Examen de práctica para estudiantes de Geofísica (plan 2016)

Material diseñado por el equipo docente del Gabinete de Inglés. Material extraído de https://pubs.usgs.gov/gip/earthq1/where.html

NAME:..... **DATE:.....**

EARTHQUAKES

You are doing a project on earthquakes for your English class at university with a classmate.

Task 1. Your classmate would like to know the answers to the following questions. So, you look for information on the internet and read the article below to answer her questions.

1. What's the difference between the Earth's inner and outer layers?

2. Where do shallow depth earthquakes occur?

3. Do plates always move in same way? Why (not)?

4. What is the difference between the earthquakes that occur at transform faults and those that occur at subduction zones?

5. Can earthquakes occur only at plate boundaries? Why (not)?

Where Earthquakes Occur

The Earth is formed of several layers that have very different physical and chemical properties. The outer layer, which is about 70 kilometers in thickness, consists of about a dozen large, irregularly shaped plates that slide over, under and past each other on top of the partly molten inner layer. Most earthquakes occur at the boundaries where the plates meet. In fact, the locations of earthquakes and the kinds of ruptures they produce help scientists define the plate boundaries.

There are three types of plate boundaries: spreading zones, transform faults, and subduction zones. At *spreading zones*, molten rock rises, pushing two plates apart and adding new material at their edges. Most spreading zones are found in oceans. Spreading zones usually have earthquakes at shallow depths (within 30 kilometers of the surface).

Transform faults are found where plates slide past one another. An example of a transform-fault plate boundary is the San Andreas fault, along the coast of California and northwestern Mexico. Earthquakes at transform faults occur at shallow depths and form linear patterns.

Subduction zones are found where one plate subducts another, pushing it downward into the layer where it melts. Subduction zones are characterized by deep-ocean trenches, shallow to deep earthquakes, and mountain ranges containing active volcanoes.

Earthquakes can also occur within plates, although plate-boundary earthquakes are more common. Less than 10 percent of all earthquakes occur within plate interiors. As plates continue to move and plate boundaries change over geologic time, weakened boundary regions become part of the interiors of the plates. These zones of weakness within the continents can cause earthquakes in response to stresses that originate at the edges of the plate or in the deeper crust.

Task 2. In class, you are going to discuss the following question: What would you do if you were in an earthquake?

So, you prepare your answer in advance below:

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Task 3. Your classmate has just listened to an interview with Maggi Glasscoe, a JPL geophysicist, about earthquake research. She sends you the link to the podcast and her answers to <u>check if they are correct</u> because she would like to use this information for the project. Listen to the podcast and check her answers by correcting any wrong answers.

	Her answers	Your answers
In 1902 an earthquake destroyed San Francisco.	true	
Scientists are now re-creating the earthquake with a computer.	false	
They have problems with the model because they don't have data from observations.	false	
Scientists believe they can use computer models to study earthquakes in different areas.	true	

Task 4. While you were surfing the net for more information about earthquakes, you found an interesting blog. You decide to contact them by filling in the form below

ScienceBlog Our Bloggers Topics Contribute/Contact Love Us on Facebook Or Twitter! RSS Subscribe

ScienceBlog.com wants to hear from potential bloggers. Please tell us a bit about yourself, your occupation and free-time activities, and why you are interested in earthquakes. Any plans for the near future? Let us know, too!

Name *

First Last

Email *

Phone Number

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Existing website, if any

About you *

Submit

Task 5. You also want to include information about earthquake prediction in your project. So, you read the following text and write a summary (in English) using <u>your own words</u>

Predicting Earthquakes

The goal of earthquake prediction is to give warning of potentially damaging earthquakes early enough to allow appropriate response to the disaster, permitting people to minimize loss of life and property. The U.S. Geological Survey conducts and supports research on the likelihood of future tremors. This includes field, laboratory, and theoretical investigations of earthquake mechanisms and fault zones. A primary goal of earthquake research is to increase the reliability of earthquake probability estimates. Ultimately, scientists want to be able to specify a high probability for a specific quake on a particular fault in a particular year. Scientists estimate earthquake probabilities in two ways: by studying the history of large earthquakes in a specific area and the rate at which strain accumulates in the rock.

They also study the past frequency of large earthquakes in order to determine the future likelihood of similar large shocks. For example, if a region experienced four magnitude 7 or larger earthquakes during 200 years of recorded history, and if these occurred randomly in time, then

scientists assign a 50 percent probability to the occurrence of another magnitude 7 or larger quake in the region during the next 50 years.

But in many places, the assumption of random occurrence with time is not true, because when strain is released along one part of the fault system, it can increase on another part.

Another way to estimate the likelihood of future earthquakes is to study how fast strain accumulates. When plate movements build the strain in rocks to a critical level, the rocks suddenly break and slip to a new position. Scientists measure how much strain accumulates along a fault segment each year, how much time passed since the last earthquake along the segment, and how much strain was released in the last earthquake. Next, they use this information to calculate the time required for the accumulating strain to build to the level which results in an earthquake.

Both of these methods, and a wide array of monitoring techniques, are being tested along part of the San Andres fault. For the past 150 years, earthquakes of about magnitude 6 occurred an average of every 22 years on the San Andreas fault near Parkfield, California and the last shock was in 1966. Because of the consistency and similarity of these earthquakes, scientists started an experiment to "capture" the next Parkfield earthquake. The main goals of the ongoing Parkfield Earthquake Prediction Experiment are to record the geophysical signals before and after the expected earthquake; to calculate a short-term prediction; and to develop effective methods of communication between earthquake scientists and community officials responsible for disaster response and mitigation. This project made important contributions to both earth science and public policy.

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KEY

Teaching points:

Present Simple and Continuous	Adverbs of frequency; prepositions of time & dates
Can - can't	*Like* + -ing; *would like* + to infinitive
Object pronouns and possessive pronouns	Comparative and superlative adjectives
Past Simple: was-were/ regular and irregular verbs	Past time expressions
Present Perfect	First and second conditionals
Be going to for future plans and intentions	Different uses of *will*

Task 1. Suggested answers:

1) The outer layer is about 70 km thick and consists of about a dozen large, irregularly shaped plates that slide over, under and past each other. The inner layer is partly molten.

2) They occur at spreading zones, transform faults and subduction zones.

3) No. At spreading zones the plates are separated by molten rocks that rise; in transform faults, the plates slide past one another and in subduction zones, one plate subducts another.

4) The earthquakes which occur at subduction zones are shallow to deep earthquakes and the earthquakes at transform faults occur at shallow depths and form linear patterns.

5) No, they can also occur within plate interiors although this kind of earthquakes is less frequent.

Task 2. Student's own answer.

Task 3. F (1906), T, F (they have observations), T.

Script - Space-Age Quake Research - 04.14.06

Narrator: I'm Jane Platt and you're listening to a podcast from JPL -- NASA's Jet Propulsion Laboratory in Pasadena, Calif.

April 18, 1906 - a massive, deadly earthquake left the city of San Francisco in shambles. One hundred years later, earthquake research has changed dramatically. Various agencies are studying quakes, including NASA and JPL, which are bringing space technology into the mix. We can't actually travel back in time to study the 1906 earthquake directly, but scientists are doing the next best thing - re-creating the earthquake inside a computer.

Glasscoe: So we're using computer models to model the 1906 earthquake and the deformation that occurred as a result of this earthquake.

Narrator: Maggi Glasscoe, a JPL geophysicist. She and her colleagues use math and physics to figure out how the Earth buckled and shifted during the 1906 quake. They try to re-create that scenario in the computer.

Glasscoe: We have a good idea of how the physics of the Earth work and we have the observations, so we try to fit our model as best we can to the observations.

Narrator: This helps them understand the forces behind earthquakes, the quake cycle, and where and how strain is building up that might lead to future quakes.

Glasscoe: This modeling project is specifically looking at the deformation associated with the 1906 earthquake, but we are also applying these computer models to look at different areas, including the Los Angeles basin.

Tasks 4 & 5. Student's own answers.

---------- **End of the test** ----------

FOLLOW-UP ACTIVITIES - Grammar Practice

A. Read this article about the Earth's faults and put the verbs in brackets in the correct form

Faults are where large blocks of the Earth's crust move past each other. At plate limits, they …….. (be) most often adhered to each other, but at times they slide several feet in a great earthquake. Living near faults is a fact of life for many Californians, but how do you recognize an active fault?

Some faults, called creeping faults, …….. (move) very slowly all the time. Structures like bridges, sidewalks, and buildings built upon these faults are balanced as the faults slowly move. You can find these faults by looking for inclined or offset borders and sidewalks. Not every different border is a fault, but if you …….. (find) several features aligned, maybe you found a fault. However, most faults …… (not creep), so geologists look for effects faults have on the landscape.

Active faults also …….. (make) their own landscape features. If one side of the fault moves up or down, it …… (create) a long, straight elevation called a "scarp." As faults move along in repeated earthquakes, the rock along the fault is broken and eroded and long valleys can form there.

In the past, faults …… (cause) both hills and valleys to form. Faults also interrupted the movement of underground water, forcing it to the surface to form springs and ponds.

Now, a lot of these features are easiest to see from the air. Our newest tool to find faults is Laser Imaging Detection And Ranging (LIDAR), which …….. (use) laser light from an airplane to make a detailed image of the ground surface that can even see through trees in a forest. Scientists think that as it is able to read the landscape, in the future, it ……. (allow) us to identify the exact location of dangerous faults.

B. Some students are talking about earthquakes and volcanoes during a coffee break at a conference in the US. Complete their conversation with a suitable word or phrase

_____: one word .....: one or more words

M: Hello, Jenny!

J: Hi, Matt! I ……. (phone) you last night to see if you were coming, but you …….. (be/ not) at home.

M: Oh, yes. My mum told me. I was **on** / **at** the library doing some research. So, what ……..…….. (you/ think) about the conference so far?

M: I think it's really interesting, **because** / **although** it gives us a lot of information. ……..……. (you/ ever see) a volcano eruption?

J: No, but I've seen many pictures and I think it's amazing! Can you recommend any documentary? I …….. (never / see) an eruption live and I think it would be really interesting.

M: Yes! It's outstanding! California's plates are really interesting. I will ask for more information and I will tell you.

J: Ok, thanks. Hey, Tom told me you had an interview at the new research center in California. ..... (you / work) there?

M: Yes! I had an interview last week. It's one of the …… centers in the United States and you can visit it for free with your student card. ……..…… (you/ want) to visit it tomorrow?

J: I _____ tomorrow. My car is broken and I have **some** / **an** appointment with the mechanic _____ 3 p.m. Can we …… (go) next week?

M: Mmmm, I …….. (check) my agenda and I will call you tomorrow. Bye!

J: Bye, see you soon!

(Find the KEY on the following page)

KEY to follow-up activities

A.

1- are
2- move/are moving
3- find
4- don't creep
5- make
6- creates
7- caused
8- uses
9- will allow

B.

1- phoned 2- weren't 3- at 4- do you think 5- because 6- Have you ever seen	7- have never seen 8- are you going to work/ will you work 9- best / most important 10- Do you want to visit 10- can't 12- an	13- at 14- go 15- will check