

EXAM ANSWERS

Chapter 6.5 - Energy & Momentum

Answer 1 2014:1:4

(3 marks)

A space probe travels along a line from the Earth to Uranus at a constant speed of $0.95c$ relative to the solar system. Just as it reaches midway between the two planets, it sends laser beams out to the Earth and Uranus at the same time. What speed do the laser beams approach the Earth and Uranus, respectively?

Speed of laser beam approaching the Earth: _____

Speed of laser beam approaching Uranus: _____

To an observer on Uranus, will the light from the space probe appear red shifted, or blue shifted? Circle the correct answer.

Description	Marks
c or $3 \times 10^8 \text{ m s}^{-1}$	1
c or $3 \times 10^8 \text{ m s}^{-1}$	1
Blue shifted	1
Total	3

Answer 2 2014:1:8

(3 marks)

Describe briefly the relationship between the mass and energy of an accelerating object as its speed approaches, but cannot exceed, the speed of light in vacuum, c .

Description	Marks
Energy and mass are related, $E=mc^2$	1
An object increases in mass as it is accelerated (gains energy)	1
This will limit the speed of an object as its mass becomes very large as it approaches the speed of light	1
Total	3