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Paul, Bob, Ken, and Bob's Modular Maze Panels: Door Construction

This page gives details on how to construct *one way doors* for the maze. These doors are required to construct the mazes for year 2010 and beyond (probably).

Having one-way doors in your makes is like a maze on steroids. Small mazes become much more difficult and can take much longer to solve.

I have wanted to add one way doors to the maze for ages, but I was endlessly worried about the design. The doors would have to be very sturdy. They would need to last for years. And most of all - they would need to be very reliable - always closing and always latching.

This door design has satisfied my ambitions. They work great and it looks like they should work great for years to come.

Design Drawings:

These are the engineering drawings which show how to construct the maze panels. The drawings are complete and show all the details.



1. The Door: [construction diagram](#)
2. The Frame: [construction diagram](#)
3. Fully Assembled, Reverse View: [construction diagram](#)

Materials List




All of these materials can be found at your local Home Depot or Lowes hardware stores.

The quantities listed below are what is necessary to create 10 fully assembled doors. 10 doors are required to assemble the maze for Year 2010 (and beyond, I presume).

Materials for constructing the maze panels:

	Item	Cost per unit	Quantity needed	Total Cost
	furring strips (advertised as 1" x 3" x 8' [1 inch by 3 inches by 8 feet] in dimensions, but actually are 2.5"x0.75")	\$1.14	60*	\$68.40
	#10-24 bolts, 1 1/2 inches long	\$1.18 (pack of 6)	7	\$8.26
	washer (any that fits the #10-	\$5.00	1	\$5

	<p>24 bolt above)</p>	<p>(pack of 100)</p>		
	<p>door spring</p>	<p>\$4.23</p>	<p>10</p>	<p>\$42.30</p>
	<p>gravity gate latch</p>	<p>\$4</p>	<p>10</p>	<p>\$40</p>
	<p>hinge</p>	<p>\$2</p>	<p>20</p>	<p>\$40</p>
	<p>#10 wood screws, 3/4 inches long</p>	<p>\$10 (package of 100)</p>	<p>1</p>	<p>\$5</p>
	<p>wood glue</p>	<p>\$4</p>	<p>1</p>	<p>\$4</p>
	<p>1 lb box of coarse-thread 1 1/4" drywall screws</p>	<p>\$5.00</p>	<p>1</p>	<p>\$5.00</p>
	<p>5lb box of size #6 x 1" self-</p>	<p>\$27.00</p>	<p>1</p>	<p>\$27.00</p>

	drilling drywall screws (1" preferred, but 1-1/4" inch also okay)			
	10' x 100' x 6mil black plastic sheeting (note: picture shows 20' plastic, but 10' is more than enough)	\$40	1	\$40
	size 8 screw eyes	\$8 (pack of 50)	13	\$8

*The count of 60 furring strips is about 15-20 more than actually required because many boards will likely be too warped to be useful for constructing doors.

Total Materials Cost

The total cost for 10 doors comes out to somewhere around \$300 total, or about 30\$ per door (includes frame and all hardware). Note that this cost could be much less if you use extra materials from the maze panel construction, such as left-over plastic sheeting and drywall screws (reduces the cost by about \$100).

Also note, the gussets in the instructions below: It is assumed that these are left-overs from the [maze panel construction](#).

Instructions: Door Construction

For all of the following instructions, see the construction diagrams above. In fact, you probably don't need the instructions at all. The diagrams pretty much tell the whole story.

Note: Furring strips are advertised to be 1"x3" (by 8 feet) in dimensions, but the actual size is 2.5"x0.75".

The following tools will likely be needed: Circular saw, power drill(s), power screwdriver(s), staple gun(s), screw drivers, socket wrenches, and sharp scissors.

Step by step instructions:

- Select Furring Strips** - Select furring strips which appear to be straight. Look down the length of the furring strips and discard any which bend too much in any direction (see picture below of bad furring strips).
- Construct the door outline** - Cut two furring strips to 16 3/16 inches long. Cut two more to 72 inches long. Arrange in a square according to the [construction diagram](#). Place triangular wooden gussets at each corner (see [panel construction](#) for more information on making the wooden gussets), smear with glue and screw the gussets into the furring strips with #6 x 1" drywall screws.
- Construct the top and sides of the door frame** - Cut two furring strips to 83 inches. Cut one more to 22 inches. Arrange as the top and sides of the door frame according to the [construction diagram](#). Place two gussets at the top corners as shown and glue and screw into place.

4. **Construct Door Threshold** - Using scraps, cut 4x 2.5 inch furring strip blocks. Using wood glue and the coarse-thread 1 1/4" drywall screws, attach the blocks to either side of the door frame, at the bottom (use a drill to drill holes for the screws in the small blocks ahead of time, to avoid splitting them).

Next, cut another furring strip to 27" long. Drill 6 holes in the bottom of this board to align with the three boards above (two blocks and the door frame). Turn the door frame on its side and glue/screw the threshold into the door from the bottom using the coarse-thread 1 1/4" drywall screws.

5. **Attach Door Frame Hardware** - Screw in the door hinges with the 3/4" wood screws in the specified locations. Make sure the flat part of the hinge is down (and the hinge part itself bumps up). *Note well: Hinges must be exactly vertical! If they are not, the door will not smoothly open!* This may be easier to do if the door is in place when you attach the hinges (this is what we did). Also, you can screw the hinges into the door at the same time, if you wish.

Attach the gravity gate latch. Make sure that the latch itself (the loose moving part) is arranged such that it will fall closed by gravity when the door is upright. Fasten with the screws provided with the latch. Put the latch all the way to the side of the door frame, close to the door.

6. **Attach the screw eyes** - Drill holes and screw in the screw eyes on all sides.

7. **Attach the door to the frame** - Place the door inside the frame about 3 inches from the threshold. Screw the hinges into the door with the 3/4" wood screws.

8. **Attach the latch bolt to the door** - Place the bolt on the door so that it lines up with the latch. Mark the holes in the latch bolt with a pencil and then drill the holes into the door, all the way through. Attach the latch bolt to the door with the #10-24 bolts. Place a washer on the wood-side (see diagram).

Note: Do not use the provided wood screws for the latch bolt! The latch bolt will be under an enormous amount of stress, more than simple wood screws can handle. Using the #10-24 bolts to attach the latch bolt to the door is a must.

9. **Attach the spring** - On the opposite side of the door from the hinges and latch, attach a spring at the top of the door from the middle of the door (approximately) to the door frame.

Note: Hinge must be nice and tight! You will need to experiment with just how tight depending on your type of spring. Make it tight enough so the door will reliably close by itself even if the door is at a slight angle forwards or backwards. If the spring still isn't tight enough, consider screwing in a block of wood (see the [construction diagram](#)) under the spring to increase the tension and provide a better angle for the spring to work.

10. **Wrap the door in plastic** - First cut the plastic to the same height as the door (72") and make it 72" long as well. Place it along the inside of the door and staple it to the door (make sure it's nice and tight, top-to-bottom). Then stretch it over the door (cut a hole for the latch with a knife), over the other side, and then pull it through the door in the small place between the door and the frame. Cut slits for the hinges, cover the original door side one more time, and then staple the whole thing into place.

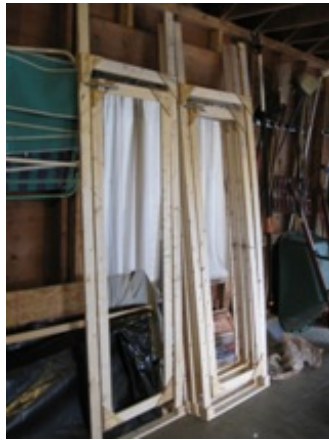
After having done the first door, I recommend undoing the plastic and then using it as a template to cut out all of the other plastic sheets and the hinge slits.

One more hint, have a nice sharp knife handy (box cutter is good), and be ready to trim any left over plastic bits away from wherever they may occur.

Once the doors are assembled, find some place to store them for a day or two to let the wood glue dry.



Warped furring strips. Quite frightening!



Fully assembled doors without plastic.



Spring detail. Note the wooden block to increase tension. Also note the spring is attached with bolts (with washers on both sides)



Latch detail. Be careful to line up the striker bar with the latch before bolting the bar to the door.



Hinge detail.



Threshold detail.



Threshold bottom.



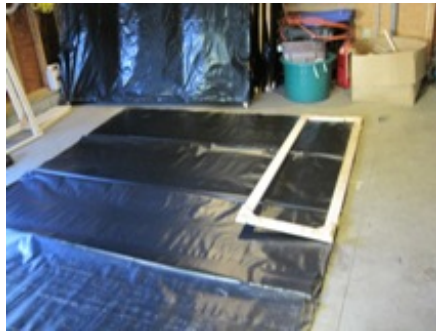
A second view of the threshold bottom.



Wooden parts cut to size, ready for assembly.



Maze doors in progress. How exciting!



Measuring out the plastic template for wrapping the door.



Wrapping the door - part 1.



Wrapping the door - part 2.



Wrapping the door - part 3.



Fully assembled doors, stacked for storage.



Latch and handle.

Thumbnails created by [Pics Handler](#).

[Click here to contact Paul](#) (please do).