

Video 8B: Trenches and subduction

1) How do most geologists explain ocean trenches? Trenches occur along _____.

What is supposedly happening at these zones? _____

Why do they need water to be dragged down by the plates? _____

2) If crust is disappearing at trenches, where is appearing? _____

They call this: _____

3) Correct names for these zones:

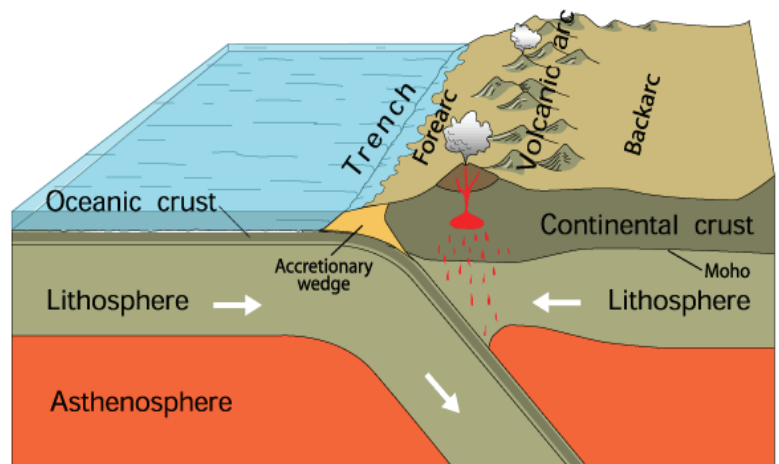
New crust coming up: _____

Old crust going down: _____

4) For earth to maintain its shape, the rate of new crust coming up must be about equal to the rate of old crust going down.

Let's check the math on this:

Miles of convergent boundaries: _____ Miles of divergent boundaries: _____



5) What is the mechanism of plate movement suggested by plate tectonic theory?

_____ in the mantle. However, the best seismic data we have tells us the mantle is _____.

Compare the theory of how plates are moving to actual data. Most of the movement is towards _____.

6) Is subduction possible at all? Here just a few problems. The complete list is much longer than this.

PROBLEM #1: Compressive strength can't be exceeded.

VIDEO LAB: What happens when you exceed compressive strength of a slab? _____

Note: This gives rise to the "push-pull" problem acknowledged by Plate Tectonics. This led to the conveyor belt theory.

PROBLEM #2: For subduction to work, the plates can't fracture when bent. (Reality: rock does fracture)

INSTANT LAB: What happens when a material's tensile strength is exceeded? _____

PROBLEM #3: According to PT, a plate must sink into something more dense than itself.

VIDEO LAB: Sheets of Styrofoam (not dense) floating on water (more dense).

PROBLEM #4: Friction-- we can calculate this. What does the math say?

VIDEO MATH LAB: (Don't worry if you don't understand the formulas. The end result is the main point.)

PROBLEM #5: The impossible geometry of subduction along arc and cusp shapes-- why no wrinkles?

INSTANT LAB: You will need a napkin or paper towel and the corner of a table. (Or you can just watch me do it.)

PROBLEM #6: They need magma to rise from the outer core. Can this happen?

What is the crossover depth of magma in the mantle? _____ How deep is the mantle? _____

(See the video lab in the supplemental activity section of this lesson for a demonstration.)

PROBLEM #7: There should be millions of years of sediments in the trenches. And what happens to all those seamounts? Do they get scraped off or do they also go down into the trench?

7) INSTANT LAB: What can cause an "arc and cusp shape"?

You can do this along with me if you have a ping pong ball, or other air-filled ball, or even the corner of a milk jug or water bottle.

8) VIDEO LAB: Can an interior force also cause something to deform?

This is the famous "can crushing experiment." The can collapses because as the steam inside cools the volume shrinks.