

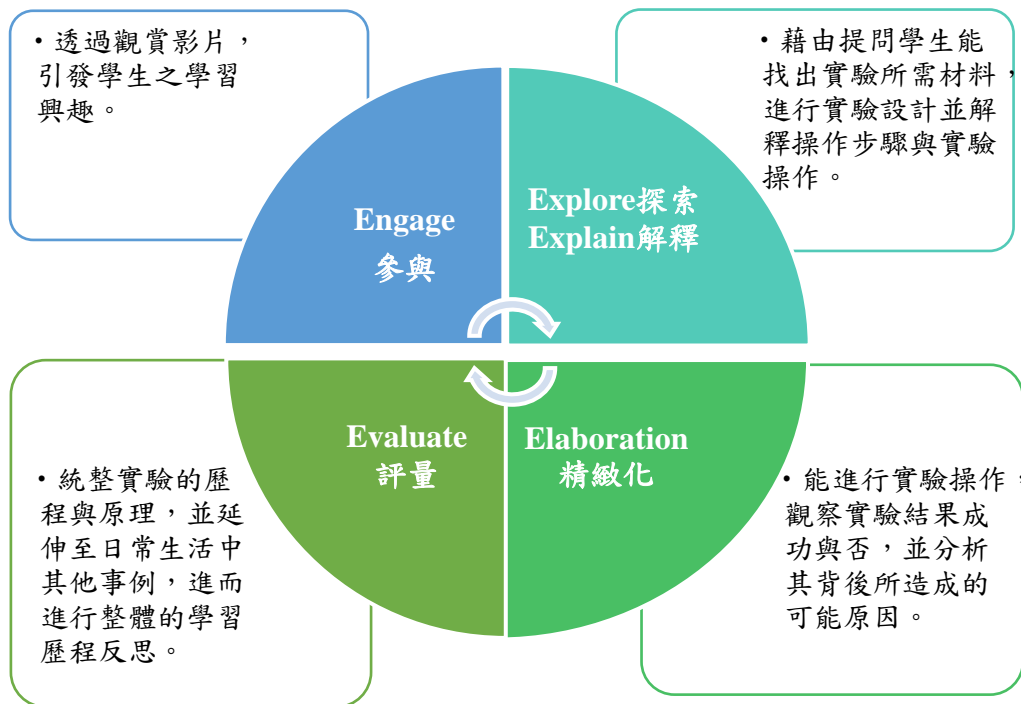
## 活動名稱：《觀測太陽》

### 一、教學設計理念說明：

本活動主旨在培養學生具有觀測太陽位置的能力，引導學生可具體指出時間、太陽高度角與影子變化的關聯性。由喚醒學生日常生活中觀察太陽與影子的經驗，帶領學生探究各種透過影子間接測量太陽方位與高度角的方法。本節主要探討概念如下：

1. 一天之中，太陽在天空中方位的變化是由東向西移動，正午在正南方。
2. 一天之中，影子的長度由長變短，再由短變長；太陽的位置與影子的位置相反。
3. 一天之中，太陽在天空中高度角的變化是呈現由小到大，再由大到小的變化。

### 二、教學概要：

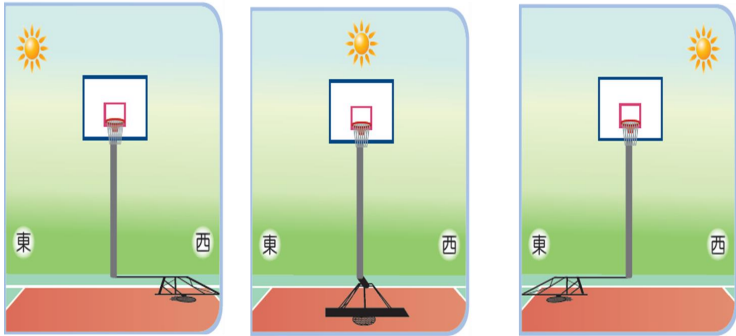


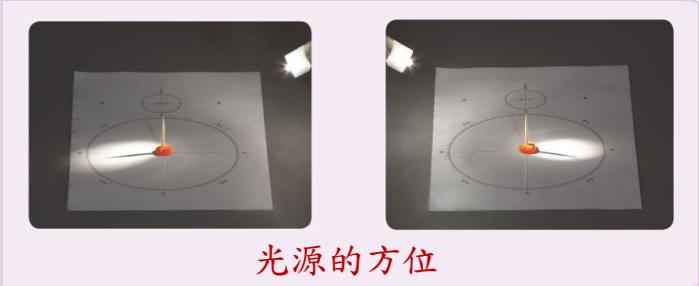
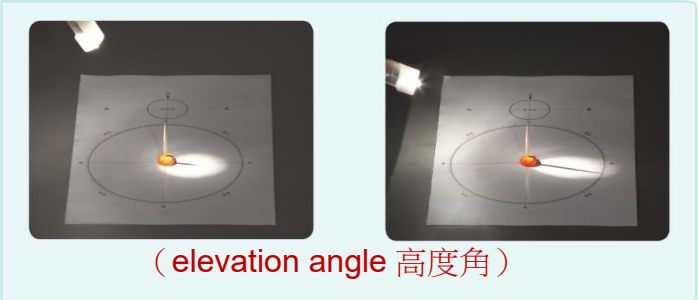
### 三、活動設計

領域	自然科學領域		設計者	陳宜君、陳美卿
實施年級	五年級		總節數	共 2 節
活動名稱	觀測太陽 Let's observe the sun!		教材來源	南一版
教學內容				
本節	<ol style="list-style-type: none"> <li>1. 引導學生觀察白天竿影的變化，推論太陽在空中有方位和高度角的位置變化。</li> <li>2. 引導學生探究各種利用影子觀測太陽的方位和高度角的方法。</li> </ol>			
設計依據				
學習重點	學習內容	INC-III-13 日出日落時間與位置，在不同季節會不同。	核心素養	自-E-A3 具備透過實地操作探究活動探索科學問題的能力，並能初步根據問題特性、資源的有無等因素，規劃簡單步驟，操作適合學習階段的器材儀器、科技設備及資源，進行自然科學實驗。
	學習表現	tm-III-1 能經由提問、觀察及實驗等歷程，探索自然界現象之間的關係，建立簡單的概念模型，並理解到有不同模型的存在。		
跨域連結	英文領域			
學習目標	<ol style="list-style-type: none"> <li>1. 學生能透過觀察白天竿影的變化，推論太陽位置與影子的關係。</li> <li>2. 利用知道方位和高度角，來描述太陽在天空中的位置。</li> </ol>			
教學設備／資源	Videos, PPT, direction sheet(方位板), Staw holder (底座), compass(指北針), ruler(尺), set square(三角板), flashlight (手電筒)			
語言學習目標	Language <i>of</i> learning			
	<p>E-1 vocabulary: observation 觀察、shadow 影子、elevation angle 高度角、east 東、west 西、south 南、north 北。</p> <p>E-2 The shadow moves from <u>west</u> to <u>east</u> throughout the day. 一天中影子的位置由西往東移動。</p> <p>E-3 The shadow goes from <u>long</u> to <u>short</u> and back to long throughout the day. 一天中影子的長度由長變短，再由短變長。</p> <p>E-4 The sun and shadow are in <u>opposite</u> positions. 太陽的位置與影子的位置相反。</p>			

Language <i>for</i> learning	
教師用語 For teachers	學生用語 For students
I. <u>Academic English:</u> ● How does the shadow change from the morning to the afternoon? II. <u>Classroom English</u> ● What do you think? ● What happened? ● What did you observe?	1. The shadow moves from _____ to _____. 2. The shadow changes from _____ to _____. 3. In the morning/At noon/In the afternoon, the shadow is longer/shorter and points west/north/east. 4. It's because _____. 5. I think _____ because _____. 6. I observed _____.

**教學活動設計**

教學目標	主要問題與引導	時間	評量重點
學生能透過觀察白天竿影的變化，推論太陽位置與影子的關係。	<b>1<sup>st</sup> Course</b>  <b>【Engage 參與】</b> Warm Up : Teacher asks questions. 1. Why can't we observe the sun directly? 2. How can we observe the sun?	5'	Students can share their ideas.
	<b>【Explore 探索】【Explain 解釋】</b> Development Activity 1: 1. What do you observe?  ➤ Does the sun always in the same position(位置) during the day?	10'	Students can observe and share their ideas.

<p>學生能透過操作，了解太陽位置與影子的關係。</p> <p>知道利用方位和高度角，來描述太陽在天空中的位置。</p>	<ul style="list-style-type: none"> <li>➤ Does shadow always point the same direction(方向) ?</li> <li>➤ Does shadow has the same length(長度) under the sun?</li> </ul> <p>Development Activity 2:</p> <ol style="list-style-type: none"> <li>1. Teacher’s demonstration: Use staw hlder, flashlight to demonstrate the relation between shadown and light.</li> </ol> <div style="text-align: center;">  <p>光源的方位</p>  <p>(elevation angle 高度角)</p> </div> <ol style="list-style-type: none"> <li>2. Have students share their ideas: <ul style="list-style-type: none"> <li>➤ When the light comes from east, the shadow points west.</li> <li>➤ When the light comes from west, the shadow points east.</li> </ul> <p><b>Conclusion:</b> The light and shadow are in oppisite positions.</p> <ul style="list-style-type: none"> <li>➤ The shadow goes from <u>long</u> to <u>short</u> and back to long throughout the day.</li> </ul> </li> </ol> <p>Development Activity 3:</p> <ol style="list-style-type: none"> <li>1. Play the video: Sun's shadow time lapse  <a href="https://www.youtube.com/watch?v=3B7KLstUZbl">https://www.youtube.com/watch?v=3B7KLstUZbl</a></li> </ol>	<p>12’</p> <p>7’</p>	<p>Students can explore the activity.</p> <p>Students can observe the process.</p>
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	<p>➤ What happened?</p> <p>a) In the morning, the shadow is longer and points west.</p> <p>b) At noon, the shadow is shorter and points north.</p> <p>c) In the afternoon, the shadow is longer and points east.</p> <p>➤ The length of shadow changes with the elevation angle:</p> <p>a) When the light (sun) comes from higher elevation angle, the shadow is shorter.</p> <p>b) When the light (sun) comes from lower elevation angle, the shadow is longer.</p> <p style="text-align: center;"><b>【Evaluate 評量】</b></p> <p>Summary Activity:</p> <ol style="list-style-type: none"> <li>1. Have students share their findings for today's class.</li> <li>2. Finish workbook page 3.</li> </ol> <p><b>2<sup>nd</sup> Course</b></p> <p style="text-align: center;"><b>【Engage 參與】</b></p> <p>Warm Up : Teahcer ask questions for a quick review.</p> <ol style="list-style-type: none"> <li>1. What did we learn last time?</li> <li>2. What can we do to observe the sun?</li> <li>3. Can we tell the position of the sun by observing the shadow? Why?</li> </ol> <p style="text-align: center;"><b>【Explore 探索】 【Explain 解釋】</b></p> <p>Development Acitivity: Let's observe the sun.</p> <ol style="list-style-type: none"> <li>1. Teacher leads the students to make sun observers: <ol style="list-style-type: none"> <li>a) Place the direction sheet on the table.</li> <li>b) Align the directions in the sheet with those the compass.</li> <li>c) Tape the compass onto the sheet.</li> <li>d) Have the stick firmly fixed in the middle by using the clay.</li> </ol> </li> </ol>	<p>6'</p> <p>15'</p> <p>10'</p>	<p>Students can make conclusions for today's class and finish the worksheet.</p> <p>Students can recall what they have learned.</p> <p>Students can follow teacher's guide to make sun observers.</p>
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	<p>e) Use a set square to make sure the stick is vertical to the direction sheet.</p> <p>f) Record the endpoint of shadows and times at different times of the day.</p> <p>g) Draw lines from the central point to the endpoints of the shadow at different times.</p> <p>2. Have students discuss and share their observation:</p> <p>a) What have you found?</p> <p>b) T: Does the length of the shadow changes from the morning to the afternoon? S: The shadow changes from <u>_long_ to _short_</u>, and back to <u>_long_</u> in the afternoon.</p> <p>c) T: In what direction does the the shadow move? S:The shadow moves from <u>_____</u> to <u>_____</u>.</p> <p>d) What’s the relation between the length of the shadow and the elevation angle of the sun? (The shorter the shadow is, the greater the elevation angle is.)</p> <p style="text-align: center;"><b>【Evaluate 評量】</b></p> <p>Summary Activity:</p> <ol style="list-style-type: none"> <li>1. Have students share their findings for today’s class.</li> <li>2. Finish activitybook page 4.</li> </ol> <p style="text-align: center;">~The End ~</p>	<p>8’</p> <p>7’</p>	<p>Students can share their findings.</p> <p>Students can make conclusions for today’s class and finish the worksheet.</p>
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### 參考資料

- **Sun's shadow time lapse**  
<https://www.youtube.com/watch?v=3B7KLstUZbl>
- Sidewalk Shadows(有字幕)  
[https://www.youtube.com/watch?v=YvnQFGP\\_k4E](https://www.youtube.com/watch?v=YvnQFGP_k4E)
- <https://www.generationgenius.com/>  
<https://www.tigtagworld.com/clil>

# Sun and shadow

Name: \_\_\_\_\_

◆ What do you observe?



Questions	Answer
➤ Does the sun always in the same position(位置) during the day?	<input type="checkbox"/> YES <input type="checkbox"/> NO
I observed the sun moves from _____ to _____ throughout the day. (east,west)	
➤ Does shadow always point the same direction(方向) ?	<input type="checkbox"/> YES <input type="checkbox"/> NO
I observed the shadow moves from _____ to _____ throughout the day. (east,west)	
➤ Does shadow has the same length(長度) under the sun?	<input type="checkbox"/> YES <input type="checkbox"/> NO
I observe the shadow goes from _____ to _____ and back to <u>long</u> throughout the day. (long,short)	