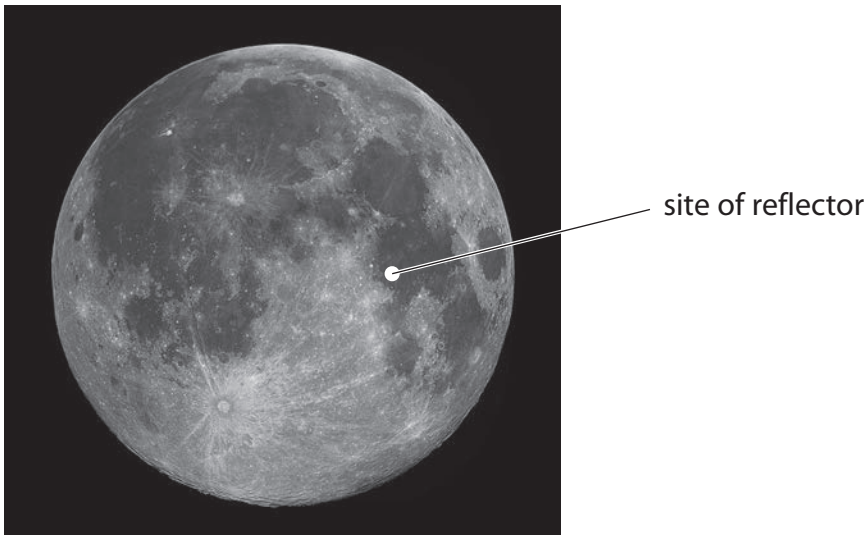
15 In 1969, astronauts left a reflector on the surface of the Moon.



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The reflector consists of mirrors at 90° to each other.

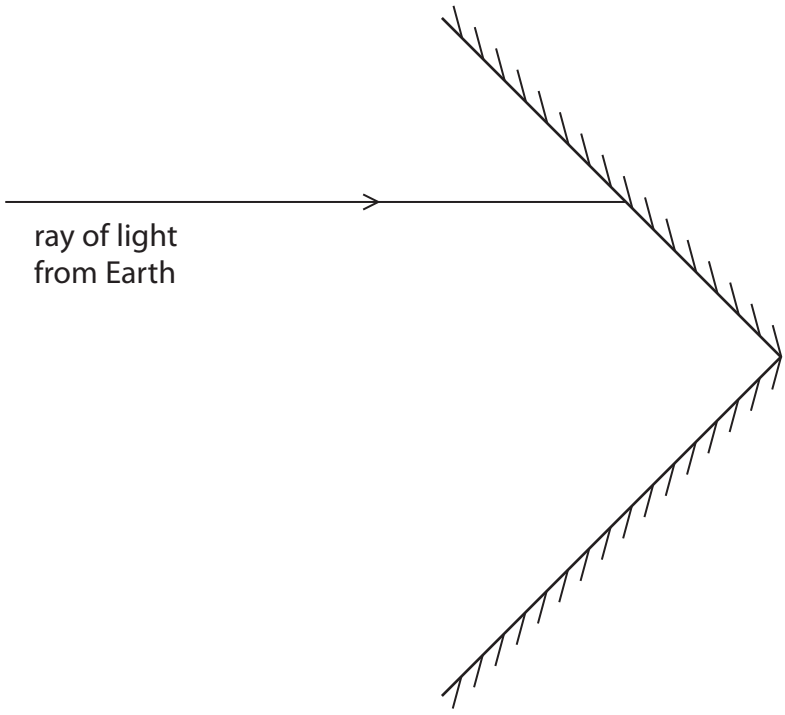
Scientists on Earth aim light from a laser at the reflector.

This light reflects back to them.

(a) The diagram shows two mirrors in the reflector.

Complete the diagram to show the path of the ray of light.

(2)



(b) The speed of light in a vacuum is 300 000 km/s.

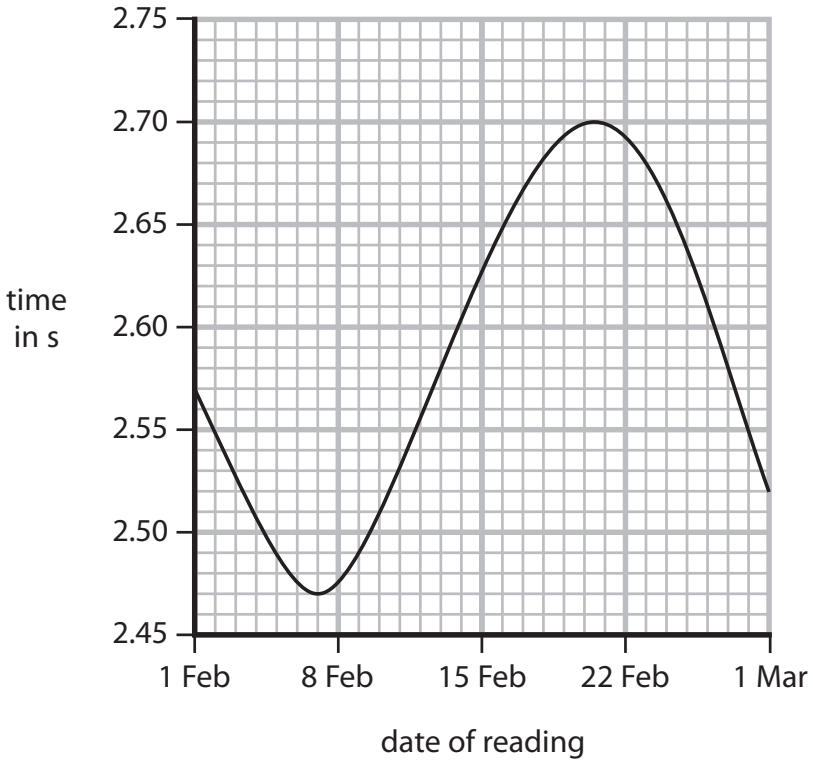
The average time for a ray of light to travel to the Moon and back is about 2.6 s.

Show that the Moon is about 400 000 km from the Earth.

(3)

(c) Scientists measure the time for the light to travel to the Moon and back very accurately, but the time is different every day.

The graph shows how these times change over the period of one month.



(i) Suggest what can be deduced about the orbit of the Moon from the information in the graph.

(3)

(ii) The scientists also discovered that the average time for light to travel to the Moon and back increases gradually every year.

What further information does this give about the orbit of the Moon?

(1)

(Total for Question 15 = 9 marks)

TOTAL FOR PAPER = 120 MARKS