

Baseball Diamond

4th grade
Overview Use your knowledge of area and perimeter to determine how much chalk is required to outline the baseball field.
Objectives/Standards Common Core Standards: <u>Math</u> 4MD.1 (relative size of units) 4MD.3 (area and perimeter formula, real world) <u>Reading</u> 4.RI.3 (explain procedures in technical text) 4.RI.4 (determine meaning of domain specific words) 4.RI.7 (interpret diagrams) 4.RI.10 (comprehend technical texts) <u>Language</u> 4.L.4 a, c (determine and clarify meaning for words) 4.L.6 (use domain specific words)
Materials <ul style="list-style-type: none"><input type="checkbox"/> S2 Robot<input type="checkbox"/> marker<input type="checkbox"/> large paper<input type="checkbox"/> programming instructions<input type="checkbox"/> computer with internet connection<input type="checkbox"/> basic programming instructions for starting, saving and uploading
Time 1.5 hrs.
Teacher suggestions: <ul style="list-style-type: none">• Have students stop, save and run their programs after each turn to make sure the program is one course.• Students may want to experiment with adding a sound after certain steps to help them troubleshoot their program.• Have students keep a journal of what they are learning and what is and isn't working along the way.
Vocabulary <ul style="list-style-type: none"><input type="checkbox"/> block<input type="checkbox"/> default<input type="checkbox"/> icon<input type="checkbox"/> scale

- uploading
- worksheet

Lesson

The Problem: A baseball diamond requires someone to run the machine to chalk the lines and chalk for the field. You'll need to use your robot to draw a 1:60 scale model of the baselines of a high school baseball field and determine how much chalk is needed for a full size field. Students will need to convert the distance from feet to inches and divided by 60 to get their scaled size. Students should research the dimensions of a baseball field and the angles between the base lines and then determine the expected perimeter of their model.

Additional information:

- use 5 inches for the chalk width

Programming Instructions: Follow the basic instructions to starting and saving programs. Your S2 robot has 3 wheels, each driven by a small motor. For this program, you're going to program your robot to turn on the motor to drive those wheels in order to move straight, stop and make several turns. You'll use the Action Blocks to get it moving. Just follow the steps.

1. Start with a clean worksheet.
2. On the left side of the screen locate the Action Block, "Insert a move command". (It looks like the top of the S2 with a white arrow on it.) Click on the block to place in on your worksheet. You'll see a window pop-up. The information in this window will let you set how the robot will move; the speed of each wheel, the direction the wheels turn (velocity) and the duration. The red arrow controls the left wheel and the green arrow, the right. Up is for forward and down is for a reverse motion. To change the numbers, click and hold on the black circle in the middle of the S2 figure. Move it around and see how the red and green arrows change in size and direction. Also notice how the numbers in the bottom section change as you hold and move your mouse there. A negative number means the wheel will rotate backwards. Use the yellow stopwatch on the right to set the time or distance of motion. *Insert picture of Action Block window with labels.* This step will draw the first base line.
3. Set both sides to a speed of (positive) 50, which is the default setting.
4. Set the Time/Distance to 2. (You can adjust this up or down for different size paper.) With these settings your robot will move for a speed of 2 seconds at half speed then stop. The Motion settings window should look like this: *(Insert graphic)*. Click on the green checkmark to close the window. Use the up arrow until T=2 or the right slider. Watch the time on the stopwatch move.
5. You'll need your robot to turn left at first base. Use your research to figure out the angle between the baselines. To make your robot turn you'll need to adjust the speed of the wheels. To make the robot rotate around one wheel, you'll need to set the speed of that wheel to 0. For a left turn, add another Action Block after the first one. This time set the speed of the left wheel to 0 and the right to 50. You'll need to experiment with the Time/Distance setting to make the robot turn the correct distance. Suggestion: start with a setting of two and adjust up or down from

there -- more time to turn further and less time to turn less.

6. Repeat steps 2 and 3, three times to get your robot back to home plate. **Don't clear the screen.** *To edit a block, click on the block you want to change, then select the red S2 icon to change the settings. Click on the garbage can icon to delete the block.*
7. Add one more Straight Ahead Move block, like in step 2. **Don't clear the screen.**
8. In order to upload the program you'll need to plug in the cable. As soon as you hit start the robot will start moving, so let's add a delay at the beginning of the program so you'll have time to unplug the cord. In the Action Bar find the Hourglass icon, called "Insert a pause". Click on it, move the cursor to place the grey bar just after the red Start block and click to place the new block in the beginning of your program just ahead of the first "Move" block. A "Wait awhile" window appears, set it to pause for 7 seconds. You can use the slider or click above the slider to input a time. Press "OK".
9. Now, if you have the program the way you'd like it, go ahead and plug in the cord to both the robot and the computer and upload your program to the S2. Once the upload is complete, unplug the cord and place it at home plate. Put a marker in the hole. You'll have 7 seconds before it starts moving.

Question: Did your robot make it back to base? Why or why not?

Question: What adjustments might make your robot run better?

10. You can re-run the program by pressing the blue reset button. **Try running the program several times before making any adjustments to the programming.**

Question: What is the perimeter of your model of the baseball field? Does it match your prediction?

What area does the baseline chalk cover on a regulation size baseball field?

Extensions and Optional Activities

1. Students may wish to research a different type of ball field (softball, Little League, Major League).
2. Program the drawing for and figure the chalk on a football or soccer field, including, or not, additional field lines.