



# Metric Balls

## 1 Why

We speak of a set of elements of a metric space which are all within some distance of a fixed point.

## 2 Definition

The inspiration is balls in space.

Consider a metric space and an element of the base set. The *metric ball* of radius  $r$  centered at the element is the set of all elements which are less than  $r$ -distance from the element.

### 2.1 Notation

Let  $(A, d)$  be a metric space. Let  $a \in A$ . Let  $r$  be a real number. Then the ball centered at  $a$  of radius  $r$  is

$$\{b \in A \mid d(a, b) < r\}.$$

We denote the ball centered at  $a$  of radius  $r$  by  $B(a, r)$ .