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| **Grade 5** | **Lesson:**  **Landforms Part 4**  **Earthquakes** | | Reference to English Interconnections Lesson  Earthquakes and Plate Tectonics pg. 15 | |
| **Science Standard(s): Standard 2 Objective 2** | | | | |
| **Content Objective(s):** | | **Language Objective(s):** | | |
| Students will give examples of different landforms that are formed by earthquakes and uplift and describe how technology is used to predict and measure earthquakes by creating books about earthquakes independently.  ***I can give examples of different landforms that are formed by earthquakes and uplift and describe how technology is used to predict and measure earthquakes by making an earthquake book by myself.***  我可以独立制作一本关于地震的书，在其中举例说明由地震和隆起产生的地形，并且描述科技是如何预测和测量地震的。 | | Students will be able to define an earthquake, explain how earthquakes create different landforms, and describe the type of damage caused by different magnitudes by participating in an activity with a partner.  ***I can explain what an earthquake is, explain how they create different landforms, and describe the damage different earthquakes can cause by participating in an activity with a partner.***  在和同伴的活动中，我可以解释什么是地震，地震怎样制造不同地形，并且描述不同级别的地震造成的伤害。 | | |
| **Essential Questions:**  *How is the Earth’s surface changing over time?*  *地球的表面是如何随着时间的变化而改变的？* | | **Required Academic Vocabulary for Word Wall:**  **Listen:** Earthquake, fault, pressure, energy waves, magnitude, seismograph, fault scarp, mountains, valleys  地震，断层，压力，能量波，震级，地震仪，断层崖，山脉，山谷  **Speak:** Earthquake, fault, fault scarp, mountains, valleys, seismograph, magnitude  地震，断层，断层崖，山脉，山谷，地震仪，震级  **Read:** Earthquake, fault, fault scarp, mountains, valleys, seismograph, magnitude  地震，断层，断层崖，山脉，山谷，地震仪，震级  **Write:** Earthquake, fault, fault scarp, mountains, valleys, seismograph, magnitude  地震，断层，断层崖，山脉，山谷，地震仪，震级  **Sentence Frames:**  An earthquake is \_\_\_\_\_\_\_\_\_  Earthquakes can create \_\_\_\_\_\_\_\_\_ by \_\_\_\_\_\_\_\_\_\_.  The strength of an earthquake is measured using a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to identify its \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  An earthquake with the magnitude of 4 would look like \_\_\_\_\_\_\_\_.  An earthquake with the magnitude of 7 would look like \_\_\_\_\_\_\_\_\_.  Scientists can predict earthquakes by \_\_\_\_\_\_\_.  地震是\_\_\_\_\_\_\_\_\_\_\_  地震会造成\_\_\_\_\_\_\_\_\_，是由于\_\_\_\_\_\_\_\_\_\_\_。  地震的强度是由\_\_\_\_\_\_\_\_\_\_\_来测量它的\_\_\_\_\_\_\_\_\_\_\_。  4级地震会造成\_\_\_\_\_\_\_\_\_\_\_。  7级地震会造成\_\_\_\_\_\_\_\_\_\_\_。  科学家们可以通过\_\_\_\_\_\_\_\_\_来预测地震。 | | |
| **Materials:**   * Vocabulary cards * Magnitude Chart * Slips of Paper with questions and sentence strips(one set per partnership) * Ziplock bags or cups * Blank Paper (1 per partnership) * Whiteboards, markers and erasers (one set per partnership) * Earthquake book pages * Scissors * Crayons * Stapler | | **Additional Lesson Vocabulary:**  Crust, plates, strength  地壳，板块，强度 | | |
| **Lesson:** | | | | **Instructional Time: 55 minutes** |
| **Opening:** **(6 minutes)**  **T: “Raise your hand if you have ever felt or experienced an earthquake.”**  “有同学曾经感觉到过或者亲身经历过地震的请举手。”  Students raise their hands.  **T: “Some of us might know a little about earthquakes, and some of us might know a lot! Let’s look at what we know and what we want to know about earthquakes.”**  “可能我们当中有的人对地震有一点点了解，可能有的人了解很多！让我们看看我们对地震了解多少，又想了解多少呢。”   * Post KWL chart.   **T: “Turn to your partners and share one thing you each know about earthquakes.”**  “找一个同伴互相告诉对方你知道的关于地震的事。”  Students share with their partners.  **T: “Now, raise your hands and share what you talked about and we’ll write it on our chart. If your ideas were already mentioned, put your hands down.”**  “现在请同学们举起手来，然后我们分享我们知道的关于地震的事，然后写在我们的表格上。如果你想说的已经被提到了，就请把手放下。”   * Call on students and write down the things they know about earthquakes on the KWL chart.   **T: “Now everyone, take a minute and think… what do you want to know about earthquakes?”**  “现在所有人花1分钟想想，关于地震你们想知道些什么呢？”   * Give students 15-30 seconds to think.   **T: “Turn to your partners and share one thing you each want to know about earthquakes that we don’t already know.”**  “和你的同伴讨论一下你们各自想要知道的关于地震的我们还不知道的一件事。”  Students share with their partners.  **T: “Now, raise your hands and share what you talked about and we’ll write it on our chart. If your ideas were already mentioned, put your hands down.”**  “现在请同学们举起手来，说说刚才你们讨论的结果，然后写在我们的表格上。如果你想说的已经被提到了，就请把手放下。”   * Call on students and write down the things they want to know about earthquakes on the KWL chart. Make sure students mention the key ideas of the lesson- landforms created by earthquakes, how technology can determine size of earthquakes, how to predict earthquakes, etc.   **T: “Let’s look at our objective for today to see what we are going to learn. Class, read it with me!”**  “我们来看看今天的学习目标，看看我们今天要学什么。同学们，请跟我读！”  *S: I can give examples of different landforms that are formed by earthquakes and uplift and describe how technology is used to predict and measure earthquakes by making an earthquake book by myself.*  我可以独立制作一本关于地震的书，在其中举例说明由地震和隆起产生的地形，并且描述科技是如何预测和测量地震的。  **T: “Great. It looks like we’re going to learn a couple of things today. Partner 1, turn to Partner 2 and identify one thing we are going to learn and be able to do today. Go.”**  “很好。看起来我们今天要学很多东西。1号同学告诉2号同学1个我们呢今天要学的东西。开始。”  *S1: We are going to say the names of different landforms created by earthquakes and uplift.*  “我们要学由地震和隆起产生的地形的名称。”  **T: “Good. Partner 2, turn to Partner 1 and identify another thing we’re going to learn and be able to do today. Go.”**  “好。2号同学告诉1号同学另一个1个我们呢今天要学并且要做的东西。开始。”  *S2: We are going to explain how technology is used to predict and measure earthquakes.*  “我们将要解释科技是如何预测和测量地震的。”  **T: “Excellent. Now talk in your partnerships about how we will know that we learned our objective, and raise your hands when you agree on an answer. Go.”**  “好极了。现在在你们的小组里讨论我们今天如何完成我们的学习目标，讨论完的请举手。开始。”  *S: We will make earthquake books independently.*  “我们将会独立的制作关于地震的书。”   * Select one partnership to share their response with the class.   **T: “Great. Let’s get started!”**   * “很好。我们开始吧。” * **Introduction to New Material (Direct Instruction): (12 minutes)**   **T: “Looking at what we know about Earthquakes, we know the earth’s surface moves during an earthquake. And it seems that our class wants to know what exactly is an earthquake, how earthquakes are caused, what landforms are created by earthquakes and how we measure earthquakes.”**  “看看我们关于地震都知道什么，我们知道地震的过程中地面会晃动。看来我们想知道到底什么是地震，地震怎么产生的，地震可以造成什么样的地形，还有我们如何测量震级。”   * Refer to the KWL chart.   **T: “Given what we know about earthquakes, let’s see what type of definitions you can come up with for an earthquake. When I say, ‘Go’, turn to your partners and come up with a definition of an earthquake. Let’s see what you come up with. Ready, go!”**  “在我们所知道的关于地震的知识的基础上，让我们看看我们能给出地震怎样的定义呢。我说开始的时候，和你的同伴想一个地震的定义。让我们看看你们都能想出什么。准备，开始！”  Students talk with partners and come up with definitions for ‘earthquake’.   * Have several students share out their responses. Write key words they may use on the board   **T: “You came up with some really good definitions of an earthquake. We’re going to describe earthquake as ENERGY WAVES passing through Earth caused by sudden shifts of the Earth’s crust along faults. There are two main parts to this definition. First, earthquakes are energy waves passing through the earth. The second part explains they are caused by shifts in the Earth’s crust along faults.”**  “你们关于地震的定义都很好。地震就是由于地壳沿着断层的突然变化引起的，变化产生的能量波穿过大地就造成了地震。这个定义有两个主要的部分。第一，地震是由穿过大地的能量波造成的。第二部分解释了这些能量波是由地壳沿着断层的变化引起的。”   * Post the earthquake vocabulary card and write the definition on the board.   **T: “Partner 1, I want you to remember the first part of the definition. Partner 2, I want you to remember the first part of the definition. When I say, ‘Go’ I want you to turn to your partners and define earthquakes by combining the two parts of the definition. Ready, go!”**  “1号同学，你来记住第一部分，2号同学，你来记住第二部分。我说开始的时候，在你们的小组里合作说出地震的定义。准备，开始！”  *S1: An earthquake is an energy wave passing through the Earth.*  *S2: Caused by sudden shifts of the Earth’s crust along faults.*  “地震是由穿过大地的能量波造成的。”  “这些能量波是由地壳沿着断层的变化引起的。”  **T: “Great job. Now Partner 2, it’s your job to remember the first part of the definition and Partner 1 you are going to remember the second part. When I say, ‘Go’ I want you to turn to your partners and define earthquakes by combining the two parts of the definition. Ready, go!”**  “非常好。现在2号同学来记第一部分，1号同学来记第二部分。我说开始的时候，在你们的小组里合作说出地震的定义。准备，开始！”  *S2: An earthquake is an energy wave passing through the Earth.*  *S1: Caused by sudden shifts of the Earth’s crust along faults.*  “地震是由穿过大地的能量波造成的。”  “这些能量波是由地壳沿着断层的变化引起的。”  **T: “Excellent. Now we all should remember what an earthquake is. They are caused by shifts of the Earth’s crust along faults. What are faults?”**  “好极了。现在我们应该都记住什么是地震了吧。地震是由地壳沿着断层的变化引起的。什么是断层呢？”   * Show fault vocabulary card.   **T: “A fault is a crack in the Earth’s surface along which two rock masses slide past one another.”**  “断层是地表的裂缝，这些裂缝是由两个大石块滑过彼此时留下的。”   * Show large picture of the fault. Use it to demonstrate.   **T: “The rock mass to the right of the fault moved upward relative to the rock mass on the left side of the fault moving downward. Look at the reddish rock layer that is outlined by the blue lines. Notice how the fault offsets the rock layer so that the layer is higher on the right than on the left. Fault movement causes earthquakes.”**  “右边的石块相对于左边的石块向上移动，而左边的就是向下。看这里被蓝线标出来的红色岩层。注意断层是如何将岩层分开的，右边的高一点，左边的低一点。断层运动会引起地震。”  **T: “We’ve learned what earthquakes are and how they are caused. Now what different landforms are created by earthquakes? There are three different types of landforms we’re going to discuss today. Earthquakes create fault scarps, mountains and valleys. We’ve discussed a little about mountains and valleys. Let’s learn about fault scarps.”**  “我们刚刚学了什么是地震和地震的起因。现在想想地震会造成什么地形呢？今天我们将会讨论3种不同的地形。地震会形成断层崖，山脉和山谷地形。我们已经讲了一点关于山脉和山谷的知识了。我们来学学什么是断层崖。”   * Show Fault Scarp vocabulary card.   **T: “A fault scarp is a steep break or escarpment that forms where vertical fault movement reaches the ground surface. We saw a picture of fault movement, but the picture we saw was below the Earth’s surface. When it reaches ground surface, it create a fault scarp.”**  “断层崖是由垂直的断层移动接触到地面而形成的悬崖或陡崖。我们在图片中看到了断层运动，但是这幅图展示的是地下的。当它接触到地面的时候，断层崖就形成了。”   * Show large picture of fault scarp.   **T: “This picture shows a 10-foot-high fault scarp (highlighted in purple) that formed suddenly during the 1954 Dixie Valley, Nevada earthquake. This is typical of what a newly created fault scarp would look like. The man is walking on the valley block. The valley block dropped and the mountain block rose. Faults scarps in Utah are expected to form with bigger earthquakes and could range from fractions of inches to 20 feet high. Remember that fault scarps are formed by earthquakes when the fault movement reaches the surface of the Earth. When I say, ‘Go’ I want you to turn to your partners and explain in your own words what is a fault scarf and how is it formed? Ready, go!”**  “这幅图是一个10英尺高的断层崖（紫色），它是在1954年内华达州迪克西山谷地震中突然形成的。这是典型的新形成的断层崖的样子。这个人在山谷的石块上。山谷的石块下降了，另一侧的石块上升了。犹他州的断层崖可能是在大型地震中形成的，可能会有从几英尺到20英寸高。记住，断层崖是由断层运动产生地震到达地面而形成的。我说开始的时候，和同伴讨论并用自己的话解释断层崖是如何形成的。准备，开始！”  *S: A fault scarf is a steep break that forms when the Earth’s movement reaches the surface of the Earth.*  “断层崖是由垂直的断层移动接触到地面而形成的悬崖或陡崖。”   * Have a couple of students share their explanations.   **T: “Earthquakes also form mountains and valleys.”**  “地震也会形成山脉和山谷。”   * Show Mountain and Valley vocabulary card.   **T: “During an earthquake, the mountain ranges uplift and the valleys drop.”**  “在地震中，山脊会上升，山谷会下降。”   * Show large picture of Utah mountains and valleys.   **T: “Earthquakes in Utah have created mountains and valleys over a long time (hundreds of millions of years). Steep mountain fronts are the result of repeated fault movement. This is the Wasatch Range in Utah. As the Earth’s crust shifts, mountains are shifted upwards and the valleys drop. When I say, Go’ I want you to turn to your partners and explain in your own words how earthquakes form mountains and valleys. Ready, go!”**  “长期以来（几亿年），犹他的地震形成了许多山脉和山谷。陡峭的山壁是由反复的断层运动形成。这是犹他州的沃萨奇岭。随着地壳的变化，山脊上升，山谷下降。我说开始的时候，请找到你的同伴，并用自己的话解释地震是如何形成山脉和山谷的。准备，开始！”  *S: The Earth’s crust shifts which makes the mountains lift upwards and the valleys drop.*  “地表的运动使得山脉上升，山谷下降。”   * Have a couple of students share their explanations.   **T: “We wanted to know how we can predict earthquakes. Well, scientists haven’t mastered that. We do not have the perfect tool for predicting earthquakes. But everyone think… given what we know and what we learned, how do you think we might predict when an earthquake might occur?”**  “我们想知道如何预测地震。科学家们还没有掌握这个技术。我们没有侦测地震的完美仪器。但是我们想一想...根据我们知道的和所学的，你们觉得我们可能会如何预测地震呢？”   * Give students 30 seconds to think.   **T: “Turn to your partners or even make a small group. Discuss possibilities. Given what we know and have learned about earthquakes, how might we be able to predict when an earthquake might occur?”**  “跟你们的同伴或者组成一个小组。讨论一下可能的方案。根据我们知道的和所学的，你们觉得我们可能会如何预测地震呢？”  Students discuss with partners or in small groups.   * Have students share out their ideas.   **T: “Some of your ideas were great! Scientists look at the movement plates of the earth and the location of fault zones. They also can look at the history of earthquakes in a particular area and make guesses about when the next one might occur based on a pattern.”**  “有几个方案好极了！科学家们观察地球板块和断层带的移动。他们也会研究一个特定地区的地震历史，依据一定的模式推测下一个地震发生的大概时间。”  **T: “The last thing we wanted to know was how can we measure earthquakes. Are all Earthquakes the same? What do you think?”**  “最后，我们要学的是如何测量地震。所有的地震都一样吗？你们有什么想法？”  *S: No, some are stronger than others.*  “不，有的地震比别的强。”  **T: “Good! When we measure the strength of an earthquake, we use a SEISMOGRAPH and talk about its MAGNITUDE.”**  “很好！当我们测量地震强度时，会使用地震仪，不同的强度叫做震级。”   * Show the vocabulary card for Seismograph.   **T: “The magnitude of an earthquake varies according to the amount of energy released by plate interaction. If there is a lot of energy, we have a stronger earthquake. There are also different types of faults that make different types of earthquakes. The magnitudes are measured on a scale of 1-10+.”**  “地震震级强度不同，是由板块碰撞所释放的能量大小决定的。如果释放的能量很大，地震就很强。不同的断层带会产生不同的地震。震级从最小到最大为1-10+。”   * Place the magnitude chart under the document camera. Go through the different magnitudes and explain the effects of each magnitude and how often they occur. You can have students stand up and act out each level of earthquake and how they might respond if they were to experience an earthquake with each magnitude.   **Guided Exploration: (7 minutes)**  **T: “While predicting earthquakes with technology is not yet possible, scientists do have a way of recording the magnitude of an earthquake by using a machine called a seismograph. A seismograph uses a roll of paper rotating under a stationary pen. Most of the time, the pen draws a straight line. When the earth shakes, the roll of paper will move, but the pen remains stationary. The wavy line that it draws can be used to determine the magnitude of the earthquake. Let’s experience how a seismograph works.”**  “虽然现代科技还不能预测地震，科学家们可以通过使用地震仪来记录震级。地震仪里面有一卷滚动的纸和一支固定的笔。大多数的时候，画出的线是直的。当大地震动时，那一卷纸就会移动，但是笔还是固定的。画出的波浪线就是用来决定地震震级的。让我们来看看地震仪是如何工作的。”   * Have students work with their partners. Give each pair a blank piece of paper and a pencil. Have one student hold the pencil above the paper pressing hard enough to draw a line, but light enough that the paper beneath it can be moved. Have this student close their eyes. Have the other student will move the paper beneath the pencil. The first time have them move it straight to illustrate a time with no earthquakes. The next time shake and move the paper across the table as it moves beneath the pencil. * Repeat a few more times alternating between shaking and steady. Have each person in the partnership take turns with the pencil.   **T: “Partner 1 turn to Partner 2 and explain how do you know when an earthquake took place.”**  “1号同学向2号同学解释我们怎么知道地震了。”  *S1: The pencil moved and drew a wavy line up and down.*  “铅笔移动，画出上下的波浪线。”   * Have a student share response with the class.   **T: “Partner 2 turn to Partner 1 and explain how you could tell if it was a small or a large earthquake.”**  “2号同学向1号同学解释我们怎么知道地震大还是小。”  *S2: When it was a small earthquake, the line didn’t move as much. During a big earthquake, the pencil drew a lot of lines, big and much more wavy.*  “如果是小地震，那条线不会有很多起伏。如果是大地震，那笔会画出更多更起伏的线。”   * Have a student share response with the class.   **T: “This is how a seismograph works. With a small magnitude earthquake, the lines are small and don’t vary much from the straight line. When the magnitude of an earthquake is great, the lines are bigger and vary greatly from the straight line. This is how technology is used to tell us how big an earthquake is. Partner 1, turn to Partner 2 and explain what a seismograph is.”**  “地震仪就是这样工作的。如果是小震级的地震，画出的线就很小也不是特别不直。当震级大时，线就会变大，并且起伏很大。这就是现代科技如何告诉我们地震的大小的。1号同学向2号同学解释什么是地震仪。”  *S1: A seismograph is a machine that uses a roll of paper underneath a pen. It draws a straight line most of the time, but when the earth shakes the roll of paper moves making wavy lines.*  地震仪里面有一卷的纸在一支笔的下面。大多数的时候，画出的线是直的。当大地震动时，那一卷纸就会移动，就会画出波浪线。   * Have a student share response with the class.   **T: “Partner 2, turn to Partner 1 and explain how a seismograph is used to determine the size or magnitude of the earthquake.”**  “2号同学向1号同学解释地震仪是如何用来决定震级的。”  *S1: The seismograph draws small wavy lines that don’t vary much from the straight line when the earthquake is small. It draws big wavy lines that are very wavy when the earthquake is big and has a greater magnitude.*  “如果是小震级的地震，画出的线就很小也不是特别不直。当震级大时，就会画出巨大起伏的波浪线。”   * Have a student share response with the class.   **Guided Practice: (10 minutes)**   * Cut out the strips of sentence frames and put them in a ziplock bag or plastic cup for each partnership. * Pass out one bag/cup of paper strips, whiteboard, marker and eraser to each partnership.   **T: “We’re now going to explain and demonstrate what an earthquake is, how it forms a fault scarp and mountains and valleys, and how it is measured. You will work with a partner and one of you will select a slip of paper and ask the question. The other partner will answer the question using the sentence frame on the strip of paper. The student who answers will also use the whiteboard to draw a picture to demonstrate the answer he/she gives.”**  “我们将要解释并展示什么是地震，地震是如何形成断层崖，山脉和山谷的，以及如何测量地震。你将会和一个同伴合作，你们其中一个要选一个纸条，然后问上面的问题。另一个同学要用纸条上的句型来回答问题。回答问题的同学也要来白板上画图展示你的答案。”  *Use the Modeling Cycle:*  *Teacher Models:*   * Use a puppet, stuffed animal or imaginary partner to help you model.   **T1: “If I am Partner 1, I am going to draw out a paper and ask the question. My paper says, ‘What is one landform an earthquake can create?’ It is now my partner’s turn to answer the question using the sentence frame on my strip of paper and draw a picture to demonstrate the answer.”**  “如果我是1号同学，我将要抽一张纸，然后问上面的问题。纸上写着，‘地震会创造什么地形？’现在我的同伴将会用纸条上的句型来回答我的问题，然后画图展示他/她的答案。”  **T2: “As Partner 2, I will use the sentence frame on the strip of paper to answer. ‘Earthquakes can create mountains and valleys by shifting the mountains upwards and dropping the valleys.’ I will now use the whiteboard and the marker to draw a diagram. I can draw a before the earthquake picture, and then the after. Or I can draw the after and draw some arrows to show how the earth’s crust shifted. Now it’s my turn as Partner 2 to draw the paper and ask the question, and Partner 1 will use the sentence frame to answer and draw a picture.”**  “现在我是2号，我将要用纸条上的句型来回答问题。‘地震会创造山脉和山谷，山脉是地面向上移动，山谷是向下移动。’我现在会在白板上画一个图。我可以画一个地震前的图，然后画一个地震后的图。或者，我可以画一个地震后的图，然后画出一些箭头标出地壳是如何移动的。现在我作为2号该抽一张纸来问问题了，1号同学要用句型回答并画图。”  *Teacher Models with a Student:*   * Select a student to help you model.   **T: “I will be Partner 1, I am going to draw out a paper and ask the question. My paper says, ‘How is the strength of an earthquake measured?’ It is now my partner’s turn to answer the question using the sentence frame on my strip of paper and draw a picture to demonstrate the answer.”**  “我来当1号同学，我要抽一张纸来问问题。我的纸条上写着，‘如何测量地震的强度？’现在该我的同伴用我纸条上的句型来回答问题了，然后画一个图来展示答案。”  *S: The strength of an earthquake is measured using a seismograph to identify its magnitude.*  **T: “Now my partner will use the whiteboard and the marker to draw a diagram. He/she will draw a seismograph to show how it is used to measure an earthquake.”**  “现在我的同伴在白板上画一个图。他/她将要画一个地震仪来说明如何测量地震。”  Student draws on the whiteboard.  **T: “Now it’s my turn as Partner 2 to draw the paper and ask the question, and Partner 1 will use the sentence frame to answer and draw a picture.”**  “现在作为2号该抽一张纸条并画图，1号同学要用句型回答并画图。”  *Two Students Model:*   * Select two students to help you model.   *S1: What would an earthquake with the magnitude of 7 look like?*  “7级的地震会是怎么样的？”  *S2: An earthquake with the magnitude of 7 would look like it would cause heavy damage with many buildings collapsing completely or partially.*  “7级地震会造成巨大损害，许多建筑会部分或全部倒塌。”  Partner 2 draws a model on the whiteboard.  *All Students Practice*   * Have all students get with their partners and practice . Walk around and help students with the language and the content.   **Independent Practice: (15 minutes)**  **T: “Great job class! I could tell you’re learning a lot about earthquakes. Now, you’re going to create your own little book using the same sentence frames and pictures that we practiced with our partners. You will all create your own books independently, and now instead of orally stating your sentence frame, you’ll be answering the question in your book by writing the sentence frame. Instead of drawing your pictures on the whiteboard, you’ll be drawing them and coloring them in your book. You’ll need to follow these steps in working on your books:**  “同学们，做得好！我能看出你们学了很多关于地震的知识。现在，我们将要制作一个小册子，用刚才的句子和图片。你们要独立的制作，现在不用口头说了，你们要把你们的答案写在你们的小册子里。也不用在白板上画图了，现在要画在你们的小册子里。完成小册子需要以下几个步骤：”   1. **Write all of your sentences.** 写出你的所有句子。 2. **Draw all of your pictures.** 画出你的所有图片。 3. **Color all of your pictures.** 给你的图片上色。 4. **Cut out the pages on the dotted lines.** 沿着虚线把每一页剪下来。 5. **Staple your pages together in order.”** 按顺序把每一页钉在一起。  * Write these steps on the board for the students to refer to. Post the sentence frames. * Pass out the papers for their books. Additional modeling may be needed, but it is unlikely. The same language and a similar procedure is being repeated.   **T: “You can begin! Be sure to follow the steps in order! I will be looking at (or collecting) your books to create a grade. Do your best work!”**  “现在可以开始了！一定要按照步骤的顺序来做！一会儿我要看你们的小册子来打分。加油！”   * Walk around and monitor student work. Give students a grade as you walk around, or you can collect their books and assess their work.   **Closing: (5 minutes)**  **T: “Let’s go back and look at our KWL chart we started at the beginning of class. What have we learned today? Turn to your partners and discuss the things you learned today. Go!”**  “我们回头看看我们一开始写的KWL表。我们今天学了什么？和你们的同伴讨论今天我们都学了什么。开始！”  Students talk with their partners about what they learned.   * Call on students to share the different things they learned today. List them on the KWL chart.   **T: “Great job today. Let’s review our objective and see if we mastered it.”**  “今天做的真好。我们来复习一下今天的目标，看看我们学会了没有。”  **T: “When I say ‘Go’ Partner 1 turn to Partner 2 and use the sentence frame to define an earthquake. Go!”**  “我说开始的时候，1号同学用这个句型向2号同学解释什么是地震。开始！”  Point to sentence frames.  All Partner 1’s turn to their Partner 2’s and define an earthquake.  **T: “When I say ‘Go’ Partner 2 turn to Partner 1 and use the sentence frames to identify a landform that can be created by an earthquake. Go!”**  “我说开始的时候，2号同学用这个句型告诉1号同学地震可以创造什么地形。开始！”  Point to sentence frames.  All Partner 2’s turn to Partner 1’s and identify a landform*.*  **T: “Did we meet our objective today? Let’s read the objective as a class. Go!”**  “我们今天的目标都完成了吗？让我们来读一下学习目标。开始！”  Everyone reads the objective on the board.  **T: “Now, Partner 2 will tell Partner 1 what we learned today.”**  “现在，2号告诉1号我们今天都学了什么。”  *S: We learned about different landforms that are formed by earthquakes and uplift and described how technology is used to predict and measure earthquakes.*  “我们学了地震和隆起创造的不同地形，科技是如何预测地震的，还有如何测量地震。”  **T: “Now, Partner 1 will tell Partner 2 how we know we learned it. Go!”**  “现在，1号同学告诉2号同学我们怎么知道我们学会了。开始！”  *S: We participated in an activity with a partner, and as a whole class.*  “我们和同伴完成了一个活动，也做了全班的活动。”  **T: “You all did a great job today. When you go home today I want you to tell your families what you learned about earthquakes and see if your family has a plan for what to do in case we have an earthquake.”**  “今天所有人都很棒。回家以后，我想让你们告诉你们的家人今天都学了什么，看看他们知不知道地震以后怎么办。” | | | | |
| **Assessment:** | | | | |
| Informal Assessment as you watch group and partner discussions  Collect or view students’ Earthquakes books for formative assessment. | | | | |
| **Extra Ideas:** | | | | |
| * Practice your school’s procedures for Earthquake drills. Encourage students to practice safety procedures at home by holding an Earthquake drill at home. * More activities and ideas at <http://earthquake.usgs.gov/learn/kids/> | | | | |

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| Earthquake  地震 |
| Fault  断层 |
| Fault Scarp  断层崖 |
| Moutains and Valleys  山脉和山谷 |
| Seismograph  地震仪 |

**Richter Magnitudes**

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| **Magnitude** | **Description** | **Average earthquake effects** | **Average frequency of occurrence (estimated)** |
| Less than 2.0 | Micro | Microearthquakes, not felt of felt rarely by sensitive people. Recorded by seismographs. | Continual/several million per year |
| 2.0-2.9 | Minor | Generally felt by few up to many people. Weak shaking in the felt area. | Over one million per year |
| 3.0-3.9 | Minor | Often felt in the area by at least many people, but very rarely causes damage. | Over 100,000 per year |
| 4.0-4.9 | Light | Noticeable shaking of indoor items, rattling noises. Many people, or everyone, feel it with slight to strong intensity. Slightly felt outside. Generally causes none to slight damage. Some falling of objects. | 10, 000 to 15, 000 per year |
| 5.0-5.9 | Moderate | Can cause moderate to major damage to poorly constructed buildings. At most, slight damage to well-designed buildings. | 1,000 to 1,500 per year |
| 6.0-6.9 | Strong | Can be damaging/destructive in populated areas. Damage to many or all buildings, poorly designed structures incur moderate to severe damage. Death toll between none and more than 25,000. | 100 to 150 per year |
| 7.0-7.9 | Major | Can cause great damage over larger areas. Damage to all buildings, many to receive moderate to very heavy damage, or collapse partially to completely. Death toll is usually between none to more than 150,000. | 10 to 20 per year |
| 8.0-8.9 | Great | Can cause major damage across very wide, large areas. Many to all buildings severely damaged or destroyed. Death toll is usually between 50 to more than 500,000. | One per year (rarely none, two or over two per year) |
| 9.0-9.9 | Great | Destructive to very devastating in extremely large areas. Many to all buildings severely damaged to completely destroyed, even miles from the epicenter. Ground changes. Death toll usually between 250 and one million. | One per 5 to 50 years |
| 10.0+ | Massive/Epic | Heavy, widespread, colossal damage/devastation across enormous areas. Death toll most likely over 100,000 people. Large ground changes. Never recorded. | None ever known |

**芮氏地震仪的震级**

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| **震级** | **程度** | **平均地震影响** | **平均发生频率（大约）** |
| 2.0以下 | 极微 | 微震,，敏感的人很少有感觉或没有感觉。地震仪有记录。 | 持续不断的/每年几百万次 |
| 2.0-2.9 | 甚微 | 通常一些或很多人能感觉到。在地震区有轻微的摇晃。 | 每年一百万次以上 |
| 3.0-3.9 | 微小 | 在地震区，通常大多数人都能感觉到。但很少造成伤害。 | 每年十万次以上 |
| 4.0-4.9 | 弱 | 室内物品明显的摇晃并发出声音。许多，甚至所有人都有或弱或强的感觉。在室外感觉轻微。通常没有或造成轻微伤害。有东西会掉落 | 每年一万到一万五千次 |
| 5.0-5.9 | 中 | 结构不稳的建筑会有中等或巨大的损伤。对结实的建筑至多造成轻微的损害。 | 每年一千到一千五百次 |
| 6.0-6.9 | 強 | 在人口密集地区会造成破坏性/毁灭性的伤害。许多或所有建筑都会有损伤，不结实的建筑会有中等或严重的损坏。死亡人数在0至2万5以上。 | 每年一百到一百五十次 |
| 7.0-7.9 | 甚強 | 会造成大范围的巨大伤害。所有建筑被损坏，许多会有中等至严重损坏，部分或全部倒塌。 死亡人数通常在0至15万。 | 每年十到二十次 |
| 8.0-8.9 | 超強 | 会造成巨大范围的非常巨大的伤害。 许多或所有建筑受到严重损坏或被毁。死亡人数通常在50至50万。 | 每年一次 (很少不发生，两次或者两次以上) |
| 9.0-9.9 | 极強 | 在非常巨大的范围内造成毁灭性的伤害。 许多或所有建筑受到严重损坏或被毁，甚至包括里震中几英里外的地区。地表发生变化。死亡人数通常在250到1百万。 | 每五到五十年一次 |
| 10.0-10.9 | 巨大 | 在极其庞大的范围内，造成严重的，广泛的，巨大的伤害/毁灭。死亡人数大概在10万以上。巨大的地表变化。至今从未被记录过。 | 未知 |

(Chart found on wikipedia based on data collected by USGS)

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| 地震可以创造什么地形？  \_\_\_\_\_\_\_\_\_\_\_\_地形是通过地震时  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_所造成的。 | 什么是地震？  地震是\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_。 |
| 如何测量地震的强度？  地震的强度是通过\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  测量它的\_\_\_\_\_\_\_\_\_\_的。 | 4级地震是什么样的？  4级地震\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_。 |
| 7级地震是什么样的？  7级地震\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_。 | 科学家们如何预测地震？  科学家们通过\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  来预测地震。 |

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| What is one landform an earthquake can create?  Earthquakes can create \_\_\_\_\_\_ by \_\_\_\_\_\_. | What is an earthquake?  An earthquake is \_\_\_\_\_\_\_\_. |
| How is the strength of an earthquake measured?  The strength of an earthquake is measured using a \_\_\_\_\_\_\_\_ to identify its \_\_\_\_\_\_\_\_. | What would an earthquake with the magnitude of 4 look like?  An earthquake with a magnitude of 4 would look like \_\_\_\_\_\_. |
| What would an earthquake with the magnitude of 7 look like?  An earthquake with a magnitude of 7 would look like \_\_\_\_\_\_. | How can scientists predict earthquakes?  Scientists can predict earthquakes by \_\_\_\_\_\_. |

姓名: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 班级：\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 日期：\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

地震

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什么是地震？

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地震会创造什么地形？

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地震还可以创造什么地形？

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如何测量地震的强度？

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4级地震是什么样的？

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7级地震是怎么样的？

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科学家们如何预测地震？

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