AQA A-LEVEL PHYSICS · 7408

PHYSICS



EXAM QUESTION PACK

3.9.1 TELESCOPES: RADIO

SCORE	PERCENTAGE
/10	%

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Q1.

(a) The table summarises some of the properties of Vesta, one of the largest objects in the asteroid belt between Mars and Jupiter.

Diameter / m	Distance from the Sun / AU	
	smallest	largest
5.4×10^5	2.15	2.57

(i) Calculate the largest possible distance, in m, between the Earth and Vesta.

distance = _____ m

(2)

(ii) Show that when Vesta is at a distance of 1.73×10^{11}d m from Earth, the angle subtended by Vesta to an observer on Earth is about 3×10^{-6} radian.

(2)

(b) Observations of Vesta have been made by the Infrared Telescope Facility (IRTF) in Hawaii.

(i) Draw a ray diagram for a Cassegrain telescope.

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(2)

(ii) The IRTF includes a camera capable of detecting infrared radiation with wavelengths in the range 1.0 μm to 5.0 μm.

The smallest angle the telescope can resolve is 3.3×10^{-7} radian.

Calculate the diameter of the objective of the telescope.
Give your answer to a suitable number of significant figures.

diameter of objective = _____ m

(2)

(c) Discuss the level of detail the IRTF would be able to detect on the surface of Vesta, when Vesta is 1.73×10^{11} m from Earth.

_____

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_____

(2)

(Total 10 marks)

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