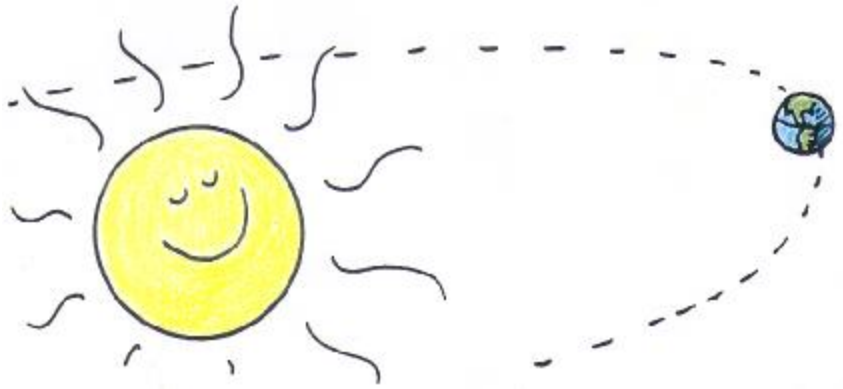
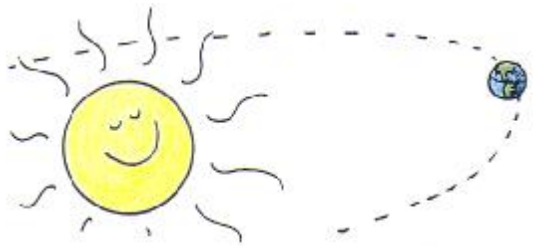
NEXT-TIME QUESTION



Which would require the greater change in the Earth's orbital speed (30 km/s); slowing it down so that it would crash into the Sun, or speeding it up so that it would escape the Sun?

Which would require the greater energy?

NEXT-TIME QUESTION



Which would require the greater change in the Earth's orbital speed (30 km/s); slowing it down so that it would crash into the Sun, or speeding it up so that it would escape the Sun?

Which would require the greater energy?

Answer:

In order to crash into the Sun, the Earth's orbital speed of 30 km/s would have to be reduced to zero. This is a change of 30 km/s. In order to escape the Sun, the Earth's orbital speed would have to be increased to 42.5 km/s, a change of 12.5 km/s. So a greater change in speed is required to slow the Earth for a Sun crash than to speed it for solar escape. But the energy needed to increase it from 30 km/s to 42.5 km/s is the same as the energy needed to slow it to zero. That is, $\Delta KE_{(30 \rightarrow 42.5)} = \Delta KE_{(0 \rightarrow 30)}$.