Court Time

An exercise to demonstrate changes in the Earth through time, and the length of time it took for those changes to happen. In this case, using a basketball court (after all I work at the University of Kentucky).

Materials

- A gym or full-court basketball court
- Tape measure
- Paper, colored pencils or crayons, or other materials to draw or make costumes or posters of ancient animals and plants (can be done at home or in class prior to the activity)

Activity

Constructing time lines is a common method for demonstrating changes in Earth history. But these demonstrations don't have to be limited to lengths of adding machine paper. You can get across the same principles on a basketball court or gym. In fact, the concept of the expanse of time between events can sometimes be better shown in a gym than a classroom because there is more room. Of course, its also more fun to be in the gym than in the classroom. Rather than drawing objects or moments of time on a piece of paper, the students can be active members of the time lines themselves.

Before bringing the students out onto the court, pick the events you want your class to use from the list of Important dates in Earth history, or have the students pick a creature or event. As with the time lines on paper, you have to decide how much time you want to demonstrate on the court. There are two ways to do this depending on what you want the students to understand: (1) all of geologic time, or (2) that part of geologic time in which there has been abundant life. The advantage of showing all of geologic time is that most of the students will be clustered toward one end of the court, and they can see how far away the student representing the beginning of the Earth is standing. This is an excellent way to show how long it took these life forms to develop. If you would rather stress how long it took the more familiar life forms to develop, or to better show species change through time, use only the last 542 million years of Earth history, since the beginning of the Paleozoic Era (beginning of Phanerozoic Eon).

Times and distances for both the 4.6 billion year time courts and 542 million year time courts are provided below. If you want to demonstrate how the change in scale influences perception of time or ability to see changes try both; first with the court representing all of geologic time, and then second with the court representing just the Paleozoic era to the present.

To make the time courts more exciting for the students, assign each a key date in Earth history before going to the gym. Let each student go to the library or provide information about the key date so that they can make a mask, poster, or write a short limerick about their key event. For example, if a student was assigned blue-green algae, they might say "I'm blue-green algae, not much more than slime, but I ruled the Earth for a very long time!" For a mask they might make a headdress that looked like sea weed, or drape themselves in green streamers. This will let each student use their own creativity to illustrate the concept of changes in time.

Prior to Activity:

Measure your gym floor or outdoor basketball court with a tape measure. There is considerable variability in the size of school gyms and courts. High School basketball courts are supposed to be 84 feet long and 50 feet wide.

NBA courts are 94 feet long. The distance from the free throw line to the back court line is 15 feet on most basketball courts.

Calculations:

To determine the distance between time periods or key events on the gym floor (or to have the students make the calculation) determine if you want to show all of geologic time, or just the time of abundant life (Paleozoic Era to present, also called Phanerozoic Eon) and divide by the length of the court.

(1) For an 84 foot-long basketball court, all of geologic time would be calculated as:

4,600,000,000 years / 84 feet=54,761,904 yrs/foot, which you could round off to 55 million years/foot.

*If your court is a different length, substitute the true length for 84 ft and use that calculation to determine years/foot

At this scale, for an 84-foot long basketball court with free throw lines at 15 ft: Back Line = 4,600 my Free throw line = ~3,800 my Half court = 2,300 my Opposite free throw = ~800 my Opposite back line = today   At this scale, the Paleozoic era begins 10.4 ft from the opposite back line and most of the ancient creatures that students are aware of will be within 10 feet of the back line. To calculate the position of a creature or event on the court at this scale (or to have student calculate the position), get its age from Important dates in Earth history then use the following calculation:

(1a) Date you wish to show in million years / 54.76= distance from Opposite back line in **decimal feet**.

For example, Tyrannosaurus rex lived 75 million years ago, so: 75 my/ 54.76 my/ft = would be 1.37 feet from the opposite back line.

(1b) (Date you wish to show in million years / 54.76) * 12 inches/ft= distance from Opposite back line **in inches.**

For example, Tyrannosaurus rex lived 75 million years ago, so: (75 my/ 54.76 my/ft) 12 in/ft = would be16.4 inches from the opposite back line*

(2) For an 84 foot-long basketball court, on which you want to demonstrate the scale of time from the beginning of abundant life (beginning of the Paleozoic Era, Phanerozoic Eon) to today would be calculated as:

542,000,000 years/84 feet=6,452,380.95 which you could round off to 6.5 million years/foot for quick measurements

At this scale, for an 84-foot long basketball court with free throw lines at 15 ft: Back Line = 542 my Free throw line = ~445 my Half court = 271 my Opposite free throw = ~97 my Opposite back line = today   At this scale, the Paleozoic era begins at the back line and you can better demonstrate the change of creatures from the beginning of abundant life to the present. To calculate the position of a creature or event on the court at this scale, get its age from Important dates in Earth history then use the following calculation:

(2a) To calculate in feet: Date you wish to show in million years / 6.45 my/ft = distance from Opposite back line in **decimal feet** .

For example, Tyrannosaurus rex lived 75 million years ago, so: 75 my/ 6.45 my/ft = would be 11.63 feet (11 ft 7.6 inches) from the opposite back line.

(2b) To calculate in inches: (Date you wish to show in million years / 6.45) * 12 inches/ft= distance from Opposite back line **in inches.**

For example, Tyrannosaurus rex lived 75 million years ago, so: (75 my/ 6.45 my/ft) 12 in/ft = would be139.5 inches from the opposite back line*

On the Court:

Using the tape measure, have your students move to their creature's position on the floor based on the distance calculated for their creature or event. You can speed up the activity by using tape to mark off time or geologic periods the night before and having the students go to a relative position rather than measuring with a tape measure. Be sure to clear this with your gym first since some won't want tape on the gym floor.

Once positioned, tell the students its important to stay in their spots. If you use the "all of geologic time" scale, students will get very bunched up near the end line. You might point out that the lengths of their shoes are several million years (depending on the scale you use and their shoe size). Spread the students out across the width of the court so they don't bump into each other.

Let all of the students see each other's creature or event. Relate to the students the positions on the floor so they can see the distance between creatures or events and better relate to the expanse of time and earth history.