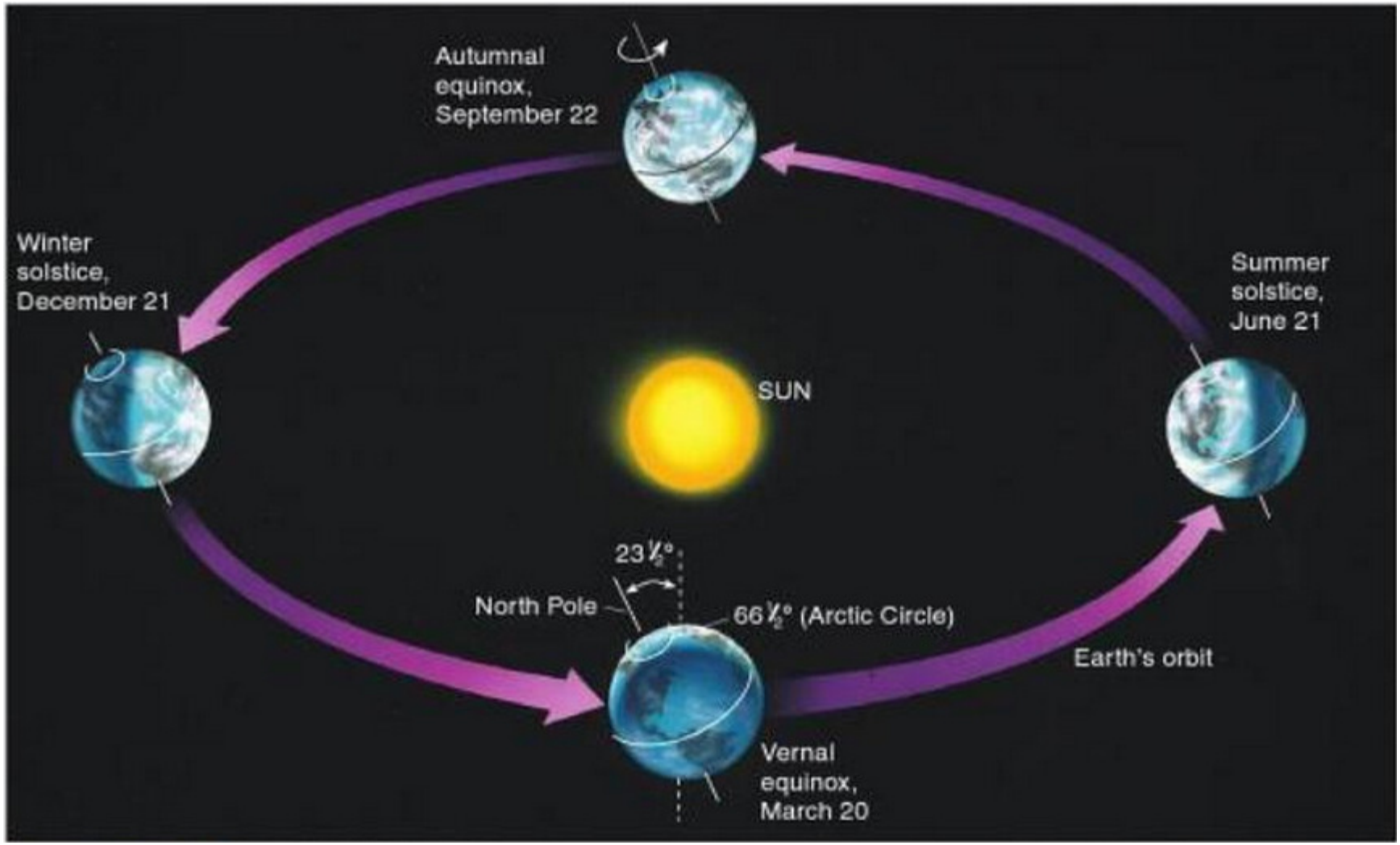
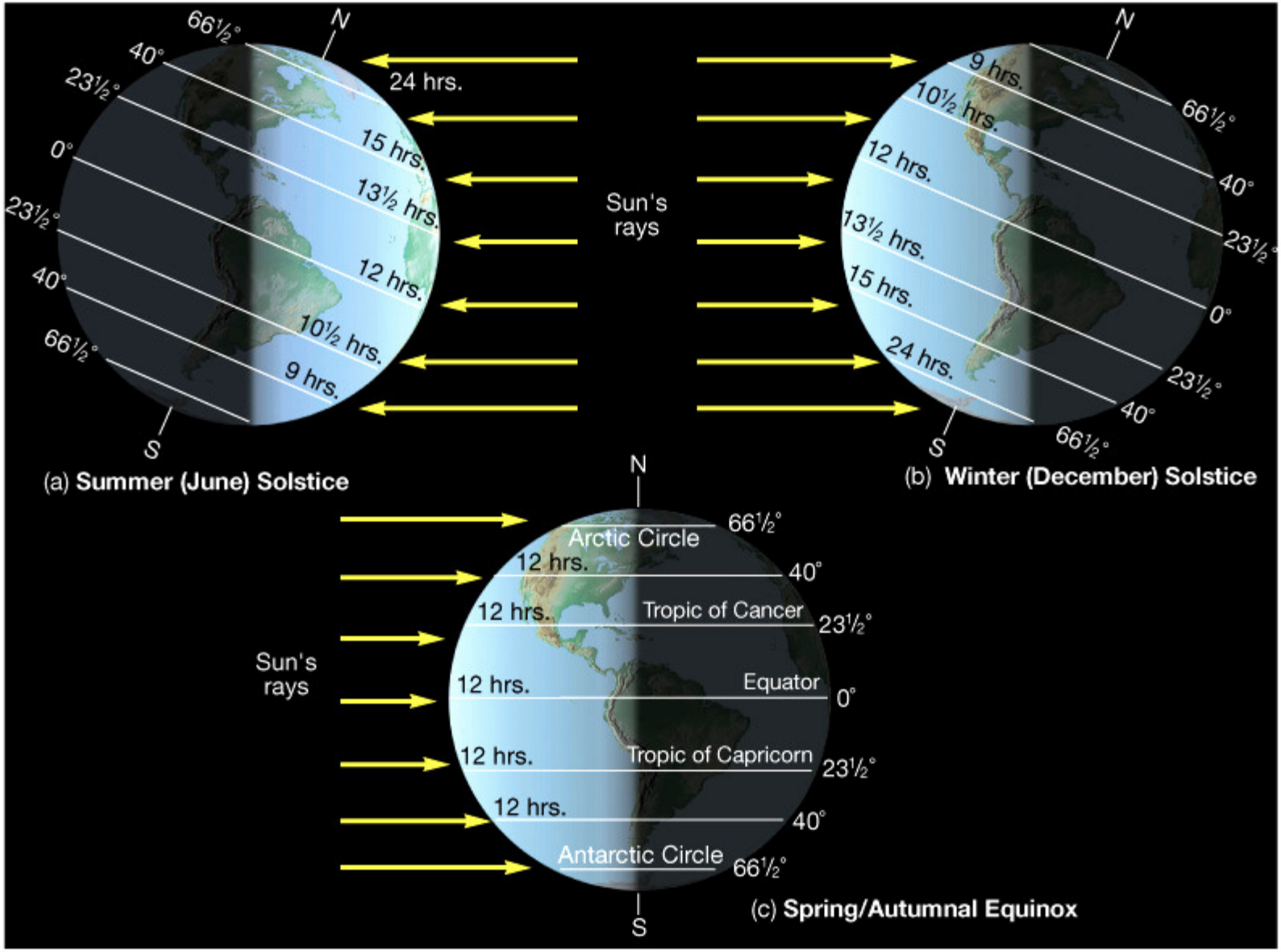
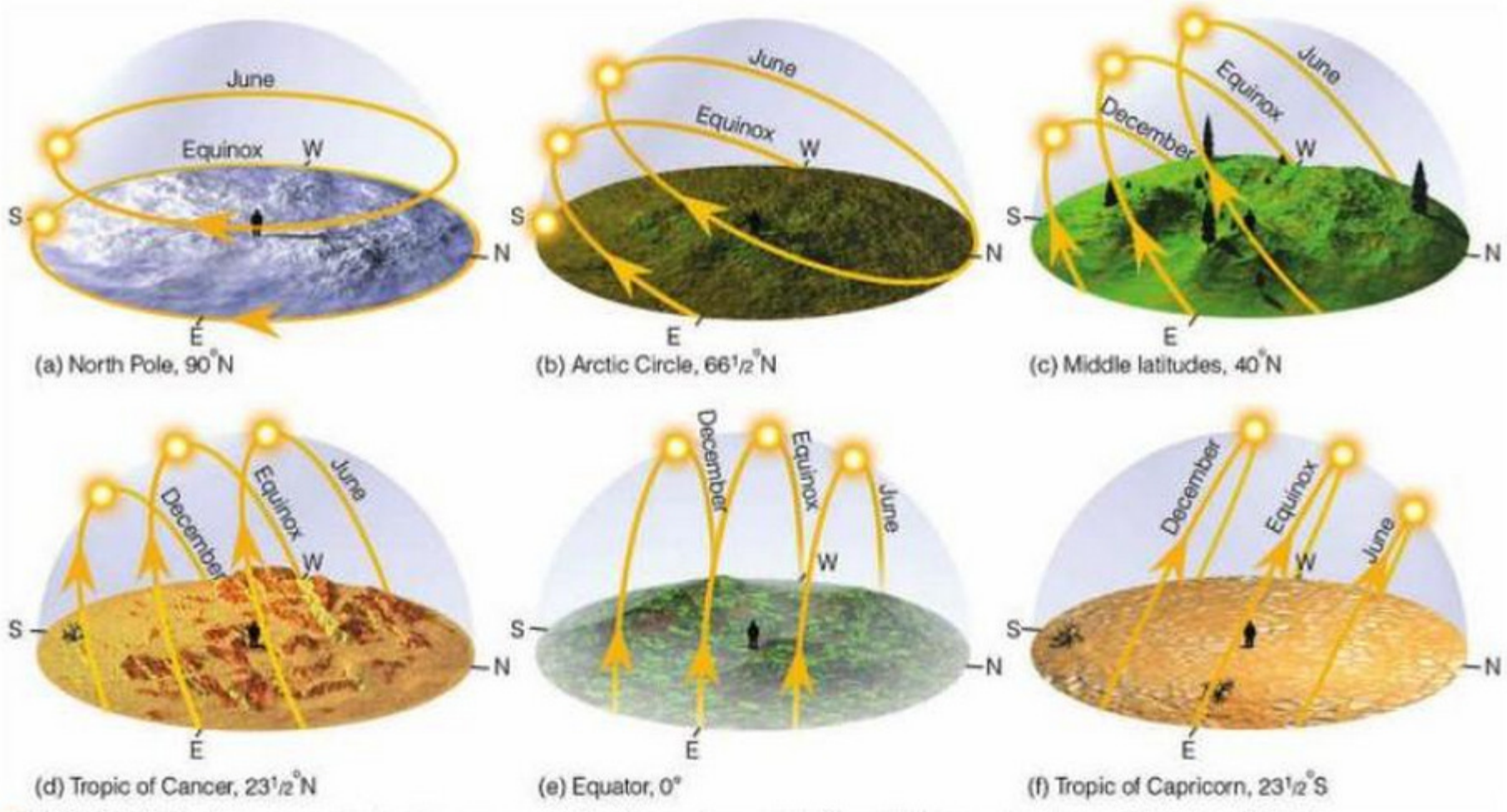
The Earth has a tilt with respect to the rotation plane around the sun…




N
66½°
40°
23½°
0°
23½°
40°
66½°
S
24 hrs.
15 hrs.
13½ hrs.
12 hrs.
10½ hrs.
9 hrs.
Sun's rays
(a) Summer (June) Solstice
N
9 hrs.
10½ hrs.
12 hrs.
13½ hrs.
15 hrs.
24 hrs.
66½°
40°
23½°
0°
23½°
40°
66½°
S
(b) Winter (December) Solstice
N
Sun's rays
66½°
Arctic Circle
12 hrs.
40°
12 hrs.
Tropic of Cancer
23½°
12 hrs.
Equator
0°
12 hrs.
Tropic of Capricorn
23½°
12 hrs.
40°
Antarctic Circle
66½°
S
(c) Spring/Autumnal Equinox


June
Equinox
W
S
N
E
(a) North Pole, 90°N
June
Equinox
W
S
N
E
(b) Arctic Circle, 66½°N
June
Equinox
December
W
S
N
E
(c) Middle latitudes, 40°N
June
Equinox
December
W
S
N
E
(d) Tropic of Cancer, 23½°N
December
Equinox
June
W
S
N
E
(e) Equator, 0°
December
Equinox
June
W
S
N
E
(f) Tropic of Capricorn, 23½°S

Question

- What would happen if there was a different tilt of the Earth's axis
  - Lesser tilt?
  - Greater tilt?

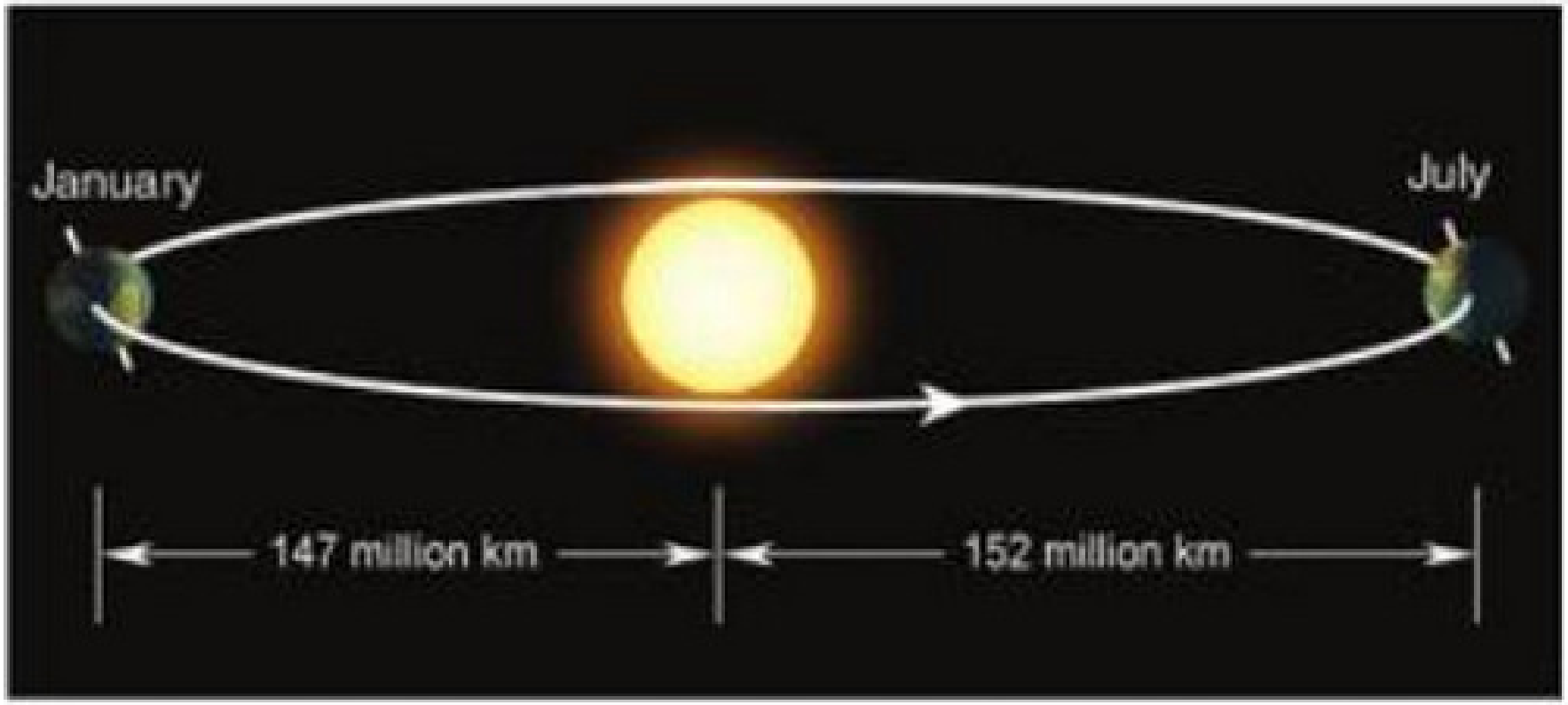
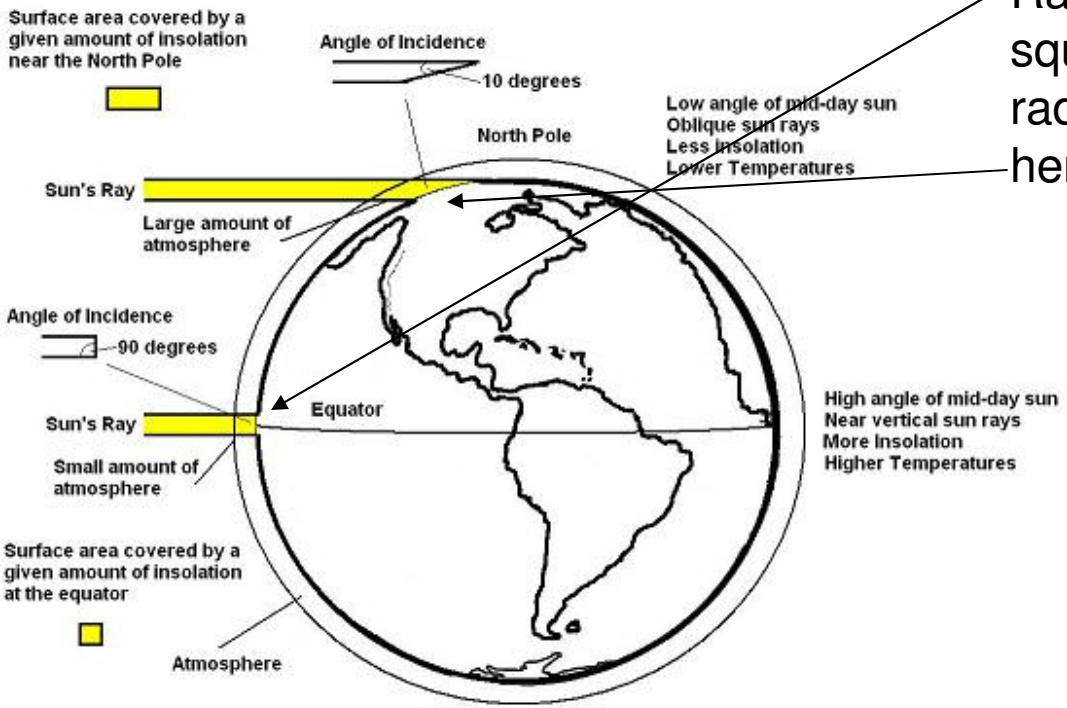


FIGURE 2.18 The elliptical path (highly exaggerated) of the earth about the sun brings the earth slightly closer to the sun in January than in July.

- Temp cycles result from:
  - Earth spin
  - Earth rotation around the sun
- These two things determine:
  - Angle of incidence
  - Duration of daylight



Radiation received per meter squared here is greater than the radiation per meter squared received here.

*Max heating is when the sun is perpendicular to the earth's surface!

Which of the following helps explain why even though high latitudes in the Northern Hemisphere experience 24 hours of sunlight on June 22, they are not warmer than latitudes further south? (Choose one answer.)

a. all of the above

b. some of the sun's energy is reflected by snow and ice in the higher latitudes

c. solar energy is spread over a larger area in higher latitudes

d. increased cloud cover reflects solar energy in the higher latitudes

e. solar energy is used to melt frozen soil in the higher latitudes

Diurnal Cycle of Temperature

- During the day, solar radiation heats up the Earth's surface and hence, the air above it….How?
  - Wind mixing (Turbulence)
  - Convection: Mass Transport of Molecules
- Throughout the day/night, the Earth losses energy through emitting IR to space
  - When are the warmest temperatures reached during the day?

During the night…

- Radiation Inversion
  - Air is calm
  - Night is long (winter)
  - Dry air
  - Cloud free
- Why are there wood burning bans is these conditions here in the city?