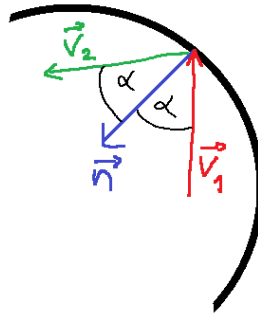


## Assignment 1: Bouncing Balls

### Minimal version (up to 9 points)

- Create a large transparent sphere.
- Create a small non-transparent sphere at a random position anywhere inside the large sphere, moving at a random but constant speed.
- Make sure the ball is correctly reflected at the outer sphere such that the angle of reflection equals the angle of incidence.



Reflection at a surface: The angle of incidence between  $\vec{v}_1$  and the surface normal  $\vec{n}$  equals the angle of reflection between  $\vec{v}_2$  and  $\vec{n}$

### Extended version (up to 12 points)

Extend your program such that it contains an arbitrary number of balls each with its own random position and speed.

### Full version (up to 15 points)

Turn your program into a little game as follows:

- Add a black sphere (or any other object) whose position can be controlled with the keyboard.
- Detect when the black ball collides with the outer sphere or any of the other balls. Report *Game over!* in that case.

### Handing in the solution

- Hand in your *complete* solution (html and js files) no later than Sunday, Nov. 1st, by email to `klaus.juenemann@haw-hamburg.de`.
- Chaotic coding style (complete lack of comments, variable names like a, b, c ..., etc.) will lead to a reduction of points.