## Locating a crater

## The scenario

This activity brings together ideas from the previous activities to allow your students to play the role of the Insight scientists in trying to locate a crater as a result of a trace on the seismometer. This activity works well as a starter for the HiRISE imaging activity and allows your students to take information given to them and deduce themselves how they could work out where the impact occurred.

## The activity

Give students the information briefing sheet and the 'before' image. Explain that they need to use this themselves to work out the rough location of the impactor. This can then be checked with the powerpoint.

## Learning objectives

- loci
- properties of longitudinal and transverse waves


## Equipment needed

- information hand out
- challenge hand-outs
- ruler
- pair of compasses
- protractor
- pencil
- calculator
- how do we locate an impactor powerpoint

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## Worksheet: locating a crater

## Scenario

You are a scientist working on the Mars Insight mission analysing data from the seismometers on board. Using the information on this sheet, and the equipment provided, can you work out where the impactor hit?

## P- and S-waves

P-waves are longitudinal waves, very much like the wave you get if you push a pulse along a stretched slinky spring. P-waves are the fastest seismic waves, and the first to be experienced following an earthquake or impact.

S-waves are transverse waves, similar to the wave you get when you send a pulse down a stretched slinky spring by moving your arm from side to side. In S-waves, the particles oscillate in a perpendicular plane to the direction of propagation to the wave, in the vertical plane, horizontal plane or a combination of the two.

## S-P time



Since the P-waves will travel through the Martian ground faster than the S-waves, these will be recorded first by the seismometer. The greater the distance from Insight, the greater the delay between the arrival of the P-waves and S-waves. This allows us to form a graph to allow us to calculate the distance from the lander that the impact occurred (see right).

What we know:
The S-P time for the impact was 53 seconds.
The impact occurred at an angle of $60^{\circ}$ from west of the lander.
Can you estimate where the impact occurred?


## Keywords

- transverse
- Iongitudinal
- p-wave
- s-wave



## Circle the crater you think Insight detected

S-P time $=53$ seconds

So distance from the lander was km

Angle of impact was $60^{\circ}$ from west.


