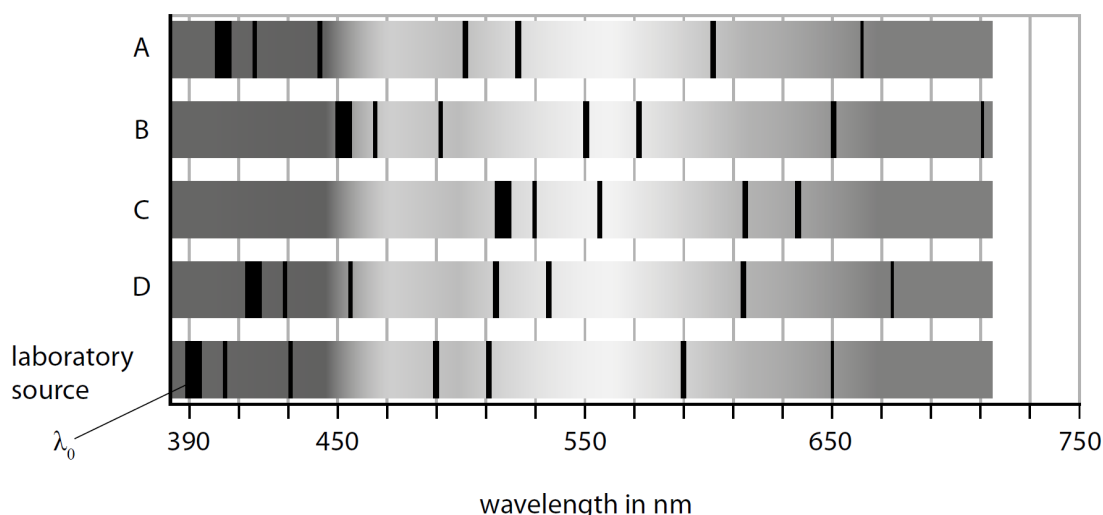


Name:

Class:



The figure below shows some lines in the absorption spectra from four different galaxies (A, B, C, and D) and from a laboratory source. All the spectra are aligned and to scale.



i. Explain, using the figure, which galaxy is furthest away from us.

An explanation to include two of the following:

- Galaxy C has the greatest red shift.
- So this galaxy has the greatest speed.
- Since the galaxy with the greatest speed will be furthest away, then galaxy C is at the furthest distance.

ii. Calculate the speed, v , of galaxy D. Use the equation:

$$v = \frac{(3.0 \times 10^8) \times (20 \times 10^{-9})}{390 \times 10^{-9}}$$

$$= 15\,400\,000 \text{ (m/s)}$$

Speed = **15 400 000 (m/s)**

A car accelerates at a constant rate of 1.83 m/s^2 along a flat straight road.

i. The force acting on the car is 1.870 kN. Calculate the mass of the car.

Give your answer to three significant figures.

$$M = f \div a$$

$$M = 1870 \div 1.83$$

mass = **1020 kg**

ii. The car accelerates from rest for 16 s. Calculate the speed of the car after 16 s.

$$v = u + at$$

$$v = 0 + 1.83 \times 16$$

Speed = **29.3 (m/s)**