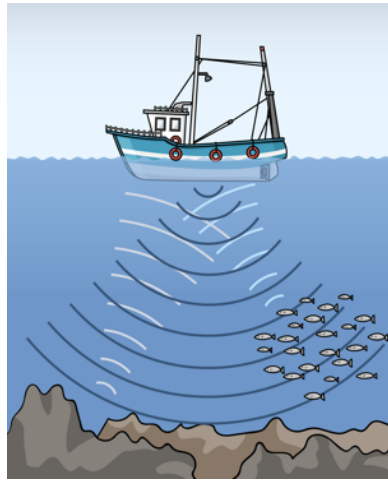
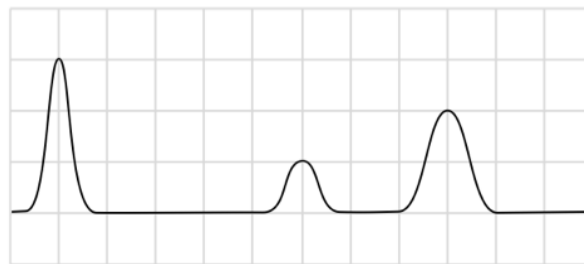


0	1
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A fishing boat is using sonar to locate a shoal of fish.



Two reflected pulses are received for each transmitted pulse, as shown on the below oscilloscope trace.



10 milliseconds per horizontal division

0	1	.	1
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On the above trace, label the transmitted pulse **T**, the pulse reflected from the fish **F**, and the pulse reflected from the sea bed **B**.

[1 mark]

0	1	.	2
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Calculate the distance of the shoal of fish from the boat. The speed of sound in water is 1500 m/s.

Distance = \_\_\_\_\_ m

[3 marks]

0	1	.	3
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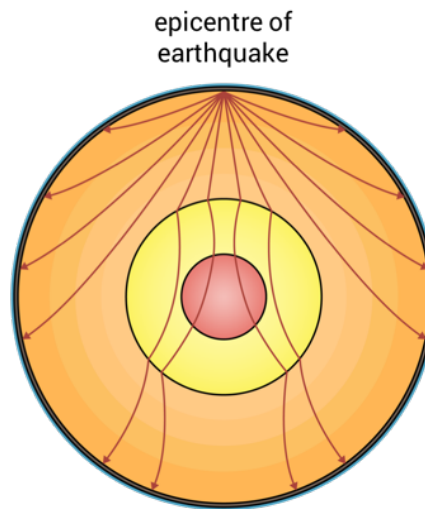
Safety guidelines state that the boat should not travel through water which is less than 7.5 m deep. **Calculate** the amount of time between the sending and receiving of a pulse which is reflected from the sea bed in water of this depth, then **sketch** the position of such a pulse on the above trace.

Distance = \_\_\_\_\_ m

[3 marks]

0 2

The below diagram shows the path of P-waves through the mantle and the outer and inner cores following an earthquake.



0 2 . 1

P-waves are longitudinal waves. Explain the meaning of the term *longitudinal wave*.

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[2 marks]

0 2 . 2

S-waves, which are transverse waves, are also produced in an earthquake. Besides the fact that one is longitudinal and one is transverse, write down one other difference between these two types of seismic waves.

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[1 mark]

0 2 . 3

On the above diagram, sketch the path through the centre of the Earth of the S-waves produced at and near the epicentre of the earthquake.

[1 mark]

0 2 . 4

Describe and explain the path taken by P-waves in the above diagram as they travel *from* the mantle *into* the outer core.

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[2 marks]