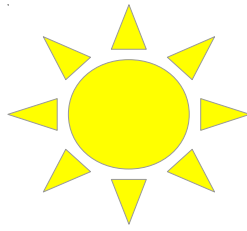
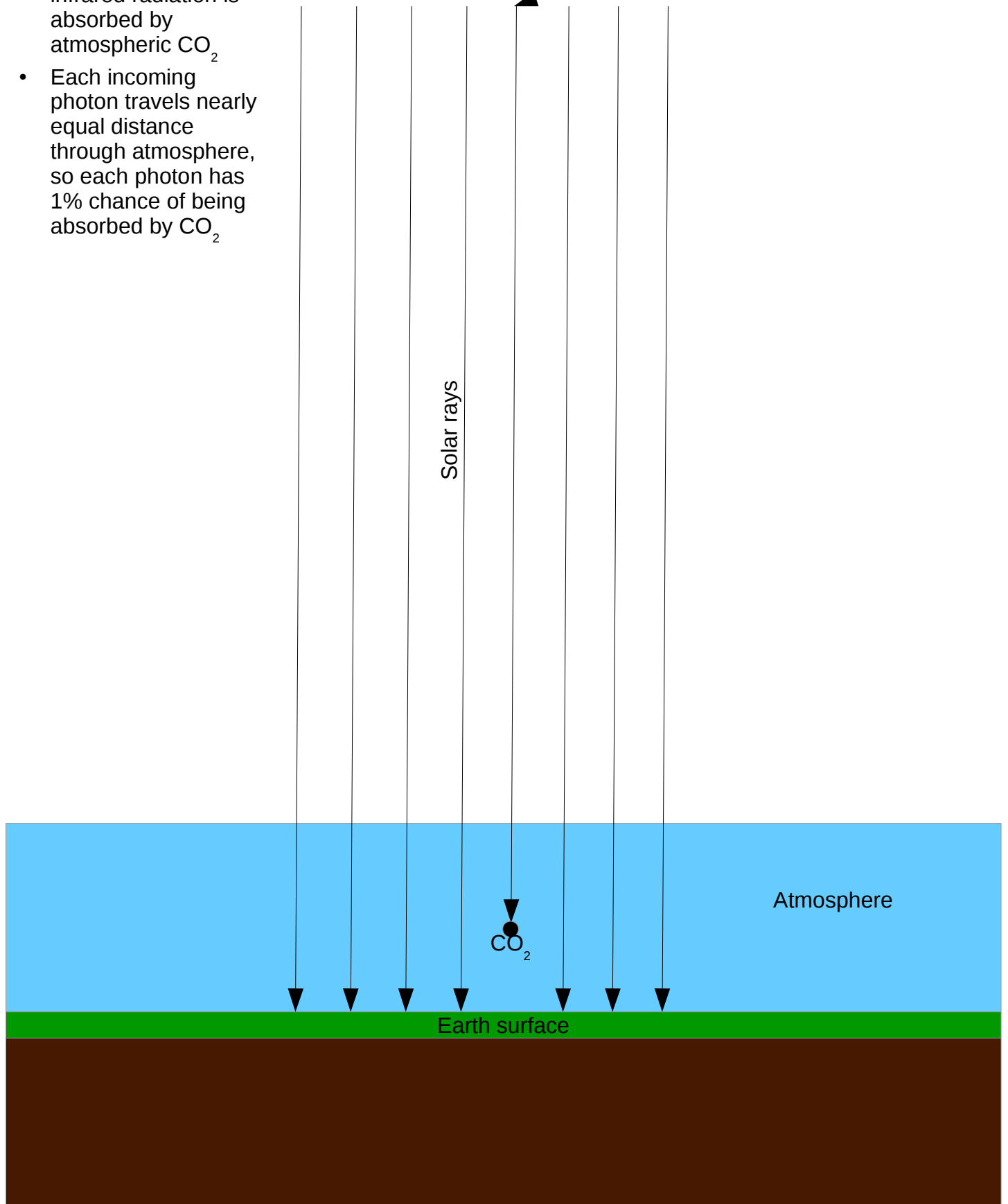


How CO₂ cause global warming

- All rays from Sun are roughly parallel to each other when they hit Earth surface
- Let's assume that 1% of incoming solar infrared radiation is absorbed by atmospheric CO₂
- Each incoming photon travels nearly equal distance through atmosphere, so each photon has 1% chance of being absorbed by CO₂

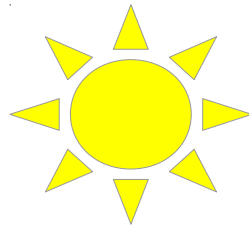


1% of incoming radiation is absorbed by CO₂

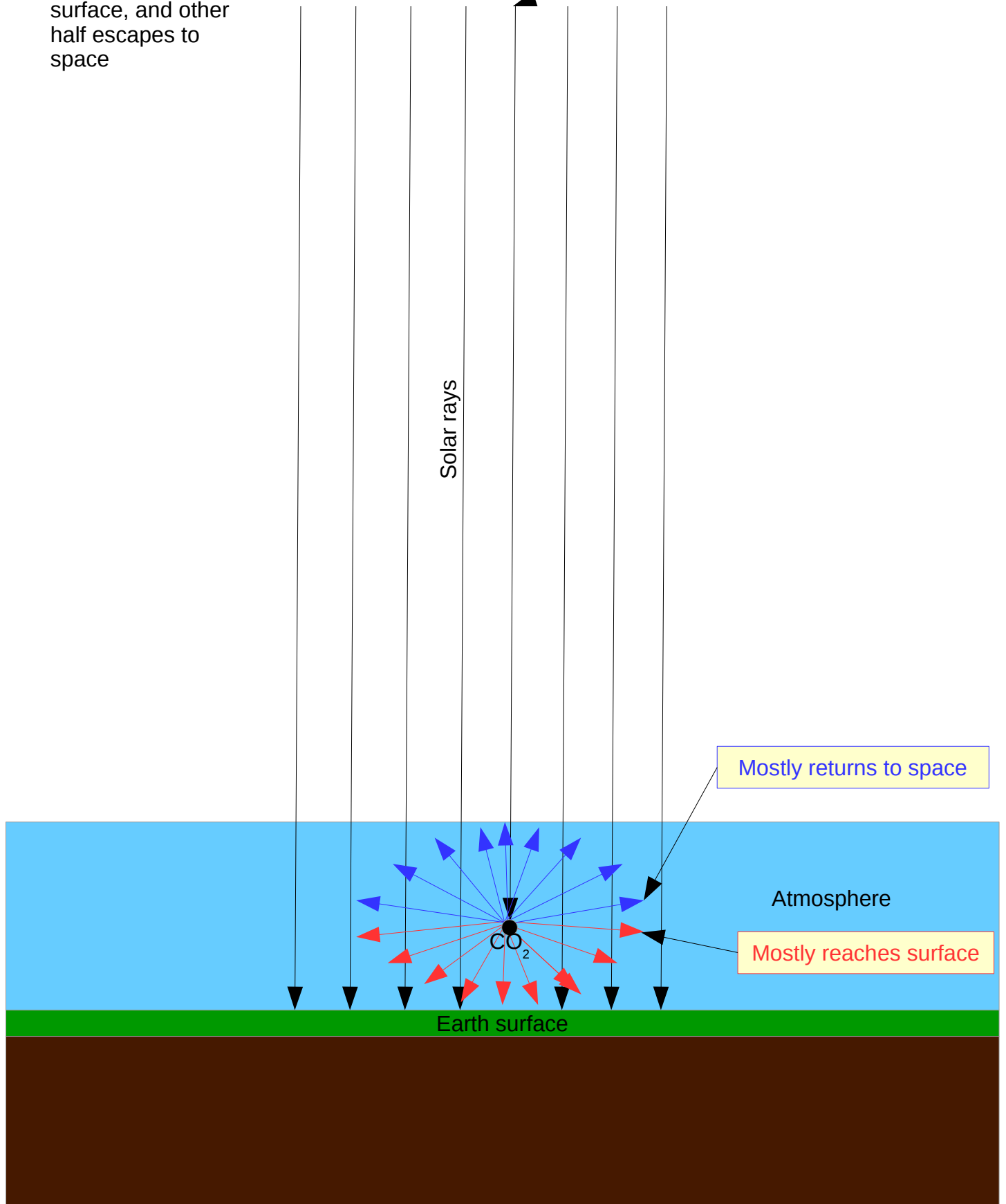


How CO₂ cause global warming

- CO₂ absorbs infrared radiation and re-emits it in all directions
- Approximately half of that radiation emitted by CO₂ reaches surface, and other half escapes to space

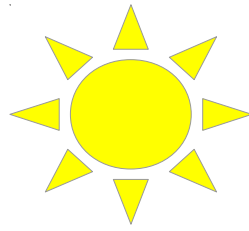


1% of incoming radiation is absorbed by CO₂



How CO₂ cause global warming

- Thermal emission from surface is approximately equal in all directions
- **Thermal radiation emitted in directions other than perpendicular to surface, has longer path through atmosphere, so it has higher chance to be reabsorbed by CO₂ than incoming solar radiation**
- Solar radiation reflected from surface is also largely scattered in random directions



1% of incoming radiation is absorbed by CO₂

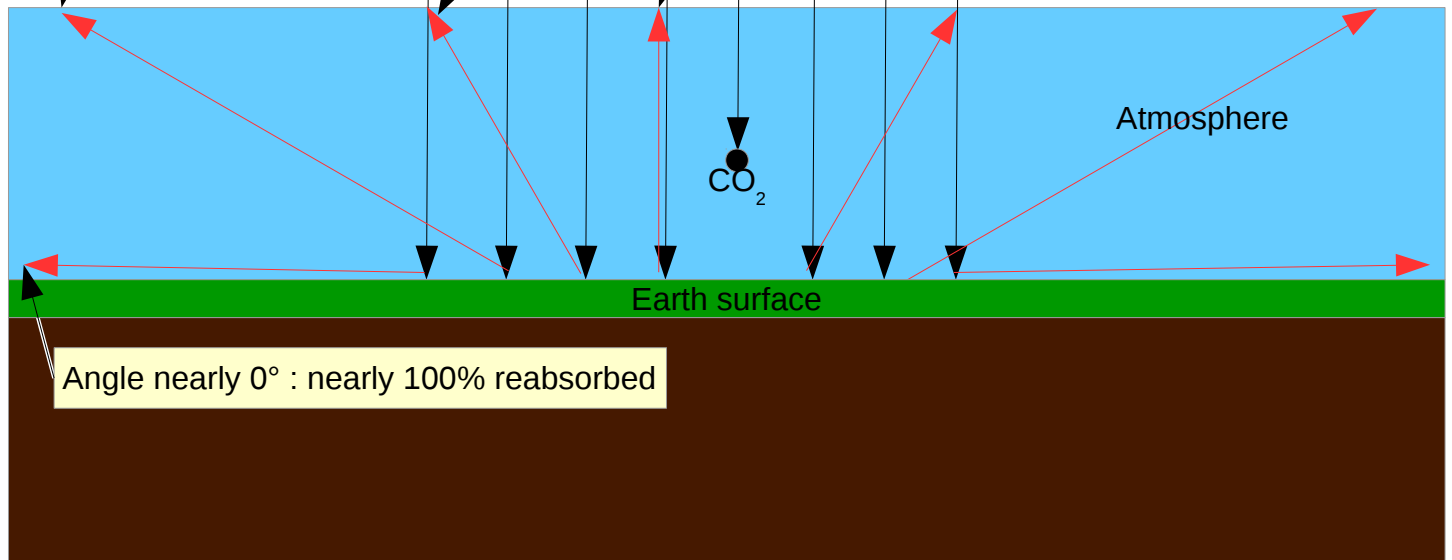
If Sun is directly overhead, 1% of incoming thermal radiation is absorbed by the atmosphere, and thermal radiation is at the same wavelength, amount of thermal emission from surface absorbed by atmosphere is roughly 5% to 6%.

Solar rays

Angle 90° : 1% reabsorbed

Angle 60° : 1,15% reabsorbed

Angle 30° : 2% reabsorbed



Angle nearly 0° : nearly 100% reabsorbed