‘Geohazards Let’s Work it Out!’ ANSWERS	**Curriculum Area:** Mathematics and Statistics, **Level 3-4**	**Strand:** Number and Algebra	**Background Pages:** All
Achievement Objectives:	Use a range of additive and simple multiplicative strategies with whole numbers, fractions, decimals, and percentages. Conduct investigations using the statistical enquiry cycle: *(gathering, sorting, and displaying multivariate category and whole-number data and simple time-series data to answer questions).*		
Learning Intention:	Students will be able to solve problems and conduct statistical investigations based on the *Geohazards* virtual Field Trip.		

1. Each whole number on the Richter scale represents an earthquake that is 10 times more powerful than the preceding one. That is, a 2.0 earthquake is 10 times more powerful than a 1.0 earthquake. What number on the Richter scale is 100 times more powerful than a 2.0 earthquake?
2.0 is 10 times more powerful than 1.0. 3.0 is 10 times more powerful than 2.0, or 100 times more powerful than 1.0. Since 4.0 is 10 times more powerful than that, it is 1 000 times more powerful than a 1.0 earthquake.

2. The Alpine Fault in the South Island is a place where the Australian and Pacific tectonic plates meet on land. The blocks of land on either side of the fault do not slide past each other smoothly. Instead, they build up stress and then slip every now and then, causing large earthquakes.
Major earthquakes have happened on the Alpine Fault in about the years 1100, 1450, 1620 and 1717.

3. Work out how many years it has been between each of these earthquakes: 1100 to 1450 = 350 years 1450 to 1620 = 170 years 1620 to 1717 = 97 years

4. What is the average number of years between the earthquakes in Question 2?
350+170+97=617 years divided by three (time periods) = 206 years (rounded to the nearest year).

5. If we took the average number of years between earthquakes, when could we have expected another major earthquake on the Alpine Fault? 1717 + 206 = 1923, so the year 1923.

6. Why do you think there has not been an earthquake recently on the Alpine Fault and what do you expect to happen in the future? Answers will vary but earthquakes are unpredictable, it is likely that a large earthquake on the Alpine Fault could happen in the near future.

7. If 300 cars were damaged during ash fall after a volcanic eruption and they cost on average $1500 to repair how much would the total cost be? 300x1500=$450,000

8. A sprint running track is 100m long. Convert the following Geohazard measurements:
a). The Tarawera eruption caused a rift in the mountain, 17 kilometres long or 17 x10 =170 running tracks

b).Mount Tarawera is 1111m high, or 1100/100 = 11 running tracks high.

c). When Mount Tarawera erupted in 1886 the eruption could be heard as far away as Blenheim, over 500km away or 500 x 10 = 5,000 running tracks.

9. In New Zealand there have been about 10 tsunami higher than 5 meters since 1840. On average how many tsunami is that = 10 every 174 years so 10/174 =0.057 per year so a reasonable number would be about one every 20 years

10. Go to the Geonet website and take a look at the 10 most recent earthquakes and put them in order from the biggest to the smallest in the table. (Answers will vary)

	Date	Location	Magnitude
1. 2. 3. 4. 5. 6. 7. 8. 9. 10.			

11. Now graph these earthquakes;
(Don't forget to work out a reasonable scale for the magnitude).