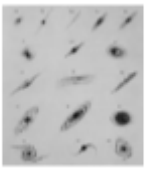
Our Dynamic Universe

The Universe



1) Assuming the universe has been expanding at a constant rate, use Hubble's Law to determine the approximate age of the universe.

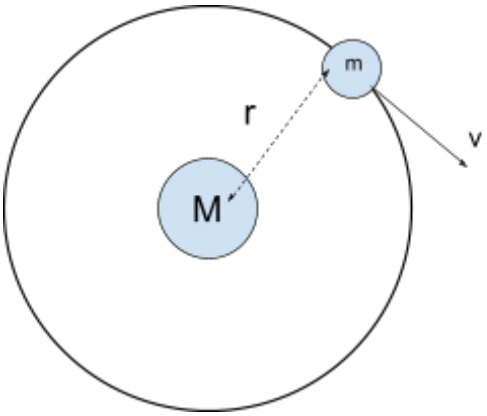
2) What is the term that describes the beginning of the inflation of the universe?

3) Explain why baking raisin bread is a good model to describe why we see all distant galaxies move away from us even though we are not at the centre of the universe?

4) How long after the big bang did stars and galaxies form?

5) The equation that describes the force needed to keep an object of mass m travelling with a velocity v in circle of radius r is given by $F = \frac{mv^2}{r}$

If this force is equal to the force of gravitation $F = \frac{GMm}{r^2}$ then find an equation for the speed v of the object at a distance r from a larger mass M.



6) Explain why it is necessary to state that a galaxy must contain ***dark matter***.
In your explanation include the research of Vera Rubin.

7) Which one of these statements is true:
   i) The universe is expanding at a constant rate and is heating up.
   ii) The rate of expansion of the universe is slowing down and it is cooling down
   iii) The rate of expansion of the universe is increasing while it is cooling down.

8) Describe how astrophysicists can `see' dark matter.

9) The expansion rate of the universe should be slowing down due to the force of gravity between the galaxies. The universe's expansion rate is actually increasing. What do astrophysicists hypothesise is increasing the expansion rate?

10) Which of these statements correctly describes the makeup of our universe:

i) matter 4% , dark matter 22%, dark energy 74%
ii) matter 22%, dark matter 22%, dark energy 74%
iii) matter 33%, dark matter 33%, dark energy 33%

11) Dark matter cannot be `seen' by any of our electromagnetic detectors.
It is observed indirectly. One method is by ***gravitational lenses***.
Explain using the model of light passing through a glass of water how areas of dark matter can be detected.

12)