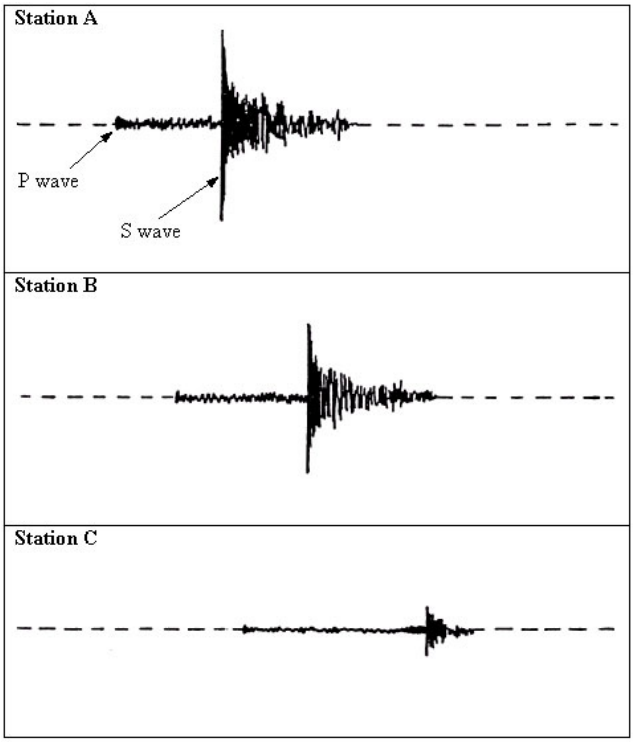
Earthquake data

This task is about using data to find out more about earthquakes.

An earthquake struck the South Island of New Zealand about 10:17 a.m. yesterday morning. Below are the seismograph records from three different recording stations; A, B, and C. (See map of the South Island for their location).



a) For each station measure (in millimetres) the distance between the beginning of the P wave and the beginning of the S wave.

Station A: distance between P and S wave = _____ mm.

Station B: distance between P and S wave = _____ mm.

Station C: distance between P and S wave = _____ mm.

b) The distance between the P and the S wave, i.e., the information from part a) can be used to calculate how far each station was from the epicentre of the earthquake. Use Table I below to work out these distances.

Table I - Relationship between time and distance between P and S waves and distance from epicentre								
Distance between P and S waves (mm)	5	10	15	21	26	30	36	41
Time between P and S waves (seconds)	4	7	10	14	17	21	24	28
Distance from epicentre (km)	25	50	75	100	125	150	175	200

i) Station A was _____ km away.

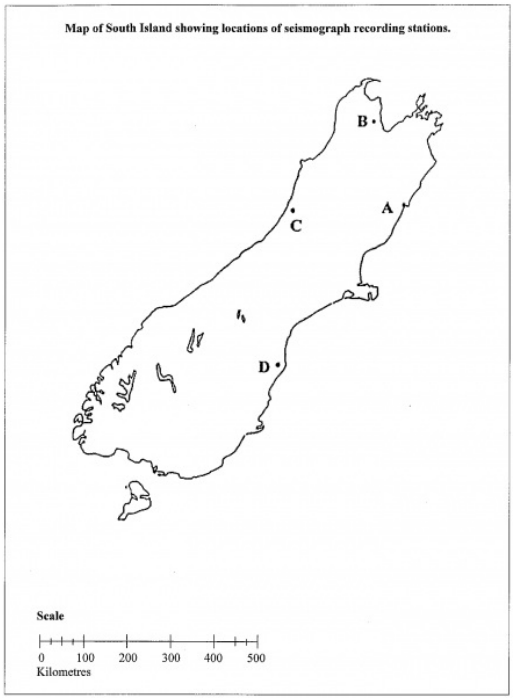
ii) Station B was _____ km away.

iii) Station C was _____ km away.

c) Use the distances you calculated in b) above, and the scale on the map of the South Island to show where the epicentre of the earthquake was located. Use a compass to find this point on the map of the South Island, then mark this point with an **X**.

d) Another seismograph recording station which is further away from the epicentre than A, B, or C is located at point D in the South Island (see map). In the space below draw a recording that could have come from this station, and label the P and S waves. Your drawing only needs to be an approximation of such a recording.

Station D



e) Use the data from **Station A** to complete the statements to calculate the magnitude of this earthquake.

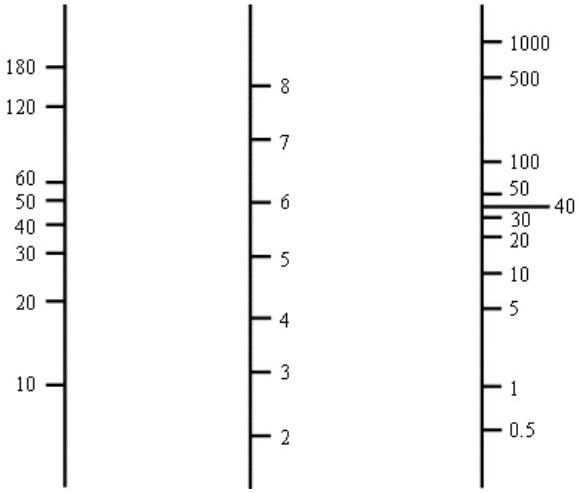
i) Use Table I to calculate the time difference between the arrival of the P and S waves for Station A.

Time difference = _____ seconds

ii) Measure the maximum amplitude of the S wave (on the seismograph record) in Station A in millimetres.

Amplitude of S wave = _____ mm

iii) On the diagram below draw a line between these two points to find the earthquake's magnitude.



S-P Interval (time difference in seconds between waves)

Magnitude

Amplitude (max height of wave in mm)

iv) What is the magnitude of this earthquake? _____