Our Dynamic Universe

Hubble constant = 2.34 x 10⁻¹⁸ s⁻¹

$$\text{Hubble constant} = 2.34 \times 10^{-18} \text{ s}^{-1}$$

1) A galaxy has a recessional velocity of 4.0×10^7 m s⁻¹. Using Hubble's law equation, determine the distance the galaxy is away from Earth.　　　　　　[1.71×10^{25} m]

2) A galaxy is 5.0×10^{25} m away from Earth. Use Hubble's law equation to determine the recessional velocity of the galaxy.　　　　　　[1.2×10^6 m s⁻¹]

3) By observing the redshift of a galaxy the distance to the galaxy is determined to be 1.4×10^{22} m away from Earth.

 a) Explain what is meant by redshift of the galaxy.
 b) Use Hubble's law equation to determine the recessional velocity of the galaxy.
 　　　　　　　　　　　　　　　　　　　　　　　　　[33 km s⁻¹]

4) A spectral absorption line from an element studied in a lab on Earth has a wavelength of 400.0 nm. The same spectral absorption line has a wavelength of 400.4 nm when viewed on a distant galaxy.

 a) Find the z shift ratio of this spectral line.　　　　　　　[1×10^{-3}]
 b) Using the redshift ratio find the recessional velocity
 　of the galaxy.　　　　　　　　　　　　　　　　[3×10^5 m s⁻¹]
 c) Determine the distance of the galaxy from Earth.　　[1.3×10^{23} m]

5) During a lecture by Prof. Brian Cox on the hubble constant, he quotes the hubble constant as :
 42 miles per second / 3 million light years.

 a) Explain what this number means.
 b) Why does he use the analogy of raisins being baked in bread to help us understand the expanding universe?
 c) A galaxy is at a distance of 9 million light years from Earth. What would the recessional velocity of the galaxy.

https://goo.gl/18od7k

6) A graph is drawn of the distance in megaparsecs to a galaxy against the speed of that galaxy measured in kilometers per second.
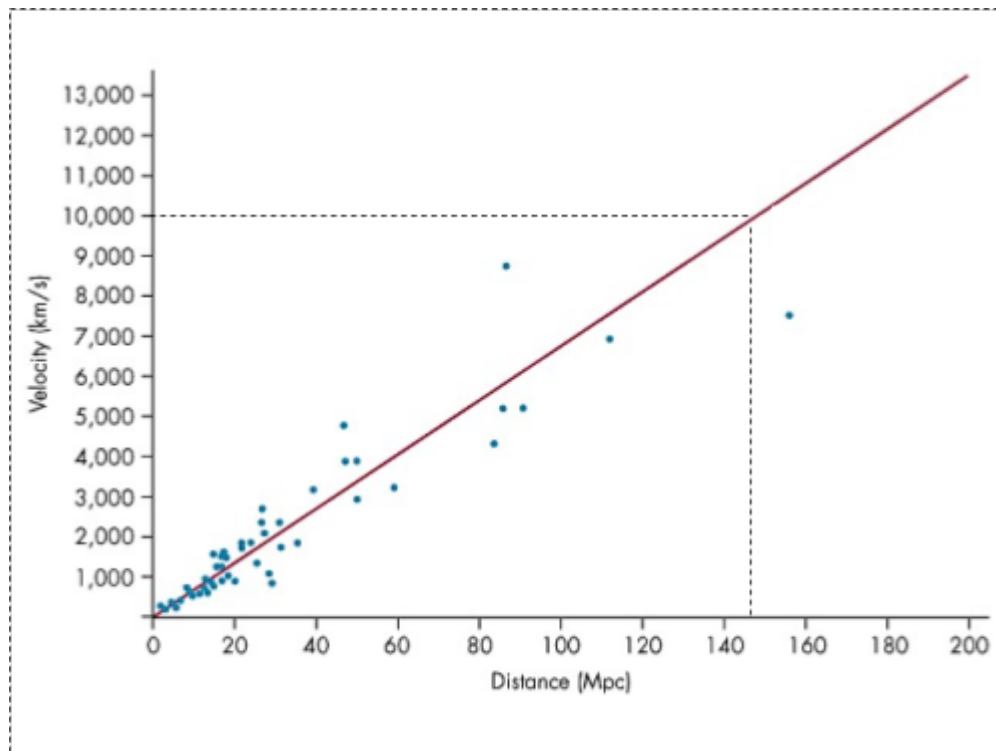
a) Using your knowledge of physics explain what the graph is showing us about distant galaxies.

b) Determine the gradient of the graph in units of km per second per Mpc.

c) A galaxy is measured to be 300 Mpc away. Find its recessional velocity.

7) The best modern day value of the Hubble constant, H_O, is given as 72 km s^{-1} Mpc^{-1}
Copy and complete these sentences about the Hubble Constant:

a) According to the best value of the Hubble constant, a galaxy at a distance of 1 Mpc will have a recessional velocity of _____ km s^{-1}

b) Using the same value of the Hubble constant a galaxy at a distance of 4 Mpc will have a recessional velocity of _____ km s^{-1}

c) The recessional velocity of a galaxy is measured to be 36 km s^{-1}
This galaxy is at a distance of _____ Mpc away from us.

d) The recessional velocity of a galaxy is measured to be 8 km s^{-1}
The galaxy is at a distance of _____ Mpc away from us.