

Motion detector lights and zones

Instructions for the teacher

INTRODUCTION

Certain outdoor lights have a detector that activates a light when motion is detected in a specific zone. These zones form angles, which can be measured in degrees.

Teaching objectives	<ul style="list-style-type: none"> • Draw, then measure the detection zone angles created by 5 outdoor motion detector lights. • Have the students work elsewhere than at their desks, in cooperation with their classmates.
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Duration	15 to 30 minutes
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Material	<ul style="list-style-type: none"> • Chalk • Protractors* (1 for 2 students) • Metre sticks or rulers (at least 30 cm long) • <i>Motion detector lights and zones</i> (document to project on the IWB)
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*While it's possible for the students to do the activity using a small plastic protractor, it's preferable to use a larger model, measuring at least 20 cm in diameter. Certain websites offer free protractors that you can print. We are offering you a protractor [here](#).

TASK

In teams of 2, draw and then measure, on the classroom floor, the detection zone angle of 5 lights, presented one after the other.

PROCEDURE

1. If necessary, prepare the classroom by pushing the desks up against the walls so that there is enough space in the middle of the room. Distribute one stick of chalk to each team.
2. Present the example to the students (see *Motion detector lights and zones* – to be projected on the IWB). Demonstrate how to draw the first line with the ruler, then show the students where to place the protractor in order to draw the second line to form a 60-degree angle.
3. Project the images of the lights one at a time on the IWB. Ask the students to draw them, then have them draw the lines to form the angle specified. The last step is to measure the angle using the protractor.

As the activity proceeds, check and comment on the teams' sketches. Tolerate a few degrees difference given the width of the chalk line. You could also ask some of the stronger students to help you with this.

4. For lights D and E (detection zones of 270 degrees and 240 degrees), give the students a little extra time to solve the problem.
5. Suggest to the students that they draw a few detection zones of their own. They can then have the members of another team estimate and then measure the angles. This will help encourage discussion.
6. Some chalk dust might be left behind. Have the students do a quick pass of the broom!

Taking it further

Each team asks another team to estimate the angles drawn on the floor. The first team then measures the angles to validate their estimates. The teams then reverse roles.

Variants

The activity can be done on a piece of cardboard set down on the floor, or it could be done in the corridor, in the schoolyard, in a park or even on a smooth sidewalk.

TEACHERS' TROVE

- As a prerequisite for the activity, teach the students to measure angles that are already drawn: constructing an angle with a protractor is more difficult than simply measuring an angle.
- Ask the students to write down directly on the floor the angle in degrees for each drawing so that it is easier for you to check their answers.
- Accept answers within 2 degrees of the correct measurement.
- If you do not think that you have enough space in your classroom, you can do the activity elsewhere. We have proposed an image for each light; you can find others on the Internet.