

Rules for the Laser Bounce

Equipment provided: 1 mounted green laser (5 mw), 5 swivel mounted plane mirrors, with support stands and clamps, laser goggles, fog machine

1. The laser will be set up on a horizontal counter approximately one meter above the floor and be pointed in such a way that the beam will travel horizontally toward the back of the room. Five 4.6 cm diameter plane mirrors will be available to position on tables at any desired location around the room. An approximate layout of the room is shown below. Laser goggles will be provided to each participant. **Several barriers (not shown) will be placed at various positions in the room.**
2. A target (bulls eye with concentric rings) will be placed somewhere on the wall of the lab opposite the laser.
3. On cue, a stopwatch will be started, the laser will be turned on and participants will begin orienting their mirrors in an attempt to direct the laser beam onto the target as near to the center as possible. A maximum of 5 minutes will be allowed for this process. A small fog machine is available and can be used to make the beam path more visible.
4. When the team has completed their mirror alignments they will signal the official who will stop the stopwatch and record their time, T. The distance, D, from the center of the target to the arrival point of the laser beam will be measured and recorded. The total distance, X, traveled by the laser beam from the laser to the target will also be measured and recorded.
5. The score for the team will be determined as follows:

$$\text{Score} = 50*N + \frac{1000}{D + 2} + \frac{(300 - T)*500}{300} + 20*(X - 20)$$

Where

N = number of mirrors used ($N_{\max} = 5$)

D = distance in cm (rounded to the nearest cm) from where laser hits wall to center of target

T = total elapsed time in seconds (rounded to the nearest second) for team to align mirrors ($T_{\max} = 300$ s)

X = total path length in meters (rounded to the nearest ½ meter) of the laser beam from laser to target

