


Key concept (age 11-14)



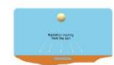


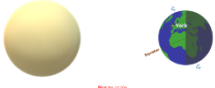
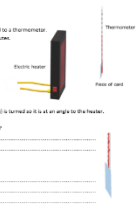

PES2.1: Days and seasons

Progression toolkit: Days and seasons

Learning focus	The temperature is higher in the summer because the tilt of the spinning Earth increases the length of a day <i>and</i> increases the heating effect of the Sun's radiation.				
As students' conceptual understanding progresses they can:					
As students' conceptual understanding progresses they can:	Describe the apparent movement of the Sun during the day. P	Describe the effect of seasons on temperature, day length and the apparent movement of the Sun. P	Explain why days are longer in summer and shorter in winter.	Explain why the angle of the Sun changes the effect of its heating.	Explain why average temperature is higher in summer and lower in winter.
Diagnostic questions	Changing Sun	Changing seasons	Summer days	Heating the towel	Hot summer days
Response activities	Long days of summer			Getting warm	Explaining summer
Response activities			Which season?		

Key:

P Prior understanding from earlier stages of learning

<h3>Changing Sun</h3> <p>BEST STUDENT WORKSHEET</p> <p>Changing Sun</p> <p>The Sun changes through the day.</p> <p>a. How does the Sun appear to change through a day?</p> <p>A The Sun goes up in the morning and goes up again. B The Sun moves to an arc (it follows the shape of a rainbow). C The Sun gets brighter each morning and fades again at night. D The Sun goes up in the morning and comes on over our heads.</p> <p>b. What is the best reason for your last answer?</p> <p>A Sun's light is blocked when it's behind the Moon. B Sun orbits the Earth once a day. C Earth spins on its axis once a day. D Earth orbits the Sun once a day.</p> <p><small>Developed by the University of York Science Education Group and the Salters' Institute. This document may have been edited. Download the original from www.BestEvidenceScienceTeaching.org. © University of York Science Education Group. Distributed under a Creative Commons Attribution-NonCommercial (CC BY-NC) license.</small></p>	<h3>Changing seasons</h3> <p>BEST STUDENT WORKSHEET</p> <p>Changing seasons</p> <p>Describe away from the Equator have winter and summer.</p> <p></p> <p>Winter in Argentina Summer in Canada</p> <p>These statements are about summer. For each statement, tick (✓) or cross (✗) to show what you think.</p> <table border="1"> <thead> <tr> <th></th> <th>I am sure it's right</th> <th>I think it's right</th> <th>I'm not sure</th> <th>I think it's wrong</th> <th>I am sure it's wrong</th> </tr> </thead> <tbody> <tr> <td>A. The Sun is higher in the sky in summer.</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>B. Days are longer in the summer.</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>C. The Sun shines more strongly in the summer.</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>D. It is summer in Canada and Argentina at the same time.</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><small>Developed by the University of York Science Education Group and the Salters' Institute. This document may have been edited. Download the original from www.BestEvidenceScienceTeaching.org. © University of York Science Education Group. Distributed under a Creative Commons Attribution-NonCommercial (CC BY-NC) license.</small></p>		I am sure it's right	I think it's right	I'm not sure	I think it's wrong	I am sure it's wrong	A. The Sun is higher in the sky in summer.						B. Days are longer in the summer.						C. The Sun shines more strongly in the summer.						D. It is summer in Canada and Argentina at the same time.						<h3>Summer days</h3> <p>BEST STUDENT WORKSHEET</p> <p>Summer days</p> <p>The average temperature is higher in summer than in winter. It's the average temperature.</p> <p></p> <p>a. What is the length of day in summer? Put a tick (✓) in the box next to the best answer.</p> <p>A A summer day is longer than a day in winter. B A summer day is the same length as a day in winter. C A summer day is shorter than a day in winter.</p> <p>b. What is the best reason for your last answer? Put a tick (✓) in the box next to the best answer.</p> <p>A A half of the Earth is tilted towards the Sun in summer. B A half of the Earth is tilted away from the Sun in summer. C The Sun moves at a different speed in summer. D The Earth moves right at the same speed.</p> <p><small>Developed by the University of York Science Education Group and the Salters' Institute. This document may have been edited. Download the original from www.BestEvidenceScienceTeaching.org. © University of York Science Education Group. Distributed under a Creative Commons Attribution-NonCommercial (CC BY-NC) license.</small></p>	<h3>Heating the towel</h3> <p>BEST STUDENT WORKSHEET</p> <p>Heating the towel</p> <p>Radiation from the Sun is hitting the towel. Radiation from the Sun is heating the towel.</p> <p></p> <p>a. When does the Sun heat the towel most quickly? Put a tick (✓) in the box next to the best answer.</p> <p>A Early in the morning B At midday C In the afternoon D It always heats the towel all the same speed!</p> <p>b. What is the best reason for your last answer? Put a tick (✓) in the box next to the best answer.</p> <p>A The Sun's temperature is changing. B The Sun is closer. C The distance the Sun is always the same. D The heat radiation is more spread out. E The heat radiation is less spread out.</p> <p><small>Developed by the University of York Science Education Group and the Salters' Institute. This document may have been edited. Download the original from www.BestEvidenceScienceTeaching.org. © University of York Science Education Group. Distributed under a Creative Commons Attribution-NonCommercial (CC BY-NC) license.</small></p>	<h3>Hot summer days</h3> <p>BEST STUDENT WORKSHEET</p> <p>Hot summer days</p> <p>On average days are hotter in summer.</p> <p></p> <p>Why is it hotter in summer? For each statement, tick (✓) or cross (✗) to show what you think.</p> <table border="1"> <thead> <tr> <th></th> <th>I am sure it's right</th> <th>I think it's right</th> <th>I'm not sure</th> <th>I think it's wrong</th> <th>I am sure it's wrong</th> </tr> </thead> <tbody> <tr> <td>A. Days are longer.</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>B. The Sun is hotter.</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>C. The Earth is closer to the Sun.</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>D. 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<h3>Long days of summer</h3> <p>BEST STUDENT WORKSHEET</p> <p>Long days of summer</p> <p>A teacher uses a spotlight and a globe to show why days are longer in summer and shorter in winter.</p> <p></p> <p>To answer:</p> <ol style="list-style-type: none"> What makes the globe a good model for the Earth? How can the spotlight and globe show why days are longer in summer? What needs to be changed to show how days are shorter in winter? How is this change related to what 'happens'? <p>How is it different?</p> <p><small>Developed by the University of York Science Education Group and the Salters' Institute. This document may have been edited. Download the original from www.BestEvidenceScienceTeaching.org. © University of York Science Education Group. Distributed under a Creative Commons Attribution-NonCommercial (CC BY-NC) license.</small></p>	<h3>Which season?</h3> <p>BEST STUDENT WORKSHEET</p> <p>Which season?</p> <p>Days are longer in summer because the Earth's axis towards the Sun. The diagram shows summer in Sun (Canada).</p> <p></p> <p>Not to scale</p> <p>What do you think happens in other countries? For each statement, tick (✓) or cross (✗) to show what you think.</p> <table border="1"> <thead> <tr> <th></th> <th>I am sure it's right</th> <th>I think it's right</th> <th>I'm not sure</th> <th>I think it's wrong</th> <th>I am sure it's wrong</th> </tr> </thead> <tbody> <tr> <td>When it is the middle of summer in some countries, it is the middle of summer in every country.</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>When it is the middle of summer in some countries, it is the middle of winter in some other countries.</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>When it is the middle of summer in some countries, it is the middle of autumn in some other countries.</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p><small>Developed by the University of York Science Education Group and the Salters' Institute. This document may have been edited. 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Will it reach the same temperature as before?</p> <p>Explain: What do you think will happen?</p> <p>Carry out the investigation.</p> <p>Observe: Record the high and low temperatures of the card each time.</p> <p>Explain: Where your predictions and explanation correct? Try to improve only. First explanation to explain what happens more clearly.</p> <p><small>Developed by the University of York Science Education Group and the Salters' Institute. This document may have been edited. Download the original from www.BestEvidenceScienceTeaching.org. © University of York Science Education Group. Distributed under a Creative Commons Attribution-NonCommercial (CC BY-NC) license.</small></p>	<h3>Explaining summer</h3> <p>BEST STUDENT WORKSHEET</p> <p>Explaining summer</p> <p>Many countries are far from the Equator. In summer in summer they are in the same hemisphere as the Earth is tilted.</p> <p>The Earth spins on a tilted axis. It spins round each each day. It orbits the Sun once each year.</p> <p></p> <p>These statements are about the reasons for summer and winter. Some are right and some are wrong. Use some of the statements to explain why it is warmer in summer.</p> <table border="1"> <tbody> <tr> <td>The Earth is closer to the Sun.</td> <td>The Earth is further from the Sun.</td> </tr> <tr> <td>One half of the Earth is tilted towards the Sun.</td> <td>One half of the Earth is tilted away from the Sun.</td> </tr> <tr> <td>The Sun is closer in the sky.</td> <td>The Sun is higher in the sky.</td> </tr> <tr> <td>Heat radiation from the Sun is less spread out when it reaches the ground.</td> <td>Heat radiation from the Sun is more spread out when it reaches the ground.</td> </tr> <tr> <td>There is less heat radiation from the Sun.</td> <td>There is more heat radiation from the Sun.</td> </tr> <tr> <td>As the Earth spins, this part of the Earth is in daylight for longer than darkness.</td> <td>As the Earth spins, this part of the Earth is in darkness for longer than daylight.</td> </tr> </tbody> </table> <p>It is warmer in summer because ...</p> <p><small>Developed by the University of York Science Education Group and the Salters' Institute. 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