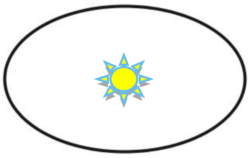
Solar & Sidereal Day

We say that it takes 1 day for the Earth to rotate so that the Sun appears in the same spot in the sky. We also say that 1 day is always broken into 24 hours of even length. This is known as a **SOLAR DAY**.



BUT

In reality, the Earth does not travel in a circle round the Sun. It travels in an elliptical orbit at different speeds affected by the Sun's gravity. The average day length in this case is 23.93 hours because some "days" are longer than others. If we want one year to mean one complete revolution of the Earth round the Sun so that it will appear in exactly the same spot in the sky, we have to add about 4 minutes to every year.

Solar day = Sidereal day + 4seconds

Student Demonstration

Materials

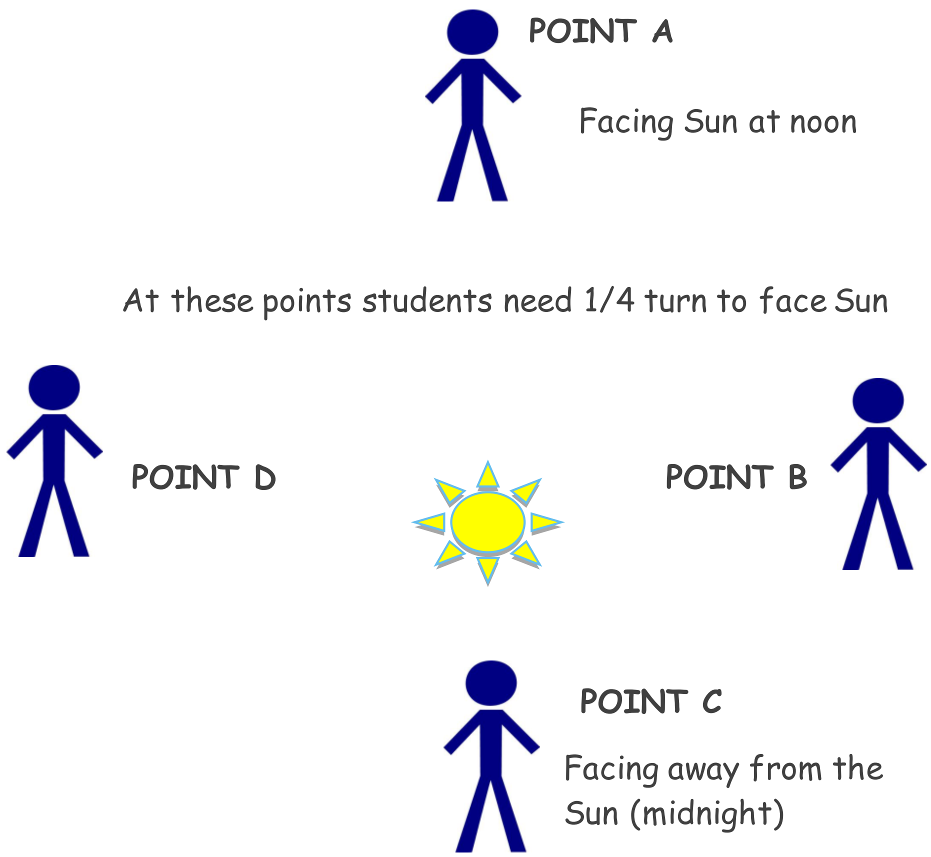
- 1 teacher to model the Sun
- 1 student to model the Earth

Method

1. The teacher is the Sun (of course!) shining their light all around.
2. Ask the student to face you. It is noon or midday at Point A of the Earth's yearly revolution of the Sun. Every time the student rotates to indicate one day they should be facing the same way. Sometimes it is a good idea to ask them to pick a spot behind you in the classroom and make sure they end up facing that spot.

Solar & Sidereal Day - Teacher's Notes

3. Ask the student to complete one rotation on their axis to indicate one day. They will be facing you. It is noon.
4. Ask the student to continue rotating on their axis but make a quarter revolution of you to Point B. By the time they are a quarter of the way round they will find that at the point that was "noon" they are no longer facing you but are 90° turned away from you. (one quarter of a revolution). It will take them a quarter more of a revolution's to be facing you for "noon". These days will be longer.
5. Half way along their revolution



Solar & Sidereal Day - Teacher's Notes

AND

Because the Earth is a slightly flattened sphere, the speed of rotation at the equator has to be very much faster than at the poles. We hurtle round our axis at hundreds of kilometers in one day. Why do we not get spun off at this great speed? That is because the "spin off" force is only one three thousandths as strong as the much greater force of gravity.