1. **Describe the global distribution of earthquakes and how often quakes of various magnitudes occur**

Margins of Tectonic Plates

1. **Understand the different types of faulting at different plate boundaries, and which plate boundaries produce the largest quakes**
2. **Divergent**. plates are moving apart, leading to tension or stretching. Due to the tensional forces, rocks break and many small(ish) earthquakes occur. Divergence occurs at mid-ocean ridges or spreading centres.
3. **Transform.** Here, plates move past each other, leading to shearing forces between plates. Rocks are being sheared, thus many earthquakes occur here. These are moderate to large 'quakes, but not as large as those that occur in the next 2 boundary types below.
4. **Convergent type 1**. In this and the next type, plates move toward each other and collide, leading to compression. In this type, one of the plates is less dense than the other (see examples below). Thus, one plate subducts or dives under the other at subduction zones. Rocks are compressed and extensive small to very large earthquakes occur. In fact, the largest earthquakes occur at subduction zones.
5. **Convergent type 2**. Same as in Type 1, plates move toward each other and collide, leading to compression. Here, neither plate is subducting or plunging, thus the plates crumple up like a rug being pushed together. Rocks are compressed and extensive small to very large earthquakes occur.

 **Dip-slip Faults** involve vertical motion along a slanting plane. There are two types of dip-slip faults defined in terms of the direction of motion of the *side which leans over it's neighbour*. As shown in Figure EQ.18a, **reverse faults** are those where the side leaning on its neighbour moves up. **Normal faults** are those where the side leaning on its neighbour drops down, as might be expected if gravity had it's way.

 **Strike-slip Faults** involve motion that is horizontal. There are two types of strike-slip faults, defined in terms of which direction the two sides move. If you stand with one foot on each side, either the left or the right side will appear to be coming towards you. In fact it does not matter which way you face; the sense of the motion is the same either way.

 The third fault type, **Oblique Faults**, involves motion that is a combination of the vertical and horizontal directions of motion. We will not study this type in great detail.

1. **Describe how the Earth builds, stores, and releases energy in earthquakes (elastic rebound)**

Energy stored by stress in plates, stress accumulates

Conditions affecting release: area of zone broken, strength of rocks broken, amount of motion

1. **Understand concepts of (1) stress causing strain and (2) plastic versus brittle deformation**
2. **Describe how the rupture propagates from the focus and why shaking and damage are not necessarily greatest at the epicenter**
3. **Describe the different types of seismic waves and how they move through the Earth**

Body Waves

* + Pressure Waves: particles back and forth in line
  + Secondary Waves: particles move side to side

Surface Waves

* + Travels along boundaries (not through materials)
  + Generated when P&S waves reach surface
  + Rayleigh Wave: backward rotating motion in line with direction
  + Love Wave: side to side motion

1. **Describe how an earthquake is recorded and how to locate the epicenter**
2. **Understand how local ground conditions can affect the duration and amplitude of shaking**

Harder rocks, smaller motions

1. **Compare and contrast the meanings and uses of earthquake magnitude and intensity scales**

Richter – only in SoCal

Mercalli – measures effects of earthquake from blue to red

1. **Explain the different magnitude scales, which one is best for large quakes, and why**
2. **Explain factors that determine earthquake intensity**
3. **Identify fault zones that could produce an earthquake damaging to Cascadia;**

**Describe the evidence for the Cascadia subduction zone generating large megathrust earthquakes**

1. **Understand the basics of how buildings can be designed or retrofitted to better resist earthquakes (and reduce casualties)**
2. **Be aware of how earthquakes can be the cause of other natural disasters (e.g., tsunamis, liquefaction, landslides)**
3. **Know the difference between forecasting and prediction**
4. **Explain what we can and cannot predict about large earthquakes**
5. **Make informed decisions about earthquake safety - how to act, how to prepare**