

Question Number	Answer	Mark
16(a)(i)	<p>Redshift is the (fractional) increase in the wavelength received (1)</p> <p>Due to the source of radiation moving away from the observer (1)</p> <p>[Accept answers in terms of frequency]</p>	(2)
16(a)(ii)	<p>Use of <math>z = \frac{v}{c}</math> (1)</p> <p>Use of <math>v = H_0 d</math> (1)</p> <p><math>d = 2.9 \times 10^{24} \text{ m}</math> (1)</p> <p><u>Example of calculation</u></p> <p><math>v = 0.0158 \times 3.00 \times 10^8 \text{ m s}^{-1} = 4.74 \times 10^6 \text{ m s}^{-1}</math></p> <p><math>d = \frac{4.74 \times 10^6 \text{ m s}^{-1}}{1.62 \times 10^{-18} \text{ s}^{-1}} = 2.93 \times 10^{24} \text{ m}</math></p>	(3)
16(b)	<p>The force between the galaxies obeys the inverse square law</p> <p><b>Or</b> <math>F = \frac{G m_1 m_2}{r^2}</math> <b>Or</b> <math>F \propto \frac{1}{r^2}</math> (1)</p> <p><math>F = ma</math>, so as the (resultant) force increases, so does the acceleration (1)</p>	(2)
	<b>Total for Question 16</b>	<b>7</b>