

PAPER MODELING GUIDE

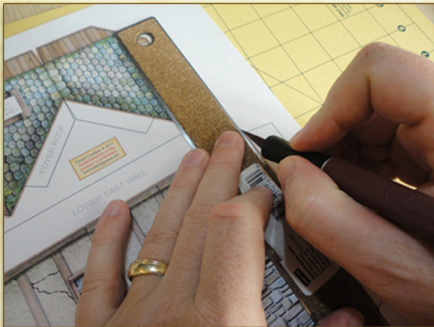
v1.0



FEATURING

Dave Graffam
MODELS
davesgames.net

**SIMPLE TIPS AND PRACTICAL ADVICE
FOR MODELERS OF ALL SKILL LEVELS**



CREATED BY JERRY JENSEN

Welcome to the Paper Modeling Guide. This is a “living” document that will be improved upon as needed. To ensure that you have the latest version, check the version number on the front cover.

This document has been designed to serve both the beginner and seasoned paper model builder with practical tips and advice that is fully illustrated and described.

While many of these general tips and techniques can be found in the paper modeling world, they are presented here specifically applied to Dave Graffam Models.

TABLE OF CONTENTS

Choosing Paper	3
Printing	3
Different Scales	3
Multi-Layered PDFs	4
Tools	4
Glue	5
Modeling Techniques	6
Model Copies	6
Scoring	8
Cutting	10
Folding	13
Edging	15
Dry Fitting	16
Reinforcing	16
Gluing	19
Basing	20
Storing	23



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Paper Modeling Guide document created by Jerry Jensen

Illustrations provided by Jerry Jensen

Cover photo by Uwe Heruth

Editing and layout by Jerry Jensen and David Graffam

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CHOOSING PAPER

The type of media (paper) used will make a big difference on how the model looks color wise (as well as cost). Whether using Inkjet or LaserJet color copies, consider using the following paper types.

Inkjet or LaserJet Paper

Brightness: 96 to 98

Weight: 24 lb

Size: Standard US 8½" x 11". If using A4 sized paper, please refer to the Printing section for details.

Cardstock

Type: White

Weight: 110 lb

Photo Paper

Type: matte finish (This option is the most expensive)

***Author's Note:** I use prints on regular paper, especially if I'm getting laser color copies from a venue, it's cheaper than getting the copies on card stock. The colors are more vibrant and the level of blacks is much darker than working with inkjet. Regardless of using inkjet or LaserJet prints, I've found that by using spray glue to apply the color copies to card stock gives the model more durability. See the **Model Copies** and **Reinforcing** sections for more details.*

PRINTING

These files are set up for the standard 28mm-30mm tabletop wargaming scale, and for US letter-sized (8½ "x 11") sheets. Before printing, verify under Page Handling that the Page Scaling option is set to 'none'. The Auto-Rotate and Center option can be checked. Make any other print quality adjustments as needed.

If you are printing on A4-sized sheets, you may want to reduce the print size to 95% of the original.

Different Scales

To print at a smaller scale, use the table below and change your print size percentage.

SCALE	%
28mm	95%
25mm	84%
20mm	65%
18mm (HO)	60%
15mm	50%
12mm	40%
10mm (N)	34%
8mm	27%
(Z)	23%
6mm	20%

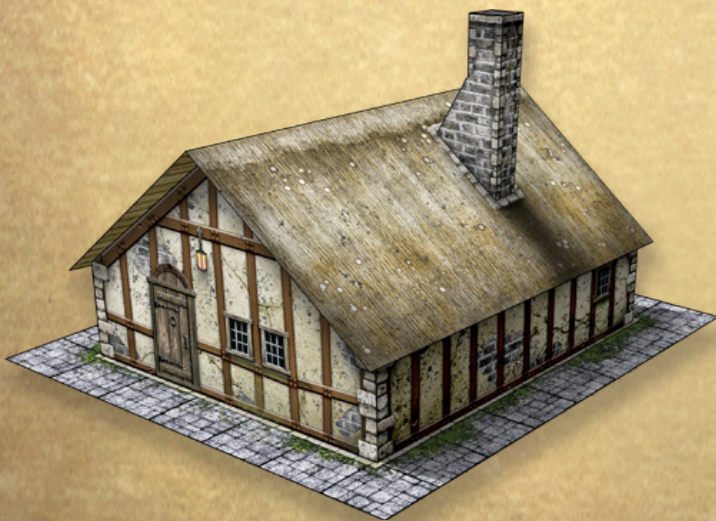
MULTI-LAYERED PDFs

Many of Dave Graffam's models contain PDF files with multiple layers that you can make visible or invisible. When you open a multi-layer file, you'll see the default design.

To make changes, open the Layers menu and expand the Layers Palette to reveal the selection of layers. Some of the layers will be visible; others will be invisible. Click on the 'eye' icon to change a layer's visibility.

Choose your surface textures and add or remove external features. As a simple precaution, verify that all matching pages of the model have the same layered options turned on or off. Once the model has the desired look, print it.

Test It Now: *This instructions booklet includes multiple layers, so you can test your layer-manipulation skills right away. This will let you turn off or change the graphics that appear on these pages.*



TOOLS

The following is a list of standard and optional tools needed to build any of Dave's models. All of these items should be available at your nearest supplier of artists' materials.

Self-healing cutting mat: A gridded mat of about 12" x 18" will be perfect.

Hobby knife: X-Acto is the most well-known brand of these. Blades should remain sharp for cutting and scoring several sheets, but they will dull out eventually so it's a good idea to pick up a pack of extra blades.

Scissors: Any quality pair of paper scissors will do. Scotch makes some that are designed for cutting through heavy paper.

Metal ruler: A 12" metal ruler with a non-slip backing is a good choice, and a 6" ruler will be useful as well.

Permanent ink pens (black): Sharpie and Crayola brand markers will be used to edge your models, an important finishing touch.



Glue

Recommended: UHU Office Pen liquid glue, Aleene's Original Tacky Glue, Scotch scrapbooking glue, spray glue (see the Model Copies section for details on using spray glue) or any other low moisture tacky glue.

In a pinch: You can use small amounts of Elmer's white glue and ordinary glue sticks. White glue has a high moisture content and is more likely to make your pieces warp, and glue sticks sometimes aren't sticky enough for paper modeling.

Not recommended: Rubber cement, hot glue gun.

Optional Tools

The usefulness of these tools may depend on the model being built, but most will improve the building process and overall look of your completed projects.

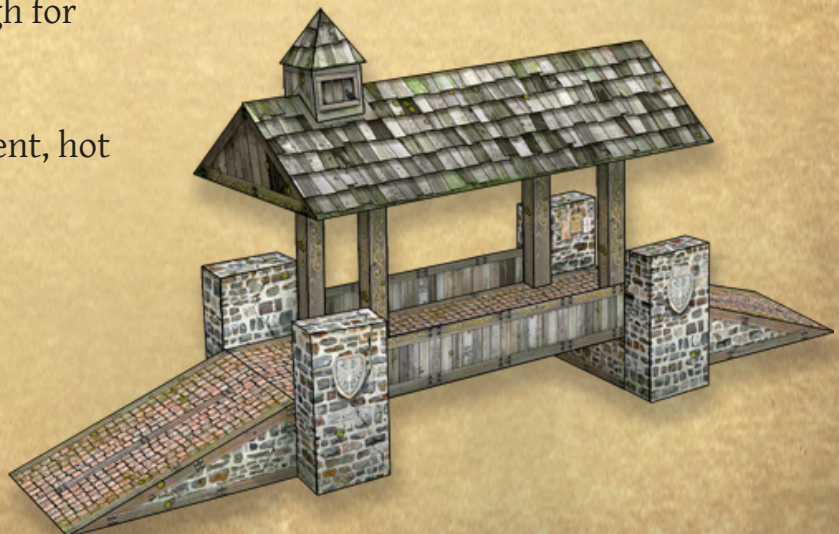
Foam core: This sturdy but lightweight material can be used to support building model bases (called the footprint).

Pencil: Regular or mechanical.

Permanent ink pens (various colors): For edging different parts of the model (base, roof, etc.) with a color other than black. Good color choices include browns, grays, greens and blues.

French curves and circle templates: These plastic drawing/cutting templates are ideal for boats and other curved objects.

Toothpicks: Use these to help glue small or hard to reach areas.



MODELING TECHNIQUES

As the heart of the Paper Modeling Guide this list is presented in the recommended order of building paper models.

MODEL COPIES

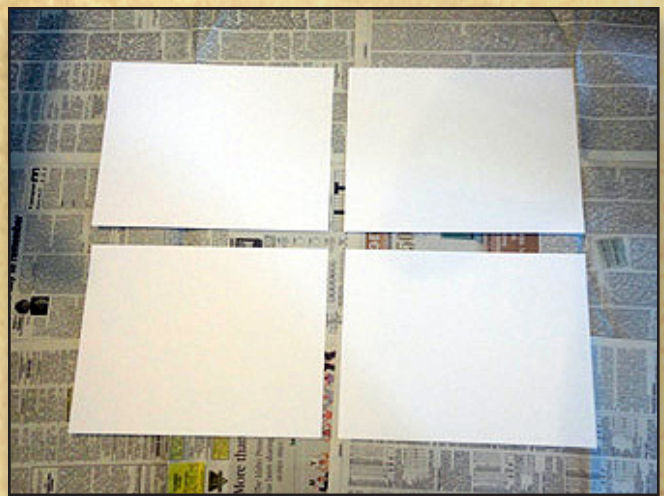
Note: If printing directly on card stock, this section may be skipped entirely.

This section deals specifically with the process of applying regular printed copies of the model (either Inkjet or LaserJet) to card stock using spray glue.

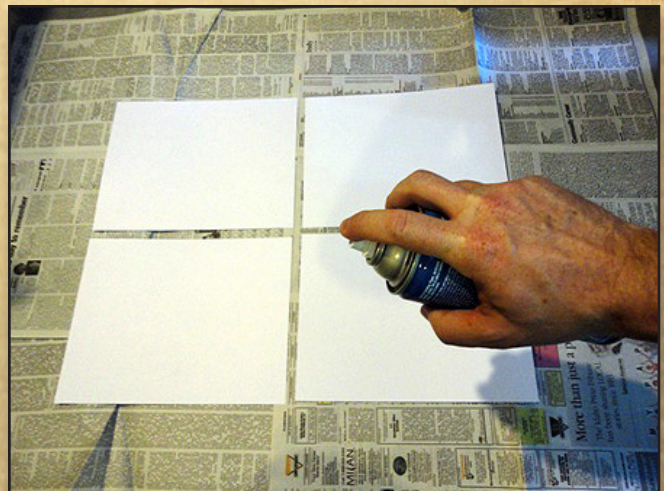
Find a well ventilated area to work in such as a basement, garage, outside, etc.

Lay down enough newspaper to cover 4 sheets of card stock. There should be enough excess newspaper to catch any overspray from the spray glue.

Place up to 4 sheets of card stock as shown. (See the Modeling Tip below.)



Using the directions on the spray glue can, spray all 4 sheets of card stock.



Materials List

- All printed copies of the model(s)
- Spray glue
- Card stock sheets (enough for the printed copies)
- Newspaper (or equivalent)
- Clean hard surface

Move one of the sprayed sheets to a clean hard surface.

Modeling Tip: If the model requires more than 4 sheets (or if you are spray gluing more than 1 model at a time), when removing the sprayed sheet, place a new piece of card stock where the removed sheet was.

Start with the lower left corner and carefully attach the printed copy to the spray glued sheet of card stock.

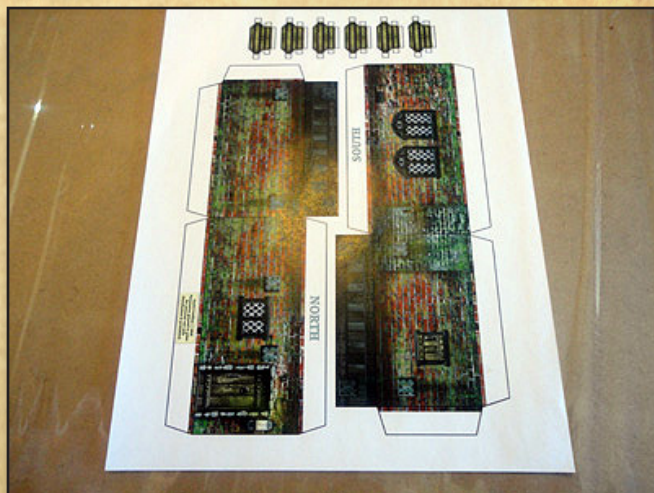


Modeling Tip: Some spray glued sheets may curl slightly depending on the humidity in the work area. If so, place a heavy book on the sheets and allow them to dry flat.

Carefully align the left side of the printed sheet up with the edge of the card stock and apply.



Lay the rest of the printed copy down and use your hand to smooth down the entire sheet, making sure the printed copy is entirely glued to the piece of card stock.



Repeat this process for all the printed sheets that need to be glued. Allow at least 10 minutes to dry before moving on to the next step.

SCORING

This section was added before the Cutting stage because the model piece will be much easier to fold and prep for gluing versus trying to score it after it's been cut out.

Materials List

Model sheet(s)
Cutting mat
Metal ruler
Hobby knife

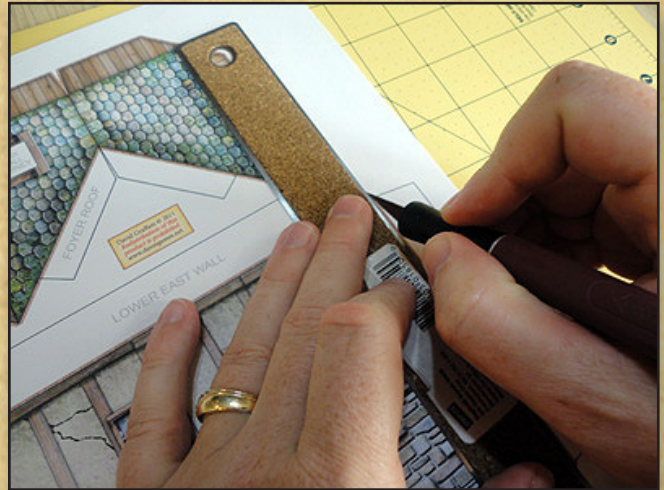
Score Definition: A line (or incision) made with or as if with a sharp instrument (though in this case the incision does not go through the paper).

This helps make a fold much cleaner or sharper in paper modeling. There are 2 main ways to scoring:

1. Score on the front side (printed side) of the model.
2. Reverse scoring (back side).

Front Side Scoring: Line up the metal ruler on the black line to score. With the hobby knife, make a light cut, just enough to break the surface of the sheet.

Reverse Scoring: From the printed side, line up the metal ruler on the black line to score. Make a small cut (all the way through the paper) both at the top and bottom of the line.



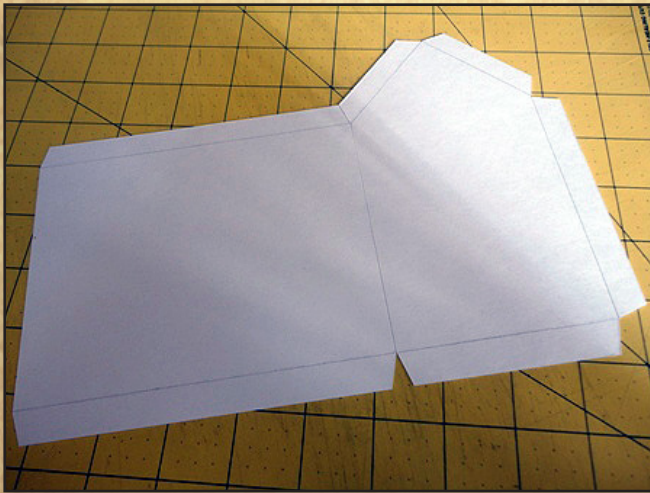
Turn the sheet over and line up the metal ruler with both cut marks. Use the back of the hobby knife blade and score from one cut to the other.



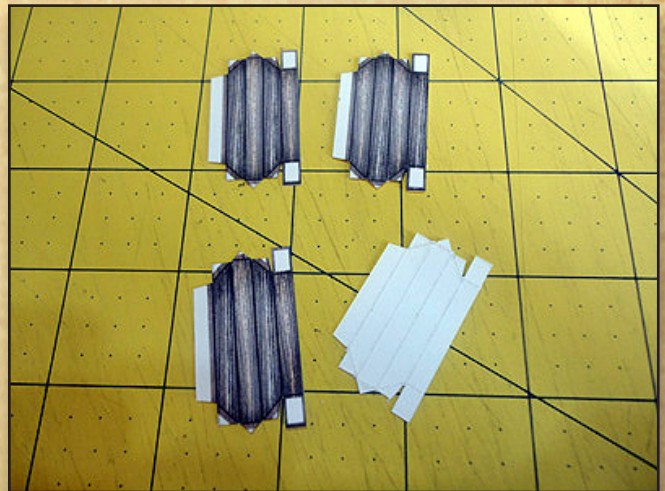
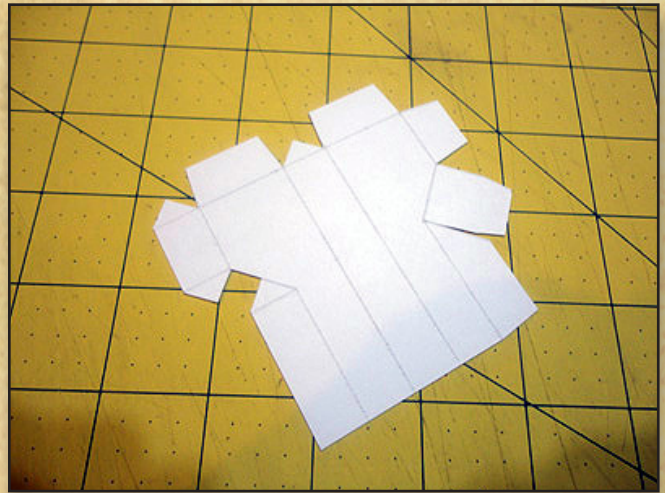
Modeling Tip: Regardless if the folds are to be folded forwards or backwards, I recommend the Reverse Scoring technique for scoring a model piece. This is because by using the back of the blade, there's no chance of cutting through the page and the printed side of the model remains free of cut marks. As such, using a 2nd hobby knife with an older blade to do reverse scoring may be in order to keep the primary hobby knife's blade sharp.

The following are examples of how Reverse Scoring looks when the model is cut out:

Building Sections



Small Objects



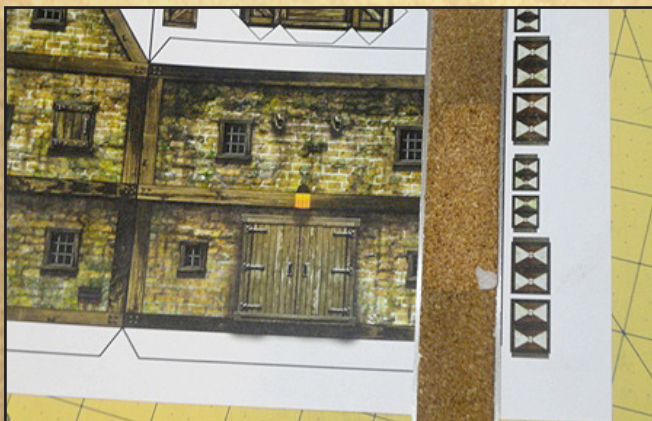
CUTTING

The precision of cutting is an important aspect of how well a model will not only fit together but how well it will look in the end. The following sub-sections will help detail specifics on cutting techniques.

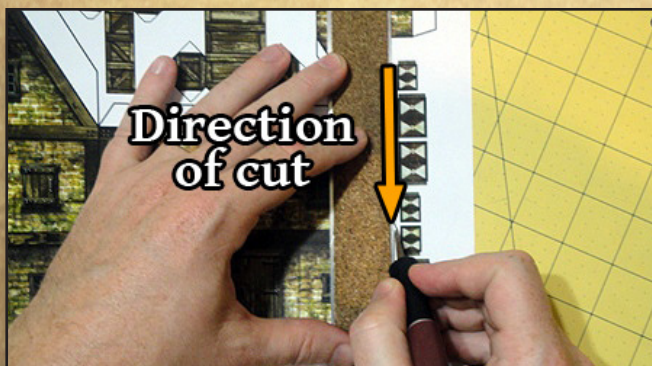
Modeling Tip: As good common practice, always cut on the outside or away from the model, thus lessening the chance of a miss cut cutting into the model piece.

Straight Lines

Line up the metal ruler on the line.



Carefully cut along the line. You may need to make more than one pass to cut all the way through the paper.



Materials List

- Model sheet(s)
- Cutting mat
- Metal ruler
- Hobby knife

Modeling Tip: If cutting an angled line, start the cut closest to the printed model piece and cut away from the model.

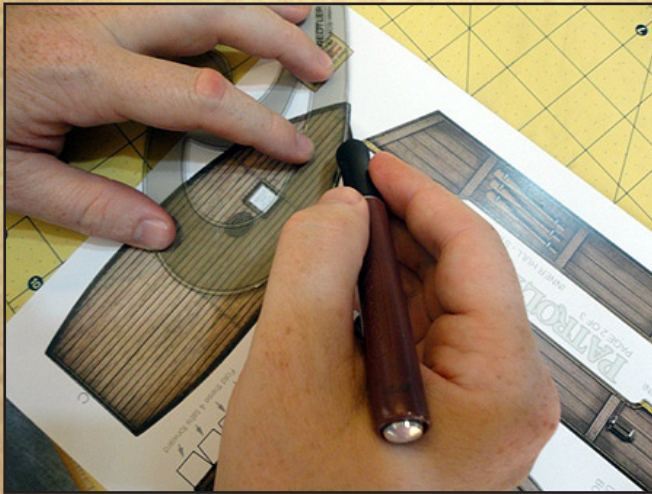


Curved Lines

Using scissors carefully cut along the curved line.

OR

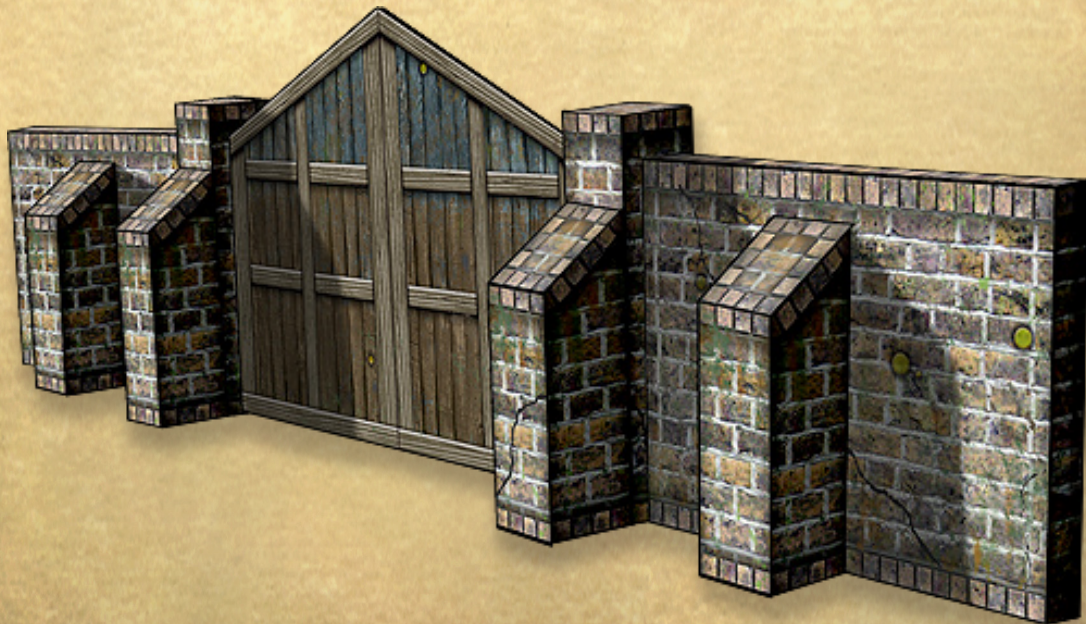
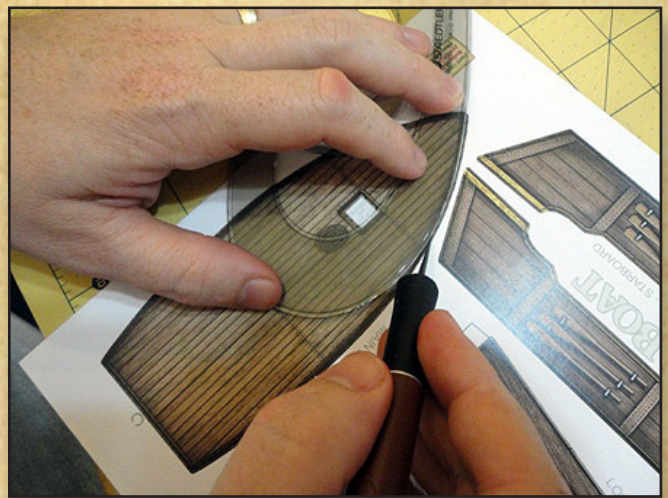
Line up the French curve with the curved line, allowing the cut to be made on the outside of the model.



Materials List

Scissors or French curve

Use the hobby knife to carefully cut along the curved line.



Circles

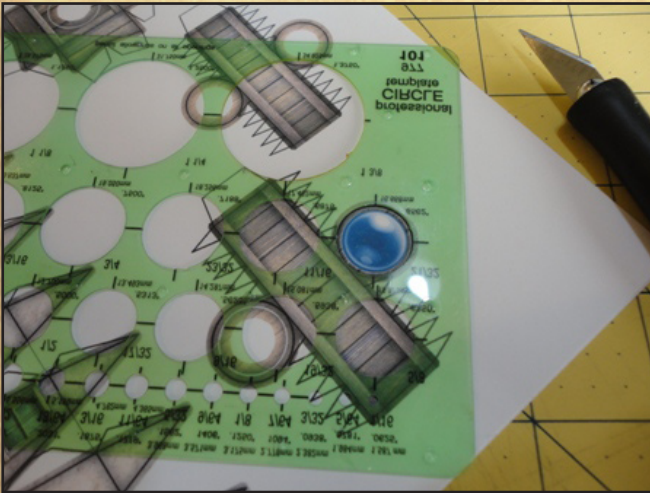
Materials List

Circle template or Scissors
Scotch tape (if using a circle template)

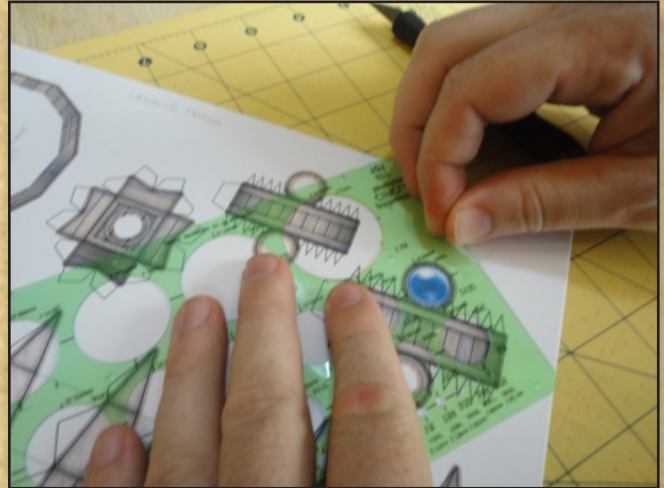
Using scissors carefully cut along the curved line.

OR

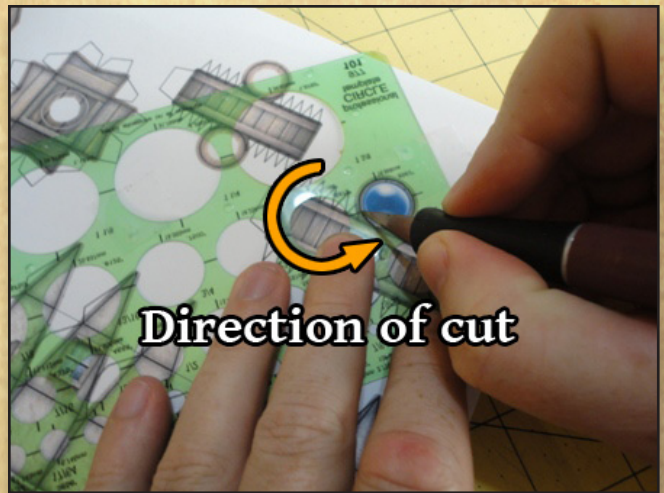
Line up the circle template to use the appropriate circle size to cut out.



Use Scotch tape to tape down the circle template. Be sure to not place the tape over another printed section of the model.



Working in a counter clockwise direction, use the hobby knife to carefully cut in quarter sections. Rotate the entire model as you go.



FOLDING

As a general practice, to get straighter lines when folding parts of the model, use the surface of the cutting mat. To help with the various forms of folding techniques, see the sub-sections below.

Building Sections

Place the model section on the cutting mat with the printed side down.

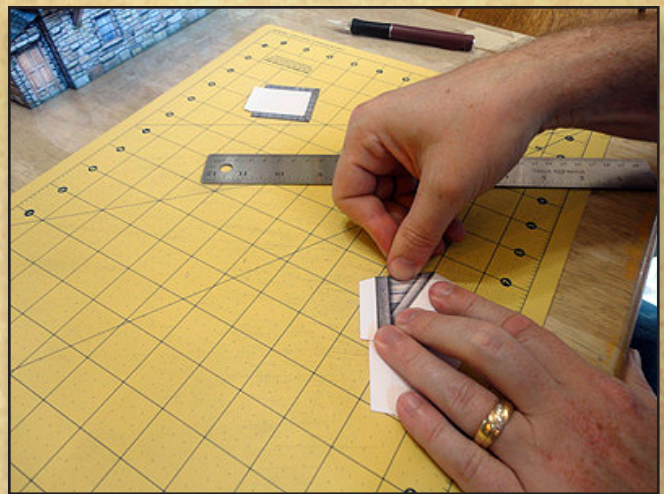
With your fingers as a brace use the metal ruler to assist in carefully bending up the model section at the fold line.



Materials List

Model piece(s)
Cutting mat
Metal ruler
Hobby knife

Fold the tab completely over; remove the metal ruler and use your thumb to crease the fold.

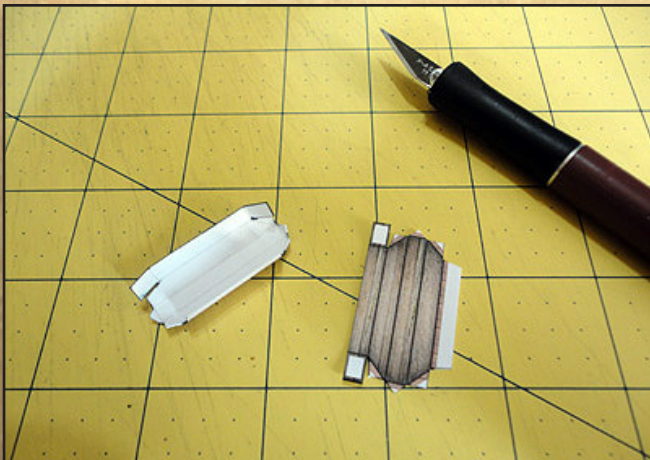


Continue with the other parts of the model piece that need to be folded.

Modeling Tip: In some cases you may only want to instead fold a section 45 to 90° (for example, the dome of the Observatory model). Use at your discretion.

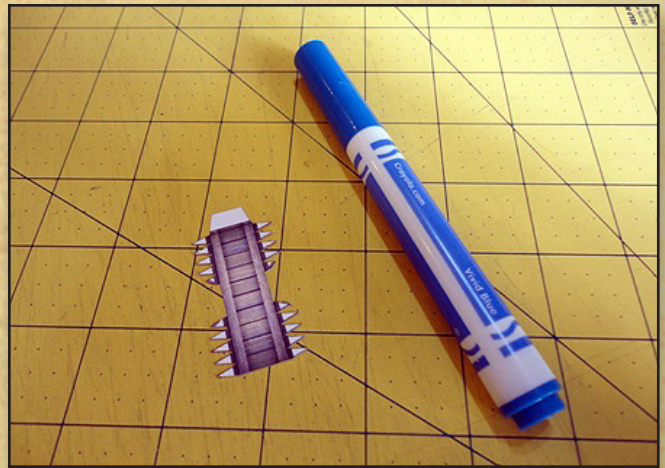
Small Objects

Smaller objects require more accurate folding. To do this, use the metal ruler as a guide and carefully fold each tab or section up by using the hobby blade.

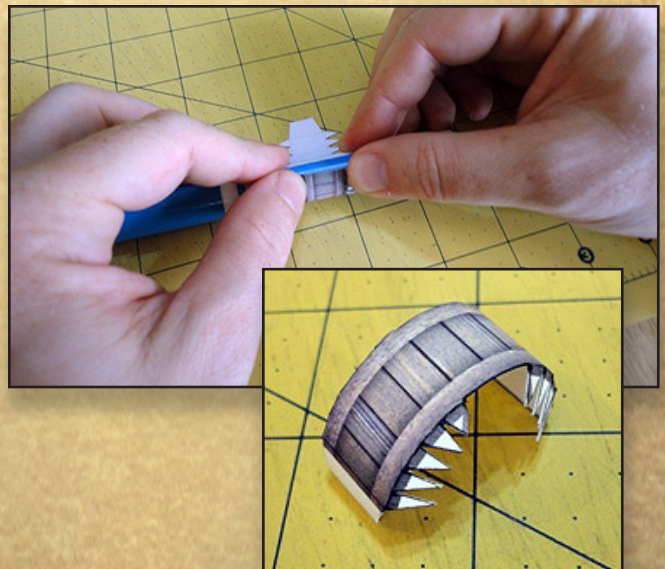


Rounded Objects

To make a properly rounded part, get any object that's roughly the same size in diameter to what the rounded section of the model should be when completed.



Start at one end and carefully wrap the model piece around the round object, pressing as you go to help give the model piece the desired rounded shape. It may be easier again, working on the flat surface of the cutting mat.



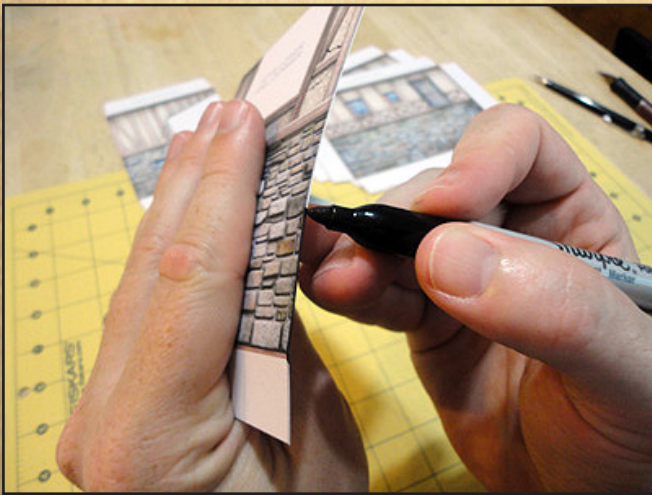
EDGING

This is a process of coloring the white areas from the section of the model being cut out, folded or scored by using a Sharpie (or marker of choice). Edging also makes the model look more professional.

Modeling Tip: Edging the model pieces before gluing them together reduces the risk of accidentally marking part of the printed model. It also allows you to color in any additional white areas that would otherwise be seen after being glued.

Hold the model piece where the printed side is facing up.

Glide the marker along the edge as shown.



Materials List

Model piece
Marker (Sharpie or other)

Modeling Tip: If possible, make a single pass with the marker along the edge. Repetitive strokes across the same area may cause the marker to bleed on to the printed side of the model (especially if using ink jet prints). Use at your discretion.

Modeling Tip: Using your third finger as a guide along the bottom surface of the model section will give you greater control over edging and reduce the chance of the marker slipping off the side.

For wall ends, roof corners, etc. turn the model over and draw a black line along the edge to be glued.



DRY FITTING

Dry fitting is a simple technique of lining up two pieces of the model to see how well they fit before gluing them together. This is highly advantageous giving you the opportunity to make any changes before gluing.

Modeling Tip: *If you choose to follow the next step: Adding Thickness to Models, you may want to take note and/or possibly outline (with a pencil) where the glue tabs will fit when gluing the 2 pieces together.*

Also, when dry fitting the sections see if there are any 'white' areas of the model that will be visible when they are glued together. If so, simply edge or fill in those areas using a marker.

Make any additional adjustments as necessary.



REINFORCING

Materials List

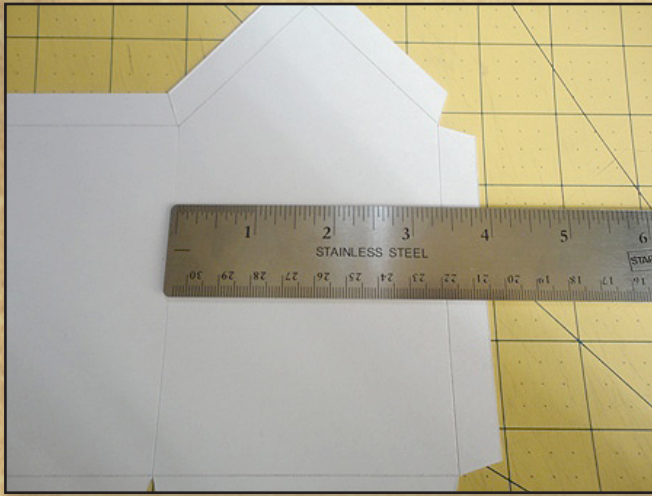
Model piece(s)
Cutting mat
Metal ruler
Hobby knife
Additional card stock
Pencil
Spray glue

Buildings

You may want to add thickness to any walls, annex, large dormers, etc. of a model for greater durability and longevity. Other parts of the model such as small dormers, chimneys, buttresses, support beams, etc. generally would not need to have thickness added.

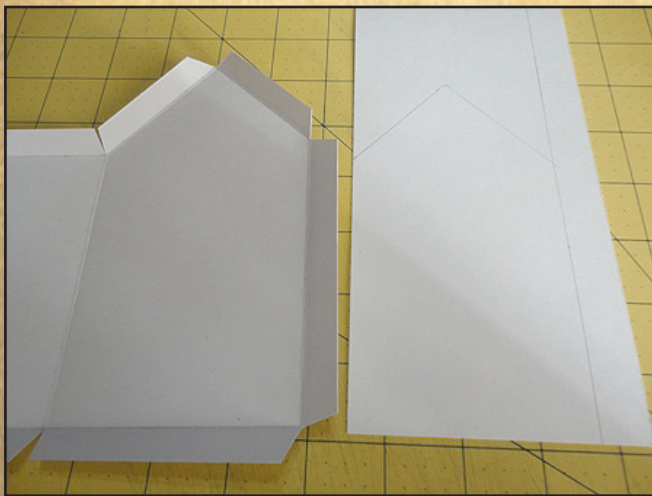
To do this, simply add a second layer of cardstock to the back of the desired model piece.

Roughly measure the dimensions (length and width) of the model piece.

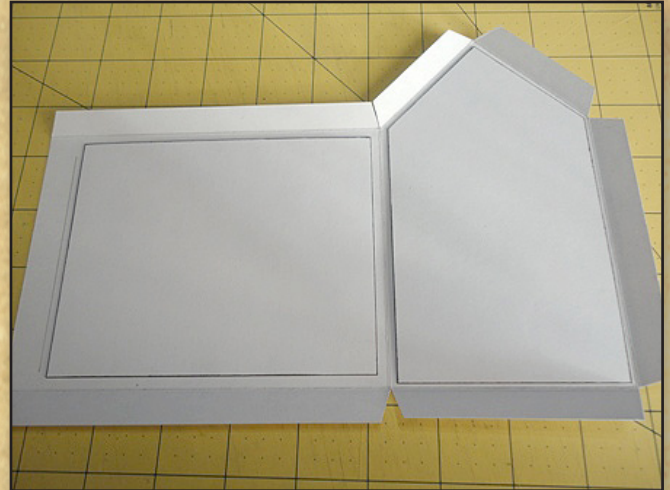


Modeling Tip: Because the extra pieces of card stock will be hidden on the inside of the model, they do not need to be cut exact.

Transfer the dimensions to an extra sheet or scrap piece of card stock.

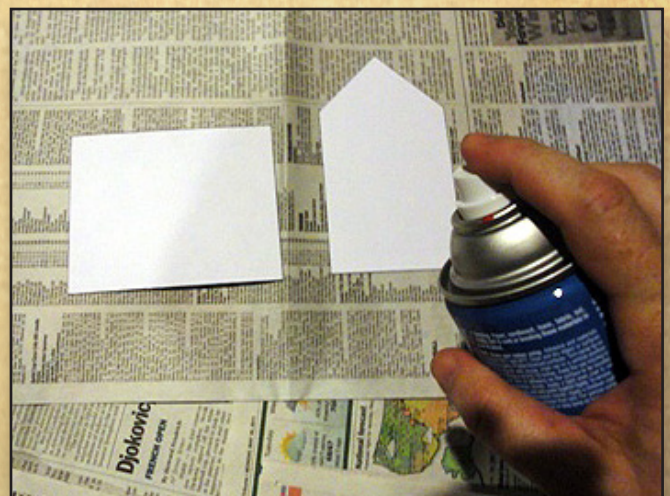


Cut out the piece and dry fit it to the back of the model section, making sure it does not overlap any folding sections.



Spray glue and apply the card stock to the back of the model piece.

Modeling Tip: Another glue of choice can be substituted for spray glue when adding the extra piece of card stock.



Balconies and Bridges

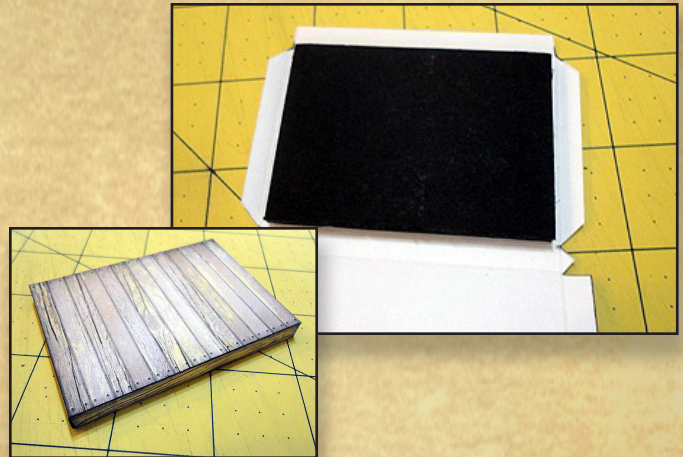
To add thickness to a balcony or bridge (especially to support metal gaming miniatures or other gaming props) consider adding a piece of foam core to fill the middle of the model piece (or under part of a ramp) during the building process.

Roughly measure the inside dimensions of the model piece. Make sure the measurement is slightly smaller to allow the ease of folding the glue tabs. Transfer the dimensions to a piece of foam core.



Modeling Tip: Depending on the thickness of the foam core an extra piece or two of card stock may be needed to fill any gaps or spaces in between the model section. This tip does not apply when adding foam core to a bridge ramp.

Cut out the piece of foam core and dry fit it to the back of the model section, making sure it does not overlap any folding sections.



Verify the model piece can fit together with the added foam core.

Use your liquid glue of choice or spray glue to apply the foam core. See the Basing section below for further details. Complete the model section as normal.

Materials List

- Balcony or bridge section(s)
- Cutting mat
- Metal ruler
- Hobby knife
- Additional card stock
- Foam core
- Pencil
- Spray glue

GLUING

Use the recommended glue(s) as mentioned under the Tools section. Regardless of the type, using too much glue can cause pieces to warp; using too little and the pieces may not hold together.

Modeling Tip: *When gluing model pieces together it is good practice to have an extra sheet of paper or similar covering the work area to keep it clean from any excess glue usage. The sheet is to wipe any excess glue on, rest glued pieces, etc. Sometimes even applying a small amount of glue on this extra sheet and then using a toothpick to transfer the glue to the model piece works well too.*

When applying the glue, spread an even coat. Be sure that the edges of the glue tabs are glued as well to avoid separation or peeling apart of the 2 pieces being glued together. Once the section has been glued, apply the 2 model pieces together and hold for roughly 30 seconds to 1 minute.

Modeling Tip: *Make sure the outermost part of the model section being worked on is glued first (i.e., the corner of 2 walls). Once the 2 pieces are dried enough, turn the section over and press down the rest of the glue tab.*

Materials List

Model piece(s)
Glue of choice (see Tools)
Toothpicks or scrap card stock
Object for hard to reach areas
Extra paper to use for excess glue



Small Sections or Props

When gluing small model parts with hard-to-reach components, try using a toothpick.



BASING

Some model builders choose to simply add a building to its base (or footprint) with no further steps, thus keeping the model as flat on the gaming table as possible. Another approach is to add foam core to the base giving the model more stability while protecting the base from potential damage (i.e., warping, curling of the edges, etc.). The process also adds some weight to the overall model.

This section covers how to add foam core to a model's base (or footprint).

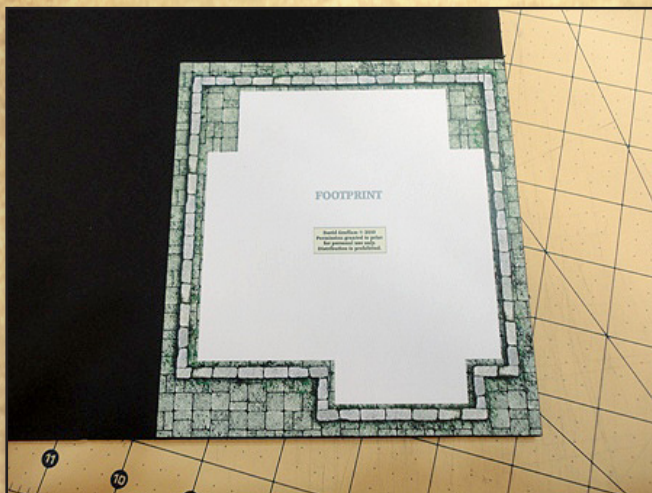
Modeling Tip: Add foam core to a model's base before putting on the building.

Materials List

- Model base (footprint)
- Cutting mat
- Metal ruler
- Hobby knife
- Pencil
- Spray glue

Once the model base has been cut out and edged, line it up on a piece of foam core that will cover the entire base.

Modeling Tip: You may want to use the marker to add a black line around the edges on the bottom side of the base to hide any potential white spots.

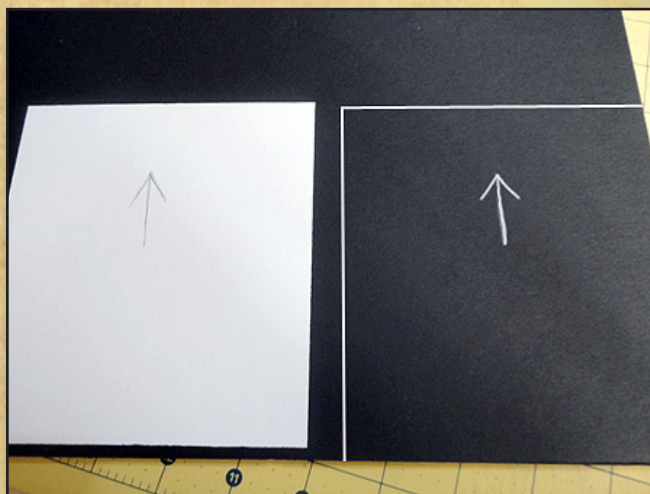


Use the pencil to trace the edges of the base on to the foam core.



Modeling Tip: To keep the base lined up with how the foam core will be cut out, draw arrows or another mark to distinguish the orientation. To do this:

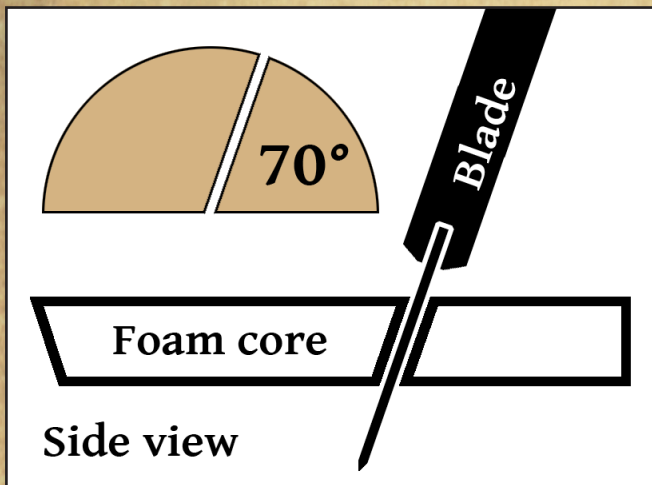
Flip the base over and draw an arrow.



Draw another arrow in the same direction on the foam core. When the two pieces are glued together they will be in the same orientation.

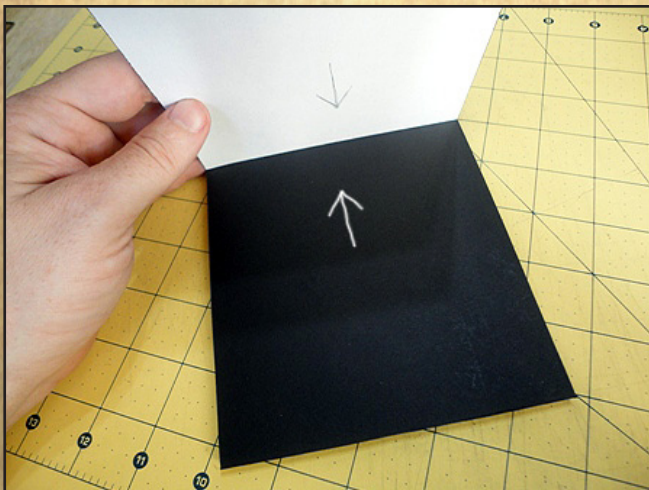


Line up the metal ruler on the penciled line and cut the foam core at a 70° angle.



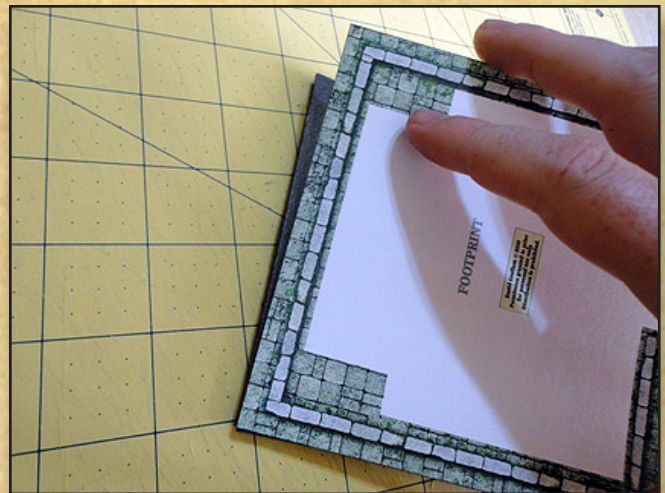
Modeling Tip: Cutting at this angle allows models with foam core to fit together more easily.

Dry fit the base with the foam core to verify they line up together. Make any adjustments as needed.

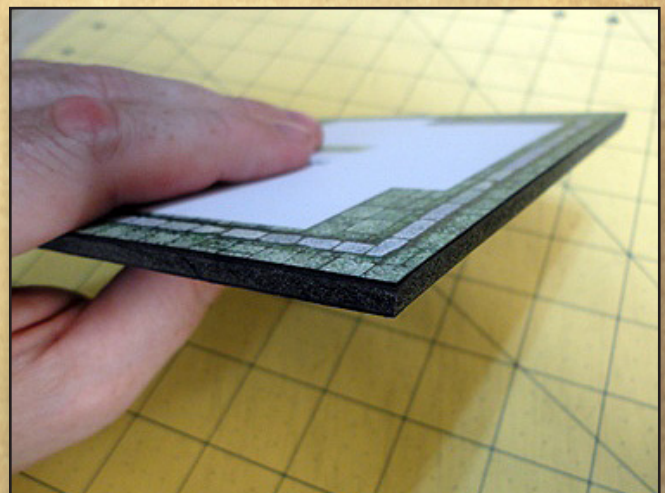


Following the steps of the *Model Copies* section at the beginning of this document, use spray glue to cover the piece of foam core.

Using the arrows drawn earlier to verify proper alignment, start with one corner or edge and carefully attach the base to the foam core.



Continue working around the base ensuring the two pieces are lined up.



The model building can now be added.

Modeling Tip: Adding foam core to a model's base after the building has been glued on can still be done, though it may be a little more difficult to work with, depending on the size of the model.

Modeling Tip: As a model builder, once I get the 4 main walls assembled, before anything else I'll typically prep the base (or footprint) and glue the walls on. Doing it this way allows me to smooth down the inside wall glue tabs, help position any building extensions that will later be added and provide some weight in assembling the rest of the building.

Props

Using a smaller box, such as a shoe box or similar size may be appropriate to store props. If you want be more organized, add dividers to keep items separated.

Another suggestion would be to use plastic Tupperware containers. For an even more organized solution, try using a plastic fishing tackle box.

Once again the above are merely suggestions. Use your best judgment on what options suit your needs (and budget!).



STORING

Once models are completed the question becomes how they can be stored properly as to not become damaged. While there are many ideas to storing models and props the following lists a few suggestions:

Buildings

Use either cardboard boxes or plastic containers. You will want to stack the models carefully to ensure smaller sections of the model (balcony, chimneys, etc.) don't become damaged.

