compartmented bath, a living area, dining area, and small efficiency type kitchen. The bedroom must contain a study area and ample storage space.
2. First make a list of each area in the apartment. Then, for each area, list the furniture and **fixtures** that you would include in the design.
3. From the furniture **templates** enclosed in this package, cut out the furniture required for the design. If you need additional pieces, ask your instructor for copies of the templates.

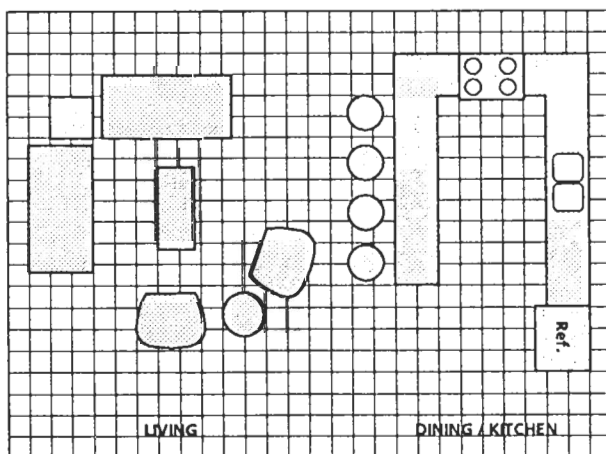


Figure 1 - Sample furniture placement

4. Use the 1/4" graph paper to arrange the furniture the way it would be in each area of the apartment. You will need separate sheets of graph paper for the bedroom, the living area with dining space and kitchenette, and the bathroom. (See Figure 1.)
5. After you have the furniture and fixtures arranged, glue them in place.
6. Next draw a line around the furniture, indicating the **floor space** for each area of the apartment. (See Figure 2.)
7. Now cut out the room or area templates along these lines.
8. Use a sheet of graph paper and arrange the templates into a template plan. Notice that you will need to plan for doors, windows, closets, and hallway space as you arrange the templates. After the templates are arranged into what would be a "workable arrangement", glue them in place on the graph paper.

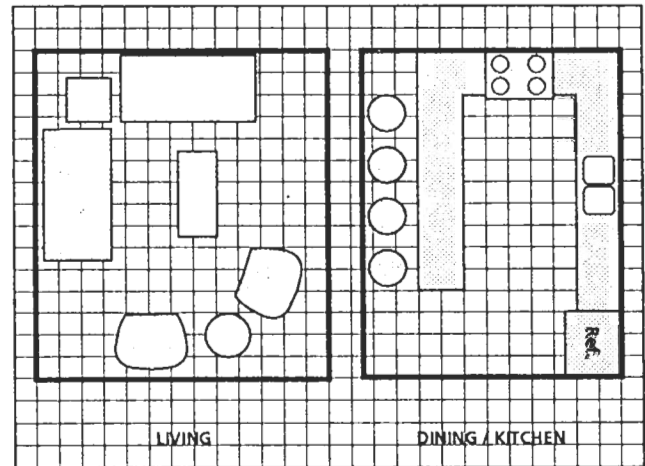


Figure 2 - Sample room templates

Floor Plan Presentation Drawing

1. Now draw in the walls. **Interior walls** are 6" thick, or 1/2 of a 1/4" grid on the graph paper. (See Insert for example.)
2. Add doors and windows to the plan. (See Insert.) Note the symbols for doors and windows.
3. Ask your teacher to look at your design to suggest design changes and help you describe your ideas using the correct symbols for an architectural floor plan. Very often, the first try at a design is not what the finished design will look like. You can make changes during any of the following steps.

- Place a sheet of tracing paper over your template plan. Trace in the walls, doors, and windows. Use materials symbols to indicate tile floors, closets, and other elements in your design. This drawing will be done in what is called **presentation style**. It shows what the finished design will look like, but does not give enough information to build the structure. **Presentation drawings** are used to present and explain design ideas to the client.
- Darken in the walls with an HB pencil.

Drafting the Floor Plan

- On a second sheet of tracing paper, redraw your floor plan. Use your **architect's scale** to measure the sizes from the presentation drawing. Draft the walls using proper material symbols.
- Add in the fixtures in the bathroom and kitchenette.
- Place door and window symbols on the plan.
- Indicate the centers of all **exterior** doors and windows with a **center line**.
- Dimensions** are placed on an architectural drawing in a similar manner as you have done on mechanical drawings, except that the **dimension lines** are not broken. Dimensions are given in feet and inches.
- Labels are placed on the floor plan using architectural lettering, which is often more expressive than the single stroke Gothic lettering found on mechanical drawings.

Sketching Interior Elevations

- Obtain a sheet of graph paper. Establish the length of the walls for one of the rooms of your apartment. Now draw rectangles for each wall, using the 1/4" grid with one foot for each 1/4" ($1/4" = 1'-0"$). The height of the wall should be 8'-0" for a normal ceiling height.
- Draw in the doors and windows that would appear on each wall. Consult your floor plan for their location. Add in any details like closets, cabinets, or built-in furniture.
- Repeat the process until you have an elevation for each of the interior walls of your apartment.
- Have your teacher check your work. Attention to detail in the kitchen and bathroom will be necessary!

Drafting Elevations

- Obtain a sheet of drawing paper, and tape it to your drawing board. Measure the size of each elevation from your graph paper sketches. Draw rectangles for each wall elevation in your apartment. You might want to do each single room on a separate sheet.
- Complete a drawing of the interior elevation for each room in your apartment. A helpful tool for kitchen and bathroom elevations is an elevation fixture template. However, it needs to be a 1/4" scale template.
- To add a finishing "touch" for your elevations, use a technical pen with India ink to ink in the elevations. Ink drawings look much better, and will also reproduce better. This will be important for the next procedure.

Building an Interior Design Model

- Obtain a sheet of six- or eight-ply illustration board.
- Obtain copies of your drawings, including the presentation floor plan and the elevations. These copies can be blueprints or photocopies of your originals.
- Cut out the copy of your presentation floor plan. Use rubber cement or a glue stick to glue the drawing onto a piece of illustration board approximately the same size as your cut-out floor plan.
- Cut out the individual walls of your elevation copies. Glue these to pieces of illustration board.
- Study the drawing of your floor plan. Notice that several interior walls (of individual rooms) will make up one exterior wall. These individual walls will be assembled as a single wall.
- Cut out the individual walls, using an X-acto knife, a metal edge ruler, and a cutting surface. Do not cut on your desk!
- Cut out windows and doors. Save the pieces you have cut out!
- Assemble the model of the apartment by gluing the walls in place on the elevation.

Finishing the Model

- Once you have completed construction of the model, you can add finishing touches. The

kitchen cabinets can be built using pieces of illustration board, and then glued into place. Three-dimensional cabinets make the model look much more realistic.

2. The doors can be glued in place, so that they appear open.
3. Windows can be covered with clear acetate to look like glass. You can draw on the acetate with a technical pen to make the window parts.
4. Floors can be covered with colored paper to simulate carpet.
5. Tile floors can be simulated using construction paper, and then drawing in the "squares". This can be done for tile walls in the bathroom as well.
6. Bathroom fixtures can be constructed out of illustration board. You can also make fixtures by carving them out of soap. Of course, you can buy ready-made fixtures in 1/4" scale as well.
7. Flat latex paint can be used to paint walls if you so desire. Be careful to do a neat job!
8. You can even make furniture out of illustration board if you want to show how the apartment would be furnished.
9. Drapery material can be made from small scraps of cloth. Fold them in an accordion fashion, and iron them flat; they will look just like real draperies!

Presenting Your Design Solution

1. Architects and interior designers often do work for clients on an approval basis. They must "sell" their ideas to the **client** in order to gain the contract. Models, illustration drawings called **renderings**, and illustrated presentations are prepared to help do this.
2. Drawings and renderings are mounted on illustration board, labeled, and even colored. Design markers and colored pencils are materials that can be used to color your drawings. Colored renderings look better and do a great job of selling your ideas.
3. After your model is complete, you will use the model and your set of drawings to sell your ideas to your classmates, who will act as the

clients. You should be prepared to explain your design solution, point out the unique ideas you have developed, and use the drawings and model to "show off" your ideas. This is an **illustrated presentation**.

Safety

When using art materials, always read the labels. Make sure you know how the materials are to be used and stored.

When using X-acto knives, be careful as the blades are very sharp. Cut away from fingers and hands using a cutting surface, not your desk.

Ecology

Read labels. Be sure you know how to dispose of all art materials, paints, and glue. Do not flush them down the sink!

Vocabulary

floor plan	elevations
detail drawings	perspectives
CAD	template
fixture	rendering
illustrated presentation	wall sections
architect	interior designer
presentation drawing	working drawing

On Your Own

1. Find the Home & Design Section in the Sunday paper. Cut out examples of apartment floor plans. Mount them on illustration board, and create a bulletin board in your classroom of apartment designs.
2. Cut out perspective renderings and mount these as examples.
3. Ask your instructor to help you start a perspective drawing of your apartment. See if you can complete the drawing, adding the interior details like kitchen cabinets or furniture.



TEACHER GUIDE

DRAFTING: ARCHITECTURAL DESIGN

Objectives: Upon completion of this assignment, students will be able to:

- Use architectural symbols to describe a floor plan and elevation.
- Create room templates and assemble the rooms into a workable floor plan.
- Use drafting techniques to complete a working drawing of a floor plan.
- Use illustration techniques to create a presentation style floor plan.
- Construct a simple model of a floor plan/elevation design.
- Describe the role of an architect and/or interior designer in planning and drafting an architectural project.
- Make an illustrated presentation of a completed design project.

Helpful Hints:

1. Collect floor plans of apartments from the local newspaper and make photocopies to distribute to your students. This will help stimulate ideas.
2. Build a simple illustration board model of one of the apartment designs to serve as an example.
3. Visit some local sales offices at duplex or condo locations and get some sales promotion materials. They often contain good examples of presentation drawings and renderings.
4. Invite an architect or interior designer to visit your lab. They will usually bring drawings or slides of their buildings, as well as colored renderings and perspectives.
5. Call the International Fine Arts College in Miami and ask for a presentation on interior design. They are often happy to visit your school and will provide an excellent presentation! Other schools like University of Miami and Miami-Dade Community College also make presentations.
6. Illustration board is available in the *DCPS Stores & Distribution Catalog*.
7. A follow-up assignment to this activity might be to do a simple one point perspective of one of the rooms in the model.
8. An alternative is to use a larger scale, such as $1/2" = 1'-0"$. This makes building the model a little easier for some younger students.

**LANGUAGE ARTS APPLICATION
DRAFTING: ARCHITECTURAL DESIGN**

Student Name

In all types of jobs you will find that you need the ability to communicate your ideas effectively. Writing skills are necessary in all occupations. Here are a few examples of how writing skills are related to this activity.

Architectural drawings contain lines and symbols used to communicate ideas and objects. You will also find abbreviations used by architects on drawings. A knowledge of what these abbreviations represent will be useful in reading other architectural drawings.

Use an architectural drawing textbook or architectural graphic standards reference book to determine what each of the following abbreviations represents on a drawing.

- AIA _____
- AMP _____
- APT _____
- AVG _____
- BSMT _____
- BM _____
- BTU _____
- BC _____
- BL _____
- CONC _____
- CEM _____
- CIR BKR _____
- CU FT _____
- DEG _____
- FT _____
- ENT _____
- FT LB _____
- EXT _____
- INT _____
- GAR _____

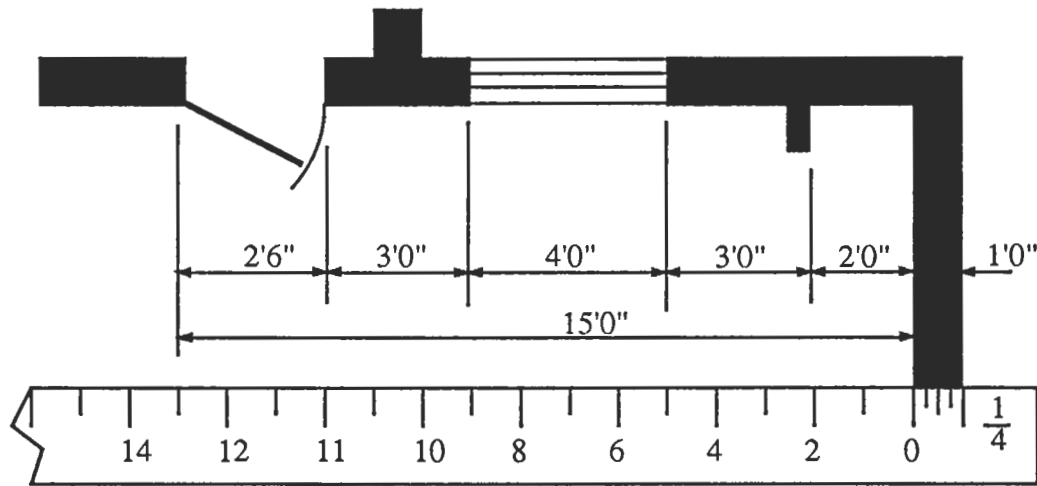
**MATH APPLICATION:
ARCHITECTURAL DRAFTING - SCALES**

Student Name _____

In all types of jobs and occupations, you need the ability to apply mathematics effectively. Here are a few examples of how math skills are used in relation to this activity.

Most *architectural scales* are triangular in shape. Each surface of the triangle is marked with a different set of scales. Dimensions are always marked on the scale. Some scales are read from left to right; others read from right to left. Always start at the zero point on the scale you are using and read away from it.

The example below shows the use of a $1/4" = 1'0"$ scale to measure a plan. Other common proportional scales used by architects are $3/32$, $1/8$, $3/16$, $3/8$, $1/2$, $3/4$, 1 , $1\ 1/2$, and 3 . In the $1/4" = 1'0"$ example, the scale to the right of the zero is $1/4"$, which represents one foot, or 12 inches. It is subdivided into four segments; each segment in the sample represents 3 inches ($12/4=3$). Each segment to the left of 0 represents 1 foot. Different brands of scales will vary but remember in $1/4"$ scale, $1/4"$ will always represent one scale foot.



Using the $1/4" - 1'0"$ scale, measure the following lines and record your answers.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

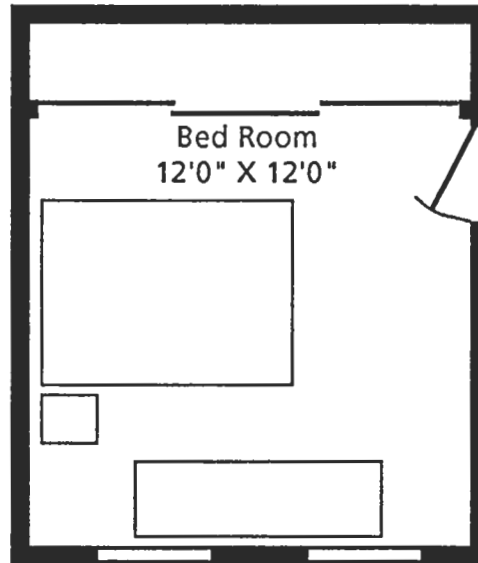
**MATH APPLICATION:
ARCHITECTURAL DRAFTING - AREA**

Student Name _____

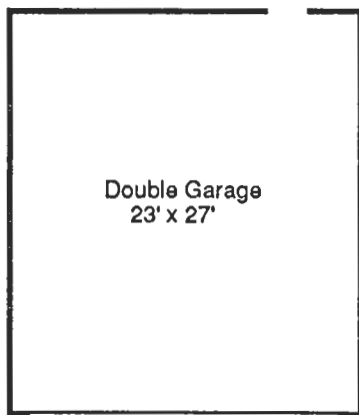
The measuring of *area* of a room involves determining the number of unit squares that are equal in measure to the given area.

Example: A floor plan of an average bedroom is shown in this example.

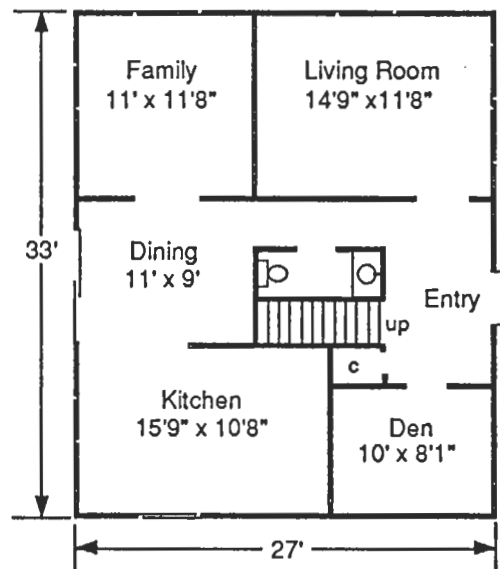
Area = length x width
Area = 12 ft. x 12 ft.
= 144 ft.²
or 144 square feet



Calculate the square feet of each of the following floor plans and record your answers.



1. _____ sq. ft.



2. _____ sq. ft.

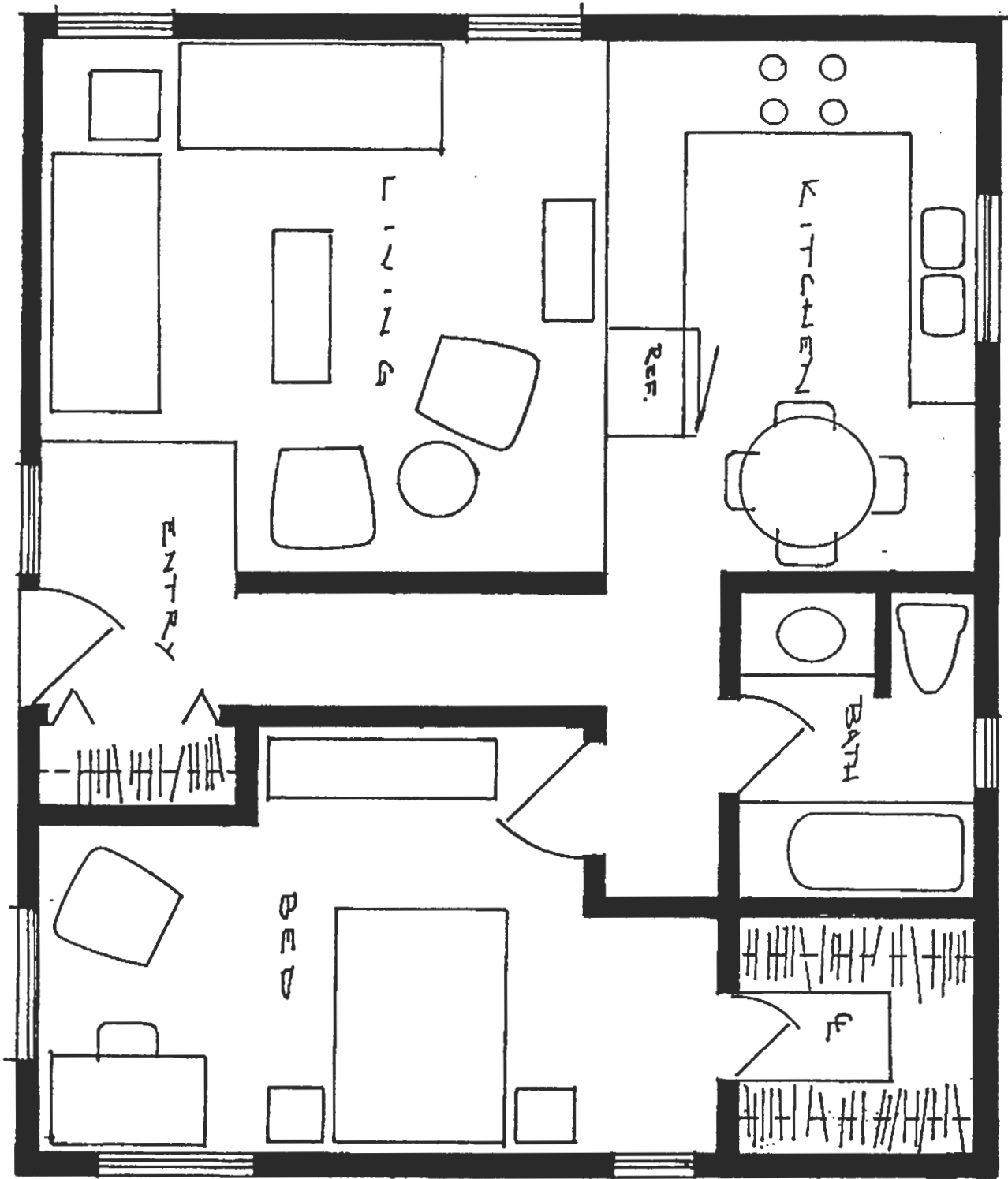
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QUIZ
DRAFTING: ARCHITECTURAL DESIGN

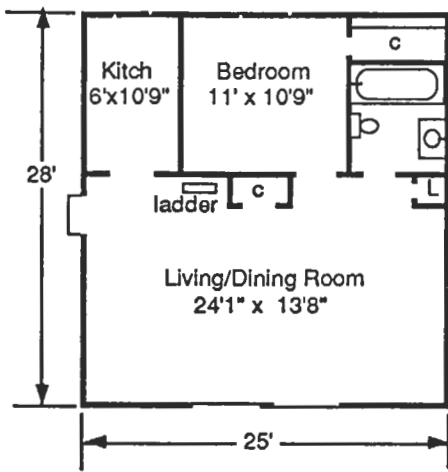
Student Name

True or False:

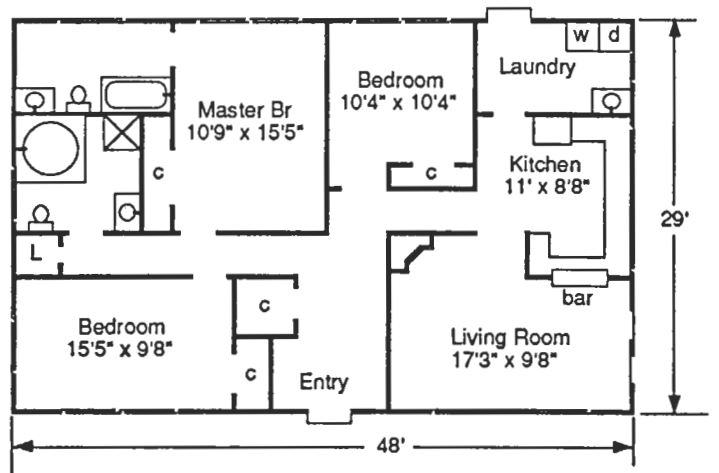
- _____ 1. Floor plans show the size and shape of rooms in a building.
- _____ 2. An elevation describes what a building looks like, including style, window and door placement, and types of materials used.
- _____ 3. Detail drawings show construction details, such as staircases, window construction, and materials used for floors, walls, and ceilings.
- _____ 4. CAD systems can be used to create architectural drawings.
- _____ 5. Architects design and plan buildings, and Interior Designers create designs for interior spaces; both must learn to communicate ideas using architectural drawings.
- _____ 6. Presentation drawings are used to show a client a design solution.
- _____ 7. Working drawings are used to communicate technical information to the workers who will build the structure.
- _____ 8. A wall section describes the methods of construction and the materials used in building a structure.
- _____ 9. A perspective drawing is a pictorial drawing that shows what a building or interior will look like in three dimensions.
- _____ 10. A rendering is a drawing that uses shades, colors, and textures to illustrate an idea, such as the interior of a home, a building exterior, or an architectural feature of a building.



Sample Floor Plan

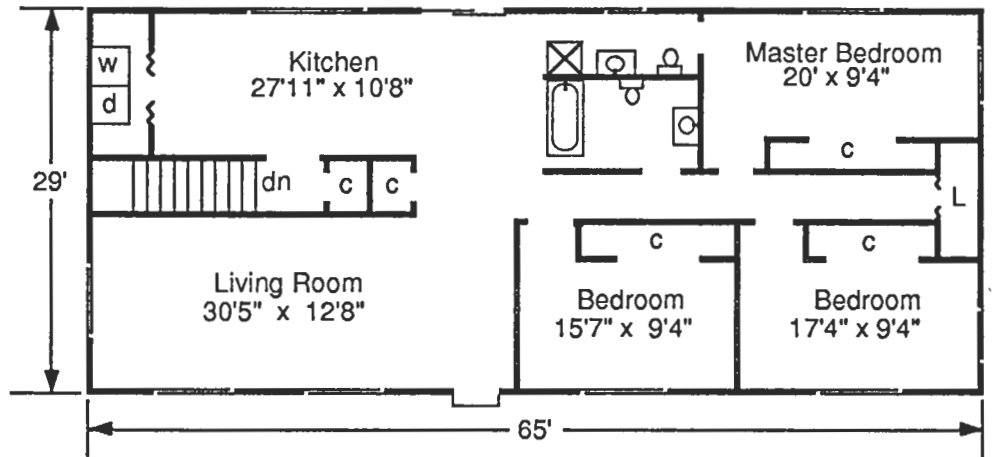


Plan Number 3

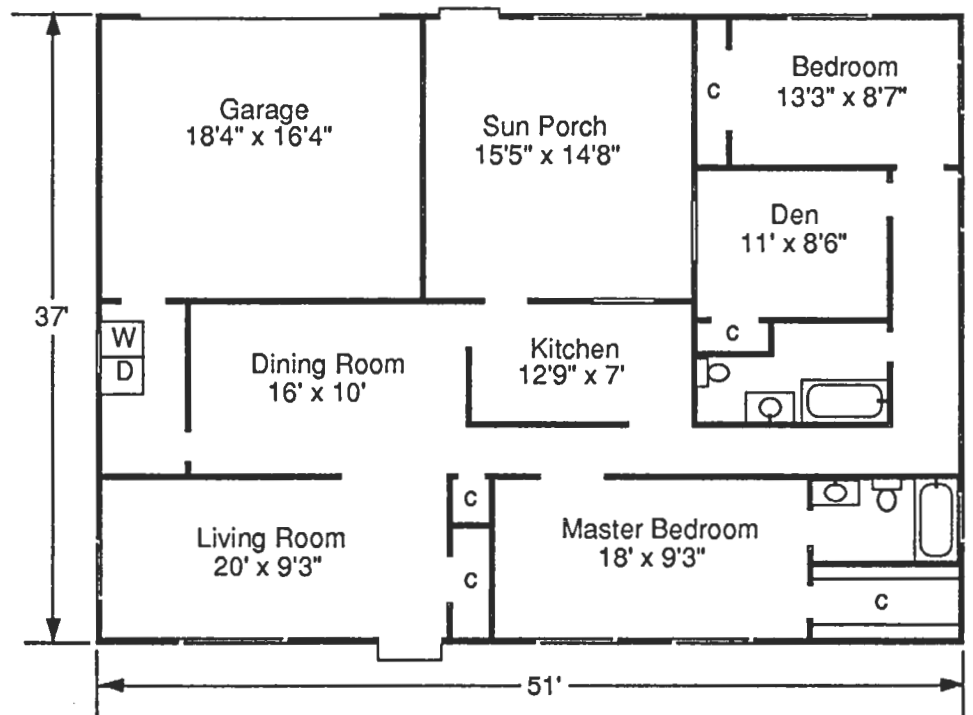


Plan Number 4

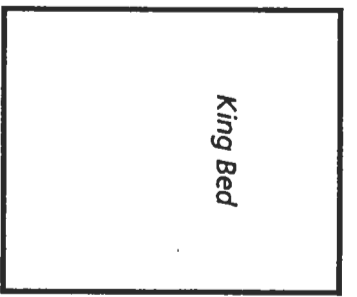
- 3. _____ sq. ft.
- 4. _____ sq. ft.
- 5. _____ sq. ft.
- 6. _____ sq. ft.



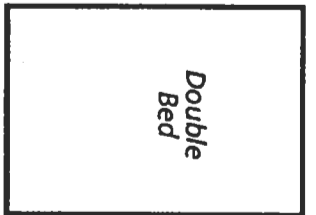
Plan Number 5



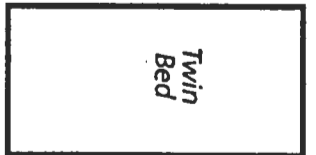
Plan Number 6



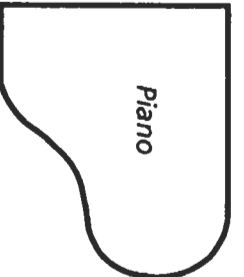
King Bed



Double Bed



Twin Bed



Piano



Arm Chairs



Chairs



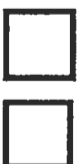
Sofa



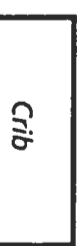
Dresser



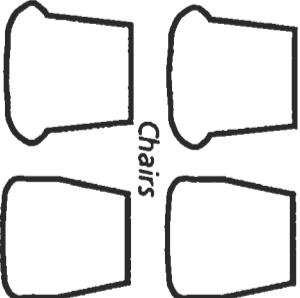
Chest



Night Stand



Crib



Chairs



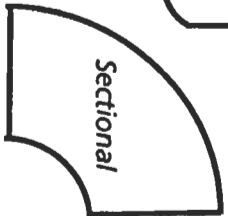
TV



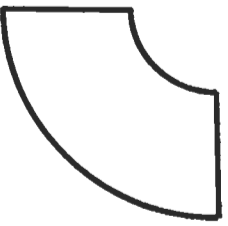
Coffee Table



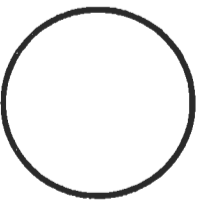
Desk



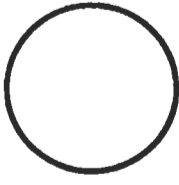
Sectional



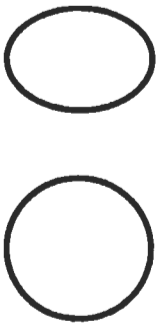
Dining Table



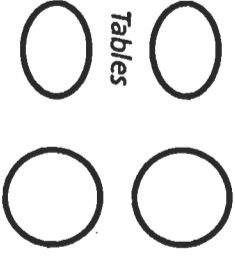
Tables



Tables



Tables



Sinks



Water Closet



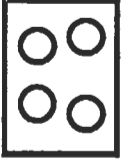
Buffet



China Cab.



Chairs

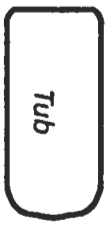


Stove



Ref.

**Furniture Template
1/4" Scale**



Tub