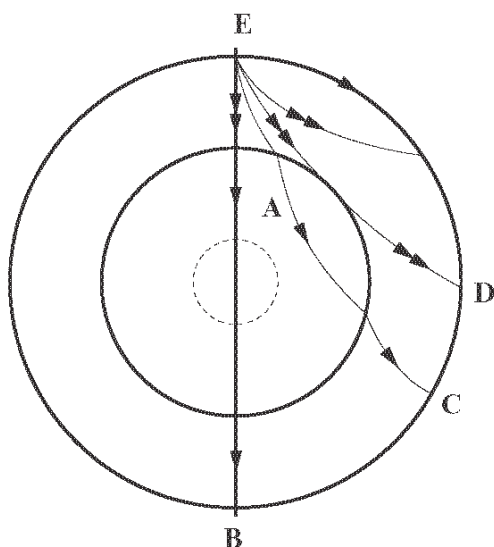


WJEC Physics GCSE
Topic 1.7: Seismic waves
Questions by topic

1.

The diagram shows how seismic waves from an earthquake at point E travel through the Earth. These waves travel through the Earth and are detected by scientists elsewhere.



(a) State which seismic waves (if any) are detected:

(i) between points B and C

[1]

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(ii) between points C and D.

[1]

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(b) Explain how the Earth's structure affects the path of the seismic wave that passes from E to A on the diagram. [4]

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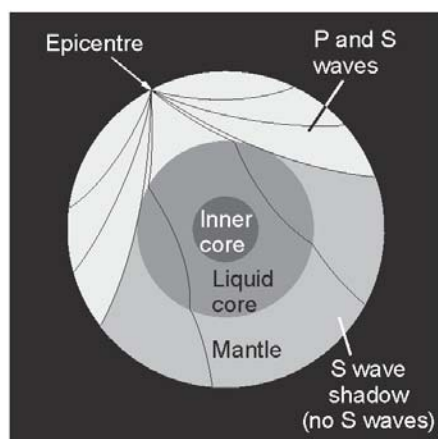
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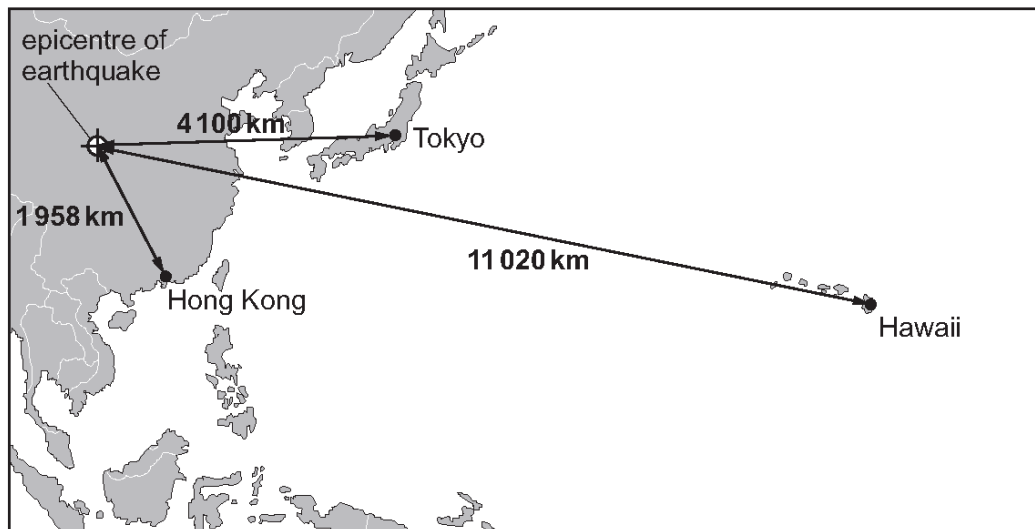
2.

Use the diagram below and your knowledge to compare the properties of seismic P waves, S waves and surface waves. [6 QWC]

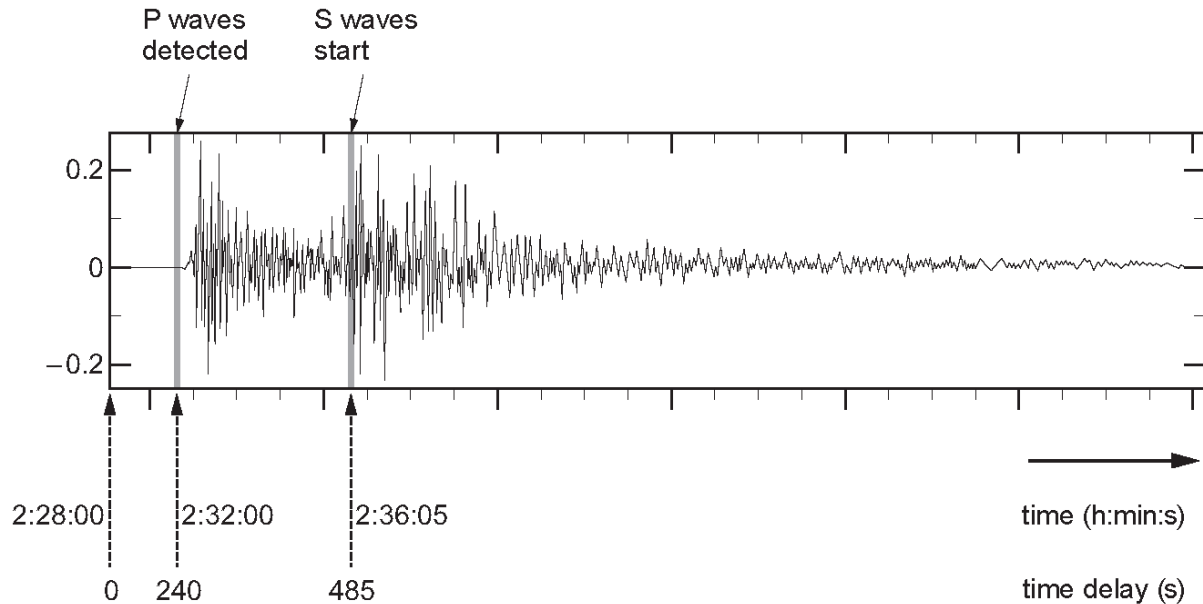
[illegible]

3.

The map below shows the epicentre of an earthquake which occurred in China at exactly 2:28 p.m. on 16 December 2013. The positions of seismic recording stations in Tokyo, Hawaii and Hong Kong are also shown. The trace produced by the Hong Kong station is shown below the map.



Hong Kong station trace



Use information from the map and the Hong Kong station trace, to answer the following questions.

- (a) Use an equation from page 2 to calculate the speed of the P waves travelling from the epicentre to Hong Kong. Give your answer in km/s. [3]

speed = km/s

- (b) Explain what similarities and differences you would expect between the Hong Kong, Hawaii and Tokyo station traces. [6 QWC]

Include in your answer:

- statements describing how the traces would be different;
- statements describing how the traces would be similar;
- calculations showing how the greater distances affect parts of the traces.

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- (c) A student calculates the speed of P waves for another earthquake in the San Francisco area and finds that it is different. Suggest a reason why this might be the case. [1]

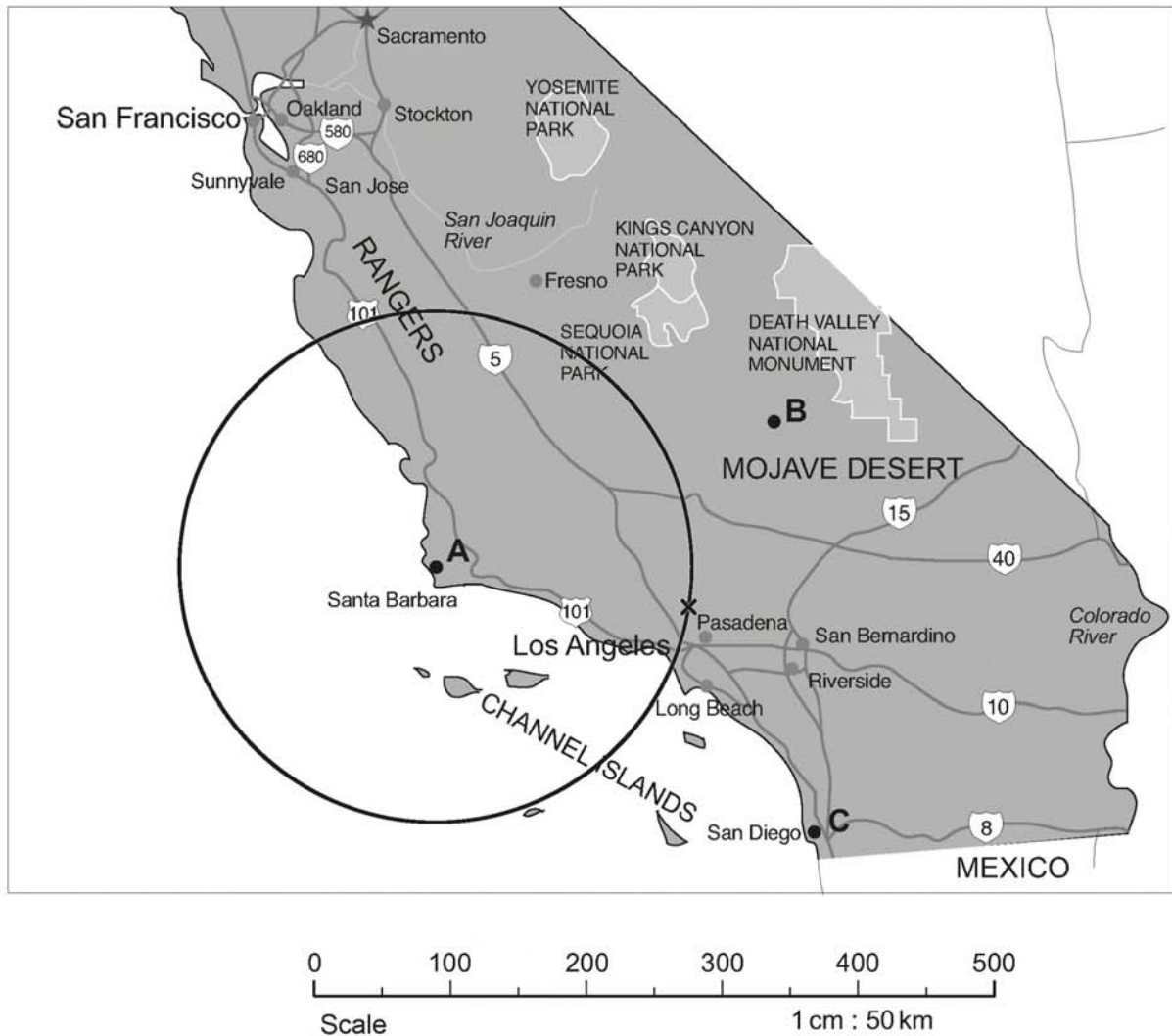
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4.

The map below shows the positions of two seismic recording stations **A** and **B** (in the American state of California). The epicentre of an earthquake lies somewhere on the circumference of the circle around **A**. Station **B** is used to locate two possible positions of the epicentre of the earthquake.



- (a) (i) The P wave arriving at station **B** took 25 s to arrive from the epicentre. The speed of the P wave was 6 km/s. Use the equation:

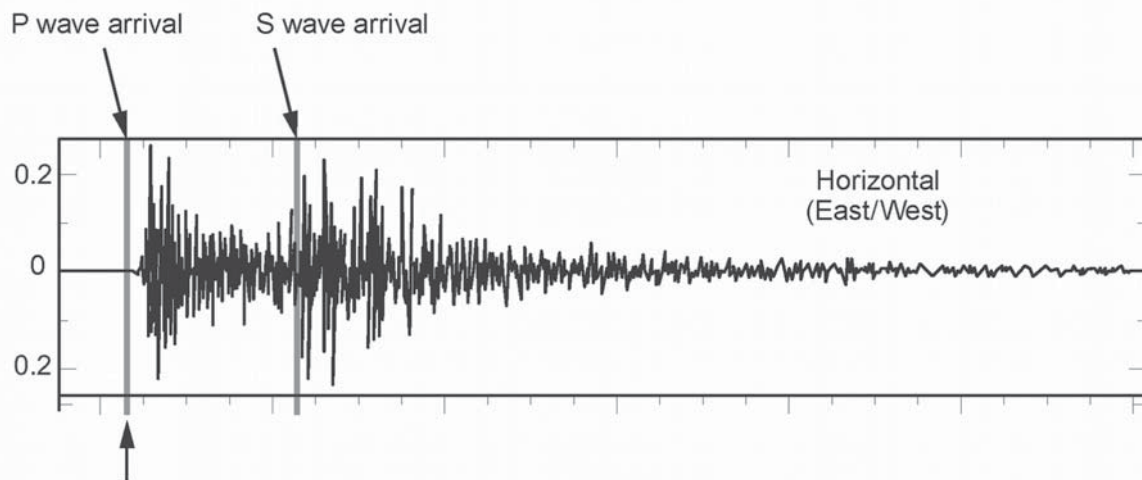
$$\text{distance} = \text{speed} \times \text{time}$$

to calculate the distance of **B** from the epicentre of the earthquake. [2]

distance = km

- (ii) One of the possible positions of the epicentre is shown with an **X** on the circle. **Mark the other possible position** of the epicentre on the circle. [1]

- (b) The record of the P and S waves arriving at station A is shown below.
The S wave arrived at station A 20s later than the P waves.



6 h 01 min 22 s – Arrival time at station A

- (i) State why the S wave arrived later than the P wave. [1]

- (ii) Fill in the gaps below.

The S wave arrived at station A at hours minutes seconds. [1]