

<b>第二單元：能量</b>	<b>Unit 2: Energy</b>
<p><b>主要觀念：</b></p> <p>2.1 觀察，辨認，和形容不同形式的能量：聲音，機械，熱力，電，和化學。</p> <p>2.2 辨認能量轉變的憑證和人類如何利用這些能量的轉變：熱到光，化學到電，電到聲音，等等。</p> <p>2.3 觀察並形容熱力如何被傳導，並可以從一個地方傳遞到另一個地方。</p> <p>2.4 觀察並形容熱力可以被釋放出來的不同方法：燃燒，摩擦，或把一種物質和另外一種物質混合。</p> <p>2.5 物質和能量的互動，例如，電讓燈泡發亮，深色吸收光能，等等。</p> <p>2.6 聲能：高低音（頻率），震動，音量，聲音如何穿越固體，液體，氣體，和噪音污染。</p>	<p><b>Key Ideas:</b></p> <p>2.1 Observe, identify, and describe a variety of forms of energy: sound, mechanical, heat, electrical, and chemical</p> <p>2.2 Identify the evidence for energy transformations and how humans use these energy transformations: heat to light, chemical to electrical, electrical to sound, etc.</p> <p>2.3 Observe and describe how heat is conducted and can be transferred from one place to another.</p> <p>2.4 Observe and describe different ways in which heat can be released: burning, rubbing (friction), or combining one substance with another.</p> <p>2.5 Interactions of matter and energy (e.g., electricity lighting a bulb, dark colors absorbing light, etc.)</p> <p>2.6 Sound energy: pitch (frequency), vibrations, volume, how sound travels through solids, liquids, gases, and noise pollution.</p>
<b>單元大綱</b>	<b>Unit Overview</b>
<p>我們無法經常的看到能量，但是我們知道它就在那裏。一鍋水在爐頭上滾沸。在鍋子裏煎蛋。烹飪需要很多的能量。四處移動也是需要很多的能量。例如飛機利用能量在城市中穿梭。小鳥需要能量在空中飛翔。</p> <p>任何時候東西變暖，變冷，或移動，能量即是從一種形態轉變到另一種形態。經常的我們可以看到或感覺到能量釋放造成的效果。例如，我們由食物中得到能量。這個能量讓我們存活並提供我們做所有事情的力量。儲存在食物裏的能量在我們體內釋放出來。汽車用的汽油也是有儲存的能</p>	<p>We can't always see energy, but we know it's there. A pot of water boils on the stove. An egg fries in a pan. Cooking takes a lot of energy. So does moving around. Jet airplanes speeding between cities use energy. So do birds soaring through the sky.</p> <p>Anytime something gets warmer, gets cooler, or moves, energy is being changed from one form to another. Often we can see or feel the effects of released energy. For example, our bodies get energy from food. This energy keeps us alive and provides power for all we do. The energy stored in the food is released in our bodies. The</p>

量。燃燒汽油釋放出能量，這個能量讓汽車移動。

gasoline used in a car also has stored energy. Burning the fuel releases the energy and the energy makes car move.

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<b>2.1 主要觀念</b> 觀察，辨認，和形容不同形式的能量：聲音，機械，熱力，電，和化學。	<b>Key Idea 2.1:</b> Observe, identify, and describe a variety of forms of energy: sound, mechanical, heat, electrical, and chemical
<b>科學用語：</b> 1. 功      2. 能量      3. 實質，實體 4. 熱      5. 化學      6. 物質 7. 震動    8. 電路	<b>Scientific Terms:</b> 1. work    2. energy    3. matter 4. heat    5. chemical 6. substance 7. vibrate 8. circuit
<b>內容：</b> 如果你沒有能量，你無法移動。以科學角度來看， <b>能量</b> 是一種做功的能力，這個功是當一些物體移動時發生的。相對而言，如果你在讀一本書，你沒有做任何的功。如果你在跑步，你在做功。能量也會移動。 <b>熱能</b> 從熱的東西移動到冷的東西。當你握著一杯熱可可，熱能從杯子移動到你的手。所以，當能量移動，功就完成。  能量存在於不同的形態裏。熱能是提高實體溫度的能量。化學能是儲存在物質裏的能量，例如食物，汽油，木頭，或一根火柴的頭。光能是從物體釋放出來的能量，例如太陽或一個燈泡。聲能是因物體震動，造成空氣的移動而產生的能量。  機械能和實體的移動有關。如果一粒彈珠打到另一粒彈珠，機械能讓第二粒彈珠移動。  電能讓家電用品運作，例如收音機或燈泡。電能在一個密閉式電路裏流動。電能如果從一個電源離開，例如一個變電所，它完成工作以後必須回到它的電源。例如，如果它從一個電源出來到達一個燈泡，點亮燈泡之後，它必須回到它的電	<b>Content:</b> If you do not have energy, you would not be able to move. In science, <b>energy</b> is the ability to do <b>work</b> and work only happens when something moves. In other words, if you were reading a book, you would not be doing any work. If you were running, you would be doing work. Energy moves too. Heat energy moves from hot things to cold things. When you hold a cup of hot cocoa, the heat moves from the cup to your hands. So, when energy moves, work is being done too.  Energy exists in several forms. <b>Heat</b> is the energy that raises the temperature of <b>matter</b> . <b>Chemical</b> energy is the energy stored in <b>substances</b> such as food, gasoline, wood, or the tip of a match. Light energy moves out from objects such as the Sun or a light bulb. Sound is energy created when objects <b>vibrate</b> , causing movement in the air.  Mechanical energy is involved with moving matter. If a rolling marble strikes another, mechanical energy makes the second marble move.  Electric energy powers appliances such as a radio or light bulb. It travels in a closed <b>circuit</b> . Electric energy that leaves a source, such as an electric plant, must come back to its source after doing work. For example, if it comes from a source and goes to a light bulb, it must go back

源。不然，它無法點亮燈泡。	to that source after it lights the bulb. Otherwise, it cannot light the bulb.
<b>複習:</b>  1. 能量和功如何相關? 2. 當科學家使用“功”這個名詞時，是指什麼意思? 3. 當你在推一面牆壁的時候，你有在做功嗎? 4. 當一個物體震動的時候會產生什麼形態的能量? 5. 哪一種能量從太陽到地球?	<b>Review:</b>  1. How are energy and work related? 2. What do scientists mean when they use the term work? 3. Are you working when you push a wall? 4. What form of energy does an object create when it vibrates? 5. What is one type of energy that reaches Earth from the Sun?

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<b>2.2 主要觀念</b> 辨認能量轉變的憑證和人類如何利用這些能量的轉變：熱到光，化學到電，電到聲音，等等。	<b>Key Idea 2.2:</b> Identify the evidence for energy transformations and how humans use these energy transformations: heat to light, chemical to electrical, electrical to sound, etc.
<b>科學用語：</b> 1. 有機體      2. 轉變	<b>Scientific Terms:</b> 1. living organism    2. transformation
<b>內容：</b> 第一個利用來自太陽的光能的 <b>有機體</b> 是植物。植物將來自太陽的光能轉變為食物，其中儲存著化學能。當動物和人類吃了植物以後，他們將儲存的化學能轉變為熱能讓自己保持溫暖，和機械能可以讓自己移動。當植物的部位為木頭或乾的樹葉，燃燒以後，它們儲存的化學能便轉變為熱能。  當煤炭燃燒，它儲存的化學能轉變為熱能。然後熱能也許轉變為機械能，轉動機器並產生電能。電能可以轉變為光，聲音，熱，或者機械能。它可以讓一盞燈，一個門鈴，一個電熱板，或一個攪拌器運作。機械能也可以轉變為聲音。例如，你敲擊一個鋼琴鍵，便會聽到一個樂音。  其他能量的 <b>轉變</b> 和人類如何利用能量轉變的例子有：當我們點亮一根火柴，儲存在火柴棒的化學能燃燒並轉變為光能和熱能。當我們使用一個攪拌器，電能轉移成機械能。當太陽照射到我們，能量從光能轉變為熱能。	<b>Content:</b> The first living organisms to use light energy from the Sun were plants. Plants change light energy from the Sun to food, which is stored chemical energy. When animals and people eat a plant, they change its stored chemical energy to heat to stay warm and to mechanical energy to move. When plant parts such as wood or dry leaves are burned, their stored chemical energy is changed to heat energy.  When coal is burned, its stored chemical energy is changed to heat energy. Then the heat energy may be changed to mechanical energy to turn a machine that makes electrical energy. Electrical energy can be changed into light, sound, heat, or mechanical energy. It may power a lamp, a doorbell, a hot plate, or a blender. Mechanical energy can be changed to sound. You push a piano key and hear a musical note.  Other evidence for energy <b>transformations</b> and how humans use these energy transformations are: When we light a match, the chemical energy stored in the match burns and is transformed into light energy and heat energy. When we use a blender, the electrical energy is transformed into mechanical energy. When the Sun shines on us, the energy changes from light to heat.
<b>複習：</b>  1. 當煤炭燃燒時，會發生什麼樣的能量改變？	<b>Review:</b>  1. What energy change takes place when coal is burned?

<p>2. 當你吃過東西以後，你出去騎單車。食物最可能轉變成什麼形態的能量？</p> <p>3. 當太陽的光能到達地球，它如何改變？</p> <p>4. 形容當我們使用烤麵包機時的能量如何轉變。</p>	<p>2. After you eat, you go out and ride your bike. Into which forms of energy was the food most likely transformed?</p> <p>3. How does the Sun's light energy change when it reaches Earth?</p> <p>4. Describe the change of energy when we use a toaster.</p>
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<b>2.3 主要觀念</b> 觀察並形容熱力如何被傳導，並可以從一個地方傳遞到另一個地方。	<b>Key Idea 2.3:</b> Observe and describe how heat is conducted and can be transferred from one place to another.
<b>科學用語：</b> 1. 摩擦 2. 轉移 3. 固體 4. 液體 5. 氣體	<b>Scientific Terms:</b> 1. friction 2. transfer 3. solid 4. liquid 5. gas
<b>內容：</b> 機械能可以產生熱。運作當中的機器零件摩擦產生熱。 <b>摩擦</b> 是物品互相摩擦造成。當你摩擦你的雙手，摩擦讓你的手感到溫熱。當你用砂紙摩擦一根木頭，這個木頭會變的溫熱，因為木頭和砂紙之間的摩擦產生熱。  能量通常從一個物體轉移或移動到另一個物體。當你要烤麵包，你將熱從烤麵包機傳到麵包。當瓦斯爐上鍋子裏的水滾了，能量從瓦斯爐轉到鍋子再到水。當你喝熱可可，熱能移動到你的細胞，牛奶裏的化學能也轉變為機械能，讓你可以活動，熱能讓你溫暖。  有些材料轉移能量比其他的材料好。例如，金屬傳熱非常的好。因此，如果你想要一個馬鈴薯烤得更好，你可以插一根鐵釘在馬鈴薯的中間。這個鐵釘將熱從烤箱傳到馬鈴薯的中央。有些時候，你不希望能量轉移，因此你可能要利用一些轉移能量不良的材料，例如，木頭或塑料。這因此說明為什麼爐子和鍋子是用金屬製成。如果一個金屬鍋子有金屬把手，這個把手在爐子上會變得非常燙。因此，有些鍋子把手是使用木頭或塑料製成的。	<b>Content:</b> Mechanical energy can release heat. The friction between moving machine parts releases heat. <b>Friction</b> is caused by materials rubbing together. When you rub your hands together, friction makes your hands feel warm. A piece of wood gets warm when you sand it with sandpaper because the friction between the wood and sandpaper releases heat.  Energy is often <b>transferred</b> or moved from one object to another. When you make toast, you transfer heat from the toaster into the bread. When water is boiled in a pan on a stove, energy is transferred from the stove to the pan to the water. As you drink hot cocoa, the heat energy moves into your cells. Chemical energy in milk either turns into mechanical energy to help you move or heat energy to keep you warm.  Some materials transfer energy better than others. For example, metals transfer heat very well. Therefore, if you want a potato to bake better, you can push a metal nail through its center. The metal nail transfers heat from the oven to the center of the potato. Sometimes you do not want energy to transfer, so you might want to use material that does not transfer energy well, for example, wood or plastic. That is why stoves and pots are made of metal. If a metal pot has a metal handle, the handle becomes very hot on the stove. Therefore, some pot handles are made out of wood or plastic.

<p>固體轉移熱量比液體好。而液體轉移熱量比氣體好。例如，水轉移熱量比空氣好。如果室溫下，放一個冰塊在水裏，它會比在同樣溫度下，曝露在空氣中，融化的快。你可以將你的手伸進一個350度的烤箱裏，但是你不可以碰觸到烤盤或是蛋糕。因為烤盤和蛋糕是固體，而固體傳熱比空氣好。</p>	<p>Solids transfer heat better than liquids. Liquids transfer heat better than gas. For example, water transfers energy better than air. If you put an ice cube into water that is at room temperature, it will melt faster than if you leave it exposed to air at the same temperature. You can put your bare hand in a 350 degree oven but you can't touch the cake pan or the cake. This happens because the cake pan and cake are solid, and solids transfer heat energy better than air.</p>
<p><b>複習:</b></p> <ol style="list-style-type: none"><li>1. 為什麼燃燒煤炭會比燃燒紙張產生更多的熱能?</li><li>2. 為什麼煮馬鈴薯會比烤馬鈴薯來得快熟?</li><li>3. 你的身體如何讓游泳池裏的水變得比較溫熱?</li></ol>	<p><b>Review:</b></p> <ol style="list-style-type: none"><li>1. Why does burning coal produce more heat energy than burning paper?</li><li>2. Why do potatoes cook faster when you boil them than when you bake them?</li><li>3. How does your body cause the water in a swimming pool to get warmer?</li></ol>



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<b>2.4 主要觀念</b> 觀察並形容熱力可以被釋放出來的不同方法：燃燒，摩擦，或把一種物質和另外一種物質混合。	<b>Key Idea 2.4:</b> Observe and describe different ways in which heat can be released: burning, rubbing (friction), or combining one substance with another.
<b>科學用語：</b> 1. 釋放      2. 摩擦      3. 混合 4. 物質      5. 轉變	<b>Scientific Terms:</b> 1. release      2. friction      3. combine 4. substance      5. transform
<b>內容：</b> 第一個使用來自太陽的光能的有機體是植物。植物將來自太陽的光能轉變為食物，即是儲存的化學能。當動物和人類吃植物，他們便將植物裏儲存的化學能改變成熱來保持溫暖和機械能來活動。當植物的部位，例如木頭或乾葉子，燃燒起來，它們儲存的化學能改變為熱能。  機械能也可以 <b>釋放</b> 出熱。在兩個活動的機器零件之間 <b>摩擦</b> 產生熱。當你摩擦你的雙手，摩擦力讓你的手覺得溫暖。  有時候當我們混合兩種 <b>物質</b> （液體的醋和固體的蘇打粉在玻璃管裏 <b>混合</b> ），得到一種新的物質（氣體）。如果我們觸摸玻璃管，會感覺到溫熱。我們已經將能量從化學能 <b>變換</b> 到熱能。	<b>Content:</b> The first living organisms to use light energy from the Sun were plants. Plants change light energy from the Sun to food, which is stored as chemical energy. When animals and people eat a plant, they change its stored chemical energy to heat to stay warm and to mechanical energy to move. When plant parts such as wood or dry leaves are burned, their stored chemical energy is changed to heat energy.  Mechanical energy can also <b>release</b> heat. The <b>friction</b> between moving machine parts releases heat. When you rub your hands together, friction makes your hands feel warm.  Sometimes when we <b>combine</b> two <b>substances</b> (a liquid vinegar and solid baking powder) to make a new substance (a gas), we <b>transform</b> the energy from chemical to heat.
<b>複習：</b>  1. 車子開了以後，為什麼輪胎會熱熱的？ 2. 當煤炭燃燒，發生什麼能量改變？ 3. 當一根蠟燭燃燒，發生什麼能量改變？ 4. 是否我們每一次混合物質得到一個新的物質時，都會有熱能釋放出來？為什麼是或不是？	<b>Review:</b>  1. After a car is driven, why are its tires warm? 2. What energy changes takes place when coal is burned? 3. When a candle burns, what energy change is taking place? 4. Will heat energy be released every time we combine substances to get a new substance? Why or why not?

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<b>2.5 主要觀念</b> 物質和能量的互動，例如，電讓燈泡發亮，深色吸收光能，等等。	<b>Key Idea 2.5:</b> Interactions of matter and energy (e.g., electricity lighting a bulb, dark colors absorbing light, etc.)
<b>科學用語：</b> 1. 互動的      2. 蒸發      3. 吸收 4. 反射      5. 來自太陽的	<b>Scientific Terms:</b> 1. interact    2. evaporate    3. absorb 4. reflect      5. solar
<b>內容：</b> 能量和實體是 <b>互動的</b> 。能量在實體裏產生改變。例如，陽光提高水的溫度造成水的 <b>蒸發</b> 。實體也被利用於能量形態改變的過程中。例如，當你用機械能來玩一個樂器，這個樂器的實體會製造出聲音；或者你拍手會產生聲音（手是一個實體）。  實體裏細小的不同有時會造成能量互動的差異。例如，深色會 <b>吸收</b> 比較多的光線，而淺色會 <b>反射</b> 比較多的光線。因此，你也許注意到在夏天人們通常穿著淺色的衣服。有些人將游泳池底漆成很深的顏色。深色的底部吸收熱能並轉移到水裏面。  人類利用實體和能量之間的互動。電能會造成燈泡發亮或烤麵包機發熱，電還可以讓門鈴響。電能有時會儲存在實體裏。例如，有些計算機，收音機，和手錶是利用電池裏儲存的能量而運作。有些太陽能電池儲存來自太陽的能量。	<b>Content:</b> Energy and matter <b>interact</b> . Energy produces changes in matter. For example, sunlight raises the temperature of water and causes it to <b>evaporate</b> . Matter is also used in processes that change the form of energy. When you use mechanical energy to play a musical instrument, the matter in the instrument produces sound; The same thing happens when you clap your hands to make sound (hands are matter).  Small differences in matter may cause different interactions with energy. For example, dark colors may <b>absorb</b> more light, while light colors may <b>reflect</b> more light. You may have noticed that people often wear lighter colors in the summer. Some people paint the bottom of a swimming pool very dark. The dark bottom absorbs heat energy and transfers it to the water.  Humans utilize interactions between matter and energy. Electrical energy may cause a bulb to light up or a toaster to heat up. Electrical energy can also make the doorbell buzz. Electrical energy is sometimes stored in matter. For example, some calculators, radios, and watches run on the energy stored in batteries. Some <b>solar</b> batteries store energy from the Sun.
<b>複習：</b>  1. 當我們開車的時候，能量如何和實體互動？ 2. 當電視開的時候，能量如何和實體互	<b>Review:</b>  1. How is energy interacting with matter when we drive a car? 2. How is energy interacting with matter when the TV is on?

<p>動?</p> <ol style="list-style-type: none"><li>3. 解釋在一個炎熱的天氣裏，用一支黑色的太陽傘比較好還是一支白色的太陽傘比較好?</li><li>4. 什麼樣的能量和成長中的植物互動?</li><li>5. 列出三個人類利用能量和實體之間互動的方法。</li></ol>	<ol style="list-style-type: none"><li>3. Explain whether a black or a white sun umbrella would be better to use on a hot day.</li><li>4. What kind of energy interacts with growing plants?</li><li>5. List three ways in which humans use the interactions between matter and energy.</li></ol>
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<b>第二單元：能量</b>	<b>Unit 2: Energy</b>
<b>關鍵問題：</b> 有哪些方法能量可以從一種形態轉變到另一種形態？	<b>Essential Question:</b> What are some ways that energy can be changed from one form to another?
<b>2.6 主要觀念</b> 聲能：高低音（頻率），震動，音量，聲音如何穿越固體，液體，氣體，和噪音污染。	<b>Key Idea 2.6:</b> Sound energy: pitch (frequency), vibrations, volume, how sound travels through solids, liquids, gases, and noise pollution.
<b>科學用語：</b> 1. 音調    2. 震動    3. 音波 4. 音量    5. 分子    6. 回音 7. 污染    8. 噪音    9. 喪失聽力	<b>Scientific Terms:</b> 1. pitch    2. vibration    3. sound waves 4. volume    5. particle    6. echo 7. pollution    8. noise    9. hearing loss
<b>內容：</b> 聲音的 <b>音調</b> 是指聲音有多高或多低。如果你學小貓叫，你也許要發出高音調的聲音。然而，你如果想要學獅吼，你也許要發出低音調的聲音。 <b>震動</b> 造成聲音音調的不同。如果一個物體震動的慢，它就會產生低音。 <b>聲波</b> 相隔的比較遠。如果一個物體震動的快，它就會產生高音。聲波相隔的比較近。  一些聲音會比其它的聲音大聲，是源於一個物體的 <b>音量</b> 撞擊到另一個物體的力量大小。例如，如果我們輕輕的敲擊桌面，我們製造出輕的聲音。如果我們敲擊桌面重一點，我們便會製造出大一點的聲音。我們必須用多一點的能量來敲擊桌面重一點，我們製造出來的音波便有多一點的能量，因此聲音便會更大聲。  水裏的 <b>分子</b> 比木頭裏的分子彼此距離更遠，因此它們可以自由的移動。空氣中的分子彼此距離最遠。實體裏的分子震動產生音波穿越實體。當一個分子開始震動，它會撞到另一個分子。然後，這個分子再撞到另一個分子，如此繼續下去。分子之間越靠近，它們彼此撞擊的就越快。當分子撞擊到另一個分子的時候，音波的能量從這個分子移動到另一個分子。所以分子越靠近，實體裏的音波移動的越快。聲音在液體裏移動的比在固體裏慢。聲音在空氣裏移動的慢因為空氣裏的分子彼此距離得很遠。	<b>Content:</b> The <b>pitch</b> of a sound is how high or how low the sound is. If you were pretending to meow like the kitten, you might make a sound with a high pitch. However, if you were trying to sound like a roaring lion, you might make a sound with a low pitch. <b>Vibration</b> makes the pitch of sounds different. If an object vibrates slowly, it will make a low sound. The <b>sound waves</b> are farther apart. If an object vibrates quickly, it will make a high sound. The sound waves are closer together.  What makes the <b>volume</b> of some sounds louder than others is how hard an object hits another object. For example, if we tap our desk lightly, the sound we make is a soft sound. If we tap the desk harder, the sound we make is louder. It takes more energy for us to tap the desk hard, so the sound waves we make have more energy, and the sound is louder.  The <b>particles</b> in water are farther apart and move more freely than the particles in wood. The particles in air are the farthest apart of all. Sound waves travel through matter by causing the particles in matter to vibrate. When a particle begins to vibrate, it bumps into another particle. Then that particle bumps into another — and so on. The closer together the particles are, the faster they bump into one another. The energy of the sound waves moves from one particle to another as the particles bump into

<p>回音是一種從一個物體反彈回來的聲音。我們也許可以在一個四面環繞山丘的地方聽到回音。動物利用回音來尋找食物。當一隻海豚在水裏游泳的時候，它發出聲音。然後音波撞擊到一個物體，例如一條魚，聲音再反彈回來到海豚。這樣，海豚便會知道魚在哪裏。</p> <p>當一些東西讓水，土地，或空氣骯髒的情況下，我們會想到<b>污染</b>。<b>噪音</b>也可能是一種污染。噪音是音量太大，或太高，或持續太久而對我們造成傷害。它們可以讓我們變得煩躁並影響我們的睡眠。它們甚至可以造成<b>聽力喪失</b>。我們無法控制所有圍繞在我們身邊的噪音。我們無法讓救護車的警笛不要響。但是，有一些噪音是我們可以控制的。例如，我們可以把電視機，收音機，或音樂的音量降低。我們可以降低耳機的音量來保護我們的耳朵。</p>	<p>one another. So sound waves travel fastest in matter in which the particles are closest together. Sound travels slower in a liquid than in a solid because the particles of the liquid are farther apart. Sound travels slowly through air because the particles of air are so far apart.</p> <p>An <b>echo</b> is a sound bouncing back from an object. We might hear an echo in a place surrounded by hills or cliffs. Animals find their food by using echoes. As a dolphin swims through the water, it makes sound. When the sound waves hit an object, such as a fish, they bounce back to the dolphin. Then the dolphin knows where the fish is.</p> <p>We probably think of <b>pollution</b> as something that makes the water, land, or air dirty. <b>Noise</b> can be pollution, too. Noises that are too loud or high pitched, or go on too long, can harm us. They can make us cranky and disturb our sleep. They can even cause <b>hearing loss</b>. We can't control all the noises we hear around us. We can't make an ambulance not sound its siren. However, there are noises that we do have control over. For example, we can turn the sound down on TVs, radios, or music players. We can lower the volume of earphone to protect our ears.</p>
<p><b>複習:</b></p> <ol style="list-style-type: none"> <li>1. 聲音如何產生的?</li> <li>2. 你如何讓一個物體發出大的聲音?</li> <li>3. 為什麼一個小鐘會比一個大鐘發出比較高的音調?</li> <li>4. 為什麼聲音在木頭裏移動的比在空氣裏快?</li> <li>5. 我們可以怎麼做來降低噪音污染?</li> </ol>	<p><b>Review:</b></p> <ol style="list-style-type: none"> <li>1. How is sound made?</li> <li>2. How can you cause an object to make a loud sound?</li> <li>3. Why does a small bell make a higher pitched sound than a large bell makes?</li> <li>4. Why does sound travel faster through wood than through air?</li> <li>5. What can we do to reduce noise pollution?</li> </ol>

解答	Answer Key
<p>2.1</p> <ol style="list-style-type: none"> <li>1. 沒有能量，功無法完成。</li> <li>2. 當一個力讓某樣東西移動，能量轉移時，功便完成。</li> <li>3. 沒有，我沒有在做功因為牆壁沒有移動。</li> <li>4. 當一個物體震動時，它產生聲能和熱能。</li> <li>5. 來自太陽的光能傳到地球。</li> </ol>	<p>2.1</p> <ol style="list-style-type: none"> <li>1. Without energy work cannot be done.</li> <li>2. Work is done when a force makes something move and energy is transferred.</li> <li>3. No, I am not working because the wall doesn't move.</li> <li>4. When an object vibrates, it creates sound energy and heat energy.</li> <li>5. Light energy from the Sun reaches Earth.</li> </ol>
<p>2.2</p> <ol style="list-style-type: none"> <li>1. 當煤炭燃燒，它的化學能轉變為熱能。</li> <li>2. 食物最有可能轉變為熱能和機械能。</li> <li>3. 太陽的光能改變成熱能。</li> <li>4. 當我們使用一個烤麵包機時，電能轉變為熱能。</li> </ol>	<p>2.2</p> <ol style="list-style-type: none"> <li>1. When coal is burned, its chemical energy changes to heat energy.</li> <li>2. The food most likely changes into heat energy and mechanical energy.</li> <li>3. The Sun's light energy changes to heat energy when it reaches Earth.</li> <li>4. When we use a toaster, the electrical energy changes to heat energy.</li> </ol>
<p>2.3</p> <ol style="list-style-type: none"> <li>1. 燃燒的煤炭比燃燒的紙張製造出更多的熱能，因為煤炭儲存比較多的化學能。因此，煤炭會釋放出比較多的熱能。</li> <li>2. 馬鈴薯在水裏會比在烤箱裏煮熟的快一點，因為液體比氣體傳熱更好。</li> <li>3. 游泳（機械能）產生摩擦，而摩擦產生熱，並傳遞到水裏。</li> </ol>	<p>2.3</p> <ol style="list-style-type: none"> <li>1. Burning coal produces more heat energy than burning paper because there is more chemical energy stored in the coal. Therefore, the coal can release more heat energy.</li> <li>2. Potatoes cook faster in water than in the oven because liquids transfer heat better than gases.</li> <li>3. Swimming (mechanical energy) creates friction and friction causes heat, which gets transferred into the water.</li> </ol>
<p>2.4</p> <ol style="list-style-type: none"> <li>1. 輪胎和路面摩擦，產生摩擦力，而摩擦力造成熱。</li> <li>2. 它儲存的化學能轉換成熱能。</li> </ol>	<p>2.4</p> <ol style="list-style-type: none"> <li>1. The tires rub on the road, creating friction, and friction causes heat.</li> <li>2. Coal's stored chemical energy is converted to heat energy.</li> <li>3. The candle's chemical energy changes to</li> </ol>

<p>3. 他的化學能轉變成熱和光。</p> <p>4. 並不是每一次混合兩種物質得到一個新的物質的時候都會釋放熱。每一個物質都一定要有化學能。例如，如果我們混合水和蘇打粉，就不會有反應。</p>	<p>heat and light.</p> <p>4. Heat energy is not released heat every time two substances are combined to make a new substance. There has to be energy in each of the chemicals for heat energy to be released. For example, if we combine water and baking soda, there would be no reaction.</p>
<p><b>2.5</b></p>	<p><b>2.5</b></p>
<p>1. 從汽油來的化學能讓車子移動。</p> <p>2. 電能讓電視運作。</p> <p>3. 在熱天用白色的陽傘比較好，因為淺色會反射陽光，而黑色反而會吸收陽光。</p> <p>4. 光能和正在成長的植物互動，讓植物成長。</p> <p>5. (可能的答案) 人類利用太陽光將衣物曬乾；利用烤麵包機烤麵包；利用電池來使用手電筒。</p>	<p>1. The chemical energy from the gasoline makes car move.</p> <p>2. The electrical energy makes televisions work.</p> <p>3. A white sun umbrella would be better to use on a hot day because light color will reflect the sunlight, whereas the black one would absorb it.</p> <p>4. Light energy interacts with growing plants to make them grow.</p> <p>5. Possible answers: Humans use sunlight to dry clothes on a line; using a toaster to toast bread; and, using batteries to run a flashlight.</p>
<p><b>2.6</b></p>	<p><b>2.6</b></p>
<p>1. 所有的聲音都是由一些東西讓實體震動而產生。</p> <p>2. 敲擊物體更重會產生更大的聲音。</p> <p>3. 一個小鐘傳出來的音波彼此比較靠近，震動的更快。如果一個物體震動的快速，它就會產生一個高音調的聲音。</p> <p>4. 聲音在木頭裏比在空氣裏移動的更快，因為木頭裏的分子比在空氣裏的分子更彼此靠近。在木頭裏，當一個分子撞擊到另一個分子時，聲波的能量從一個分子移動到另一個分子會更快。</p> <p>5. 我們可以把收音機，電視機，和耳機的音量調低來降低噪音污染。</p>	<p>1. All sounds are made by something that causes matter to vibrate.</p> <p>2. Hitting the object harder will make a louder sound.</p> <p>3. The sound waves moving out from a small bell are closer together and vibrate quickly. If an object vibrates quickly, it will make a high-pitched sound.</p> <p>4. Sound travels faster through wood than through air because the particles in wood are closer than the particles in air. In wood, the rate at which the energy of sound waves moves from one particle to another as the particles bump into one another will be faster.</p> <p>5. We can reduce noise pollution by turning down the volume of radios, TVs, and earphones.</p>