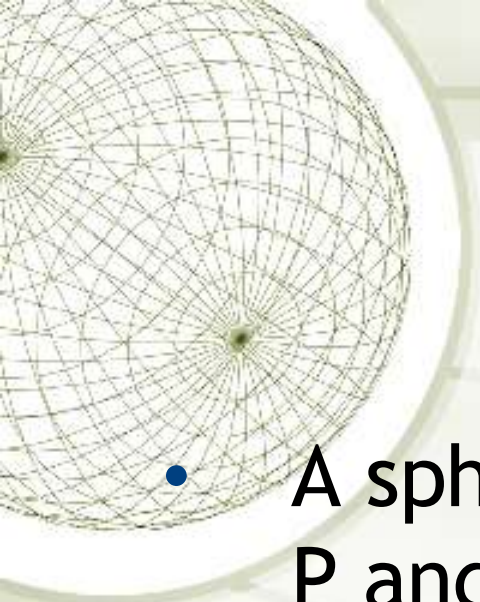


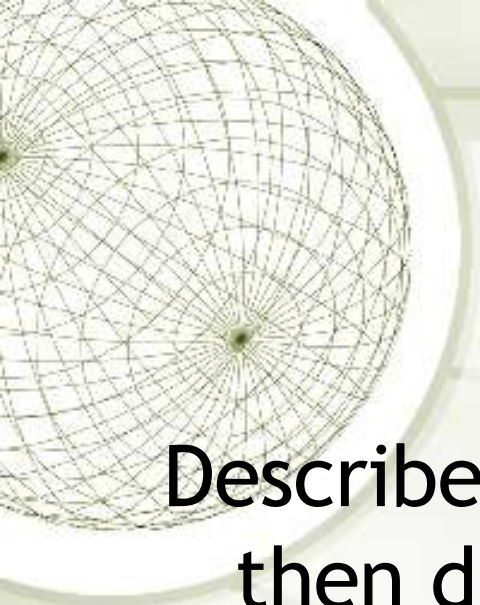
# *Spheres and hyperspheres*

Mental exercising

# *Reminder*

- A sphere in  $E^n$  with a center at a point  $P$  and radius  $r$  is the set of all points in  $E^n$  that are  $r$  away from the point  $P$ .
- A unit sphere  $S^{n-1}$  is a sphere with a center at the origin and radius 1.

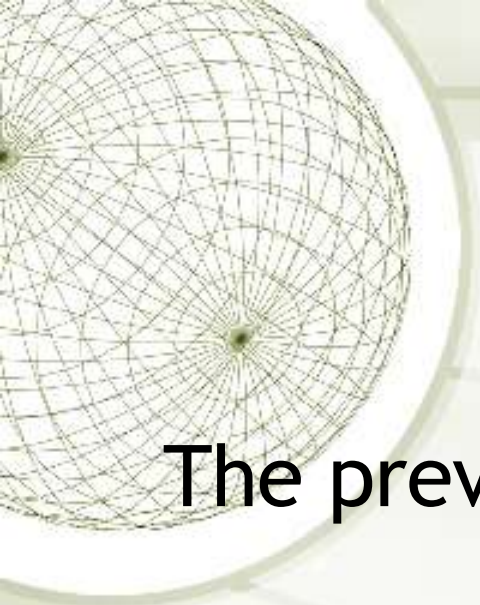




## *Circles in $E^1$*

Describe the following sets in words and then draw their pictures.

- What is  $S^0$ ?
- What is a circle with center at 0 and radius  $r$ ?



*Repeat*

The previous exercise in  $E^2$ ,  $E^3$  and  $E^4$ !

YELL when you run into problems.

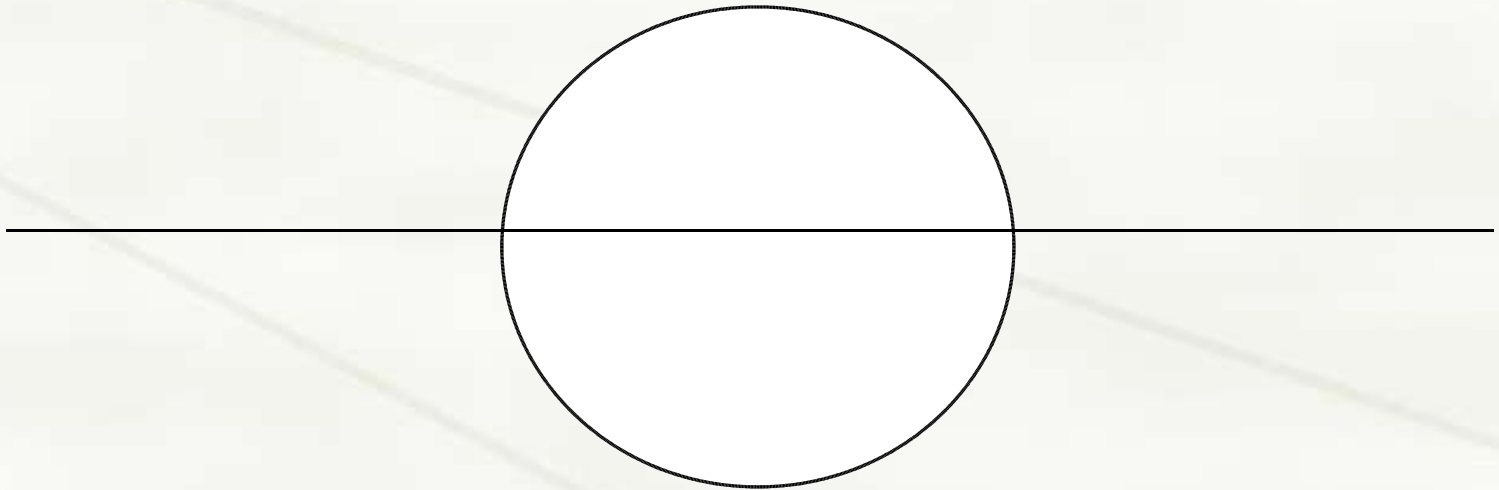


## *New approach*

- Draw  $S^1$ . What are the horizontal layers of it? Draw them and describe them.
- Draw  $S^2$ . What are the horizontal layers of it? Draw them and describe them.
- What will be the horizontal layers of  $S^3$ ?

# *Visualization*

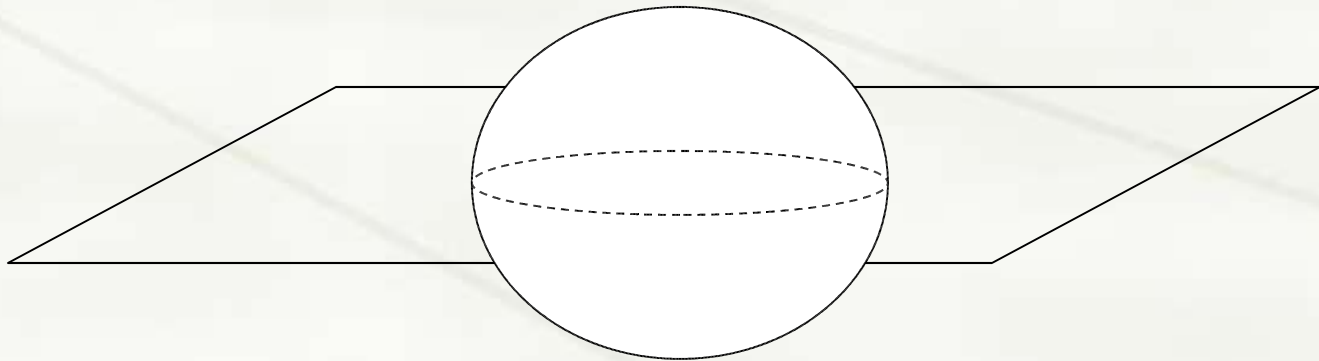
- How can 1-dimensional being visualize a circle?

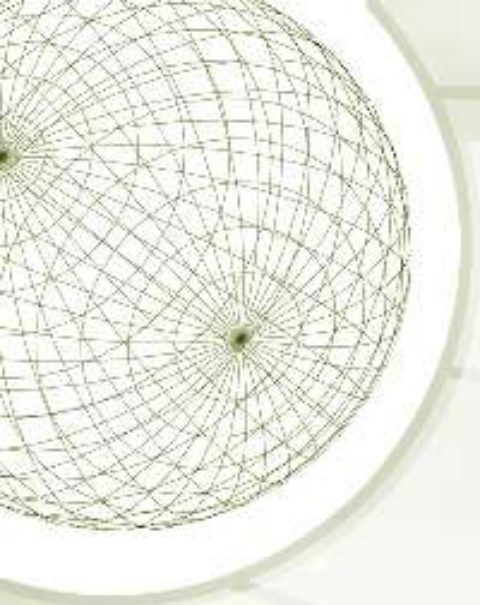


Remember: the circle needs to fit onto the line.

# *Still familiar*

- How would a flatlander imagine a sphere?





# *Hypersphere*

- How would YOU imagine a hypersphere,  $S^3$ ?