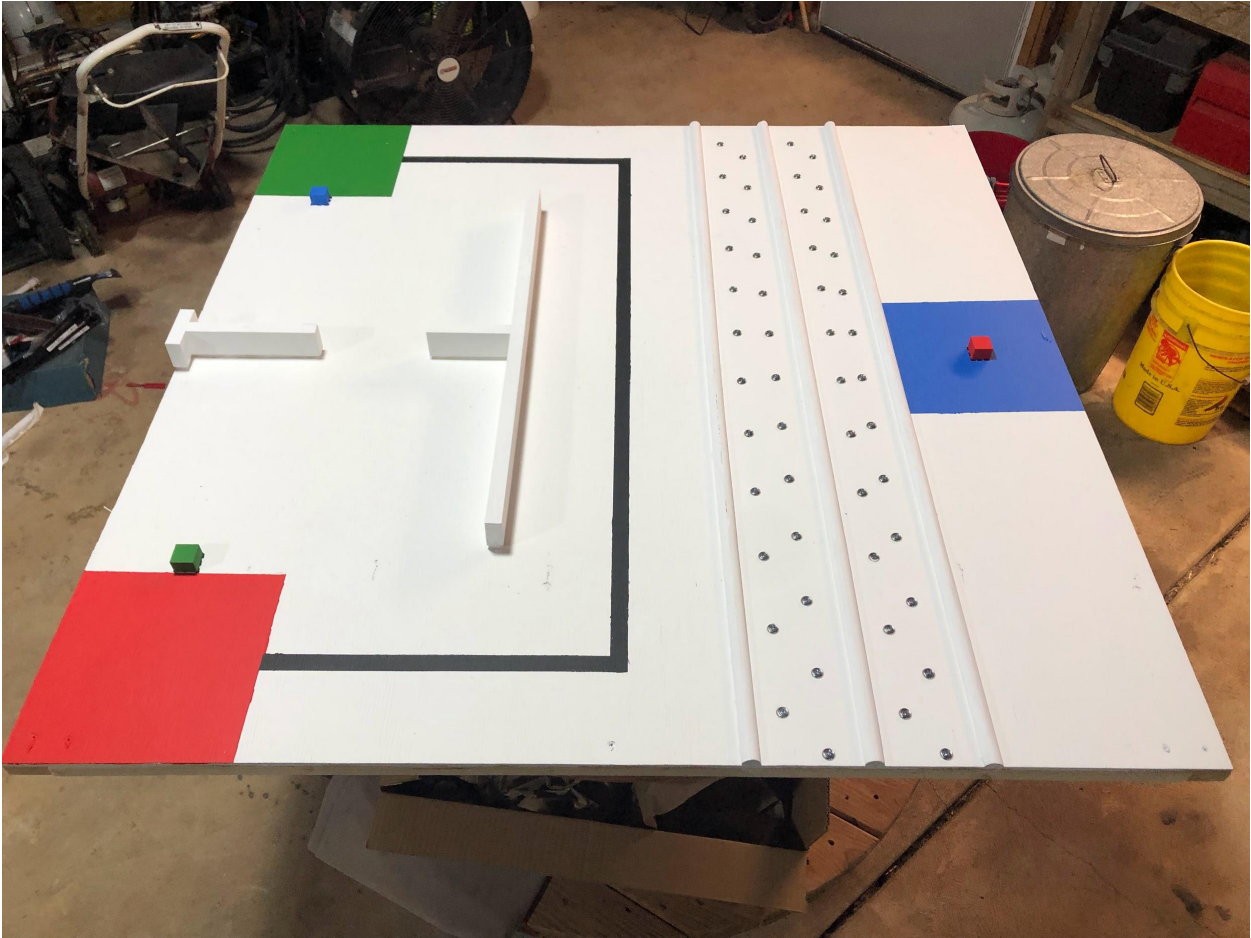
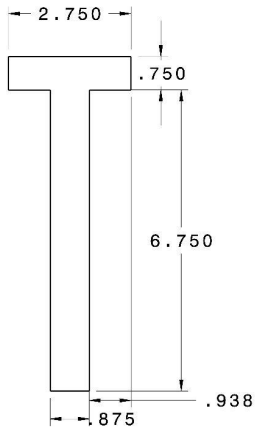
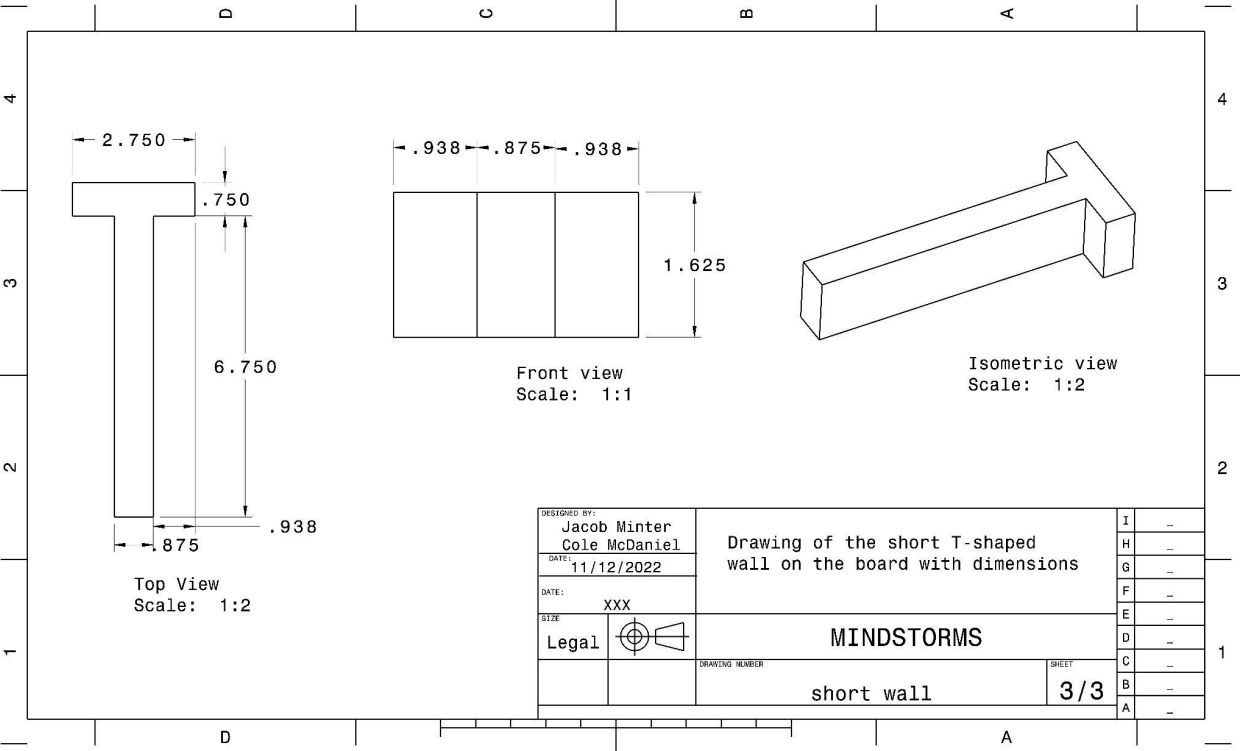


**Transportation Madness**

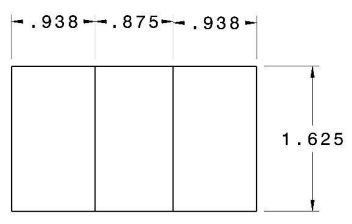


**FINAL DRAFT SHEET**

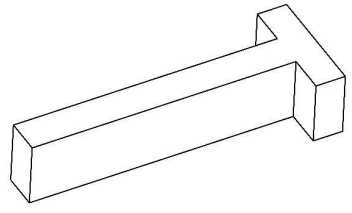




Top View  
Scale: 1:2



Front view  
Scale: 1:1



Isometric view  
Scale: 1:2

DESIGNED BY: Jacob Minter Cole McDaniel	Drawing of the short T-shaped wall on the board with dimensions	I	-
DATE: 11/12/2022		H	-
DATE: XXX	MINDSTORMS	G	-
SIZE Legal		F	-
	short wall	E	-
		D	-
	3/3	C	-
		B	-
		A	-

**FINAL BOM**

<b>Item</b>	<b>Unit Price</b>	<b>Quantity</b>	<b>Total Price</b>	<b>Notes</b>
8oz. Behr Dynasty Matte/Flat Paint-Primer - Color -> Deep River (P500-6)	\$6.50	1	\$6.50	<b>Color Mix Values - R 0 G 121 B 179</b>
8oz. Behr Dynasty Matte/Flat Paint-Primer - Color -> 100 MPH (P107-7)	\$6.50	1	\$6.50	<b>Color Mix Values - R 201 G 63 B 56</b>
8oz. Behr Dynasty Matte/Flat Paint-Primer - Color -> Hills of Ireland (M390-7)	\$6.50	1	\$6.50	<b>Color Mix Values - R 65 G 123 B 66</b>
8oz. Behr Dynasty Matte/Flat Paint-Primer - Color -> Broadway (PPU18-20)	\$6.50	1	\$6.50	<b>Color Mix Values - R 67 G 68 B 66</b>
Glidden Interior Paint/Primer -> Pure White	\$11.00	1	\$11.00	
House of Fara  3/8 in. x 3/8 in. x 48 in. Oak Quarter Round Moulding	\$2.70	6	\$16.20	
Everbilt Flat	\$1.40	1	\$1.40	



Head Phillips Wood Screws, #8 x 1 in., 12 pack				
Everbilt Flat Head Phillips Wood Screws, #8 x 1/2 in., 100 pack	\$6.00	1	\$6.00	
Everbilt #8 Stainless Finishing Washers, 50 pack	\$6.00	1	\$6.00	
3" Paintbrush	\$2.00	1	\$2.00	
1" Paintbrush	\$1.40	1	\$1.40	
Scotch Extremely Strong Velcro, 12 x 1 in. clear/transparent	\$4.80	1	\$4.80	
Original Gorilla Glue, 2 fl. oz.	\$7.00	1	\$7.00	
1/4 in. x 4 ft. x 8 ft. BC Sanded Pine Plywood	\$30.60	1	\$30.60	

1 in. x 4 in. x 10 ft. Premium Kiln-Dried Square Edge Whitewood Common Board	\$7.20	1	\$7.20	
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### Final Score Sheet

Action	Score
Robot begins with all touchpoints inside of the red zone	0
Robot travels to green zone and all touchpoints enter green zone	Using Path A (6" gap between the walls) - 200 Using Path B (The side of the black line-follower line) - 100
Robot takes the green block to the green zone*	100
Robot travels to the blue zone and all touchpoints enter the blue zone	300
Robot takes the blue block to the blue zone*	100
Robot travels to the red zone and all touchpoints enter the red zone	200
Robot takes the red block to the red zone*	100

\*A block will be considered in the zone if the entire block has passed into the space over the appropriate zone. A block need not be left in the painted area.



## Instructions

### Painting the Base

1. Cut to 4'x8' sheet of wood into a single 4'x4' sheet, or purchase a 4'x4' sheet from the hardware store.
2. Pick the side of the sheet that has the fewest number of cracks and is the flattest surface
3. Paint the 4'x4' sheet with white paint on one side. Ensure that all knots and holes are filled with white paint to help the robots when/if they are using color sensing.



*The sheet, with its best looking side facing up having its first coat applied*



*A knot/imperfection in the sheet that was filled in on the first coat*

4. Let the paint dry until it's tacky to the touch
5. Apply a second coat of paint to the 4'x4' sheet.
6. Let the paint dry again until it's tacky to the touch
7. If needed (If the wood grains can be seen), Apply a third coat of paint to the 4'x4' sheet

#### Gluing the Quarter Round

1. Grab 2 pieces of quarter round.



2. Get a cup of water and a small paintbrush and lightly wet one side of one piece of the quarter round



3. Add a thin layer of glue to the piece of quarter round that you did not apply the water to



4. Stick the two pieces of quarter round together and align them end-to-end.
5. Place a squeeze clamp at the end of the quarter round and another squeeze clamp about 4 inches down the quarter round.
6. Wrap painters tape or any other tap around the two pieces of quarter round in between the clamps to hold them together. Make sure that the tops of the quarter round are lined up.



7. Move the clamp at the end of the quarter round as far to the end as it can go. Move the other clamp onto the painters tape. Wrap the quarter round with tape between the clamps.



8. Move a clamp to the first piece of tape that you placed, and move the second clamp about 4 or 5 inches down the quarter round.
9. Wrap the quarter round between them with tape.





10. Repeat steps 15 and 16 all the way down the quarter round.
11. Repeat steps 9-17 to make 3 joined pieces of the quarter round.

#### Cutting and Painting the Walls

1. Cut the 1"x4" board in half to get 2 1"x2" boards
2. Cuts
  - a. 2 1"x4'
  - b. 2 1"x3'8"





3. Lay out the 1"x4's and the 1"x3'8" in a rectangle with the ends of the 1"x3'8"s butting up to the 1"x4's



4. Lay the 4'x4' sheet onto the boards.
5. Line up a 1"x4' board with the side and ends of the sheet and use 3 of the countersunk screws to hold the board in. Space the screws evenly across the board.



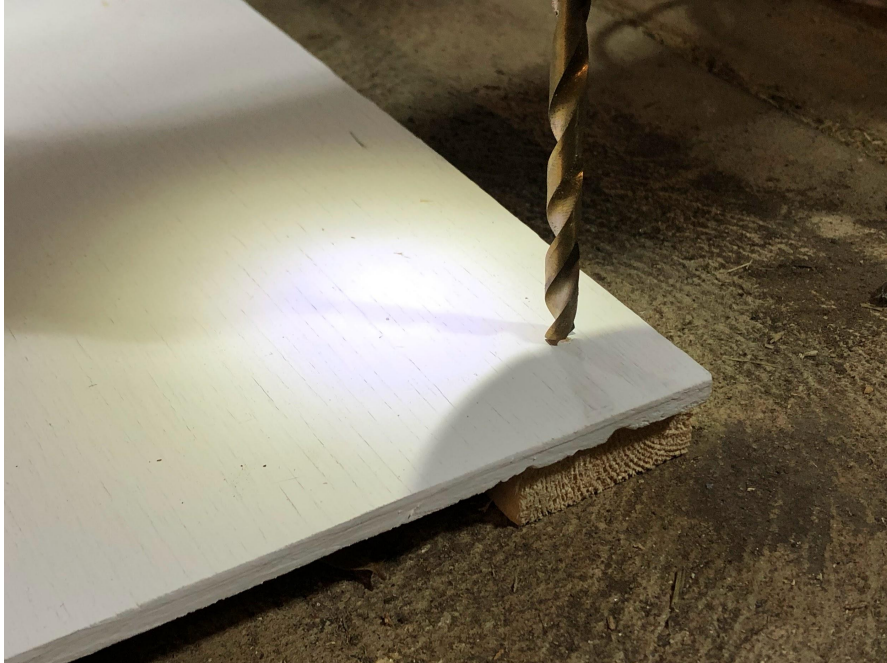




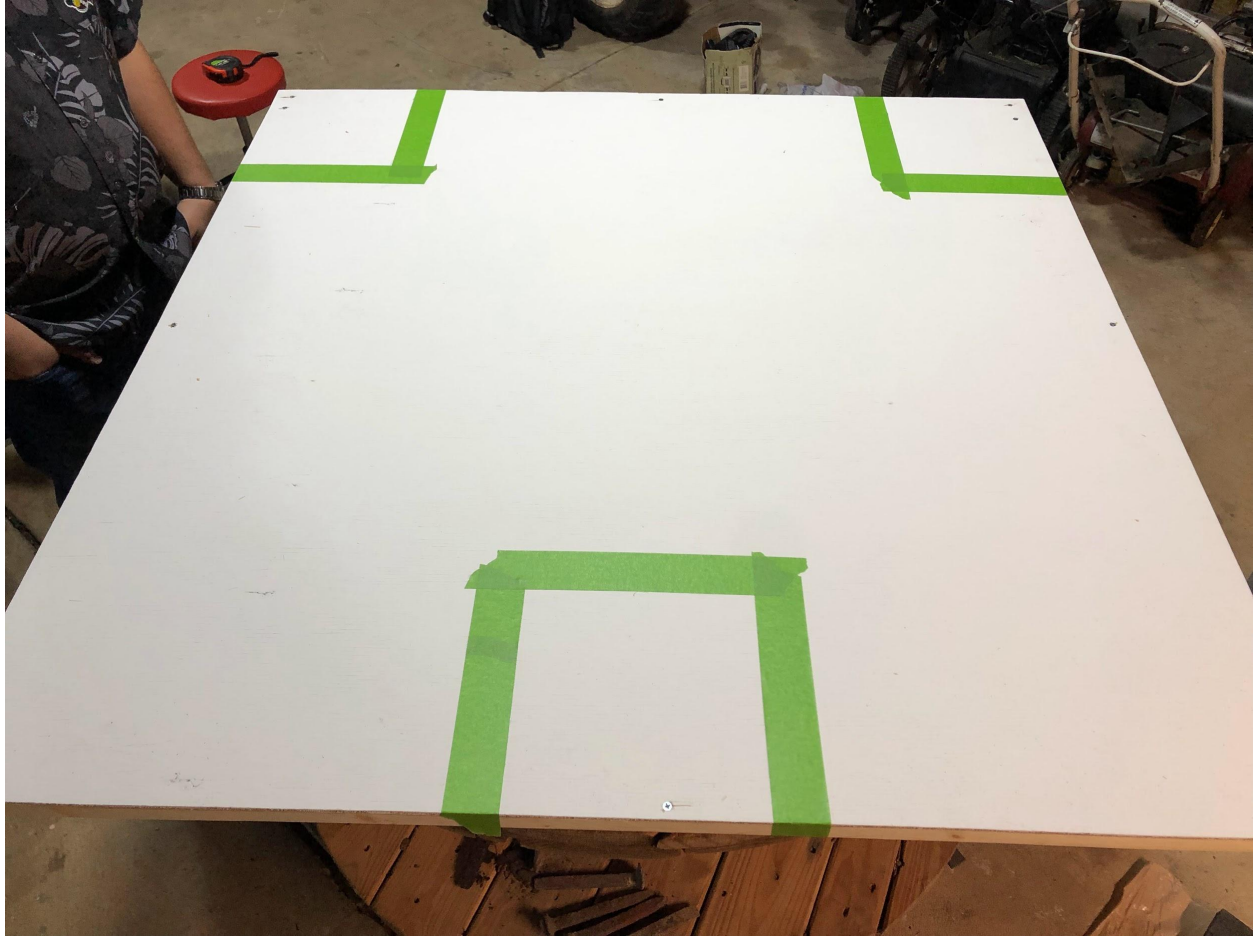
- a. Make sure to drill pilot holes for the screws that are smaller than the threads.



- b. Also drill a 1/16" deep hole with a larger drill bit for the countersunk head



- c. When putting in the screws, make sure they are flush with the 4'x4' sheet
6. Repeat step 5 for the 1"x4' on the other side of the sheet from the board you just did
7. Now place the 1"x3'8" board between the 1"x4' boards on one side and line it up with the edge of the sheet.
8. Repeat the drilling and screwing instructions from step 5.
9. Repeat steps 7 and 8 on the other side of the sheet with the last 1"x3'8" board to complete the square.
10. On one side of the square, use painters tape to make a 9"x9" square in either corner of the square.
11. On the opposite side of the side, use painters tape to mark a 9"x9" square centered in the sheet, but touching the edge.





12. In the picture above, paint the centered square blue, the top left square red, and the top right square green.



13. Peel the tape off before the paint is dry, otherwise, it will pull the paint up with it.

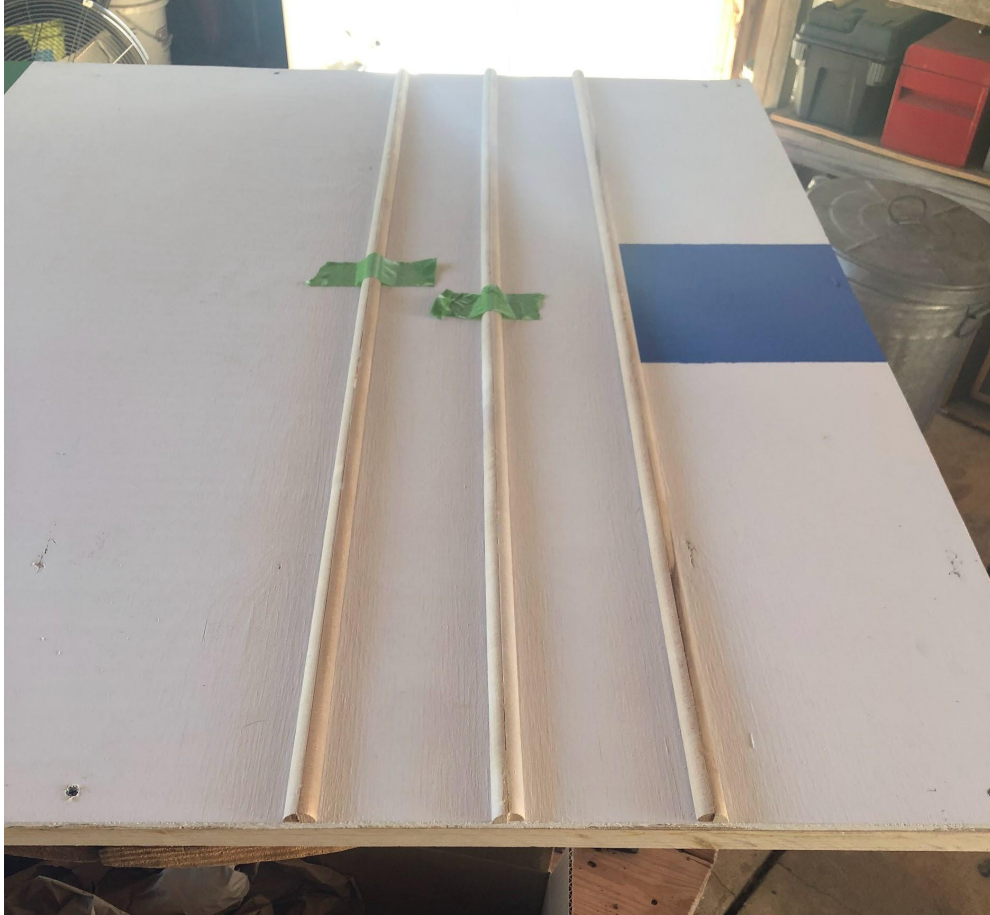
### Bumps

1. Pull the tape off of the quarter round pieces

2. Use a knife to go along the top of the quarter round and carve off any glue that leaked out



3. Place one of the quarter round bumps against the blue square.
4. Measure 4.5" from the center of the quarter round and place the center of another quarter round there.
5. Measure 4.5" from the center of that quarter round and place the center of another quarter round again. It should look like the picture below.
6. Put a piece of tape across the center of each piece of quarter round to hold it down.



7. Mark the placement of each piece of quarter with a pen or pencil so you know where to put it when you go to glue it down.





8. Pick up a piece of quarter round and use a paint brush to wet the bottom of it.



9. Put a line of gorilla glue down the length of the quarter round.



10. Place it back down and line it up with the pencil lines.

11. Lay a rag and something heavy on top of it to hold it down or use clamps.





12. Repeat steps 8-11 for the other two pieces.



13. Let the glue dry for about an hour then remove the bricks and rags.
14. Use the white paint to paint the quarter round. Use 2 or 3 coats.



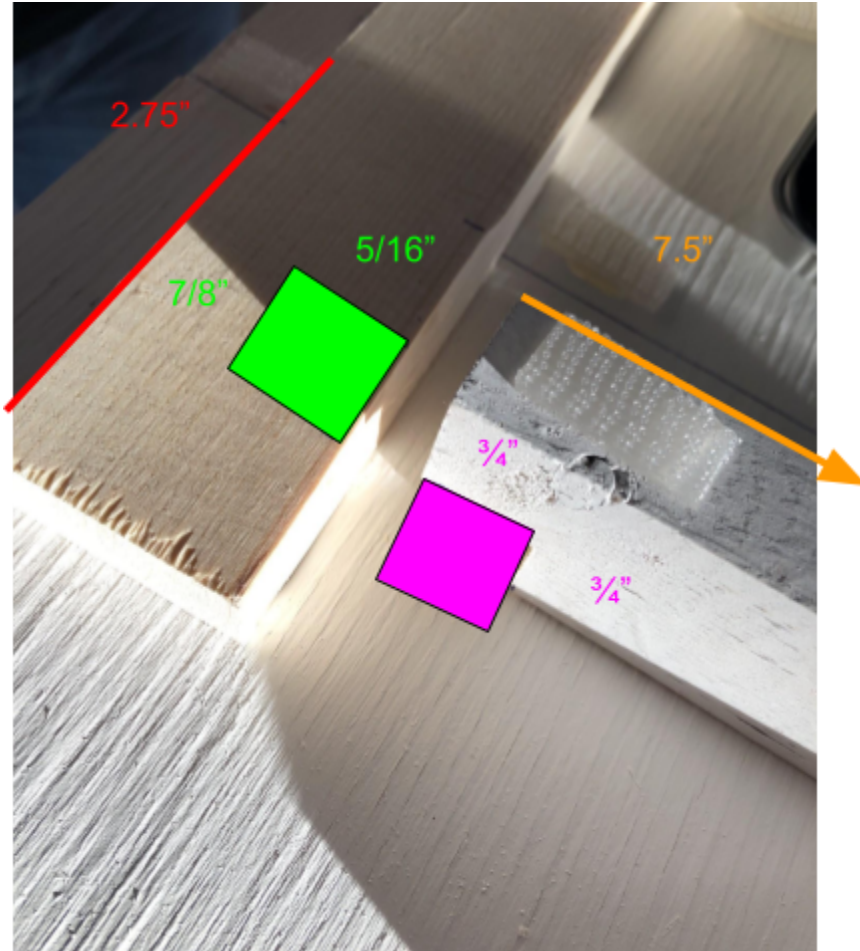


### Walls

1. Take the remaining 1"x4" board and rip it in half to make 2 long 1 5/8" wide boards.
2. Cut one of those long boards down into a 7.5" board.
3. On the end of the 7.5" board, Cut a 3/4" cube out of that piece at the end of the board from the corner.
4. Now, measure in 1 1/8" and cut out a 3/4" x 5/16" cube.
  - a. 3/4" wide so the 4.5" board fits in it
  - b. 14/16" inches tall so that it is the same height as the 4.5" board.
5. Now cut a 2.75" board including the cube in the center.

**REFERENCE FOR STEPS 2-5**





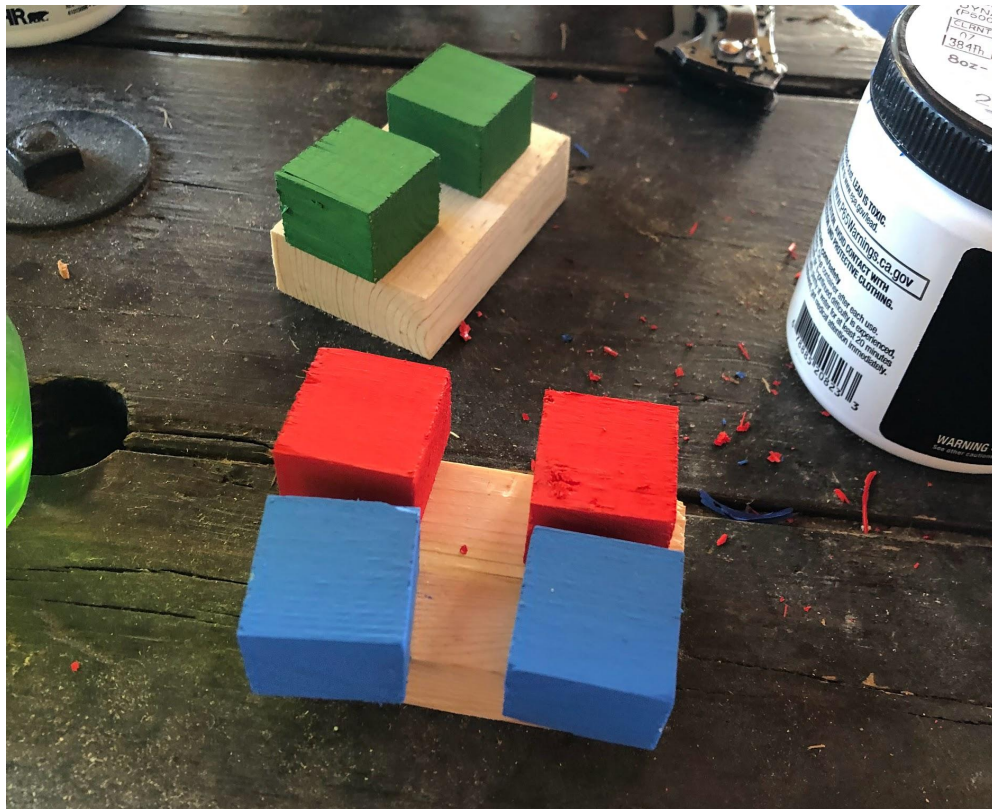
6. Take the other one and cut it into a 27" board.
7. Use the remaining scraps to cut 3 1"x1"x 3/4" blocks.
  - a. If using a table saw, set the fence with a piece of wood clamped against it.
  - b. Measure 1" between the piece of wood and the saw blade, adjust the fence as needed.
  - c. Push the wood used to make the cubes against the wood and then into the saw blade. This allows extra room so the block does not get wedged between the fence and the blade and launch out of the saw.







8. Get out the red, green, blue and white paint.
9. Paint one of the cubes red, another cube green, and the last cube blue. It is easiest to paint 3 of the sides, let them dry, and then paint the last side.



10. Paint the 27", 4.5", 2.75", and 7.5" walls white. Follow the same method where you paint 3 sides, let them dry, and then paint the fourth side.



11. Do 2 or 3 coats as needed.



12. Measure 23.5" to the left of the edge of the table by the red square and mark it with a pen.



13. Line the right edge of the 7.5" wall with those pen marks.
14. Line the end of the 7.5" wall with the edge of the board
15. Cut three pieces of velcro and space them evenly to the bottom of the wall.
16. With both sides the velcro stuck together, peel the paper off of the sticky side and push the wall onto the board so its right side is lined up with the pen mark.
17. Take the 2.75" board and place one large piece of velcro at the bottom and one piece at the top.
18. Push the block so it sticks to the base of the course and the 7.5" wall.
19. Measure 13.5" down the 27" board and use gorilla glue to attach the 4.5" board to it so it is at the center of the 27" board.





20. Use a clamp to hold the pieces together.
21. Let the wood sit for about an hour while the glue dries.
22. Line the center of the 4.5" board on the T up with the center of the 7.5" board, and space them 6" apart.
23. Put 4 pieces of velcro on the t.
24. Press it into the board so the velcro sticks.

### Bumps

1. Measure  $1 \frac{5}{16}$ " to the left of the quarter round that is next to the blue square and make a mark. Measure from the edge that is next to the other piece of quarter round.
2. Measure  $2 \frac{5}{8}$ " from the same position and make a mark.
3. Measure repeat steps 1 and 2 and extend the marks further down the quart round.
4. Now lay some sort of straight edge along the points that are  $1 \frac{5}{16}$ " away.
5. Make a mark  $\frac{1}{2}$ " down the straight edge starting on the side of the red square.
6. Now make marks that are  $3 \frac{5}{8}$ " apart, starting at the  $\frac{1}{2}$  mark, until you make 13 marks.
  - a. There should be about  $\frac{1}{2}$ " of room at the end.



7. Repeat steps 1-6 between the other pieces of quarter round
8. Now take a drill bit that is slightly smaller than the threads of the #8,  $\frac{1}{2}$ " wood screws and drill a pilot hole at each of the marks.





9. Now, from the mark that is  $2 \frac{5}{8}$ " away, measure  $2 \frac{5}{16}$ " from the side of the board with the red square and make a mark.
10. Line up a straight edge on the marks that are  $2 \frac{5}{8}$ " away.
11. Now make marks down to the end of the board that are  $3 \frac{15}{16}$ " apart, starting at the  $2 \frac{5}{8}$ " mark, until you make 12 marks total..
12. Repeat steps 9-11 between the other pieces of quarter round.
13. Drill pilot holds in all of these marks as in step 8.
14. Clean off the wood shavings and add 2 coats of white paint to cover up all of the pencil marks.



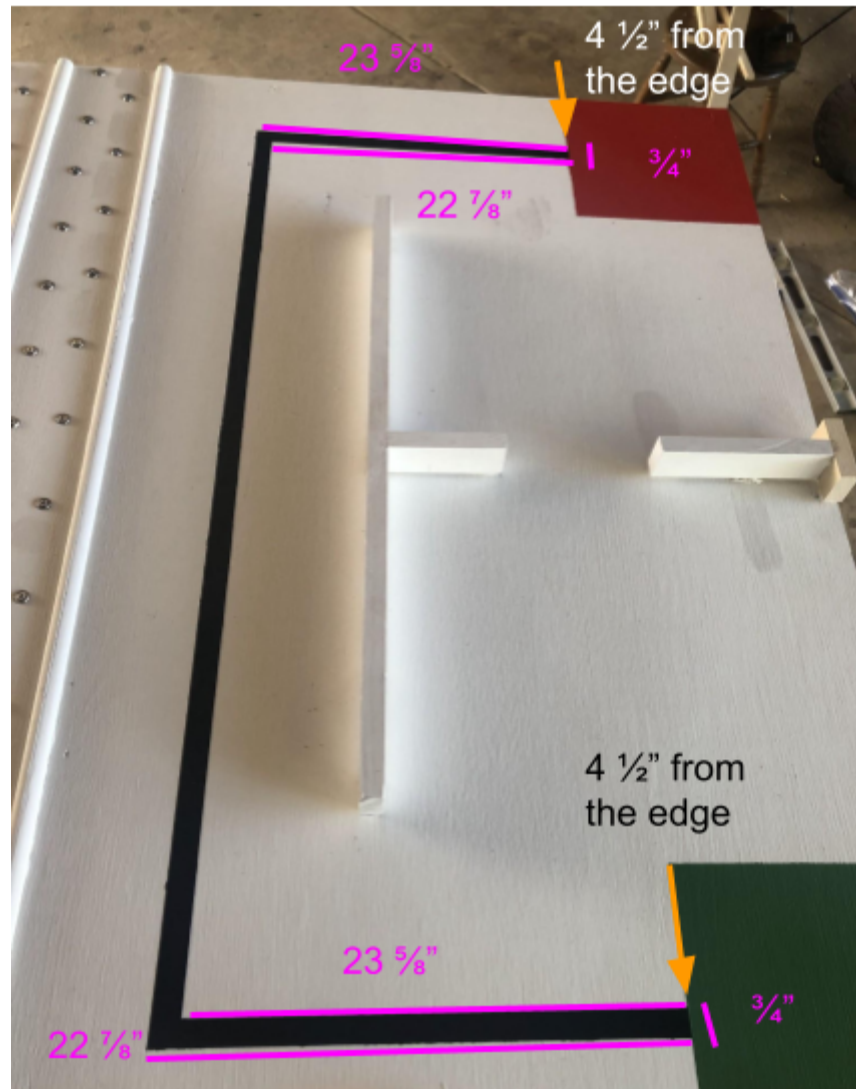
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15. Now take the finishing washers and the #8, 1/2" screws and run a screw through the center of the washer and into the pilot hole. Do this for all 50 holes.





Line Follower

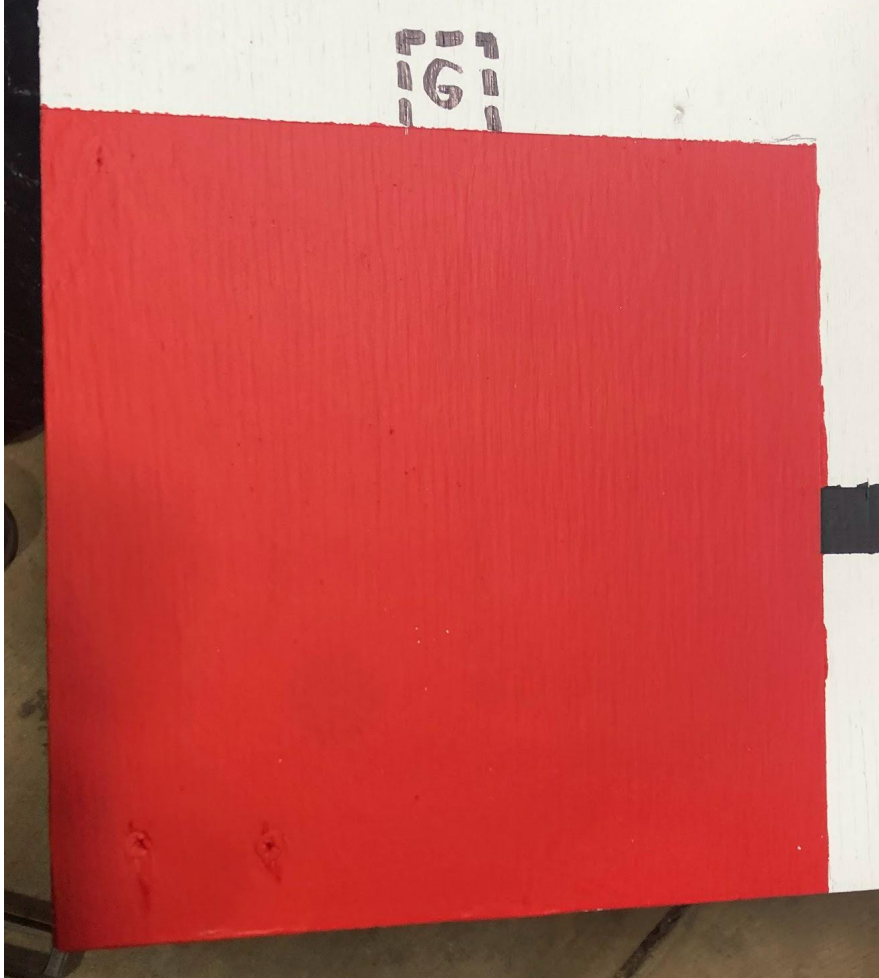


1. Draw the dimensions above using a pen or pencil
2. Draw the long line between them using a straight-edge to create the entire line follower line in pen or pencil.
3. Now tape it off with painter's tape.
4. Paint 2-3 coats of the black paint or until the white paint no longer shows through to create the line follower line.
5. Peel the painter's tape off before the paint dries, otherwise it will pull the paint up with it.

### Cube Marks

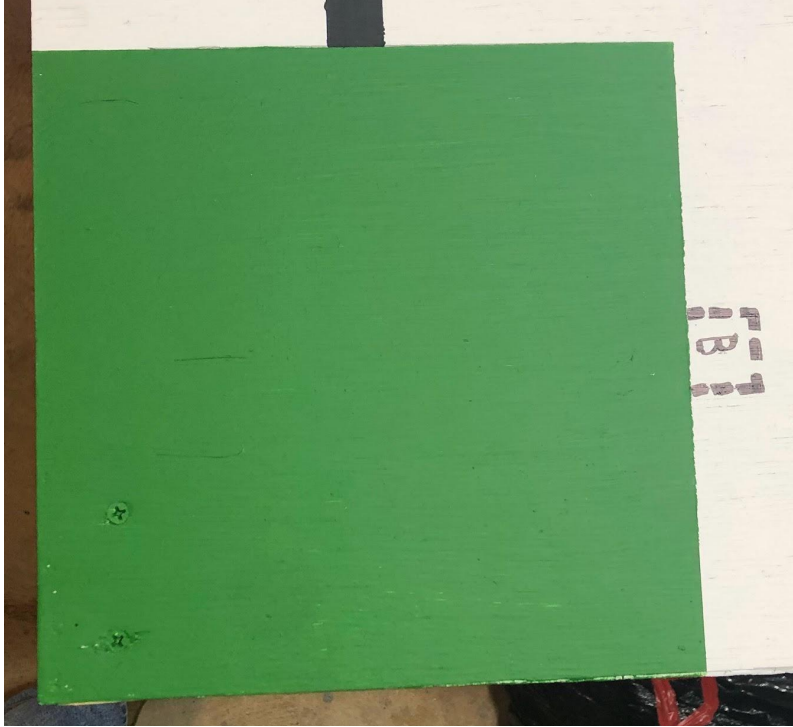
Finally, you need to draw the squares to show where to set down the cubes on the course.

1. Next to the red square, draw a 1"x1" square, with dashed lines, centered 4.5" up the red square. Write "G" on the inside. The green cube will go here.



2. Next to the green square, draw a 1"x1" square, with dashed lines, centered 4.5" up the green square. Write "B" in the middle. The blue square will go here.





3. Finally, in the center of the blue square, draw a 1"x1" square with dashed lines. Write "R" inside. The red cube will go here.

