

# Solar Energy Answer Key

400 B.C.E.: Socrates promotes passive solar design for comfortable living. Ancient Greeks use the sun's position in the sky to heat their homes in winter and keep them cool in summer. The open front of a Greek house faces south. Winter sunshine fills the house and warms the air inside, the earth floor, and thick walls. At night, the warm floor and walls continue to radiate heat and keep the temperature comfortable. The Greeks build porticos, or covered porches, over the front of their houses. The roof of the portico blocks the rays of the summer sun. The house stays cool inside.	<b>16</b>
200-300 B.C.E: A Greek mathematician shows that a reflective surface shaped like a parabola can concentrate sunlight to a point. Ancient Greeks, Romans, and Chinese use these early solar concentrators to light fires including spiritual fires.	<b>3</b>
1500s: Leonardo da Vinci proposes the first industrial applications of solar concentrators.	<b>21</b>
1767: Swiss scientist Horace de Saussure invents the world's first solar collector, or "solar hot box."	<b>1</b>
1839: French scientist Edmund Becquerel first observes the photovoltaic effect. Becquerel experimented with two identical electrodes in a conducting solution, converting light directly into electrical current.	<b>7</b>
1861: French scientist Augustin Mouchot patents a solar engine, the first machine which produced electricity from the sun by evaporating steam which propelled a small engine.	<b>12</b>
1880s: American engineer John Ericsson launches the solar energy industry in the U.S. Ericsson develops several solar-driven engines to power steam generators for ships.	<b>19</b>
1891: Father of solar energy in the U.S., Clarence Kemp, patents first solar water heater.	<b>6</b>
1890s: First commercially available (roof-mounted) solar water heaters are produced in southern California.	<b>8</b>
1908: William J. Bailey of the Carnegie Steel Company invents solar collectors that became predecessors of today's solar collectors.	<b>18</b>
1920-50s: South Florida develops as a significant market for solar water heaters (thermosiphon design). Several companies service a market of about 50,000 homes. The industry virtually expires in the 1950s, unable to compete against cheap and readily available natural gas and electric service.	<b>2</b>
1941: Over 60,000 solar water heaters in place in America.	<b>10</b>
1940s: 'Solar Homes' become popular. More builders consider active and passive solar housing design.	<b>14</b>
1954: Bell Telephone researches the sensitivity of a properly prepared silicon wafer to sunlight. The 'solar cell' is developed. Initial solar cells were about 4% efficient at converting sunlight to electricity and later became 11% efficient.	<b>9</b>
1950s: Photovoltaic cells are used to power U.S. space satellites.	<b>13</b>
1960: First solar powered, 2-way radio, coast-to-coast conversation takes place between the U.S. Army Signal Corps in New Jersey and California.	<b>5</b>
1973: Spurred by the first oil embargo, interest in terrestrial applications of photovoltaics blossoms.	<b>17</b>
1974: More than 20 companies start production of flat plate solar collectors in the U.S.	<b>4</b>
1977: The cost of solar cells are about \$77/watt.	<b>22</b>
1978: Under President Jimmy Carter, the National Energy Act (NEA) is signed, which regulates renewable energy producers feed-in to the electric grid.	<b>24</b>
1978: The first solar-powered calculators are used.	<b>25</b>
1979: Second oil embargo strengthens solar industry. Solar panels are installed on the White House under President Jimmy Carter.	<b>15</b>

## Solar Energy Answer Key (continued)

1980: First solar cell power plant dedicated at Natural Bridges National Monument, Utah.	<b>20</b>
1980: Carlisle residence, featuring the first building-integrated photovoltaic system, passive solar heating and cooling, superinsulation, internal thermal mass, earth sheltering, daylighting, a roof-integrated solar thermal system, and a 7.5 kilowatt-peak (kWp) photovoltaic array of polycrystalline modules is completed.	<b>11</b>
1981: President Reagan has solar panels removed from the White House. They were on the White House for three years.	<b>28</b>
1985: 20% efficient solar cells are developed by the University of New South Wales. The cost of solar cells are about \$6.50/watt.	<b>30</b>
1994: Solar PV cells reach the potential for 40% efficiency, developed by the U.S. National Renewable Energy Lab.	<b>33</b>
2001: "Big box" home improvement stores begin selling residential solar power systems in California. A year later, solar electric systems are sold in big box stores nationwide.	<b>35</b>
2003: President George Bush has 9 kW of solar panels installed on the White House, as well as a solar thermal system. Additional solar power was added again in 2010 under President Barack Obama.	<b>29</b>
2006: The Energy Policy Act creates a 30% investment tax credit for commercial and residential renewable energy systems, including solar.	<b>23</b>
2008: A new world record in solar electric efficiency is set when the U.S. National Renewable Energy Lab converts 40.8% of the sun's light into electricity using solar photovoltaic technology.	<b>27</b>
2011: The cost of solar cells falls to \$1.50/watt.	<b>32</b>
2005-2015: Solar electric power installations grow at a rate of 60% per year.	<b>34</b>
2015: 209,000 American jobs are with solar industries, which is more than double the solar jobs of 2010. The solar industry is expected to provide 420,000 jobs by 2020.	<b>26</b>
2016: Juno, a spacecraft launched in 2011, reaches Jupiter's orbit. This research station is the most distant completely solar-powered system known to humanity.	<b>31</b>
2016: Solar Impulse 2, powered by more than 17,000 solar cells on its wings, is the first solar-powered plane to tour the globe.	<b>36</b>